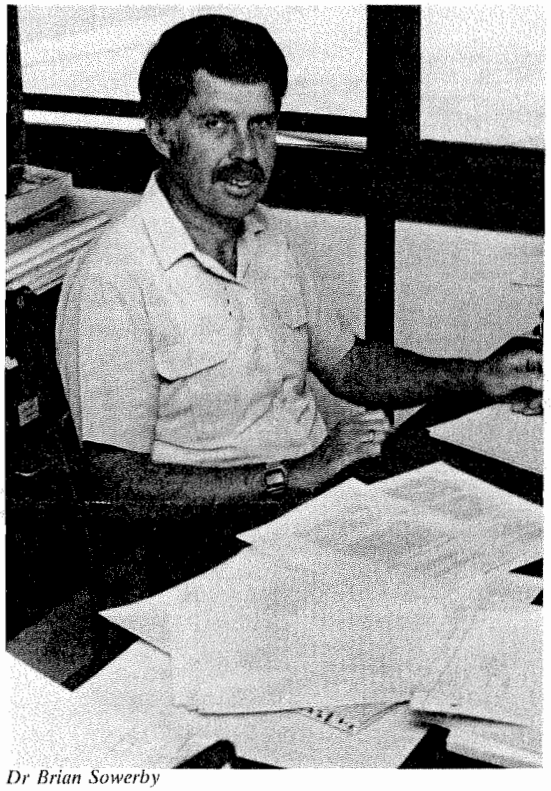
CoResearch
CSIRO's staff newspaper
No. 287 December '85 — January '86

Mineral Engineering scientist wins inaugural McLennan medal



Dr Brian Sowerby

The highly-successful transfer of an innovative coal analysis system has won CSIRO scientist Dr Brian Sowerby the inaugural Sir Ian McLennan Achievement for Industry Award.

Outstanding research of benefit to the wider community was the major criterion for the award, which was instituted this year by the CSIRO Advisory Council, and presented at a ceremony on 3 December in Sydney.

Dr Sowerby, a senior principal research scientist, is with the Division of Mineral Engineering's Lucas Heights laboratory.

His Coalscan instrument offers a revolutionary new way of analysing the 'dirt', or ash, content of coal.

These measurements are critical in monitoring the washing and grading of coals to ensure minimum wastage and product of consistent quality. This is particularly important when coal is exported, as heavy penalties apply if contractual specifications are broken.

Coalscan is now in operation in many of Australia's largest coal mines and the use of the instrument is still spreading. The instrument has made a major contribution to the market success of Adelaide-based company Mineral Control Instrumentation Pty Ltd, which has generated sales exceeding $2.5 million.

Export prospects

It was recently installed overseas for the first time' and export prospects are excellent.

In honouring Dr Sowerby, the judging panel noted that his achievement had benefited two industries — the mining and manufacturing sectors.

*The award was named in honour of eminent Australian businessman Sir Ian McLennan (see *CoResearch* No. 285, October'85).

Despite some reservations....

ASTEC report welcomed by Chairman

CSIRO Chairman Dr Keith Boardman has welcomed many of the findings of the Australian Science and Technology Council's report on CSIRO.

However, he criticized a key recommendation which, if accepted, would have CSIRO run by an eight-member board on which the Organization would have only one representative — a chief executive officer appointed by the board.

Despite his reservations, Dr Boardman said the ASTEC report provided CSIRO with both 'a clear charter and a challenge'.

'If adopted, the report will give us the flexibility we need to respond most effectively to changing national priorities and, at the same time, a degree of continuity and stability.

'All are crucial for a research organization like CSIRO.'

The Organization particularly endorsed recommendations that:

- CSIRO continue to concentrate on longer term, more broadly applicable research, balanced by an emphasis on shorter term, more directly applicable research;
- it make a firm commitment to transfer results to users;
- it undertake more contract research for industry;
- it be able to retain income from contract research, licences and other sources;
- personnel management policies be made more flexible.

Dr Boardman is now 'vigorously' presenting his contrary views on the proposed ABC-style management structure to the Federal Government.

While agreeing with the report that the Organization needs to clearly separate policy and management roles, Dr Boardman also said top management should be involved in, and so committed to, policy decision making.

This was in line with modern management practice, he said.

'We believe, therefore, that CSIRO should have more than one representative on the proposed board, and that the Chief Executive, because of his crucial policy and leadership role, should be appointed by Cabinet and not be a mere servant of the board.

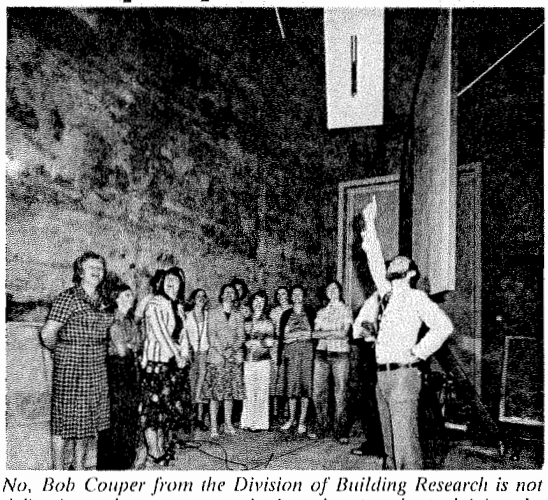
'This is essential for maintaining the partnership between scientists and users which has characterized CSIRO's success over many years.'

*Dr Boardman's comments appear in full in his column over the page. All the ASTEC report summary and recommendations are reproduced on pp. 7 and 8.

The second ASTEC report (tabled at the same time as the CSIRO report), dealing with the broader issues of Government funded research and development in Australia, will be outlined in the February issue of *CoResearch*. Because of the space devoted to the ASTEC report, regular features such as the EEO column, A Matter of Opinion, On the Record and Tech Talk have been held over until next year.

The Federal Government commissioned the report into CSIRO in May this year, and it was tabled in Parliament on Wednesday, 27 November. It's eight years since the last major review of CSIRO — the Birch report. When framing the terms of reference, it became clear that the role of CSIRO should not be seen in isolation but as part of the overall policy of government development, and the Government decided to make the review of the Organization part of a wider study. ASTEC was asked to address the general question of the rationale for government involvement in research and development and to apply its findings first to CSIRO and then other publicly-funded research organizations. ASTEC was also asked to examine the reason for the disappointingly low level of research and development in the private sector and to suggest ways by which it could be increased.

Couper points the way



No, Bob Couper from the Division of Building Research is not delivering a lecture on creationism, but merely explaining the acoustic workings of DBR's reverberation chamber to a visiting group of librarians. For a run-down on other Building Research activities, see pp. 3–6. (Incidentally, views on creationism are also aired in this issue. Turn to p.2).

Dear Editor,
I am writing concerning CREATIONISM. My belief is that the earth was created by God in six periods of 1000 years' length (a day with God is 1000 years with man).

Conventional wisdom, as espoused by Darwin and his mentor, Charles Lyell, is that the earth and life in all its forms came about by accident and slow change. There is an abundance of evidence to demonstrate that extinction of life forms has occurred through catastrophe. There is none better than the extinction of the mammoths in Siberia. Their death and preservation came about so quickly that their flesh is still edible, thousands of years later. Undigested grass found in them no longer grows in the area, but grows thousands of kilometres to the south.

Coal is often used as an example of the product of slow change, formed well before the advent of man. A gold chain, an iron pot and a spoon have been found in different coal deposits. These deposits must have therefore been formed within the time of civilised man. Recently coal has been formed artificially in the laboratory in one year (*Nature* v.314, p.316, 28 Mar 1985).

One requirement of the theory of evolution is that there be a new species and missing links between species. Where are the missing links? Where are the fertile new species?

Consider the perfect organization of the human body. That this should result from a series of accidents to the amoeba defies imagination. We can just as well expect a dictionary to result from a series of accidents to a pile of letters. To create order out of disorder requires a guiding intelligence.

There is a creator. He did create the earth and all life forms in it.

Ronald H Hill
Division of Atmospheric Research

Dear Editor,
Invariably spawned from the USA, fundamentalist Christian groups and organizations such as the Brisbane-based Creation Science Foundation Ltd fight a never ending battle against truth, honesty and the scientific method! Does that sound a bit reactionary? Be in no doubt of mind. The advocates of equal time for creation science and evolution in the school curricula are not just a few religious zealots indulging in a Don Quixote activity against the windmill of science. They are well organized, produce attractive, multicoloured publications (CSIRO could learn from them) and have already succeeded in equal time in the Queensland Government secondary school system. In their own so-called Christian schools no equal time is to be found — no normal biology or other life and natural sciences are taught. Any science (eg. cosmology, physics, chemistry, biology, geology, etc) that contradicts in any way the literal fundamentalist beliefs is dismissed as wrong or is portrayed as a series of lies designed to 'prop-up' evolution.

The targets of these anti-science groups are children and the uninformed. Their theology is simplistic and rejected by most mainstream Christian churches. And yet no major science organization or Christian church in Australia has publicly contradicted this bizarre movement. All scientists should be aware of their responsibilities (see *CoResearch* No. 286, p. 12) to counteract this insidious anti-science movement in our society.

N.W. Archbold
CSIRO Geomechanics

CoResearch ***has received a number of thought-provoking letters on this month's special subject, creationism. Unfortunately it's not possible to publish them all in this issue, and some have been held over for early next year.***

Our special comment section for the February issue of **CoResearch** ***is, not surprisingly, the ASTEC report. Because of space restrictions we must ask correspondents to limit their letters to between 150 and 200 words. The deadline is Monday, 27 January.***

Dear Editor,
Creationism, as understood as a virtually literal interpretation of the early chapters of Genesis, is unacceptable on both scientific and religious grounds.

With the former, the empirical method of science is subjugated to a putatively infallible written document; with the latter, the purpose and significance of the passages are misconstrued.

Yet, while Darwinian evolution, including its later developments, may doubtless be adequate for small-scale variations such as colour changes, it is not without difficulties for large-scale changes such as the development of wings, or the complex, reciprocal actions of different species mutually assisting each other's fertilization processes.

Despite the disparaging of the old 'argument from design' (Paley's watch etc.), and despite efforts to exclude teleological considerations from normal scientific practice, indications of directive, purposive activity still obtrude. Hence, one finds, for example, H. Bergson's 'creative evolution', and G.B. Shaw's life-force, as expounded in the Preface of "Back to Methuselah", and hence the typical Shavian question: 'Are we really to believe that a pondful of amoebas evolved into the French Academy?'

Indeed, even Hume and Kant, prominent as drastic critics of the argument from design, still admitted to a fascination with it.

Evolution, as well as its strictly scientific aspect, also raises issues of overall philosophy or world-view, and the two connotations are often intertwined.

At least creationism should challenge us to acknowledge that there are certain fundamental questions (eg. the nature and destiny of man — sorry, humanity) that should not be casually swept under the carpet.

Geoff Forster
CILES

Dear Editor,
The creationism dispute is between a very small group who claim to be scientific and religious and the vast majority of both scientists and churches.

From the article in *Science*, Feb 19 1982, it's clear that it was officials of the Methodist, Episcopalian, Roman Catholic, Presbyterian and Southern Baptist churches together with Jewish and educational bodies that successfully challenged the 'Balanced Treatment of Creation Science...' Act in Arkansas in 1981.

Liz Burden's implication [in a note to division communicators] that 'creationism' is being taught in church schools probably relies on a report that the creationists have one small school in Queensland.

Liz asks if it is fair to use religious beliefs to dispute scientific theories (of evolution) without using scientific principles to question religious beliefs. Either activity is fair; both may be unprofitable. Belief in science (order in the physical world) and belief in religion (order in the moral-spiritual-ethical world) may be compatible or imcompatible depending on particular beliefs.

Few take the doctrine of the trinity as a definition of three, or trans-substantiation as a chemical statement. But much 'science' is accepted by faith. Try asking people to explain, without quoting authority, their beliefs in quantum mechanics, general relativity or the electron.

I believe science (and true religion) has more to fear from the many who give credence to astrology than from the few who believe in creationism.

John H Taplin
Division of Minerals and Geochemistry

Dear Editor,
Might I suggest that those who have a view supporting Creationism are likely not to want an instant lottery ticket.

Greg Davis
Research Scientist
Division of Groundwater Research

From the Chairman

A column by Dr Keith Boardman

I am writing this column the day after I received from the Department of The Prime Minister and Cabinet copies of the ASTEC reports. The reports provide strong reasons for the funding and performance of R&D by government, but stress the imbalance in Australia between the level of performance and the distribution of funding between the public and private sectors.

I was pleased to learn that ASTEC has reaffirmed the advantages of a large multidisciplinary statutory authority, particularly one with the reputation and prestige of CSIRO, for the conduct of applications oriented research of the longer term and broadly applicable nature. The main role of CSIRO as recommended by the Birch inquiry and adopted by the Government in 1978 is confirmed, but ASTEC recommends that greater efforts be directed to interactions with the end-users or potential end-users of our research and to ensuring the effective transfer of the research results. ASTEC believes that CSIRO's research should be directed primarily towards the technological development of Australian industries. It recommends that the longer term studies should appropriately be balanced by shorter term more directly applicable activities. I have no quarrel with this view, but I would be concerned if there was too much emphasis on specific short-term projects at the expense of the longer-term and broadly applicable studies, particularly if this meant transferring a substantial proportion of appropriation funds from strategic research to short term tactical research for particular firms. On the other hand, I strongly support the view that divisions should actively seek support from industry for the tactical end of the research spectrum, and applaud the ASTEC recommendation that these additional funds, as well as the earnings from the commercialization of CSIRO's research, should not be used to reduce the level of appropriation funding.

It is vital that we have a balanced effort which maintains our research at the cutting edge of science and technology, but ensures that the research is being applied for the benefit of all industry sectors and the community. ASTEC acknowledges that pure basic research is an appropriate activity for CSIRO provided it is integrated into our total program of work and is directed towards our major objectives. It questions whether research groups conducting pure basic research not linked to our major objectives should remain in the Organization.

I believe the initiatives introduced by the Organization during the past two years demonstrate that CSIRO is already well down the track in implementing many of the ASTEC recommendations. The formation of divisional advisory groups, the expanded criteria for promotion, the introduction of formal corporate planning, the formation of Sirotech and the introduction of the CSIRO Manufacturing Industry Collaborative Program and the CSIRO-universities joint research schemes are some of those initiatives. They are intended to improve our interactions with end users as well as other research performers and lead to greater commercialization of our research results.

It is surprising, therefore, that ASTEC has seen fit to recommend a major change in the top organization structure to an ABC-type structure. I strongly put the view to ASTEC that the proposed structure is contrary to the corporate culture of the Organization and it could even jeopardize the implementation of the recommendations of the ASTEC report and inhibit CSIRO from playing an important and vital role in fostering the development of major industry sectors, including new industries.

I see a potential for conflict between the Organization and an essentially outside board, although I realize that much depends on the individuals appointed. The tremendous co-operative effort which has prevailed in the past with a governing board consisting of a mixture of part-time and full-time members will be lost. I believe decisions on the objectives of the Organization and the setting of broad priorities requires a blend of internal and external inputs and this blend should be reflected in the composition of the governing body of the Organization. Modern philosophies of management emphasize the importance of integrating policy-making and implementation, and progressive companies have boards which consist of a mixture of non-executive and executive directors. Many Australian companies, particularly those with some involvement in high-technology have moved in this direction, and a brief survey I had carried out of the composition of boards of some 'hi-tech' companies in the USA showed all have more than one executive director on their boards. Many of the companies have a full-time Chairman/Chief Executive. It seems the board structure proposed by ASTEC could be considered old-fashioned even for private companies.

A Chief Executive of CSIRO appointed and dismissable by a board drawn from outside the Organization rather than by the Executive Council of Government would not have the status of the present Chairman/Chief Executive. I believe a board

DBR — Where to from here?

The question on the minds of most staff at the Division of Building Research is whether they will still be CSIRO employees this time next year.

If they have their way in this age of industrial democracy, then the answer will be a resounding YES.

The possibility of the Division being hived off and amalgamated with the National Building Technology Centre (formerly the Experimental Building Station) was raised in February this year.

Now it seems likely that a move of this kind will be recommended by the Building Research and Development Advisory Committee (BRDAC) early next year.

DBR Chief Dr Lex Blakey is rather sceptical about the motives for such a proposal.

'BRDAC has been led by the Department of Housing and Construction to believe that there would be "improved co-ordination",' he said.

'What is meant by improved co-ordination has never been spelled out. There have never been any examples given of lack of co-ordination or of ways which we have failed to respond to Government requests.'

BRDAC's expected recommendation to the Government to take Building Research out of CSIRO is wholeheartedly opposed by Dr Blakey but official opposition to the move within BRDAC is difficult.

The Division was eliminated from formal participation in BRDAC decisions in a reorganization two years ago, despite an association dating back about 40 years.

In the past, a member of the CSIRO Executive or Institute Director, as well as the DBR Chief, sat on the Committee. Now, Dr Blakey attends meetings as an observer only.

'This means there's no way of recording the fact that there's an alternative view to the one the committee has accepted,' said Dr Blakey.

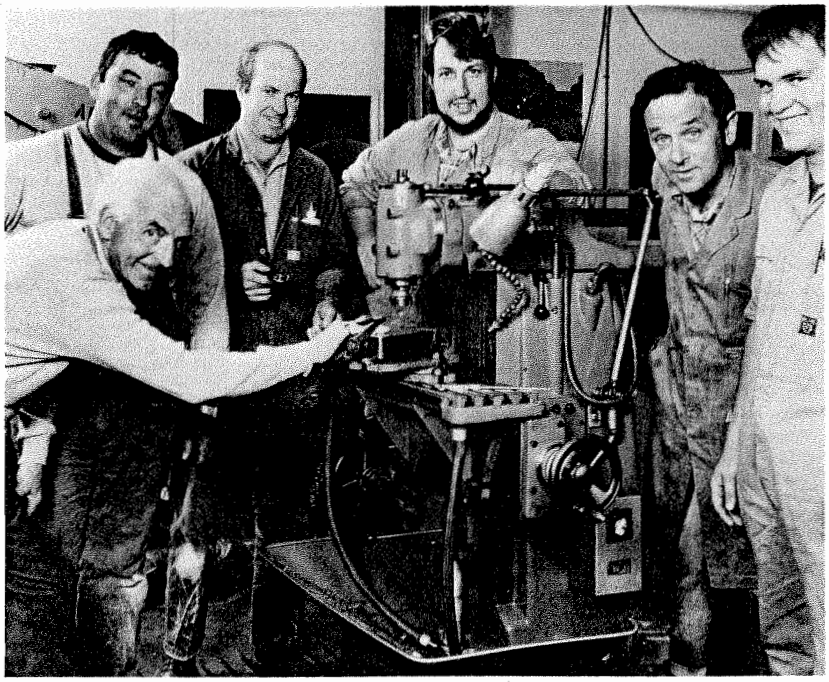
Perhaps the greatest fear Dr Blakey and many of his staff have is the possibility of a swing towards short-term trouble shooting and away from broader research.

'There would probably cease to be any effective long-term consideration of the needs of the industry,' he said.

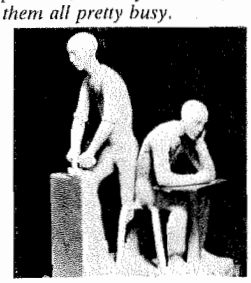
'It would become very much an *ad hoc* response to day-to-day requirements.

'The thing which is needed more than anything is effective anticipation of the needs of industry. That would be impossible if the Organization was directly under Government control,' said Dr Blakey.

'That was the tenor of the Housing and Construction submission to the ASTEC review — that priorities would be set by Government.'



Some of the workshop 'boys'. From left to right, Jim Wilson, Ron Peacock, Gary Hannan, Mark Watkins, Ron Maxted and David Dennis. Belfast-born Jim Wilson, who has spent 14 years with CSIRO, is the head of the workshop. Machine, sheet metal, welding, plumbing, refrigeration, carpenters and painters shops, as well as the tool room, fall under his jurisdiction. At present, one of the projects underway is the construction of a machine which makes charcoal from sawdust (not pictured). At any one time, three or four major projects are on the drawing board, said Jim. Keeps them all pretty busy.



The Division's motto: 'The End is to Build Well'

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This feature is designed to present a cross-section of activities at the Division of Building Research and is not intended as a directory to the Division's research.

The next Division feature (in the February issue of *CoResearch*) will be Atmospheric Research.

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'We are, in effect, helping to build Australia's third century — by rebuilding our first and second centuries, and by helping to ensure that what we build today lasts well past tomorrow' — Blakey.

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Setting the industry standard

One (thoroughly researched) word from the Division can result in a change to building standards in Australia.

The construction industry is controlled by rigorous codes and DBR regularly contributes new information which effectively changes the standard in the industry.

Scientists and engineers at DBR provide the technical back-up necessary to produce effective building standards. This takes about one-third of their time in research and participation in about 100 Standards Association of Australia committees.

DBR claims architects and builders can often save millions of dollars by using the codes formulated by these committees.

For example, until the Light Timber Framing Code was developed by the Division in the 1970s, many builders were 'overbuilding' their houses.

In one estimate, the timber code has saved industry and the community some $25 million each year since its introduction in 1974.

DBR's four programs are aimed at all sections of the industry. In fact, the Division often goes where no science has gone before.

Program Synopsis

*Design for Durability

The objective of this program is to improve the durability of building materials and components.

The work is aimed at predicting durability at the design stage and applying the results to select materials with improved properties, design new components, provide better protection to components, modify the environment or improve installation and operational procedures.

The first study along these lines produced solar weathering index maps of Australia, while recent work has produced a corrosivity map of Melbourne, quarry face selection procedures, sound aggregates and a new durability assessment for exposed concrete.

LEADER: Dr Keith Martin

*Life Cycle Performance

The objective is to predict and influence the performance of structures during their life spans, to enable optimal use of resources.

This program covers houses, commercial and industrial buildings and civil engineering works, as well as their associated mechanical and other engineered services. Scientists are seeking to understand the basic processes taking place in creating and using constructed facilities and to measure the performance of these processes and facilities.

Work involves the development of mathematical models and criteria for predicting performance and productivity of facilities, and includes research into 'artificial intelligence'.

LEADER: Dr Frank Bromilow

*Safety and Risk

The object of work in this program is to make structures safe from the onslaught of fires, floods, cyclones and other natural hazards, as well as man-made hazards.

Part of the work is concerned with structural design methods related to safety. The immediate aim is to resolve the uncertainties of current information on structures, soils and loads and to come up with cost-effective building design.

A second part of the program is concerned with the study of existing safety systems, including available protection against hazards such as building fires and explosions.

LEADER: Dr Bob Leicester

Shelter and Infrastructure

Assisting local government and industry is one of the major aims of this program. The use of 'expert systems' for planning

Cont. on p.5

Safety and risk program
DBR battles the elements

Whether you're aware of it or not, there's a battle being waged against the elements which threaten sometimes devastating effects on our homes and other buildings.

Of course, we in Australia have been spared the massive loss of life caused by the Colombian volcano or the Mexican earthquake.

However, catastrophes such as Cyclone Tracy or the Ash Wednesday bushfires have brought home some of the environmental hazards surrounding us.

Man-made factors such as structural defects also pose a serious problem.

Work by the safety and risk program at the Division has a wide brief to find ways of making our structures as safe as possible.

Perhaps the most interesting challenge for the group has been tackling the problem of bushfires — and dispelling some of the misconceptions which may cost lives.

Latest investigations by scientist Dr Caird Ramsay shows that in many cases the safest place for people in the path of an uncontrolled fire is within their own homes.

Homes are rarely destroyed by a 'fireball' or 'wall of fire', but by more gradually-developing spot fires caused by airborne glowing embers.

If people stay at their homes and put out the small spot fires, then the fire front may pass over them without consuming the house.

The greatest danger to humans occurs as the flame front passes, because of the radiant heat. This may be at its peak for a matter of minutes and at that point you're far better off being inside rather than out.

Safety and risk leader, Dr Bob Leicester, said houses should be kept as airtight as possible to help prevent the entry of embers.

The use of metal grilles in front of windows reduces the risk of glass breakages (and hence ember entry) by shielding the glass from flying debris and from radiation. Using fire-resistant furnishings wherever possible further reduces the risk.

For a distance of 30–40 metres around the house, all ground litter should be cleared. A wind break of trees 20–30 metres from the house can be very effective in reducing the wind speed and the quantity of embers reaching the house.

It also helps to have a radiation shield of stone, earth or fire-resistant bush (such as saltbush or boobialla) close to the house.

Other aspects of fire safety — such as warning systems and low-risk design — are also researched by the group.

A video in the Building Australia series on bushfires is available for loan from the Division.

Entitled 'Bushfires and Houses', it looks at the results of the Division's survey of one of the areas hit by the Ash Wednesday fires.

Fire is just one of the areas covered by this group. Cyclones, soil heave in drought, earthquakes, floods, wind damage, etc, are also tackled.

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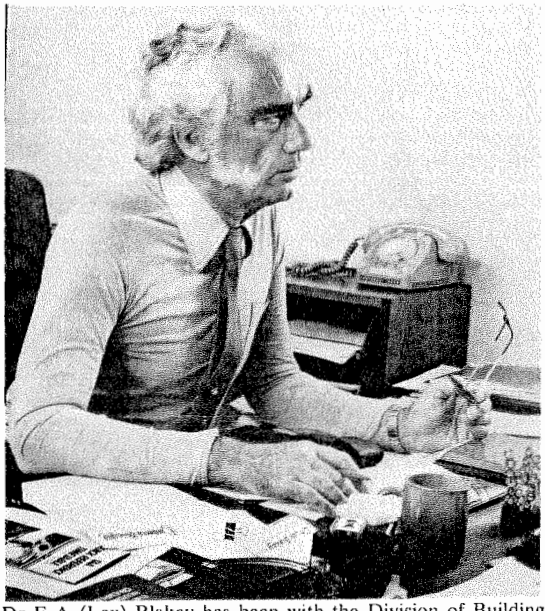
Division Chief, Dr Lex Blakey



Dr F A (Lex) Blakey has been with the Division of Building Research for most of his working life. He is a graduate of the University of Western Australia and of Cambridge in England. From 1974-76, he was seconded to the Department of Housing and Construction as First Assistant Secretary for Technology. He was responsible for all research activities of the Department. In 1979, he was appointed DBR Chief. Dr Blakey is a Member of the Institution of Engineers, Australia, a Fellow of the Australian Institute of Building, a Fellow of the Australian Academy of Technological Sciences and a Member of the Institute of Arbitrators of Australia — and has a number of other professional associations. He was recently appointed Chairman of the Building Standards Board of the Standards Association of Australia and to the Council of the Lincoln Institute of Health Sciences.

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Light timber construction school under the microscope

In many city suburbs and towns around Australia, the local school is of light timber construction (LTC).

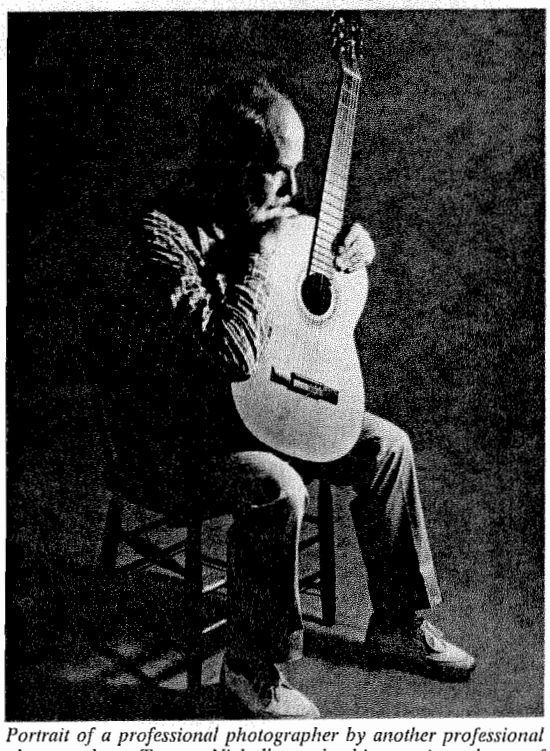
Most of these structures were put up about 25 years ago — which is about the expected LTC lifespan.

Now the Division's life-cycle performance group is collaborating with the Victorian Education Department to look at the aging of the buildings at a high school close to the DBR's Highett site.

Program member Dr Selwyn Tucker said DBR scientists are collecting mostly technical data concerning, for instance, thermal performance, acoustics, weathering and lighting to get a profile of the current state and likely future of the building.

Once data collection is complete, the results will be used to formulate a mathematical model so the group can explor cost-effective improvements.

A portrait of the artist...



Portrait of a professional photographer by another professional photographer. Tracey Nicholls took this pensive photo of colleague Peter Lee recently. Tracey has been with DBR for three years. She started her career with ideas of being a media studies teacher, but soon was distracted by a DBR advertisement for a photographer. An incredible 595 people applied, but Tracey's folio of work clinched it for her. Little did she know that she would soon be sent on glamorous assignments — such as risking life and limb photographing a piggery at Trafalgar in Gippsland. Perhaps the most exciting aspect of this work was fighting off pigs with her feet while attempting to take the shots.

New adhesive method
Sticking like glue to the tracks

Fast trains running on superglue? Well, not exactly, but adhesives could emerge as the modern way to hold the components of railway tracks together.

Work being done by the adhesives group (part of the design for durability program) may eventually spell the end for the humble dog spike.

According to Dr Voytek Gutowski at the Division, adhesive bonding is playing an increasingly important role in structural engineering — as well as in other areas such as protective coatings and biomedical applications.

As a result of work at DBR, a procedure has been developed for the manufacture of adhesively-bonded base plates for *Pinus radiata* railway sleepers.

'The process provides a proven advantage over existing systems employing mechanical fasteners,' said Dr Gutowski.

The Western Australian Railways (Westrail) and BHP are participating in fatigue tests and so far results indicate a 30–70 year life for the sleeper bond.

These positive results have led to an agreement between DBR and Westrail to lay test sleepers on a track in the north of WA.

A mining company in the Pilbara region also is interested in conducting tests.

Export potential

'The project provides good revenue prospects and has export potential,' said Dr Gutowski.

The technology required to make a lasting and reliable bond on sleepers can also be applied in the manufacture of a range of other structural components for the building industry.

While the group's research is aimed primarily at the building industry, the work has resulted in spin-offs in other areas such as automotive, paint, aircraft and space industries.

*Dr Gutowski emigrated from Poland three years ago. He had worked at the Technical University at Szczecin in the north of the country, where he was mainly concerned with the application of adhesives in the foundry industry.

Program Synopsis

Cont. from p.3

the optimum use of available resources in planning of facilities is a major element of the work involving collaboration with CAD firms and user groups.

An example of this work is research into the most favourable placement of water catchment, storage, distribution and drainage systems, or of hospitals or industrial facilities.

The building and allied industries, like local government, are very fragmented. With an average of five people in a firm or group, they can't meet their own needs for planning and design techniques, and software. The Division is giving special attention to these needs.

LEADER: Dr John Brotchie

Who you gonna call?

In promoting its innovative Sirowet process, the Division has found its inspiration in a popular film.

'We ain't afraid of no Parliament House leaks and we can bust the ghosts which caused them,' the DBR blurb (rather tortuously) proclaims.

'Leakbusters' at the Sirowet rig at new Parliament House are testing the facade to prevent the inhabitants getting that sinking feeling (see *CoResearch* No. 282, July'85).

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The Division is the largest centre of building research in Australia. It has 200 staff, including about 80 specialist engineers and scientists representing almost every discipline.

Technology transfer with a smile

Bob Couper has a rather unusual attitude to his work — he regards it all as fun.

Bob's technology transfer group has been largely responsible for raising the public relations profile of the Division during the past decade. It's a job he relishes — partly because of the challenge and partly because it's full of unexpected and amusing incidents (see funny phone calls, next page).

A scientist by training, Bob has been with the Division of Building Research for about 20 years. He spent seven years as a concrete technology researcher and two years as officer-in-charge of the Division's laboratories in Papua New Guinea.

For 11 years he has headed the technology transfer unit, having been chosen in 1974 to lead the revitalized communication effort.

'In those days, CSIRO believed research papers communicated' said Bob.

'But research papers just don't get through to the bloke who hammers the nails. We just had to market to lay people.'

Surveys showed there was a demand in both the industry and the wider community for more information on latest trends in the building industry.

'We needed to convert our knowledge into what they wanted,' he said.

Bob gives a great deal of credit to the Division's first journalist, Stuart Maxwell-Wright, for bringing communication activities up-to-date in the 1970s. (Mr Maxwell-Wright has gone on to a brilliant career with the giant public relations company, Burson Marsteller).

'He put the Division's communication on a different level to what it had been used to,' said Bob.

At the time the Division decided to beef up its communication activities, it already had considerable credibility in the industry but it lacked the ability to relay current trends and new information which were constantly emerging.

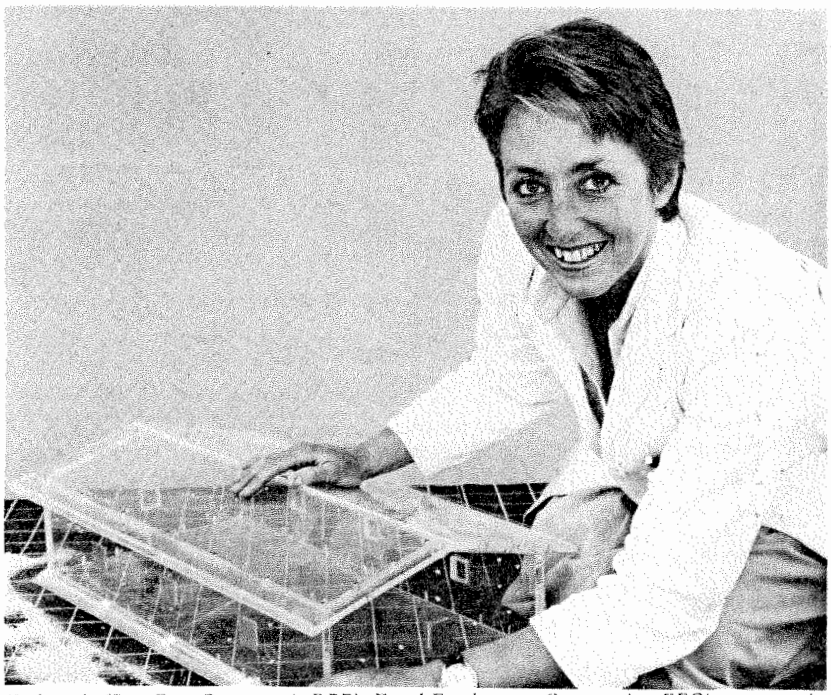
'... research papers just don't get through to the bloke who hammers the nails ...' — Couper.

So one of the Division's success stories, *ReBuild*, was launched in 1975. This readable, lively newsletter (edited by Peter Russ) has carved itself a niche by putting information the industry can use into plain English.

The group produces a wide range of information products, including the video series Building Tomorrow.

Bob Couper at his desk

Switchboard operator Tammy Millard efficiently directs some of the communication flow at DBR. Tammy, who has been with CSIRO for three and a half years, was trained as a telephonist by the PMG. She is one of two full-time operators at the Highett site (which also has parts of the divisions of Energy Technology and Food Research). A recent survey found that the DBR switchboard receives 110 telephone inquiries a week. Of these, 45 percent are from industry and a (rather surprising) 55 percent are from the general public. And that's only the tip of the iceberg, as many industry calls are also received by the technology transfer unit and individual researchers.



Technical officer Fran Geermans is DBR's Equal Employment Opportunity (EEO) representative at Highett. Fran has been with CSIRO since 1971 (apart from several 12 month stints elsewhere). Her varied work has encompassed computer programming, work on the timber structure code and research into the splitting of green timber. As EEO rep, she's required to do a lot of reading and meets once a month with other EEO people in the Institute of Industrial Technology. She is pictured here with a model of a house used in wind tunnel tests.

Industry supports DBR research

DBR has received a large amount of external support, mostly from the building and construction industry, for its research.

In 1984/85, this amounted to about 15 percent of the Division's total expenditure, and this is expected to rise to 20 percent during the current year.

A substantial part of the external contributions is comprised of support in kind, but many industries also provide direct financial assistance.

An example of this is the Division's information technology research — which is one of the Organization's top five priority growth areas.

Financial and equipment grants worth half a million dollars were received last financial year from prominent computer companies including Data General Corporation, Easinet and Ceanet.

Information technology research takes up about 25 percent of the Division's budget.

Expert systems: DBR experts are designing them now

One day, in the not-too-distant future, architects or city planners will be able to press some buttons on a computer and watch plans for that empty block down the road emerge designed to meet all building regulations.

Expert systems are computer systems which use reason when dealing with problems, in much the same manner as human experts do.

The so-called expert systems (which have evolved from work into artificial intelligence) now being developed at the Division could check plans for compliance with the exacting structural codes — many of which DBR has had a hand in developing.

This and other time-saving features could lead to an annual cost saving to industry and the community of $50 million a year.

Dr John Brotchie — assistant DBR chief and head of the shelter and infrastructure program — sees these systems as important developments for local government in Australia and overseas (DBR expert systems are now being demonstrated in New Zealand, for example).

Local government groups are among DBR's biggest users.

Population projections developed in the system could then be converted into decisions on the need for new schools, or geriatric homes, traffic signals — in fact a whole range of facilities.

The growing might of the micro-computer is being harnassed by Dr Brochie's group, providing an information revolution in facility and infrastructure planning.

A system developed by the Division called TOPMET is being used to solve layout problems in two or three dimensions.

Planning problems

A general planning model called TOPAZ has also been developed to assist in solving building, urban transport and infrastructure planning problems. This system has been put to the test for urban planning in parts of Melbourne, Gosford-Wyong, Darwin, Los Angeles and Jakarta — and, of all places, Tehran in Iran.

The Division now has a national Knowledged Based Systems (KBS) research centre, in collaboration with the Association for Computer Aided Design (ACADS), the Victorian Department of Industry, Technology and Resources (DITAC) and others. In this, it is collaborating with Computer Assisted Design and user industries in the further development of the techniques and their transfer to industry.

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'Funny phone calls' keep liaison team on its toes

The following is a (small) sample of the often richly absurd telephone inquiries recorded by the DBR technology transfer unit. Ranging from the fanciful (...what timber did Noah make his Ark from...) to the macabre ('...how do you get rid of the smell of a dead body from floorboards...'), they're all fielded with practiced skill and diplomacy by the DBR team. As Bob Couper points out, 'although we may initially have a laugh at others, we regard these seriously because as far as the other person is concerned, he has a problem which he wants solved'.

History and the Arts

Is there a method of divining for a wine cellar which has been filled in under an old house?

Could you please tell me what wood Noah made his Ark from? I want to build a house from the same type of timber.
(DBR): Do you live a flood-prone area?
No, but after Skylab you never know do you.

A painter I employed started to mix up varnish but hasn't been sighted since I paid him a deposit. Can you tell what he's left out of the mix so I can finish it myself?

I defrosted the fridge with a radiator and melted all the plastic inside. Can I fix it?

My husband gave me a painting for my birthday and whilst putting it up I have drilled through the hot water pipe. Water is going everywhere; how can I stop it?

If I hose my carpets in hot weather, will it keep the house cooler?

I have a ten-seater dining table which I would like to convert to an eight-seater. How much do I have to cut off?

Toilets, outhouses and other related matters

My outside toilet building is subsiding and appears to have sunk 18 inches into the ground. Is this dangerous?

How do you soundproof a toilet?

Have you got an instrument that will run along a sewer to find and retrieve false teeth?

How can I tell how long a piece of red gum has been in my sewer?

Creepy crawlies

I've got spiders eating holes in the mortar joints of my brick home. Will the house fall down?

I keep getting flying ants in my hair. If I wash my hair they get worse. Can I spray my hair with flyspray?

I've got bacteria eating my roof. How can I kill them?

My bath keeps getting worms in it. Should I call a plumber to check the pipes? [The culprit turned out to be a hanging basket over the bath, recently filled from the compost heap.]

Nature

What's a simple chemical I can add to a fibreglass swimming pool to create a dog repellant odour?

Will fibreglass roofing affect the production of eggs from hens?

How do you stop bees from attacking window putty?

How do you stop birds birds flying into large picture windows and depositing their stomach contents on the glass?

How do you degrease a budgie which has fallen into a pot of hot fat?

How do you get rid of yabbie holes in you backyard without hurting the yabbies?

How do you remove cow dung pats and the stains they leave behind on loungeroom carpets?

Can grass grow in a hot water service?

Smells

How do you remove the smell from a rumpus room after it has been used for years as a dog breeding area?

How do you get rid of the smell of a dead body from floorboards?

How do you de-smell a fish shop being converted into a dress boutique?

Strange — or is it?

Would a dead cat in a galvanized iron rain water tank increase the corrosion rate?

How much salt do you need to add to a bath to make it equivalent to seawater and is there a device available which will produce waves?

What height do flies fly?

Have you any idea whether wood will continue to grow when it's built into a house?

I've just bought a bargain for $250 000 — a whole shipload of Russian timber. Can you tell me what to do with it? [Any suggestions?]

I'm building a house. Can you tell me all about it? [One of the easier ones]

I'm making bagpipes to export to Scotland. What timber should I use?

How do you remove Seaview Claret 1971 stain from a marble bath and floor tiles?

How can I stop my wife planning additions?

How do you acoustically insulate the confession box in a church to stop others hearing the confessions? There are too many rumours going around.

What would the conditions be like in a precast concrete coffin? [The caller hastened to add he was not Count Dracula.]

Creative word use

Could you please send me details of and research you have carried out on the number of orgasms which occur in sewerage pipelines?

How many disciples does a rock band put out?

[From a primary school child] I'm doing a project on growing trees. Can you tell me how you can untie the knots in them?

Can I build a pagoda in my backyard using Pinus radiata? [pergola?]

Humans

Do water beds really help one's sex life?

I'm planning an addition in the bedroom. Can you please tell me how many studs I'll need and how to arrange the snoggings? What are the advantages of new and second-hand studs?

I want to enquire about timber for a grave stone.
(DBR) What sort of life span are you looking for?
The person's already dead.

The ASTEC report: summary, recommendations

(Recommendations appear in italics)

1.1 CSIRO is Australia's largest research organization, performing a range of research activities in support of different national objectives. It was last reviewed eight years ago, as a result of which substantial changes were made to its structure and policies. Since that time, rapidly changing economic circumstances have led to suggestions both in Australia and overseas that government research organizations like CSIRO could contribute more effectively to national economic and social objectives. The present review has examined CSIRO's role and organizational arrangements against this background.

1.2 To maintain and improve living standards Australia needs to strengthen the economic performance of all major industry sectors. Industrial competitiveness is becoming increasingly dependent on technological innovation in both products and processes. Scientific and technological research plays an important part in the innovation process, improving the efficiency of production and broadening the range of products in both traditional resource-based industries and new technology-based industries. Research and development makes a significant contribution to the technological development and international competitiveness of Australian industries.

1.3 Scientific research in areas of community interest, mainly concerned with physical and biological aspects of the Australian environment, including the surrounding atmosphere and oceans, is also of increasing importance as awareness grows of the degree of interdependence between economic activity, aspects of public health and the natural environment. Research in this broad field provides a framework upon which programs for natural resource and environmental management can be based consistent with the sustained utilization of renewable resources, economically sound utilization of non-renewable resources and with the maintenance of high levels of public health.

1.4 A balanced national research and development effort is needed for Australian to derive greatest benefit from its scientific and technological infrastructure. The main elements of the infrastructure include CSIRO, other government research agencies, the universities and other higher education institutions, and the research activities in the private sector. CSIRO has a central role to play in this overall infrastructure. This role will be most effective if CSIRO's research is seen to be complementary to and interactive with that of the other major elements.

1.5 To play a complementary role CSIRO's research should essentially be applications oriented with an emphasis on longer term, more broadly applicable activities balanced by a corresponding emphasis on shorter term more directly applicable activities. Furthermore, to ensure effective interaction between CSIRO, other research organizations and the end users of its research results there should be a firm commitment, not just to undertaking applicable research, but to the effective transfer of results to end users.

1.6 Such a role, which we believe is essential if CSIRO is to play its most effective part in Australia's future, requires a shift in the overall ethos of the Organization from one which has been largely science oriented to one which is largely applications oriented. This proposed change represents a major challenge and gives CSIRO the opportunity to be a significant driving force in the transformation of Australia into a technologically sophisticated nation which will be able to compete more effectively in the international marketplace.

That CSIRO's main role be the conduct of applications oriented research combined with a commitment to ensuring the effective transfer of its research results to end users.

Research in support of Australia's industries

1.7 We consider that CSIRO should make a firm commitment to fostering the technological development of major Australian industry sectors. In so doing, CSIRO's role needs to be seen against the background of world trends in science and technology and also against the background of Australia's industrial base. The capacities and needs of the various industry sectors for research and development vary considerably, as do the activities of other Commonwealth and State government research agencies and those of universities and other higher education institutions. Consequently, CSIRO's role varies from sector to sector. Three main areas of activity can be identified, all reflecting an applications orientation.

1.8 In the first place we consider that CSIRO must maintain a substantial continuing commitment to strategic basic research at a level close to that now prevailing. This work is long term and broadly applicable to a range of possible industrial applications. Such reseach extends the advancing front of technology which underlies the technology intensive industries of the future. To be effectively complementary and interactive this research should be conducted in close association with more directly applicable CSIRO research. It should involve co-operation with universities and other research organizations. Its orientation should be influenced by the industry sectors most closely concerned.

1.9 In general, this research is sufficiently long term and high risk that the private sector is not likely to fund it to a significant degree except where large firms exist with substantial in-house research and development capability. Furthermore, in many, but not all cases it provides results which are not readily appropriated by end users. For these reasons we consider it appropriately supported by CSIRO's basic appropriation funding.

1.10 To complement this long term, broadly applicable activity we consider that CSIRO should significantly increase the amount of its shorter term, more directly applicable research. Such research should be focused on more important practical problems confronting existing and emerging industry sectors or associated with the application of the results of its longer term activities. Most of this work will be applied research and experimental development of the sort usually conducted by industry itself in more technologically developed countries. In some Australian industrial sectors, notably in agriculture, State departments provide a complementary role through their research and extension activities. However, in most sectors, a significant gap will exist in the research infrastructure unless CSIRO markedly increases its own activities.

1.11 Wherever possible, this work should be conducted in close association with industry so as to assist individual firms and groups of firms to build up their research and development capability. Much of this research will result in benefits that can be directly appropriated by the private sector. We consider that when such benefits are likely to arise they should be paid for by the beneficiaries. It is from these earnings that we expect the overall net increase in the costs of CSIRO's research activities to be met.

1.12 In addition to a balanced program of applications oriented, short and long term research, we are conscious that there is a pressing need for information already in existence to be transferred effectively to end users. This will require the provision from CSIRO of a much enhanced level of information services. A benefit to the Organization of this enhanced activity will be a better understanding of the needs and capabilities of end users. We consider it important that this function be discharged as fully and effectively as possible and expect that, as its benefits to end users become apparent, it could be funded substantially by them.

That in undertaking its main role CSIRO concentrate primarily on research in support of existing and emerging industry sectors and measures to facilitate the adoption of the practical results of its research.

Research in support of community needs

1.13 CSIRO has substantial programs related to the provision of information about Australia's renewable and non-renewable resources, and of the surrounding atmosphere and oceans. Given the importance of the interdependence between economic activity, aspects of public health and the natural environment, it is appropriate for CSIRO to continue to conduct research into these areas. However we believe that, wherever possible, such programs should be linked to CSIRO's primary emphasis in support of major industry sectors.

1.14 Much of the research involved in work related to community needs will be long term in character. Apart from the linkages to industry of this research, its main user groups are in government bodies associated with the establishment of standards and monitoring of performance in areas related to the management of natural resources, environmental quality, public health and similar functions. Many of the relevant government bodies also conduct in-house research directed to their special needs. There is also a good deal of research in universities and other institutions of higher education. CSIRO's complementary role is primarily in strategic basic research to provide an underlying knowledge base which can be drawn upon by user groups and in applied research, frequently also long term, directed to specific important problems. There will also be a need for shorter term, more applicable research focused on particular problems which should be seen as an important component of the overall research effort.

1.15 The degree of interaction between the various groups varies considerably in its amount and effectiveness. Many of the groups are isolated from one another and the overall research and development effort is fragmentary. Consequently, there is a general need for more effective interaction, both to clarify the roles of each of the various groups and to improve the flow of information between them. With special regard to CSIRO, there is considerable potential to interact more closely with university research groups and, more generally, to ensure that its research programs are influenced by the needs of end users and are effectively transferred to them.

That CSIRO continue to conduct research into Australia's natural resources and aspects of public health, and co-ordinate this work as closely as possible with other organizations active in these fields.

Overall balance in research

1.16 In future, we consider that CSIRO will need to adopt a flexible approach in its overall research program in order to fulfil a role which is applications oriented and is both complementary and interactive. In this process we envisage that, overall, the level of broadly applicable, strategic basic research will be maintained close to that which is now prevailing, but the level of more directly applicable, shorter term, applied research and experimental development will increase considerably. We also envisage a considerable enhancement of the level and effectiveness of the range of information services which CSIRO provides to end users.

1.17 With regard to pure basic research in CSIRO, we see it as an appropriate activity as long as it's linked to research directed towards CSIRO's major activities. However, where there are research groups conducting pure basic research which is essentially motivated by a désire to acquire new knowledge irrespective of its practical significance, we suggest that consideration should be given to relocating them into an institutional setting closer to that of a university with appropriate transfer of funds.

That the incoming CSIRO Board of Directors give consideration to transferring elsewhere research groups conducting pure basic research which is not linked to the major objectives of CSIRO.

One CSIRO or several

1.18 We have concluded that, despite the wide range of interests supported by CSIRO, there is no overall benefit in dividing it into several smaller organizations. Although it could be easier for each such organization to develop close links with particular industry sectors or other interest groups, such possible advantages are outweighed by the potential of a single large organization to focus in a flexible manner the substantial intellectual resource which it represents on the important problems with which it is concerned at any one time. With the geographical separation of research centres within Australia and the relative isolation of Australia from major international centres of research, it is a particular advantage for CSIRO to be able to create teams with a range of skills and of a suitable size to tackle major problems efficiently and locate them appropriately. Also of considerable importance is CSIRO's international reputation which makes it relatively easy to attract and retain talented staff. We consider that CSIRO's statutory independence has been a major element in establishing its reputation and should be maintained.

That CSIRO be retained as a single statutory authority.

1.19 However, the opportunities that exist are not necessarily utilised as effectively as they could be and we consider that the Organization tends to be somewhat inward looking and bureaucratic in its operations. Strenuous efforts are needed to reduce these tendencies and take advantage of the opportunities.

Interactions.

1.20 External inputs assist in ensuring that research is relevant to user needs, technically feasible and in accord with significant public policies. CSIRO's existing arrangements for obtaining external advice give a prominent role to the Advisory Council and its associated State and Territory Committees.

1.21 We do not consider that a centralized consultative mechanism, operating in a purely advisory capacity, can adequately represent the diverse interests of end users, members of the scientific and technological community and government organizations. In practice, the Advisory Council has found difficulties in providing advice on key policy questions and it has failed to have a significant impact on CSIRO's broad directions.

1.22 Redressing these problems requires changes to CSIRO's top management structure and strengthened advisory and consultative mechanisms at various levels. These measures should make the existing Advisory Council and State and Territory Committees redundant. An important measure, already being implemented, is the formation of advisory committees for divisions, regional laboratories and, where appropriate, programs.

That the existing CSIRO Advisory Council and State and Territory Committees be discontinued.

1.23 The mechanisms provided by the standing committees to the various Commonwealth and State ministerial councils provide a practical way of co-ordinating research relevant to areas over which both the Commonwealth and the States exercise responsibilities. They constitute one part of a sectoral advisory system that also includes direct consultation between CSIRO and industry organizations and representation by CSIRO on the sub-committees of the Australian Manufacturing Council. These liaison mechanisms are an important source of external inputs into CSIRO.

That CSIRO continue to participate widely in the co-ordination mechanisms provided by the Commonwealth and State ministerial councils' standing committees and technical sub-committees, the Australian Manufacturing Council and industry organizations.

1.24 CSIRO's research priorities should adequately reflect national objectives in various policy areas for which different Commonwealth ministers are responsible. The use by departments of special research funding schemes assists in ensuring that CSIRO is responsive to government priorities. However, the re-direction of CSIRO's existing budget for allocation under customer/contractor arrangements like those used in the United Kingdom is not appropriate for Australia. Liaison between CSIRO and Commonwealth departments should be strengthened as required by the increased use of formal high-level consultative arrangements.

1.25 Interactions between CSIRO and the broader scientific and technological community should be improved by the increased use of shared or national facilities. Joint funding of collaborative research between CSIRO and higher education institutions is a valuable way of increasing the level of interaction between researchers from different institutions. The existing arrangements for such joint funding should be extended.

That the CSIRO-Universities Joint Research Scheme be expanded as funds can be made available. The scheme should also include other suitable higher education institutions.

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1.26 We believe that CSIRO needs to increase its interaction with major industry sectors. Contracting in research from industry assists in securing effective links and increasing interaction. CSIRO should increase the amount of research performed under contract to end users in industry and elsewhere.

That to increase interaction with industry CSIRO actively seeks more contract research from individual firms or groups of firms.

1.27 Public investment in research intended to assist industry sectors is allocated most effectively if industry takes responsibility for collaborating with researchers in identifying research needs and formulating research programs to meet such needs, and also contributes to the funds allocated. Existing mechanisms, such as the Rural Industry Research funds and the research associations, play a valuable role in directing research into areas of practical significance.

1.28 Effective interaction is essential in the translation of research findings into technological innovations. Good comunication between CSIRO and industry through a range of of information services is important in this process. Patents can play a significant role. The use of joint ventures and, and where appropriate, the establishment of independent companies can be effective means of facilitating the commercialization of research findings.

That CSIRO actively seek opportunities to use the establishment of independent and joint venture companies as a way of making its skills and technology available commercially.

1.29 CSIRO's initiative in establishing Sirotech has commendable features. Sirotech has considerable potential to increase the range of links between CSIRO and industry, and the effectiveness with which CSIRO research is commercialized. However, it is also important that Sirotech should not constitute a barrier between CSIRO researchers and end users. Direct links between researchers and end users should be encouraged at all levels, and Sirotech's mode of operation will need to be monitored to ensure that it supplements rather than supplants direct contacts.

That Sirotech continue to provide an avenue for links between CSIRO and the broader industrial community. Its activities should supplement rather than supplant direct research-to-industry contacts.

Funding

1.30 CSIRO's future role will involve a substantial level of research that yields benefits which are either in the public interest or which cannot be readily appropriated by the private sector. For these reasons we consider that it should be supported by normal budgetary funding. Additional support for research and other activities that yield benefits which can be directly appropriated should be largely provided by the beneficiaries.

That the level of appropriation funding for CSIRO be maintained.

1.31 In seeking additional support from the end users of its research through contract research or joint ventures, CSIRO should ensure that the full costs of any services provided are recovered from the users. Where the expectation of a broader public benefit justifies an element of public subsidy the extent of such support should be shown in the costing for such services. Outside earnings from contracts and the commercialization of research should be retained by CSIRO as an incentive to encourage the re-orientation of activities in the direction of industry demand and the commercialization of research findings.

That the full costs of research and development and other services performed under contract to or in a joint venture with industry be charged under normal commercial arrangements unless a demonstrable public benefit arises.

That CSIRO endeavour to stimulate and assist private research, development and consulting services.

That CSIRO be able to retain its earnings from outside sources.

That to promote the effective commercialization of its research, CSIRO be permitted to retain income from inventions arising from research not covered by prior commercial agreement.

Organizational Structure

1.32 We have identified two main problems that have arisen in the policy-making and management arrangements of CSIRO which were implemented following the Birch report. The first is that, as mentioned above, the Advisory Council and the State Committees have not filled the role which was envisaged for them of providing effective broad external policy input into the Organization. For all practical purposes, the present Executive has been the only effective policy body with the part time members being the main mechanism for the injection of outside views. The second is that the institute directors do not appear to have sufficient authority and independence to implement effectively the broad policies for which they are responsible. Lines of responsibility for policy and management have become blurred and the full time Executive members have each had responsibility for several institutes, resulting in institute directors to some extent being by-passed as an effective level of management. We consider it essential that the institute directors be at the top level of line management below the Chief Executive, so that they have the necessary authority to implement the Organization's policies and priorities.

1.33 To redress these problems we propose a clear separation between the roles of the top policy organ and the top line of management. Corporate policy responsibility should, we propose, be vested in a Board of Directors which would replace the present Executive. The Board should comprise a part time, non-executive Chairman, the Chief Executive and six non-executive members. It should be responsible for setting broad lines of policy and priorities in response to the policies and priorities of the Government, to the views of the broader outside community and to those of the Organization itself. Its Chairman and non-executive members will need to possess appropriate experience, knowledge, skills and personal qualities, and should be chosen to reflect, but not to represent, the range of interests served by CSIRO.

That the present Executive of CSIRO be replaced by a Board of eight Directors consisting of a Chairman and six ordinary Members plus the Chief Executive of CSIRO. Apart from the Chief Executive, all Board members should serve part time and be drawn from outside the Organization.

1.34 The Chief Executive will be the most senior member and leader of CSIRO. He or she will require special qualities of leadership and management, a distinguished reputation in research and, preferably, significant industrial experience. We consider it essential that the Chief Executive be responsible in all respects to the Board.

That the CSIRO Board be empowered to appoint and dismiss the Chief Executive.

1.35 It will be for the new Chief Executive and the Board to decide the management structure under these arrangements but, at least in the short term, we see advantages in retaining a management committee, chaired by the Chief Executive, with its membership drawn from the institute directors and senior officers of the Organization. The committee would assist the Chief Executive to manage CSIRO and to implement policies adopted by the Board. The committee would not, however, be part of the line of management responsibility under which institute directors would report directly to the Chief Executive.

1.36 We regard the institutes as an essential and desirable structural element in CSIRO's organizational arrangements. The role and composition of individual institutes have been changing, and should continue to change as the changing nature of CSIRO's work requires different structural arrangements. However, as a general approach, and to reflect the industry orientation of the Organization, we consider that, unless the Board decides otherwise, the institutes should relate primarily to existing or emerging industry sectors or linked industry groups.

That institutes relate primarily to existing and emerging industry sectors rather than to scientific disciplines.

1.37 One of the main strengths of CSIRO has been the allocation of research objectives to largely autonomous research units, generally divisions, with delegation to division chiefs of responsibility for their achievement. In the future we consider that the increased focus of CSIRO's work on the needs of major industry sectors, combined with the rapidly changing needs of Australian industry for research support, will require more frequent modification of the roles of individual divisions. It is desirable in these circumstances, and to maximize their responsibility and autonomy, that divisions work to clearly defined and agreed objectives in the form of mission statements.

That divisions and other operational research units work to mission statements with goals expressed in terms that allow their progress to be evaluated at predetermined points.

The Management of Human Resources

1.38 In the past, CSIRO has successfully maintained a suitable environment for high quality research in areas of relevance to national objectives. There are internal and external pressures on management's ability to set the conditions required to maintain such an environment. CSIRO's statutory relationship with the Public Service Board is contributing to these pressures. We believe that there should be clear acceptance that CSIRO is required to pursue staffing policies compatible with its own objectives, and that the relationship with the Public Service Board should be terminated. The need to maintain high quality research and to accept a higher proportion of income from outside sources requires greater mobility for staff and greater flexibility for management in engaging and redeploying staff.

That the present statutory relationship between CSIRO and the Public Service Board end.

That CSIRO pursue staffing policies compatible with its own objectives which give management greater flexibility in setting terms and conditions of employment.

1.39 Superannuation conditions represent a considerable impediment to increased mobility for research staff. The issues involved are complex and CSIRO and the Department of Finance will need to investigate suitable alternative arrangements.

That CSIRO and the Department of Finance investigate amendments to the present superannuation scheme and/or alternative schemes which would improve mobility into and out of the Organization, and that the Government then introduce the necessary changes.

1.40 Short term movements of staff between CSIRO, other research organizations and industry could be facilitated by a variety of measures.

That CSIRO adopt measures to encourage short term exchanges of staff with other public and private organizations.

1.41 Increased turnover and greater flexibility in research staffing arrangements are needed in CSIRO. A higher proportion of research staff on fixed terms appointments and limited use of indefinite appointments would assist in meeting these needs. Newly recruited staff should normally be appointed to fixed term appointments to allow sufficient time to appraise their potential before indefinite appointment is offered. Early separation arrangements at the initiative of management are also necessary.

That CSIRO increase the use of fixed term appointments for professional staff.

That new research staff without proven post-doctoral or other relevant experience be appointed initially to provisional fixed term appointments so that their ability can be evaluated effectively before they are offered indefinite appointment.

That CSIRO introduce an early separation incentive scheme where appropriate separation terms can be offered to research staff at management's discretion.

1.42 CSIRO's commitment to the practical implementation of its research needs to be reflected in the procedures used for staff appraisal. These should take sufficient account of achievements in research or project management where the nature of the work or the constraints of commercial confidentiality restrict opportunities for publication. Performance evaluation should be required for maintenance at existing classification levels as well as for promotion.

That the staff appraisal system in CSIRO contain adequate mechanisms for recognising achievements other than by publication.

1.43 Incentives in the form of bonuses and an entitlement to rights in inventions not covered by prior commercial agreement are an effective way of motivating staff. CSIRO should use its existing powers to introduce a system of bonuses and should be permitted to offer staff property rights in their inventions not covered by prior commercial agreement.

That property rights to and income from inventions not subject to prior commercial agreement be divided between the inventors and CSIRO according to a formula to be determined by the CSIRO Board, the overriding consideration being to promote the commercial development of the technology.

1.44 The use of the word 'scientist' in research classifications emphasizes scientific achievement in preference to more technologically oriented activities. Titles should be changed to reflect CSIRO's applications orientation more appropriately. The term 'research scientist/engineer' should be used throughout the research scale to allow individuals to refer to themselves as 'research scientist' or 'research engineer' according to their qualifications.

That the position title 'research scientist' be changed to 'research scientist/engineer' and that research workers employed in such positions use that part of the title appropriate to their qualifications.

1.45 It is in the national interest that a proportion of research workers receive training in laboratories that stress industrial relevance alongside research excellence. CSIRO, the universities and other degree-granting institutions should co-operate more actively in making CSIRO's facilities and research staff available for doctoral and post-doctoral training. More joint appointments of academic staff to CSIRO and educational institutions would assist in facilitating such collaboration. CSIRO's own requirements for well-trained technical staff and the need to ensure the facilitation of the practical implementation of research findings can require that the Organization assist in technical training from time to time.

That CSIRO in co-operation with the universities and other degree-granting institutions increasingly make its facilities and research staff available for training research workers in areas where the Organization offers particular advantages.

That CSIRO also play a role in technical training, especially where this assists in the commercialization of its work or providing for its own staff requirements.

Cont. from p.2

appointee would lack the status in dealing with the Minister, industry leaders, the public, the bureaucracy and even the staff of the Organization. The Chief Executive could be seen as a second class citizen on the board since he or she was the only board member who could be dismissed by the Board.

I am presently presenting these views vigorously to the Government. It is unlikely that Government decision on the ASTEC recommendations will be made before February.

I am looking forward to the Christmas/New Year vacation period and some relaxation at my beach cottage at Rosedale, south of Bateman's Bay. I wish all staff very best wishes for Christmas and the New Year.

A Keith Boardman

***CoResearch* is produced by the Science Communication Unit for CSIRO staff. It's also circulated to a number of people outside the Organization who are interested in CSIRO activities. Stories may be reproduced without permission, although an acknowledgement would be appreciated. Readers are invited to contribute or offer suggestions for articles. The deadline for contributions is the last Monday *before* the issue month. Editor: Liz Burden, PO Box 225, Dickson ACT 2602 Ph: 48 4479.**

CoResearch

16 page New Year issue

CSIRO's staff newspaper

No. 288 February'86

Dr Wild, AC

Former CSIRO Chairman Dr Paul Wild will receive his Australia Day honour from Queen Elizabeth at Government House in Canberra next month.

Dr Wild was one of five eminent Australians to become a Companion in the General Division of the Order of Australia (AC) — the highest award bestowed in the honours list.

The award cited his service to science and CSIRO.

The Queen will hold the investiture on Monday, 3 March.

Cont. on p.15

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Ms Val Jemmeson, information and publications officer at the Division of Atmospheric Research. DAR is featured this month — pp. 7–10.

Aquarius airtanker study: DC6 most cost-effective

The single most cost-effective aircraft for aerial bushfire suppression has proved to be the large airtanker, the DC6. However, even this plane would be useless in fighting fires of the size and intensity of the Ash Wednesday blaze and its effectiveness is limited to specific circumstances.

These were major findings of the Project Aquarius cost-benefit study of aerial suppression of bushfires in Victoria, released in a summary paper this month.

Although the south-eastern region of Australia arguably has the most severe bushfire problem in the world, Australia doesn't make regular use of large airtankers as part of its suppression armoury. Project Aquarius was set up at the request of the Federal Government to help resolve the controversy surrounding the value of airtankers in the Australia environment.

The economic study, conducted as part of the Aquarius research program by a Division of Forest Research team led by Mr Phil Cheney, indicates that costs would outweigh savings when using certain other fire suppression aircraft — notably the controversial Grumman Tracker. Net losses also resulted for the Hercules, the Neptune and the water scooper aircraft (Canadair CL-215, Canso and Twin Otter).

The study found that if existing local agricultural aircraft are used then buying a DC6 would be uneconomic and suggested hiring one from overseas during very severe fire seasons as a supplement.

Computer modelling of extensive data on bushfires in Victoria shows that use of the DC6 to drop fire retardant could result in annual gross savings of $660 000, and net savings (after deducting certain fixed costs) of $136 000 — or 26 percent of the annual fixed outlay. This compares with an annual benefit of $77 000, or 48 percent of fixed costs, for using two large agricultural aircraft at each of three home bases. While the DC6 offers the highest absolute level of savings, it is more of a gamble than the multi-purpose smaller aircraft because its lower rate of return allows less margin for errors in the estimates.

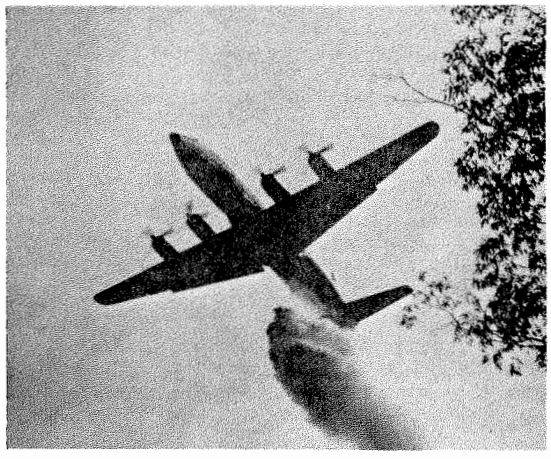
The study estimates that average annual bushfire losses in Victoria amount to $25 million per year, heavily concentrated in occasional severe seasons.

The economics of suppression were determined using a model called AIRPRO originally developed for the Canadian Forestry Service, which was extensively modified for Australian conditions. A sample of 990 fires was drawn from the fire reports of the bushfire seasons between 1978-79 and 1982-83. While it concentrated on Victoria, the model can be applied to other regions.

Suppression of fires was simulated in the model, firstly using ground control only, and then a number of different aircraft. Eight airtanker types were tested, and figures produced from the model weighed operating costs against savings from stopping the fires in a smaller area than would have been the case using only ground suppression measures.

The savings by the successful aircraft were still less than three percent of historical losses and savings for all aircraft were heavily dependent on success on a small number of fires. All aircraft failed on the major fires of Ash Wednesday in 1983.

Major savings usually relied on first attack by the aircraft before the first ground crew arrived or before the ground forces had built up to full strength — and attack in the morning before the fire spread rate and intensity had reached their peak. The overall cost effective aircraft had limitations and could not be economically used on most fires during the study period. In these cases, it was more cost effective to have the fire controlled by ground crews.



The DC6 dropping a load of fire retardant over a Victorian forest.

CSIRO experience for future science teachers

As part of a new push to work more closely with the education sector in Australia (see also story on Double Helix club), State departments of education are being encouraged to make greater use of CSIRO's resources.

An ideal way of doing this is to have student teachers spend time in CSIRO divisions participating in research projects so they gain practical experience and up-to-date knowledge to pass on to their pupils.

CSIRO already has links with the departments and scientists sit on various curriculum panels, but now the Organization wants the departments to indicate their desire for a larger interactive program.

Individual divisions already co-operate with schools from time to time and it's hoped this eventually will be expanded in all research areas.

Small groups of science teachers could visit CSIRO divisions for first hand experience of the research environment and the application of science to industrial and other problems.

Through this work, they could also develop small research projects for their students.

The prospect of teachers participating in CSIRO projects was first raised publicly by the Director of Information and Public Communication Mr Peter Dunstan in January.

He was addressing a meeting of the Australian Association of Directors of Teacher Education Institutions at the Gold Coast.

Already, the Division of Atmospheric Research at Aspendale has established a collaborative program with the Mentone Girls' Grammar School for a project on satellites.

Scientists at the Division provided background information and access to textbooks. The teachers and students built an antenna capable of receiving satellite signals and also visited the division to see CSIDA.

Food research likely growth area from '87/88

The committee reviewing the Division of Food Research has recommended higher Executive priority be given to work at the Division.

The report, which went to the Executive in December, said Food Research has been experiencing a period of 'unprecedented difficulty' with declines in secure funding only partly compensated for by short-term contributory funds.

'In view of the present and prospective pre-eminence of the processed food industry within the manufacturing sector, the committee believes it would be in the national interest for strategic research for the food industry to be accorded a higher priority by CSIRO,' said the report.

Following Executive consideration of the report, the Division is now preparing a proposal for making strategic research for the food industry a possible Executive growth area for 1987–88.

The review committee praised the Division's high standard of research and input into the food processing industry, which constitutes more than 20 percent of all Australian manufacturing.

Mainly minor variations in structure and composition of the Division have been recommended. However, the report urges greater interaction with industry and a more entrepreneurial approach. Also, a recommendation to shift responsibility for the seafood research laboratory in Tasmania to the Division of Fisheries Research has been accepted by the Executive.

The report recommended the termination of only seven of the Division's 127 current programs.

The Division has not been subjected to external review for 17 years.

From the Chairman

A column by Dr Keith Boardman

I hope that all staff have enjoyed their vacations and are refreshed and re-invigorated to face the challenges of 1986. The Government and the Minister have high expectations that CSIRO will play an increasingly important role in bridging the gap between research at the cutting edge of science and technology and its application for the benefit of Australian industry and the Australian community.

The year ahead can be seen as a new phase in the history of CSIRO, with the implementation of the policies developed by the Executive in the strategy document, the implementation of recommendations of the ASTEC review and the appointment of a new governing board following government decisions on the ASTEC review.

The main challenge for the Organization in 1986 is to achieve closer linkages between our researchers and the users or potential users of the research. The maintenance of the high quality of the strategic research effort of CSIRO and the effective application of the research for industry and community benefit is vital to the improved competitiveness of our industries. Although the rural and mining industries have recognised for a long time the crucial importance of high quality R&D in Australia, it is only recently that manufacturing industry in Australia has started to appreciate the need for an innovative R&D effort.

The 150 percent tax deduction for R&D should mean a substantial increase in company R&D budgets, but what fraction of that increase will represent a real expansion of the R&D capacity as distinct from the transfer of current expenditure to the category of R&D remains to be seen. There is an expectation of Government that CSIRO will be successful in attracting many more contracts from industry, particularly from the smaller firms that may find it more attractive to contract out their R&D needs rather than establish substantial in-house R&D.

I am sure arguments will be advanced by the Government's advisers in the Department of Finance that our appropriation funding could be reduced because of our potential to obtain contracts from industry. But such a move would be contrary to the recommendation of the ASTEC review that CSIRO's appropriation be maintained. It would inhibit our ability to further establish good collaborative projects with industry, and do nothing to raise the R&D in Australia to a level more in line with those of the industrialised nations. I believe it essential that CSIRO's appropriation funding be maintained particularly in the year following the ASTEC review in order that the new governing Board will have the flexibility to set some new directions for the Organization. Institutes should be setting targets for substantial increases in external funding over the next few years, and actively seeking funds from industry. I believe that in the longer term, support from industry will strengthen the case for increasing the level of strategic or basic research in CSIRO.

My first major address as Chairman will be later in the month to the Adelaide Symposium of the Australian Industrial Research Group on 'New Technologies for the Economic Development of Australia'. I will be presenting a strong case for the role of strategic research for industrial applications in Australia and the competitiveness of Australian industry. The release of a new booklet on CSIRO's research for manufacturing industry will coincide with the symposium; the new colourful edition of CSIRO in Brief also will be available to participants in the symposium.

The procedures for handling the ASTEC reviews have been agreed, the cabinet submission relating to the report on CSIRO will be handled by the Prime Minister and the Minister for Science. The controversial issues are the structure and method of appointment of Board members, the continuation of the Advisory Council and the State Committees and CSIRO's relationship with the Public Service Board. Cabinet decisions on the review are expected by the end of February and it is hoped the necessary changes to the Science and Industry Research Act can be passed through parliament during the Autumn Session.

I have left my travelling to a minimum during the past three months because of the review, but as soon as the cabinet decisions are taken I intend to travel extensively to meet staff as well as industrial and community leaders.

A Keith Boardman

Dear Editor,

What troubles me most about the ASTEC report on CSIRO is that it appears to be based on two doubtful economic assumptions: a) that there is a simple causal relationship between technological research and national wealth and b) that if our research is good, we will be able to produce and sell our products overseas in large quantities. The first assumption is only partially correct because heavy capital investment is needed to make a market impact overseas and such capital may not be available. As for the second assumption, the reality is that our economy is at the mercy of extremely powerful external decision-makers over whom we have no control. We simply cannot take our ability to sell for granted when: 1) massive overseas companies are playing the currency markets by the minute; 2) if we happen to stand up for a democratically determined principle which a major trader dislikes, there will be overt or covert economic retaliation; 3) three major overseas markets — Europe, Japan, and USA — are highly protectionist; and 4) the world banking system is skating on the thinnest of ice. What we needed was a report based on a variety of future economic scenarios. What we have got is one which may prove to be based on false or rejected economic thinking. Recovery by CSIRO from such an error could prove impossible unless some bet-hedging is built into the new arrangements.

Clive Hackett
Div. Water & Land Res.

Dear Editor,

I have just read *CoResearch* No. 287 December '85, sent to me through an arrangement made by the association of CSIRO retirees in Canberra.

I joined CSIR Commonwealth Research Station in Merbein in February 1931, Officer-in-Charge A.V. Lyon. I made the third scientific member in a total staff of six. Soon after I started, Bill Lyon told me quite seriously 'You have to make up your mind whether to be scientific or be practical'.

When I arrived in Canberra in late 1959, the slogan was simply 'Publish or perish!' I was fortunate that at that time I was a member of a forerunner of your Science Communication Unit, ARLS (Agricultural Research Liaison Unit).

It is fascinating to me that after more than 50 years a top line committee charged with reviewing CSIRO has come around to agreeing with Bill Lyon that the main function of CSIRO should be to 'be practical'.

Perhaps it will be much less than 50 years when another expert committee finds that the main function of CSIRO is to 'push back the frontiers of knowledge'.

D.V. Walters

Info and Policy Pointers

Staff occupying CSIRO houses should refer to policy circular 85/40 for information on an allowance now payable for moving expenses.

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Refer to information circular 85/100 for details of the multi-site licence for the new TRIM Records Management System for use in divisional registers on NGEN computing equipment.

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Details of authorised public holidays until 30 June this year are available in information circular 86/1.

###

Officers planning itineraries in the United States may need to know holidays to be observed this year by the Australian Embassy in Washington. Refer to information circular 86/2.

###

Terms of reference for the review of the Division of Applied Physics are outlined in the information circular 86/4.

###

Refer to policy circular 86/6 for new directives on contractual dealings with South African sources.

Letters to the Editor

***In this month's special comment section (in column at left), correspondents discussing the ASTEC report released late last year and detailed in the December issue of* CoResearch.**

Now for something completely different. In March we would like to hear your views on scientific aspects of President Reagan's strategic defence initiative, known more colourfully as Star Wars. Many scientists have claimed that a large number of basic scientific breakthroughs are necessary for the idea to be practical, but Reagan is sticking to his guns. Once again, please limit your letters to 200 words. Don't forget that letters on any other subject are also welcome.

Dear Editor,

According to the lead article in November 1985 *CoResearch*, the transformation toughening process in partially stabilized zirconia was discovered in 1974, 'when a group of scientists lead by the late Dr. Neil McKinnon stumbled on a phenomenon—'. We object to this inaccurate and demeaning description our work. Dr McKinnon assembled this and other teams, and was responsible for their administration. The group leader of this team was R. Garvie who, prior to coming to CSIRO, had been involved in research on zirconia materials for eleven years.

The discovery and development of transformation toughened zirconia was a natural consequence of the intense effort by a team working to achieve a goal. True, there was an element of luck because a furnace used to prepare selected samples had the correct cooling rate to generate the toughening mechanism. This good fortune meant only that the phenomenon would have been discovered later rather than sooner because cooling rate is a natural variable to be studied in this type of work.

R C Garvie
R H J Hannink
R R Hughan
Division of Materials Science

Dear Liz,

I have just seen a copy of the feature which you have run on this Division, and I am writing to express my delight and appreciation. I think you have done an excellent job. I couldn't have had a better Christmas present.

With Very Best Wishes,
Frank A Blakey
Division of Building Research

A Matter of Opinion

This month's contributor to our point of view column is principal research scientist from the Division of Human Nutrition, Dr David Topping.

I suppose I was asked to contribute to this column because I have definite views on some subjects — just like George Fisher who kicked off this series. The subject I have chosen is similar in some ways to George's because it relates to the public perception of CSIRO. I am going to address one of my hobby horses, science funding and the need for CSIRO staff to lobby hard at all levels so as to raise the level of public and political goodwill towards CSIRO.

Since joining the Organization in 1977, it has never ceased to amaze me how valuable CSIRO is to the nation. Before coming to Australia I worked for the British Medical Research Council, one of several automonous Government research councils in the UK. Each body had its own (fairly substantial) bureaucracy and separate research facilities. As well as being physically separate it also seemed to me that the scientist of one council hardly ever communicated with people working in related areas in other councils. The opposite is true for CSIRO. In spite of cries from research workers for a post to be dug into the forecourt of Tombstone Avenue and a firing squad to get to work, the bureaucracy in CSIRO is relatively small. There is a high degree of interchange between people in different divisions and institutes. All of which means that CSIRO allows a moderately poorly populated but geographically enormous country to carry out research and development of international standing for a modest outlay.

As an Organization, one of our big problems is that although the general public still has a hazy kind of reverence for CSIRO, the average citizen has little or no knowledge of the Organization's current objectives or achievements. In fact, all too often we are confused in the public's mind with a large sugar corporation. Even worse, we are rated as an almost negligible quantity by nearly all Federal (and State) politicians. To me, at least, the latter point is the explanation for the apparently never-ending stream of Federal budgets in which funding for CSIRO has been cut either actively or by default.

The impact of these adverse budgets on divisions is fairly obvious to us all — losses of staff (particularly support personnel), non-replacement of equipment, the postponing of building programs and so on. Obviously the 1984 Federal Budget was the last straw and then we actually saw CSIRO staff protesting in public at the cuts forced on them. Their efforts must have had some effect as the 1985 allocation for the Organization was not bad — although that is not to say it was positively good. However, I don't think public protests are a particularly effective long term means of guaranteeing a stable environment for research and we in CSIRO have to appreciate that we need to work at getting our research dollars, as well as taking care of our other duties.

The experience of the OA in this area of lobbying is quite interesting as well as educational. For the past few years the Association has been educating politicians of all parties by getting them to visit OA members at work and finding out what they did. These visits started almost by accident in South Australia when we found that a Senator would like to talk to us in her offices but was rather busy. When a lab visit was suggested instead, the response was quite different and since then there have been many similar meetings, first in South Australia and now in the ACT, Victoria and New South Wales.

I am not suggesting that these visits are enough by themselves, far from it. While Barry Jones has raised the public profile of science, lots more needs to be done. At a recent game of Trivial Pursuit the other participants thought I had an unfair advantage. Apparently these otherwise well-educated people included art, sport and literature in general knowledge, but not science and technology. This attitude is hardly encouraging and is probably very common, particularly among those people responsible for making politically important decisions. How many politicians or senior public servants have a science background? Very few indeed as nearly all of them are merely lawyers or economists. It is essential for all of us in CSIRO to educate these people as well as the wider community so political decisions on science and technology are not made in a vacuum. Lack of knowledge must not remain as an excuse for any further errors of national science policy, particularly as it affects CSIRO.

CSIRO Double Helix Club aims for 1000 members

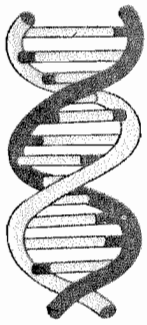
It's been estimated that about 25 percent of the Australian population has some connection with the education system, whether as parents, students, teachers or administrators.

Dr Michael Dack, head of the Science Communication Unit's community interest section, said 'if CSIRO wants to raise community consciousness of science in general and CSIRO in particular, what better group to work with'.

With this in mind, a new science club for students called Double Helix has been formed.

The club is for people aged between 10 and 18, and in 1986 a maximum of 1000 members will be enrolled.

It will be self-supporting through an $8.50 levy for members. Apart from stickers, badges, etc, members will receive the quarterly newsletter (edited in Canberra by Ross Kingsland) and have the opportunity to take part in excursions competitions, film



nights, astronomical observations and special activities in Adelaide, Melbourne, Sydney and Parkes.

CSIRO will be using teachers already in place at its Melbourne and Adelaide Science Education Centres and staff at the CSIRO Astronomy Education Centre at the Parkes radiotelescope to run the activities of the club. It's part of a drive to extend the skills and resources of the centres to a broader audience.

The call has gone out for interested students, and even at the height of the Christmas school holidays enrolments were being received 'over the counter' at Parkes.

Reaction will be gauged this year and the club will expand if the idea takes off.

Already, negotiations are nearing completion for CSIRO science education centres in other parts of Australia. Hobart and Brisbane centres look likely to open this year. This will allow more enrolments in the club and a wider variety of activities.

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Sirocredit starts up

The Canberra based Laboratories Co-operative Ltd is amalgamating with the CSIRO Credit Society in Melbourne to form Sirocredit.

Dr Don Gibson and Mr Howard Crozier, chairmen of Melbourne and Canberra boards respectively, said 'the majority of Canberra members obviously could see the advantages of uniting two already strong credit societies'. The decision was taken at a meeting on 28 January.

David Parker and his staff will continue operating the Canberra office with the usual service.

Melbourne's ability to offer free cheque accounts, Visa cards and a range of other sophisticated financial services at no greater unit cost per member were major factors in the decision.

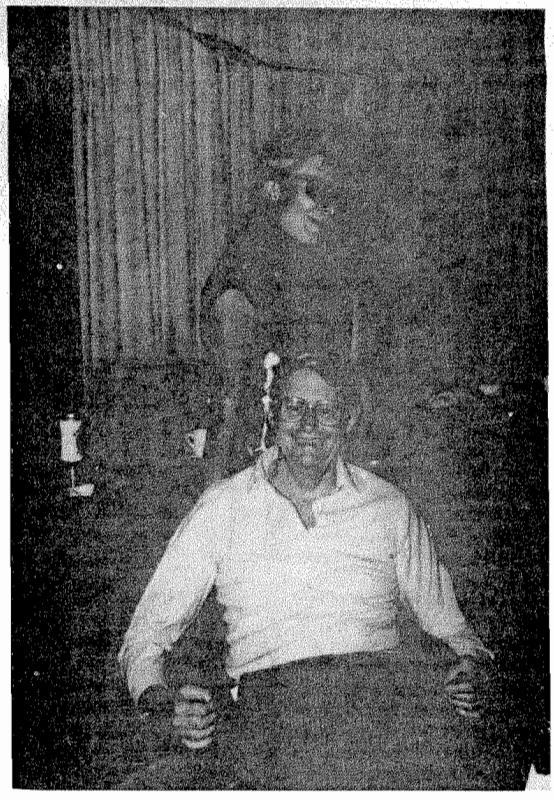
Canberra members soon will be asked to sign forms transferring their assets to Melbourne. Those with loans will have them paid out by replacement loans on the same terms from Melbourne.

Once the transfers are complete the Laboratories Co-operative Ltd will be wound up.

The Sydney-based CSIRO Credit Society has shown interest in a similar move and it's possible in the future Sydney will merge with Sirocredit.

Caption competition

As the artist said to the Chairman



Why was the Chairman gripping the arms of his chair so tightly? Was it something to do with the evil look on SCU graphic artist Sara Twigg-Patterson's face? Put your own interpretation on the events of the Headquarters 'Black Friday' Christmas party (which incidentally provided plenty of material for funny — and occasionally actionable — photos). The author of the wittiest caption will not only have her/his work published in a NATIONAL newspaper (well, CoResearch does go all around Australia) but will also receive SIX EXTRA copies to give to friends and family. Send your captions to the Editor, Liz Burden, before Monday 24 February. The address is on the back page of this issue.

CSIRO makes an exhibition of itself

In its biggest move ever into the realm of exhibitions, CSIRO will stage three major displays between August this year and March 1987. It's part of the effort to improve exchange of information with outside user groups and the general public.

1. Guest Exhibitor at the Australian National Field Days at Orange 11-14 November 1986

Usually this honour is reserved for a country (eg. China, United States, New Zealand) but this time CSIRO has been selected.

It will be the biggest and most expensive exhibition CSIRO has ever staged, with half the Organization's divisions involved in some way. The Executive has allocated $100 000 for the event, to demonstrate to Australia's rural sector that the latest emphasis on manufacturing industry does not mean agricultural research has been put on the back burner.

About 50 scientists will be on hand at the exhibition, to perform various on-the-spot analyses of crops or soils for farmers and to give scheduled demonstrations of new processes such as biological defleecing .

Dr Michael Dack is project leader and, together with SCU graphic artist Brian Gosnell, will design the exhibition around the theme 'CSIRO: Science for the Rural Community'.

The Orange Field Days are at the top of the rural community's field day calendar, with attendances now standing at around 60 000. Extensive coverage in the rural media is assured.

CSIRO will display its technology and services under the sub-themes of wool research, biotechnology, animal health, weed and pest control, soils and water, computers in agriculture, quality of agricultural productions, remote sensing and new plants and crops.

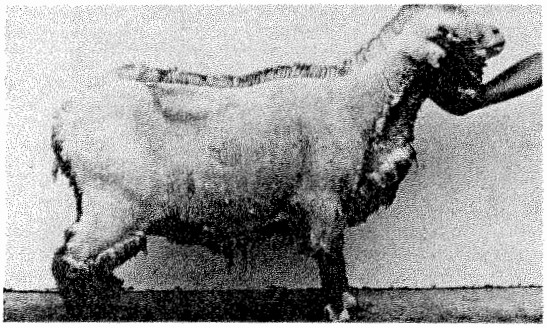
A special issue of *Rural Research*, covering these themes in separate chapters, will be produced for the event.

Co-ordinators at nine divisions are working on the subjects and working up suitable displays and schedules for each section.

The exhibition wil be housed in the main pavilion at the site, and a marquee will also be erected to provide additional space.

2. Westpac Banking Museum Guest Exhibitor from August 1986

This five-month exhibition (announced in *CoResearch* 285, October '85) is now likely to feature a *son et lumiere* (sound and light) display to highlight CSIRO developments.



Half of this sheep has been shorn using biological defleecing. This process will be one of many CSIRO inventions on display.

The theme of the whole exhibition is 'CSIRO: Responding to a Nation's Needs' and it's aimed at showing the public how the Organization has tackled various problems and found innovative solutions.

The three firm sub-themes are: science for farm and factory; new materials, new techniques; and protecting our environment. Two more sections, based on the ideas of tomorrow's world and maintaining our standard of living, are being finalized.

3. The inaugural International Technology Exhibition 3-7 March 1987

CSIRO has purchased 120 square feet of space at this exhibition, which is being held in Canberra.

It's hoped the event will become the technological forum for Australia and the Pacific, servicing buyers and sellers in industry, commerce, the professions, sciences and government.

The Executive has allocated $75 000 for CSIRO's display. Like the Orange Field Days, scientists will attend to perform demonstrations and discuss their work.

The theme is — 'Technology for Australian Industry'. At present sub-themes are being considered to illustrate this — eg. manufacturing technology, biotechnology, space science and technology and processing raw materials.

Specific items such as, insecticidal esters, PSZ, robotics and the Synchro-pulse welder will be on display.

While much attention will be given to making the display boards interesting and visually attractive, the emphasis will be on the scientists and the working demonstrations.

The CSIRO Benevolent Fund: working behind the scenes

The difficulty with writing about the CSIRO Benevolent Fund is that there's not much which can be said on the record.

Preserving the privacy of people seeking financial assistance is paramount and the work of the fund is necessarily behind the scenes and low key.

While an essential feature, this means that people new to the Organization may be unaware of the fund's existence, or more likely, so bombarded with paperwork when they first start that they overlook the deduction authority form which enables fund contributions to be taken out of their fortnightly pay automatically.

Numbers of contributors have been declining in recent times (for instance, in Canberra they now stand at a disappointing 55 percent of total staff numbers).

It's not that people baulk at the contributions, which are either five or 10 cents per week depending on your location, but probably that they do not get around to filling in the form.

Former BF Canberra chairman Dr David Goodchild said despite falling contributor numbers, there's enough money to cope with more requests than received at present.

The only criterion for allocating assistance is 'need', said Dr Goodchild.

'There's no definition of need. It's open to suggestion,' he said.

The aim is to help people as quickly as possible and avoid bureaucratic red tape. Requests are handled by site representatives who forward details to the fund management committee for approval. However, reps on the spot have some discretion to act more promptly in an emergency.

Assistance may be in the form of a grant to cover bills, an interest-free loan or even advice on how to cope with a difficult financial situation. BF seeks expert opinion from outside the Organization, such as the debt counselling service in Canberra, CARE.

All staff

He emphasizes the fund is open to all CSIRO staff and retired staff members, whether they have contributed or not. All requests are considered on their merits.

The fund started soon after Sir Frederick White came to the new Division of Radiophysics in Sydney in 1941. It spread to other Sydney divisions over some years and eventually took root throughout the Organization after Sir Frederick became CSIRO Chairman.

Apart from direct financial assistance for staff members, the fund also provides gestures of sympathy such as flowers for bereavements and gifts for people in hospital. Hospital visits are arranged in some areas.

All CSIRO sites have fund representatives. Staff should contact their staff clerks for appropriate names and numbers.

DBR does it again

***Reader response to the Division of Building Research 'funny phone calls' in the December '85 issue of* CoResearch *has been so favourable that this month we are including another prime example of DBR humour. This time it's the best of Murphy's Corner, words of wisdom which regularly appear in the Division's newsletter* Rebuild.**

'A dropped tool will always land where it can do the most damage (also known as the law of selective gravitation)'

'An expansion joint shall always be located at a point where maximum contraction occurs'

'In simple cases where one obvious right way is opposed to one obvious wrong way, it is often wiser to choose the wrong way right off. This is one step ahead of choosing the right way, which turns out to be a wrong way, which has to become a right way'

'Where two gauge rods are used during the construction of a brick wall, they will be found to be identical in all respects except for their markings'

'A continuous flashing will be continuous between gaps'

'Compounds to be applied in accordance with manufacturers' instructions will be supplied in unmarked tins'

'The commencement of site work requiring two weeks of still, dry weather will always be associated with the approach of a cyclonic depression'

'Do not believe in luck — rely on it'

'For greater economy, the announcements of future meetings will be forwarded with their minutes'

'It is impossible to make anything foolproof because fools are so ingenious'

'Components that must not and cannot be assembled improperly will be'

'All tins labelled 'mould oil' contain hydrochloric acid, or retarder, or diesel fuel — or a mixture of all three'

'Design details marked 'AS REQUIRED' will only be required when omitted'

'Manufacturers' specification sheets will be incorrect by a factor of 0.5 or 2.0 depending on which multiplier gives the most optimistic value. For salesmen's claims, these factors will be 0.1 or 10.0'

'A carefully selected matching colour won't'

'Available research information for design purposes will always be expressed in the least usable form (eg. velocity will be expressed in furlongs per fortnight)'

The Creationism debate continues

A number of letters were received on the December special subject, creationism. Because of space restrictions, many had to be held over, and most of these now appear on this page and on page 12. Apologies to people whose letters have still not appeared — we will try to run them later in the year. Please note correspondence on this issue is now closed.

Dear Editor,
Although *CoResearch* is an internal staff newspaper, the debate in the December issue about whether l'Academie Francaise could conceivably have evolved from a Consomme aux Amoebes (or was created by Cardinal de Richelieu) is so irrelevant to the tasks of CSIRO, that outsiders, who may happen to read this, may well wonder what actually does occupy the minds (and working hours) of those regiments of super-scientists, who assert that the wealth of this nation ultimately depends on their astute (or cute?) discoveries.

Not only that a basically theological debate seems less appropriate for a CSIRO paper than an intellectually stimulating bridge column (like CSIRO, bridge is concerned with a rational, systematic, asympototic approach to unpredictable statistical variability), but also the calibre of selected letters makes one wonder about the supposed super-brains of CSIRO's researchers (thought-provoking letters indeed).

R H Hill of Atmospheric Research has his head well and truly in the clouds, when he concludes that the presence of human artifacts in a coal seam proves that the seam post-dates the artifacts, and (sin of sins) omits to give a reference. And why should Archbold Geomechanics (a name with the ring of the Niebelungen as well as Peloponnesus) spoil his arguments with emotive words and an obvious grudge against the USA? Then there is Forster of CILES (I prefer Fosters by miles) drowning whatever obscure thoughts he might have in even more obscure sentences. Taplin, like a Chaplain from Mineral Waters and Theochemistry, ponders Liz Burden's agony: must Religion be backed by Science, and Science by Religion? Fair but unprofitable, he concludes, and no businessman would disagree.

As is to be expected, the deepest thoughts on this matter, which causes the nation so many sleepless nights (was I created immaculately, or did I evolve from lust?) come from Groundwater Research Davis, always hearty and salty when surfacing.

My view? Don't escape into the Supernatural, when baffled by the Natural. Don't Pass the Buck to Creation. Don't read the Comics and believe in Superman. Probe the mysteries of Life, Earth and Stars with your feet on the ground but wonder in your eyes. Fact beats Fiction anytime.

H A Haantjens
(Former Inmate)

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Dear Editor,
Current creationism is a reaction by a few Christians against science and the dogmatism of some scientists. Whereas Christians need not fear the results of scientific study, there is cause to fear the effects of dogmatically dismissing the possibility of evolution being God's way of creation. Such an attitude alienates many potential Christians, especially students. It also may prove to be a repetition of old errors made by the established church. In the past, for example, it rejected Galileo's theory that the earth circled the Sun, not the reverse. The basis was Psalm 104:5, 'teaching' that the earth is stationary!

The eventual acceptance of a sun-centred universe was a blow to man's pride. No longer was his world at the centre, with sun, moon and stars revolving around him. Surely God was teaching man a lesson of humility!

Perhaps God has another lesson to teach us today — that man's body is merely a shell for his spirit, the real person. God created man in His own image, a living soul. If the shell for this spirit had a similar progenitor to the apes, it is a blow to our pride. Yet, if so, it accentuates Christ's teaching on the importance of spiritual values compared to outward show and materialism.

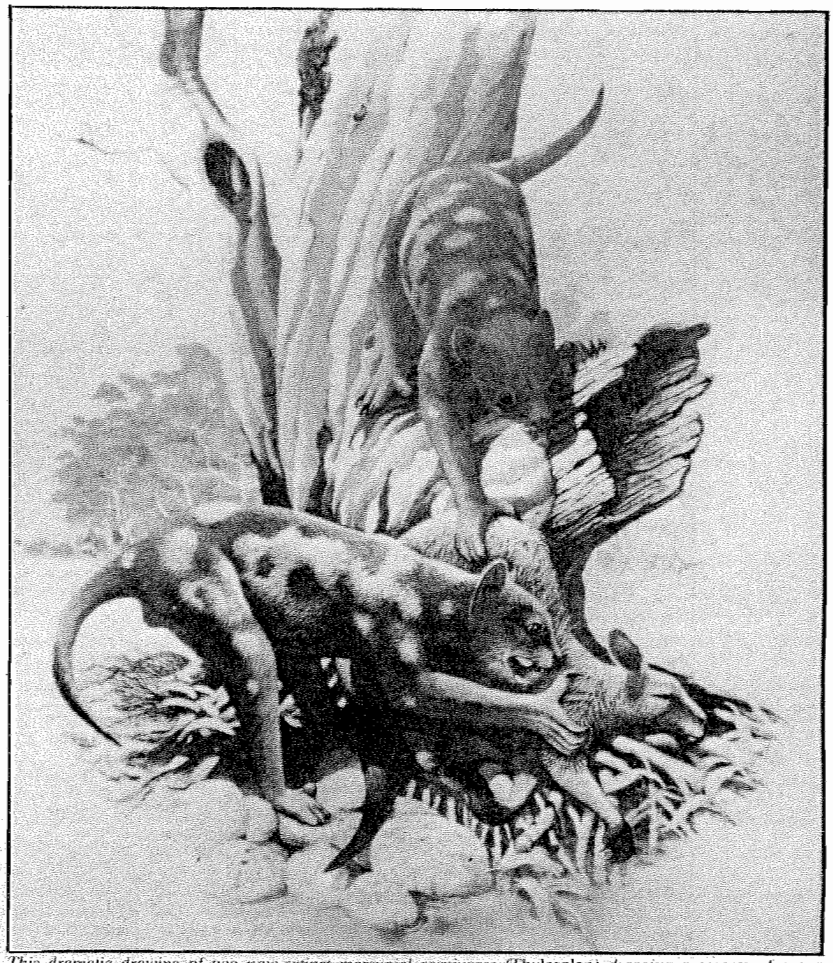
Christians accept that God made the universe as a matter of belief. This belief is not blind, but should be based on a daily experience of God's reliability in their lives.

Science cannot prove that God was the creator. On the other hand, science cannot disprove this belief, either. The scientific method can, however, be applied to studying the question of *how* the world was made. That question goes beyond the realm of belief into the domain of science.

Colin Wrigley
Wheat Research Unit

Dear Editor,
I fail to see why there is such a fuss about creationism/evolution. The species may be regarded as having been brought into existence (created) by development from earlier forms (evolution). In other words creationism and evolution are completely compatible if evolution is seen as the path to creation and timing is not taken too literally!

Geoff Wines
Headquarters



This dramatic drawing of two now-extinct marsupial carnivores (Thylacoleo) dragging a carcass of a grey kangaroo, is by CSIRO artist Frank Knight from the Division of Wildlife and Rangelands Research. Frank contributed 32 detailed colour plates, each taking 20 to 30 hours, to a new book called Kadimakara — Extinct Vertebrates of Australia edited by Dr Pat Rich from Monash University and Dr Jerry van Tets from the Division. Work on the drawings started after Frank was given a CSIRO Overseas Study Award in 1980. During his trip he was shown the original mural, The Age of Reptiles, by one of the doyens of fossil art, Rudolph Zallinger, at Yale University's Peabody Museum in the United States. Zallinger won the Pullitzer Prize in 1949 for his work. Kadimakara, which is now on sale in bookshops for $45, outlines not only current knowledge of Australia's strange prehistoric vertebrates but also traces the intriguing story of how the discoveries were made, and the often conflicting views about the evidence.

The ASTEC Report part 2: 'boost private R&D but don't cut government funding'.

The vexed question of private sector research and development in Australia is addressed in ASTEC's second report to Parliament on the state of Government-funded science.

While urging more industry research involvement, particularly at the tactical end of the spectrum, the report said the prevailing conditions in Australia make this difficult and change probably will be slow. The current level of government funding of science should at least be maintained, it said.

At present, CSIRO and the five other major Government-funded scientific organizations* account for 90 percent of Commonwealth performance of R&D. While government funding of R&D is on a par with comparable OECD countries, the level of *private* R&D in Australia is far lower.

With Australian science so dependent on the ebb and flow of government funding, we are in danger of falling further behind other western industrialized countries, particularly in the manufacturing sector, the report claims.

ASTEC believes current government policies (such as the 150 percent tax incentive) will eventually help to correct the R&D imbalance by creating a favourable climate for companies to boost their research activities.

However, it urges greater long-term planning to avoid the abrupt withdrawal of funds and subsequent lack of confidence.

Increased national export performance vital to further development of Australia will require a 'dramatically improved' performance by the manufacturing sector.

The report points to a need to encourage more applied research and experimental development in industry, while maintaining the level of public sector support for basic and strategic research.

'There has been a downward trend in funding basic research in universities in recent years, as a proportion of the gross domestic product, and this will have adverse consequences if allowed to continue,' the report said. 'Emerging technologies draw on basic research.'

'Australia can never perform more than a small part of the world's research and development, so that there will always be considerable reliance on imported technology. The challenge is to select and incorporate the best technology from whatever source and use it to develop products that are distinctively Australian and processes that suit our particular needs. The ability to use imported technology from whatever source and to adapt it imaginatively and in novel ways requires that we keep abreast of international developments.

*The other research organizations are: the Defence Science and Technology Organization, the Telecom Research Laboratories, the Australian Atomic Energy Commission, the Bureau of Mineral Resources and the Antarctic Division of the Department of Science.

The fact that Science Minister Barry Jones paid for his own official visit to Canada late last year attracted considerable attention from the media. While rather favourable publicity for the Minister, it did tend to overshadow the reason for the trip. Here Mr Jones gives his own account of the Ottawa meeting of minds.

Encounter at Meach Lake

The seven leading Western industrial nations have been holding 'summit' meetings of heads of governments since 1975. The best known have been at Ottawa (1981), Versailles (1982), Williamsburg (1983) and London (1984). The 'summit seven' comprise the United States, the United Kingdom, Japan, West Germany, France and Italy.

Because of a growing conviction that national economies are passing through a technological revolution of unprecedented magnitude and with unknowable social consequences, it was determined to hold a special meeting of 'summit seven' ministers.

As heads of government were not attending a less elevated title was adopted: 'International Meeting of Science and Technology Ministers'.

I was invited partly because of my writings and also for my (unreported) speech to ministers from 24 nations at an OECD Conference in Venice last April. This was Australia's first representation at a meeting arising from a northern summit.

We met at rambling Willson House at Meach Lake, 20 minutes by road from Ottawa, in the beautiful Gatineau Park, Quebec, lit by an Indian summer in the last days of glorious fall leaves.

To encourage vigorous debate it was agreed that no formal records would be kept, no final communique issued and that defence-related science and technology would not be discussed.

Our host was Canadian Minister for Science and Technology, Dr Tom Siddon, formerly an engineering professor in British Columbia. Four delegation leaders had been to Venice: Dr George A ('Jaye') Keyworth II, director of the US Office of Science and Technology Policy and Science Advisor to President Reagan; Dr Albert Probst from the Federal Republic of Germany; Senator Luigi Granelli from Italy and myself. Reiichi Takeuchi, Minister for Science and Technology, and Geoffrey Pattie, Minister for Industry and Information Technology represented Japan and the UK. France was unable to attend.

All the issues raised were directly applicable to Australia. Canada, especially, bears an almost morbid resemblance to the Australia scene: a huge country, with low population density and high labour and transport costs, rich in physical resources which are declining as a share in world trade, hesitant about making the transition to a high technology base, worried about high unemployment, especially in economic monocultures.

Canada also has a tradition of 'truncated development' with an even higher proportion of foreign ownership than Australia. She has the combined threat and opportunity of being part of the North American economy. The question of Canada's industrial future is as anxiously debated as the nature of Canadian nationalism, attempting to find links between French speaking farmers in Quebec, fishermen in the Maritimes and high-tech investors in British Columbia.

Dr Keyworth restated the themes of his Venice speech. In science and technology the US was 'no longer *laissez-faire*' and intended to move *away* from a free market approach, recognizing the need to 'target' particular technologies. Relying on the 'natural course of events' just doesn't happen fast enough. (This will be anathema to many Canberra trained economists and financial journalists to whom it is an article of faith that 'Governments cannot pick winners!')

Governments are often in an excellent position to judge general trends because of their access to a wide diversity of data, while businesses are inevitably quite limited.

Unique importance

'Talent and technology' are the only factors which can overcome comparative disadvantages in capital and labour costs. American industrialists, unlike our own, have now recognised the unique importance of science and technology to the national economic future. 'Science has never before moved with such speed and breadth ... Virtually every field is attractive.' Subjects like nuclear physics and optics, regarded as exhausted a decade ago, are now back at the forefront.

'All of us straddle two worlds — a technological world that stimulates change and a political world that resists it.'

Keyworth emphasizes the encouragement of basic research by Government, and promoting university-industry linkages. Under President Reagan, Federal resources have been shifted away from technology development and towards basic research.

In 1981 development claimed 42 percent of government-supported non-defence R&D; it was the largest portion of our Federal R&D budget. In just four years development became the *smallest* component — and basic research emerged as the largest. It's a shift so startling that some people still don't believe it.'

Government must, he says, 'keep the basic research pot bubbling'.

The time lag between basic research and industrial application is reducing. In optoelectronics the 1983 Nobel Prize discovery in chemistry is already at the application stage in industry.

The strongest emphasis is being placed on setting up multidisciplinary research centres. Curing atherosclerosis will depend on neurobiologists working with physiologists skilled in solving plumbing problems. Optoelectronics forces classical physicists into the same bed as electronic engineers and chemists. Artificial intelligence covers an ever wider range of disciplines.

Dr Keyworth describes this emphasis as a 'revolution' — essential 'leverage' on industry and academia and the 'single most important initiative' by the Administration in R&D.

The objective is to create a broad problem-solving environment. University disciplines and the product sector of industry have both been 'vertical' in their preoccupations, but lateral relations are now far more important.

Slide-rule manufacturers never recognized that pocket calculators would make them obsolete overnight. The Swiss watchmakers recognized too late that precision mechanical engineering would simply be irrelevant. Where the Japanese have done best, they have started with virtually a zero base.

Mr Takeuchi, in his paper, confirmed Japan's funadmental change in direction in R&D. The familiar stereotype of the Japanese as assiduous disseminators of other people's fundamental research had much historical validity. It worked in the 1960s and 1970s. However, Japan recognizes that it no longer works in the 1980s and would be a recipe for disaster in the 1990s. The emphasis now is on long term

Cont. on p.16

Tech Talk

An occasional column by CSIRO technical staff. Readers are invited to contribute.

There are innumerable instances when information present in one computer needs to be transferred to another. If the computers are the same, this is not a problem. But with the proliferation of computers these days, most Divisions end up with a myriad of incompatible machines. Most computers do however have two universal features — namely outlet plugs (RS 232 serial parts for the technically minded) and a common language (ASCII). Using these features Mr Alex Bendeli of the Division of Applied Physics has developed a black box which allows simple and quick transfers of information from one computer to another. The device, called a transient interfacing peripheral (TIP), uses a 'bubble' memory to retain data, and was fully discussed in *Industrial Research News* No. 170 (May 1985). The 'bubble box' has many uses but the most widely used application is for transferring material from scientific computers to secretarial word processors. This cuts the key-stroking in half and reduces the likelihood of RSI. (For material which is to be phototypeset it reduces the key-strokes to one-third!!)

The device, which stores about 70 pages of A4 (128 k bytes), costs about $1000 and so far the Division has made about 30. We have tried to find a commercial supplier but nobody seems interested in making them. If you do know of a potential manufacturer please contact Paul Hewitt (02) 467 6322.

News from the divisions — a round up of media releases

Tropical Crops and Pastures: The proceedings of the International Savanna Symposium, held in Brisbane more than a year ago, are now available. The conference focused on ways of making the best use of the world's tropical grazing lands. The proceedings have been published with the title, *Ecology and Management of the World's Savannas*, and are available from the Tropical Grassland Society of Australia, C/- the Division in Brisbane.

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Animal Health: A new, cost-effective worm control program called Drenchplan is now being marketed to sheep producers in the southwest slopes of NSW. The program is based on field research by the Division and developed in association with the NSW Department of Agriculture and local pasture protection boards. Drenchplan is directed against black scour worm and brown stomach worm. It soon will be extended to other parts of the state.

###

The Division also has experimentally tested and patented a new vaccine against the most common form of mastitis in dairy cattle. The vaccine is the result of more than 10 years' is intensive research. The advantage of this new vaccine is that it contains no live bacteria unlike an earlier version. Sirotech is now seeking a company to manufacture it in Australia.

###

Tropical Animal Science: A prominent Queensland grazier, Mr Richard Wilson, said CSIRO research to improve the efficiency of beef production in northern Australia is now in tune with industry needs. Mr Wilson is chairman of the Divisional Advisory Committee which has worked closely with the Division in developing a strategic plan for research during the next five years.

###

Textile Industry: The presence of vegetable matter contamination in wool and the problems of its removal during worsted processing are covered in a report released by the Division. *Report to Topmakers V: Aspects of Vegetable Matter Removal on the Worsted Card* is the latest in a series of reports directed at the topmaking sector of the wool processing industry. The Division has also released a report on baling and scoured wool processing performance.

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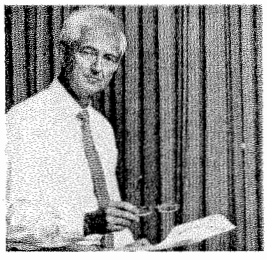
Division Feature *Atmospheric Research*

DAR — greater industry involvement part of strategic research push



DAR Chief, Dr Brian Tucker

The development of new ideas to be applied to problems of weather, climate and atmospheric pollution are the hallmarks of the Division of Atmospheric Research, which has existed for nearly three years.

There has been a change in emphasis since the days of the Division of Atmospheric Physics, towards more strategic and industry-oriented research in line with CSIRO policy.

In 1981 Atmospheric Physics (which had been established 35 years before) amalgamated with the Division of Cloud Physics and part of the Australian Numerical Meteorology Research Centre to consolidate CSIRO's atmospheric research at Aspendale in Melbourne.

Dr Brian Tucker, who had headed Atmospheric Physics, became Chief of the new Division.

DAR has established strong ties with industry as well as government bodies and has a close relationship with the Bureau of Meteorology, particularly at the working level. Dr Tucker believes the Bureau is doing a very good job in weather prediction, with limited resources. He admires the scientific interpretive skills of the professional 'on the bench' meteorologists in the various forecasting centres around Australia..

DAR scientists work well with the Bureau's new research centre set up to improve operational functions, but Dr Tucker believes the Bureau could make better use of the skills and research achievements in CSIRO. 'We have to show more and more relevance for what we do,' he said, 'so we are increasingly concerned with the maximum advantage being taken of our research into atmospheric pollution, weather and climate'. Naturally this leads to occasional differences of opinion but these are largely on policy matters.

'Having worked in the Bureau I have to say I admire the scientists who work there and are able to get research done because the working environment must be primarily concerned with providing a service,' he said.

Increasingly, the Division is becoming involved with industry. The two components of it's remote sensing and imaging CSIDA system are being manufactured by two companies and the lidar device used extensively at DAR (see separate stories) also looks like being manufactured commercially.

The Division also has expanded its program of strategic research to include a section of the new National Bushfire Research Unit (administered by the Division of Forest Research — see *CoResearch* 286, November 1985) and apart from two Forest Research scientists, four DAR scientists will collaborate to conduct bushfire work at Aspendale.

First time

Apart from some basic work a decade or so ago examining bushfires as sources of convection, it's the first time DAR has taken part in this kind of research.

Specifically, the scientists will be examining surface wind field models and drawing on DAR's extensive summertime cold fronts research program to help with understanding the conditions which led to, for example, the devastating Ash Wednesday bushfires in Victoria and South Australia. It also will be concerned with the satellite monitoring of regional bushfire potential.

The research program for the Division is discussed and assessed by an advisory committee which Dr Tucker describes as 'a roaring success'.

DAR was one of the first CSIRO divisions to set up an advisory committee and it has now been in existence almost as long as the new Division itself.

The committee, headed by Hal Holmes (the Australian Chairman of Monsanto Chemicals) meets every six months. Until recently it included a Qantas 747 pilot, and his input included the suggestion that the Division should conduct a study of an airport in Australia to determine conditions which affect aircraft safety. Dr Tucker said this is a properly a job for the Weather Bureau, but DAR could take it on if resources were provided.

###

Photos in this feature have been taken by Divisional photographer, Mr David Whillas

'I've been here since 1965 and for the first four years was assistant director in the Bureau of Meteorology responsible for research and development.

'We didn't do much real research and development until it was decided to form a joint CSIRO/Bureau group which came to be called the Australian Numerical Meteorological Research Centre,' said Dr Tucker. Australian Numerical Meteorological Research Centre,' said Dr Tucker.

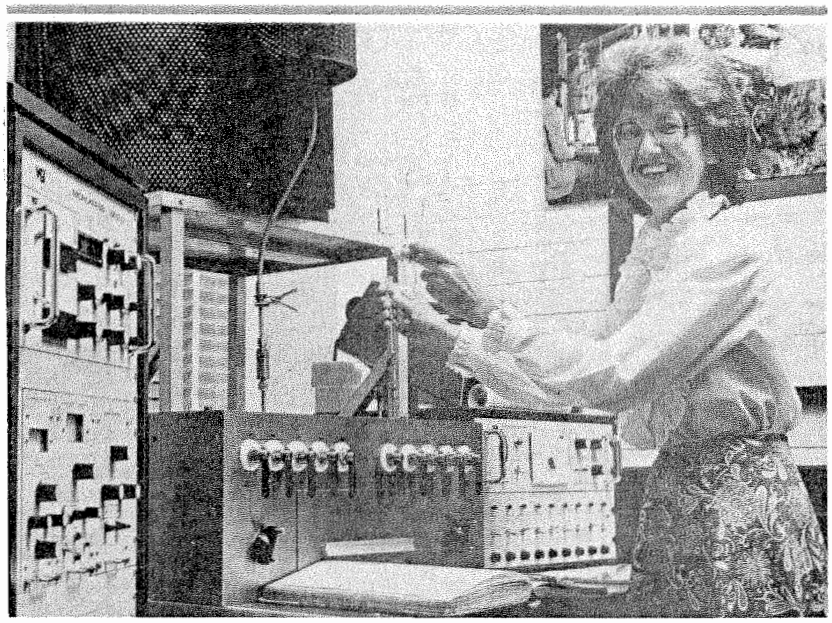
'That has proved to be an excellent example of co-operation between CSIRO and a government department.'

In 1972 Dr Tucker became Chief of the Division of Atmospheric Physics. 'That Division originally was concerned with micrometeorology but since then we have changed emphasis, moving up the scale of phenomena.'

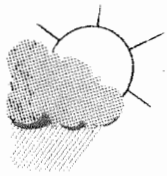
###

Division of Atmospheric Research
Chief: Dr Brian Tucker

- Atmospheric constituents
  Program leader: Dr Graham Pearman
  - reactive gases and aerosols
  - distribution and transport
  - Baseline air pollution station
- Clouds and radiation
  Program leader: Dr Garth Paltridge
  - satellite remote sensing
  - lidar
- Small-scale dynamics
  Program leader: Dr John Garratt
  - Mesoscale processes
  - environmental dynamics
  - bushfire research
- Large-scale dynamics
  Program leader: Dr Alan Plumb
  - atmospheric dynamics
  - climate modelling
  - diagnostics



Senior technical officer Helen Goodman operates the Division's mass spectrometer, doing measurements in support of the astmospheric constituents program. One of the longest-serving members of the Division, Helen was recently appointed EEO representative. Her varied work has taken her to the Cape Grim Baseline Station in Tasmania many times. Also, she has spent some time in Papua New Guinea. In 1970 she took long service leave and taught primary school students at a PNG mission in Boianai. At present, Helen is doing an Arts degree at Deakin University, majoring in sociology and the philosphy of science.



Get ready for Cyclone Bob

We all know that hurricanes, typhoons, or (as we know them in Australia) tropical cyclones are given names as they take on identities of their own.

DAR Chief Dr Brian Tucker tells the story of a weather forecaster named Clement Wragg early this century in Australia who named tropical cyclones in his area after political figures he disliked.

'He could then publicly describe a politician — who was perhaps not too generous with Weather Bureau funding — as "causing great distress" or "wandering aimlessly about the Pacific",' said Dr Tucker.

Not knowing if 'Bob' or 'Barry' have been used recently, Dr Tucker looked them up.

'No sign of a Barry, but Bob is on the list of future names although currently number 30,' he said.

'I guess 30 tropical cyclones is a long time in politics.'

CSIDA extracts useful info from weather satellites

The 'roving eyes' of satellites gather a vast amount of information which is only useful when it's analysed, and most useful if it's available right away.

Easier said than done because the sheer volume of numerically-coded information constantly being transmitted is difficult to store. The best approach is to convert the information into usable data immediately.

Of course, the definition of 'usable data' varies. There is information available for a huge variety of potential applications — from assisting the tuna fishing industry by indicating sea surface temperatures to pinpointing bushfire prone areas.

A DAR development is now making that information more readily available. CSIDA (CSIRO System for Interactive Data Analysis) is the result of considerable research and many man-years of development.

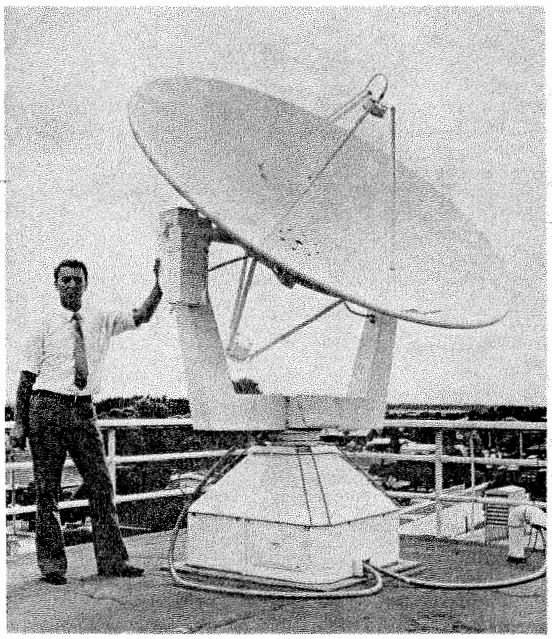
It can tap into the information flow from existing satellites and make sense of what they're sending.

Two kinds of weather satellite give differing birds' eye views of our planet.

Geostationary satellites collect their information from 30 000 kilometres above the Earth's surface. Information from these satellites is easy to gather because the spacecraft is always in the same position relative to the earth and it's simply a matter of pointing an antenna in its general direction.

More difficult to receive — but currently more useful in meteorological work — are the polar orbiting satellites.

At only 800kms above the Earth's surface, they can send back data which can result in high-resolution (detailed) pictures of the planet.



Chief research scientist Dr Garth Paltridge with the rooftop tracking antenna which was designed and built at DAR to receive information from polar orbiting meteorological satellites (see story).

###

Mr Del Smith who heads the DAR computing facilities group has been investigating the use of a revolutionary optical disk to enable storage of data received via CSIDA.

The compact, high density device has 300 times the capacity of a floppy disk and is equal to three (bulky) reels of magnetic tape.

It is able to keep permanent records in easily accessible disk form, enabling users to call back images which would otherwise be lost because of the volume of information entering the system.

He is also working on the edge of technology in the 'rectification of images'.

This involves performing a 'geometric transformation' on received images so they correspond exactly to conventional maps.

The Division of Oceanography, which has developed its own satellite image acquisition system, is particularly interested in this work, as it will enable them to pinpoint an exact ocean location on a satellite image without the need for landmarks.

As the name suggests, the polar orbiters swing north-south around both poles. They overfly a particular spot more or less at the same time twice every day and once they come over the horizon may be received by DAR in Melbourne with a tracking antenna.

These satellites are loaded with instruments that can, for example, remotely sense temperature and water vapour structure in the atmosphere. Another instrument is the AVHRR (Advanced Very High Resolution Radiometer) which can provide some spectacular graphics.

CSIDA is able to sift information from both types of satellite.

Chief research scientist Dr Garth Paltridge is head of the clouds and radiation group and has been involved with CSIDA from its conception.

'It took us just over two years to develop this system from scratch. There's half a million dollars worth of hardware, but the nine-tenths of the iceberg under the water is the software,' said Dr Paltridge.

The software is based on a package developed by Dr John O'Callaghan's group at the Division of Computing Research (now CSIRONET). It originally was designed as a general image handling package for data from the American LANDSAT satellites.

'Most of our work has gone into extending that package so it's useful for the meteorological satellites,' said Dr Paltridge.

One part of the system, the hardware (ie. antennas, tracking system and reception facility), is now being commercially made and marketed by Melbourne firm PCM Electronics.

Money provided to the Division in the Executive's information technology allocation has been used to develop a 'workstation' for processing the images, replacing the much larger original computer system.

'Three years ago the original system cost $250 000. This new terminal does the same job, only more efficiently, for about $70 000,' he said.

The image analysis components are now being marketed by a company called The Dindima Group — a highly entrepreneurial and innovative local firm.

Dindima is taking orders for delivery this year. The initial Australian market is estimated at about 80 workstations, though much larger overseas orders are also being sought.

'One of the biggest markets for the total system will be the world meteorological services,' said Dr Paltridge.

Lidar brings the upper atmosphere 'down to earth'

Getting access to the subject matter is a major practical problem facing atmospheric scientists.

How do you study global atmospheric effects from the ground when a lot of what you're interested in is going on at 15 000 metres?

One way is to go up in an aircraft (and the Division has made extensive use of CSIRO's early DC3 and later Fokker F27), but this has limitations as well.

Dr Martin Platt realized that the study of radiation and high-level cirrus cloud required an accurate remote sensing device which could be easily transported and provide fast information.

So Dr Platt introduced lidar to the Division. The device is similar to radar, using light instead of radio waves.

Australia's first lidar was stationed in Adelaide. Dr Platt visited there soon after his arrival at the Division in 1969. He had already developed a 'precision radiometer' and with these two instruments (lidar and radiometer) he was able to do some useful experiments on radiation.

It didn't take too much convincing to get the Division interested in forking out the large sum required to purchase a lidar and its associated computer equipment (about $100 000 in the early 70s).

Nothing was really known then about the relationship between high cirrus clouds and radiation (although it was known to be an important relationship affecting climate), and the lidar was a boon.

'We "looked", as far as possible, at every cirrus cloud system which went over Aspendale in a year,' said Dr Platt.

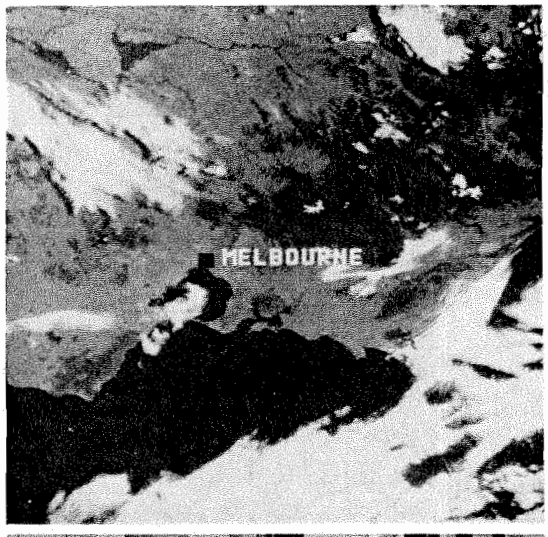
Tropical cirrus clouds were also observed over Darwin during a month-long field trial.

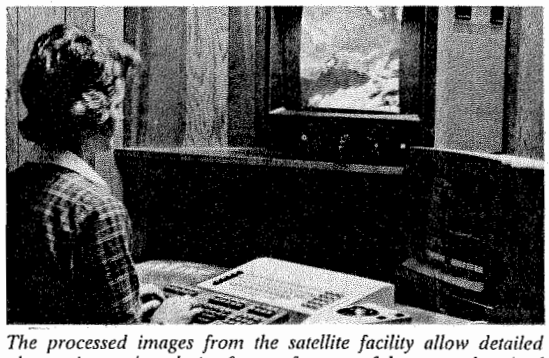
Now that lidar has proved its worth in probing the structure of high clouds, the technique is being put to use in a wider range of areas.

In recent years Dr Platt and experimental scientist Chris Scott have developed the original system further and also built a second, tuneable lidar.

This instrument is ideal for studying the behaviour of dust and smoke, and is being used to investigate the structure of power station plumes in Victoria's Latrobe Valley.

The instrument may also be used for measuring wind and the movement of 'aerosols' or small dust particles in the atmosphere.





The processed images from the satellite facility allow detailed observation and analysis of many features of the atmosphere and ocean. Here technical officer Janice Bathols manipulates a pseudo-colour image of Victoria.

Summertime cold fronts under scrutiny

Those wiggly lines on weather maps simplify and symbolize some very complex meteorological events.

One of these — the summertime cold front — has been the subject of the biggest meteorological research program ever undertaken in Australia.

The program, which was instigated in 1979 by DAR, involved a large number of weather bureau, defence force, university and CSIRO scientists and technicians.

Three large field experiments were conducted from 1980 to 1984 using the CSIRO F27 aircraft plus a surface network of temporary and existing observatories. Coordination of the experiment posed enormous logistical problems, however as Dr Brian Ryan, the project coordinator, reports 'the collaborative effort by so many institutions was very rewarding'.

'The idea was to learn how a front is structured and how it behaves,' said Dr John Garratt who heads the DAR small-scale dynamics group. Better understanding of the phenomenon leads to much more accurate forecasting.

From the work, scientists were able to develop a comprehensive conceptual model of the summertime cold front and an appreciation of the fundamental physical processes at work.

Now Dr Garratt's group is attempting to further substantiate the results and to extend their knowledge.

DAR delves into nuclear winter theory

Just how safe are we in Australia in the event of a nuclear war?

We all hope it will never be put to the test and to help ensure this, we should have at least some idea of the answer.

Dr Barrie Pittock of DAR has been reviewing the latest research into the likely state of the atmosphere after a nuclear conflict and was one of a team of eminent scientists whose report was presented at an international convention in Washington DC last year.

Peter Manins, Garth Paltridge, Barrie Hunt, Ian Enting, Ian Barton and Ian Galbally have also contributed to the Division's work on this subject.

It's emotional issue and care must be taken to look at it dispassionately. DAR is in an excellent position to use its laboratory, field and computer modelling skills to examine certain aspects of the nuclear winter problem.

The essence of the theory is that nuclear war would cause a shielding of incoming solar radiation by the vast quantities of smoke and soot which would be injected into the stratosphere as a result of fires sparked by nuclear bombs.

Of course, effects will differ depending on tonnage of bombs detonated and their location, but even if most go off in the northern hemisphere, it appears likely that part of the resulting huge cloud will spread south and alter climatic conditions in Australia.

Drought program looks at 'El Nino' phenomenon

Australians are no strangers to drought. At irregular and unpredictable intervals rainfall levels drop substantially causing the rural community, and ultimately all Australians, to suffer as a result.

Why does it happen?

The Division is now tying together all its strategic research relating to drought to form a major drought program, in line with the priorities set by the Institute of Physical Sciences.

A large part of the research revolves around a particular oceanographic feature called El Nino, or 'the Christ Child'.

This is unusually warm water off the coast of Peru which appears at Christmas time — hence the name bestowed by the Spanish when they first came to South America (although the Indians had been aware of it for much longer). It appears approximately once every five years and spreads westward to occupy the whole tropical Pacific.

The extraordinary thing about El Nino is that it seems to strongly influence aspects of southern and northern hemisphere climate.

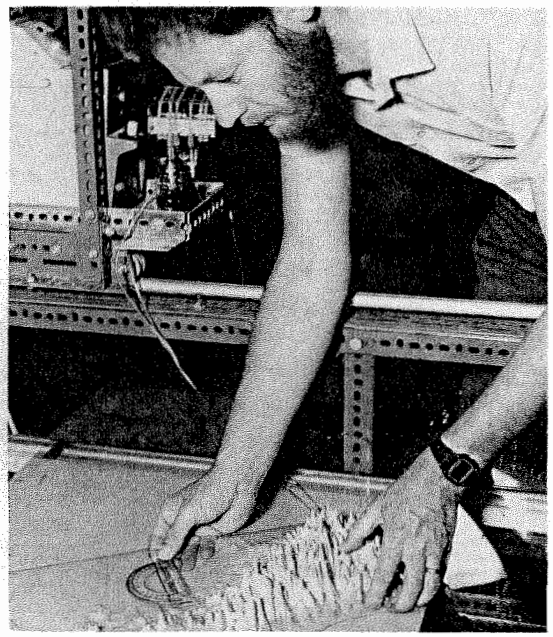
However, it is not a straightforward, one-to-one, relationship and its complexities are yet to be revealed.

Drought expert at DAR, Mr Barrie Hunt, said El Nino appears to excite a 'wave chain' which spreads outwards and affects the climate as far away as the United States.

At present, there's no indication that El Nino is on the rise again so there's unlikely to be a major drought in Australia this year, although of course parts of the country are still subject to 'naturally-occurring drought'. El Nino causes 'forced drought' which is usually more devastating and lasts longer.

The DAR program headed by Mr Hunt is looking at El Nino as part of the physical mechanisms controlling Australia's climate — including land surface changes and the role of clouds. Statistics are being modelled on a computer and some early results have been interesting and encouraging, said Mr Hunt.

Of course, the main beneficiaries of drought forecasting would be Australia's farmers, and researchers are endeavouring to make them more aware of the work now being done. Primary producers will be invited to hear speakers talk about research at a seminar being held in Melbourne on 28 to 30 May. Contact Mr Hunt for details.



Using water in a tank to model the dynamics of the atmosphere is one way atmospheric scientists can examine major phenomena in the lab. The geophysical fluid dynamics laboratory enables them to plot the interaction of the atmosphere with local topography. Here technical officer George Scott positions a model of Victoria in a tank of water for an experiment to examine air flow in the Latrobe Valley.

'Old air' a clue to changing composition of the atmosphere

Scientists and environmental groups have been concerned for some time about the emergence of the so-called 'greenhouse effect' which may lead to a warming of the Earth's atmosphere.

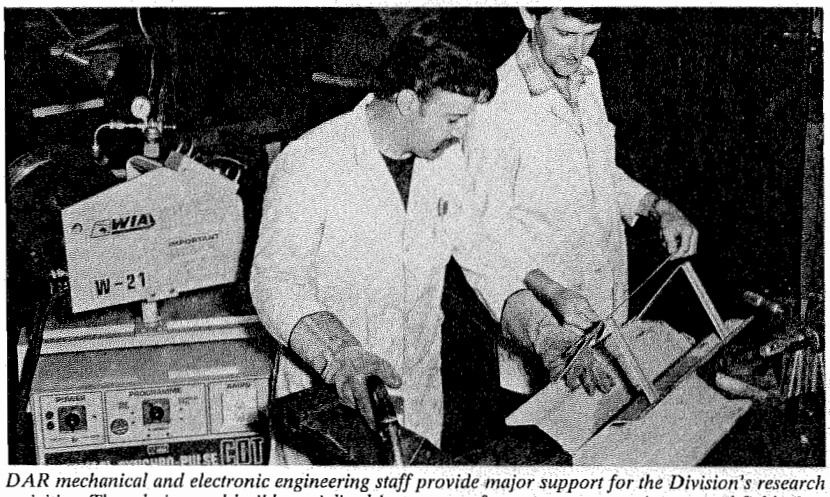
The amount of carbon dioxide in the atmosphere is increasing and this contributes to outgoing (terrestrial) radiation being trapped in the atmosphere and warming the planet. Extensive research at the Division and overseas has shown that recent increases in CO_2 are mainly due to the burning of fossil fuels.

Other gases on the rise are methane (from several sources including wetlands, mining, and — surprisingly — the belching of the Earth's large cattle population), halocarbons (from aerosol cans, foam plastics, refrigerators and as degreasing solvents) and nitrous oxide (from soils and the burning of fossil fuels).

Scientists are now collecting bubbles of 'old air' trapped in Antarctic ice, to provide an idea of the atmosphere before industrialisation. Since the 19th century carbon dioxide levels have risen by 20 percent, methane by 100 percent, nitrous oxide five to 10 percent and several halocarbons — non-existent in the atmosphere 100 years ago — are now arising by up to eight percent each year.

Dr Paul Fraser at DAR is an expert on rising levels of fluorocarbons and other trace gases in the atmosphere.

He said it's been calculated that by the middle of next century the amount of carbon dioxide in the atmosphere will be double what it is now, probably causing temperatures to rise by two or three degrees Celsius.



DAR mechanical and electronic engineering staff provide major support for the Division's research activities. They design and build specialized instruments for numerous experiments and field trips. A recent feat was the construction of the CSIDA antenna which is now being commercially manufactured. Pictured here welding an aircraft cylinder rack for a forthcoming field trip, Reg Henry, left, and Tim Blake are using WIA's Synchro-Pulse MIG welder invented by CSIRO Medal winner Dr Graeme Ogilvie at the Division of Manufacturing Technology.

To seed or not to seed — 'No' says Dr Tucker

The debate on the usefulness of cloud seeding persists.

Eminent CSIRO atmospheric scientist Dr Keith Bigg says a reinterpretation of data from early experiments indicates greater success than originally thought.

However, in a recent radio talk on Robyn William's 'Occam's Razor', DAR Chief Dr Brian Tucker came down firmly against any further rainmaking experiments. He maintained that rainmaking techniques can't break droughts — 'even the greatest enthusiast has never suggested that we can make clouds out of thin air'.

'The forces that cause large rain-bearing or near rain-bearing clouds to form act on a much larger scale than can be influenced directly by man,' he said.

He said clouds can be made to rain, but only under very specific circumstances – ie. if clouds rise precisely between four and five kilometres in height, are composed of supercooled water and have no ice particles. By sprinkling chips of dry ice or, more usually silver iodide particles, on them the clouds will rain.

'I believe that cloud systems of rain-bearing potential are unlikely to have too few ice crystals and hence I believe that commercially profitable cloud seeding is an unlikely proposition,' he said.

He said the vast majority of atmospheric scientists believe few cloud masses, as distinct from individual clouds, would be so finely balanced and yet wouldn't rain naturally.'

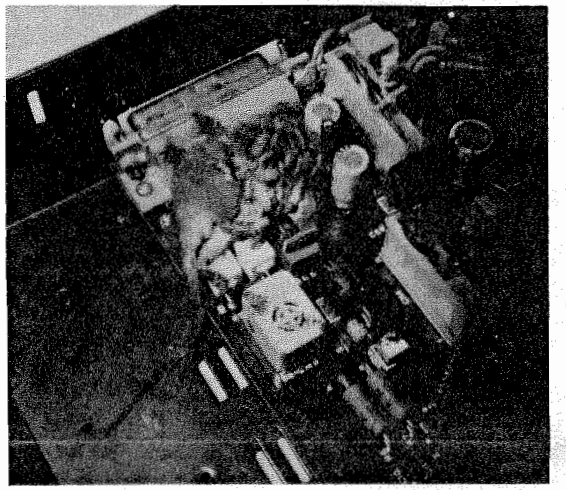
Between 1955 and 1980, CSIRO carried out several cloud seeding experiments — over the Snowy Mountains, New England and the Warragamba Dam area, the Darling Downs, parts of South Australia, western Victoria and Tasmania.

Dr Tucker says only in the Tasmania experiment was there an undisputed claim of significantly increased rainfall — and then only in autumn. There was also a disputed 19 percent increase in the Snowy Mountains. 'The rest were failures,' he said.

Long term

This view is not shared by all scientists. Cloud physics initiator in Australia, Dr E G (Taffy) Bowen backs Dr Bigg's reassessment of the figures. The new interpretation is based on the idea that results are not always instantaneous and the rainmaking effects may be long term.

To test this new hypothesis thoroughly would be costly and, to Dr Tucker's mind, there would have to be a stronger argument than currently put forward to justify that expense. However, during 1986 Dr Bigg will be given a CSIRO post-retirement research fellowship to complete a statistical analysis of the possible long-term effects of cloud seeding.



Research at DAR has revealed a new pitfall for technicians and scientists on field trips: kamikaze mice. This well mangled mouse did its spanner-in-the-works impersonation during a recent field trip. Until its discovery there was much head scratching about how a perfectly efficient printer suddenly refused to work properly. It was only when general repairs were undertaken that the furry spanner emerged and solved the mystery.

Two popular amenities, constructed at the suggestion of the Division's social club, are a barbeque area and a sunny tea garden. Here administrative staff gather in the tea garden. From left, Jamie Rourke, Sue Webdale, David Slater, Carol Drew, Michael Bell, Judy Rowan, Ken Barker and Gayle McGowan. David heads the administrative team and he has presided over some major admin changes, including those associated with setting up the new Division in 1983.

DAR in brief

The Division of Atmospheric Research would seem to be an unlikely place for a breakthrough for sock manufacturers, but research often does have unusual spinoffs. In this case, special 'optoelectronic' counters used for sensing the rotation of wind measuring instruments (anemometers) have been adapted for measuring the yarn length used by circular knitting machines. It allows for the accurate sizing and repeatability of production in the making of socks, among other things. An advantage, apart from low cost, is that the device may be readily attached to standard knitting machines. The Division's facilities group develops and adapts instruments for the research groups; experimental scientist John Bennett was the catalyst for this particular adaptation.

###

Recently, Dr Tucker enjoyed a brief period as a radio personality in Melbourne. He prepared and presented 14 consecutive talks last year on the ABC 3LO Mike Schildberger show. This morning radio program has a considerable listening audience. His talks covered a broad spectrum, from cloud seeding to the nuclear winter to meteorological satellites. He wrote the talks in an easy to understand, popular style which the general public apparently enjoyed (Dr Tucker said the fact that no complaints were received indicated success).

###

Noise is often a problem in offices — particularly those of open-plan design. Administrative officer at DAR, Mr David Slater, has played his part in reducing the decibels with a special computer printer cover which nearly eliminates the earbashing noise from the machine. With the help of a friend who works in noise control, David had a special cover designed and built last year. Contact David at Aspendale if your printer is driving you mad — he may be able to help.

###

DAR has one of the most extensive CSIRO computer networks outside CSIRONET. It supports a range of experiments and data analysis systems, including analysis of field data.

###

Clouds provide plenty of research material for atmospheric scientists. Their subtle and not so subtle effects on our weather are far from completely understood. The proportion of solar or terrestrial radiation reflected by clouds can have totally opposite effects depending on the height of the clouds. For instance, low clouds tend to have a cooling effect on the Earth's atmosphere while high clouds tend to warm. It's the high clouds in particular which are occupying the minds and time of a number of DAR scientists (see other stories in this feature).

###

Atmospheric research, like all areas of endeavour of CSIRO, has its occasional moments of excitement. Computer operator Graham Rutter remembers a time when a DAR group (including himself) nearly went up in smoke during a field trip. It was at Deniliquin several years ago and a generator was being used near thick grass. The generator threw some sparks and a bushfire started. In no time flames grew to 10 feet in height and the conflagration lasted about half an hour. Laid-back Graham said no-one was too worried — apart from being annoyed that the cables which had been placed for the experiment had to be re-layed.

###

As Dr Tucker puts it, the Division is fortunate in having more than its fair share of 'hotshots' among its research staff. 'For example, we had a winner of the David Rivett Medal, and we also have had a high level of international recognition,' said Dr Tucker. 'The Division has a formidible international reputation, with top level scientists in each of the four research groups. Quite honestly I'm delighted. I get a lot of vicarious pleasures out of the achievements of these colleagues.'

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How to contact the Division of Atmospheric Research:

Scientific Assistant to the Chief — Dr Willem Bouma
Information & Publications Officer — Ms Val Jemmeson

Station Street, Aspendale VIC
(Private Bag No. 1, Mordialloc VIC 3195)
Ph: (03) 580 6333
Telex: 34463

Retirements

Experimental Scientist **Mr Bob Holmes** has retired from the Division of Applied Physics after 38 years. He joined CSIRO in 1947 as a technical assistant. Among his many projects, Mr Holmes has been responsible for calibrating working standards of resistance.

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Mr Bill Grace has retired from the Division of Applied Physics after eight years. He came to NML in 1977 as a (temporary) electrician to assist in the changeover from the University to Bradfield Park, and soon after was given a permanent appointment.

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A senior laboratory craftsman at the Division of Mineral Chemistry, **Mr Joseph Schneider**, has been forced to retire because of ill-health. Mr Schneider has been with CSIRO since 1974.

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Dr Jim Vickery has relinquished his position as honorary research fellow at the Division of Food Research after a research career spanning 61 years. He commenced research at the University of Melbourne as an MSc candidate in 1924 and later became a scholar at Cambridge. He returned to Australia in 1931 and was appointed CSIR Officer-in-Charge of cold storage investigations. He was foundation Chief of the Division of Food Preservation in 1940. After retiring in 1967, he became an honorary research fellow and devoted himself to lipid research and chemical aspects of plant taxonomy.

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Mr Jack Williamson has retired from the Melbourne Regional Administrative Office after 34 years as an administrator. Mr Williamson started work in the Headquarters records section, moved to the Divison of Forest Products and returned to the RAO where his service in the Stores, Expenditure and Finance areas has been invaluable.

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Senior technical officer **Mr Albert Jones** has retired from the Division of Protein Chemistry after 22 years. During his work there, he was involved in design and development work for collection of data used in a number of Division's projects.

Mr Tony Caruso has retired from the Division of Wildlife and Rangelands Research, Deniliquin, after 27 years of service. Mr Caruso joined the Organization as a labourer and worked for many years at the Falkiner Memorial Field Station. More recently, as a technical assistant, he has worked with the rangelands field support group playing a major role in developing and managing field sites.

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Miss Barbara Ashbolt has retired from CSIRO after working as a typist and later secretary for 35 years. Described as 'the power behind the throne' since 1971, she has worked for Dr Don Weiss (Assistant Chief, Applied Chemistry and later Chief Chemical Technology), Dr Huntly Higgins (the next Chem. Tech. Chief) and finally Dr Warren Hewertson (current Chief Chemical and Wood Technology). Colleagues say she has played an extremely important role in promoting divisional cohesion and in supporting just causes. She is also a very good typist.

***

The regional personnel officer for New South Wales, **Mr Tom Brock**, has commenced extended furlough prior to early retirement, after 40 years' service with CSIRO. Mr Brock is well-known throughout the Organization for his vast knowledge of personnel policies and procedures and has been an organizer and leading participant in matters such as superannuation and pre-retirement seminars. Mr Paul Robinson has been appointed to replace Mr Brock.

***

Assistant Chief at the Division of Water and Land Resources, **Mr Jan Basinksi**, has retired from CSIRO after 28 years. Initially employed as an ecologist with the Division of Land Research, he soon became interested in the assessment of possibilities and limitations for agricultural development in Northern Australia. Through his own research, his membership on numerous Industry and Commonwealth/State committees and his management of a considerable part of the Division's research effort, Mr Basinski has made a significant contribution to agricultural development in Australia, particularly the North. He was acting Chief of the Division of Water and Land Resources between 1977 and 1978.

Two senior scientists from the Division of Entomology have been launched into retirement. Dr Ross Gilby and Dr Barry Moore can tally between them four PhD degrees and 58 years of service to CSIRO.

Ross joined CSIRO in 1954 and has spent a major part of his career as a chemist and biophysicist on basic research into various aspects of insect physiology.

While at Cambridge University, Ross encountered the then infant technique of gas chromatography and this led, on his return to Australia, to the construction of a gas chromatograph in collaboration with the Division's workshop staff. This was the precursor of subsequent studies on insect pheromones and chemical secretions. Ross' research on the nature of surface membranes of insect flight muscle mitochondria, cuticular lipids and water loss in insects resulted in publication of a review of lipid metabolism in insects as well as clarification of current knowledge on transport of water and other materials through cuticle.

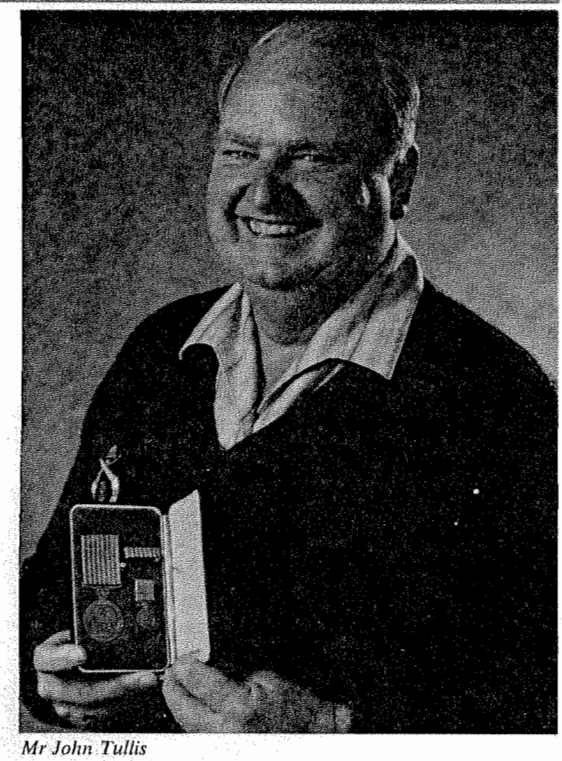
His dry wit and constant good nature will be missed by his colleagues, but the large escapees from his cockroach culture will not.

*Dr Barry Moore came to Australia in 1958 to take up a position on the Phytochemical Survey at CSIRO's Fisherman's Bend Laboratory and transferred to the Division of Entomology in 1960. He is an acknowledged world leader in the field of insect chemical secretions and their role in defensive mechanisms and was the head of the Division's physical sciences section.

In 1967 he was invited to visit Professor E O Wilson's Department at Harvard to establish a chemical facility at that laboratory. More recently, Barry has been involved in the elucidation of the chemical nature of warning odours common to many aposematic plants and insects.

Barry's many talents also include a deep interest in the taxonomy of the Coleoptera, particularly of the carabids for which he is a recognized authority. His interests and expertise in this field have taken him on collecting and consulting trips throughout the world and led to his recent participation in Project Wallace in Sulawesi (Indonesia), organized by the Royal Entomological Society.

He will continue in the Division as a part-time honorary research fellow.



Mr John Tullis

Sometimes known to his Division of Textile Industry colleagues as either 'Mr T' or 'Captain Charcoal', senior laboratory craftsman John Tullis has been officially commended for his firefighting activities with the awarding of a 'National Medal'.

The National Medal is a Federal Government award made under Letters Patent to Her Majesty, to members of the Defence Forces, Police, Fire or Ambulance Services who have given a minimum of 15 years' diligent service.

John has served 23 years with the Belmont Fire Brigade in Geelong, the last six as Brigade Captain. The unit is an all-volunteer one, and in the past year attended some 180 fires, including a call to John's own Division! Here it was a case of wearing two helmets at once — Brigade Captain, and Divisional Fire Warden.

***

Obituary: David Robinson

Friends and former colleagues of David Robinson will be saddened to hear of his untimely death on 26 December 1985. He was Professor of Animal Science at the University of California, Davis, at the time of his death.

David's association with CSIRO goes back to the 1960s when he worked at the Kimberley Research Station on the adaptation of cattle to the semi-arid tropics. He took up the position of Associate Professor of Animal Science at Davis in 1969. In 1972 he spent six weeks in Indonesia as an expert consultant with a CSIRO/ADAB team carrying out the feasibility study that led to the establishment of the Project for Animal Research and Development at Bogor, Indonesia, and became the Project's first Research Director from 1974 to 1976.

David's deep interest in developing countries and their people continued. In addition to accepting consultancies for international agencies, he became the first Director of the USAID-sponsored Small Ruminant Collaborative Research Support Program. From 1981 onwards, as Associate Dean of the University of California's International programs, he was also responsible for $50 million worth of grants and contracts for work in international programs in seven countries.

A friendly and unpretentious man who could relate to humble smallholders in developing countries as well as his academic peers, David will be sorely missed by his friends in many lands.

Alan Charles

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A former experimental scientist with the Division of Textile Industry, **Mr Brian Parnell**, has died. Mr Parnell, who was with the Organization for 27 years, had been responsible for a group researching the fundamental properties of monofilament bound wool yarns.

...People...People...Pe

It's with sadness that we report the death of Gil Barnes on 11 January 1986, as the result of cancer.

Gil had commenced early retirement only last July and had been looking forward to pursuing his many interests. A few months later he learned of his illness.

He was known and respected by many staff throughout the Organization following his years in the occupational health and safety staff evaluation areas of the Personnel Branch.

Before joining CSIRO, Gil was an examiner of patents in the patents office. He had emigrated from the United Kingdom where he was an engineer with British Nuclear Fuels.

Gil will be remembered for his deep interest in the people around him, his quiet manner and fine sense of humour.

He leaves a wife, Grace, and five children.

Gary Knobel

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Dr Jim Esdaile, formerly of the Division of Mineral Engineering, has died. Dr Esdaile was with CSIRO for more than 20 years.

Honours and Awards

Development and promotion of an innovative worm control program has placed Dr Keith Dash at the Division of Animal Health among the finalists for a prestigious Australian award.

He was one of seven finalists from 40 contenders for the 1985 Ronald Anderson Memorial Award for Achievement in Agriculture.

Dr Dash was honoured for his work on Wormkill, a worm control program for sheep in the summer rainfall zone of Australia.

Wormkill has achieved outstanding success, with an estimated 75 percent of sheep produces in northern NSW adopting the program in the first year.

***

Mr John Wilson from the Division of Wildlife and Rangelands Research has been awarded the Arthur Frost Memorial Medal for apprentices.

Mr Wilson is a plant mechanic for the Division at Deniliquin.

The award is made annually to the apprentice considered to have achieved the greatest merit and improvement through the full term of his apprenticeship.

***

Dr Ray Binns from the Division of Mineral Physics and Mineralogy has been made an Honourary Professor in the University of Newcastle's Geology Department. The two year appointment has been made to foster closer co-operation between the Division and the University.

Comet Corner

On 14 March, the European Space Agency's spacecraft Giotto will fly into Halley's Comet. The aim is to gather as much data as possible about both the nucleus and tail. Giotto is carrying a colour camera, three mass spectrometers and other instruments to conduct experiments on plasma and magnetic fields. Data will be sent to the CSIRO Parkes Radiotelescope and then via the Carnavarvon tracking station to West Germany. The best dates for seeing the Comet are 8 and 15 March and 5 and 12 April in the eastern and southeastern sky. **Dial-a-Comet:** This popular telephone information service has been extended to Adelaide and Perth. The numbers are: Sydney, Brisbane, Adelaide and Perth: 11622; Melbourne: 11613.

A message from the secretary of the CSIRO Ski Club, Mr John Connelly (Division of Applied Physics).

Halley's Comet is on the way back to our skies and will be visible in March and April. The CSIRO Ski Club operates lodges at Jindabyne and Perisher Valley and is accepting bookings for this period from members and non-members. The club's usual lodge rules and booking priorities apply, for its comfortable self-catering accommodation. However, we can't guarantee viewing conditions and recommend that intending guests satisfy themselves about the likely visibility of the comet before booking. Guests will have to bring their own telescopes or binoculars.

For booking information *only*, contact Mr Tony Marletta, 27 Ferrabetta Avenue, Eastwood NSW 2122, (02) 888 6469 7–9 pm weekdays.

Creationism debate

Cont. from p.5

Dear Editor,

There have been many charming creation stories devised over the millenia by humans seeking to explain their origins and Australian people once believed that a rainbow snake created the earth and its creatures. Given the pre-scientific and limited knowledge of the peoples devising these myths they may have represented sufficiently satisfying accounts of the mystery of human existence to serve the people and their culture.

However along with nuclear energy, computers, and medical and genetic engineering, our scientific culture has acquired immensely greater knowledge about the cosmos and earth's living creatures, which now make these creation myths seem to us like children's fairy stories. We now know much about the 4.5 billion years of earth's history, the 3 billion years of organic existence and the biological and genetic processes of creatures, which we summarize in the word 'evolution'.

In physics as in biology it may not be possible to describe ultimate causes of the cosmos and its creatures, but science can examine the actions of proximal causes; and here we are in the late twentieth century in the midst of our scientific and technological cleverness and are witness that science allows us to understand the cosmos and manipulate it for our cultural purposes.

Biological evolutionary theory may allow us to understand and perhaps even control human aggression and we should study the arrogance of certain people who turn away from the humility of observing our marvellous cosmos and its intricate interweavings to propagandizing one or other ideological theory on how the earth's creatures arose. We perhaps can understand from social science why aboriginal rainbow snake mythology is not a pressing issue in ideological battles for people's minds, whereas an old creation tale from semitic shepherds is still being hotly urged on us as an acceptable paradigm for evolutionary biological change. The semitic myth certainly makes pretty poetry and is perhaps one of the best of all the pre-scientific stories; in fact it even has some ancient stirrings of the elements of modern thinking. But the bald-faced assertion that the world and everything in it was created in six days has the same ring of falsity to us as the flat earth theory, or the four elements being fire, earth, air and water, or that gods and demons control our destinies. These statements are now just not good enough. Anyway I prefer to think that the Answer to the Universe is forty-two.

Dr Helen Stace
Division of Tropical Crops and Pastures

Dear Editor,

Does scientific creationism produce good science?

The key to good science seems to be that there is formed initially an interesting hypothesis which is rich for research. Following the research the resultant theory (if there is one) needs to be able to be improved or refuted (falsified) by further testing, intuitively acceptable by the accummulation of facts, by the mass of data, and consistently able to be analysed further.

The following scientific creationist ideas are often presented in their literature.

1. The earth and all living things were created (by the Creator) in six days, between seven and ten thousand years ago. The kind of living things created then are basically of the same kind today.
2. There was a more recent worldwide flood and geological catastrophe that explains (a) the fossil record as a single event excluding the more generally accepted idea of geological ages and (b) that the earth is comparatively young.
3. It is good science (according to scientific creationists) to show where evolutionary thinking goes wrong, thus proving (in the scientific creationists' view) that scientific creationist thinking is correct.

How do these ideas of scientific creationism conform with my outline of what constitutes good science? One hypothesis may be that there was an instantaneous formation of groups of plants and animals. This *is* interesting. The fossil record indicates that plants and animals appear to have evolved at different times over some two billion years. The hypothesis is not confirmed.

I could go on, but ...

James Whitelaw
CILES

Dear Editor,

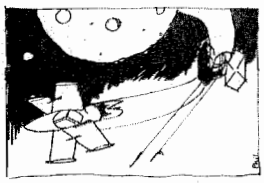
The cumulative effect of natural selection working on chance mutations accounts very well for microevolution — lateral diversification producting new varieties, races or even species. But as geneticist Richard Goldschmidt maintained in *The Material Basis of Evolution* nearly fifty years ago, higher order changes are difficult to account for in this way.

The White Queen told Alice that it requires only regular practice to believe the impossible, but like Goldschmidt I have never been able to conceive how a complex system like the mammalian eye could evolve by the accumulation of small mutations, or how a leg could become a functional wing despite negative selection pressure on the intermediate forms. Gould and other modern apologists notwithstanding, we still have no credible physical mechanism to account for macroevolutionary change.

Astonomer Fred Hoyle has found that it is unpopular to question evolutionary dogma. '*Omega*' recently reported that his mathematical studies of genetic systems had led him to reject Darwinism and infer 'a cosmic intelligence at work'. 'But', he added, 'people don't like me to get involved with the theory. It gives ammunition to the religious chaps. But that's not important: you have to get at the truth.'

I'm encouraged to find from the December letters on creationism and evolution that the spirit of critical inquiry is alive and well in CSIRO. Not everyone shares that unquestioning faith in evolution so beautifully epitomised by Graeme O'Neill's recent comment that the dung lily 'evolved in such a complex and bizarre fasion that even the dedicated evolutionist is dazzled... But evolve it did'.

Alan Charles
Institute of Animal and Food Science



Don't forget, in the March issue of* CoResearch *we will publish your letters on the scientific aspects of the Strategic Defence Initiative ('Star Wars'). The deadline is Monday, 24 February.

'Come in Alpha Centaurii. There is life on earth — it flies above the ground and is very noisy. And it seems we have arrived in the mating season...'

*Mail — 'Australia's best bargain'

by Sue Choquenot

Users of CSIRONET are finding the Electronic Mail System, now known as *Mail, a quick and economical way of passing messages and information between individuals within a building, town, state, country or even overseas at a fraction of the cost of a telephone call, telegram or telex.

Currently, no extra charge is made for *Mail above the standard network transmission fee, although this will change in the near future (see the March edition of *CSIRONET News*).

At the moment users enjoy Australia's best bargain and a 'letter' sent from one end of the country to the other costs just a few cents. Even with the proposed charges, *Mail will be considerably more economical than commercial electronic mail systems now available.

The system has several interesting features including easy to read on-screen documentation that helps you to use the system if you get lost, automatic notification of any new mail when you log-on to CSIRONET and a number of other features that you can order and change depending on your requirements.

Two researchers who are successfully using *Mail to assist in their work are Dr Robert Bell in the Division of Atmospheric Research in Melbourne and Dr Carsten Frederiksen at the South Australian Institute of Technology in Adelaide.

Dr Bell is involved in developing computer models of how the weather operates to help in prediction and understanding of the climate, while Dr Frederiksen is enhancing the modelling programs used on the CSIRONET supercomputer (a Control Data Cyber 205) to process and analyse the massive amounts of data obtained in the study. The researchers use *Mail to notify each other of the status of their work and files stored on CSIRONET. Last year Dr Bell sent and received more than 500 *Mail messages.

One of the biggest problems facing collaborative researchers located in two different laboratories (let alone different States) is returning telephone calls. 'It often takes two or three phone calls before you catch whoever you are after,' said Dr Bell. 'With the *Mail system you can leave the message and know that the people you want will get it when they next log on the CSIRONET system.'

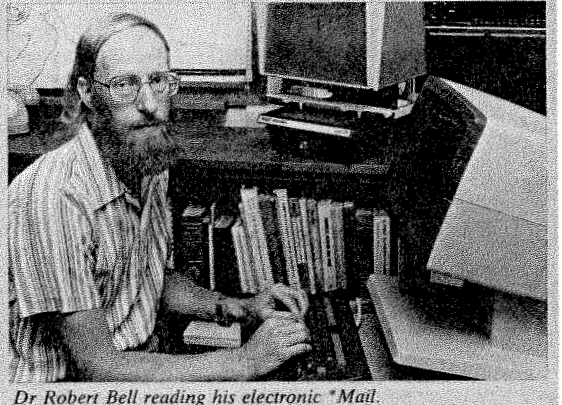
According to Ms Sally Record, senior technical officer in the Division of Human Nutrition in Adelaide, using *Mail has made her life a lot 'cleaner'. The Division has developed 'food tables' which give the constituents of commonly eaten food in Australia.

'More than 26 groups around Australia have used these food tables. When any user wants to run a program to use these tables they just notify me by *Mail. If they used the telephone I would have the problem of the telephone ringing all day and interrupting me'.

Since *Mail was introduced, clients seeking assistance have increasingly used it to contact CSIRONET in Canberra. Jan Bubb, manager of technical support, explained — 'before we started using *Mail most users reached us by telephone and left recorded messages. We found it was difficult to reach our customers by telephone to discuss their problems. Now we can leave messages on *Mail and give them updates about the steps being taken to help them'.

Jan said one of the advantages of the system was that it provided a printed rather than audio copy of all messages. In the future the section hopes to introduce a database for all requests so that they can analyse problems clients are experiencing and hopefully take action to alleviate the problems before they occur.

For information on *Mail, contact: Sue Choquenot (062-43 3381, CSIRONET mail address JOURNO) or Peter Milne (062-43 3330, CSIRONET mail address MILNE)



*Dr Robert Bell reading his electronic *Mail.*

Frontinus, Leonardo and you

This is an abbreviated version of the script of a talk given by Dr John Philip, Chief of the Division of Environmental Mechanics, on the ABC radio program Occam's Razor on 10 and 14 November 1985.

Recently I found myself, with some surprise, asked to give the after-dinner speech to the banquet of the 21st International Congress for Hydraulic Research. The venue was the Mooney Valley Racecourse, and the captive audience some 600 hydraulic engineers, with spouses. These masochists wanted a 40 minute talk. I gave them twenty and this version cuts it down to ten.

Over the years I have worried about the enormous gap between the supposedly right no-nonsense environment for getting things done in the professional engineering sense on the one hand, and on the other the sceptical and lively intellectual environment which engineering research, just like any other research, needs to be efficient and fruitful. So I set out to offer a few subversive thoughts to a generally conservative profession; and I have sugar-coated my distasteful message with a little history.

Throughout the ancient world, everyone believed that the proper measure of the flow in a river, canal, an aqueduct or a pipe was given by the cross-sectional area of flow. The unit of discharge throughout the Roman Empire was the quinaria, which was the discharge of a pipe of cross-section 445 square millimetres.

But of course, in reality the discharge has to be the cross-sectional area multiplied by its average flow velocity. Despite the evidence of their senses, however, the engineers of the ancient world assumed that the average flow velocity was a universal constant. In actual fact, of course, that supposed universal constant is subject to enormous variation, depending on the slope of the water surface (or the pressure gradient) and the size, shape and roughness of the conduit cross-section.

So the ancient engineeers had it all horribly wrong and, unsurprisingly, this generated plenty of headaches for the men in charge of water works. Sextus Julius Frontinus, Commissioner of the Roman water supply from 97AD, left records of his attempts to balance the books. He found, for example, an aqueduct with no off-takes giving a discharge of 1825 quinariae at one gauging point, but only 704 quinariae at the next. Poor Frontinus attributed the discrepancy partly to undetected leaks, but mainly to cunning Roman water thieves.

The record shows that in fact Frontinus felt something funny was going on and that he really ought to have been making some sort of a correction when the conduits were especially steep or especially flat. But what did Frontinus do about it? Like any good solid professional engineer of today, he did absolutely nothing. It was not for him to rock the boat and challenge current professional practice. So he just went on doing his sums according to accepted practice — and then he had the gall to cover up the deficiencies of Roman hydraulics by blaming its errors on cunning water thieves and undetected leaks.

This is a splendid example of how established professional practice provides a marvellous avenue of escape from personal responsiblity. Unfortunately, professional engineers can feel quite relaxed and indeed virtuous performing irrelevant calculations on an erroneous model of the real world.

We now make a leap of 1400 years to Leonardo da Vinci. Leonardo certainly needs no introduction, but you may not know that, of the 7000 sheets of notes and sketches which Leonardo left, more are devoted to hydraulics and hydrology than to any other single topic.

In Leonardo's day, the professional engineers still imagined that discharge was simply proportional to conduit cross-section; and it was left to Leonardo to discover for himself, and to announce, the principle of continuity, that the flow rate was the cross-sectional area multiplied by the average velocity (and that that average velocity could vary all over the place).

But even the Renaissance hardly jolted the intellectual inertia of the engineers; and another century had to pass before the principle of continuity entered into the professional practice of hydraulic engineering.

Dare I propose the dichotomy of Leonardo and Frontinus as symbols of on the one hand engineering research and, on the other, of professional practice? It is hard to imagine people more different than Leonardo and Frontinus.

Leonardo was the first of, and the great exemplar for, research engineers.

Frontinus on the other hand comes through as the paradigm of the conservative professional engineer.

We now take a 400-year step forward in time from Leonardo to Melbourne of the 1880s.

Melbourne would have been very comfortable with Frontinus, but it would have had no truck with Leonardo. It is all the more remarkable then that the Foundation Professor of Engineering at the University of Melbourne, William Charles Kernot, was much more of a Leonardo than a Frontinus. He was a non-conformist of Huguenot stock. He was a gadfly of the engineering profession in Victoria, using his knowledge of mechanics and physics to expose and put right a great number of gaffes committed by the government engineers of the day.

Kernot wrote of the general run of Victorian engineers: 'As far as I could discern, they were perfectly unconscious even of the existence of physical laws. Their knowledge was entirely of isolated facts — generalizations, principles they did not grasp. Things that were always under their notice they knew well, but other things requiring a little search, study or reflection they never dreamt of.'

He was even prepared to take on the most august professional engineering body of that time, the Institution of Civil Engineers, with headquarters in London. The Council of the Institution just didn't want to know about all the (really quite criminal) blunders Kernot found in the work of some of its most distinguished members. Kernot had the last word, at least to his satisfaction, when he wrote that 'one of the most unscientific constructions that I have ever experimented with was designed by a president of the Institution'.

Kernot died in 1909; and when I was a freshman at his engineering school 34 years later no trace of the spirit of Leonardo survived. The general message I took away from my engineering course was that all things are understood and that all a young engineer needs to know is what handbook to use. I have spent the last four decades struggling to recover from my engineering education and I'm still working on it.

Of course, here and now more than 40 years later, I'm sure the spirit of Leonardo has been reinstated in the Melbourne Engineering School.

My worry is that there might still be, elsewhere, engineering schools where students take away an updated version of the old message: 'All things are understood and all a young engineer needs to know is what software to use'.

But this sermon of mine is not only for engineers but also for other people, whatever they do. I'm sure most people have one or two colleagues who came out of the Frontinus mould. As likely as not, a Frontinus is your boss. Be nice to your Frontinus, but don't let him stultify you; and, above all, don't get like him as you grow older.

Robert Bell & electronic Mail

A crabeater seal

50 days on the Antarctic pack ice...

But the research made it all worthwhile

Nella Dan stuck in the ice

Dr Peter Shaughnessy, Scientific Services Officer with the Institute of Biological Resources, was aboard the ship Nella Dan on her ill-fated voyage to Antarctica last year. The ship was lodged for 50 days in pack ice near Amundsen Bay and wasn't freed until a Japanese icebreaker, Shirase, was able to come to the rescue in mid-December. Dr Shaughnessy and a number of other stranded expeditioners were lifted a few days earlier by helicopter to another supply ship, Icebird, for the return voyage to Australia.

Tuesday 29 October, and Dr Peter Shaughnessy boarded one of the Nella Dan helicopters to visit a family of crabeater seals on the same ice floe which had imprisoned the ship. It was the first of only nine days of field research out of a total of 99 away from home, but he still counts the experience as a worthwhile, albeit expensive, exercise.

Dr Shaughnessy is a seal specialist and was invited to take part in Nella Dan's research voyage by the Antarctic Division of the Department of Science. He had expected to be back on 20 November, but he and his wife (also a scientist) didn't return to Australia until two days before Christmas.

Remarkably, perhaps the most dramatic and tragic event of the icy ordeal — the death of one of the ship's cooks — went almost unnoticed by the media.

While the fate of the ship received considerable publicity, the fate of young Dane Kim Nielsen was virtually ignored, at least in Australia if not in his home country.

Dr Shaughnessy said the incident took place about one week before the ship was stuck. Kim, who was in his early 20s, lost his footing early one evening on some steps leading to the galley and fell heavily. Despite the best efforts of the on-board doctor, Kim died soon after.

'It put rather a gloom over the ship,' said Dr Shaughnessy.

Kim was the only casualty of the adventure, during which Dr Shaughnessy maintains there was never any real danger for the expeditioners.

Research continued whenever conditions permitted and the crabeater work was particularly successful, attracting publicity in its own right.

Nella Dan, which is operated by Danish officers and crew, set sail from Hobart on 16 September bound for the edge of the pack ice south of Heard Island.

It stopped first at the island (home of Australia's only live volcano) to drop off 14 expeditioners — including Dr Gwen Shaughnessy — who were doing a count of elephant seals to compare with numbers from a 1950 census.

The ship then continued south until 27 October when thick pack ice wedged it 20 miles from the coast of Antarctica, near Amundsen Bay.

Nella Dan is an ice strengthened ship but does not have the power of an icebreaker and she became helplessly stranded in ice about two metres thick.

Apart from the ship's officers and crew, there were 36 'expeditioners' - scientists and support crew — on board.

At least the ordeal proceeded in relative comfort, despite a measure of frustration as the days dragged on. Dr Shaughnessy said morale remained high and all on board accepted the situation philosophically. The 25-year-old ship is in good condition and facilities on board helped matters somewhat.

'There was a proper dining room, complete with two stewards in smart jackets,' said Dr Shaughnessy.

He said the meals on the Nella Dan were extremely good. However, after 80 days of a diet comprising in large part Danish pork it's a wonder the expeditioners didn't attack the crabeater seals with a view to seal steaks.

The expedition was far from a dead loss. Fortunately Dr Shaughnessy and his colleagues (including Mr Keith Newgrain from the Division of Wildlife and Rangelands Research) were able to locate five families of crabeaters between one and five miles from the ship. With the help of two on-board helicopters, nine trips were made to the groups before they disappeared back into the icy waters when the breeding and lactation period ended.

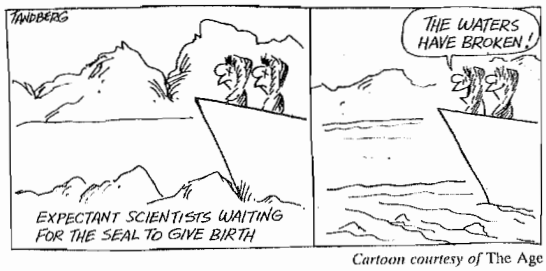
Three separate projects on the seals were carried out. One, which Dr Shaughnessy conducted with the voyage leader Dr Knowles Kerry, involved studying the breeding biology of crabeaters, another, in conjunction with the Division of Wildlife and Rangelands Research, was to determine how much milk was being transferred from mother to pup and how milk composition changed during the lactation period, and the third involved a helicopter survey to determine the distribution and abundance of seals in the pack ice.

For the milk experiment, pups were injected with radioactive water and the radioactivity was diluted as the pup took milk from the mother. Blood samples were taken from the pups and are now being analysed at Wildlife and Rangelands.

'It was quite exciting because the lactation period of the seals is very brief so we were there at the right time,' said Dr Shaughnessy.

'We set out thinking it was four to six weeks, but our observations indicated that it's only three weeks. That was also a bit of a nuisance because the ship got stuck on the 27th, we got started on the 29th and three weeks later all the seals had gone but we were still stuck for several weeks after that,' he said.

Although the results of this experiment haven't been analysed, the pups must have received plenty of milk from their mothers, because their weight shot up 30kg at birth to 110kg at the end of the three weeks. Both mother and accompanying male seal weighed in at around 230kg at the start of observations but both decreased in bulk because they were not feeding while on the ice.



Cartoon courtesy of The Age

Normally the seals eat krill (not crabs as their name suggests) and this makes them important subjects for study.

'There are many nations which believe they can harvest krill and there are estimates that they could take as much krill per annum as the current worldwide fishery — about 70 million tonnes,' said Dr Shaughnessy.

'If they were to do that, there would be enormous repercussions because virtually everything that lives in the Southern Ocean depends on krill either directly or indirectly. Even some very large animals, like whales, live directly on krill,' he said.

'While the whales are making a recovery the worst thing we could do is harvest krill'.

Because krill density itself is difficult to measure and its distribution is patchy, scientists are relying on so-called 'indicator species' such as the crabeater seal to determine krill abundance.

'Very few people have studied crabeater seals during the spring breeding season,' he said. 'The reason for that is that you get stuck in ice.'

For the various experiments, the seals were being drugged with valium and ketamine, because it's rather awkward trying to physically restrain 230kg of seal.

Firstly, someone had to place a hoop net on a long handle around the less-than-amused animal, then a bag was put over its head. Meanwhile, another member of the group would give the seal an injection.

'At first we were terribly apprehensive, but after doing it for a while we got rather smart. Unfortunately, the handle of the net kept breaking so it was quite short in the end.

Apart from Dr Shaughnessy and Mr Newgrain, the Antarctic Division had provided a contract worker to help with the experiments. A volunteer — who happened to be from the Children's Museum of Victoria — also assisted, along with two others from the ship.

'We used to get them to carry this heavy weighing machine. The milk machine was battery operated so there was a 12 volt battery which also had to be lugged around,' said Dr Shaughnessy.

'The work was quite exhausting. Usually we were out for four hours at each family group and on most days we went to two groups. Some days we were out for 12 hours at a time.'

They took packed lunches containing — you guessed it — Danish pork (plus bread and cheese) and also a very un-Danish billycan and kerosene stove for hot drinks. The daytime temperatures were around minus-10 (and dropped to minus-15 overnight).

The seal group also took emergency supplies such as tents and sleeping bags in case weather conditions prevented the helicopter from picking them up. Fortunately this didn't happen.

'However, there were occasions when the helicopters had to race out to us because a snow storm was approaching which threatened a white-out,' he said.

Finally Icebird was close enough (about 10 miles away) to enable the helicopters to take voyage leader Kerry and the ship's captain over to confer with their counterpart and by satellite phone with the Director of the Antarctic Division, Jim Bleasal.

'It was decided that 20 of the 36 expeditioners would be rescued,' said Dr Shaughnessy

'The day of the rescue — 4 December — we were apprehensive as we awaited decisions,' he said. 'We transferred after lunch using two helicopters from Icebird and one from Nella Dan.

'It took about eight trips for the people and four for all our luggage,' he said.

Icebird was on a resupply voyage to Mawson and Davis in Antarctica, so the Nella Dan expeditioners travelled further south before heading home. heading home.

'Icebird was already full of passengers by the time we got on board, so we felt like boat people, refugees,' he said. The 14 which had been dropped off at Heard Island by Nella Dan had already been picked up by Icebird.

Conditions were cramped until some people got off at Mawson and several more at Davis. 'I slept in four different bunks on the first four nights.'

The ship left Davis on 12 December and after much rolling they arrived back in Hobart on 23 December.

So ended a trip which while costly in time and money (particularly for the Shaughnessys who were both on leave without pay for most of the time) added greatly to the knowledge of crabeater seals, and the number of elephant seals on Heard Island.

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*Dr Shaughnessy has been with CSIRO for nearly five years. Before that, he worked at the Sea Fisheries Research Institute at Cape Town in South Africa, where he researched fur seals.

On the record

A selection of quotes from the media about science and CSIRO

'Technology is our destiny.' West Germany's chancellor, Helmut Kohl, to the 18-nation Eureka conference in Hanover. Reported in *The Melbourne Herald*, 6 November.

'We need ethical codes for all scientists and these need to be backed up by law.' Monash University's acting Dean of Law, Professor Christie Weeramantry, reported in *The Melbourne Sun*, 8 November.

'Unless your experiment is at a critical stage, which may mean you haven't organised things properly, all the staff are expected to make the effort and go for tea.' Dr Elsmaree Baxter, Eliza Hall Institute's instrument officer, on the Medical Research institute's ritual. *The Bulletin*, 12 November.

'Around 90 per cent of the world's technological knowledge has been discovered in the last 30 years, but this knowledge is expected to double in the next 10 years.' The Queensland Innovation Centre's general manager, Mr Ron Sampson, quoted in *The Sunday Mail*, 3 November.

'They are neat and sliceable, they don't make sandwiches soggy, but they are bland.' Dr Barry McGlasson, Division of Food Research, on the commercial tomato reported in *The Good Weekend*, 2-3 November.

'Consumers are uneducated about tomatoes. No wonder the fruit is lousy.' Dr McGlasson in the same interview.

'You can't get four legs or four breasts but you can breed for just about anything.' Dr Jeff Fairbrother, executive director of the Australian Chicken Meat Federation, talks about chickens in *The Good weekend* of 2 and 3 November.

'More is known about the nutrition requirements of chickens than those of human beings.' Dr Fairbrother in the same interview.

'While he is working on his grand plan, the crown jewels will be snatched from under his nose.' The Leader of the Australian Democrats Senator Don Chipp, talking about the Federal Minister for Arts, Heritage and Environment, Mr Barry Cohen's plans for the protection of the North Queensland rainforest. Reported in *The Age*, 1 November.

'Those who knock it [CSIRO] as boffin-driven are boof-head driven.' The Federal Minister for Industry, Technology and Commerce, Senator John Button, quoted in *The Financial Review*, 25 October.

Animal Health assists Fiji in major goat/sheep program

Replenishing goat and sheep stock in Fiji is the aim of a collaborative program between the Division of Animal Health and the Fijian Ministry of Primary Industries.

The project, to control worm infections in the animals, has a budget of half a million dollars provided by the Australian Centre for International Agriculture Research (ACIAR).

A major Fiji Government effort to further boost sheep and goat production during the past ten years has been jeopardized by worm parasite infections — resulting in severe productivity losses and a 25 percent plus mortality rate in young animals.

DAH scientists have been successful in developing control programs for similar problems in Australia, although these can't be applied directly to animals in the Pacific Islands.

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Cont. from p .1

*A number of other people associated with CSIRO also received Australia Day honours.

Officers in the General Division of the Order of Australia — AO:

Dr Graham Alexander, Chairman of the Queensland State Committee; Professor David Caro, former member of the Tasmanian State Committee; Mr Kevan Gosper, former member of the CSIRO Advisory Council; Emeritus Professor Reginald Moir, former member of the Western Australian State Committee.

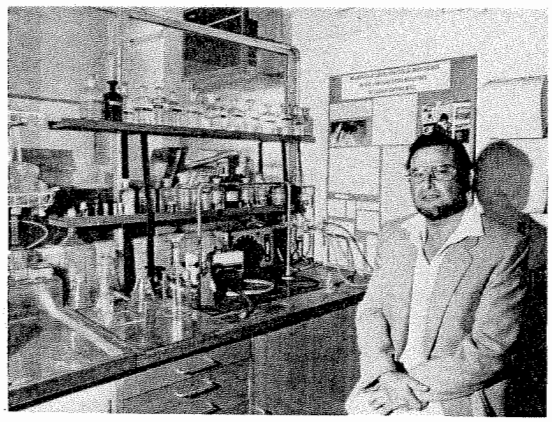
Members of the General Division of the Order of Australia — AM:

Dr Joy Bear, senior principal research scientist, Division of Mineral Chemistry; Dr Alec Costin, formerly CRS with the Division of Plant Industry; Dr Hugh Gordon, formerly SPRS with the Division of Animal Health in Sydney; and Mr Wallace Read, PRS, Division of Energy Technology. Miss Joan Russell, formerly senior technical officer, Division of Applied Physics, received a Medal of the Order of Australia (OAM).

'Designer' molecules by Holan

Late last year, a new joint venture company set up on the initiative of the Division of Applied Organic Chemistry, through Sirotech, with Du Pont (Australia) was announced and attracted considerable publicity. It has been established to develop, manufacture and market internationally a range of bioactive compounds invented at the Division. The new company is expected to generate sales of about $150M a year and greatly boost Australian-based manufacturing and export. Chief research scientist Mr George Holan is a leading figure in the 'design' of insecticides in Australia. Here we present an outline of his complex and fascinating work.

For Mr George Holan, the signing of the agrichemical joint venture agreement with Du Pont marks another high water mark in his quest for control over the toxic effects of insecticides.



Mr George Holan *News Ltd photo.*

You could say that, like designers of clothing or homes, Mr Holan designs molecules to fit exact biological purposes.

Since joining the Division of Applied Organic Chemistry in 1966, he has been a prime mover in creating biologically-active compounds which can have commercial applications.

His first task was looking at the chemical structure and biological effects of DDT — the first of the great synthetic insecticides.

Using the knowledge acquired through this work, Mr Holan has gone on to develop a methodology for manipulating compounds and to predict the outcome of any new design.

The work has led to collaborative links with research institutes worldwide, and especially important associations with the University of New South Wales, Sydney and Monash universities.

His aim is to develop compounds which are highly selective to the particular biological function he wishes to control. In the case of insecticides, this means preparing compounds which have specific toxicity (ie. that they will only kill certain creatures without harming humans, plants or animals valuable to humans) and eliminating the 'hit-and-miss' approach to insecticide or drug design.

For many years industrial chemists used their intuition when synthesizing new compounds for testing. While some have proven effective in killing insects, the lack of methodology in their preparation made a lot of the work useless.

The intricacies of molecular design are fascinating — almost like a jigsaw puzzle.

In very simple terms: if the shape of the new compound's molecule is right, it will slot perfectly into a cavity in the nerve membrane and block the messages sent via electrical impulses, causing the insect to have convulsions.

The apex shape of the three-dimensional insecticide molecules developed from that of DDT, which Mr Holan was able to deduce, gave the compounds their devastating effect on insects, by disturbing the passage of essential sodium ions through the membrane. The convulsions killed insects mainly through exhaustion and loss of water.

The trick was to come up with the correctly-shaped and -sized molecules with the right type of bonding to make the compound absolutely specific.

For instance, a compound which has the potential to interfere with nerve membranes in a number of animals (including humans) can be made specific for insects by having in its structure a very weak bond which breaks down easily in the human body. Alternatively, the molecular wedge which attaches itself to nerves can be designed in such a way that it can't do so at the higher temperature of the human body while still affecting insects operating at lower temperatures. So the 'jigsaw puzzle' is completed only in the insect.

And the techniques involved also can be translated into other applications.

'If we develop a methodology for designing biologically-active compounds, then we can do a whole range of things with it, such as attempt to design other agrichemicals and also antibacterial, anti-inflamatory and anti-viral drugs,' said Mr Holan.

He and his team have now come up with so many new compounds in various fields of biological activity that they have to be recorded on a computer.

At present they use a computer in Perth (via CSIRONET) but soon the Division will have its own. Among other things the new computer will be used for design of molecules that can be displayed and manipulated on a colour monitor screen in three dimensions.

Mr Holan has tried to establish a multi-disciplinary approach to compound design. He uses principles of selected toxicity first laid down more than 30 years ago by Professor Adrien Albert. This work involves: biology, toxicology, neurophysiology, biochemistry and finally the most important — chemical synthesis.

The work has attracted substantial commercial interest.

An extremely low-toxicity insecticide 'ester' with the generic name *Cyclopropthrin* was selected several years ago by the large Japanese company Nippon. Kayaku and should appear on the market soon.

'This broad spectrum compound is one of the least toxic of all insecticides,' said Mr Holan.

It's expected to find its greatest use in rice paddies in the Asian region. Because it's non-toxic to fish it won't damage the important staple food in the area.

It can also be used against that Australian menace, the sheep blowfly.

*From difficult beginnings, Mr Holan has gone on to be one of the leading organic chemists in Australia. He was born in Prague, Czechoslovakia, and at an early age was caught up in the horrors of the Second World War in Europe. Because of this, he didn't start his schooling until he was 15. In 1948 he came to Australia, and the following year started studying chemistry at night at the Royal Melbourne Institute of Technology. He had a long stint with a commercial company, where he eventually was in charge of basic research, working for a period in the United States, before moving to CSIRO in 1966.

Our Past

This is the first in an occasional series on the roles, both small and large, CSIRO has played in Australia's history. *CoResearch* would like to thank Michael Moran at the CSIRO Archives for supplying documents and clippings.

'The Magna Carta'

More than 770 years ago, in meadow in England, King John affixed his seal to a document which has come to be known as the British 'bill of rights'.

The Magna Carta, sealed on 15 June 1215 at Runnymede, is a landmark in western social history as it guaranteed the liberties of the British people and defined the limits of the Monarch's power. What may not be well known is that that original document was annulled only nine weeks later by Pope Innocent III.

New, greatly modified, versions were issued in 1216 and 1217 in the name of King John's son, King Henry III, who at that stage was still a child.

In 1225, when he came of age, Henry issued a third version which restored most of the omitted clauses of the 1215 charter. The wording of the this third document was finalized by Edward I in 1297.

So what has all this got to do with Australia's CSIRO?

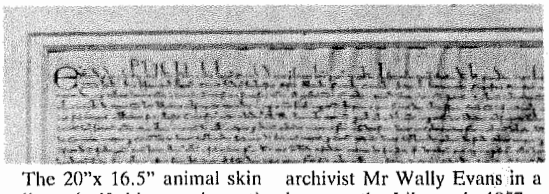
Thirty-three years ago, CSIRO scientists, with colleagues from the Defence Standards Laboratory, undertook the rather arduous business of preserving a relic of that important piece of history.

In 1952, Australia's National Library purchased (for 12 500 pounds) one of only two known surviving originals of the so-called *Inspeximus* issue — Edward's 1297 confirmation of the Great Charter — in the form in which it is found printed in the Statutes of the Realm today.

It was the only copy to be taken out of Great Britain until 1984 when a Texan millionaire purchased a recently-discovered fourth *Inspeximus*. (The third was discovered soon after the National Library's purchase).

The document apparently had been sent to the Sheriff of Surrey, Robert de Glamorgan, for promulgation in that county. It's believed to have later passed to another branch of the Glamorgan family which lived in Somerset — and, many years later, from a member of the family to the Kings School in that county.

It's written in Latin, with the text occupying 15 printed columns in the statutes, in the clear Court handwriting of Chancery scribe Hugh de Iernemuth.



The 20"x 16.5" animal skin vellum (calf-skin parchment) on which the Charter is written is susceptible to moisture and heat — and both vellum and the ink used are affected by strong light.

So, Mr H L (now Sir Harold) White, then Chief Librarian of the National Library, called on CSIRO to carry out some delicate preservation work. Little did anyone realize that it would be more than eight years before the enclosed document would be installed at Parliament House.

The transition to a much warmer climate after nearly seven centuries of mild to cold English weather threatened to damage the parchment and preservation methods were needed.

CSIRO was asked to enclose the document in an inert atmosphere at constant humidity with protection from harmful light rays. The methods were similar to those used on the original American Declaration of Independence, with some modifications to accommodate the very thick wax seal carrying the imprint of Edward I.

It was placed in a sealed metal and glass box filled with argon (the same gas which was used in electric light bulbs). The relative humidity is maintained at 25-35 percent to minimize decay of the vellum and to keep it flexible.

The glass front of the container was covered with a yellow filter to keep out ultra-violet rays to stop the ink fading.

The scientists* involved were working in an area they had never tackled before and were anxious that the methods employed could be applicable to future document preservation.

'It has deflected so much of our time and effort that we are concerned to ensure that the techniques involved are brought to a successful conclusion and that the National Library does not again have to make a call upon the varied research and technical personnel which [have] been so far involved,' said former CSIRO archivist Mr Wally Evans in a letter to the Library in 1957.

'[The] work which we have done in mounting Magna Carta has been a difficult and costly undertaking for us all, quite outside our own fields of endeavour. It has been accomplished at the expense of our normal research projects,' he said.

The main difficulty was in the construction of the glass and metal container. This involved metallizing the edges of two thick glass panels, which were then soldered to the lead strips which form the sides.

Chief Librarian White wrote to the then-Secretary (General Administration) at CSIRO Mr Frank Nicholls in March 1958 — still more than three years before the enclosed document was shipped back to Canberra from Melbourne — saying 'it is grand news that there have been compensations for your labours in the form of new scientific knowledge'.

The work was completed in August 1961. The argon-filled case is expected to ensure survival of the document for several thousand years.

*During the eight years of CSIRO involvement in the *Inspeximus* preservation, a number of scientists and technicians participated. Principally they were from the then-Division of Industrial Chemistry (which split in 1958 into a number of new groups) and the Engineering Section.

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***CoResearch* is produced by the Science Communication Unit for CSIRO staff. It's also circulated to a number of people outside the Organization who are interested in CSIRO activities. Readers are invited to contribute or offer suggestions for articles. The deadline for contributions is the last Monday *before* the issue month. Editor: Liz Burden, PO Box 225, Dickson ACT 2602 Ph: 48 4479.**

Meach Lake

Cont. from p.6

basic research, encouraging creativity, expanding human capacity and recognizing diversity. High priority goes to the 'sunshine' and 'moonlight' plans for alternative energy sources and energy-saving technologies, fifth generation computing (where progress has been slower than the Japanese had hoped), biotechnology — especially for waste control, superbugs, ultrafine particles and new industrial materials, such as ceramics.

I was asked to present the third discussion paper, 'Promoting Promising Technologies'. I argued that there was a certain lack of coherence in technological policy formulation in virtually every industrialized nation because of an ongoing and unresolved debate between two differing schools of thought within government and especially the bureaucracy.

I called these basic positions *Traditional Incrementalism* and *Radical Discontinuity*.

The *Traditional Incrementalists* are strongly committed to existing industries and economic structures, which they believe can be rejuvenated, don't regard the development of information technology or biotechnology as especially significant, regard the decline of traditional industries as a long term consequence of the 'oil shock' of 1973–74, emphasize physical resources over intellectual ones, prefer applied to basic research, see training as more important than education and regard change as a gradual linear process, building on a existing base.

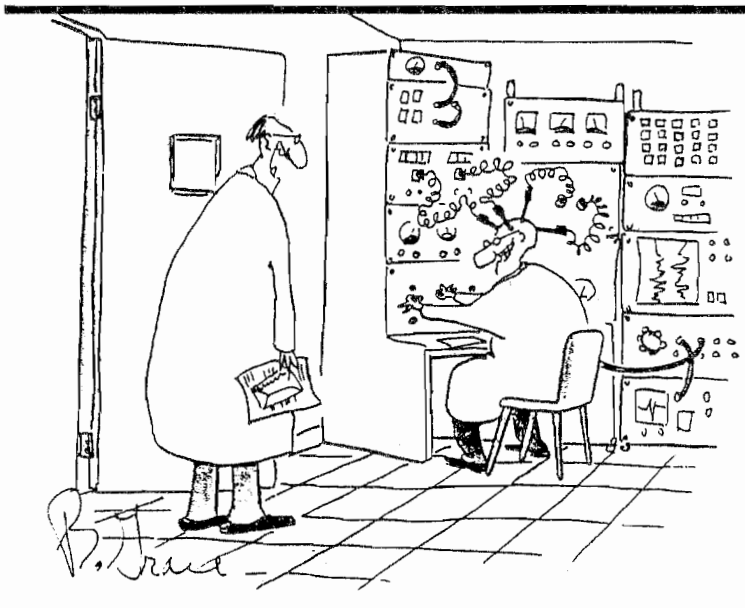
Protagonists of *Radical Discontinuity* see industrial development as a continuous process of growth, maturity and decay, look to new and complementary ('sunrise') industries, are sceptical about 'rejuvenation', regard information as a 'transforming technology', which — like electricity — alters everything it touches (work, travel, communications, health, education), see the decline of traditional industries as the beginning of a new historical cycle, the 'post-industrial' era, emphasize intellectual resources over physical ones, prefer basic to applied research, see education as more important than training and regard change as a matter of quantum leaps (eg. the Japanese electronics industry), where the existing base may be irrelevant.

The increasing volume of literature in the technology debate rarely shakes protagonists from their entrenched positions. Changes, when they occur, are like religious conversions. Faith is more important than reason, it seems.

At a formal dinner in Ottawa I expressed some concern that the meeting had taken an unduly optimistic view of tehcnology as a unique pathway to the 'good life', without adequate concern for its social impact. It's ironic that in the Age of Science, Australia — like the US — has more professional astrologers than astronomers and that problems such as alienation, drug dependence, crime, compulsive gambling, child abuse, mental breakdown and social disease are growing worse not better.

The meeting decided that international conferences of science ministers should be held regularly.

The most hopeful sign at the meeting was recognition that the economic potential of technological change was too great to be regarded as the preserve of one or two nations. Unless these changes lead to a new era of open frontiers and free exchanges of technological information, there will be a dangerous imbalance in national capacity which could destabilize international relations for decades.



"Good news, Professor Fishbane — we got the rat grant."

CoResearch

CSIRO's staff newspaper

No. 289 March '86

Phytotron fire

Blaze highlights fire safety issues

A fire on 13 February at the Division of Plant Industry's phytrotron at Black Mountain has sparked some concerns in the Organization about fire safety throughout CSIRO.

One CSIRO employee, Peter Faulkner, was taken to Royal Canberra Hospital suffering from smoke inhalation (but was later released after examination). He and Leo Trujillo had led the effort to fight the fire before the Police Rescue Squad arrived, because the ACT Fire Brigade was holding a stopwork meeting and was unable to attend until about half an hour after the blaze started. The ACT Fire Commissioner Mr Bill Kerr, personally attended the fire and helped bring it under control.

Observers say there were several disturbing aspects about the incident, aside from the absence of the fire brigade.

There is no automatic internal alarm in the building and staff in the downstairs section had to be verbally told to get out. A sensor eventually set off an external alarm at the fire station once the fire was well established.

When workers at the site attempted to set off the manually-operated internal signal by breaking the glass on an alarm, nothing had happened. Apparently the mechanism had been incorrectly installed when the phytotron was built about 25 years ago.

The alarms had been routinely checked about an hour before the fire started, but the problem was not apparent. The manual alarms had not been put to the test before as it was the first time a fire had broken out in the phytotron.

One worker who saw the fire commented 'CSIRO was very lucky not to have lost the whole building'.

He said all staff 'behaved well'. There was no panic and they calmly set about fighting the fire as best they could under the circumstances.

Two aspects of the fire have wider implications for other parts of the Organization.

Dense smoke

Firstly, the fire was in the roof of the building and got into the insulation, producing dense smoke which posed a threat to the workers who were fighting the fire without any breathing equipment. This could also happen at other sites and is a major reason staff are advised to leave the building as soon as a fire appears to have taken hold. Because there was no immediate outside help in fighting the fire, the phytotron workers took more risks than they normally would have.

Also, the cause of the fire raises questions about the likelihood of a similar occurence elsewhere. It started because of the failure of a ballast in a fluorescent light, creating high temperatures which ignited the caneite ceiling material.

Caneite, made from sugar cane waste, is now banned as a building material because of its flammability.

Occupational Health and Safety Manager Mr Gary Knobel said the run-down in building and maintenance funds was a cause for concern and he believed safety precautions, particularly in older buildings, were 'not up to scratch' in many cases.

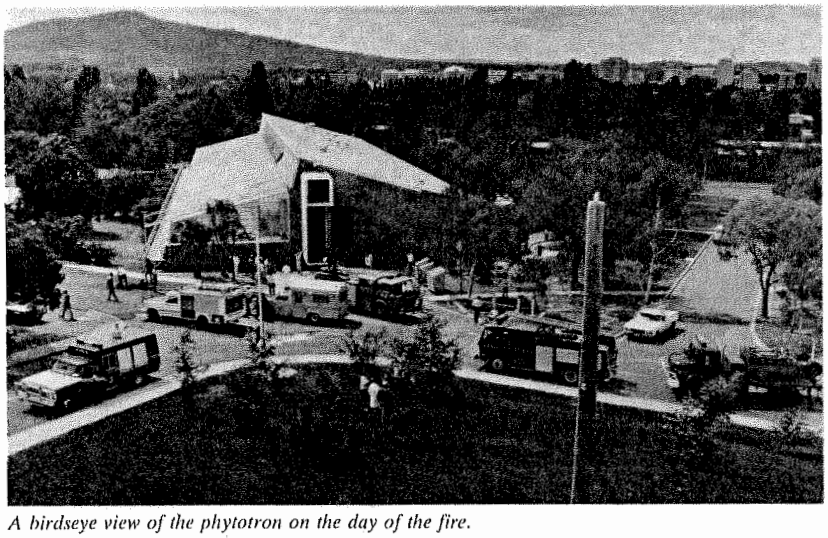
'There's a considerable backlog in repairs and maintenance,' he said. The Health and Safety Unit would like to see more funds become available to carry out urgent upgrading and maintenance work.

'Hopefully we won't have to wait for accidents to happen before we get sufficient money,' he said.

He said electrical problems do crop up from time to time and even the best maintenance procedures can't predict when something might go wrong. However, everything possible should be done to ensure that the hazards are minimised.

This may involve replacing some of the old light fittings such as the one which started the phytotron fire. Some of these fittings are 25 years old.

*Largely because of the early efforts of the workers from the phytotron and the Division of Entomology, there was relatively slight damage to the building and it's believed none of the experiments were jeopardised.



A birdseye view of the phytotron on the day of the fire.

What sort of cocktails do tropical animals prefer? What brand of suntan oil do they use? Where do they go for their holidays? These are among the questions NOT answered in this month's Division feature on Tropical Animal Science. This is a serious newspaper, so as you would expect more important issues are discussed. ***Turn to pp. 3-6.***

Staff video gears up

Patrice Newell from Channel 9's* Today *program will front the three pilot episodes of CSIRO's staff video, to be called Connections.

Divisional involvement will probably determine the success of the videos and already there's been a good response to a call for liaison people to co-ordinate input from the divisions. Nick Pitsas at the Film and Video Centre in Melbourne is scouting around for items of interest for the programs, and a freelance television journalist, Ms Marianne Latham, will write the scripts. The first one will be ready for screening on 2 April.

At a meeting of the steering committee last month, a smaller working group was formed to pave the way for divisional input and provide a channel for feedback to the committee. The group comprises Wendy Parsons (Division of Forest Research), Paul Hewitt (Division of Applied Physics) and Bob Marshall (HQ).

'85/86 communication grants being considered

On 13 March the Executive will consider a proposal for communication grants in 1985/86.

This follows a Finance Committee meeting in February when a decision was deferred because of the terms of the Executive decision on the matter last August. The Executive had then accepted the principles of Recommendation 20 of the report on external communication but required the Director of Information and Public Communication (at the time still to be appointed) to bring forward proposals for the grants in the 'context of a detailed budget for all of the communication resources and functions under his control'. Mr Peter Dunstan, the new Director, joined CSIRO in November — well into the financial year.

Twenty-seven applications were received for 1985/86 funds, and the Bureau said all these will still be considered.

The Finance Committee's deferral prompted a strongly-worded telex to the Chairman signed by a number of people around the Organization, who interpreted it as meaning the communication grants had been withdrawn. The Bureau said this was not the case.

The funding for 1985/86 had not been rejected, and 'the principle...remains endorsed', according to a letter sent by Mr Dunstan to Division Chiefs and OICs.

From the Chairman

A column by Dr Keith Boardman

My recent talk on 'Strategic Research for Industrial Applications' to the Annual Symposium of the Australian Industrial Research Group, comprising the research managers from Australia's largest companies, received wide coverage in the press and on radio.

The date of the symposium coincided with the formal takeover bid of BHP by Holmes a Court, and the comments in my talk on the potentially adverse effects of takeovers on company investment in research and development were the basis for the headlines in the newspaper articles. I was making the point that discretionary activities such as R&D are likely to suffer in a situation where companies must suddenly find cash for high interest payments. My remarks subsequently received warm endorsement from Sir James Balderstone, Chairman of BHP, during his opening remarks at the 1986 BHP Science Prize Awards in Canberra. Sir James extended my arguments to include investment in exploration activities.

In my talk to AIRG, I was critical of Australian industry for underestimating the strategic importance of investment in R&D. A PA technology survey of senior executives in Australia, the US, West Germany, Japan, Britain and Belgium, released last September showed how lacking in technological expertise Australian boards are compared with their overseas competitors. According to PA, most Australian chief executives have no systematic or planned approach to monitoring key technology developments. For example, less than 10 percent of the Australian companies surveyed vested responsibility for monitoring technology in a member of the board or the head of a technical department, compared with almost 60 percent of Japanese companies.

In my address I challenged Australian manufacturers to form special industry groups that would collaborate with CSIRO in setting strategic research objectives. Overseas we are seeing the growth of a new type of collective industrial research organisation which carries out 'precompetitive' research for its members. The new collective associations operate in a variety of ways. Some have their own facilities or use those of their members or sponsors; others contract out research to universities, government laboratories or commercial research companies. As far as I am aware there is little co-operative research towards strategic objectives in most areas of Australian manufacturing.

To facilitate interaction with the relevant industry sector and the setting of broad research priorities, the Management Committee at its recent meeting decided to establish sector policy committees in the following areas: manufacturing industry, rural industry, minerals and energy, water resource industry, information and space, natural environment, construction and urban and civil engineering, and public health.

Directors from Institutes with a significant research effort in the sector make up the sector policy committee, which will be chaired by the Director of the Institute with the greatest commitment to that sector.

The reviews of the Division of Chemical Physics and the subject review on Material Science and Technology have recommended the amalgamation of the Division of Chemical Physics and Material Science to form a new Division. Although there is general support for the amalgamation, much debate has taken place on the name of the combined Division. I appreciate the concern of the staff that the name should accurately reflect the broad objectives and work program of the new Division, and yet it must be simple enough to be meaningful to the outside world.

Keith Boardman

New Research for Australia book out

The fifth booklet in the CSIRO Research for Australia Series — Radio Astronomy — is now available. It tells the story of CSIRO's work in this field, covering the latest ideas on how our universe and its components evolved. It also gives details of the future of CSIRO's radio astronomy work. CSIRO staff may buy the book for $6 by sending a cheque to the Collector of Monies, CILES, Melbourne.

Health matters

New OHS Policies

Two new OHS policies have been issued and several more are under development: 1. Policy Circular 86/8 sets out principles and procedures to be adopted in the identification and management of asbestos both in buildings and in laboratory plant and equipment. Staff should familiarise themselves with the requirements, particularly those regarding control over use of asbestos in the laboratory. 2. Policy Circular 86/9 covers procedures for eye examinations and provision (where necessary) of special glasses for VDU work. Dr John Graham will be collecting medical-in-confidence information on this to be held as part of personal files being set up for staff undergoing medical monitoring.

A special form has been developed and staff having the eye examinations must take a copy of the form with them when attending the optometrist or ophthalmologist Arrangements for examinations are to be made through staff sections and copies of the form are available from each RAO.

Changes in CSIROHSC

The membership of the CSIRO Health and Safety Committee has been expanded and now includes Mr John Nicholas (DBR) representing the Institute of Industrial Technology and Mr Phillip Elkins from the ACTU representing CSIRO unions not already on the committee.

Dr Ken Ferguson, chairman of the committee, will be retiring in April and it's expected the Executive will soon announce his replacement.

A reminder that the CSIROHSC encourages all staff to raise issues regarding their own occupation health and safety with local OHS committees. If these issues can't be solved locally then the CSIROHSC will consider the matter and advise the Executive accordingly.

Who..when..where..why

Several recent accident and work-related illness cases have occured without the staff concerned notifying their local safety officer or, where relevant, first aid officer.

It's essential all such incidents are reported as soon as they occur so proper preventative action can be taken. Accidents are investigated so that lessons can be learned. They are not investigated to apportion blame. Hence it's very important for all of us that the details are recorded at the time (standard report form) and that medical attention is sought however minor the apparent outcome. Staff should be aware that unless these steps are taken it may be very difficult to substantiate the facts later on if it's necessary to seek compensation. Also, local health and safety committees and the OHS unit need to know about all of these incidents so that wider OHS prevention programs can be planned.

Gary Knobel

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In this month's special comment section we have a letter on the USA's controversial Strategic Defence Initiative ('Star Wars'). Further letters on this subject will be welcome. For the April issue of* CoResearch *we would like your views on the scientific importance of Antarctica. Australia's presence in that great continent has been debated in recent months. While it's not an area of direct concern to the research programs of CSIRO, work done there has a bearing on Australia's overall research performance. Please limit your letters to 200 words and send them to the editor by Monday, 31 March.

Dear Editor,

You ask for comments on the scientific problems associated with the implementation of President Reagan's Strategic Defence Initiative (or 'Star' Wars') program. The vagueness of the program makes it difficult to assess exactly but those of your readers who have read the excellent article by Bethe *et al* in *Scientific American* (Oct 1984) will know that there are very large question marks surrounding the earliest candidates for a Star Wars type defensive system. The need to intercept a substantial number of rockets whilst they are still in boost phase (less than three minutes after launch), the problems of distinguishing warheads from decoys in mid course phase, and the pointlessness of detonating weapons which have almost reached their targets (in terminal phase) makes the provision of a credible protective screen for the civilian population inordinately difficult if not impossible. Just the problem of writing the software programs for handling data acquisition, target monitoring, continuous redeployment of attack weapons, assessment of effectiveness, and provisions of the necessary in-built safeguards against inappropriate response (either positive or negative) has caused one senior consultant to resign from the advisory program; for those who are interested, the magnitude of the problem is outlined by him in *Scientific American* for December 1985.

I am quite prepared to believe that devices can be developed to intercept and destroy missiles long before they reach their targets (provided they have a reasonable distance to travel). I cannot believe that the defence can be complete, and I do not see that even a 90 percent efficiency is acceptable when that would mean that something like a thousand warheads, with the destructive capacity of 15 000 Hiroshimas would land on Europe and North America.

But my objection to 'Star Wars' or the SDI goes deeper than that. I believe that the program itself is both provocative and pointless.

Long before the SDI is effective as a complete defensive screen against an all-out attack it will be a very effective back-stop to a first strike. Even a rather ineffective anti-missile system will be a superb anti-satellite system, allowing its controllers to knock out the opponent's early warning systems, and its SDI defences (if it has any). Then with a massive first strike to debilitate the enemy the SDI system will only have to offer a defence against a much diminished second strike capacity. Far from offering a protection, the SDI strategy can only lead to a situation in which the side holding the most effective SDI system (presumably the USA) will have to strike first because only then can the system offer effective protection. Alternatively, and before that occurs, the opposition, seeing its gradually deteriorating strategic situation, may be forced to strike before it becomes completely vulnerable. Neither possibility can in any sense be seen as fulfilling Reagan's original dream of 'ridding the world of the scourge of nuclear weapons'.

Bob Hunter
Assoc. Prof.
Physical Chemistry
(University of Sydney) and
Vice President of SANA's
National Co-ordinating
Committee

TAS — new ways to help the tropical animal industry

Australia's agricultural sector is facing mounting pressures from both inside the country and in traditional international markets. The tropical animal industry is no exception, and it also has to cope with environmental problems unique to the area — problems which until now have been under-researched.

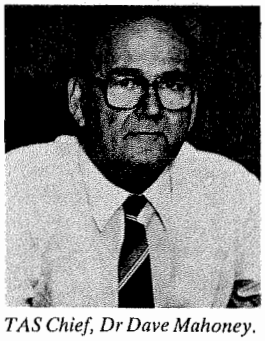
In order to assist the industry, the Division of Tropical Animal Science is preparing a planning strategy document which outlines priorities.

The strategy is being drawn up in consultation with the Division's advisory committee (see separate story).

The Division's work centres mainly on the northern cattle industry, and to a lesser extent sheep production. Other less common species such as goats and deer are also covered in some research programs.

It was only with the formation of TAS in 1982 that a CSIRO research program dedicated to the special problems of the area was formulated. Previous tropical animal work took place under the much wider umbrella of the Divisions of Animal Production, Animal Health and Entomology.

TAS Chief Dr Dave Mahoney believes that between now and year 2000, cattle producers must increase efficiency by 35 to 40 percent in order to stay in business. New technology will be needed to ensure this.



TAS Chief, Dr Dave Mahoney.

However, the Division constantly faces CSIRO funding restrictions and continually has to seek money from external sources for expansion and new initiatives. At present, about 22 percent of the Division's funds come from outside.

The Division is concerned about the reduction in CSIRO's research effort in the agricultural sector resulting from pressure to channel resources into assisting manufacturing industry. The Executive-designated priority growth areas have only indirect relevance to tropical agriculture, mainly through biotechnology which forms part of some TAS programs.

New markets

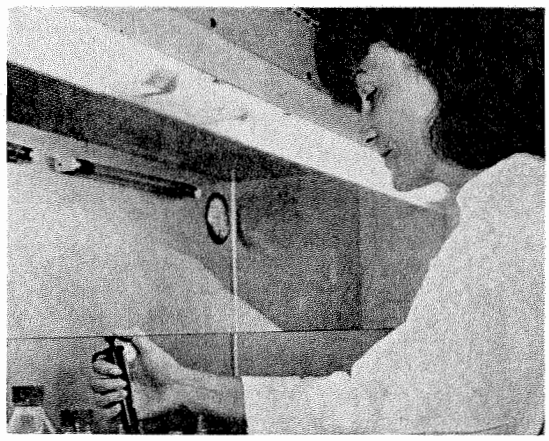
Changing dietary patterns mean domestic consumption of beef is falling, so producers are looking to overseas markets, especially the burgeoning Asian markets.

'If Australia can retain its market share as these [Asian] economies grow there will be opportunities for increasing beef exports. At least half of this should be supplied from the tropics,' said Dr Mahoney.

'However, the figures indicate that an increase of only about two million head in the tropical herd would be needed to support this anticipated trade.

'The tropical industry may also be required to provide a greater share of Australia's beef production than it does now because of its low cost structure, but even considering that the increase in numbers required would still be modest,' he said.

'This is within the capacity of the industry to deliver now, so why will it need new technology? The new technology will be essential to enable producers to stay in business over the next decade.'



Technical officer at Long Pocket, Mary White, is involved in the Division's pioneering genetic engineering work. This includes characterising antigens for vaccines being developed at TAS.

Long Pocket rainforest valuable in many ways

More than 300 species of flora and fauna thrive in the Long Pocket Laboratory's superb 'man made' rainforest.

The development of the lush green forest on the site of a gravelly gully is an achievement which is still a source of pride, 17 years after work was begun.

The rainforest was planned in the original landscaping of the Long Pocket site and it has since gone on to be an important scientific, recreation and conservation resource.

In 1969, rainforest seedlings were planted among the few standing eucalypts. Species from deciduous vine thickets were placed on the shallow gravelly soils and those from complex evergreen rainforests on the better alluvial soils.

Most rainforest seedlings were grown by the Rainforest Ecology Section of the Division of Plant Industry which was then based at Long Pocket. The seeds were collected mainly in North Queensland.

The public interest generated led directly to the development of rainforests at a number of other institutions such as James Cook University of North Queensland.

The Long Pocket rainforest is skilfully maintained by site gardener Mr Barry Wade who has worked at the laboratories for six years.

Forest benefits

The forest offers a number of benefits apart from disguising a rather unattractive gully left over from construction of the laboratory. It provides a recreation area, has a cooling effect during summer, provides cuttings for development of other rainforests in the area and a refuge for many species of animals. School students, scientists, government parks and gardens or forestry officers and many others have visited the forest on many occasions.

Staff from the Rainforest Ecology Section have retired or been moved to the Atherton Tablelands, but care of the rainforest is still a priority at the site.

Before...

...and after

Advisory Committee plays important role

The Division was among the first in the Organization to establish an advisory committee.

The idea for the committee stemmed from outspoken criticism from some members of the agricultural industry that CSIRO was not sufficiently in tune with their needs.

'As a new Division, we had to establish a closer relationship with the cattle industry if we were going to survive,' said Dr Mahoney. The divisional committee has been a great success, he said. One of its first roles was to establish guidelines for the operation of the Townsville nutrition unit under Dr Jim Hogan.

The committee comprises 10 graziers, two CSIRO scientistsfrom other divisions, one representative from each of the Queensland Department of Primary Industries James Cook University of North Queensland, the University of Queensland the the Northern Territory Department of Primary Production. It is chaired by leading Queensland grazier Mr Richard Wilson who runs a large cattle enterprise in central Queensland centered at Banana Station, near Rockhampton.

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This feature is designed to present a cross-section of activities at Tropical Animal Science, and is not intended as a directory to the Division's research.

The April issue of *CoResearch* will feature the Division of Tropical Crops and Pastures.

Scrub tick vaccine on market 'in five years'

Pet owners along the eastern coastal strip of Australia are probably aware of the dangers of the paralysis, or 'scrub', tick which can be deadly to domestic animals.

Because this tick also causes losses of calves it is being tackled in a research program headed by Dr Bernie Stone at the Division.

This parasite is quite different from the cattle tick which also is a major cause of concern in Australia.

An agreement is being negotiated between CSIRO and a major vaccine manufacturer to produce an effective vaccine. Initial work on the purification and characterisation of the antigen (a substance in the vaccine to stimulate production of antibodies against the tick toxin) — is well advanced.

The second stage will be the genetic engineering of the vaccine. The manufacturer will provide funds for the employment of a molecular biologist.

The objective is not to wipe out the tick — 'that would be an impossible task,' said Dr Stone.

'The tick is indigenous to Australia and associated with the marsupial population. It will always have hosts in the wild,' he said.

The tick and its marsupial hosts live in harmony, and the parasite's principle toxic effect is on introduced animals.

'The development of a commercial vaccine and its release on the market would be of great advantage to the owners of domestic pets and livestock,' said Dr Stone.

'In northern New South Wales as many as 10 000 calves per year are killed by the tick. The developing industries of angora goats and deer also suffer heavy economic losses.'

Paralysis toxin injected by one tick can kill a large dog such as labrador, but it's a slow process taking six to eight days.

An antitoxin is available to save the animal once it is afflicted, but this is only useful at a certain stage and survival is not always guaranteed.

Dr Stone believes a vaccine will be on the market in three to five years.

The original work on the tick toxin was carried out by Sir Ian Clunies Ross (CSIRO Chairman 1949–1959) in 1926.

Research into the procedures for producing the vaccine is well advanced and it will eventually be tested in field trials around Brisbane 'to make sure we have the genuine article,' said Dr Stone.

Dr Stone is also involved in examining human allergies to the paralysis tick. Tick allergy does cause unpleasant reactions, which are potentially serious in some humans. Work is being carried out by Dr Stone and experimental scientist Maryann Gauci to develop an assay to test for the presence of antibodies in the tick allergen and to purify the allergen.

Acaricides program discovery has major impact

One of the most common and costly problems facing graziers in the tropical areas of Australia is the cattle tick.

Each tick increases its own body weight 8000 times during infestation, and each 200 milligram tick extracts about 1ml of blood from the host animal.

Keep in mind that some heavily infested cattle may drop as many as 300 engorged ticks a day, it adds up (or multiplies) to a lot of blood being removed from the animals, causing a drop in condition and therefore in value.

In addition, some cattle are susceptible to protozoan diseases transmitted by the tick, making the pest doubly damaging.

The Division of Tropical Animal Science is heavily committed to control of the cattle tick and is attacking the problem on several fronts. One of these — the acaricide ('tick-kicide') program — is headed by Dr Jim Nolan.

This program has been responsible for a discovery which has had a major impact on insecticide-resistant tick species in the tropics as well as averting what could have been a serious and expensive chemical resistance problem.

Simply, the research group found that by adding a small amount of old-fashioned organophosphorus insecticide to the newer synthetic pyrethroid compounds, a devastating acaricide resulted.

On their own, the two original substances were considerably less effective because of the resistance to each already present in the ticks. Together, the resulting mixture is extremely effective in killing even resistant strains.

'This discovery has saved those pyrethroids from failure,' said Division Chief, Dr Dave Mahoney.

The organophosphorus compound acted as a 'synergist' (a catalyst used to enhance the effect of the original substance) which was able to reduce the amounts of pyrethroid required for satisfactory tick control.

Ephemeral fever research taken to China

There would have to be a very good reason for enduring an average temperature of minus 19°C.

Ms Helen Zakrzewski.

Mr Steven Davis.

Two technicians from the Division did just that last year at Harbin in far northern China.

The reason: the establishment of a research program to tackle a deadly and costly disease, bovine ephemeral fever, an insect-borne viral disease of livestock.

Senior technical officer Ms Helen Zakrzewski and technical assistant Mr Steven Davis spent three months at the Harbin Vetinerary Research Insitute — the first westerners to work at the lab.

To make life uncomfortable inside as well as outside the laboratory they were working in, the heating system could not be started until just before they left, because of a conversion program.

The joint project is between the Division, the Australian Centre for International Agricultural Research (ACIAR) and the Chinese Academy of Agricultural Sciences. It is co-ordinated in Australia by Dr Toby St George of the Division's microbiology section and Dr Bai Wenbin of the Harbin Veterinary Institute.

Ephemeral fever is one of a range of bovine diseases present in parts of Australia and the Division has built up expertise in identifying and treating it. The technicians' work included transferring Australian knowledge and techniques to local scientists and setting up a national serum bank.

Mr Davis said the new catchcry in China is 'modernisation'.

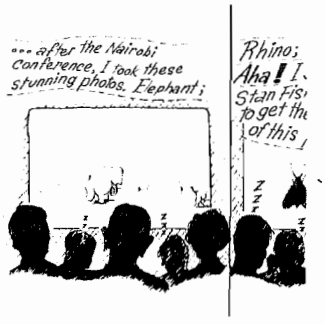
The primary aims of the research in China are to understand the epidemiology of the disease and later to develop a vaccine to halt the decimation of valuable draught animals by ephemeral fever. Because there is little heavy farm machinery, farmers rely on oxen to plough the fields. While this may not seem to fit the description of modernisation, the logistics of farming in China mean that draught animals will probably continue to be used for many years.

Two scientists from China are due to arrive at Long Pocket soon and will stay until July to participate in ephemeral fever research. They are Mrs Tian Fenglan and Mrs Jiang Chunling. It should not be presumed that the Chinese scientists are merely learning from CSIRO — they are also contributing their own knowledge.

Admin staff at Long Pocket Laboratories

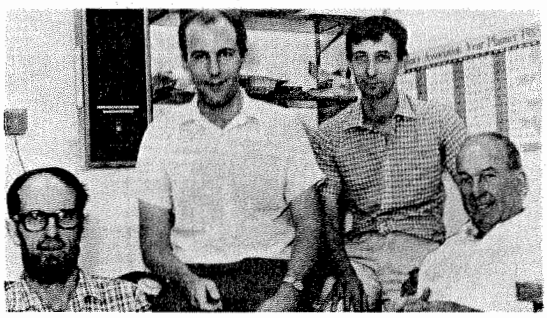
Most of the Long Pocket admin team. From left to right, John Humphreys, Larry Clunn, Stan Carne, Camille Tunney, Debbie Wilton, Michell Narracott, Col White, Dell Dunn and Peter Starr.

Some of the scientific and technica Laboratories. Back, L to R, Jenny P Janine Nielsen, Andreas Flach, Geor



From the Long Pocket lecture room – photos in this feature).

Cattle tick vaccine work



Some of the scientists involved in the development of vaccines against cattle ticks and blow flies. Left to right, David Kemp, Craig Eismann, Peter Willadsen and Tony Johnston.

It may be an impossible dream to eradicate the cattle tick by the year 2000 (a magical year for any people with big plans). However, TAS Chief Dr Dave Mahoney is at least confident that the massive losses to the cattle industry can be reduced and the tick brought under control by the turn of this century.

A tick vaccine is now being investigated and developed in conjunction with Biotechnology Australia, a Sydney-based high tech company. Genetic engineering has brought the vaccine within reach and laboratory trials so far are very encouraging.

The current mainstay in the treatment of cattle ticks is the acaricide (see separate story), but work on eradicating the tick now hinges on a discovery that the immune system of infested cows could be activated to cause the ticks' insides to break down.

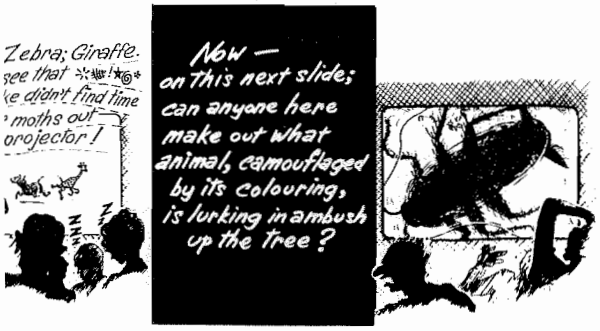
Division scientist Mr Tony Johnston has led the Division's search for a vaccine since 1980, while Dr David Kemp has been responsible for tick physiology work and Dr Peter Willadsen for the biochemistry. Funding for five years has been provided since 1981 by the Australian Meat Research Committee.

'We're a fair way down the track to isolating the vaccine,' said Mr Johnston.

However, he cautions that there's still no way of knowing whether the 12-member team will be successful in producing a synthetic vaccine by genetic engineering.

'We're optimistic, but we don't know,' he said.

' staff involved in research on animal parasites at the Long Pocket eters, Tony Vuocolo and Alan Donaldson. Front, L to R, Klaus Utech, ge Riding and Robert McKenna.



– courtesy of TAS artist Stan Fiske (who also supplied the Long Pocket

The Davies Laboratory nutrition group

Semi-arid tropics provide challenge

The semi-arid tropics which cover a large area in northern Australia, usually away from the wetter coastal strip, offer a major challenge to graziers and tropical animal scientists.

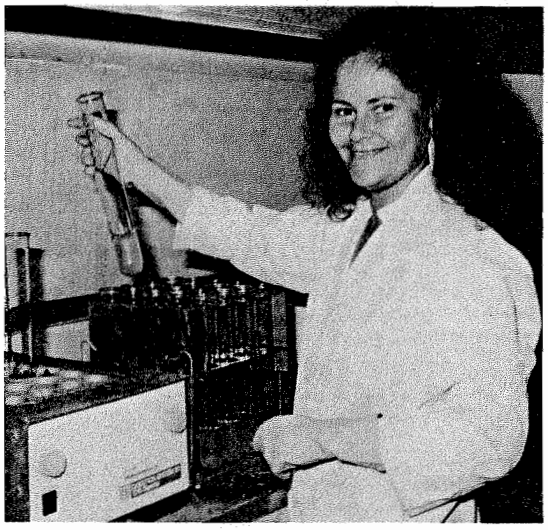
Poor nutrition in forage crops, inhibited uptake by the animals of available nutrients, a certain resistance to pasture improvements by often hard-pressed landowners, wet and dry season climatic extremes — a whole range of factors give the area some unique problems.

The grazing industry there is characterised by 'seasonal malnutrition' — slow growth and seasonal weight loss in animals, erratic fertility and breeding and heavy mortality among pregnant and lactating cows — plus usually poor soil.

The Division's section at the Davies Laboratory in Townsville (in the heart of the semi-arid tropics) under the leadership of nutrition expert Dr Jim Hogan, is tackling the problems of this economically-important grazing region. Research relevant to cattle, sheep and goat industries is undertaken.

Because of the close ties with graziers through the Division's advisory committee, the research program is now well geared to dealing with problems confronting graziers in the region.

Dr Hogan's team takes a multi-faceted approach to improving tropical herd productivity. It is working on improved pastures (in close co-operation with the Division of Tropical Crops and Pastures at Davies), mineral metabolism, more efficient use of plant fibre by the animals and improved animal and property management.



Technical assistant Delia Waterhouse is one of the team of support staff at the Davies Laboratory. She originally came to CSIRO through a CES Aboriginal and Islander Scheme aimed at giving young people the chance at further education and therefore better jobs. During her first four years there, she undertook an associate diploma in biological laboratory techniques through the Capricornia Institute in Rockhampton as an external student. She says her work has been varied and interesting, ranging from tending the goats at Lansdown Station, to assisting with the plant breeding and introduction program for Tropical Crops and Pastures.

Pasture improvement advocated by Division

Tropical legumes figure prominently in the nutritional management research program at the Davies Laboratory.

Legumes are plants which produce seeds in pods. Familiar examples are peas, lupins and brigalow.

The backbone of tropical pasture improvement through legumes is the Stylosanthes family, particularly a variety called Verano (which will be more fully examined in next month's feature on Tropical Crops and Pastures). Certain areas will also benefit from the spectacular success of leucaena, and to a lesser extent from others such as desmanthus ('donkey bean') and arachis.

The Division is collaborating with TCP to support the the trend towards pasture improvement using legume varieties, which are rich in nutrients.

Apart from putting condition on animals, legumes also enhance the nutrients in the soil by 'fixing' nitrogen.

Because of some failures in establishing stylo in Queensland (due mainly to a devastating disease called anthracnose) many graziers are wary of spending a considerable amount of money on improving their pastures with the plants.

However, new disease-resistant stylo strains are being identified and developed.

Making better use of the available feed

Cattle chew through a great deal of fibre as part of their feeding pattern, but does it do them much good?

Tropical native pastures have a high indigestible fibre content and this means the animals need to consume large quantities in order to get sufficient nutrients for growth.

To get the maximum benefit from the available feed, more needs to be known about how the ruminants' digestive system deals with fibre, especially at different times of the tropical year.

Davies Laboratory fibre researcher Dr Brian Lowry said 'tropical plants are different from temperate plants and are little researched. We are looking at the chemical nature of the fibre and how to enhance the animals' ability to metabolise fibre'.

The relationships between the properties of the feed, quantity eaten and rate of passage through the digestive system are poorly understood.

The action of the rumen is very important in studying fibre uptake — in fact it's the main controlling organism in the process and experiments on this are undertaken on cattle, sheep, goats and buffalo by Peter Kennedy and Chris McSweeney at Lansdown.

These cud-chewing animals have four chambers in the stomach — called the rumen, reticulum, omasum and abomasum. The reticulum and rumen form a large fermentation vat where fibrous feeds are digested by micro-organisms — mainly bacteria.

The research program aims to improve the potential of animals to make greater use of the available feed.

Creating a herd of 'super cows'

Cattle in tropical Australia tend to be predominantly derived from Brahman stock.

These Asian cattle have adapted over a long period of time to the harsh climatic conditions in Asia and they have taken quite well to the north Australian environment.

Unfortunately the very factors which make Brahmans and Brahman crossbreeds suitable — ie. low metabolic rate and food intake — also prevent greater productivity during more favourable conditions. A low fertility rate — the result of natural selection in the tropics where breeding has a more drastic effect on condition than in temperate zones — also militates against greater economic productivity.

So at Rockhampton, the Division is attempting to retain the positive features of Brahman adaptation while eliminating the other problems.

One of the experiments being undertaken involves stepping up nature's own system of natural selection by the establishment of a herd of 'super cows', and applying multiple ovulation and embryo transplant technology hopefully to create a much more fertile breed.

The Division has been acquiring from graziers in Queensland 'freak' cows known to breed every year (instead of every two years which is more usual).

The cows, which are held at the Division's Belmont Research Station outside Rockhampton, are being multiplied for breeding to determine if their fertility can be passed on genetically to future generations.

Dr Bob Munro who is involved in this project is also looking at ways of overcoming the normal insufficiency associated with the low fertility of lactating Brahman cows in order to improve fertility rates.

The survival package that has evolved in the Brahman breed includes a lower feed intake and maintenance requirement than for temperate breeds. Rockhampton scientists like Dr Derek Lindsay, Dr Bob Hunter and Dr John O'Kelly are attempting to improve the resistance of the breed to nutrient shortage without reducing, and if possible enhancing, the ability to respond to green feed when the rains come.

New breeds crucial for north Aust cattle industry

Establishing cattle breeds from overseas in Australia is a lengthy and costly undertaking.

Because Australia is an island, it has natural protection against devastating agricultural diseases such as foot and mouth and blue tongue. However, the defences can be and are occasionally breached when biological material harbouring the viruses enters the country.

The need to keep Australia as disease-free as possible means the importation of cattle must be strictly controlled.

Unfortunately, nothing as simple as spraying a rather malodorous chemical into an aircraft — while apparently sufficient for humans arriving from abroad — is enough for the new animals.

For example, in order to bring a potentially very promising type in from southern Africa will involve the creation of a new 'protocol', or import agreement, with the quarantine and customs authorities, said Dr Vercoe.

The most likely (and safest) way is to use one-week old embryos. They will be gathered in Africa and taken to the Cocos Island (to the northwest of Australia in the Indian Ocean), for implant into 'clean Australian cows'.

The resulting calf will then go through a series of health checks before being brought to Australia.

Dr Vercoe believes the future of the tropical cattle industry hinges on the establishment of new breeds.

'So far we have only really sampled the gene pool from Asia,' he said. 'We have only one breed from Africa — the Africanda — and only a very small sample at that.'

'In Africa, the environmental and man-made forces are quite different and there is a greater emphasis on fertility.

'African and African-based breeds could be the major force in the future. The industry needs new breeds if it is going to develop rapidly,' he said.

Dr George Seifert, Dr J Hetzel and Dr John Frisch are involved in comparisons of Australian breeds with African-based breeds both in Australia and in Africa.

'We hope to get these new breeds 'on the ground' during the next 10 years.

Embryo manipulation — a 'brave new world' for cattle producers

Embryo splitting may sound like a bizarre and slightly alarming process, but it could result in greater productivity for graziers in the north of Australia where fertility of cattle is a problem.

Dr Tim Williams at the Tropical Cattle Research Centre at Rockhampton is refining embryo manipulation techniques which enable two identical calves to be created from one fertilised egg. It is basically the natural twinning process carried out in the lab.

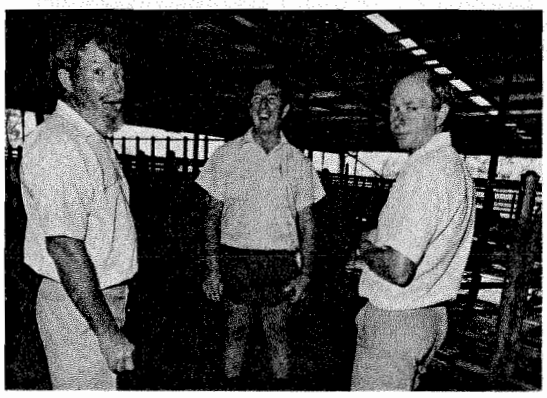
While the procedure for splitting embryos is well established, further refinements are being made to make it a viable commercial undertaking.

'The idea is to develop the embryo work so it can be practical on the farm,' said Dr Williams. 'Hopefully it will become as straightforward as artificial insemination'.

The process is carried out under a microscope, using a glass pipette to hold the week-old mass of about 60–70 cells. A blade is used to divide it into two equal sections. The embryos can then be implanted into two cows and develop separately. The process has been put to the test successfully at Belmont where Australia's first artificially created twin Brahman calves were born last July.

Because the embryos will only survive for a few hours after leaving the cow's uterus, once split they must either immediately be re-implanted or snap frozen.

Dr Tim Williams in the lab. .



Dr John Frisch is surprised, Mr Warren Sim amused and Dr Bob Hunter nonplussed in the animal pen at Rockhampton.

Freezing allows greater flexibility. Using liquid nitrogen at about −196°C, the embryos can be stored indefinitely.

Dr Williams said water is drawn out of the cells to prevent it expanding and bursting the membrane.

The embryo is rehydrated when it's needed, and at present this process results in the highest losses in the whole procedure.

However, Dr Williams is now working on a technique to transfer the frozen embryo directly into the cow. This involves immersing the embryo in a sucrose solution.

Embryo manipulation is common practice in, for example, the United States where a number of embryo transfer centres exist.

An offshoot of the embryo manipulation work is the development of 'chimaeras', or animals in which half the cells are of one genetic type (eg. brahman) and half of another (eg. hereford).

Half the cells are removed from week-old embryos and are replaced with about the same number of cells from another breed. The membrane closes around the new mixture of cells and the embryo continues to grow and divide. They are then implanted into host mothers and eventually result in animals of mixed genetic makeup.

Several chimaeras were born at the Belmont Research Station late last year.

Another aspect of the embryo work is the development of a method for sexing embryos — not easy when you're looking at a clump of 60 cells.

Researchers are working of a method using an enzyme test which gives a visual indication of the sex. Put very simply, female embryos quickly turn the blue colouring of a special solution clear, while males do not.

Greater productivity through new technology

Greater emphasis on direct manipulation of tropically adapted cattle has been a fairly recent development for the Divison.

In 1983, an international conference in Rockhampton called 'Research Priorities for the Genetic Improvement of Cattle in the Tropics' marked the turning point from research mainly into comparing physiological characteristics and performance of northern cattle breeds, to the use of biotechnology to improve productivity.

The major thrust at the Centre is towards increasing the productivity of adapted breeds while retaining the existing levels of adaption to tropical conditions.

In tandem with the genetic work, researchers also are examining the use of hormones and other means of altering metabolic function to improve fertility, promote growth and hopefully reduce the major problem of weight loss and mortality during the dry season.

*Officer-in-Charge at Rockhampton, Dr John Vercoe, describes the Centre as 'one of the jewels in the tropical animal science crown'.

The modern and well equipped laboratories (which would be the envy of other divisions still struggling to get building funds) provide an ideal environment for the Divison's complex and pioneering genetic work.

Field work is carried out at Belmont, about 20km from the Centre. Dr Vercoe said Belmont is critical to his laboratory's research at Rockhampton.

Seminars aim to advise on best superannuation options

'An act of faith' is how Canberra RAO Tony Culnane describes most employees' attitude to payment into the superannuation fund. Few people know or think much about it until they near retirement and by then some favourable options may have been passed up.

So by popular demand, Mr Culnane and his colleague Mr Don Thomson are organizing another round of pre-retirement and superannuation seminars in Canberra to help people make informed choices.

Other RAOs are planning similar seminars, although not until later in the year.

Two new up-to-date slide modules are now available to explain entitlements for people who have been contributing since before the July 1976 changeover to the new scheme and those who started the contributing after that date. (The old scheme was more complicated than the current one, and past contributors require slightly different information.)

'We want to make the point that there are superannuation choices,' said Mr Culnane.

For example, from the compulsory contribution base of five per cent which all permanent employees pay, people may also opt to increase deductions by up to another five per cent.

'We advise people to increase their contributions as they approach retirement. There are two advantages to this — firstly the earning rate of the fund with investments running at around 14 or 15 percent and also the minimal taxation on the lump sum when people retire,' he said.

If that money had been placed in a savings account, tax would have to be paid on the resulting interest.

To contribute more, employees simply need to fill in an 'election form' from their staff clerks and return it to the RAO.

Favourable options

Other favourable options such as retiring early in a financial year may not be well known among employees. These are some of the issues to be addressed in the seminars.

There are two basic options for receiving superannuation entitlements at the retirement age of 65. (People opting for early retirement have the same, but proportionately lower, entitlements. Contact your RAO for individual details):

1. A lump sum plus interest on retirement PLUS an index-linked pension of 50 percent of salary at the time of leaving; or
2. A higher, non-index-linked pension with no lump sum. The formula used is — for every $1000 of contributions, the retired person will receive an extra $110 per year. For example, someone who had contributed $70 000 during his or her employment would receive $7700 per year in addition to the government pension.

Depending on individual circumstances, Mr Culnane generally recommends the first option. Employees should be aware, though, that option two automatically will be implemented by default if a decision isn't actively taken by the employee within three months of retirement. Once this happens, it can't be reversed.

These two options are based on people retiring at the designated age. More complicated cases involving disability benefits etc, or complications arising from contributions to the old scheme need to be looked at individually.

'The bulk of CSIRO people are working in laboratories and not dealing with administrative matters,' said Mr Culnane. This accounts for the lack of appreciation of the benefits available.

'Most people don't realise how well off they are in the super scheme,' he said.

'We are usually talking about very large sums of money — often over $50 000 lump sum and a pension of $15 000 a year once employees reach retirement age.'

Apart from attending the seminars, Mr Culnane urges all CSIRO people with queries about superannuation to get in touch with the relevant RAO.

At present, Canberra RAO receives about 15 enquiries a week from people wanting details.

The RAO is able to provide 'retirement profiles' on request, outlining contributions and entitlements. Also, each year a computer statement of equity in the scheme is issued automatically by the Australian Government Retirement Benefits Office and distributed by the RAOs to all CSIRO contributors.

The seminars are being held in Canberra on 8 and 9 April at a venue to be decided. Apart from Mr Culnane and Mr Thomson, a range of outside speakers are being organized to talk on related retirement topics, including a representative from the Council on the Ageing and a doctor from the Health Authority.

The seminars will be for held on two half days and employees are encouraged to bring their spouses along.

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The editor has received some wise and witty captions for the competition announced last month. Because of space restrictions, the winners will now appear in the April issue.

Think Trees Grow Trees

Six Wallangarra white gums were planted at the Museum of Australia site in Canberra last month to mark the launch of a new book on trees in Australia.

Called '*Think Trees Grow Trees*', the colourful, glossy book was compiled by leading ecologists, foresters, farmers, economists and scientists — and seven of the 14 co-authors are from CSIRO.

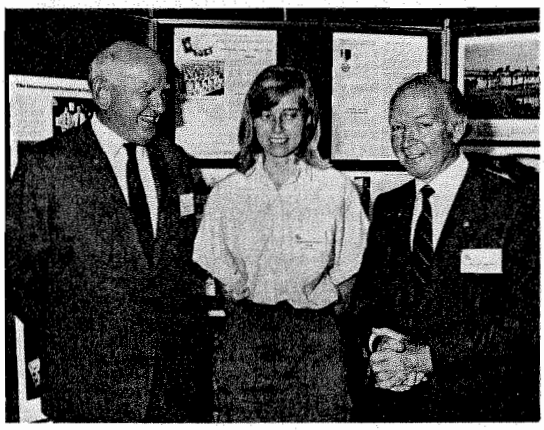
The book was produced jointly by the Australian Institute of Foresters and the Department of Arts Heritage and Environment and officially launched by the Federal Minister Mr Barry Cohen.

Mr Cohen said the book 'encapsulates the objectives of the National Tree Program'. That program was initiated by the Commonwealth Government to increase trees in rural areas, promote a co-ordinated approach to tree conservation and establishment and develop better awareness of the value of trees.

Think Trees Grow Trees reviews the role of trees in the Australian environment and is said to be the only one of its kind on the market. It is available through any Australian Government bookshop Environment Centers or discounted from the Institute of Foresters.

The CSIRO scientists involved in the project were: Chris Burrough, Alan Brown, Phil Cheney, Wilf Crane and Glen Kile (all from the Division of Forest Research), John French from the Division of Chemical and Wood Technology and Hugh Waring who retired several years ago from DFR.

Maryanne takes out BHP Science Prize



Sir James Balderstone, Maryanne Large and Dr Earl Owen (medical director, Microsearch Foundation of Australia) who presented the prizes.

A first year university student, 18-year-old Maryanne Large of Sydney, has won the 1985 BHP Science Prize for her design of a new photographic tool.

Maryanne, who won a gold medal and $5000 in the national science competition for school students, designed a simple piece of equipment to allow photographers to check the final quality of a photograph without the need for contact prints or proofs.

The award for excellence in scientific research in schools is jointly organised by BHP, CSIRO, and the Australian Teachers' Association with support from Westinghouse Electric Australia.

Maryanne discovered by chance that when light shone through a negative at a certain angle the image could be seen as a positive — the final form of a photograph.

A silver medal and $1000 was awarded to a Victorian student, Gerald Wluka, 17, for his research paper entitled: 'Bubbles! An investigation into the motion of air.' Brett Fordyce, 17, of Toowoomba, Queensland, won the bronze medal and $500 for his study of the interaction between lead arsenate pesticide and phosphate fertiliser.

Medals were given to the three students aged under 15 who submitted the best entries in their age group. They were Duncan Watts of Toowoomba, Queensland, for his investigation into the environmental effects of acid rain in two non-industrial areas; Michael Hill of Perth for his research into the bioacoustics of the Bottlenose Dolphin; and Susie Alfredson of Melbourne, for her study into the viscosity of oil.

Apply now for Study Awards

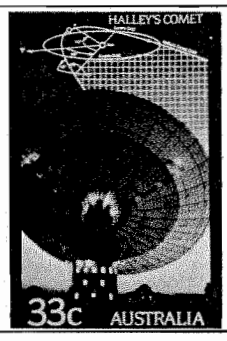
Applications are invited for the 1986 CSIRO Study Awards which provide opportunities for staff to gain training and experience related to their careers.

The awards are open to the broad staff categories: trades, technical, professional (non-research) and clerical administrative.

Application forms and information sheets for the 1986 awards are now available and have been distributed to the divisions, units and regional administrative offices.

Applications must reach Headquarters by 27 June 1986.

For further information contact Mr P O'Brien on (062) 48 4265.



The CSIRO radiotelescope at Parkes features on new stamps being issued soon by Australia Post to mark the return of Halley's Comet to our skies.

The 33 cent stamp will be issued on 9 April, to coincide with the Comet's closet approach to Earth.

Designed by Jim Passmore of Melbourne, the stamp (pictured left) shows the radiotelescope as well as a diagram of the Comet's path in relation to Earth. The photo used in the stamp's design was provided by CSIRO.

First day covers will be available from 9 April at the Visitors Centre at the Parkes Telescope. The cost will be 48 cents.

***Incidentally, TAA will operate one hour flights to view Halley's Comet next month. The cost is $99.**

Good science for Qld forest industry

Queensland's forest managers are benefiting from some important information on genetics and nutrition emerging from the Division of Forest Research's South Queensland Regional Station.

Data on the genetics of the commercially-important tropical pine tree varieties called slash, caribbean and hoop has come from collaborative research by CSIRO's Dr Paul Cotterill and Ms Christine Dean, and Dr Garth Nikles from the Queensland Forestry Department. The research is being welcomed by the forest industry because the results can be used to estimate the response of plantation species to selection for different traits and the trade-offs needed to get that response (for example, sacrifices in wood quality may have to be made to maximise growth). The work will enable the industry to be much more objective in selection.

Another project to be undertaken by the Division in collaboration with the Forestry Department and Australian Paper Manufacturers will examine ways of crossing slash pine and caribbean pine to produce hybrid offspring combining the best characteristics of both species for optimum commercial value.

Direct benefit

The Division said both aspects of the work — the studies of inheritance of production characteristics and species hydridisation — incorporate innovative science of direct benefit to industry.

Work on the nutrition of Queensland's pine plantations by Mr John Maggs and his team is also valuable to both science and the forestry industry.

Mr Maggs said the forest floor plays an important role in supplying nutrients for continued tree growth. Dead foliage and other litter falling from the trees is broken up on the forest floor. In a cyclic action, nutrients released during litter decompositon become available again for uptake by the trees.

The research has involved measuring inputs to the forest floor in litter fall and also throughfall (rain which has passed through the forest canopy), leachate (water which has passed through the forest floor) and reserves of nutrients in the floor.

Mr Bob Hewitt, another member of the team, also investigated the contribution of 'non-symbiotic' nitrogen fixation in nutrient turnover. This means that nitrogen is relased without the presence of a nitrogen fixing legume plant.

The results of the whole nutrition study will complement and aid the interpretation of longer-term Queensland Department of Forestry field trials.

BRIAN goes micro

The microcomputer version of CSIRO's original Barrier Reef Image Analysis (BRIAN) system was launched last month by Science Minister Mr Barry Jones.

The new system is being marketed in Australia and overseas by Melbourne based-company MPA Pty Ltd.

The fast, accurate and relatively inexpensive system for processing satellite images looks set to win a big share of the world computerised image analysis market.

BRIAN was designed to survey the Great Barrier Reef and has saved the Government over $20 million and 10 years of survey effort.

In an agreement drawn up by Sirotech, CSIRO and MPA have transferred the system to a microcomputer and packaged it for commercial release at around half the price of its nearest competitor.

For $33 000, any company or authority concerned with managing large areas of natural resources will be able to process commerically available satellite data on its own facility.

Research collaborators, Dr David Jupp from the Division of Water and Land Resources in Canberra and Dr Geoff Pickup of the Division of Wildlife and Rangelands in Alice Springs said much of the data normally processed by micro-BRIAN was from the Landsat satellites. The system also was capable of processing data from the NOAA and others currently used for oceanographic survey and land cover mapping.

In accordance with the Organization's new policy, a proportion of proceeds of sales will be returned to the research groups behind the development, to provide extra operating funds for further research.

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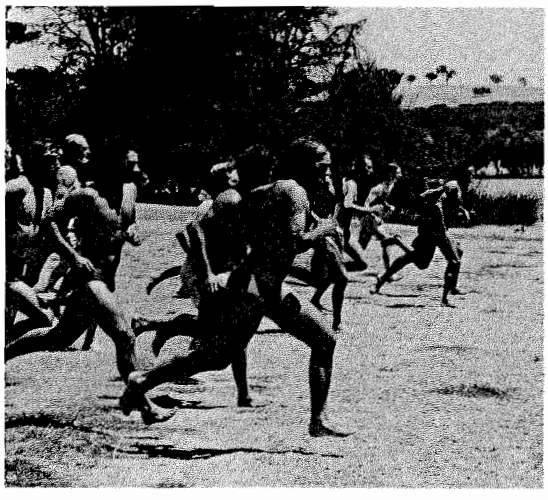

The 1986 Canberra mini-triathlon got underway with competitors running into the murky waters of Lake Burley Griffin. This year's hotly contested event, comprising swimming, running and cycling, took place on a fine, warm day late last month. The placegetters in the individual contest (in which participants competed in all three phases) were: 1. Paul Quilty (Library — Black Mountain); 2. Mick Crowe (Division of Forest Research); and 3. Keith Bennett (HQ). In the teams event, the top places went to: 1. Water and Land Resources (Jim Brophy, Paul Daniel and Gordon Burch); 2. HQ (Robert Hughes, John Paloni and Col Thomas); and 3. Forest Research (Leroy Stewart, Mike Cashmore and John Raison).

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***CoResearch* is produced by the Science Communication Unit for CSIRO staff. It's also circulated to a number of people outside the Organization who are interested in CSIRO activities. Readers are invited to contribute or offer suggestions for articles. The deadline is the last Monday before the issue month. Editor: Liz Burden, PO Box 225, Dickson ACT 260. Ph: 48 4479.**

...People...People...Pe

Moulton Medal to Mineral Engineering scientist

Dr Rob La Nauze from the Division of Mineral Engineering has received the coveted Moulton Medal — an international senior publications award — for 1985.

The medal has been awarded annually since 1929 by the UK-based Institution of Chemical Engineers (IChemE) for the best paper 'of a mature character' published by the Institution during each year.

It's believed to be the first time that IChemE has made the award for work actively carried out in Australia.

The winning paper was 'Mass Transfer Considerations in Fluidised Beds Combustion with particular reference to the influence of System Pressure,' published in *Chemical Engineering and Research and Design* last July, backed up by a review published by Dr La Nauze the previous January.

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The ACT Social Clubs are planning a ball on 31 May to celebrate CSIRO's 60th anniversary. The ball is likely to be held at the Australian National University Refectory. Call Jill Colefax at Headquarters for details.

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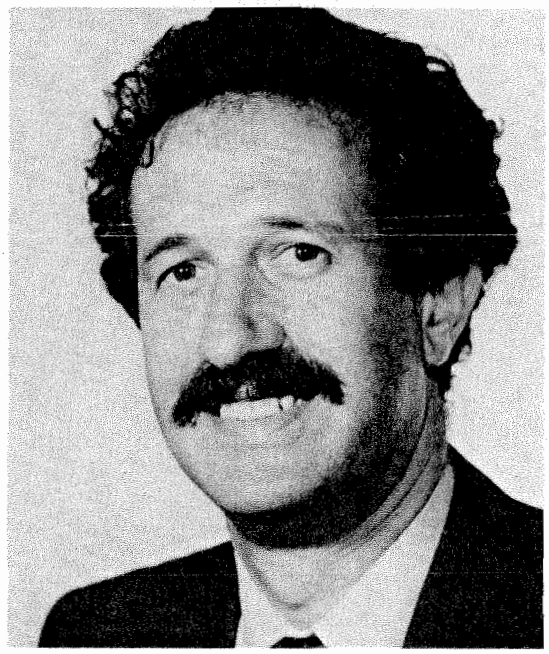
Bridge champion George



Contrary to popular opinion, not all computer people spend every day and night sitting at a terminal gazing at a flickering green screen and tapping away at a keyboard to produce strange and obscure changes to the insides of the computer.

For example, George Havas, acting General Manager (Marketing) for CSIRONET, has been selected to represent Australia in the 1986 World Bridge Championships in Miami, Florida, in September this year.

George and his long time partner Ron Cook were selected following the Blue Ribbon Pairs Championships held in Canberra in January.

This is not the first time that George has ventured overseas to wave the Australian flag over international bridge tables. He won the Far East Pairs Championship in 1971 and has represented Australia on a number of occasions since then. His bridge travels have taken him as far as Moscow and China.

The writer of a regular bridge column for *The Australian* for 12 years, George also contributes articles to Australian and international bridge magazines.

George is very reticent about what sort of training he is doing in preparation for this event (distance running, weight lifting, shadow boxing?) He has however, revealed that he does not use the super computer resources of CSIRONET to analyse the oppositions tactics.

CoResearch

CSIRO's staff newspaper

No. 290 April'86

Chem. Physics/Materials Science merger

Concerns expressed about future of chemical physics research in CSIRO

Major changes in CSIRO's research direction ultimately have the greatest impact on divisional staff — and this has been highlighted by the trauma associated with the decision to merge the divisions of Chemical Physics and Materials Science.

Following reviews of both divisions, it has been decided to form a new, combined division to be called Materials Science and Technology.

Work at Chemical Physics has long been highly regarded in the scientific community, and in the past four years in particular the Division has forged closer ties with industry. One example is the development of an electron multiplier for a Sydney based company called ETP, which has already established a small but significant export market. However, the fact remains that the Division is mainly renowned for its basic research.

DCP Chief Dr Lewis Chadderton says he is a 'stalwart champion' of applied research. But he also believes there's now a danger that much of the outstanding science being carried out at the Division will be phased out and Australia will lose an important scientific resource.

Dr Chadderton and many of his staff are not opposed to a *merger* of the divisions, believing such a move to be a worthwhile rationalisation of resources — especially as the two groups are based in adjoining laboratories. However, many claim the *way* the amalgamation is proceeding amounts to a 'takeover' which gives precedence to materials science.

But Institute of Physical Sciences Director Dr Neville Fletcher (who was a member of the Chemical Physics review committee) said the change is essential if CSIRO is to best serve the interests of Australian industry and the community. He said the Organization could no longer defend the situation of most scientists at the Division simply doing interesting things which may one day have profitable spinoffs.

'We want the Chemical Physics people to think of their particular scientific skills in relation to a defined field which is industrially important — the science of materials — and to actually change their work,' said Dr Fletcher.

'One of the recommendations of the review says that people working in the Division should act as soon as possible to redirect the focus of their activities towards the new purpose of the Division.'

He said, for example, the people in the advanced materials laboratory are 'a bit short of basic scientific backup' while the chemical physics people on the other hand have been 'pursuing interesting scientific problems without any real focus on what they hope is going to come out of them. By putting the two of them together we hope we can get a much better balance between basic and applied research, with room for a little that is truly fundamental.'

One focus of disquiet about the merger is the name of the new Division — Materials Science and Technology.

Several Chemical Physics staff contacted by *CoResearch* are concerned that the name doesn't reflect their work and is a signal that what they are doing will be irrelevant under the new arrangements.

Dr Chadderton would have preferred a name such as the Division of Physics and Chemistry of Materials to take account of the contribution of his scientists.

Dr Fletcher: 'It's true the new name doesn't reflect the work at Chemical Physics now but it's meant to reflect the orientation of work the Division will be doing in the future.'

'Chemical Physics has an extremely good record in academic science and in the spinoffs from academic science — things like atomic absorption spectroscopy.

'But I think since the Division was set up the philosophy really has changed. They would like to go on simply doing good science for its own sake. However, this is not really an approach which the Organization feels it can adopt anymore. I want to maintain the excellence of the science but to direct it towards solutions of important long term practical problems.'

This attitude saddens a veteran DCP scientist, Sir Alan Walsh, who was involved in the pioneering work on atomic absorption spectroscopy in the 1950s. He is now retired, but continues his association with DCP in an honourary capacity.

'I'm sad and angry that Chemical Physics has died as a Division. I know of no Division with such *esprit de corps*, or with a better track record in applied as well as fundamental research.'

He is concerned that the new push for relevance, forcing all research to have a specific aim, will result in mediocrity and a failure to attract good scientists to the Organization.

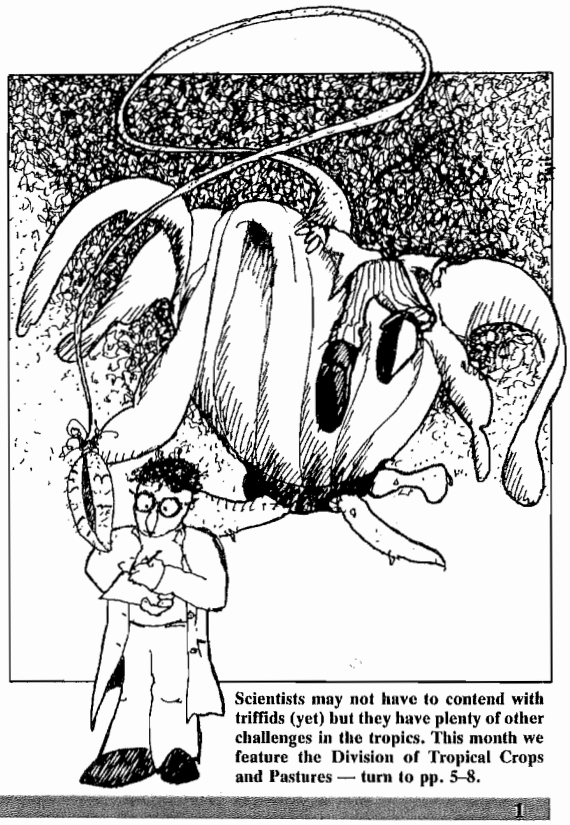
Dr Fletcher denies that the changes have been prompted by political expediency. 'Whilst it's true that this thinking goes along with what the Government is pushing us to do, I think it's a direction we probably have to go in anyway '

Senior Research Scientist with Chemical Physics, Dr Sylvia Mair, summed up her attitude to the move by saying 'the staff of DCP have, at least until

Cont. on p.9

Dr Wild gets 'gong'

Former Chairman Dr Paul Wild receives his Australia Day honour from Queen Elizabeth at Government House in Canberra. Dr Wild was one of five eminent Australians to become a Companion in the General Division of the Order of Australia (AC).



Scientists may not have to contend with triffids (yet) but they have plenty of other challenges in the tropics. This month we feature the Division of Tropical Crops and Pastures — turn to pp. 5–8.

From the Chairman

A column by Dr Keith Boardman

'Public decision makers, whether parliamentarians, civil servants, leaders of commerce or industry, or voters in a democratic society, need to understand the scientific basis of their decisions. So, too, do private individuals going about their private lives. Improving that understanding is not a luxury: it is a vital investment in the future wellbeing of our society.'

This is the main message of the report on public understanding of science, published recently by the Royal Society. The report stresses that the scientific community itself has an important role to play in improving the public understanding of science. The scientific basis of community issues such as environmental pollution or public health is often overshadowed by other factors such as economic constraints, ethical concerns or social factors. Responsible decision making requires a balanced understanding of all the aspects of an issue, including the science. The report emphasises that a better understanding of science and technology by parliamentarians, senior civil servants and leaders of industry is so important.

The issues and recommendations of the report bear a remarkable likeness to the views expressed in the review of CSIRO's external communication activities. The review report stressed that CSIRO staff need to participate more openly and vigorously in public debate on scientific and technical issues within their areas of expertise. Our report also emphasised the need for improved communication with community leaders and decision makers including Members of Parliament. I encourage all staff to play a part in ensuring that the implications of advances in science and technology are understood better by the community and decision makers.

Our Minister, Barry Jones, has been a strong advocate of improved interaction between scientists and parliamentarians and has pressed hard for the establishment of a House of Representatives joint committee on science and technology. It now seems likely that in the near future a motion will be moved in the House by the special Minister of State to establish such a committee.

I had a very successful and enjoyable three day visit to Western Australia. There was an opportunity to visit all the CSIRO sites in Perth and talk to staff about their research programs, as well as to address a combined meeting of staff from all the laboratories on the challenges facing the Organization after the ASTEC review. A meeting and very pleasant dinner with the WA State Committee and a meeting with officers of relevant WA Departments provided opportunities for broad ranging discussions on issues of interest and concern to the State. Unfortunately, a scheduled discussion with Mr Mal Bryce, Deputy Premier, was cancelled because Mr Bryce was ill, but I had a valuable meeting with Mr David Parker, Minister for Minerals and Energy.

At a cocktail hour reception hosted by Mr Pat Mahoney, deputy Co-ordinator, Industry and Company Services, Department of Industrial Development, I informally addressed a group of industrialists on the relationship between strategic and tactical research and the respective roles of CSIRO and industry in R&D. Following my remarks, there was a frank and lively discussion of the problems facing manufacturers in WA and the special difficulties for WA firms in collaborating with CSIRO groups on the other side of the continent.

No doubt the majority of staff watched the television coverage of the encounter of Giotto with Halley's Comet and would wish me in this column to warmly congratulate Jon Ables and the Giotto team at the Parkes radiotelescope for their successful and important role.

The warmest of tributes were paid to Ken Ferguson at a dinner in Canberra to mark his retirement, for his outstanding contributions to CSIRO and the nation: as a scientist, as Chairman of the Animal Research Laboratory, Associate Member of the Executive and Director of the Institute of Animal and Food Sciences. On behalf of staff, I wish him a long and rewarding retirement.

A Keith Boardman

Of Equal Concern

Viewers of* Yes Minister *will enjoy the following scene from the episode on Equal Opportunities, as it appeared in the Hacker diaries. Any resemblance to CSIRO is purely fictional.

[...Sir Humphrey's diary reveals what occurred at the Permanent Secretaries' meeting that fateful Wednesday morning. — Ed.]

I informed my colleagues that my Minister is intent on creating a quota of 25 percent women in the open structure, leading to an eventual 50 percent. Parity, in other words.

Initially, my colleagues' response was that it was an interesting suggestion.

['Interesting' was another Civil Service form of abuse, like 'Novel' or, worse still, 'Imaginative'. — Ed.]

Arnold set the tone for the proper response. His view was that it is right and proper that men and women be treated fairly and equally. In principle we should all agree, he said, that such targets should be set and goals achieved.

Everyone agreed immediately that we should agree in principle to such an excellent idea that it was right and proper to set such targets and achieve such goals.

Arnold then canvassed several of my colleagues in turn, to see if they could implement this excellent proposal in their departments.

Bill *[Sir William Carter, Permanent Secretary at the Foreign and Commonwealth Office. — Ed.]* said that he was in full agreement, naturally. He believes that the Civil Service must institute some positive discrimination in favour of women. But regretfully he felt obliged to point out that it can not happen in the FCO for obvious reasons. Clearly we cannot post women ambassadors to Iran, or any of the Muslim countries, for instance. Generally speaking most of the Third World countries are not as advanced as we are in connection with women's rights — and as we have to send our diplomats to new postings every three years, and entertain many Islamic VIPs in this country, the proposal would definitely not work for the FCO. Nonetheless he wished to make it clear that he applauded the principle.

Ian *[Sir Ian Simpson, Permanent Secretary of the Home Office. — Ed.]* said that he was the principle. He believes we all could benefit from the feminine touch. Furthermore, women are actually better at handling some problems than men. He had no doubt about this. Regretfully, however, an exception would have to be made in the case of the Home Office: women are not the right people to run prisons, or the police. And quite probably, they wouldn't want to do it anyway.

We all agreed that this was probably so.

Peter *[Sir Peter Wainwright, Permanent Secretary of the Department of Defence. — Ed.]* said that, alas! the same applies to Defence. Women are hardly the people to control all those admirals and generals. Nor is it a practical possibility to place a woman at the Head of Security.

Arnold, speaking for us all, agreed that Defence must clearly be a man's world. Like

Cont. on p.12

Dear Editor,

The recently released CSIRO Annual Report 1984/85 is an excellent publication. All CSIRO staff can take pride in our achievements which are comprehensively reported.

In Chapter 2 — Distribution of Research Effort, much attention is devoted to designated growth areas. The nominated growth areas for 1984/85 were biotechnology, advanced materials, generic manufacturing technologies, information technologies, water and soils, plant diseases and oceanography. All are worthy priority areas and warrant and receive additional resources. As the report indicates, growth areas are expanded primarily through redeployment.

Having read of our achievements and of the designated growth areas, what caught my attention were the two statements of payments — Consolidated Statement of Payments and Statement of Payments, General Research Account. These statements report where the funds were expended. I was interested to look at growth, expecting it to occur in the research sectors of the Organization. Simple arithmetic applied at the sub-total levels for each statement reveals the following:

	Consolidated (all funds) %	General Research Account (Appropriation Funds) %
HQ (including RAOs)	+12.12	+12.15
IAFS	+ 0.28	− 3.91*
IBR	+ 5.72	+ 1.87
IEER	+ 0.11	+ 2.71
IIT	+ 1.94	+ 2.22
IPS	+ 5.39	+ 5.26
BSS	+ 7.83	+10.52

*Major reduction in AAHL expenditure

The two most significant growth areas from the published financial data are Headquarters (including RAOs) and the former Bureau of Scientific Services. After allowing for inflation (CPI for the year ended June 1985 was 6.7 percent), growth in real terms occurred in both these areas of activity. On the other hand, all research institutes were in decline in real terms, some considerably more than others. I have no doubt that growth in Headquarters and the former Bureau of Scientific Services can be strongly defended, and thoroughly justified. CSIRO has had many additional non-research responsibilities, policies and initiatives placed upon it and these invariably have a considerable cost element. Nevertheless it is sad for many of us that the limited additional financial resources, especially of an appropriation fund nature, do not reach the institute level. What institutes gain in resources is more than offset by direct budget cuts and inflation.

Most divisions and staff are experiencing real difficulties and frustrations caused by budget problems. This letter, Dear Editor, is a simple manifestation of that frustration. CSIRO is an excellent research organization. Let us keep it that way through research achievement. Let us give higher priority to research.

Ian R. McDonald
Food Research

More letters on p.11

A Matter of Opinion

This month's contributor to our point of view column is the Chief of the Division of Chemical Physics, Dr Lewis Chadderton.

When divisions die, they need not do so quickly. The atmosphere at Chemical Physics still has a whiff of Dunkirk beaches, Gordon's Khartoum, the Eureka Stockade and Napoleon's field at Waterloo. This is both a sense of grievance and of grave injustice.

In the introduction to our 1982-83 Biennial Report I wrote — 'anyone who has witnessed, from inside, the disastrous irreversible consequences which a sudden swing of emphasis can have on a research laboratory...will testify to a most anathematic experience'. I do wish I had not been quite so prophetic! Was it not Max Walsh who, when discussing CSIRO and industry, made the classic remark 'you just don't tap an agricultural scientist on the shoulder one evening and tell him — congratulations, you're working on silicon chips tomorrow'?

Let me explain something. For a long time now I have been *for* a merger of the Divisions of Chemical Physics and Materials Science. I believed the best research programs from *both* divisions could thus be maintained and industry better served. My fear now, and it's shared by many, is that time will show this unique amalgamation to be a takeover; that the 'merger' will be more like that between the iceberg and 'Titanic', and that vital physics and chemistry programs will 'go down with the ship'. I do hope I shall be proved quite wrong!

I have always been enthusiastic and proud of CSIRO. Despite feverish warnings from my fellow Chiefs I embraced, in particular, the concept of internal reviews as supplying the vital features of independence and objectivity. Comprising senior committee members chosen from commerce, industry, universities, overseas — and with clear terms of reference — reviews have always seemed, however expensive, the proper democratic way to apply checks and balances and to point the forward way.

A *divisional* review for Materials Science was followed, after a protracted period, by a material science *subject* review for CSIRO as a whole. There then followed a *divisional* review for Chemical Physics. Since recommendation 1 of the subject review was for a *break up* of Materials Science, and recommendation 1 of our divisional review was for a *merger*, the Executive committee was obliged to address the question of reconciling these two diametrically opposed conclusions. It was aided in this task by the remarkable near-simultaneous appearance of the two review reports.

The creation, by amalgamation, of a new hybrid division of Materials Science and Technology is all but a 'fait accompli'. Further comment here would be quite spurious. On the other hand, the review procedure has been seen to be excruciatingly fallible, to say the least. The apparently hasty linkage of disparate subject and divisional reviews brought us to this state! *Why should* separate and independent reviews by *forced* into compatability when the terms of reference are so fundamentally different? Which review went wrong?

It is a matter of *my* opinion that selecting a piece of one review and grafting it onto some chosen part of another seriously compromises the purpose of each independent review process itself.

'The committee was incredibly impressed with the quality, the very high scientific quality of the research in the division, and we strongly endorse the continuation of *all* of the research efforts, both basic and applied, within the division'.

The words of Jim Williams, chairman of the review committee at Chemical Physics, ringing loud and clear when he addressed the Division on Monday, 4 November, just three days after the review finished. There was more to come.

'We believe that the Division of Chemical Physics is a national resource of which all Australians should be proud [and]...which should be nurtured carefully for the good of Australian science'.

Who then could possibly blame members of the Division for their eager anticipation of a Chemical Physics Section promised in the new arrangements? Who cannot also now understand their profound disappointment, and silent cynicism, after the sting? *Of course* the final decision on reviews in CSIRO lies exclusively with the Executive, whose decisive tendency we all applaud. Yet it is precisely the *way* in which a Chief and his divisional staff are treated, in complex review matters such as these, which is surely the key to obtaining the best out of them. This is especially the case when they are being turned in new research directions.

Cont. on p.4

Robin's long day in the Halley's hot seat

How would you feel if you were at the controls of the main receiving dish for signals from the Giotto spacecraft during its rendezvous with Halley's comet, and the signals suddenly disappeared?

Robin Wark, Experimental Scientist with the Division of Radiophysics, had the chance to find out how she felt at 11.10am on Friday 14 March, when she was in the 'hot seat' as telescope operator during the Giotto encounter.

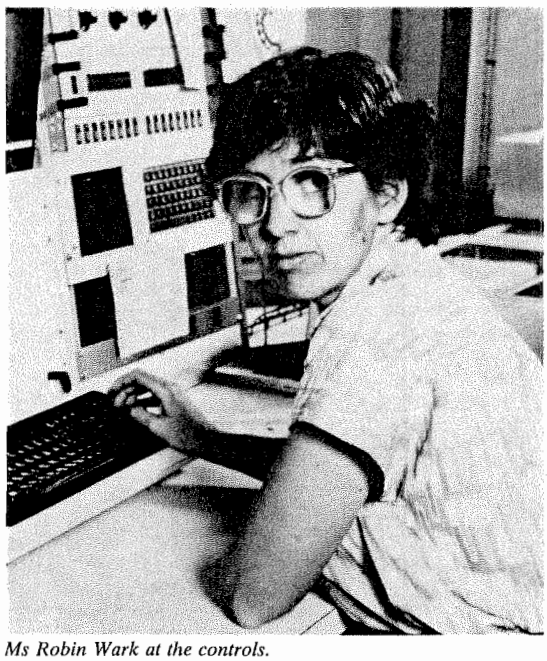
'There was nothing we could do really,' she told *Co-Research*. 'We had a chart recorder showing the signal coming in, and when the probe was at 640 kilometres distance from the comet we saw the signal go.

'We hadn't done anything to change the telescope's tracking sequence for about 10 minutes, so we were pretty sure that the fault was the one everybody had expected — a collision with a large dust particle from the comet.

'Nevertheless, I was just about to start checking that nothing had happened to the telescope when the signal came back in again after about 18 seconds.

'That was nice. We knew that Giotto had already sent back as much data as anyone had hoped, so we weren't too upset by the signal's disappearance — but it was fantastic when we got it back. It took about two hours for the wobbling spacecraft to stabilise to the extent where there was minimal variation of signal, and we kept tracking it till about 2.15 pm.

'I went home and slept then, from 4 o'clock in the afternoon until the following morning'.



Ms Robin Wark at the controls.

Control room

Robin's need for sleep was hardly surprising: her day started at 2am, and by 3am she was in the control room in the tower building underneath the telescope dish, conducting 'pre-pass' tests.

Although the Giotto spacecraft did not rise above the horizon at Parkes until 5.15am it was necessary to make an early start because 'there are all sorts of bits and pieces involved in a radiotelescope and you can't get it going instantly,' she said.

'Two-and-a-quarter hours might seem like a long start-up, but it wouldn't be long at all if something went wrong in one of the tests.'

Robin was backed up on the day of the Giotto encounter by another telescope operator, Dr David McConnell 'in case I fell down the stairs or did something silly' — and the NASA receiving dish at Tidbinbilla was also tracking Giotto and recording the signal, in what ESA referred to as 'hot back-up'.

Until 12 months ago, Robin was working in Sydney as a geophysicist with a Canadian consulting company. She has always been interested in astronomy, but graduated in geophysics from Sydney University in 1981 because she realised that jobs for astronomers were hard to come by.

'Then this came up and much to my surprise I got it.'

Although Robin had the 'hot seat' on the day of the encounter, Giotto involved all CSIRO staff at Parkes at some time over the past three years, as well as staff from ESA, NASA, OTC and Telecom. The mission required the installation of a whole new control system for the telescope, funded in part by ESA and by NASA for the Voyager fly-by of Uranus.

CSIRO's main involvement with the research side of Giotto was collaboration by Dr Peter Hall in the highly successful Giotto radio science experiment (GRE) which was designed initially to calculate the amount of gas and dust coming from the comet by recording how much the spacecraft slowed down when it encountered the cometary environment.

This was achieved by measuring the Doppler effect on the received radio signal at Parkes. Dr Hall has been analysing the data, and says the experiment has far surpassed expectations.

'When the craft was hit, it started to wobble and caused the spinning antenna to be misdirected,' he said. 'The effect of this was to produce a very interesting periodicity of the received signal strength so that we'll actually learn more from this experiment than we would have if the craft hadn't been hit.

'We think that in addition to learning more about the comet, we may be able to determine the size of the dust particle that upset Giotto's attitude, and also gain a unique insight into the dynamics of the craft as it was impacted by dust particles.

'That will be of great interest to the designers of the craft, to see how the damping system reacted to what was apparently a major impact — and will also, I think, become a classic study of its kind.

'The Parkes data was recorded in as raw a form as possible, and it is likely that Parkes will turn out to be the major contibutor to the radio science experiment.'

Dr Hall says the wealth of data received was doubly satisfying since the experiment was a 'string and sealing wax' effort, with extra radio components costing only $200. Much of the equipment was built by Mr Ralph Marson, a vacation student from Sydney University. Mr Marson was at Parkes for the Giotto encounter and was enthusiastic in his approval for the expanded vacation student program conducted by the Division of Radiophysics.

The Insidious Keaton

Dr Ian White from the Division of Environmental Mechanics can add short story and poetry writing to his list of achievements. Last year he entered an ABC short story competition and his eerily prophetic story was one of the winners chosen for broadcast. Here we reproduce his story, The Insidious Keaton, and a poem which makes some astute observations about science in Australia.

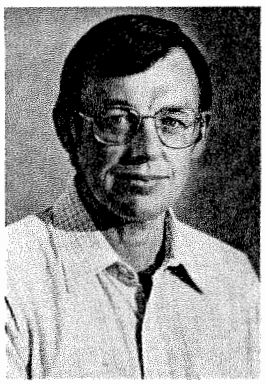
The shrill beeping of her breath alarm shocked her out of her stupor. It had been a long 18 hour shift. Wearily she extracted two more keatons from her money holder and inserted the plastic interferograms into the slot in her breathing tube. Her supply of keatons was dangerously low. After the midday devaluation a keaton only bought 30 minutes of air. She quickened her pace. To be out after midnight meant an automatic charge to pay for street lighting and she couldn't afford that.

How often had she now witnessed someone being, as they put it, 'caught short'? Out of keatons, out of air, out of luck! Horrible futile struggling to rip the breathing mask off their face; grotesquely accompanied by the air alarm. Then the shutter inexorably closed off the outside air and their life. It was believed that half the last keaton paid for the alarm which, in mock decency, piped its staccato death knell for a full minute after death.

She nervously ran her fingers over her own breathing tube. An ingenious Sirosell Inc. invention — simplicity itself. Mask securely glued around mouth and nose; electronically sealed food hatch; the vital shutter behind the open air inlet; the remotely programmable shutter controls; the keaton collection box property of Mitsu-Cola Inc. and the insatiable keaton slot. Making people pay for breathing was a direct application of the Founding Fiscal Forward Planner's basic philosophy — 'The User Must Pay'.

The breathing tube, a concrete embodiment of this principle, had at one stroke solved Austral Inc's problems of unemployment, social welfare, medical care, aging and the handicapped. Simply, if you couldn't put keaton's in the slot you couldn't breath.

How did all this happen? Vague memories of talks with her father surfaced. Nothing dramatic, just a gradual change started in the 80s or thereabouts. First casualty was the ABC, a sort of broadcasting company which had the quaint notion about education and entertainment being freely available to benefit the entire nation. Apparently no-one noticed that the financial reports gradually surplanted the news, or that the exchange rate forecast displaced the weather forecast. Next to go was the CSIRO — some research crowd which wanted science for the national good or something. It actually spawned Sirosell Inc. whose breathing tubes, food dispensers and even the very keatons themselves are known to all Austral Inc's shareholders. Strangely it seemed that the staff of both organisations not only acquiesced but aided in the process.



Dr Ian White

A whole host of other submissive institutions were privatised and it all culminated in Mitsu-Cola's takeover of the government and the foundation of Austral Inc. (limited liability). A bizarre feature of this gradual process was that almost the entire population took the statements of the Founding Fiscal Forward Planner, or Treasurer as he was then, to be meaningless. Had they only known!

Wrapped in thought she hadn't noticed the time until the midnight siren sounded. Startled but almost at the entrance to her flat she slipped a keaton into the footpath-use meter and stepped onto the entrance foyer. She was about to push a keaton into the door slot when a hand gripped her shoulder. She faced the two Mitsu-Cola Violation Auditors with their portable terminal. 'Unauthorised and undeducted use of street lighting after midnight' was the muffled charge. The smaller of the two deftly entered her 14 digit ID number. After a moment's pause he read out the penalty: 'Credit rating reduced to zero, automatic on-the-spot deduction of 18 keatons'. Only two keatons to last till dawn and no chance of borrowing — this then was her death sentence. Quite calmly she kicked the taller Auditor knowing full well that his off-sider would immediately remotely close her breathing shutter. With usual proficiency he did.

As she held her last breath she recalled her father's anguish about the impossibility of life beneath the threatening shadow of the bomb. The Auditor's wondered at her last muffled cry: 'No, no, no, the insidious keaton!'

The dollar stalls
And falls
Cuts unkind
Manufacturing's in a bind
Who's to blame?

Ministers prefer
ASTEC infers
Problems' resolutions
Need technological solutions
Quite tame!

Not science for the nation
Communication's our salvation
Glossy handouts, perhaps
We'll heave upon our own bootstraps
Till we're lame

River Murray's
Salty slurry
Save the perch
Do more research
Just the same?

Stand amazed
Complexities erased
By hard political decision
We're a new drum to beat on
Join the game!

Our stance
Dictated by Finance
Silver, thirty pieces
Just about defines the species
What a shame

Woodchipping ban
Unacceptable to Japan
Get to the core
More science called for
Glad you came!

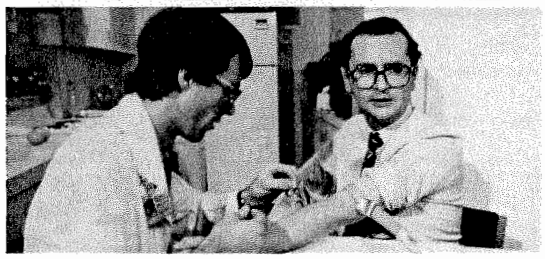
For all ill
A magic pill
Forget detailed examination
Of patient or the nation
Stake a claim!

Expediency, like boot laces
Won't save many places
Or support this caper
So much waste paper
No naked flame!

Soil blowing
Profitability's going
Three PhDs
Better than trees
Instant fame!

CSIRO concurs
Doesn't stop the slurs
Bares its chest
And beats its breast
A bureaucratic frame?

Behind the scenes on Discovery



Dr David Topping submits to blood cholesterol analysis in the interests of science communication.

As part of its Discovery series, the ABC plans to show a new CSIRO Film & Video Centre production on diet and health, called 'Too Much of a Good Thing' on 3 May. Here, Nick Alexander from the Centre reveals some of the background to the making of the program.

Often, it seems, astrology and film-making have much in common. In both, the conjunction of one's stars can influence events in an inescapable way!

Such was certainly the case during the production, last year, of our television program on diet and health. The timing of a filming trip to the Northern Territory was entirely dictated by the happy co-incidence of three events: a survey of edible native plants by an Army Major; a field trip by a Melbourne University diabetics researcher; and a 'traditional bush-foods' fortnight by the aboriginal community at Port Keats.

It was important that we film all three events in order to tell our story, and so a hasty 'northern safari' was arranged for writer/producer Russell Porter, director/cameraman Roger Seccombe and sound-recordist Roger Kerton. After a gruelling eight days, they arrived back thoroughly exhausted, but carrying over a kilometre of film showing, among other things: Major Les Hiddens discovering a native plum with a vitamin C concentration 50 times that of an orange; the people of Port Keats collecting turtle eggs, yams, magpie geese, lizards and various native fruits; and Dr Kerin O'Dea explaining how a group of aborigines, suffering typical Western-lifestyle diseases, had markedly improved in health after living off the land for several weeks.

These three seemingly unrelated events provided pivotal sequences for '*Too much of a good thing*'. The main argument of the program is that diet is strongly implicated in the so-called diseases of affluence — cardiovascular disease, diabetes, cancer and obesity — and that if we modify our diet so that it more closely resembles that of our hunter-gatherer forebears, we can reduce our risk of falling prey to these diseases. As a society, we would also reduce our alarmingly high healthcare bill which is currently in the tens-of-billions-of-dollars a year bracket.

In trying to come to grips with a massive amount of nutritional research and encapsulate it in a 40 minute television program, Russell Porter consulted widely. As well as researchers from the CSIRO Division of Human Nutrition, he spoke to professors of nutrition (it seems there are only two of them in Australia), other university researchers, and the South Australian Health Advisory Unit. He found that the vast majority of nutritionists have reached a consensus — informed advice is now available. All that's needed is the willingness to act on it.

Matter of Opinion

Cont. from p. 3

In my opinion it is vital that there be very careful consideration before the findings of a review committee are swiftly presented to divisional staff. There can be very serious ramifications. Despite the well meaning Review of Reviews it is all too easy for an exercise in utility to become one in futility. A little careful thought does not go amiss!

I make a final appeal for moderation in this, our CSIRO — for which I have so much affection — as she evolves and responds to industrial needs. There is no inconsistency between a bold, decisive policy of applied research and an active, albeit smaller brief in basic science. Our own Professor Adrienne Clarke, past employee of Chemical Physics and present part time member of the Executive, has put it very well. 'Nations whose economy depended strongly on new products...' she said, are 'well aware of the need to protect their ultimate resource, the basic science and the scientist'.

Division Feature

Tropical Crops & Pastures

April 1986

TCP faces funding cuts — but some areas expand

The Division of Tropical Crops and Pastures has a long history of assisting primary producers in northern Australia through research in to a range of grazing problems peculiar to the tropics.

Since the establishment of the Division by the legendary pasture scientist, Jack Griffiths Davies, it has become a major resource for graziers who make their livings from the often harsh but sometimes lucrative environment in the north.

But the Division has faced huge cutbacks in staff numbers and funding over the past 10 years, forcing constraints on some of its work.

Acting Chief Dr Ray Jones said there had been a 25 percent drop in staff and 45 percent in operating funds in that time.

This has led to large cutbacks in several programs — including pasture agronomy, plant nutrition and plant physiology. These represent some of the more basic work carried out by the Division.

However, there has been some growth in other areas, in line with Executive designated priorities. Plant pathology is one area which has been boosted. This is vital in the quest by the Division to beat the costly anthracnose disease of tropical legumes (see separate story).

This feature is designed to present a cross-section of activities at Tropical Crops & Pastures, and is not intended as a directory to the Division's research.

The May issue of *CoResearch* will feature the Division of Manufacturing Technology.

The Samford Pasture Research Station, which is about a 30-minute drive from the Cunningham Laboratory, was established in 1954 as a site for field experiments.

The 291-hectare station is primarily a research facility in which plant introduction and genetic resources, plant breeding and the astronomy, ecology and field physiology of tropical pasture production can be investigated.

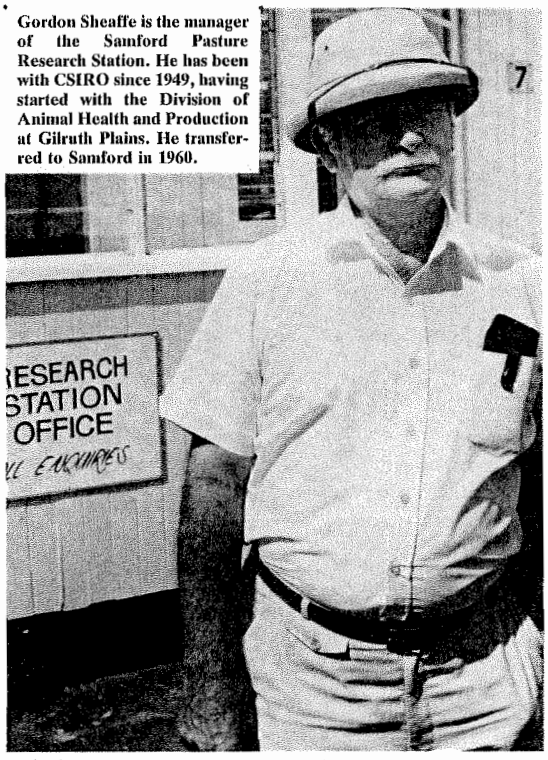
A herd of 140 breeding cows is kept at the site to provide animals for grazing experiments.

Siratro, leucaena, Wynn cassia and white clover are the main legumes grown at Samford.

The Division concentrates its research on pastures and field crops in tropical and sub-tropical zones, excluding the arid zone.

In pasture research the emphasis is on beef production and the objective is to develop new legume based pastures. In addition, the Division aims to define the effects of environment and management on growth, productivity and stability of improved pastures, native grassland and woodlands.

TCP's work is carried out from three major laboratory bases — Division headquarters at the Cunningham Laboratory in Brisbane, the Davies Laboratory in Townsville and the Darwin Laboratories in the Northern Territory. In addition, there are several strategically located research stations in northern Australia for field work.



Gordon Sheaffe is the manager of the Samford Pasture Research Station. He has been with CSIRO since 1949, having started with the Division of Animal Health and Production at Gilruth Plains. He transferred to Samford in 1960.

The station is the centre for receiving, storing and regenerating the Division's seed supplies in southern Queensland. New introductions are grown in a quarantine glasshouse for observation. The introductions are grown under control glasshouse conditions to produce seed for storage and for future field experiments. Information is generated on the agronomic and botanical characteristics of the plants. Following field tests promising lines are identified and seed is then distributed for regional evaluation.

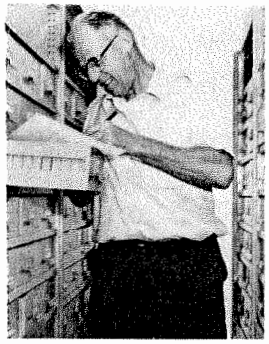
The Controlled Pollination Unit and Genetic Resources Centre are also based at Samford.

Mr Geoff Bunch examining the pasture legume Wynn cassia at Samford.

Genetic Resources Centre and Controlled Pollination Unit operated at Samford

The Division is one of the major centres in the world for maintaining seed of tropical pasture grasses and legumes. An active working collection is kept under medium term storage conditions for supply to national and international research programs. The entire collection of 21 000 lines is also maintained as a germplasm bank in long term storage.

An important facility at Samford is the Controlled Pollination Glasshouse which comprises 36 rooms covering 800 square metres. Air entering the glasshouse is carefully filtered to enable the production of pure seed in isolation from unwanted pollen. Year round growth and seed production is made possible by an automated system which keeps temperatures in the 18–35°C range.



Mr Bill Beall working in the seed store at Samford.

New information technology program establishing 'expert systems'

Dr John Russell heads the new information technology program at the Division.

The program has been set up to establish 'expert systems' combining available information on climate, soil, plants and operations relevant to particular agricultural industries.

Expert systems are designed to marshall all the facts about a particular problem or situation and come up with optimum planning strategies.

The initial system is called SATISFY ('Semi Arid sub Tropics Improved System For Yield'). This package is being developed to improve the management of grain crop systems on cracking clay soils in the sub tropical summer rainfall areas of inland eastern Australia.

'Although they are initially very productive, these soils are frequently short of water and crop yields fall as fertility declines under prolonged cultivation,' said Dr Russell.

'We are attempting to develop an expert system for more efficient use of the land. For instance, this involves formulating criteria for the optimum use of nitrogen fertilisers.'

Another package, REFINE ('REsearch For INput Efficiency') is being set up for the sugar industry. Sugar cane is by far the most important crop in northern Australia and second most important in all of Australia (after wheat) in terms of value and exports.

Dr Russell said there is a need to integrate available information on crop production to simulate the prevailing conditions and ultimately improve managerial and research strategies.

Books mark 25th anniversary

In 1959, CSIRO established the Division of Tropical Pastures, and the 25th anniversary of this event was cause for celebration in 1984.

To mark the occasion, the Division has published two hard cover books. One, entitled *Pasture Research in Northern Australia — its History, Achievements and future emphasis*, deals with a broad range of research, starting from the end of last century to the present day. The other, *The Northern Challenge — A History of CSIRO Crop Research in Northern Australia* focuses more on the Organization's successes — and failures — in the north.

The books are available from either the Division's headquarters in Brisbane or from CILES, for $8 each.

Leucaena breakthrough leads to CSIRO Medal

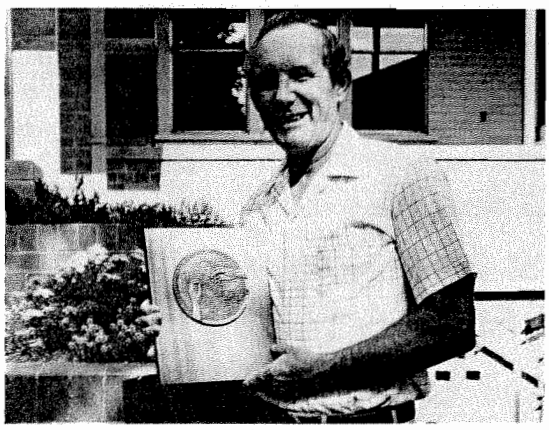
Acting Chief Dr Ray Jones has the distinction of being in the first group of scientists to receive a CSIRO Medal for research achievement.

This was for his work on biologically eliminating the toxicity in ruminants caused by the tropical shrub legume, leucaena — thus clearing the way for greater commercial use of the plant.

Cattle can gain weight quickly when grazing leucaena, and although it is restricted to areas with good quality soils, the shrub has significantly enhanced the range of tropical forage legumes.

In the face of considerable scepticism from his peers, Dr Jones pursued a 'hunch' which eventually led him to pinpointing anaerobic bacteria in the rumen of goats overseas which were able to break down the mimosine in leucaena into harmless substances. Mimosine is present in leaves and before the introduction of the overseas bacteria it caused toxic symptoms in Australian ruminants (this has particular relevance to cattle because of the magnitude of the cattle industry in northern Australia).

It had been conventional wisdom that ruminal 'bugs' were the same in all cattle, regardless of their location. Dr Jones' discovery has proven this is not the case, and raises the possibility of using this approach to solve toxicity problems in other agronomically useful pasture plants.



Dr Ray Jones with his CSIRO Medal.

The toxicity of leucaena was rarely fatal and symptoms (such as hair and weight loss) disappeared once the animals stopped eating the plant. However, sub-clinical toxicity reduced appetite and liveweight gain so that the full potential of the legume could not be realised.

In other parts of the world, such as Hawaii and Indonesia, these symptoms did not appear, although a diet high in leucaena had been consumed by goats and cattle for many years.

After investigations which took him to several countries, Dr Jones isolated the rumen bug which enabled the complete breakdown of mimosine, and this will be available to Australian graziers.

Leucaena is highly palatable to cattle, which chew the shrub's low, bushy green leaves. It is rich in protein and is also able to fix nitrogen, thereby improving soil fertility. Some farmers have had trouble establishing the plant, but a booklet issued by the Tropical Grassland Society of Australia outlines ways of overcoming the difficulties.

Without grazing by cattle, leucaena will grow into trees, although these can easily be slashed to provide feed. But leucaena is so tasty that any cattle in the vicinity won't allow it to reach tree height.

Record cattle weight gains of 275kg per head and 1420kg per hectare a year have been recorded by the Division since Dr Jones' breakthrough — but 'it was a hard fight', he said. Particularly pleasing was the dramatic beneficial effect of introducing the bug to the Ord Irrigation Area where the toxicity was most severe and precluded commercial use.

Anthracnose disease — 'a sword waiting to fall'

Currently the most important pasture legume in the semi-arid tropics is the Verano variety of caribbean stylo (*Stylosanthes hamata*).

It already is used extensively throughout northern Australia, as well as Thailand, India and Africa.

Only about 50 varieties of caribbean stylo are currently available here, and the Division said much greater genetic diversity is required for practical and theoretical studies on resistance to diseases — especially the troublesome anthracnose.

Acting Chief Dr Ray Jones has described anthracnose as 'a sword waiting to fall'.

The first variety of stylo to come to Australia was Townsville stylo which arrived 'accidentally' at the turn of the century from Brazil. This spread naturally and became established over the years — and was also widely used in pasture improvement programs.

However, it was largely wiped out by anthracnose. Other cultivars such as Schofield and Endeavour were severely affected by the disease in the 1970s.

Of all the stylo varieties, Verano has the best resistance, but new races of the disease could overcome this resistance.

A joint project with the University of Queensland and the Queensland Department of Primary Industries is now looking at the disease to get a better understanding of how it can be overcome by introducing or breeding resistant cultivars of stylo.

Dr John Irwin from the Botany Department at Queensland University is involved in the project.

He says Verano is the 'great white hope' for stylo in north Australia, but more accessions are urgently needed to ensure it doesn't go the way of Townsville stylo.

Anthracnose is a fungal disease which spreads by spores. It penetrates the leaf surfaces, pushing down into the epidermal cells. It's growth under the cuticle resembles 'apple scab'.

Different sources

The aim of the collaborative study, which is complemented by work on resistant accessions in South America, is to identify different sources of resistance, then intercross the resistant accessions and test progenies for resistance.

The anthracnose research team: Dr Don Cameron, Dr Sukumar Chakraborty, Dr John Manners and Dr John Irwin with Stylosanthes *seedlings at the Cunningham Laboratory.*

The major emphasis is on the development of cultivars with broadly based resistance to anthracnose. Field studies by Bob Davies (QDPI) in north Queensland have tracked disease development in five stylo species. These have been particularly useful in establishing the role of rainfall in spore release.

The collaborative program has been strengthened with the recent appointments by the Division of an epidemiologist and disease physiologist, who are now based at the University of Queensland.

'We know there are anthracnose resistant strains in South America, and these could be right for our semi arid tropics,' said Mr Edye.

Seed collected will be progressively sent back to Australia to undergo the four month quarantine procedure.

Once out of quarantine, the seed will be 'multiplied' (ie. more seed obtained) and made available to researchers in Australia, Asia and Africa.

Research by the Division will include studies of regional adaptation and evaluation, plant breeding for anthracnose resistance and studies on the evolutionary genetics of the genus.

Collecting missions will be undertaken in Colombia, Venezuela and Brazil, with Mr Edye's longest stay being 14 weeks in Venezuela. That country has by far the largest area where collecting is likely to be successful.

Ruminal biotech. work starts up

Dr Jones' discovery of a 'bug' which stops the toxic effects of leucaena in ruminants has opened up a wide range of possibilities for manipulating rumen metabolism.

A new program dealing with ruminal biotechnology, headed by Dr Merv Hegarty, has been set up at the Division.

The nutritional value and toxicity of grasses and legumes when eaten by ruminants like cattle, sheep and goats is influenced by the way the feed is metabolised in the rumen (one of four stomachs in each animal).

Dr Hegarty's team has started work on the project which ultimately aims to manipulate the rumen fermentation by using micro-organisms to enable animals to get more benefit from the feed, and to eliminate toxicity.

Money has been allocated for the appointment of a microbiologist and Dr Hegarty said it's hoped a a suitable person can be found within six months.

Scientists in the new program are working closely with Dr Dennis Minson's fibre research program which examines the complex chemistry of plant fibre.

'We hope to understand why microbes have difficulty breaking down fibre in the rumen, and then change the way they do so to improve digestibility and increase feed intake. That is, we are interested in changing the microbes, not the food,' said Dr Hegarty.

The second aspect of the work — plant toxicity — stems directly from the work done by Dr Jones.

'He showed for the first time that it was possible to transfer micro-organisms with the ability to break down toxins from one animal to another,' said Dr Hegarty.

Collecting for resistance

In the pursuit of new, disease resistant accessions of caribbean stylo, a major collection project is now underway in South America.

Townsville based TCP scientist Mr Les Edye is leading this effort to boost the number of caribbean stylo accessions in Australia.

The variety, Verano, is a vitally important tropical legume for pasture improvement in the northern tropics, but at present Mr Edye said the collection is 'inadequate'.

'There is an urgent need to greatly increase the genetic resources of this species so that gains in commercial acceptance for pasture improvement are not lost through Verano suddenly succumbing to a new race of anthracnose,' he said.

'Greater plant diversity is required to develop new strategies to keep anthracnose under control.'

Research team D Cameron, S Chakraborty, J Manners, J Irwin

Soy and mung beans a potential large export crop for Australia?

While domestic consumption of the grain legumes such as soy and mung beans is currently quite limited, a huge overseas market already exists.

Drs Bob Lawn and Bruce Imrie at the Cunningham Laboratories are involved in research which aims to create a much bigger grain legume industry, with a view to tapping into the vast export market.

For example, Dr Lawn said that in 1981 Japan imported six million tonnes of soybeans, mostly from the United States.

Although soybeans have been cultivated for more than 80 years in Australia, only about 100 000 tonnes are produced each year and our exports are 'next to nothing'.

He is concerned that our near neighbours in South-East Asia buy their supplies of grain legumes from further afield, while Australia misses the boat. He believes we have the potential to carve an important place in the region as a major exporter.

To do this, new varieties with higher yields and without some of the deficiencies of current cultivars need to be made available to farmers.

At present the major commercial areas are in the subtropical and temperate south-east Queensland and several districts in New South Wales. The soybean breeding program is seeking to produce cultivars adapted to the monsoonal tropics, for both wet season and irrigated dry season sowings.

Development of a bigger mung bean industry is also dependent on providing varieties with more commercially useful traits, such as a longer growing season, higher yield and a greater weather resistance.

Dr Lawn said mung beans are an excellent source of starch and may be used in a wide range of dishes. Only about 15 000 hectares of the bean are currently cropped in Australia.

Traditionally, soy and mung beans have been 'village crops' unsuited to mechanised production,and new varieties have been bred for Australian conditions.

Both soy and mung beans are quite widespread in the wild and these varieties are important in the Division's grain legume program. Native mung bean plants were originally collected in Australia by botanists Banks and Solander in 1770 at Cooktown. The collection of wild mung bean is an adjunct to the breeding program, which is aimed at 'pulling out' the varieties with best resistance to climatic conditions. The team wants to take adaptive traits such as salt tolerance and hard seededness out of the wild types and transfer them to commercial plants.

An important discovery to emerge from the Division's collaborative soybean research has been the ability of the crop to grow in saturated soils — in fact, seed yields in these conditions can be up to 30 percent higher than in conventionally grown plants.

This could be exploited to advantage in, for example, the lowland areas of the tropics where seasonal water logging occurs, and in areas with rice-based agriculture.

A project in Thailand funded by the Australian Centre for International Agricultural Research (ACIAR) could make use of this characteristic.

Also, new research in tropical soybean improvement and production has just begun in the Burdekin Irrigation Area in north Queensland, which is aimed at making the crop an important alternative to sugar cane growing.

With the planned expansion of irrigation capacity in the region there is substantial local interest in soybeans.

A strong feature of the soybean and mung bean research is the collaborative links with state departments of agriculture in Western Australia, Northern Territory and Queensland, the University of Queensland, grower organisations such as the Queensland Graingrowers Association and private companies such as Beans Hong Kong Limited and La Choy Food Products.

Soybeans are a delicious and healthy addition to the diet. The Division is keen that there be greater awareness of the versatility of the crop to increase consumption in Australia. It has available a number of recipes if people are interested. These include:

SPROUTED SOYBEAN CURRY

1 medium sized onion
1 medium sized apple
2-4 stalks celery
2 tbs soy oil
1 1/2 cups meat stock or bouillon
1 tsp curry powder
1 tsp salt
1/8 tsp pepper
1/2 cup seedless raisins
3 cups sprouted soybeans
2 tbs flour

Finely cut onion, apple and celery. Lightly brown in hot oil. Add stock or bouillon. Mix flour, curry powder, salt and pepper together and make a paste with a small amount of water. Stir paste into vegetable mixture thoroughly. Add 1/2 cut raisins. Add cooked sprouted soybeans. Let simmer for 1/2 an hour.

Dr Bill Winter presenting the results of pasture improvement and animal nutrition research at Manbulloo Station via Katherine in the Northern Territory.

Division involved in range of overseas projects

International research co-operation forms a major part of the Division's activities. It is involved in four major projects funded by the Australian Centre for International Agricultural Research (ACIAR).

1. In Kenya, a program is underway to improve dryland crop and forage production in the semi-arid tropics. With a population growth of nearly five percent each year in Kenya, there is pressure on the land and a lot of areas previously inhabited by nomadic people have now been turned over to cropping. There are no proven reliable farming systems for many of the these areas, and research there is investigating how to develop them. There are four staff working on the project, headed by Dr Roger Jones. ACIAR is providing about $1.3M a year for the work. Under the project, the Division is establishing research in northern Nigeria, where the problems are similar to those at Katherine in the Northern Territory. The ACIAR project is also funding a cropping systems program at Katherine (led by Dr Bob McCowan) to support the research in Africa.
2. The recently approved grain legumes project in Thailand aims at increasing yield and identifying new soy and mung bean cultivars suitable for the wet tropical conditions. Two Cunningham-based grain legume experts, Dr Bob Lawn and Dr Bruce Imrie, have been heavily involved in planning and development of the research program, which is an extension of a research initiative at the Division to boost grain legume development in Australia (see separate story).
3. Research in Indonesia and in north Queensland is aimed at selecting multi-purpose shrub legumes for infertile soils in the tropics, for fuel, forage, land stabilisation and nitrogen input. The soils concerned have low pH and high levels of aluminium and manganese toxicity. The project, which emphasises the evaluation of species and establishing their nutritional needs, commenced in January 1986.
4. A joint ACIAR/Australian Development Assistance Bureau (ADAB) project now operates in a number of countries in SE Asia and the Pacific region, including the Philippines, Thailand, Malaysia, Indonesia and Fiji. The aims of facilitating pasture research in these countries and assisting their scientists in publishing their work and carrying it through to practical application. In these countries there is often a poor interface between research and extension, and work doesn't always reach the potential end users. As part of the project, Mr Tony Evans assembles and edits four newsletters a year, which are available to any forage scientists in the region. The project is helping to build a database of the environmental conditions and how various species have performed in the field.

Computer modelling for farmers

Computer modelling is important among the new techniques now dominating much agricultural research in Australia.

At the Davies Laboratory in Townsville, the Division of Tropical Crops and Pastures in collaboration with James Cook University is working on computer models to advise graziers the effects of various management options including pasture improvement on profitability.

Dr Peter Gillard at Davies and Dr Richard Moneypenny at James Cook work together on developing computer models which graziers can use to assist in decision making.

By feeding costs and other figures such as production data into the model, a numerical picture of options emerges. For example, it may be revealed that a grazier should step up his culling rate to prevent all his feed being consumed during a particular period.

The computer is able to dramatically reduce the time needed to determine the likely outcome of various actions.

'Dynamic logistics' in admin

Administering such a widespread Division as TCP requires some 'dynamic logistics' according to administrative office Mr Ross Davidson.

The Division conducts research from 'Brisbane to Broome' and administers 12 staffed sites across northern Australia, and two in Africa, with a third, in Nigeria, to be started this year.

Dynamic logistics are also required when dealing with a pressing problem involving space restrictions and antiquated research facilities at the Division's headquarters — the Cunningham Laboratory at St Lucia, Brisbane.

Mr Davidson is involved in planning a new laboratory which if the building program allows will be built at Pinjarra Hills in Brisbane's western suburbs, about 20 minutes from the Cunningham Laboratory. Although the Cunningham site has certain advantages — being near the Queensland University, the Division of Tropical Animal Science and the Department of Primary Industries — it lacks important research and service facilities and is too restricted to redevelop.

Currently stage one of the new laboratory is number three on the building priority list and Mr Davidson hopes the Division will get the go-ahead for construction later this year.

The project has in fact been in the pipeline since 1979 and accommodation and research difficulties have been steadily worsening in the past few years.

The most pressing need is for a modern 'controlled environment' facility where plants may be grown under controlled conditions of light, temperature, humidity and day length.

'We have some old and cheaply built growth rooms with limited control of environment, but in order to meet the needs identified by the Review Committee in 1984 we must have up-to-date facilities for research into stress physiology, plant nutrition, nitrogen nutrition and biotechnology,' said Mr Davidson.

'Like many other laboratories of its vintage, Cunningham was built on the cheap and has all the problems associated with wooden walls and floors that are both a fire hazard and a nuisance when sinks overflow.'

'Cunningham is disadvantaged in other ways too — it lacks adequate radioisotope facilities and service areas, the library is too small, there's not much storage, and it doesn't even have a lunch room,' said Mr Davidson.

There are 150 people on site, including some from Soils, Mathematics and Statistics, Forest Research and CSIRONET. Later this year, the Division of Horticultural Research also plans to establish a research program at Cunningham, putting further pressure on the available space.

The ultimate plan is to shift all Cunningham staff to Pinjarra Hills, but this doesn't look like happening in the short term. Mr Davidson said the planned Stage 1 was principally a controlled environment plant growth facility and would only accommodate the 40 or so staff whose research is most closely involved with the facility.

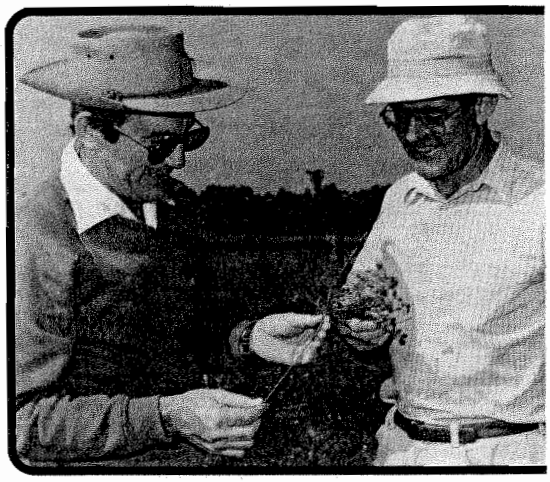
He said the Division is going through a period of development and change. Part of that has been a re-jigging of field station work, with for example Katherine in the Northern Territory being upgraded and staff transferred to it from Kimberley Research Station in Western Australia which is being closed. One of the south east Queensland stations, Beerwah is also being closed while Narayen in south east Queensland and Charters Towers in north Queensland are to be boosted with new work this year if funds permit.

Mr Davidson, as well as other senior administrative officers, Darby Butterick and Earle Smith travel frequently to the Division's outstations.

'There is particular emphasis on staff care,' said Mr Davidson. 'Fostering an esprit de corps is part of the administrative role. We try to be quickly responsive to staff concerns.'

The three administrators can tally between them 69 years with the Division.

'I believe administration flows more smoothly because of the long term relationship with our colleagues,' said Mr Smith.



Dr Ray Jones and Dr Peter Kerridge examining the root system of Wynn cassia at Narayen Research Station. Wynn cassia is a promising new legume for lighter soils in the semi arid tropics.

TCP in tune with industry needs

Mr Richard Wilson is great advocate of science for the northern cattle industry.

Apart from being one of Australia's leading graziers, he is on the TCP advisory committee, heads the Tropical Animal Science advisory committee and is one of two grazier members of the new industry body, the Australian Meat and Livestock Research and Development Corporation.

The TCP Advisory committee, chaired by ex-Director General of the Queensland Department of Primary Industries, Mr Elton Burns, was formed early last year following the Divisional review which recommended its establishment. It held its second meeting in February, when the major agenda item was the question of advice on native pasture research.

'The priorities for the committee are to ensure the best return to the industry from the Division and to look critically at the research,' said Mr Wilson.

Under the Division's previous advisory arrangments, Mr Wilson chaired the Narayen Research Station Advisory Committee and he has a good knowledge of the Division's research.

'The scientists are not in an ivory tower,' he said. 'A number of aspects of the work have direct application to the industry.'

Although he has witnessed the resistance of other northern Australian cattle producers to improving their pastures, he remains a staunch advocate of the idea.

'Graziers have been unwilling to spend the money involved in establishing legume pastures because of the threat of disease (like anthracnose in Stylosanthes) which could wipe out their investments,' he said.

'However, improved pasture means bigger and faster weight gains in cattle compared to native pasture and therefore better long term economic performance.'

Mr Wilson sees one of his roles as spreading the word about TCP's pasture research and Tropical Animal Science's animal research programs and he maintains a fairly high public profile.

Societies important for communication

Industry societies have a significant role in the Division's external communication activities.

Scientists and technicians at TCP are involved in several groups which meet regularly at St Lucia.

One of the most prominent is the Tropical Grassland Society of Australia, which has some 20 percent of its 400 members in overseas countries such as South America, Botswana, Canada, England, the United States, Indonesia, Japan, Papua New Guinea, the Philippines and the Solomon Islands.

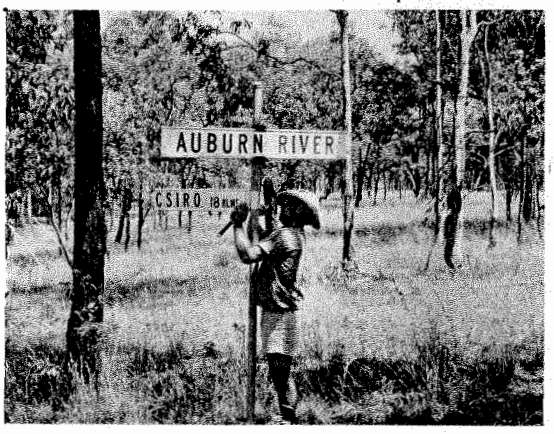
The Division's Dr Dennis Minson is the 24th president of the Society (which was formed in 1963) and the seventh from TCP.

Dr Minson sees the Division's involvement as crucial because the Society provides an informal venue for research and extension workers from CSIRO, state departments and universities to meet and discuss the practical application of research results.

The Society seeks to distribute information on tropical pasture science, and the sale of books by the Society is a major communication activity benefiting both the Society, and the Division.

One of the major functions of the Society is the organisation of field days, and four are planned for this year. Late last year a successful field day was held in the Brisbane Valley, with 180 people including rural media representatives attending. This year's field days will concentrate on leucaena.

The Society, which is based at the Division's Cunningham Laboratories, produces two regular publications — a journal containing scientific papers, summaries of field days, book reviews and details of new pasture plant releases, and a newsletter aimed at meeting the needs of primary producer members who constitute more than 50 percent of membership. This concentrates on new developments which have potential economic importance for farmers.



Technical assistant Grant Geriche from the Narayen Research Station (left) affixes a sign directing people to the station. Narayen, which is 63kms south west of Mundubbera in the grazing area of central Queensland, has a staff of about 15 people. Most research is directed at improving native pastures although some crop work is also done. Staff at Narayen will celebrate the station's 20th anniversary later this year.

AAHL gets rabies

Rabies is a horrifying disease which we in Australia have so far managed to escape.

However, our quarantine and disease control authorities must constantly be on the alert to prevent the introduction of the disease.

As part of our protection process, live rabies virus has been held at the Commonwealth Serum Laboratory for many years for the preparation of diagnostic reagents.

Now CSIRO's Australian Animal Health Laboratory (AAHL) has taken over responsibility for rabies diagnosis in this country.

AAHL is the world's safest animal virus laboratory and the transfer last month of the rabies virus resulted from a Government decision to centralise all foreign animal viruses held by Australian laboratories in the most secure environment available.

Other deadly and exotic animal viruses have been transferred from various Australian laboratories during the past few months. These include Aujszky's disease (a disease of pigs also known as psuedorabies), bluetongue, fowl plague, Newcastle disease and swine fever.

Although rabies doesn't occur in Australia, there are some viruses in the same family. As well as its diagnostic work, AAHL will be looking into the differences between these native viruses and rabies to make sure the tests used can reliably differentiate between them.

AAHL will test for the presence of rabies virus in the brains of animals which have died in quarantine or which were killed because they were suspected of having the disease. About 40 samples will be tested at the Laboratory each year.

*Australia is one of only half a dozen countries which are free of rabies, a disease which affects warm-blooded animals and causes an agonising death in humans.

Our strict quarantine laws, applied to all animals brought into Australia, are our main protection against the disease. Their effectiveness is demonstrated in the fact that the last Australian outbreak was in 1866-67, in Tasmania. The most likely routes for the introduction of the virus are through smuggled animals, or flying or swimming wildlife from South East Asia.

If the disease was picked up by the Australian feral animal population it would be very difficult to control.

As part of our protection against the disease, any animals showing rabies symptoms — and all dogs and cats which die in quarantine from whatever apparent cause — are tested to make sure they don't have rabies. This testing is carried out on the brain of the animals and involves use of a laboratory strain of the virus.

Rabies is caused by a virus that affects the nervous system and is usually spread by the bite of an infected animal such as a dog, cat or fox.

The length of time between an animal contracting rabies and developing symptoms depends on the severity of the bite and its distance from the victim's brain. While it may be only three weeks, it could be as long as 13 months, increasing the chance of an apparently healthy animal passing the disease on.

Human victims develop a fear of water, known as hydrophobia, which prevents them from drinking. Between brief painful fits they remain clear-headed for the few distressing days before they lose consciousness and die.

Chemical Physics

Cont. from p. 1

now, taken immense pride in the excellence of their scientific research — in fact the high quality of the work was commented on by the Williams committee which reviewed the Division.

'Many of us fear that these traditions of excellence may be lost, along with our identity, in the merger.'

Dr Mair said the past few months have seen a tendency towards lower staff morale caused by the atmosphere of uncertainty and by the the implied criticism of research programs. 'Now one must tell oneself not just to work but to work on regardless.

'We await the appointment of the new super chief to see where the future really lies.'

Chief Research Scientist Dr Leo Clarebrough said morale in his section — crystal defects physics — had not been affected by what he described as 'political gameplaying'.

He said the work in crystal defects was basic to a range of materials science and he felt there was no danger of it being discontinued. however, he said it was disturbing that there appeared to be a 'total lack of decision about the research effort' for the future Division.

A new Chief is expected to be named before the end of this year. When this appointment is made it's hoped all the uncertainties will be ironed out and the research program formulated.

Seminar strengthens CSIRO/universities ties

Professor Alan Billings (WA), Professor Ian Ross (ANU), Dr Alan Reid (CSIRO) and Professor Adrienne Clarke (Exec.) chat at the CSIRO/AVCC seminar.

In line with the spirit of the ASTEC report, interaction between CSIRO and Australian universities is being stepped up.

As part of this process, the CSIRO/Universities Collaborative Research Grants Scheme (expected to be worth more than $1.6 million this year) has now been extended to include most Australian universities.

The scheme, a significant mainstay of co-operation between CSIRO and the universities was jointly introduced by CSIRO and the Australian Vice-Chancellors Committee (AVCC) in 1982 and has led to increased collaboration and sharing of equipment and facilities in research programs of mutual interest. Grants under the scheme provide 'seed money' which brings together complementary skills and research groups so a greater concentration of effort can be made. By providing new opportunities for university and CSIRO scientists to work together it is hoped more extensive collaboration will develop without further support from the scheme.

The decision to invite seven more universities into the scheme to add to the 12 already involved was one of the matters discussed at an Executive seminar at the Division of Chemical and Wood Technology in Melbourne last month attended by 60 senior CSIRO and university staff — the latter representing the AVCC.

The theme of the seminar was CSIRO and the universities working together to meet national needs in science and technology.

It was a lively seminar with wide ranging discussion on issues aimed at ensuring closer links between the two groups. These included determination of national R&D priorities, development of a joint approach to public policy relating to R&D issues, future arrangements for the funding of R&D at Australian universities, the operation of national facilities, increased collaboration in training the next generation of research workers, a proposal to form 'networks' of CSIRO and university scientists in particular areas of research, arrangements for the commercialisation of research results, the teaching company scheme and the rewarding of achievements in research.

A summary report of the seminar is being prepared for consideration by the Joint CSIRO/AVCC Committee which has the task of promoting further interaction between CSIRO and the universities.

Jones: 'CSIRO akin to big business'

Science Minister Mr Barry Jones last month tabled CSIRO's 1984/85 annual report in Parliament.

At the same time he issued a statement to MPs and the media strongly supporting long-term strategic research in the Organization.

He said that placing an economic value on scientific discovery was 'enormously difficult'.

'I believe CSIRO in on the right track in attempting to come to grips with the question of evaluation, if for no other reason than being able to demonstrate the worth of its research to the nation,' he said.

'Of course the ideal would be to be able to read in the CSIRO annual report a clear indication of the financial return to the Australian community from the taxpayers' investment, which in the last financial year amounted to $324 million. But with a research organization like CSIRO, it will never be a matter of simply adding up a balance sheet at the end of a 12 month period, as it might be in a small retailing or wholesaling business.

'CSIRO is more akin to big business, where investments usually take a number of years to pay dividends, and where the success or failure of ventures is hard to foresee.'

Mr Jones illustrated the long-term benefits of basic research saying it would be impossible to calculate the financial returns from Charles Goodyear's accidental discovery of the vulcanisation of rubber 147 years ago.

'Obviously no-one would have foretold the revolutionary effects of Goodyear's discovery nor could anyone today put an accurate figure on the returns from it,' he said.

Mr Jones also cited CSIRO's own work on biological control of the water weed salvinia as a prime example of long term research leading to spectacular results.

'To the casual observer at that time, this may have seemed a somewhat obscure and irrelevant subject for CSIRO to be spending taxpayers' money on, but the outcome of that research has been one of the world's great triumphs in biological control,' he said.

Mr Jones commended the shift in the balance of the Organization's activities from focusing primarily on the research process to one more equally focused on the application of research.

'The important concept here is the *balance* between longer term strategic research and the shorter term research which is highly specific and oriented to solving some of industry's immediate problems.'

Congratulations Helen!

Renowned CSIRO scientist Dr Helen Newton Turner has received the Rotary award for Vocational Excellence.

The award was presented for 'vision and skill in the field of genetics, leading to marked improvements in the sheep industry and worldwide acceptance of her continuing research to help clothe and feed the world'. Dr Turner was formerly the leader of the sheep breeding research team in the Division of Animal Genetics. She retired in 1973 but now continues her research at the Division of Molecular Biology in Sydney.

Award to Helen Newton Turner

Retirements

Dr Ted Hillis one of Australia's best-known wood scientists has retired from CSIRO after 44 years' service.

His field of activity covered almost the whole spectrum of wood science with a bias towards the quality and utilisation of the fast-grown eucalypts. This interest was reflected in the two books to which he contributed and edited or co-edited: *Wood Extractives and their Significance to the Pulp and Paper Industries* and *Eucalypts for Wood Production*. Both of these are prescribed texts in several overseas countries.

He has published widely on the influence of forest practices on wood and bark quality and his work has impressed foresters in many countries. His distinguished international reputation led to numerous invitations to speak at scientific gatherings in many parts of the world and on many occasions he was the keynote speaker.

In recent years he has become increasingly aware of the changing nature of the forest products resource and its essential role in a world of diminishing resources. He advocated strongly for increased basic research in wood science to take advantage of the renewable nature of wood and its ability to satisfy many of society's needs through production from fast-grown plantations and multipurpose forests.

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Kit Corney, a pillar of daily life at the North Ryde Laboratories of the Institute of Energy and Earth Resources has retired after nearly 28 years' service. As canteen manageress, Kit was well known and loved both by past and present staff at North Ryde, and by many frequent visitors.

Kit commenced duty on 30 April, 1954, as a nominal part-time cleaner but she was, in reality, a canteen assistant with what was then the Coal Research Section (later to become the Division of Coal Research). In those days, tea was served at your desk and (at least in theory) you kept on working. Kit used to be the first on site, arriving at around 6am and opening the gates for everyone else.

In 1972, with the completion of the new main building Kit was made full time and in 1974 she became a permanent employee (or in today's woolly jargon, an 'indefinite appointee').

She had a prodigious memory for lunch orders and you became what you ordered. One senior, long-serving staff member told me he was 'Two Cheese Rolls — but only on Mondays'. Kit could even remember how you liked your tea if you returned as a visitor to the site long after leaving it for pastures new.

Since Kit left, a lot of colour has gone from the canteen — every overseas traveller had sent her a postcard and her collection used to cover every square inch of the cupboards behind the serving counter.

Kit will be greatly missed, especially by those to whom she was a personal confidante and unofficial counsellor. We would like to say a big 'thank you' to her for the work she did and the friendship she offered. We wish her well in her retirement.

Brian Harding

Miss Jean Conochie retired on 9 March 1986 after 39 years' service with CSIRO.

Miss Conochie was probably best known as editor of *Scientific Serials in Australian Libraries* (SSAL), a position which she held from 1960 until December 1984, when all remaining records were transferred from CSIRO to the National Library of Australia for incorporation into the ABN database and the National Union List of Serials (NUCOS). The integration of these lists and the production of NUCOS marked the culmination of years of planning by Miss Conochie and others, to bring the two union lists SSAL and SALSSAH together.

But Miss Conochie's contribution to the profession has not been limited to her editorship of SSAL. She was also responsible for cataloguing standards across the CSIRO Library Network, and for the on-going compilation of the CSIRO Union Catalogue.

With more than 24 publications to her credit, Miss Conochie enjoys an international reputation as a serials cataloguer and bibliographer. She was accorded the distinction of Fellow of the Association in 1967; awarded an MBE for services to science in 1978; and in 1985 received the Association's prestigious HCL Anderson Award for outstanding personal service to librarianship and to the library profession in Australia, to the Library Association of Australia, and to the theory and practice of librarianship.

Mrs Halina Podhaiski has retired from the Division of Food Research after 29 years. Mrs Podhaiski, a technical officer, carried out vital work in the microbiology laboratory, preparing agar media.

###

Experimental scientist, **Mr Peter Fead** has retired from the Division of Applied Physics. Mr Fead was with the Division for 27 years.

###

After a career spanning nearly 31 years with the Division of Applied Physics, **Mr Alan Gibson** has retired. Mr Gibson, an experimental scientist, made a valuable contribution to standards development and calibration.

###

Senior principal research scientist, **Mr David Roney** has retired from the Division of Mineral Chemistry. Mr Roney was with CSIRO for just over 18 years.

###

Dr Ken Alexander retired recently from the Division of Building Research. Dr Alexander made an outstanding contribution in the field of concrete research, and this work attracted international interest as well as influencing the Australian Concrete Code.

Have a ball on the 60th anniversary

When: 7.30pm Saturday 31 May 1986
Where: Australian National University Refectory, Canberra

For three hours you can eat whatever you like, whenever you like and in whatever quantity you like. There is the entree servery with a selection of hot and cold dishes (try them all if you like). Then there's the roast counter where fresh vegetables and rounds of bread from the bakery complement large hunks of roast meats straight from the oven. Further along the line you'll find a charcoal grill bar where even the sauces are to choice, and the health food bar with cold meats, cheeses and 20 different fresh salads. And finally there is the dessert and coffee bar, with its display of sweets and fruits.

To accompany these culinary delights will be complimentary red and white wine. A full bar service will also be available. And to make the evening complete, music will be provided by the Canberra School of Music Big Band.

Cost: $25 per single ticket

Get your social club to organise a bulk booking for your division or unit. Tickets: Jill Colefax (062) 48 4453 or Jan Collins (062) 48 4210. Bookings close on 15 May.

Claringbold resigns

The Chief Executive of CSIRONET, Dr Peter Claringbold, has retired after 16 years with the computing network, and a total of 26 years with CSIRO.

Dr Claringbold is leaving for 'personal reasons'.

The Chairman of the Board of CSIRONET, Mr Denys McCullough, is now the part-time Executive Chairman and will be spending more time with CSIRONET undertaking major policy work.

Mr David Glavonjic, formerly General Manager Services, will become acting Chief General Manager and will concentrate on the day-to-day management of CSIRONET

New Fossil Fuels Chief

A leading chemical engineer, Professor Ming Leung of the University of Queensland, has been appointed Chief of the Division of Fossil Fuels.

Professor Leung, 49, has an impressive research record, particularly in the field of fluidisation, and is the world's foremost authority on the circulation of solids through vertical pipelines (standpipes).

For the past five years, Professor Leung has headed the University of Queensland's Department of Chemical Engineering.

He worked in the chemical industry for five years before becoming a university lecturer in Malaysia. In 1967 he joined the University of Queensland as a senior lecturer, and became professor (personal chair) in 1980.

Professor Leung said he was looking forward to joining the Division. 'One of my major concerns is how we market the Division's expertise both in Australia and overseas,' he said.

He takes up his new position in early August.

Softball comp.

Dr Ernest Del Fosse ('Del') shows the style which helped the Entomology Workshop Wonders win the inaugural Battered Ball softball trophy in Canberra last month. Ento played the Unaccountables from HQ. But HQ didn't dip out entirely as their A Team (the 'Budget Bravados') cleaned up Forestry Three to take out the Bunting Bat trophy. Dr Boardman presented the prizes.

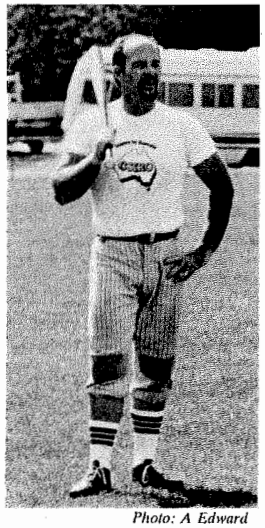
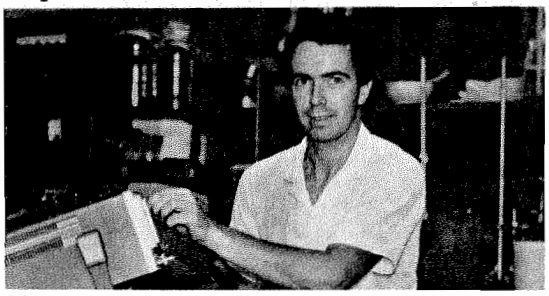


Photo: A Edward

Study award winner brings back important new info for soil research



CSIRO Study Award recipient Mr Steve Zegelin has examined a new technique which promises to make a substantial contribution to soil-water research in CSIRO and Australia at large.

Mr Zegelin, an experimental scientist at the Division of Environmental Mechanics, recently returned from a six month visit to North America where he studied Time Domain Reflectometry (TDR) — a process for the rapid, *in situ*, non-destructive measurement of soil-water content.

TDR, developed by scientists in Agriculture Canada and the United States Department of Agriculture and Geological Survey, is based on the measurement of the travel time of a high frequency electromagnetic wave travelling a known path through the soil.

During his study tour, Steve not only learned the basic theory and application of TDR but also contributed to experiments underway to extend the applications of the technique. While visiting scientists at Agriculture Canada, Steve assisted in the development of a more concise TDR-based method for analysing the concentration of salts in soils. This method is based on the measurement of the electrical conductivity of the saline soil. TDR therefore can be used to simultaneously measure the water content and salt concentration of a soil; this capability, unmatched by any other technique, may lead to rapid advances in the application of soil physics theory to problems in the field.

Potential applications

Another potential application of TDR is to measure not only the average water content over the length of the probe, but to determine also the water content profile — ie. the water content at discrete points along the probe. Along with scientists of the US Geological Survey, Steve studied the use of TDR to measure water content profiles out in the field.

In addition, Steve participated in projects concerning the development of better parallel transmission line probes and the computer analysis of TDR information.

TDR already has achieved widespread acceptance in North America as a water content measurement tool. With growing interest in applications of the salinity and water content measuring capacity of TDR in soil science, agriculture and industry, research and development of the device should yield many rewards in a relatively short time.

Apply now for Study Awards

Applications are invited for the 1986 CSIRO Study Awards which provide opportunities for staff to gain training and experience related to their careers.

The awards are open to the technical, professional (excluding all scientist classifications) and clerical administrative.

Application forms and information sheets for the 1986 awards are now available and have been distributed to the divisions, units and regional administrative offices.

Applications must reach Headquarters by 27 June 1986.

For further information contact Mr P O'Brien on (062) 48 4265.

Project PACLARK takes to the sea

Australia's $12M oceanographic research vessel *Franklin*, operated by CSIRO, is being used this month for Project PACLARK. A team of scientists from Papua New Guinea, Australia and Canada are searching for evidence of sulphide ore deposits on the deep sea floor of the Woodlark Basin off PNG to the east of the D'Entrecasteaux Islands.

The PACLARK cruise departed from Cairns on April 3 and returns to Townsville on April 19. *Franklin* will be on station for about 12 days. Dr Ray Binns, Chief Research Scientist at CSIRO's Division of Mineral Physics and Mineralogy, and Professor Steve Scott, Professor of Geology at the University of Toronto, Canada, will be co-chief scientists.

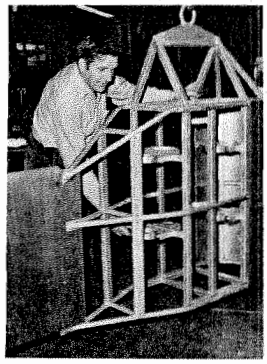
Dr Binns said during the past 10 years massive copper-zinc sulphide deposits have been found along a number of ocean 'spreading ridges'

A small but active sea-floor spreading system exists in the Woodlark Basin and the PACLARK team has an excellent chance of finding metallic sulfides there, in the process of formation. 'Irrespective of any commercial value the deposits may have, this will be of great interest to geologists in helping us understand how orebodies form,' Dr Binns said. Unlike other parts of the ocean floor, such as the Bismarck Sea where discoveries were reported earlier this year, the Woodlark Basin offers a geological setting very similar to that of ancient ore deposits now exploited on land, and thus provides a 'natural' laboratory for exploration research.

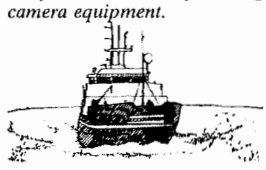
The PACLARK team of 12 includes other scientists from CSIRO and Canada, as well as representatives from the Baas Becking Geobiological Laboratory in Canberra, the Australian mineral industry and the PNG Geological Survey.

Most of the searching will be done at around 2000m water depth and for this it has been necessary to modify many of the instruments carried by *Franklin* as well as the additional ones the scientists will take with them.

Since no previous searches of this kind have been carried out in the area, the PACLARK cruise will be essentially a reconnaissance study. If it does find promising evidence of hydrothermal activity or recovers mineralised samples, it will then be necessary to mount further expeditions using submersibles to explore and sample the area in detail.



Workshop staff put the finishing touches to the cage that will carry the bottom-following camera equipment.



DBR receives building science honour

The Division of Building Research has taken out the 1986 Building Science Award in New South Wales.

It has been conferred by the Building Science Forum of Australia NSW Division, to promote and encourage advancement in the industry.

This years' award is for research done by Mr David Woodhead, Mr Mike Rahilly and Mr Gus Solomansson which led to the development of the 'Quote' Cost Estimating System for Alterations and Additions to Houses.

The system makes it possible for housing contractors to reduce the substantial time and effort spent on estimating costs and material quantities for building quotes.

'Quote' has now been taken up by the Housing Industry Associaiton of Australia for incorporation in their newly inaugurated HIATEX videotex system available to the Association's members.

Tech Talk

An occasional column by CSIRO technical staff. Readers are invited to contribute.

A common problem encountered in environmental field research is the counting of pulses in real time. Mr Alan Jackson of the Division of Environmental Mechanics has developed a pulse-counting unit for the Division's Micrometeorology Program for use in collecting wind profile data.

The device, built around a simple low-cost microprocessor system, can record 32 channels of pulsed data and the associated lapse time. It accepts pulses up to a 3KHz rate from either switches or units driven by open collectors. The output from the pulse counter is controlled by either a manual or a computer-controlled switch, and accumulated data is transmitted over an RS232C interface to a host computer or line printer.

For more information on the pulse-counting unit, please contact Mr Alan Jackson of the Division of Environmental Mechanics, GPO Box 821, Canberra, ACT, 2601; telephone: (062) 46–5659.

More Letters to the Editor

Dear Editor,

I am disappointed at the misspelling of my name in the February issue of *CoResearch* (p11), which indicates ignorance of, or contempt for non Anglo-Saxon names, as well as poor editing standards.

Jan J Basinski

Dear Editor,

I was pleased to see the story retold, of CSIRO's work on Australia's copy of Magna Carta. Thank you for your acknowledgement of CSIRO Archives' part in keeping that memory alive.

What intrigues me about the Magna Carta episode is the discrepancy between the resources CSIRO was prepared to put into preserving that single document and the resources available for keeping CSIRO's own archives safe, retrievable and available. (In real terms, it must have cost about the same as the current CSIRO Archives annual budget).

The very Division (now defunct) which put so much work into Magna Carta, was also distinguished by the poor condition in which its own exceptionally valuable files (many of them concerned with paper technology!) came to CSIRO Archives.

Of course, there is no Australian document which approaches Magna Carta in importance. However, the preservation and display of that original copy of one version of the Magna Carta is a purely symbolic exercise. Far more accessible and useable copies of the same are available throughout the world. The value for any historical research purpose of us having this copy in a glass box is nil.

I see this as a case of cultural cringe. This great and glamorous document from a faraway time and place has the mystique which draws out resources without limit, but the records of what we are doing from day-to-day in history's most exciting century in a significant outpost of modern science are commonly regarded as so much old rubbish to be got rid of once finished with.

I suggest that we need to see ourselves and our work at CSIRO in a historical perspective and a part of a scientific and technological culture — and to value our archives (and other primary evidence of what we did, and why) accordingly.

Colin Smith
CSIRO Archivist

EEO
Cont. from p.2

Industry. And Employment, with all those trade union barons to cope with.

John *[Sir John McKendrick, Permanent Secretary of the Department of Health and Social Security. — Ed.]* took an even more positive line. He was happy to inform us that women are already well represented near the top of the DHSS, which has two of the four women Dep. Secs. currently in Whitehall. Neither of them is in line for Permanent Secretary, obviously, as they are Deputy Chief Medical Officers, (and in any case they may not be suitable for other reasons). Furthermore, women constitute 80 percent of the typing grades, so he was delighted to be able to tell us that his Department is not doing too badly by them. He added that, in principle, he was in favour of them going to the very top.

Arnold summed up all the views expressed: the feeling of the meeting was — unquestionably — that in principle we were all thoroughly in favour of equal rights for the ladies. It is just that there are special problems in individual departments.

I raised again the question of the quota and stated that I was against it.

Everyone immediately supported me. There was a feeling that it was not on a bad idea — in fact a typical politician's idea.

I gave my view: namely, that we must always have the right to promote the best man for the job, regardless of sex.

Furthermore — and I made it clear that I was speaking as an ardent feminist myself — I pointed out that the problem lay in recruiting the right sort of women. Married women with families tend to drop out because, in all honesty, they cannot give their work their full single-minded attention. And unmarried women with no children are not fully-rounded people with a thorough understanding of life.

There was general agreement that family life was essential and that it was hard for spinsters to be fully-rounded individuals.

I summed up my remarks by saying that, in practice, it is rarely possible to find a fully-rounded married woman with a happy home and three children who is prepared to devote virtually her whole life, day and night, to a Government Department. It's Catch 22 — or, rather, Catch 22, subparagraph (a).

Arnold had allowed considerable time for this discussion, which indicates the importance that he attached to the problem. He concluded the matter by asking everyone present to ensure that all of their respective Ministers oppose the quota idea in Cabinet by seeing that each Minister's attention is drawn to each Department's own special circumstances. But he also asked all present to be sure to recommend the principle of equal opportunities at every level.

Through the chair, I made one final point. My Minister sees the promotion of women as one means of achieving greater diversity at the top of the Service. I asked all my colleagues to stress, when briefing their Ministers, that quite frankly one could not find a more diverse collection of people than us.

It was unanimously agreed that we constitute a real cross-section of the nation.

[Appleby Papers — 41/AAG/583].

[Hacker's diary continues]

June 19th

Cabinet today. And with a very odd outcome. I put forward my proposal for a quota for women for top Civil Service jobs.

All my Cabinet colleagues agreed in principle but then they all went on to say that it wouldn't work in their particular Departments. So in the end they didn't really support me at all.

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***CoResearch* is produced by the Science Communication Unit for CSIRO staff. It's also circulated to a number of people outside the Organization who are interested in CSIRO activities. Readers are invited to contribute or offer suggestions for articles. The deadline is the last Monday before the issue month. Editor: Liz Burden, PO Box 225, Dickson ACT 260. Ph: 48 4479.**

New committees align with industry sectors

The setting of long term policies and priorities to assist Australia's industry and community sectors is the aim of new Sector Policy Committees being established by the Institutes.

It is intended that the new committees will ensure the effective alignment of CSIRO research with the needs of industry and the community. They will cover manufacturing industry, rural industry, minerals and energy, public health, construction and urban and civil engineering, water resources, natural environment, and information and space industries.

These groups also correspond broadly with the recently revised scheme for the classification of CSIRO research.

Each committee will comprise appropriate Institute Directors and will be chaired by the Director with major involement in that particular sector. Division Chiefs are likely to be invited to participate in the work of the committees.

It is a clear intention that the committees will not intrude on the planning and management responsibilities of Directors and Chiefs. Rather their role will be to provide a broad policy framework and to identify sector priorities. They will also provide a focal point for contact between CSIRO and the industry and community sectors.

The committees will consult with the Director of Information and Public Communication, Peter Dunstan, on external communication matters.

What the artist *really* said to the Chairman (we may never know!)

Connections

The first edition of the pilot staff video magazine *Connections* was premiered on 2 April and is now showing at 67 locations across Australia from Katherine to Culgoora and Atherton to Armidale. Every division is involved in the screenings and early feedback indicates a positive response. Staff comments on the style, content and value of a staff video magazine can be directed to Alice Bugge, Film & Video Centre, 314 Albert Street, East Melbourne Vic 3002 Ph (03) 418 7201. If you haven't seen *Connections* and would like to see the second and third editions, contact your divisional communicator or liaison officer. or Malcolm Paterson, at the above address. Ph (03) 418 7341.

Money allocated for communication projects

Communication grants worth $150 000 have been allocated to 16 projects including videos, open days and special communication programs.

The grants will go to 14 divisions and units and to the Marine Laboratories, and are provided on a one-for-one funding basis.

They were allocated to: AAHL, $2400 for a video; Animal Health, $30 000 for an extension program; Applied Organic Chemistry, $10 000 for a communication program; CIRC, $2000 for an audiovisual; Energy Technology, $3000 for a community leaders program; Entomology, $15 500 for a booklet and a video; Forest Research, $9200 for a bushfire awareness program; Forest Research $5100 for a video; Groundwater Research, $9000 for friends of CSIRO; Marine Laboratories, $14 500 for open days; Mineral Engineering, $11 800 for audiovisuals; Protein Chemistry, $5000 for a salary of a communication expert; Radiophysics, $7500 for a film; Tropical Crops and Pastures, $14 500 for a Queensland awareness program; Textile Industry, $6000 for a video; and the Wheat Research Unit, $4500 for open days.

CoResearch

CSIRO's staff newspaper

No. 291 May '86

Scientist is a concerned citizen

If any evidence is needed that scientists can have a social conscience, look no further than Dr Richard Smith.

Some say Dr Smith, who is based at the Centre for Irrigation Research, has taken up where murdered anti-drug crusader Donald Mackay left off. He has certainly shouldered a frustrating, time consuming and even dangerous task.

Dr Smith is chairman of Griffith Concerned Citizens, a group formed to fight for a full enquiry into what members see as an unsatisfactory investigation of Mackay's death, and to tackle the wider issue of 'cleaning up' the town of Griffith and urging the prosecution of major drug figures behind Mackay's murder and associated criminal activities.

The two major objectives in the group's fight are firstly, to have the National Crimes Authority use its full powers to investigate organised crime originating from Griffith and ensure the effective prosecution of participants in a major drug growing and distribution cell which is part of a larger Mafia drug ring in Australia (and as a result of agitation by the group the matter has now been referred to the NCA). Secondly, the group believes it's been forced to take on what should be the parliamentary role of calling to account the New South Wales law enforcement authorities responsible for withholding vital evidence about Mackay's disappearance, such as the description of James Frederick Bazley given to police in 1977 by a witness.

'We want to know why those entrusted with the administration of justice in NSW not only failed to act on the evidence but also withheld that evidence from the Victorian police,' said Dr Smith.

Dr Smith's group, along with three of Mackay's children, met the NSW Premier Neville Wran, other politicians and

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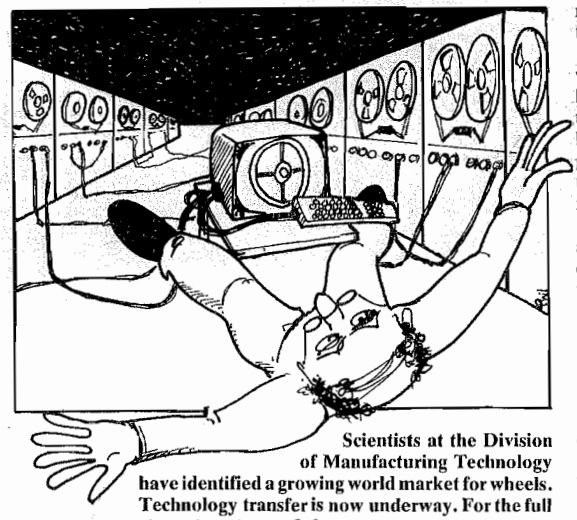
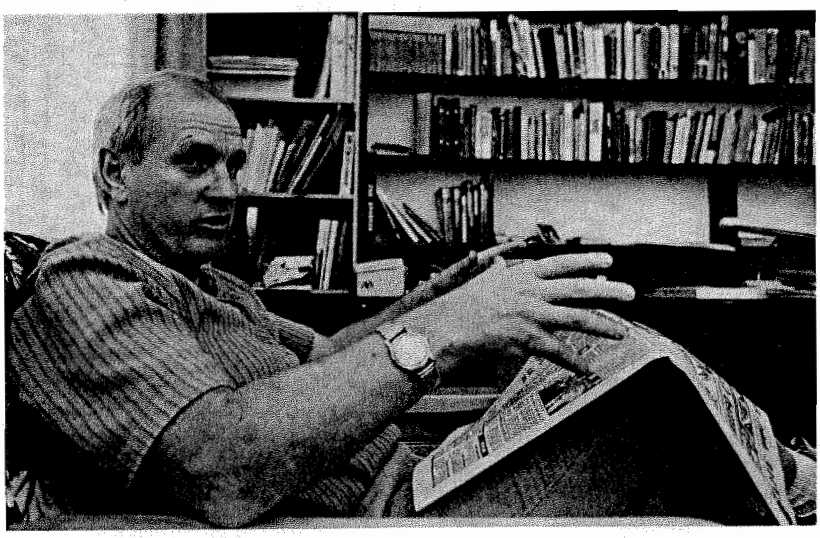


Scientists at the Division of Manufacturing Technology have identified a growing world market for wheels. Technology transfer is now underway. For the full story, turn to pp. 3-6.



Dr Richard Smith in his office. *Photo courtesy of The Age*

Water & Land Resources system
NATCOM aims to boost effective communication

The Division of Water and Land Resources is establishing a radically new communication system designed to greatly improve awareness of the Division's research among users and open new avenues for the transfer of research results.

The system, called NATCOM (NATural resources COMmunication) is being developed in response to difficulties faced by the Division in communicating its activities and results to an exceptionally wide range of research users.

Divisional information officer Mr Peter Martin believes the Division's interdisciplinary character, for all its unique strengths, causes special problems in communication. One is the sheer spread of people likely to be interested in the Division's activities. Users and potential users of the research can, for example, be found in all State and Federal Government departments concerned with land, agriculture, forests, water, environment, local government and tourism and recreation.

For every State or Commonwealth government officer collaborating with the Division there are probably several hundred other individuals in government agencies around the country directly interested in the joint research. The problem is not only and where they are, but what communication channels are likey to be effective in reaching them.

In the past the tendency has been for divisions to take several approaches in communication. One, scientific literature, is obviously a correct channel to use in getting information out — as long as one has no delusions about who reads it. The majority of people with a valid interest in a research project probably don't.

A second tack has been a sort of grape shot approach via the mass media hoping that enough of the right people will see the story and tell their colleagues.

A third has been to use the 'trade' media servicing a particular sector. If a division has a very narrow market, said Mr Martin, the number of trade channels open to it are probably restricted and hopefully not too difficult to use. If however the market is very wide there can be hundreds of such channels, each good for a story on a fraction of the Division's work. Given the fact that an information officer might only get the chance to prepare one or two stories a month, the impact through these channels is not likely to be marked.

And to those who say the only communication channel which matters is personal contact, Mr Martin said again this can only reach a fraction of the people who would like to be informed — even though for that fraction it may well be the most effective means. In a survey of his Division's personal contacts in Victoria 18 months ago, for example, he found that only five percent of the top 300 natural resources officers were known to Divisional staff.

Mr Martin thinks it might well be difficult, not to mention expensive, for Divisional staff to know a greater proportion than this — and that such a figure could well be true for other CSIRO divisions in different sectors.

The problem is where to spend your limited communication time and money. As Mr Martin said, 'we don't all have an Ecos or IRN team in the basement, and above all scientists have research to get on with'.

The answer, he said, is to use information technology. With a microcomputer similar to that used daily by 'every second scientist' in his Division, it's a relatively simple matter to build a system capable of answering questions such as 'Who are the staff in the Victorian Government departments concerned with both conservation and geographic information systems? What are their departments, sections and locations?'

The answers provided will require decisions and action by staff in conjunction with the information officer. If the system recommends a particular newletter for a certain subject and location, an item and supporting material will still have to be prepared. The difference is that staff know that the information will be going into the best possible communication channel for reaching that particular audience. Mr Martin hopes that having NATCOM will not only enable him to justify spending more time preparing such items at

Cont. on p. 7

From the Chairman

A column by Dr Keith Boardman

I recently attended two symposia which covered topics of vital interest to the Organization.

The first was organised by the Bureau of Industry Economics and addressed the problems facing Australian manufacturing industry. The second was the annual general meeting symposium of the Australian Academy of Science, where the main issues were the funding for research and development in Australia and the relation between basic and applied research.

There was general agreement among the speakers at the BIE symposium, from government, industry, the unions and academia, that Australia must lift its performance considerably if it is to be freely competitive in the international marketplace. There was debate, however, on the reasons for our poor competitiveness with some mud slinging between the participants from government, industry and the unions.

I gained the impression from the debate, however, that there is now a realisation that all sectors must co-operate more effectively for the national good to increase the productivity of Australian industry through greater innovation and improved design, quality and marketing of Australian products.

Several speakers at the Academy symposium saw the need to increase R&D in Australia to a level (per GDP) more comparable with that of the successful industrialised nations. Concern was expressed at the imbalance of R&D in Australia, compared with many of the OECD nations, with the low level of industrial research and experimental development. The Minister for Science, Mr Jones, sounded a warning about the consequences for Australia of correcting the imbalance by reducing the level of basic research. He saw a clear requirement for a substantive increase in the amount of R&D in industry and for a closer interaction between industry and the universities and CSIRO.

Many participants of the symposium warned of the declining infrastructure for research in the universities and pointed to the urgent need for considerable investment in new equipment in both universities and government laboratories, and for more opportunities for younger scientists.

New discoveries and advances in scientific knowledge are occuring at an ever quickening rate and the time between fundamental discoveries and the development of new technologies has shortened considerably. Existing technologies and products require upgrading more frequently.

To remain competitive, industrial firms need to recognise the limits of existing technology and the potential of new technology. Managing innovation is a key to continued prosperity of companies, particularly in the competitive international environment.

Last month, I opened a new CSIRO laboratory at Katherine for research on cropping in the semi arid tropics, and an international forest industries machinery exposition at Myrtleford. In my addresses, I emphasised the importance of strategic longer term research to gain a better understanding of the functioning of natural systems, so that they might be better managed for improved long term productivity with minimal environmental impact. At the forest equipment exposition I said that better knowledge of how a forest works and how it responds to disturbance is central to resolving the dispute between environmentalists and the forestry industry.

Staff and resources for the expansion of work at Katherine and for the upgrading of the facilities there came from the phasing down of CSIRO research on irrigated tropical agriculture at the Kimberley Research Station.

While in the top end, I took the opportunity to visit the Darwin laboratories for discussions with the staff there. The tropical ecology section of the Division of Wildlife and Rangelands Research has a field station at Kapalga in Kakadu National Park, and I found it most interesting and enjoyable to revisit Kapalga at this time of the year, following the wet season, with the abundance of plant and animal life, and to see the impact of exclusion of buffaloes on the ecology of the wetlands.

N Keith Boardman

Health matters

First Aid

A policy circular outlining first aid arrangements has been issued. This sets out minimum standards for provision of primary first aid treatment which can often be vital in saving a life or minimising injury. The benefits of first aid training extend of course well beyond the workplace to the home, holiday or sporting arena.

Staff often seem reluctant to undergo first aid training and to accept the responsibility of being an authorised first aider. However, the Organization and your fellow staff members rely on committed volunteers to operate an effective first aid service.

The policy circular covers issues such as minimum numbers of first aiders, equipment, allowances, training and legal coverage. Senior management is fully supportive of the concept that all staff regularly participating in field work or working in remote areas should be trained in first aid.

Your life or someone else's could very well be in your hands at some crucial time — give it a thought.

Health and Safety Seminars

The OHS unit is arranging to conduct two streams of two-day seminars in each region during 1986. The first theme 'hearing conservation' got underway in Adelaide on 29/30 April and the second series 'ergonomics, accident investigation and agricultural chemicals' started in Canberra on 6/7 May. Advance notice will be sent to divisions in each region so that as many interested staff as possible may attend.

Towards Safer Working Conditions

While management and supervisors in each division have the ultimate responsibility for providing safe and healthy work conditions, minimum standards and guidelines are often called for in areas such as assessment of the OHS implications of new research work and field work.

The CSIRO Health and Safety Committee has set up a working party on each of these issues and Institutes have nominated relevant staff to represent them. Issues to be dealt with include: remote/field work (minimum size of field parties, communications, procedures, vehicles, driving schedules, call-in arrangements, first aid), assessment of research projects (hazard analysis, materials and chemicals, health monitoring requirements, clearance procedures). Further details on either working party may be obtained from the OHS unit (062-48 4440).

Games People Play

There has been a significant increase in reports of accidents occuring during lunchtime and after work sporting activities involving CSIRO 'official' or 'semi official' teams. While healthy recreational activities are to be encouraged, staff should take into account their general level of fitness before participating in contact or endurance sports.

Warmup exercises should always come first — but many people forget these, particularly when a softball match or similar event has to be fitted into a normal lunch break.

Remember: be healthy, wealthy and WISE.

☆ ☆ Gary Knobel

***CoResearch* pre-empted the publicity about Australian attitudes to SDI (Star Wars) research program in the February issue when we called for letters on the subject. In the March issue we ran a letter from a prominent SANA (Scientists Against Nuclear Arms) member Dr Bob Hunter from the Uni. of Sydney. Now COSSA director Ken McCracken adds his comments. With the issue being the focus of such intense publicity, others may still wish to reply.**

Dear Liz,

Ian McDonald's letter in the last *CoResearch* gave figures showing that the Bureau increased its expenditure in 1984/85 at a rate greater than CPI; almost as much as HQ.

Having struggled with balancing our budget we only wish this were true. Using the same figures as he presumably did ($9 509 444 in 1983/84 and $10 006 718 in 1984/85) we calculate that the Bureau's total expenditure under the General Research Account (Appropriation Funds) increased by 5.25% — just about half the 10.52% arrived at by Ian's 'simple' arithmetic.

Graham Warden, Bureau of Info. & Public Communication

Dear Editor,

Your article in the March issue about the phytotron fire aroused memories of a substantial fire at the Division of Textile Physics in 1975. At first there was an attempt to ascribe this fire to a ballast in a fluorescent fitting. In the course of the investigation it became evident that 'probably an electrical fault' usually equals 'don't know', and that in such cases the often-taken easy way out is to blame a fluorescent ballast.

All this would have been merely humourous if it were not for the fact that the reputation and indeed the conscience of several electricians and other staff members was at risk, and it took a lot of trenchant talk to overcome the fluorescent-light allegation by pointing out that the available facts suggested that the fire had originated several metres from the fluroescent fitting in question.

I hope that the ascribed caused of the phytotron fire, 'the failure of a ballast in a fluorescent light' to quote your article, is accompanied by harder evidence.

Also, your article contains the suggestion that 25-year-old electrical fittings are a fire risk. I hope there is evidence for this too, for we are all surrounded with such things at work and at home.

H.W.M. Lunney
Division of Textile Physics

Dear Editor,

The stars wars issue, as usually discussed, presents me with two very unattractive alternatives. Either way, Australia loses. It's like a national debate over the relative merits of suicide by poisoning or starvation.

I believe that a third option exists, and that Australia, in rejecting star wars, would guarantee its own future, while gaining worldwide respect by adopting such an option.

First to the debate between poisoning or starvation. The anti-star wars option is seen by many as the option of logic, humanity and sanity. As a citizen of the world, I agree.

However, as an Australian scientists and technologist, I know that Australia already has the lowest expenditure on R&D in the developed world. Even if the Treasurer's worst fears regarding over-enthusiastic utilisation of the 150 percent tax deductibility of R&D are realised, we will still be in the lowest 10 percentile.

Acceleration of R&D over-

Cont. on p.7

Manufacturing Technology

CSIRO invention being exported 'as fast as it can be made'

A new generation welding machine, now being manufactured in Australia and exported at the rate of 100 a month to the US, UK and New Zealand, is the most dramatic success achieved by the Division of Manufacturing Technology during its six-year history.

The 'Synchro-Pulse CDT Welder' already has sold widely in Australia, and is now being air-freighted out of the country as fast as its Adelaide-based manufacturers, Welding Industries of Australia, can make it.

'It is a spectacular success,' says Divisional Chief Dr Bob Brown. 'The manufacturers have experienced no barrier to sales and are expecting a further rise in exports as the machine gains acceptance in the huge northern American market.

'Recently, ten machines were air freighted to the North Sea oil fields to perform a difficult welding task, and saved millions of pounds in barge fees because they did the job in a fraction of the expected time.

'A company which produces prefabricated communication antennas is now including the welder as part of its package, because it gives a neat weld bead with does not require machining.

'The latest version, which has a computer chip control system developed in collaboration with CSIRO, is particularly suited to the rapidly-growing field of robotic welding. The welder has captured exactly the kind of market niche Australia needs in order to revitalise its manufacturing industry.'

The Synchro-Pulse CDT (Controlled Drop Transfer) Welder has been responsible for virtually all of the sales growth of Welding Industries of Australia over the past two years, but it is by no means the only major achievement of the Division since its establishment in April 1980.

Other innovative products include:

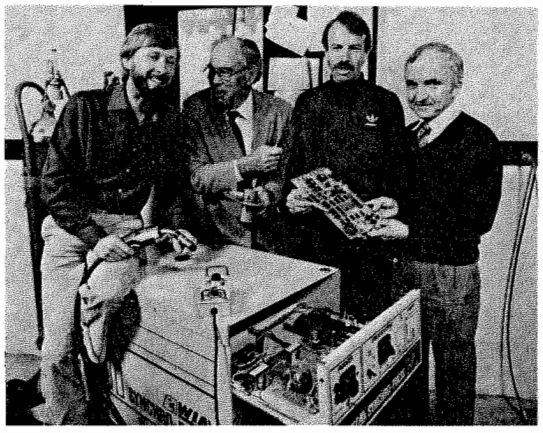
* Metlflow, a software package now being used in Australia and by overseas manufacturing giants like General Motors to design the 'runner systems' through which molten metal is pumped to make diecast components.
* A vastly-improved robot vision technology, the 'high-speed vision processor', soon to be sold in the form of a set of circuit boards to overseas manufacturers of complete robot vision systems.
* A new and more efficient technique for applying a wear-resistant hard facing to mild steel for fabrication of bulldozer blades, truck trays, ore chutes etc. This is enabling a Sydney company to lift profits and exports.
* Another CSIRO technique which will enable the same company to expand its product range by producing thin hard-faced metal plate which will be unique on the world market.
* A range of new and significantly improved welding wires which will enable an Australian company to start selling its products on the export market.
* A 'discrete event' computer simulation package which has resulted in large time and motion savings for several production plants.
* A control system for laser cutting, now being marketed by two companies.

The Division has more innovative products 'in the pipeline', many of which cannot be disclosed at this stage under the terms of collaborative agreements. It has also been of major assistance to manufacturing industry by answering hundreds of short-term technical enquiries, and where possible, 'troubleshooting'.

This feature is designed to present a cross section of activities at Manufacturing Technology and is not intended as a directory to the Division's research.

The June issue of *CoResearch* will feature the Division of Radiophysics.

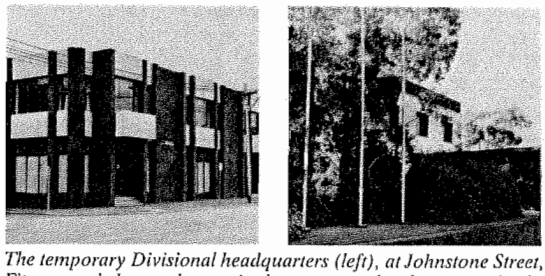
Photos: Trevor Kenyon (Adelaide) and Helen Niblett (Melbourne).



Members of the arc technics program in Melbourne with the new Synchro-Pulse welder (l-r): Michael Ogilvy, Graeme Ogilvie (program leader), Geoffry Payne and Tony Schubert.

The Administrative office group at Melbourne (l-r): Wendy Mendoza, Brian Gleeson, Matt Getson, Fadia Ahmed, Gavan Brogan, Jadranka Marinovic and Pauline Macca.

Goodbye Fitzroy, Hello Preston



The temporary Divisional headquarters (left), at Johnstone Street, Fitzroy and the newly-acquired permanent headquarters, in the Melbourne suburb of Preston. Staff will be moving into the new building this month, leaving three rented premises in Fitzroy in which they have 'camped' for the past few years. The Divisional Chief paid tribute to staff for their patient tolerance of 'quite unpleasant' living conditions in the meantime.

Change of attitude at last — Chief

'Give a man a fish and he eats for a day. Teach him to fish and he eats for a lifetime'. This Japanese proverb is often applied to overseas aid projects, but Dr Bob Brown, Chief of the Division of Manufacturing Technology, considers it apt for Australian manufacturing industry today.

'There've been a huge number of reports, such as the Crawford, Jackson and Myer reports in the 1970s, warning that Australia will lose its place as a developed nation if it continues to allow its manufacturing sector to decline,' he told *CoResearch*.

'Those reports were not heeded at the time, with the result that we've lost an awful lot of ground in Australia.

Dr Brown does not consider the reports were a complete waste of time. For instance, a 1979 report by the Institute of Engineers in which he personally played a major role 'involved a big team of 120, so a lot of people learned from it'.

'Many of our manufacturing companies have been slow to realise that they must place a high priority on research and development if they are to survive, but I think a much-needed change of attitude is now taking place,' Dr Brown said.

'And I think scientists, certainly in our Division, are also realising that there is more to be gained out of transferring their work than there is out of publishing it in international journals.

'For example, take the mathematics behind the high-speed vision processor, which is now being manufactured in Adelaide for sale to overseas robot manufacturers.

'Had Dr Myles Harding followed the "traditional" scientist's approach, he might have published a paper on his algorithm in some high-level computing or mathematics journal.

Dr Bob Brown

'It almost certainly would have been picked up by the Japanese and made into a device, with absolutely no recognition given to CSIRO.

'Instead, it was published in a series of confidential reports, and the concept was marketed and sold to an Australian company. It has now been turned into a product which is a huge step forward in robot vision.

'If Dr Harding had published in the old way, it would have been just one more in a list of publications to his credit. As it is, he has been promoted rapidly within the Organization, his CV looks very good indeed, and he has helped a lot of other people.'

Dr Brown's evident enthusiasm for manufacturing is shared by others in the Division. Starting hours, particularly at the Divisional headquarters at Fitzroy in Melbourne, are early. The laboratories are usually in full swing by 7.30-8.00am and there's a fair 'core' of staff still in after 6pm, as well as some weekend work.

CSIRO into 'every conceivable aspect' of diecasting industry

The Diecasting group in Melbourne (l-r) Stephen Asquith, Thang Nguyen, Kevin Bousfield and Alan Davis.

Before the end of this decade, many of the world's car manufacturers will be buying a CSIRO developed computer program, 'Metlflow', to design the runner systems for diecast components.

The Melbourne-based company marketing the program, Moldflow Pty Ltd, expects export sales of up to $200 000 for the product, rising quickly to a multi-million dollar operation in the following years.

Strong interest in Metlflow has been shown in introductory seminars in North America by car manufacturers and toolmaking and machinery component companies.

Ironically, says the leader of the diecasting group, Mr Alan Davis, no-one actually set out to develop a new software system when the research started in 1978.

'It came about because we started using computer aided design (CAD) to design the channels (runner systems) through which molten metal is pumpoted top form diecast components,' he said.

'We found we couldn't get the shapes we wanted without CAD. After we'd completed 15 or so diecasting consulting jobs with industry, it started to evolve into a saleable package.

'Dr Ho Siauw, a staff member who is now in Singapore on a three-year secondment, played a major role in developing and re-writing the program into Fortran so that it could be marketed.

'Our Division helped write the Metlflow users manual, and we are still working with diecasting companies to make sure the designs work. The software has its limitations, but we haven't the staff to work on a more advanced version. The Division will have to decide whether to continue to help the company enhance Metlflow, or whether that is now more properly the responsibility of the company.'

In the meantime, the diecasting group continues to be involved in one way or another in almost every conceivable aspect of the non-ferrous diecasting industry in Australia.

Major project

In July, Australian companies producing brass fittings, such as household taps and showers, will attend a CSIRO seminar to hear the results of a major 12-month study financed by the New York-based International Copper Research Association (INCRA).

Mr Davis says CSIRO was careful to consult closely with Australian companies to ensure it selected an area of study that would be particularly useful to Australian industry before it applied for a US$30 000 grant for the project.

The study, on 'gravity tilt casting of copper alloys', came up with useful information on designing process parameters for tooling, and will result in improvements to the Australian product and process.

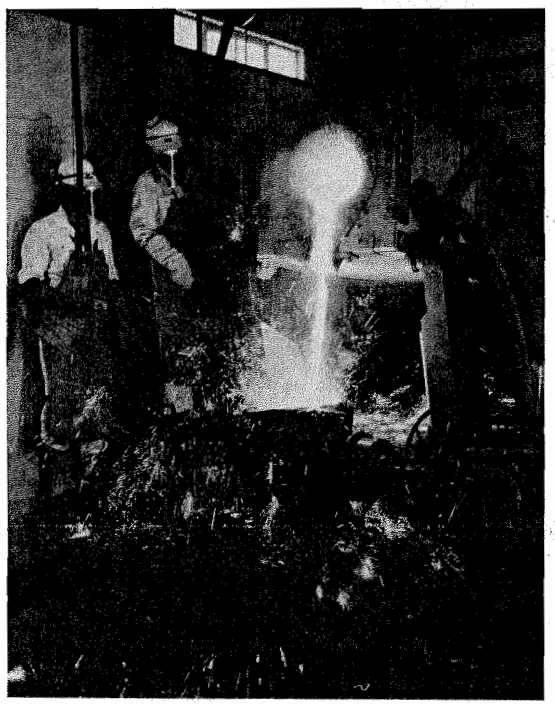
Adelaide technology head of US in applying hard plate to mild steel

The ability to look beyond the project at hand to commercial opportunities other than those originally intended is a key contribution CSIRO can make to Australian industry, according to the officer-in-charge of the Adelaide laboratory, Dr Ian Sare.

As an example, Dr Sare cites the case of CSIRO research carried out in Adelaide which has resulted in a more efficient way of applying a hard wear-resistant surface to mild steel plate.

'Dual-layer plate of this kind is used extensively for such things as bulldozer blades, the trays of dump trucks, chutes and bins for metallic ores, and pipes with hard linings,' he said.

'Starting in 1981, CSIRO collaborated with a Sydney company, Vida-Weld Pty Ltd, to look at the existing production methods and see if we could come up with something better.



Brian Arnold (right) and Dennis Pulver at work on the small-scale foundry at the Adelaide laboratories, used for research in ferrous casting.

'We actually brought one of their production machines to Adelaide and worked on it here for nine months before shipping it back to Sydney with modifications that resulted in a 10 percent increase in efficiency.

'The company was naturally very pleased with this result, but in the meantime, our scientists had identified two types of technology that would extend the company's product range in the general area of wear-resistant products.

'The first technique, a new method of surfacing, will enable the company to market thinner hard-coated steel plate. Apparently the company has often had enquiries from potential customers wanting thinner plate, and has not been able to supply it.

'A development prototype machine built with CSIRO's assistance is now being installed in Sydney, and one of our technical staff, Mr Gordon Kimpton, is located with the company for three months to get it running.

'Vida-Weld exports about 60 percent of its standard plate, and envisages that the new range of thin bi-metallic products will find a large market. They have established a joint venture company in North America to manufacture the product there.

'The second technique, of composite-casting, is to directly cast wear-resistant materials onto steel substrates.

'We are now producing components for field trial in our own experimental foundry. Again, Vida-Weld sees a major potential export market and intends a joint venture in the US to be involved.'

International opportunities for welding consumables

A collaborative research and development program undertaken by the Division and Welding Industries of Australia (WIA) Pty Ltd is poised to carve out a niche in the very competitive but large world market for welding consumables.

WIA already has had a successful collaboration with CSIRO in development of the pulse welding machine (see separate story).

Since 1982, it has contributed large amounts of time and money to an electrode development program with CSIRO, resulting in the development of expertise in welding consumables that didn't exist in the country before.

The leader of the project, Dr Ian French, said close contact had been maintained with WIA at all stages of the research.

'WIA had background knowledge vital to the project's success, and were able to assist in directing the research,' he said. 'Basically what we discovered is that there were opportunities for improving the bead shape and arcing behaviour of existing consumables, and the strength of the weld metal they produce.

'There's a great deal of satisfaction in knowing that in the end we'll see products on the market as a direct result of our work, and that they'll be improvements on what's presently available.

'Manufacturing industry is probably one area where we can look to a growth in employment, so in those terms it is important nationally.'

Mark Neller measuring wire diameter on the welding wire manufacturing mill in Adelaide, watched by Dick Shunke and Ian French.

Industrial property: questions, questions, questions!

In a collaborative research and development program, who are the parties involved? What is their legal status? What will each party contribute? When does the program start and finish? How will the management committee be composed, how often will it meet and who will it report to? What will be kept as secret know-how?

This is just a sample of the multitude of detailed questions that the Division's Industrial Property Officer, Dr Henri Martel, has to answer when drafting an agreement with a company collaborating with CSIRO on developing a new product or process.

Here are some more: Who applies for patents? When does the commercial phase begin and end? What commercial rights do the parties have? What recognition will be given in product identification? How can the agreement be terminated? What happens if there is a breach of confidentiality? What happens if the company is wound up?

Apart from drafting agreements, Dr Martel is also responsible for monitoring the results of the scientific work of the Division. Although based in Adelaide, he regularly visits Melbourne and Sydney to keep in touch.

'Scientists are a funny breed,' he said. 'They'll only open up to people they trust. It's taken a long time to build up that trust, but our scientists now realise how important it is for me to be one of the first to be fully informed about what has been discovered.'

Dr Martel's priorities are to protect the 'intellectual property' of the Division and ensure that it is transferred to industry in the right way.

But isn't Sirotech the commercial agent of CSIRO? 'Yes it is, but my job is to do a lot of the leg work with the scientists and facilitate Sirotech's work by acting as an interface between the Division and Sirotech.

One of the most recent agreements Dr Martel has drawn up concerns promising technology for the processing or disposal of industrial by-products using electric arcs, a further development from the research on welding which resulted in the successful pulse welding machine.

'It can be a nerve-wracking process. Each stage has to be reached now, now and now. Fortunately, many of our scientists and engineers have come straight from industry, where they're used to strict deadlines.

Robots lead invasion of Sydney

The 'Flexible Manufacturing Cell' — a manufacturing demonstration unit which incorporates commercially available robots and other standard numerically controlled machinery, has proven extremely successful in Melbourne in the past two years.

It has now been transferred to the Division's new Sydney laboratory at Lindfield to spearhead a co-ordinated 'invasion' of NSW by the Division.

The Sydney invasion is now proceeding, according to plan, some six years after the Division became operational in its Melbourne and Adelaide laboratories.

The Officer-in-Charge of the Sydney lab, Dr Hartmut Kaebernick, says the cell will act as a talking point for the Division's activities, particularly in integrated manufacture.

'In Melbourne, the Division found that many visitors to the cell had not seen such a set-up before and had not thought in terms of using flexible manufacturing techniques in their own operations,' he said.

'By observing the cell operating, visiting manufacturers would often be stimulated in appreciating something more about their own particular limitations or problems.

'This could create a starting point for useful discussions and co-operation and even lead to an involvement with the Division in a collaborative research project.'

'An important message for Australian manufacturers is that a flexible manufacturing cell of this kind needs little or no change over time between different jobs which possess similar characteristics and which can be processed by the same equipment, making it ideal for small production runs,' he said.

Staff of the Sydney Laboratory (l-r): Robert Ghinzel, Brian Bartlett, David Kells, Charles Marendy, Hartmut Kaebernick (officer-in-charge), Ken Crane, Phon Tran

Dr Jago: slogging away at small gains

Take a look at your Bic disposable razor next time you shave. It's a good example of materials engineering, according to Dr Dick Jago, newly appointed head of the Materials Engineering Program.

'The stainless steel-chromium blade is only a couple of millimetres deep and the plastic handle is moulded around the metal insert,' he says. 'It was a bright idea to combine materials in this way: in a simple form, it's materials engineering — selecting and applying the right materials for the job.

'The details of applying an advanced ceramic like PSZ, which can tolerate high temperatures and resist wear and corrosion, are still to be resolved. For example, how do you fit a ceramic component to a machine so it will run for thousands of hours at temperatures around 1000 degrees C?

'Although the use of advanced ceramics is still at the research and development stage, industries are constantly improving their efficiency through selecting and applying materials with special properties, and there will be a growing demand for advanced materials tailored to specific needs.

'Australia is in a good position to develop a unique expertise that adds value to PSZ, and obtain an edge on the world market.'

Dr Jago is a firm believer in 'slogging away at small gains' in the Australian manufacturing industry. There have been glimmers of hope, he says, where innovative Australian products have sold well overseas.

'If you multiply this by thousands of such successes, Australia will resume its place among manufacturing countries.

'I find it rather depressing at the moment that we're behind Spain and Ireland and other countries generally regarded as less advanced. Our quality of life is closely related to manufacturing, and we've been rather blind to develop a dependency on the rural and mining sectors, a dependency which is now working against us.'

Ford man's mid-life crisis

After 12 years with Ford Australia, most recently in charge of inventory control and vehicle scheduling at the Broadmeadows car asembly plant in Melbourne, Dr Alan Wells had a 'mid-life crisis'.

He decided the time had come to get out and do something different — and applied successfully for a position with CSIRO Manufacturing Technology, heading the Integrated Manufacture program in Adelaide.

'At Ford, I found myself with less and less time to do forward planning,' he said. 'The CSIRO job was one of the few I'd seen advertised that permitted the luxury of some time to sit back and think about manufacturing problems as opposed to operating within the constraints of a fairly hectic production environment'.

Already, he is at work on a collaborative project with an Australian car manufacturer to modernise part of its plant.

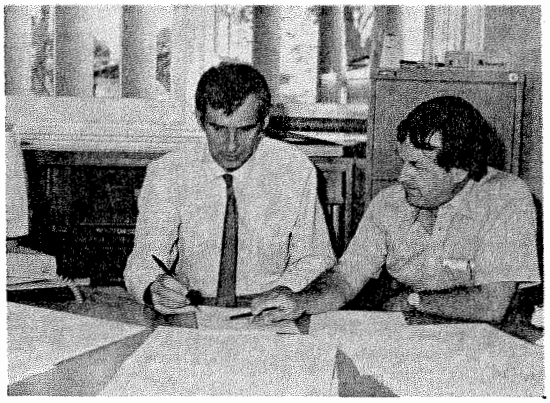
'The way these operations are run today has to be different from the way they were run many years ago.

'The Integrated Manufacture group is in a position to work in collaboration with companies to implement "group technology" theories, whereby you structure manufacturing in cells, more or less dedicated to producing a set of parts falling into a particular geometry or material class.

'These cells have better internal control, a higher degree of skills exchange among workers, and a higher degree of self-responsibility for the end product.

'The same principles can be extended right through a corporation, to make it more flexible and adaptive, and more productive. And of course, the principles are not confined to the automotive industry but can be applied to other plants and industries.'

Dr Wells believes the Integrated Manufacture group has a unique range of skills — in electronics, mechanics, computing and industrial engineering — which make it an effective group for tackling problems throughout the manufacturing sector.



Alan Wells and Terry Seabrook of the integrated manufacture Group examining computer data.

'There's no doubt in my mind that Australia is as capable as any country of manufacturing good products. We do have problems in economy of scale (although this is becomes less relevant if export markets are tapped), and we do have problems of labour costs.

'The only way to counteract these problems is to become more innovative in terms of product and manufacturing processes. Unless management is prepared to put more effort into product and operations research, they're going to find themselves in a lot of difficulty.

'So is the country. Our rural sector and exports of raw materials and energy products are not sufficient to support our standard of living and expectations for the future. The country has to be robust to withstand changing market conditions, and for that it needs a fit and well manufacturing sector.

Collaborative reseearch — more to it than 'inscribing the tablets'

Some scientists believe CSIRO's work is to 'inscribe the tablets' and leave it up to industry to make what use they can of the new knowledge.

'I've actually had that view put to me by a Chief, but I've had no personal experience of a case where it's been like that,' says Dr Graeme Ogilvie, Assistant Chief of the Division and Leader of the Arc Technics Program in Melbourne and Adelaide.

Dr Ogilvie, who conceived and directed the development of the Synchro-Pulse CDT welder (see story page 1 of this feature), says close collaboration with industry at all stages is essential for a successful product.

'The special skills of industry in manufacturing, marketing, ergonomics etc. must be combined with the special skills of the research team.

'Our experience with the CDT welder has driven home the very important lesson that the process of innovation is not linear — that is, it doesn't lead from conception to invention to production to marketing in separate stages.

'Instead, it is essential that there be feedback up and down the chain all the time. Experience in production can feed back to research, and even lead to revision of the basic ideas.

'The old idea of a laboratory single-handedly producing a package which can then be passed on to manufacturing industry is not only simplistic, it's dangerously misleading. In the very likely event of the package not being suitable, the Organisation's image suffers, and the national interest is poorly served because the well of invention in CSIRO is not encouraged.

'CSIRO has related well to its constituencies in mining and agriculture, but we did go through a period in manufacturing where our image was very poor. Now, we do everything we can to build the right relationship with the country's manufacturing industry.

'Another important aspect is the "multiplier effect": the full exploitation of one innovation very often brings on a sequence of further innovations. We have an example with the CDT welder, which is relevant to Dr French's work in Adelaide with special welding wires suited to that class of machine.

'Yet another reason for seeking collaboration is to validate the way you are going. As researchers, we are prepared to explore on our own initiative for a while, but when we reach the stage where a big investment of time and money is required, we seek validation of the activity by advertising for a commercial partner.'

Dr Ogilvie says the success of the CDT welder has helped to create a climate of credibility for the Division in industry, and has helped crystallise views on maximising effective activity in support of industry.

In addition, some of the switching technologies used in the CDT welder were combined with the data acquisition system used for electric arc studies to conduct performance measurements for the Dunlop 'Pulsar' battery. This has led to the development of three different kinds of battery testers, which will be marketed by KTV Electronics and Powerplus Batteries for testing of batteries during manufacture, wholesale distribution and retail distribution.

The arc technics program is now concentrating on exploring the potential of an electric arc device for the treatment of industrial by-products. An agreement has been signed with Siddons Industries, but details are confidential at this stage.

Twelve minutes to midnight for Australian manufacturing

Asked for his opinion on the prospects of Australian manufacturing, Dr Malcolm Good, who will lead the Integrated Manufacture Program when Dr Warren Gellie leaves CSIRO in November, says it is 'twelve minutes to midnight' and Australian companies will have to take advantage of more new technologies in order to survive.

'The State and Federal Governments are now being very supportive of manufacturing, and technologies are now being developed that are perfect for the Australian situation because they allow short runs of products.

'But in many companies, there will have to be a change in the way financial decisions are made about installing automated equipment. At present, company accountants are requiring a very short pay-back period, so that a lot of the longer-term benefits of automation are being left out of the equation.'

Dr Good says the CSIRO Integrated Manufacture Program constitutes a strong support group for industry.

The robotics group in Melbourne (l-r): Vaughan Roberts, Robin Kirkham, Peter Corke and Malcolm Good, with the microprocessor-based robot control system.

In the area of robotics, the group is developing a general purpose micro-processor-based robot controller which could have significant advantages for Australian industry.

'The controllers that come with robots are usually a "closed book" for researchers,' he said. 'We have built our own general-purpose robot controller that takes in "sensory" information and can be easily adapted for a wide variety of tasks and robot manipulators.

'Most current robots are position-controlled, which is fine for tasks like palletising, machine loading, spray painting and welding which don't require extreme accuracy.

'But what about a task like de-burring a piece of sawn metal, where the robot arm is required to apply more force when it comes to an irregularity? This is still an expensive manual task, but the general purpose controller can control the force in real time on the basis of sensed forces and torques.

Collaborative program

'This technology is being applied in a collaborative research program with BHP's Melbourne Research Laboratory.

In the area of production scheduling, the 'discrete event simulation' group under Dr Myles Harding has come up with a unique approach to predicting where bottlenecks will occur in the flow of parts and labour on the factory floor.

'This has already been used to great effect in a number of industrial situations,' said Dr Good. 'For instance, a large car manufacturer was faced recently with the problem of scheduling the flow of cars through the various operations in a new paint shop, taking account of different processing rates, the need for temporary storage of unpainted car bodies, and the handling of defective units.

'The problem had planners moving bits of coloured paper around on a board and tearing their hair out.

'Using the CSIRO simulation approach, Dr Harding was able to simulate the plant in a couple of weeks. He showed that the proposed multi-million dollar facility, about to go to tender, would have experienced severe operational problems.

'Together with the company's engineers, alternative solutions were developed and verified by simulation.'

Ex-foundry boy: 'What am I doing here?'

Occasionally, when preparing papers for a Divisional review, or organising a high-level conference, information officer Murray Houghton finds himself asking 'What am I doing here?'

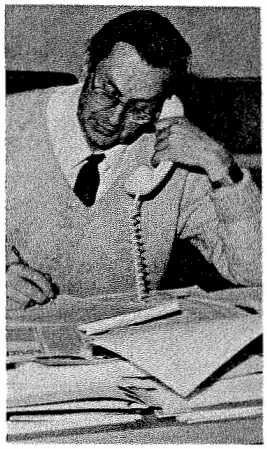
He started his career as an electroplating workshop hand, worked in numerous foundries, doesn't have an undergraduate degree, and lost his job of 15 years when his multinational employer ceased manufacture in 1975.

But Dr Houghton, awarded a PhD by Monash University in 1979 despite having no undergraduate degree, could hardly be better qualified. His combination of academic and 'grass roots' knowledge of manufacturing technology stands him in good stead to answer the wide range of inquiries that pour into the Division from industry.

Dr Houghton started work in 1950 at the age of 18 with J.W. Handley Pty Ltd of Abbotsford, Melbourne, makers of watch cases and bands. A year later, he moved to the stainless steel foundry of Aviation Manufacturing Co, where he became an assistant in the production laboratory while studying for a metallurgy diploma at Melbourne Technical College.

He gained his diploma in 1958 and in 1960 moved to the foundry laboratory of the Commonwealth Aircraft Corporation. The next move was to Rola Co (later Plessey) Australia, where he rose to technical services manager and became an expert on the design, use and manufacture of permanent magnets.

'Unfortunately Plessey was more interested in investing in real estate than in magnets,' he said. 'In 1975, they closed a number of Australian plants including the magnet factory and laboratory, and I found myself out of a job.



Dr Murray Houghton

'I was offered a temporary appointment at Monash as a Research Fellow, and, believing I would only last six months, took it as a "fill in". I stayed for three and a half years, learnt how to use electron microscopes and Mossbauer spectrometers, and my colleagues persuaded a reluctant Professorial Board to enrol me a PhD following the publication of a series of research papers.' (The subject was "The microstructure and magnetic properties of an iron/chromium/cobalt alloy").

After returning to industry for two years in northern NSW, family reasons brought him back to Melbourne, where he worked for CSIRO for the first time, as a member of the Division's diecasting team.

'The alloy we developed was not immediately suitable for commercialisation, so I then worked on zirconia plasma-sprayed thermal barrier coatings at Monash, before rejoining CSIRO two years ago as information officer.

'Like the University, CSIRO was a culture shock at first but I've found my background helps in understanding industry problems, and in directing industrial inquiries to the right person, Division or consultant.'

NATCOM

Cont. from p.1

the expense of other functions, but also staff will begin to use it for themselves. In fact, the system is centre to the Division's new communication strategy.

To gather information needed to answer these questions a two-pronged approach is being used. One is to spend a week in a State capital visiting the government departments concerned with natural resources and collecting administrative charts, names and functions. The other is a suite of questionnaires, one for each 'sector', which is now being finalised with the assistance of a sample of State department officers in South Australia and Victoria. Mr Martin hopes to have the final version printed and distributed to several thousand people by the end of next month.

Groundwork

The software needed to handle this data does not appear to be a problem and much of the groundwork for it already has been done by Mr Martin and local computer consultants.

What is most likely to cause difficulties is the speed with which the personnel information will become obsolete. In the short term, said Mr Martin, CSIRO will simply have to initiate the necessary updates. In the longer term, however, he believes we should try to persuade the relevant government departments to issue the appropriate information in computer-readable and NATCOM-usable form — say every six to 12 months.

The software being planned already has aroused interest among the group of State officers assisting in the questionnaire design — 'the answer to the maiden's prayer' said one Victorian officer.

An important aspect of NATCOM is that it will allow Selective Dissemination of Information — not the SDI of Star Wars, but the SDI that high-tech librarians are buzzing about. It means that instead of using only the established media to get a message over, it will be possible to prepare, say, an information sheet on a remote sensing research project and get the computer to generate a mailing list of interested individuals.

Initially NATCOM will hold information for New South Wales, South Australia and Victoria, but if successful could be expanded to include other States and the Commonwealth. But limited resources have meant very slow progress, and the failure to attract any funding from the first round of CSIRO communication grants has slowed things further. Mr Martin says communication initiatives using computers appear to be outside the guidelines set for grants. He has written to the grant administrators asking them to reconsider the guidelines for 1986/87 funding.

###

Correction

In the May issue of CoResearch several words were missing from the story entitled 'Apply now for Study Awards'. Paragraph two should read: The awards are open to the broad staff categories of: trades, technical, professional (excluding all research scientist classifications) and clerical administrative.

###

EEO Management Plan swings into action

CSIRO's Equal Employment Opportunity Management Plan has been endorsed by the Executive, and EEO officer Ms Carmel Macpherson believes it should guarantee a fair go for everyone in or attempting to enter the Organization.

The final document now includes structural changes to assist migrants, Aboriginals/ Torres Strait Islanders, people with disabilities and women. Most of the strategies dealing with women had been accepted by the Executive in February 1984.

The Plan proposes strategies that make EEO a line management responsibility by proposing that those people charged with managing and supervising at every level must be responsible for their own actions and their subordinates' actions. 'The basic premise is that those managers who are not part of the solution are, by definition, parts of the problem,' said Ms Macpherson.

EEO can't be 'marginalised', she said, but will become part of the mainstream of management in the Organization.

The Plan also has been fully endorsed by the Consultative Council and the Management Committee and Ms MacPherson said there had been strong support for the Organization's EEO objectives.

Of course, implementing an EEO Management Plan is now essential, not only for Government departments but also statutory authorities.

In the past four years, all Government organisations have been made accountable through the Freedom of Information legislation. In addition, the application of the Administrative Decisions (Judicial Review) Act and the Sex-Discrimination Act call for an unprecedented level of accountability to ensure the best possible deal for all employees.

'CSIRO's systems are under scrutiny and this means it must have structures in place which ensure it can withstand investigation,' said Ms Macpherson.

Since the Plan dealing with women came into effect, marked changes in employment patterns have emerged. For instance, in 1979 women comprised only four percent of staff in the Administrative Office 1 to 7 categories but as of March this year they now comprise 30 percent.

Similarly, in research scientist categories there has been a proportiional increase of 28 percent in women filling the positions.

But Ms Macpherson dismisses any claims of 'tokenism' or target numbers, saying that the new structures mean the best person for the job will be employed.

This is the underlying principle of the Plan, she said — the objective selection of applicants without regard for factors unrelated to the work such as sex, marital status, ethnic status, etc.

A series of seminars is being held now, which will eventually go to all CSIRO divisions, outlining the Plan's objectives and advising on how they are implemented by staff responsible for recruitment.

'People were suspicious of EEO at first, but when they realised the benefits the responses to the seminars was very positive. People are keen to learn and apply the new techniques' she said.

Ms Macpherson said the objectives go beyond recruitment procedures. For instance, the Organization is increasingly concerned about the large number of students who drop maths and science at Year 10. The Organization is working closely with the school systems to try to boost the pool of potential CSIRO staff.

The question of migrants, Aboriginals and people with disabilities hasn't been as fully addressed as yet, because the unit does not have a complete picture of the numbers of people in these categories in the Organization. To rectify this, a census will be undertaken later this year through the EEO contact network.

In addition, Chiefs and all senior managers will be asked to file a yearly report on EEO, outlining the applicant pools for jobs and pinpointing the target groups which are not applying for jobs, promotion rates, etc. The monitoring function is vital to the implementation of the Plan and the major responsibility for this will be with the EEO unit. Ms Macpherson said the unit will assist in every way possible to compile figures, but the most important input from managers will be analysis of the data, explaining trends in their areas of responsibility and offering suggested strategies.

The Science Minister Barry Jones wants an annual EEO report from CSIRO, and the Chiefs' and senior managers' reports will be the basis of this.

A closer look at some of the specific arrangements specified in the plan will appear in the next issue of *CoResearch*.

Big response to first Connections

Responses to a questionnaire on the first pilot edition of the staff video program, Connections, have come in thick and fast to the Film & Video Unit.

And like the *CoResearch* survey last year, the comments cover the whole spectrum — from 'drop it' to 'we love it'.

About 250 forms representing several thousand staff members (with some groups and divisions submitting a single form covering the prevailing opinions) have now been received by Unit OIC Nick Alexander and he said the overall response had been 'favourable'.

One exception was the Division of Environmental Mechanics, where the overwhelming response was strongly critical. In a letter to Mr Alexander, a spokesman said 'it is symptomatic of the current trend in CSIRO to emphasise gloss and slick presentation rather than solid content'.

This contrasts with, for example, the views of staff at the Division of Atmospheric Research, who found it 'worthwhile, informative and about the right format'.

Three common objections were that, a. it was perceived as directing valuable resources away from research, b. the content was 'old hat', much of it having already appeared in *CoResearch* and c. that the items were too short and lacked sufficient depth. These comments were balanced by others saying that the video was informative, interesting and 'long overdue'.

A large number of respondents praised the overall presentation, with many people saying it was 'very professional'.

The second Connections program should be at Divisions now.

Letter

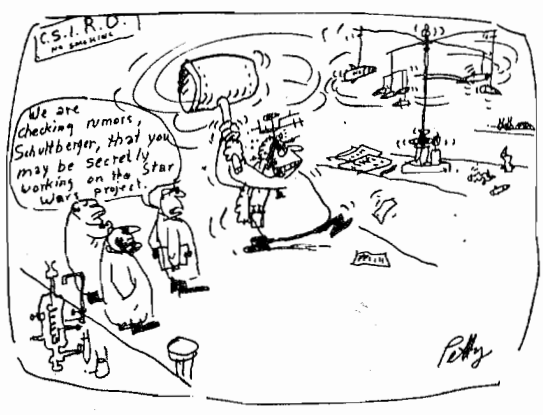
Cont. from p.2

seas by the star wars program will therefore widen the technology gap even further. Most significantly, much of the 'star wars' research will be in lasers, microelectronics, robotics, new materials, etc — the new technologies — and will spin-off into new products for the farm, factory, mine and home. Our R&D and technological industry will fall further behind with each passing year. So the anti-star wars alternative will lead to an acceleration of the already widening technology gap. This is not just a possibility — it is an inevitability.

Unless, that is, our government recognises a third option. That option is to adopt a policy of technological reconstruction. This would be designed in such a manner as to stimulate and involve Australian industry. Annual targets of government and industry based R&D would be established, to bring Australia back in line with median developed countries after, say, five years. A target of 1.5 percent GNP would appear to be appropriate.

Australia cannot remain a prosperous nation if we depend on technological crumbs that fall off other people's tables. In rejecting star wars, it is vital that we also reject the option of technological impotency as well. It will cost money, a few votes, and a lot of hard work, but a third option of technological reconstruction is the only option that allows us to take a moral stand, without also hastening our technological demise.

Dr Ken McCracken
COSSA



Former Chairman immortalised on canvas

(Left) Dr Wild and his portrait, which illustrates him against a background of images representing the solar heliograph which he developed in Australia. Inset: Dr Wild views the painting with artist Mr Charles Tompson. Photos: Paul Costantoura.

In keeping with CSIRO's tradition of commissioning paintings of former Chairmen, a portrait of Dr Paul Wild was recently completed. It was unveiled by the Minister for Science, Mr Barry Jones last month. Funds for the painting, which was done by Canberra artist Mr Charles Tompson, were provided solely by staff contributions. Mr Tompson is a former illustrator for Consolidated Press and chief illustrator for the Fairfax Group. He won the Walkley Award for the best national illustration in 1968.

Possingham takes role in new Research Council

The Chief of the Division of Horticultural Research, Dr John Possingham, has been appointed to the new Australian Dried Fruits Research Council for a three year term.

The Council has been established by the Federal Government under its Rural Industries Research Act 1985.

The main objective is to fund and administer research and development which will increase commercial returns to members of the industry.

The Act provides a broad definition of R&D and includes projects in the production, processing, storage, transport and marketing of the products of the industry.

Dr Smith

Cont. from p. 1

senior police officials last month to press for a full enquiry.

That meeting did result in the announcement of a probe into some of the grey areas in the police investigation which finally ended in the conviction of Bazley, a 'Mafia hitman', several weeks ago for conspiring to murder Mackay.

But the meeting was a harrowing experience for Dr Smith and the other members of the group, who were put on the ropes for their trouble. Recent newspaper reports said that members of the delegation were verbally abused and told they were pursuing an issue which had little significance.

Dr Smith is concerned that the resulting enquiry will not be sufficiently full and open to get to the bottom of disturbing allegations about the way the investigation was handled and the apparent 'misinformation' circulated in the days after Mackay disappeared in 1977.

Dr Smith said his group will present any evidence they get in public if the enquiry does not cover the issues fully.

He admits to feeling a 'latent fear' about having a high profile on the matter. 'Donald Mackay put his head up and spoke out — and he was murdered. Anyone else who does the same thing is at risk,' he said.

He said his colleagues at the Centre for Irrigation Research have provided 'moral support and encouragement' for his campaign and he feels 'very secure' in the environment there.

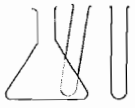
Dr Smith is research leader in irrigation with a particular interest in infrared thermometry. He has been with the Centre since 1980.

Alfredson to chair College of Chemical Eng.

The Chief of the Division of Energy Chemistry, Dr Peter Alfredson, has been elected chairman of the College of Chemical Engineers for 1986/87.

The College is part of the Institution of Engineers Australia, whose colleges are responsible for learned society activities aimed a promoting high standards of knowledge and practice within their disciplines.

Dr Alfredson has been with CSIRO since 1981 when he was appointed foundation Chief of the newly formed Division of Energy Chemistry.



***CoResearch* is produced by the Science Communication Unit for CSIRO staff. It's also circulated to a number of people in the Organization who are interested in CSIRO activities. Readers are invited to contribute or offer suggestions for articles. The deadline is the last Monday before the issue month. Editor: Liz Burden, PO Box 225, Dickson ACT 2602. Ph: 48 4479.**

Embleton made Chief of new division

Dr Brian Embleton has been appointed Chief of the new Division of Mineral Physics and Mineralogy.

Dr Embleton has been acting Chief since January last year.

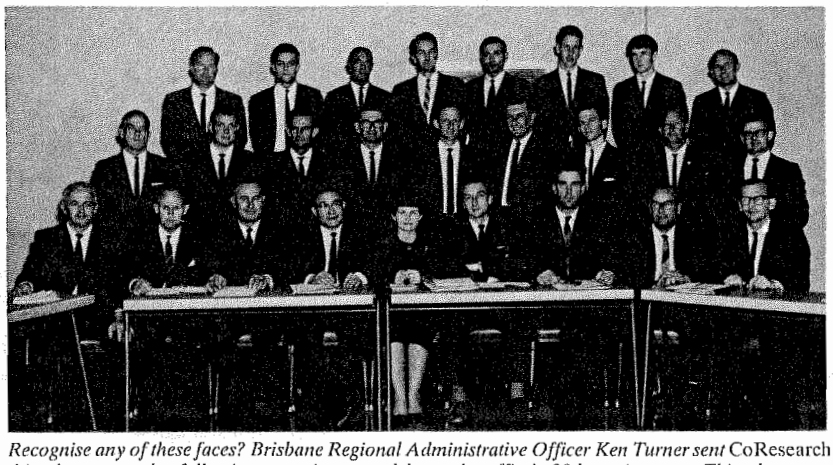
The Division was created by the amalgamation of the Division of Mineral Physics and the Division of Mineralogy and Geochemistry in Sydney, and the Geobiological group at the Baas Becking Laboratory in Canberra.

Dr Embleton joined the Division of Mineral Physics in 1975 and has been instrumental in developing rock magnetic studies for application to mineral exploration and has conducted field studies in Australia, India and China.

###

A former clerk with the Division of Energy Technology, **Mr Dudley Gardiner**, died last month after being washed off rocks while fishing in the Sorento/Rye area of Victoria. Mr Gardiner joined the Central Experimental Workshops in January 1953 and stayed with CSIRO until his retirement in July 1976.

Mr Eric Reed , a senior experimental scientist with the Division of Entomology, retired recently after almost 25 years with CSIRO. His career successfully spanned several disciplines and involved him in pioneering research on the potential of nematodes for the biological control of pasture scarab beetles, with publication in *Nature* on nematodes, research on the potential of viruses to control potato moth and the design of the mass rearing facilities for sheep blowfly studies. As a hobby, Eric pursued an interest in the taxonomy of thrips and wrote a chapter on this subject for the standard text *The Insects of Australia.*



Recognise any of these faces? Brisbane Regional Administrative Officer Ken Turner sent CoResearch *this photo recently, following a seminar to celebrate the office's 20th anniversary. This photo was taken at the first seminar there. Only one person still works at the office — Mr H C Toussaint (fourth from the right in back row). 'Others in the Organization may have an interesting moment or two identifying the personalities,' said Mr Turner.*

Dr Wild and his portrait

CoResearch

CSIRO's staff newspaper

No.292 June '86

F–27 research aircraft

Fokker's usefulness doubled by added search capacity

The crew of CSIRO's Fokker F-27 aircraft flew their first fully-equipped search and rescue mission last month but the distress call was a hoax.

When Jan Smith and Cecil Maher of the Research Aircraft Facility flew to Sale in Gippsland, Victoria, they did not expect to spend more than four hours combing Bass Strait for a sinking cabin cruiser with five people on board.

The CSIRO team was one of six fixed-wing and two helicopter teams involved in the search and rescue mission, which started on the night of Sunday 25 May.

Ms Smith, a navigator with the Facility, said they had been asked on Sunday night to leave the Sale RAAF base at first light on Monday morning to join the search.

The six members of the Sydney-based Research Aircraft Facility had only just completed a week-long National Safety Council training course in search and rescue techniques. Rescue equipment, including life rafts and containers with food, water and survival equipment, had been installed in the F-27 less than a week before the Bass Strait mission.

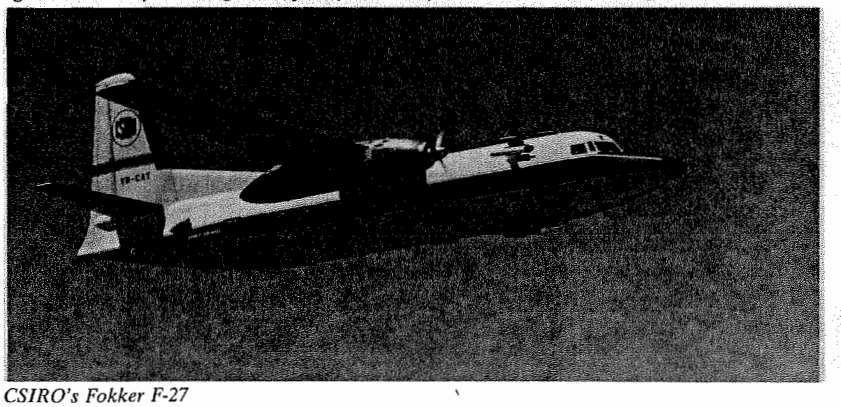
The search was mounted after a radio operator in Mount Gambier, South Australia, heard a distress call from someone who claimed their boat was sinking about six nautical miles north-west of Flinders Island.

The distress call had not been on a marine emergency frequency but on a CB frequency used by land-based people in distress, and the call sign proved later to be that of a boat which was not in difficulty.

The CSIRO Fokker F-27, crewed by Captain John McCracken, and Michael Coad of East-West Airlines and with Ms Smith, Mr Maher, John Bennett from the Division of Atmospheric Research and two army personnel on board, took part in the search until it was called off at about 12 noon.

Ms Smith said they had flown nine search tracks at half mile spacings, but had seen no sign of the boat.

'We saw lobster buoys, sighted huge pieces of kelp but no boat or signs of wreckage. We were flying at about 1000 feet and dropped down to about 500 feet to get a closer look at anything that seemed interesting.'



CSIRO's Fokker F-27

The Department of Aviation selected the F-27 to become a search and rescue aircraft in March 1985 and the staff were trained and the aircraft equipped at the Department's expense. 'We will now retrain every six or eight months in observing and search and rescue techniques.'

Ms Smith said each observer spent no more than half an hour at a time searching for a boat or signs of wreckage. 'Any longer than that and your eyes can't cope and your concentration starts to fail,' she said.

The Fokker F-27, which is operated and maintained by East-West Airlines under contract to CSIRO, is used for a wide range of research projects involving a number of Divisions including Forest Research, Fossil Fuels, Atmospheric Research, and Mineral Physics and Mineralogy.

The research projects have involved subjects as diverse as the effects of bushfires, weather prediction and remote sensing for minerals. The aircraft was being used to collect data for a project for NASA and the Division of Atmospheric Research when it was called out for the search and rescue mission.

'We left for the base at 5.30am and got back to Sale at about 12.30pm, had three-quarters of an hour for lunch and started flying for CSIRO until dark,' Ms Smith said. 'It made for a very long day.'

The F-27 was bought by CSIRO in 1978 and has been extensively modified for research purposes.

Mr Trevor Higgin, of the Department of Aviation, said the F-27 was 'probably one of the best, if not the best, semi-dedicated search and rescue aircraft' available to the Department.

Semi-dedicated aircraft were privately owned but with trained operators available to help with search and rescue missions. The Department had taken on a number of aircraft based on the east coast of Australia, trained the operators and supplied equipment, he said.

The CSIRO Fokker F-27 was particularly valuable because it carried search and rescue equipment and trained personnel on board at all times. Other aircraft had to return to their base to load rescue equipment.

The full cost of flying a search and rescue mission is met by the Department.

Weevils to the attack in Sri Lanka

Four thousand tiny black weevils flew Qantas to Sri Lanka late last month on behalf of Australian science.

The weevils, known properly as *Cyrtobagous salvineae*, are being sent by CSIRO to Sri Lankan researchers to initiate a biological control program against the floating fern, Salvinia.

The project leaders are Dr Ivor Fernando of the University of Kelaniya near Colombo in Sri Lanka, and Dr Peter Room of the Division of Entomology in Brisbane. The project is being funded by the Australian Centre for International Agricultural Research.

Salvinia is a serious weed throughout the tropics and subtropics and has plagued Sri Lanka since the late 1930s. It grows rampantly in rice paddy areas and must be removed before rice seedlings can be planted. The weed also grows in dams and irrigation channels and the Sri Lankan authorities believe it will be a major threat to the viability of a huge irrigation scheme.

The salvinia weevil has already received wide acclaim following very successful programs against the weed in Australia and in Papua New Guinea. The CSIRO research team was awarded the 1985 UNESCO Science Prize for their work in controlling salvinia in Papua New Guinea.

The weevils attack salvinia by eating away the buds and by burrowing into the stems. The weed eventually becomes waterlogged and sinks, leaving pollution-free clear water.

The colony in Sri Lanka will be held in quarantine for at least two to three months for testing against various plant species including rice to make sure the weevils will only attack salvinia when released.

The weevils will also be checked for parasites and disease so that only the offspring of healthy, parasite-free weevils will be released in the field.

'Pedibus in terra fixi, in caelo astra spectant.'
This month's Divisional feature, on the Division of Radiophysics, is on pages 3–6

From the Chairman

A column by Dr Keith Boardman

Shaping the future — a Strategy for CSIRO 1985-1990 was circulated widely to parliamentarians, industry, community and union leaders and the media. The response was very encouraging and indicated good support for the Organization and the objectives and goals as set out in the strategy document.

Even some of the most vocal critics of CSIRO in recent years have applauded the strategy as a suitable blueprint.

Among the objectives the strategy indentified the need for greater flexibility in personnel management in order that CSIRO may respond to changing research needs, which can involve a shift of resources between sectors.

The ASTEC review on CSIRO saw early retirement from CSIRO as one way to improve flexibility in the Organisation, and recommended that CSIRO introduce an early separation incentive scheme which could be offered to research staff at management's discretion. The reasons given by the ASTEC for their recommendation were that research differs from other activities in that high quality research can only be conducted by highly creative and motivated researchers, and not all research staff retain curiosity and motivation throughout their careers.

The Executive strongly support the ASTEC proposal, but proposed that the scheme should be voluntary and apply if possible to staff of all classifications.

In responding to the ASTEC report, it seems very likely that the Government will endorse an early separation scheme for professional scientific staff and provide financial support for a one-term scheme. The scheme would be more limited than the Executive proposal which also included technical staff.

I can fully appreciate the strong reaction from the technical staff at being excluded from an early separation scheme. There may also be fears that some technical staff may be declared redundant under Determination 509 as a consequence of professional staff separating under the scheme, and be denied compensation comparable to the benefits paid to professional staff under the separation scheme.

This would indeed be discriminating, but I can assure staff that the Executive has no intention to retrench technical staff under Determination 509 as a consequence of professional staff separation.

Staff flexibility also will be enhanced by improved opportunities for training, which will include staff development to improve skills in management. I believe that individuals should be involved in decisions about career changes and accept the need for retraining when needed. During the past week, I addressed the inaugural meeting of the advisory group on staff training and development and stressed the importance the Executive attaches to a variety of opportunities for staff to further develop their potential.

###

The organization of water research in CSIRO is under active consideration again following the reviews of the Divisions of Groundwater Research, Environmental Mechanics and Water Land Resources, and the proposal of the Government to establish a Murray-Darling Freshwater Research Centre at Albury-Wodonga.

There is general recognition for the need for a clearer focus on CSIRO's water resources research for better communication and interaction with the water industry.

I have established a committee chaired by Dr Michael Pitman to make clear recommendations to me about the organisation of water resources research, taking account of the recommendations of the divisional reviews and the working party chaired by Dr Adrian Peck. The recommendations of the Pitman Committee will then be considered by the Management Committee on June 19 and the Executive on July 10.

The location of water resources research is related to the Institute structure, and although the Management Committee will shortly be reconsidering Institute structure, I do not propose that any changes be made to the Institutes until the new Board is in place following changes to our Act later in the year.

I recently accepted an invitation to visit the central reserach laboratories of ICI at Ascot Vale; and have lunch with the Managing Director of ICI, Mr Chris Hampson, and senior managers of the research laboratories.

I found the visit and the discussions very useful indeed, and I gained a good appreciation of the research of ICI, a multinational, and how it fits with the business objectives and philosophy of the company. I believe there is scope for more interaction and collaboration between CSIRO and hi-tech firms such as ICI for the benefit of the nation.

A Keith Boardman

Retirement of Ken Ferguson

The Director of the Institute of Animal and Food Science, Dr Ken Ferguson, retired recently after 39 years with CSIRO.

Dr Ferguson, who became foundation Director of the Institute in 1979, joined the Organisation in 1947 as an assitant research officer in the Division of Animal Health and Production.

An endocrinologist, Dr Ferguson was an Associate member of the Executive from 1976 to 1979, and Chairman of the CSIRO Animal Research Laboratories from 1973 to 1979.

His most notable work has been in the field of hormonal and nutritional control of wool growth. He also developed the procedures used for the preparation of human pituitary hormones for the treatment of dwarfism and infertility in Australia.

At a farewell dinner, the Chairman, Dr Boardman, said CSIRO would miss Dr Ferguson's 'wise counsel, his objectivity, his immense knowledge of the agricultural scene in Australia'.

Dr Fergurson, who is married with two sons and three daughters, lives on a sheep farm near Queanbeyan, NSW. He will now devote time to practical farming.

Ken Ferguson

He is also a consultant to the newly listed company, Peptide Technology.

The Chief of the Division of Animal Health, Dr Alan Donald, has been appointed acting Director of the Institute for an indefinite period.

Dear Editor,
The proposed 'Early Separation Incentive Scheme', if allowed to go ahead with the limitations of only Research and Experimental categories is possibly the most divisive item ever introduced to CSIRO. How discriminating to have the Es and an STO working together for 33 years only to have one to be allowed to bask in the Queensland sun with $200,000 invested while the other languishes for three more cold years to retire on a mere $180/wk nett. Tell me, can the technical and trades ranks ever be happy again?

E. Dunstone
Food Research

Dear Editor,
In the destruction of the Division of Water and Land Resources I can find only one crumb of comfort. The higher the walls that are built between water research and other kinds of land research the more strenuously people will try to climb them.

J.G. Speight
Water and Land Resourses

Dear Editor
The item of the new NATCOM science communication system in the last *CoResearch* needs one point brought out better. The system will not simply be a computer searchable directory of who's who in natural resources management, as the item may have implied. It WILL have such a directory, but only as a front end.

Equally important will be its ability to suggest which communication channels are most likely to be effective, given the subject material, the location of the target audiences, and the information-gathering habits of those audiences. The questionnaire mentioned in the item will be a major source of data on all these matters.

NATCOM will not replace current communciation activities. It is being designed to complement them. It is a system that will tell you the best way to get your specialised message across to the right people, wherever they are. When the bugs (or worse!) are ironed out, the system should be applicable outside the natural resources sphere.

Beyond NATCOM may come the total computerised networking of all individuals with shared specialist concerns, regardless of where or for whom they work. CSIRO ought to be thinking NOW about the design of such systems for Australia and making suggestions to government. A mish-mash of uncoordinated computerised networking systems across the country will benefit no one.

Peter Martin
Division of Water and Land Resources

Dear Editor,
The article "Big response to first Connections" in the May '86 issue of *CoResearch* may have given readers the impression that the Division of Enviromental Mechanics was the only Division strongly critical of the first Connections.

However, later in the article three *common* (emphasis mine) objection were listed. Obviously other Divisions also preceived various weaknesses in Connections. Perhaps we should be congratulated on identifying all three of the problems.

Will Steffen
Information Officer

###

Dear Editor,
Congratulations! Your issue 291 had two occasions to mention the Institution, once with respect to Bob Brown and once with respect to Peter Alfredson, and you only got it wrong once!

By Australian journalist standards that borders on the miraculous. Perhaps the classic case of the norm is the Government Gazette naming all the streets in the Canberra suburb of Monash after engineers, mostly members of the Institution. All affiliations were spelt out in full and every one is wrong.

Mick Fleming
Water and Land Resources

Letters cont. Page 7

Division Feature **Radiophysics**

The Australia Telescope: like reading a telephone directory 10km away

Many of Australia's Bicentennial activities will focus on the past. At least one, though, will look to the future.

The Australia Telescope (AT) has been designed to give this country an advanced tool for one of the most fascinating scientific endeavours of all — astronomy — through the 1990s and beyond.

The AT, an official Bicentennial project, will be a remarkable engineering and scientific feat, giving Australia more power than ever before to probe our galaxy and the Universe. As befits a national commerorative project, at least 80 percent Australian content has been stipulated by the proposers of the project. This not only demonstrates confidence in Australia's manufacturing capabilities but also should provide a boost for the development of a space-based industry through the development of new techniques and the letting of lucrative contracts.

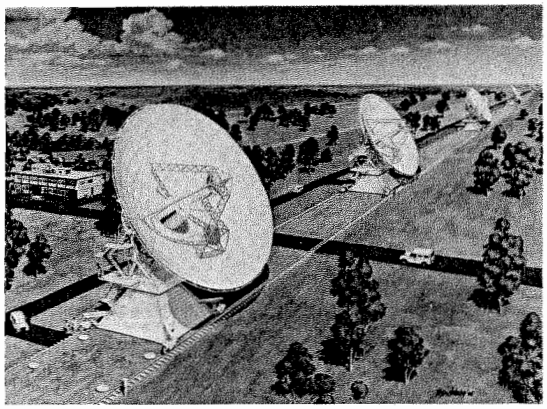
Among its many uses, the AT will enable astronomers to examine phenomena such as the Milky Way nucleus, the birth of stars, the debris of exploded stars, the Magellanic Clouds and the myesterious black holes.

Engineer, Mr John Brooks, is the AT project manager. He oversees five separate groups dealing with antennas, receivers, signal distribution, correlators and computer processing facilities.

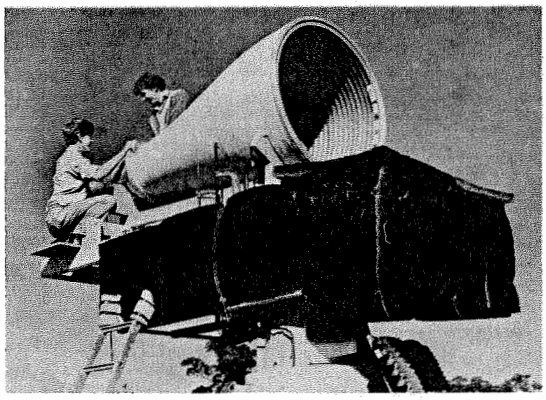
The huge project, costing $43 million (March 1985 dollars), will comprise a 'compact array' of six 22 metre parabolic antennas at the original radioheliograph site at Culgoora near Narrabri, linked to another 22 metre dish at Siding Spring and the Parkes radiotelescope further south. This configuration is called the Long Baseline Array (LBA). Civil works at Culgoora have now been completed by Roberts Construction of Queensland. The railway track on which the six parabolic antennas will be positioned is now in place.

The frame work for the antenna 'stations' was manufactured in the Division's workshop.

Very simply, the AT will work like this: the rotation of the Earth together with the movement of the compact array dishes up and down the railway line at Culgoora will, after a period of about 12 days, form a 'fully filled' simulated antenna six kilometres in diameter. With the addition of the long baseline antennas at Siding Spring and Parkes, a 'dish' almost equivalent to a 340km diameter radiotelescope will be created. This technique is called aperture synthesis.



Artist's impression of the compact array for the Australia Telescope at Culgoora, NSW. This part of the Telescope has been named the Paul Wild Observatory.



Bob Shields (left) and Stephen Skinner with a feed horn to be used on the Australia Telescope. The horn has been mounted on the outdoor antenna test range.

Unlike optical telescopes designed to eceive very short light waves which can be picked up with relatively small instruments, radio telescopes receive much longer radio waves emitted by planets and stars and hence for the same resolution, need to be several orders of magnitude larger. Thus the need for the aperture synthesis technique. Further, to catch the extremely weak radio emissions (with power of only about 10 to the minus 27 watts), one needs to have a large collecting area either by having a large number of relatively small antennas or a smaller number of larger antennas. For these and other reasons the Australia Telescope has chosen seven antennas with a diameter of 22 metres.

The resolution obtained with the AT (LBA mode) will be equivalent to reading a telephone book from 10 kilometres away. In addition, a lot of extraneous 'noise' from a number of sources needs to be averaged out until you are left with a meaningful message, said Mr Brooks.

A scale model of one of the movable antennas has been built by John Uden in the Division's workshop.

The carpenters have also built a full–size model of the antenna feed and equipment housing which currently occupies a corner of the Division's car park.

The high accuracy required for the AT and related projects has necessitated the purchase of digital readouts for machinery, NC and CNC machines and retraining of all workshop staff to handle the new technology both purchased and developed on–site.

Technology transfer

The scientific and engineering expertise developed in the study of radio astronomy may be applied in much more diverse areas of endeavour — from satellite receivers to medical tomography.

Division Chief Dr Bob Frater said the firm basis from which all work at the Division stems is radio astronomy, and about two thirds of staff are directly involved in this research and development.

'Astronomy is supported in nearly every country of the world. It provides the opportunity for scientists to research in physics and applied maths and is a good area for postgraduate training,' said Dr Frater. The spin-offs from this more basic work offer an enormous range of possibilities for development and technology transfer.

Dr Frater became Chief nearly five years ago with the aim of bringing to fruition a major new telescope for radio astronomers, the Australia Telescope (see separate story) and to build groups which would work with and develop the same technology but apply it to a wider range of areas.

For instance, there are many similar techniques in the design of a radio telescope and a satellite earth station. The Division is now heavily involved in developing sophisticated receiving systems for OTC in two separate projects and is contributing to the development of the second generation AUSSAT satellite to design the transmitting equipment on the spacecraft itself. Pioneering work on earth stations to receive more than one satellite transmission simultaneously is also undertaken.

Dr Frater said the contracts with industry 'represented a major demonstration of technology transfer'.

Technology transfer has long been an important aspect of work at the Division - perhaps the most spectacular example being the Interscan aircraft landing system.

The Division is now keen to see greater involvement by Australian industry in space-related technology, and in promoting this it co-operates where possible with the CSIRO Office of Space Science and Applications (COSSA). Dr Frater believes 'there is significant co-ordination of space activity in CSIRO'.

However, he said the Government is not sufficiently supportive of the push for the establishment of space-based industries. 'I would like to see a higher level of risk in Government purchases. They have to be prepared to take the risk and buy Australian designed and made satellite components, rather than buying from established manufacturers overseas,' he said. He doesn't necessarily advocate the construction of whole satellites here — and certainly not the rockets to launch them — but there's no question the expertise exists for the design and construction of ground stations and certain satellite components. Support could lead to the development of a significant Australian industry, with prospects to export to the burgeoning South East Asian markets.

Dr Bob Frater

'One of the reasons Australia has done so well in radio astronomy is that the subject covers the whole range from pure science to applied areas such as building components. There is total integration of activity — none of our research at any level is ever done without a specific goal in mind,' said Dr Frater.

This had led to 'exceptional contact' with the outside — whether as technology transfer or public relations.

The Division holds press conferences and encourages all scientific staff to be interviewed. When it took on crucial roles in the NASA Voyager mission and the European Space Agency's Giotto project, the Division also shouldered an additional public relations task.

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This feature is designed to present a cross section of activities at the Division of Radiophysics and is not intended as a directory to the Division's research. Photos: John Masterson.

Secret beginnings to a distinguished career

The Division of Radiophysics began its long and distinguished record of achievement in secret.

Radar research had been underway in Britain several years before the outbreak of World War II. Early in 1939 the Radio Research Board in Australia recommended that Dr D.F. Martyn (who was later to become Chief of the Division) go to Britain to visit existing facilities and offer assistance where possible, and as a result of his findings the Board recommended that CSIR (as it then was) set up a radar laboratory.

The Division was officially proclaimed after the war and new peacetime projects using the expertise developed during the war years began. These included the very new subjects of radio astronomy, radio navigation, computing, transistors and rain making.

The expertise gained in radar-pulse and time-delay circuits was used in the design and construction of CSIRAC, one of the first computers in the world. It came into service in 1952.

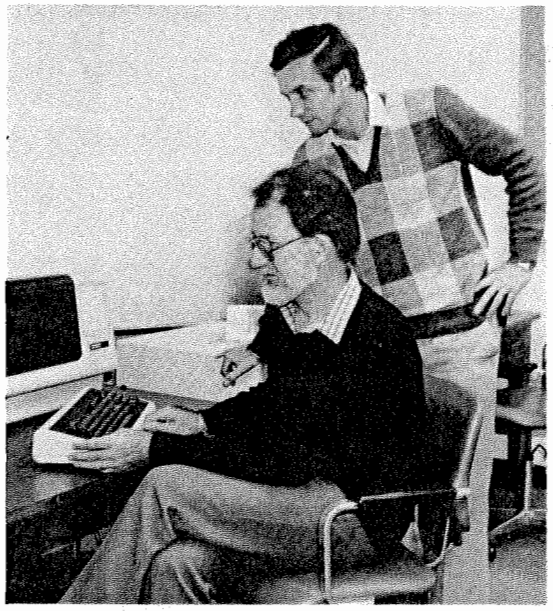
At the same time, interesting developments were occurring in the more comprehensive field of cosmic radio astronomy. The outcome of these developments was the Parkes 64-m telescope, which opened for business in October 1961.

The next major project came six years later with the opening of the radioheliograph at Culgoora, NSW. The heliograph consisted of 96 antennas equally spaced around a three kilometre radius, and was designed to provide radio images of the sun at two second intervals. The heliograph ceased operation in 1984 and the site is being used for the compact array of the Australia Telescope. The 16 years of Culgoora solar research is summarized in 'Solar Radiophysics', published last year by Cambridge University Press.

These years of apparently pure astronomical research at the Division had one very interesting and inevitable result. Engineering skills, without which the astronomers would have been unable to make progress, were the very ones which enabled the Division to progress technologically to the point in the 1970s when its microwave landing system, Interscan, proposed by the new Chief, J.P. Wild, was the international choice for use at all major airports around the world.

As perhaps one might expect from such a mature Division, the Radiophysics staff have accumulated an impressive quota of scientific honours. The most notable achievements include seven FRSs. Indeed three of the Division's Chiefs, Sir Frederick White, V.D.Burgmann and J.P. Wild, went on to become chairmen of CSIRO.

In the 1980s, under the leadership of Dr R.H. Frater, the Division prepares for the high-technology era — the Australia Telescope, antenna work for space communications, signal and image processing with their medical and geophysical ramifications. These are the current concerns of this old but very forward-looking Division.



John O'Sullivan and Don McLean of the Signal and Imaging Processing Group, using the DeAnza image processing terminal.

Signal processing

One of the most interesting and complex areas of research associated with the AT is signal processing.

The AT, through its compact array and long baseline antennas, will create a huge 'dish' 340km in diameter. For the simulation to be accurate, sophisticated methods are required to process the very weak signals being received from space, put them together and come up with usable data.

A range of techniques is required to deal with the very large quantities of data involved. Aspects of high-speed hardware processing are as important as refined methods for analysing the data.

The techniques are not confined to the interpretation of radio signals. Scientists at the Division, working in the Signal and Imaging Technology Group led by Dr John O'Sullivan, say the principles may also be applied in seemingly unrelated disciplines, such as medicine and geophysics, through computer-aided tomography.

The Division sees a major opportunity for applying the Division's extensive existing knowledge of signal processing methods to industrial problems and is keen to speak to potential users.

OTC contracts awarded to Division

Expertise gained during the past two decades in antenna technology for radio astronomy, and more recently for satellite communications, led to the Division being awarded two contracts by the Overseas Telecommunications Commission (OTC).

The contracts, which were let in July 1985, for the design and construction of three 18-metre cassegrain communication antennas, two for Perth and one for Oxford Falls near Sydney and a research and development project for an Intelsat prototype roof-top earth station terminal.

For the first project, Sydney-based firm MacDonald Wagner — which is working closely with the Division as a consultant on the AT project — and Johns Perry were awarded contracts to design and manufacture the 18m diameter antennas. The Division has been sub-contracted to specify the optics, feed system and method of panel manufacture, to design the feed horn and to participate in the various testing programs.

For the second contract the Division forms part of a consortium, together with Codan Pty Ltd, MITEC (University of Queensland), Sydney University and the South Australian Institute of Technology.

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Solid progress on solid state devices

Another new initiative in the Division is a program to develop gallium arsenide (GaAs) devices — field effect transistors (FETs), high electron mobility transistors (HEMTs) and Schottky diodes — and to incorporate them into monolithic microwave intergrated circuits (MMICs).

The object is to develop this technology to the point where it can be transferred to interested Australian manufacturers of microwave equipment, such as satellite ground station components or specialised communications equipment.

This new work on solid state devices, another spin-off from the Australia Telescope project, is assisting in the establishment of a fundamental physics base for the satellite receiver work at the Division.

The solid state devices group, headed by Dr John Archer, is responsible for this program. A member of the group, Mr Bob Batchelor, said that GaAs was capable of higher frequency (and higher speed) operation than the more familiar silicon devices. For this reason GaAs FETs are used extensively in today's microwave receivers, and will play an important role in tomorrow's super computers.

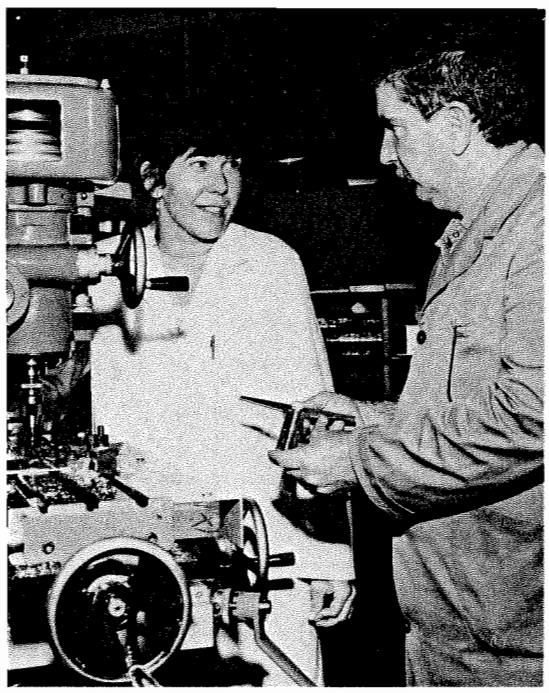
To ensure a reliable supply of GaAs material with the desired characteristics, the group will take delivery of a $1 million 'molecular beam epitaxy' system.

Killing three 'birds' with one antenna

The antenna systems group has an on–going contract with AUSSAT for the design of small to medium–sized ground station antennas capable of communicating with more than one satellite at once.

Since there will be three AUSSAT 'birds' operational at any one time, one antenna which does the work of three is seen as a very cost–effective development.

The group is also acting as antenna consultants to AUSSAT in the formulation of the system concepts for the next generation of AUSSAT satellites, prior to calling for tenders. This is an exciting projects, and could lead to Australian antenna designs being used in these satellites.



Senior laboratory craftsmen Elaine Koch and Bruce Egan in the Radiophysics Machine Shop.

A science that raises more questions than it answers

While astronomy with its ancient beginnings has captured the imagination of the world since earliest times, radio astronomy is a product of the past four decades.

But in that short time radio astronomy has made some remarkable discoveries about the mysteries of the Universe. It has also, perhaps, raised more questions than it has so far answered.

Quasars, pulsars, black holes — these are some of the terms which have entered the language since radio astronomy began its probe of the outer reaches of space and expanded the limits of human knowledge.

Astronomers look into the past — they 'see' what occurred many years back, nearly to the start of the Universe, often before Earth existed. Far away is long ago.

Astronomers with the Division of Radiophysics have been at the forefront of research into the cosmos since the Division played a leading role in initiating the science of radio astronomy at the end of World War II (see separate story).

The commissioning of the 64-metre Parkes radio telescope in 1961 was a turning point in Australian radio astronomy and there have been many highlights since then. These include: measurements in 1963 that led to the first identification of a quasar; the mapping of important regions of our galaxy for the hydrogen that marks the birthplace of new stars; the discovery in collaboration with the University of Sydney's Molonglo Observatory of more pulsars than elsewhere; and the discovery of complex organic molecules in space.

Added to these and other achievements is another major claim to fame. In the early hours of 26 March 1982, a team of Australian and British astronomers observing with the Anglo-Australian Telescope established that a radio-emitting object found by the Parkes radio telescope was the most distant object in the Universe. The object is a quasar ('quasi-stellar object') given the rather prosaic name of PKS 2000-330. The energy now reaching us from this quasar left around 20 000 million years ago. To be picked up now by radio, optical and X-ray telescopes, the energy must have been extremely luminous.

The 'Great Nebula' in Orion

Briefly, some of the other major phenomena observed by the Division's astronomers include:

1. Pulsars. In 1967 a student at Cambridge University, Jocelyn Bell, first discovered the clock-like radio pulses which have come to be called pulsars. These small (maybe 10 kilometres across) but extremely dense objects are collapsed stars which spin very rapidly, emitting a stream of energy which produces radio waves. These waves can be received by radio telescopes and show up as periodic bursts as the pulsar's beam of energy swings around like the beam from a lighthouse. About 400 pulsars have been located, most of them within our own galaxy, the Milky Way.

2. Quasars. Although originally thought to be 'radio stars', quasars are in fact very distant galaxies, notable because they contain a central 'powerhouse' which emits more light than all the 100 billion stars in the galaxy put together.

3. Black holes. The almost incomprehensible powerhouse in the centre of a quasar is probably a black hole. It is believed that the power source could be the enormous gravitational energy — greater than nuclear fusion could produce — released when matter falls towards a massive compact object, It is still just a concept because no-one has ever seen a black hole.

4. Remnants of supernovae. SNRs (supernova remnants) are the relics of stars which ended their lives with a catastrophic explosion. Some are among the brightest objects in the radio sky — that is, their output of radio waves is relatively high.

There is considerably more to radio astronomy than the items in this summary. For further information on the subject get hold of the recently released CSIRO Research for Australia book entitled 'Radio Astronomy'. The cost to CSIRO employees is $6. To order, send a cheque to the Collector of Monies, CILES, Melbourne.

Some members of the administrative staff (1-r): Helen Willetts, Phillip Moore, Ernie Chen, Chris Preston, George Brightman, Susie Davies, Carolyn Spence and Brett Culloden.

The spiky echo-eater

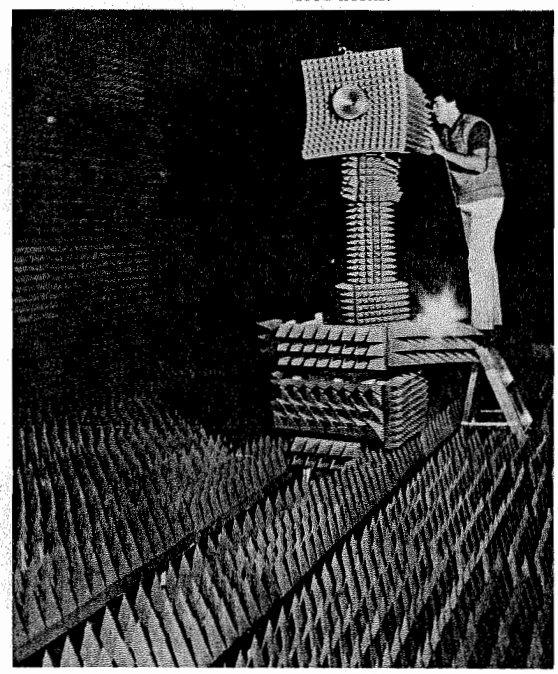
The blue, sharp-looking spikes give the Division's anechoic ('non-echoing') chamber a slightly dangerous look to the uninformed observer.

Touch the spikes, though, and they are revealed to be soft and pliable polystyrene foam.

This microwave-absorbent foam covers every surface in the chamber, to simulate the free-space conditions outside. The foam alone cost $60 000. The chamber has been specially designed for development work on scaled antenna models and the measurement of smaller antennas.

'The anechoic chamber gives us a more controlled environment with no reflections,' said senior technical officer Mr Bob Shields. It enables the many small changes needed for an antenna under development to be made quickly and easily.

The chamber is part of the Division's antenna measurement facilities operated by the Antenna Techniques Group at the Division's head office site at Epping. There are also two outside antenna ranges, one 30m and the other 240m in length. The 30m outdoor range is particularly useful for testing the large low-frequency AT feed horns.



Stephen Skinner setting up to test a corrugated feed horn in the anechoic chamber.

CAD makes big difference

Computer Aided Design (CAD) is undoubtedly a fast and efficient method for designing items ranging from tiny printed circuits to whole buildings.

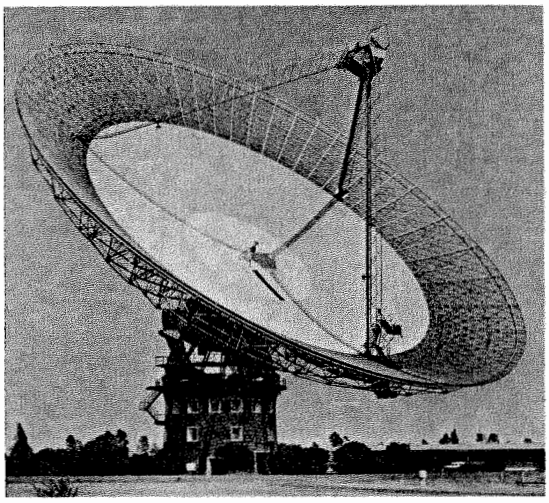
These are just some of the uses the Division's engineering services section has found for its Intergraph CAD system, which greatly reduces the time taken to perform repetitive drafting tasks.

Management of the system is one of the responsibilities of Dr Warwick Wilson, who leads a team working on digitizers and correlators for the AT. This team uses the Intergraph for printed circuit design.

Keith Corkery heads a five-person team in the drawing office which makes extensive use of CAD. He said it has made a big difference to the office capabilities, as it eliminates the need for redrawing repetitive items.

The system consists of two workstations, each with a full colour graphic display screen on which 63 drawing levels can be shown and overlaid. This means that, for example, the various components of a building (eg. floor, ceiling, air conditioning system, computer facilities), or a multi-layered printed circuit board may be laid out in different colours, showing how they all fit together. Three dimensional images may also be generated.

Using a hand-held cursor, as well as the more familiar computer keyboard, the designer can move elements of the plan around for the optimum effect.



The Parkes Radiotelescope

New techniques cut cost of Australia Telescope

Two novel techniques developed at the Division as part of the AT project have saved many thousands of dollars and simplified the manufacture of crucial components — the dish panels and the feed horns.

The Division already had considerable experience in the manufacture of accurate panels, having upgraded the 64m diameter Parkes radio telescope to provide for operation at wavelengths more than five times shorter than its original specificiation. However, the AT specifications called for a standard of accuracy not previously attempted in Australia.

The reflector surface of each AT antenna is made up of six rings of panels, each differently shaped. The usual method of construction would have required six individually machined moulds. The cost? At least $60 000 per mould.

In the event the panel development team of Don Yabsley and Barry Parsons, helped by consulting engineers Macdonald Wagner Pty Ltd, developed a new process which avoided the need for expensive, accurately machined moulds.

This remarkable achievement was made possible by a strange new piece of equipment which looks rather like a bed of thick blunt nails. In fact the bed consists of threaded steel rods, each capped by a tiltable pad, set out in a grid above a level base and covering an area somewhat greater than the largest of the reflector panels (about 2m x 2m). Using dial gauges, a straight edge and the inevitable computer printout, it takes about two days to set the bed to the profiles of any particular panel. It is then used as a mould on which the panel is assembled.

The panel surface is backed by a frame assembled from extruded aluminium ribs. These are formed on a stretch-bending machine built in the Division's workshop. It takes less than five minutes to bend each of the ribs, and the machine incorporates an adjustable form which can be set to suit any of the required rib profiles.

With these simple techniques the perforated panels were well within the specified tolerance of surface accuracy (0.25mm) but panels made with solid sheets were generally outside the 0.15mm limit wanted for the inner region of each antenna.

Then in the classic scientific tradition, Barry Parsons had a brainwave in the shower one morning. An old vacuum fan from the cloud physics research program was brought back into service to reduce the air pressure in the enclosed space below the surface sheet. This provided a near-perfect method of holding the surface sheet to the required profiles until the epoxy adhesive had cured completely.

This new system has sparked interest among manufacturers and at least two — Johns Perry and Evans Deakin — are now using it.

The other important telescope engineering breakthrough which has saved the AT project a considerable sum of money is the design and building of odd-looking devices called feed horns for the new telescope's Cassegrain antennas.

The cone-shaped horn will funnel the energy it receives from the subreflector into a relatively small diameter pipe, which will pass the signal to the low noise receiver for amplification.

In 1965 the Division originated the concept of using internal corrugations in feed horns during a research program aimed at improving the feeding of the Parkes dish. Dr Bruce Thomas, along with Mr Harry Minnett (a former Chief) played a pioneering role in the development of this horn. Corrugated horns are now used universally for satellite communications (where both transmission and reception take place in the one horn) as well as for radio astronomy.

Each AT antenna will require four feed horns — the largest about two metres long with an opening of one metre in diameter. A feed horn of this size and weight would be extremely difficult to machine or cast in the usual way and would be very costly.

The solution to this problem is another tribute to the ingenuity of the scientists and engineers at Radiophysics.

The key was in the use of ordinary roof insulating foam and the concept of forming the corrugations from separate aluminium bands and annular rings. Mr Vince Harrigan used a foam mandrel to define the internal profile of the horn and then assembled the bands and rings alternately with the insulating foam sheet as a spacer. After the outside of the structure is coated with fibreglass to tie all the components together, the mandrel and polystyrene disks are removed.

The weight of the finished product is a fraction of the weight of a machined horn, and at $5000 is approximately one-tenth the cost.

The feed horns are being built in the Division's workshop and tested using the anechoic chamber and outdoor test range.

Parkes: 25th anniversary coming up

The 'grand old lady' of Australian radio astronomy, the Parkes telescope, turns 25 in October this year.

While that is a venerable age in radio astronomy terms, the telescope has been given a new lease of life which will ensure its usefulness for many more years.

Participation in the Giotto and Voyager missions meant a substantial upgrading of the telescope, with the European Space Agency investing about half a million dollars on new components.

The cost to the Division was in personnel and in observing time lost. There was a three-year disruption to radio astronomy at the telescope.

The Division was under contract to ESA to track the Giotto probe on its mission to Halley's Comet since the launch of the spacecraft in July last year. Parkes director Dr Jon Ables said for six months prior to that the telescope had been 'taken apart' for upgrading. The regular radio astronomy program is now returning to normal.

For the Voyager mission, NASA had installed the microwave link to its telescope at Tidbinbilla near Canberra. This link will remain for at least 10 years, and the extra power it gives will be available to astronomers at certain times of the year.

The agreement to receive Voyager's images of the planet Uranus for NASA earlier this year was part of the long-standing Australia/US science agreement administered in this country by the Department of Science. The Parkes telescope has been used for other NASA missions in the past — notably for reception of Apollo 11's TV pictures of the first moon landing, and the emergency contact after the accident on Apollo 13.

The telescope is different in a number of ways from the instrument officially opened on 31 October 1961 by the Governor-General of the time, Viscount De L'Isle.

It was originally designed in England, with galvanised iron wire panels able to receive wavelengths of 10cm and over.

Since then, as the result of a series of upgrades, designed and executed by Divisional staff, since the early 1970s, the telescope now has a solid aluminium central hub (which can gather wavelengths of 7mm and over) and perforated aluminium panels extending 44 metres from the centre (for 1.3cm wavelengths and over).

The new panels, and the major component upgrade last year, have equipped Parkes to become part of the Australia Telescope project.

Although it will form part of the AT's long baseline, the telescope will still operate as a separate entity for certain projects. Dr Ables said in the study of pulsars, for example, the broad view of the sky provided by the Parkes telescope was more appropriate than the fine resolution provided by the AT.

Although it was originally envisaged that the telescope would be linked by microwave to Siding Spring and Culgoora, the link will now be in the form of data recorded at Parkes and sent to a central processing centre (which may be at either Culgoora or Epping). The data tapes will be fed into powerful correlators for processing with data provided by the other telescopes.

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The Parkes telescope is operated as a national facility and visiting astronomers from around Australia and the world are invited to observe there. The University of New South Wales, the Australian National University, the University of Wollongong and the University of Tasmania are particularly heavy users of observing time at Parkes. User time is regulated by the Parkes Time Allocation Committee (PTAC) comprising five astronomers. astronomers.

About 24 people work on site, including those at the small accommodation complex maintained for visiting astronomers.

A thriving visitors' centre is also located at the telescope and is administered by the Science Communication Unit.

Alan Wright and Lyn Newton at the work station of the Parkes Radiotelescope.

Tech Talk

An occasional column by CSIRO technical staff. Readers are invited to contribute.

The interface from a digital computer to "real world" sensors often costs more than the computer. Roger Davis of the Division of Tropical Crops and Pastures has developed a low cost digital voltmeter (DVM) and solid state 12 channel scanner. The computer interface and power supply are fully isolated from the analog circuits thus reducing common mode errors and eliminating ground loops involving the digital computer. The system has a number of options: the choice of 1, 2, 3 or 4 pole scanning, 2V, 200mV or 20mV range, a precision constant - current source, LCD display and lightning protection of both the analog and digital interface. The system is ideal for situations that require a number of sensors which can use the same DVM range and mode, located up to 100m from the central controller. The RS232 compatible interface allows it to be used with a variety of computers. The 20 mV range provides 1 microbolt resolution.

Further information contact Roger Davis, Division of Tropical Crops and Pastures, 306 Carmody Road, St Lucia QLD 4067.

Of Equal Concern

What is a management plan? Put very simply, an EEO Management Plan is a structured program of action to enable disadvantaged groups and individuals to participate to the full extent of their capabilities in pursuing a career in CSIRO.

The plan aims to ensure that all personnel activities will be conducted so as to ensure that for each vacancy in the Organization people with equal probability for job success have an equal probability of being hired for or promoted to the position.

The key objectives are:

- to demonstrate to the Government and to staff within CSIRO that the Executive is fully committed to integrating EEO responsiblities into the management structure; (For example, annual EEO audits will be required of all locations including a five-year strategy to increase target group representation at all levels.)
- to ensure that line management is in possession of relevant information to effect change, where required, to CSIRO's existing structures and staff behaviors.

The overall thrust of the management plan, in line with Government thinking, is to reject the so called 'deficit model' of disadvantage whereby it is held that all problems emanate from shortfalls in the disadvantaged groups themselves. The deficit model focuses solely on remediation and thus takes attention away from aspects of the system (recruitment, promotion etc) which may be at fault and which may exclude large sections of the population.

An example: many women are forced to resign because of inadequate child-minding facilities, particularly for the under twos or because of a desire to be engaged in full-time child rearing. One strategy in the plan, aimed at enabling the Organization to recapture the skills and abilities of these women, is that in future any parent who resigns to pursue full-time parenting will be accorded 'internal applicant' status and have access to all positions advertised in the staff circular.

In summary, the EEO Management Plan:

- proposes strategies that are consistent with Federal Government policies in matters of equity;
- proposes strategies that would place this Organisation in the forefront of introducing management policies that tap all available human resources and potential, both inside and outside the Organization;
- proposes strategies that make EEO a line management responsibility by putting forward the proposition that those people charged with managing and supervising at every level must be responsible for their own actions and their subordinates' actions. The basic premise is that those managers who are not part of the solution are, by definition, parts of the problem.

Copies of the plan will be available in all libraries. If you have any queries please don't hesitate to contact me.

Carmel Macpherson
EEO Officer

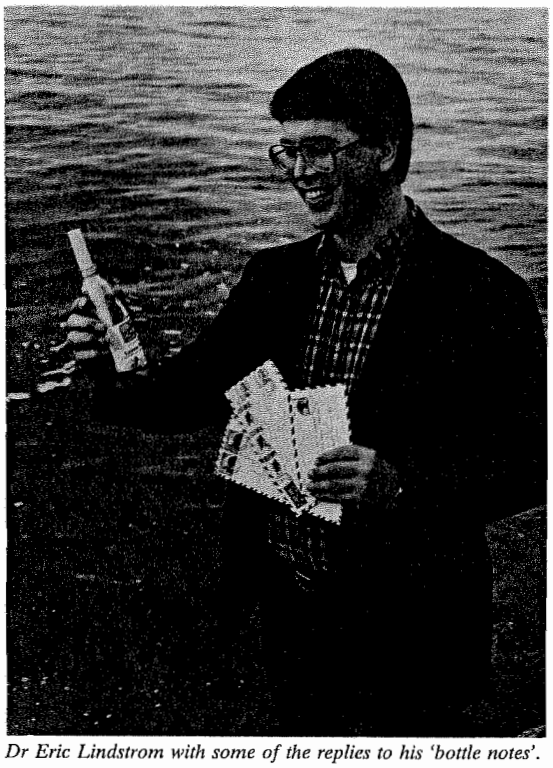
Soft drink bottles provide 'a bit of extra data'

Countless visions are conjured up by thoughts of messages in bottles drifting in the ocean and washing up on far-flung shores. For oceanographers, however, it is a more serious business than one would imagine, especially considering the number of times these bottles are the subject of jokes.

What began as a 'fun exercise' for Dr Eric Lindstrom of CSIRO's Division of Oceanography in Hobart during a research program at the Equator early this year is proving beneficial for studies of ocean currents. While he was on the oceanographic research vessel 'Franklin', taking part in a joint Australian-American ocean circulation study, Dr Lindstrom gathered 25 empty softdrink bottles from his companions and placed in them slips of paper which finders were asked to return to him in Hobart. He offered a $2 reward for information of where the bottle was found and the date of discovery.

The bottles were released between the Truk Islands and the Coral Sea, in the Solomon Sea and in the Bismarck Sea. Replies now are coming in - including one from a plantation boss on a cocoa/coconut plantation redevelopment who also is seeking a penpal!

Bottles have been found on the east coast of New Ireland, having travelled about 250 miles, on the west coast of New Ireland and in the Western Province of Solomon Island.



Dr Eric Lindstrom with some of the replies to his 'bottle notes'.

This principle of tracking ocean movements has been used since the 16th century, the modern form involving the use of drift cards.

"The soda bottle exercise is a no-cost, fun venture that also provides a bit of extra data - all of which proves useful for scientists trying to unravel the mysteries of ocean circulation", said Dr Lindstrom.

Although he is pleased with response to his project, Dr Lindstrom says it is not likely to be as successful as his first venture in this field. "I had 100 per cent return rate from a similar operation in the Atlantic in 1978... I only released one bottle and it was found six months later nearly 1500 miles from where it entered the water"! said Dr Lindstrom.

###

International award for CSIRO video

The CSIRO 'Women In Science' video won a 'Silver Reel' award at the International Television Association's 18th Annual Video Festival held in Dallas, Texas, in April.

The video had already received recognition in Australia when the International Television Society of Australia awarded it a 'Silver Mobie' last December. All the Australian winners were entered in the Dallas festival but 'Women In Science' was the only Australian entry to win an award.

The video was produced by the Film and Video Centre in collaboration with Ross Kingsland of the Science Communication Unit and the Women's Bureau of the Department of Employment and Industrial Relations.

Malacological visitor

An expert on molluscs from Harvard University in the United States, Dr Ruth Turner, visited the Division of Chemical and Wood Technology during her stay in Australia in March.

Professor Turner is Professor of Biology at Harvard, and Curator in Malacology at the Museum of Comparative Zoology which is also at Harvard.

While in Melbourne, she gave a lecture on 'marine borers and their relationship to microbiological research' at the CSIRO site at Highett and had discussions with Laurie Cookson and John Barnacle about their work with crustacean and molluscan wood borers.

Letters to the editor

Cont. from p.2

Dear Editor,

H.W.M. Lunney (*CoResearch* letters, May 86) may be assured that the Phytotron fire was caused by a faulty fluorescent light ballast. There have been two independent investigations, one by the Chief Safety Officer of the ACT Electricity Authority and one by the police arson squad, both of which reached the same conclusion. The fire risk was enhanced in this instance because the light fittings are attached directly to a very inflammable caneite ceiling. This ceiling will be replaced in the near future. However, the Phytotron's electricians confirm that there is a risk from 25 year old electrical fittings and applicances, mainly from perished rubber insulation. They recommend that such equipment be inspected by a qualified person and replaced or repaired as necessary.

Iain A Dawson
Phytotron biologist

Communication plans endorsed

The Executive has endorsed a three–year action plan designed to enhance CSIRO's information and communication efforts. The plan involves a major restructuring of the Bureau of Information and Public Communication.

Under the plan proposed by the Director of Information and Public Communication, Mr Peter Dunstan, from July 1 this year CILES will be split into two units, two new units will be set up and the Science Communication Unit will become the Public Communication Unit.

At its May 8 meeting in Adelaide, the Executive said the financial implications of the plan would be considered in the total budget context.

The plan contains a number of new initiatives, including the development of a corporate identity package, the establishment of Science Education Centres in Hobart, Sydney and Brisbane and of CSIRO centres in capital cities, and the development of a communication program to reach community leaders.

Mr Dunstan said the plan aimed to 'advance and improve the information and communication objectives and activities of the Organization.' CILES and the Science Communication Unit will be replaced by five Units each headed by a manager responsible to the Director.

These Units will be:

- An Information Resources Unit with responsibility for CSIRO's library and bibliographic services, data base development, enquiry and referral and related information services.
- An Editorial and Publishing Unit responsible for the editorial, printing and publishing services, and translation services.
- A Public Communication Unit responsible for planning, organising, directing and evaluating the corporate public communication program, and for providing services and advice to the Institutes and Divisions on their communication policies. This Unit will include the Media Group, public publications, film and video production, exhibitions and community relations programs.
- A Public Affairs Unit with responsibility for the management of public issues and current affairs by monitoring political, economic and social trends, ensuring CSIRO corporate external policies in the areas of public interest and in developing an effective briefing service.
- An Internal Communication Network responsible for developing a structured communication network, ensuring policies for effective communication procedures for handling external enquiries, and effective marketing of information and publications.

Mr Dunstan said the plan aimed to 'ensure the most professional science and technology information service in Australia and the most effective public communication at both corporate and Divisional levels.'

'It is important to realise that while the Bureau is responsible for corporate communication, the plan recognises the crucial role that Divisions play in the communication of their work,' he said.

'I hope the Bureau will be able to facilitate the communication efforts of the Divisions and provide advice and resources as and when required.'

'Particular emphasis is to be given to internal communication and to structured communication with targeted groups. A more pro-active media approach, a wider use of public platforms, an increased use of the electronic media, as well as a program to communicate with specified community leaders are important factors in meeting the objectives of the plan.'

Mr Dunstan said he was 'very encouraged' by staff responses to the plan.

Down-to-earth space science on show

About 150 people from industry, government and education bodies attended a recent public seminar in Hobart on 'applications of space science to down-to-earth problems'.

The seminar was held at the Marine Laboratories and organised by the Tasmanian State Committee of CSIRO.

State Committee chairman, Professor Peter Scott (who also chaired the seminar), declared the event 'an outstanding success', as it bought together a wide range of professional people with a direct interest in the role of satellites in Australia's development and highlighted the potential for Australia to develop its own space industry. The Committee also was particularly pleased with the attendance of about 50 senior secondary school students.

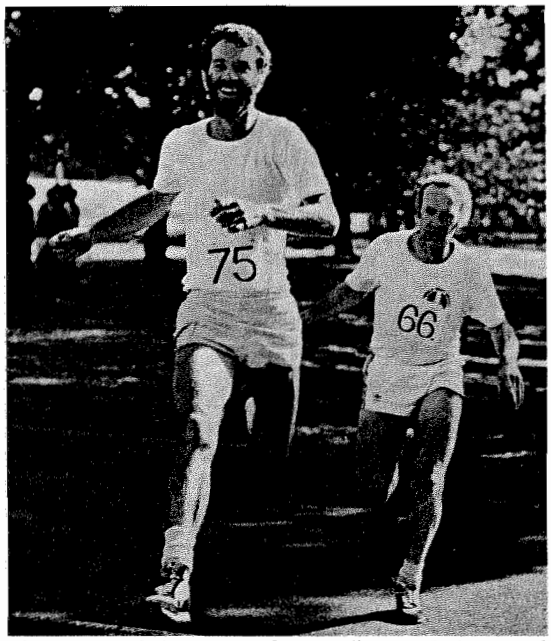
In his opening address, State Premier Mr Robin Gray drew attention to some of the benefits now available to everyone as a result of space science and technology, and the continuing need for Australia to seek solutions to its problems through its own research.

The Premier went on to say the seminar was evidence that the State Committee had 'a valuable grassroots contact with the community which can only help scientists and the public alike'.

COSSA Director, Dr Ken McCracken, spoke on the aerospace industry in Australia and the contribution made to it by CSIRO. He listed contracts already won by Australian companies and the thrust of current developments in civilian space science and technology, but warned that local industry had to be further nurtured. The space industry is a source of state-of-the -art technology that spins off into other industries, he said. 'Without a local space industry, this technology will come to Australia third-hand and place our manufacturing industry at a severe disadvantage.'

Other speakers included Dr Michael Wagg of AUSSAT, who spoke on the planning now under way for AUSSAT's second generation, and Dr Graham Harris from the Marine Laboratories who spoke about remote sensing of ocean resources.

It's Cup time again!



The agony and the ecstasy. Garry Miller, of Environmental Mechanics (left), and Bill Dominguez, of Headquarters, fight it out for 62nd and 63rd places in a recent Black Mountain Cup.

The CSIRO athletic event of the year — the annual Black Mountain Cup Fun Run in Canberra — will be held this year on Friday, 18 July.

This is the 10th year for the Black Mountain Cup, which is run over a rugged 5·6km course on the slopes of Black Mountain.

Runners this year will be hard pressed to match last year's performance, in which Plant Industry's Peter Berney shattered the previous course record with a time of 18 min 8·77 sec. Berney's performance helped the Plant Industry team take out the coveted Cup again in record time (aggreate for four runners) of 1 hr 25 min 27·2 sec.

Early Black Mountain Cups were dominated by Entomology, but their grip on the Cup was first broken in 1981 by Plant Industry. Since then, Water and Land Resources has also won the team event.

Organisers are hoping for a record field for this year's Cup, including several teams from Sydney — and Melbourne — based Divisions.

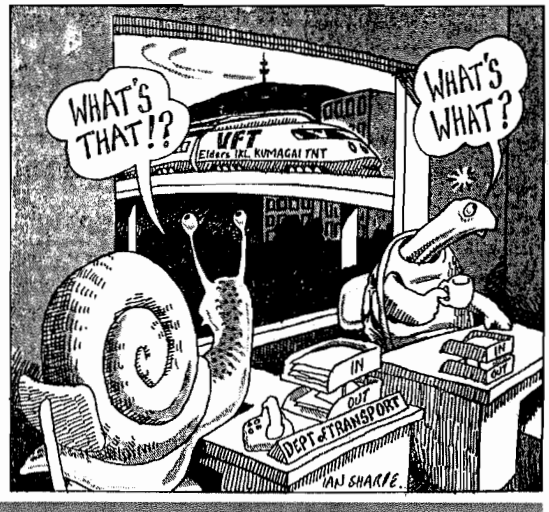
The event, which starts at the Division of Environmental Mechanics' Pye Laboratory (Black Mountain) at 12.30pm, is sponsored by the Laboratories Co-operative Ltd. For information and entries, call Gregory Heath (062) 46-5692 or Colin Hazelton (062) 46-5891.

Very Fast Train warms up

The Very Fast Train proposal entered a new phase last month with the formation of a private-sector joint venture to fund a pre-feasibility study. The project, which involves the construction of a high speed railway between Sydney, Canberra and Melbourne, was conceived by Dr Paul Wild in 1984 when he was Chairman of CSIRO.

The participants in the joint venture are Elders IXL, Kumagai and TNT. The pre-feasibility study will take about 12 months and if the viability of the project is confirmed the next step would be a detailed feasibility study.

This is how cartoonist Ian Sharpe saw the project. Cartoon courtesy of The Canberra Times.



CoResearch

CSIRO's staff newspaper

No. 293 July '86

ASTEC report decisions

Appointments to new Board expected before end of year

CSIRO should have a new corporate-style Board by the end of the year following the Federal Government's decision last month on the Australian Science and Technology Council's (ASTEC) report.

The Organization will continue as a single entity and its primary role will remain applications-oriented research in support of major industry sectors and selected areas of community interest. The position of Chairman will be renamed the Chief Executive.

Under the decision announced by the Minister for Science, Mr Jones, the present Executive will be replaced by a new Board with a part-time non-executive Chairman and six to eight part-time members appointed for their personal abilities rather than as representatives of sectoral interests.

The Chief Executive will be appointed by the Government and will be the only full-time member of the Board and the only CSIRO member.

The Government expects the legislation establishing the Board to be passed in the Budget session of Parliament and the appointments to be made before the end of the year.

The appointments of the Chairman, Dr Boardman, and the part-time members of the Executive have been extended until the appointments to the new Board are made.

In a move designed to further boost links with industry, the Organization will be allowed to retain income from outside sources without any decrease in its Budget allocation.

However, Mr Jones said while CSIRO would place more emphasis on the application of its research, it was important that 'its ability to contribute to future industrial development is not inhibited by excessive attention to the short-term needs of existing industries'.

The Chairman, Dr Boardman, welcomed the Government's decision.

He said the endorsement of ASTEC's key recommendations would allow CSIRO to build on initiatives it had already taken to improve management of research and its application by industry and other users.

'The Government's decisions will give CSIRO greater management flexibility and, at the same time, a level of financial stability that is essential to a research organisation,' he said.

Dr Boardman particularly welcomed the endorsement of revenue retention, a voluntary early retirement scheme and a Government-appointed Chief Executive.

Cabinet rejected a key recommendation which would have given the Board the power to hire and fire the Chief Executive.

Dr Boardman said the voluntary early retirement scheme for professional staff would give the Organization the flexibility to respond more quickly to new opportunities and needs, while not penalising staff who had contributed to CSIRO's work over many years.

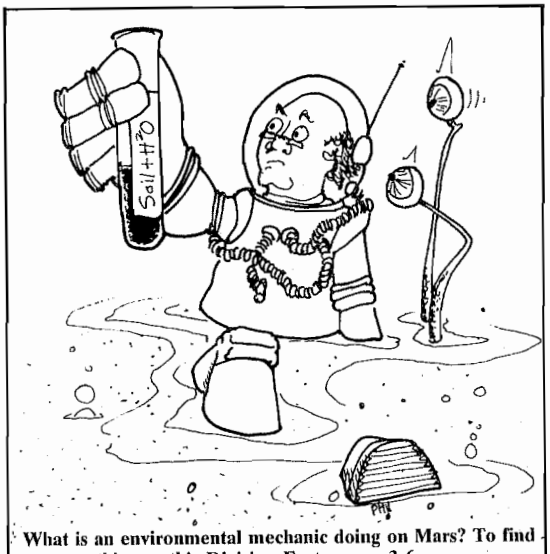
Mr Jones said that although the Advisory Council and State and Territory Committees had provided 'valuable advice and direction', it was clear the structure was not ideal.

The council and committees would be scrapped and the incoming Board required to set up 'appropriate non-statutory advisory mechanisms linking CSIRO with Parliament, industry and the community.'

The consultative council would be retained to provide 'an effective forum for the representation of staff views.'

A number of important ASTEC recommendations, including links with the Public Service board on staffing, fixed-term appointments for professional staff, and property rights to inventions, will be referred to the incoming Board for examination.

The Government has agreed in principle to a number of other recommendations and these will be implemented after examination by the Board. These include recommendations on contract research for industry, the future of SIROTECH Limited, and encouragement of short-term exchanges of staff with other organizations.



What is an environmental mechanic doing on Mars? To find out, see this month's Division Feature, pp.3-6.

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Artist in residence at Marine Labs

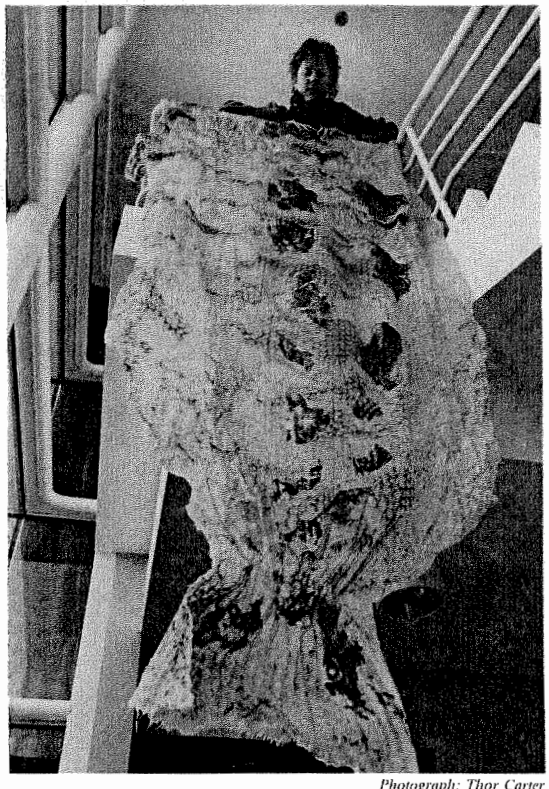
CSIRO's first artist-in-residence, Ms Ruth Gall-Bucher, is finding her four-month stint with the Marine Laboratories in Hobart 'very interesting and challenging'.

The residency is funded by CSIRO and the Visual Arts Board of the Australia Council and is aimed at encouraging the production of new works of art that represent aspects of marine science.

Ms Gall-Bucher, who has worked for the past three years at the Hobart Technical College, said it offered the opportunity to deal with different subjects. Ms Gall-Bucher taught fashion design drawing and fashion history at the technical college.

She has worked in a range of mediums including wood, fibreglass, drawing, painting, and black and white photography.

Ms Gall-Bucher has a masters of Fine Art from the Tasmanian School of Art and was a member of an artists' contingent which travelled to New Zealand in 1985 to participate in Anzart — a biennial exchange of Australian and New Zealand artists. Her work has been exhibited in Auckland, Melbourne and Tasmania.



Photograph: Thor Carter

Ms Gall-Bucher with her three-metre 'sea creation'. The creation is made from muslin gauze impregnated with latex.

###

60th anniversary CoResearch

The August edition of *CoResearch* will feature articles about the Organization's 60th anniversary.

Staff contributions to the anniversary issue would be welcomed. Please send any interesting or humourous anecdotes about CSIRO past and present to Liz Burden, PO Box 225, Dickson, ACT 2602.

Preference will be given to short items.

From the Chairman

A column by Dr Keith Boardman

Cabinet consideration of the ASTEC report on CSIRO finally took place on 24 June, which almost coincided with the 60th anniversary of the establishment of CSIR. I believe CSIRO can be pleased with the overall which can be seen as providing strong Government support for the Organization. There is a clear message, however, that CSIRO should further strengthen its links with industry and other users in order to achieve a more effective transfer of research results for the nation's benefit.

In announcing the Government decisions, the Minister for Science, Mr Barry Jones, said that 'while CSIRO will place more emphasis on the application of its research, it is important that its ability to contribute to further industrial development is not inhibited by excessive attention to short-term needs of existing industries. CSIRO must maintain a balance in its activities, with a major emphasis on strategic research and should ensure that its science remains at the forefront of world developments.'

I warmly applaud this statement, which is in line with the message I have conveyed to staff on my individual visits that all Divisions must maintain an appopriate balance between shorter-term and longer-term projects, and between strategic and tactical work. work.

The recent announcement by the Division of Animal Production of the successful transplanting of a gene for sheep growth hormone at the single-cell embryo stage is a good example of the potential benefits to the nation of CSIRO scientists remaining at the very forefront of science and technology areas relevant to our main objectives.

In a most significant decision, the Government agreed with ASTEC that CSIRO should be able to retain its earnings from outside sources without this leading to a decrease in appropriation, although it must be recognised that the level of our funds will continue to be determined in the annual budget context. However, the decision will strengthen our position in negotiations with the Department of Finance on revenue retention and provide a major incentive for Divisions to actively seek support from industry.

ASTEC did not explicitly address Government direction of CSIRO, but consistent with a recent Government paper on statutory authorities the Government decided that the Minister for Science will be able to issue general guidelines to CSIRO from time to time, setting out policies and priorities which the Government wishes CSIRO to support through its actions. I believe that the issuing of general guidelines by the Government should remove uncertainties as to the Government's broad intentions for CSIRO, and assist the Organization in determining its priorities.

I am pleased that the Government has rejected the ASTEC recommendation that the new CSIRO Board should have the power to hire and fire the Chief Executive; and decided that the Chief Executive should be appointed by the Governor-General on the recommendation of Cabinet.

Effective partnership

I am disappointed, however, that the Government accepted the ASTEC recommendation that there should be only one full-time CSIRO member of the Board. An additional member, namely a Deputy Chief Executive, would have ensured a more effective partnership between the Organization's management and the Board.

I am sure that staff will be relieved that the uncertainties of the past twelve months as to the future of CSIRO are over.

The type of research carried out by CSIRO is more important than ever before to the nation's future competitiveness and well-being, and I sincerely hope that the Organization can now look forward to the stability essential to the longer-term planning and performance of research and its development.

The staff of the Organization is its most valuable resource, and I ask for your full co-operation in charting the future directions of our work and carrying out research of the highest quality and relevance to Australia.

M Keith Boardman

Salmonella to be taken to Stanford

When Dr Trilochan Mukker leaves for the United States in September he will carry an unusual Australian export — strains of Salmonella bacteria.

Dr Mukker of the Division of Animal Health in Sydney is taking the Salmonella strains to Stanford University, California, where the bacteria will be used in research into a vaccine against Salmonella infection.

Salmonella bacteria cause gastro enteritis in animals and people and is a problem particularly for the live sheep export trade and for farmers with large calf-rearing units.

Dr Mukker was awarded a grant under the US-Australia Bilateral Science and Technology Agreement to go to Stanford University for three months to take part in the collaborative research project.

The scientists hope to use the Australian strains to develop mutant forms of the bacteria. Trials have shown that the mutant forms when used as the basis of a vaccine will not cause illness, but will create immunity to naturally occurring Salmonella bacteria.

Dr Mukker said mutants of two strains had shown excellent results in trials on sheep carried out at the Division. The Australian bacteria would be used to develop mutant forms of four other strains.

He said he would be bringing the mutant forms developed in the US back to Australia for further experimental trials.

###

Seafood specialist wins merit award

The head of the Seafood Technology Section of the Division of Fisheries Research, Dr. June Olley, recently won the annual award of merit of the Australian Institute of Food Science and Technology.

Dr. Olley's work includes mathematical modelling of spoilage and programs with developing countries. She is a consultant to the Australian Council of International Agricultural Research.

The award, presented at the institute's annual conference in Brisbane, is the top award of the Institute of Food Science and Technology.

Health matters

The CSIRO Health and Safety Committee has a new chairman following the retirement of Dr Ken Ferguson in April. Dr Alan Donald, Director of the Institute of Animal and Food Sciences, will now head the committee and will chair his first meeting in July. Matters to be discussed include:

* occupational overuse injuries (draft policy);
* hearing conservation;
* OHS assessment of research projects;
* remote working and field work safety.

Two-year follow up review

It is now just over two years since a review committee headed by former Executive member Professor David Craig recommended wide ranging changes to occupational health and safety arrangements within the Organization.

The OHS Unit, set up as a result of the review is currently collecting detailed information to determine the extent to which the Executive's decisions on the review have been implemented.

OHS Unit visitor

Ms Maureen Clarke, an officer of the Department of Health, is currently attached to the OHS Unit for three months as part of the Public Service Board's management development scheme.

Maureen's background in the nursing and welfare area will be of great value to the Unit as she is assisting Dr John Graham in the development of new proposals in the rehabilitation area.

Audit package completed

Mr George Halley, a principal of M&M Protection Consultants has submitted his report following a consultancy to develop an occupational health and safety audit system tailored to CSIRO's needs.

The Divisions of Molecular Biology, Animal Production and Textile Physics in Sydney participated in the development of the modular audit system and in the process gained an insight into the way in which health and safety is management in the private sector.

Following analysis of the package by the OHS Unit, it is expected that the audit system will be issued for use by all divisions for internal assessment of day-to-day OHS performance.

Have you had a shot recently?

A small but steady number of Australians contract tetanus each year and of these up to one half will die. The causative organism is anaerobic and thrives in wounds contaminated by soil or road dust containing the spores.

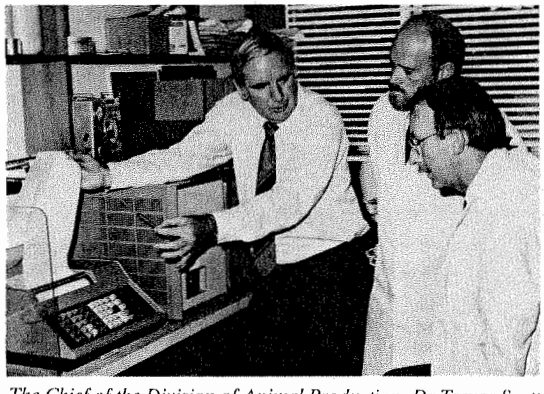
All staff and their families should be protected by vaccination, and booster shots at regular intervals are necesary to maximise immunity. Vaccination needs to be repeated at least 10 yearly after full basic immunization.

If your work brings you into contact with animals, field work, plant material or other biological materials, you are at increased risk. Divisions are expected to provide vaccination in these circumstances and Commonwealth medical officers will carry out vaccination of groups at risk at minimum cost to the Organization.

How long is it since you had your last tetanus booster?

Gary Knobel

Political flavour to AP visit



The Chief of the Division of Animal Production, Dr Trevor Scott, left, with the Member for Lindsay, Mr Ross Free, centre, and the Member for Chifley, Mr Roger Price, during a visit to the Ian Clunies Ross Animal Research Laboratory, Prospect, NSW. Dr Scott is explaining some research results on modifying the flavour of sheep meat. Mr Free and Mr Price visited the laboratory as part of the CSIRO Officer's Association science awareness program.

Division Feature *Environmental Mechanics*

Division shows that small is beautiful

With a total staff of 29, Environmental Mechanics is the smallest Division in CSIRO, and perhaps the most unusual.

Set up in 1971 around a core of personnel from the agricultural physics section of the Division of Plant Industry, Environmental Mechanics established from the outset a distinctive character based on a multi-disciplinary staff, small size, and an efficient approach to tackling physical problems in the natural environment.

The Division's formal objectives are to investigate the exchange and transport of energy and matter in the environment, with special reference to plants, soils, and the lower layers of the atmosphere. Applications of the research are in agriculture, ecology, hydrology, meteorology, and industrial processes.

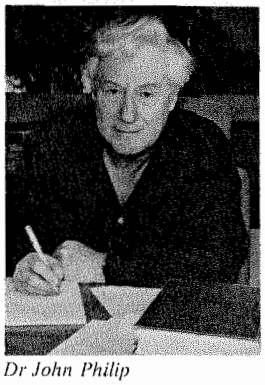
'In tackling these problems,' Dr John Philip, Chief of the Division, points out, 'we have considerable strength in a range of scientific fields, including fluid mechanics, applied mathematics, classical physics, physical chemistry and thermodynamics. This meld of disciplines, taken in combination with our general concern about applications, is unique, certainly in Australia. Our team is an extremely valuable resource to CSIRO and to Australian science.'

Does the Division's very small size adversely affect a research effort aimed at an apparently broad spectrum of problems? Is small really beautiful?

Dr Philip thinks so. 'Certainly it facilitates cohesion good internal communication, and the informal environment in which ideas prosper best. It renders unnecessary much of the bureaucratic procedures seemingly inescapable in large divisions.'

Small is also fragile, he quickly adds. 'The plain fact is that the total resource of the Division could disappear into one or two *ad hoc* projects of the type not unknown to CSIRO, with an aura of "relevance" and little real research, or even scientific, content.'

'Proper use of our small resource requires firmness of purpose to concentrate our resources,' Dr Philip says. 'We have, therefore, unashamedly sought to base our research efforts in the natural sciences, and to formulate the problems we tackle in ways that lead to application and insight at many levels in many fields.



Dr John Philip

'A case in point is our soil-water work. The primary application is to soils but when problems are posed in terms of the physics of flow in porous media, the results are potentially useful in a whole budget of scientific fields and technologies (23 in a recent count).'

Because many of the Division's research projects have this general character, its work is often misinterpreted as being 'basic'. The fact is that the work is directed to very practical goals, the concern to 'get the science right' making for economy and efficiency.

'We tend to be much stronger in mathematics and physics than is customary in laboratories doing research in our fields,' Dr Philip said. 'Undoubtedly this has led some to regard us as "basic", but "basic" and "applied" are subjective terms, conditioned by where one sits on the spectrum. Thus many physicists and mathematicians look on us as hopelessly "applied" and pretty much beyond the pale.'

'Most significant advances in our fields depend on the creative use of mathematics and physics, and the fact that the methods and concepts of these disciplines are readily accessible to us is a central element in our success.'

Indeed, the report of the committee which conducted the recent review of Environmental Mechanics emphasised the applied nature of its research: 'The work carried out in the Division lies almost entirely in the area of applied research and there is a wide range of potential users for the results of this work. The research is pertinent to the needs of Australian industry and contributes significantly to the search for an understanding of the Australian natural environment.'

Dr Philip is concerned about two recent trends in CSIRO: the annual budget reductions at the Divisional level and the push for more *ad hoc* projects in response to a simplistic perception of the needs of Australian manufacturing industry.

'We judge that at present we are operating at just over the critical mass for the mix of scientific research we pursue. This leaves us extremely vulnerable to the current annual call-in of positions and funds.'

The review report concurred. 'The number of scientific staff in the Division is at the lower limit of a scientific critical mass and consequently the Division is vulnerable to any call-in of resources. The number and type of scientific staff in the Division should be carefully monitored to ensure that the Division does not fall below the threshhold of scientific critical mass.'

As Dr Philip puts it, 'We are not interested in being much larger; but we should like to be better and to be less vulnerable.'

Division at a glance...

The staff. From left, front row: Tom Denmead, Alan Jackson, Colin Hazelton, Dick Lang. Second row: Greg Heath, Steve Zegelin, Nancy Topic, Will Steffen, Meryl Clarke, John Philip. Third row: Garry Miller, Chi-Hua Huang, Paul Katen, Phillip Ford, Ian White, John Finnigan. Back row: Russell Cornish, Ned Larsson, Mike Raupach, Ian Blair, John Knight, Barry Millar, Phil Broadbridge, Peter Coppin, Frank Bradley, Mike Sully, Keith Perroux.

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This feature is designed to present a cross section of activities at the Division of Environmental Mechanics. It is not intended as a directory to the Division's research.

Photos: Greg Heath

Pye Laboratory a fitting home

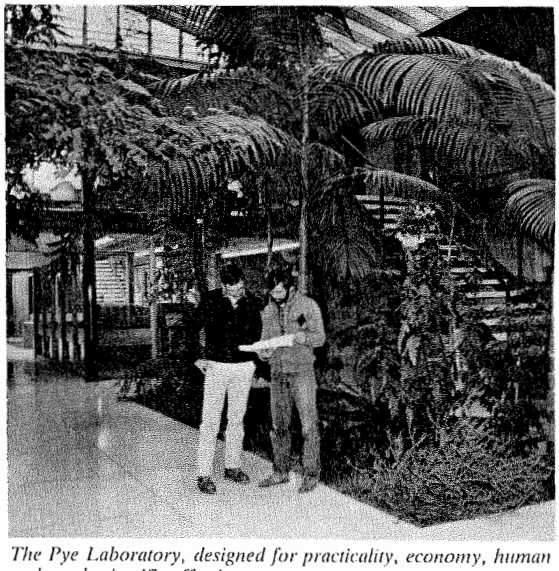
The Pye Laboratory, designed around a central courtyard that fosters communication and interaction between the building's occupants, is a fitting home for the Division of Environmental Mechanics.

Funded by a gift from Mr F C Pye, a well-known New South Wales pastoralist, the Pye Lab was built in 1966 to accommodate the agricultural physics section of the Division of Plant Industry. Its design, by Sydney architect Ken Woolley in close consultation with Dr John Philip, is notable for its practicality, economy, human scale, and scientific effectiveness.

Divisional status in 1971 brought with it administrative staff occupying scientific space and the need to accommodate all Divisional workshop, technical and support services, previously provided elsewhere in the Division of Plant Industry. By 1974 space was beginning to be a problem, and by 1982, when approval was granted for a 60 percent building extension, overcrowding of the laboratory was very serious indeed.

Mr Woolley was commissioned to design the extension, which conforms closely with the existing building. The new extension provides accommodation for the administration, a computer and data processing room, a properly equipped seminar room, a fluid mechanics laboratory, and extensions to the workshop and to the wind tunnel room.

On the upper level, more 'think boxes' will accommodate the present overflow of scientists, with a small margin to cater for visitors and expansion.



The Pye Laboratory, designed for practicality, economy, human scale and scientific effectiveness.

Wave mechanics helps hydrology

Australia's 'arid-zone' hydrology, in which water moves through mostly unsaturated soil, is quite distinct from the 'main stream' hydrology that evolved for the saturated soils of humid Europe and north-eastern America and requires different techniques for its study to aid water conservation and management.

The Division's Applied Mechanics and Soil Physics groups have contributed significantly to developing the theoretical and mathematical underpinning needed to understand and predict unsaturated water flow.

A recent major advance in predicting such flows was the discovery by Dr John Philip, in collaboration with Dr Trevor Waechter of the University of Melbourne, that the equation governing steady flow from small sources of water buried in soil is analogous to that describing the scattering of plane harmonic waves from solid objects.

Scattering is of considerable importance in electromagnetism, acoustics, and quantum mechanics. Thus, mathematical techniques and results developed in over 50 years' research in these areas are immediately available to arid zone hydrology.

'The analogue is a striking example of the economical approach to nature afforded by mathematical physics,' says Dr Philip. 'Beyond its aesthetic appeal, the analogue leads to saving of effort and to new hydrological insights.'

New insights into arid-zone hydrology have also come with recent work on the effect of buried holes on unsaturated soil-water flow.

Drs Philip and Waechter, along with Dr John Knight, leader of the Environmental Mechanics applied mechanics program, have embarked on studies analysing steady downward seepage in a uniform soil, interrupted at some level by a hole. They have calculated the build-up of water pressure at the walls of the hole and have determined the effect of the hole's geometry on its susceptibility to water penetration.

Dr Knight is enthusiastic about the potential applications. 'The work applies to caves, tunnels, and underground storage cavities, and the results thus lead to design criteria for most efficient prevention of seepage into tunnels and cavities in unsaturated zones.'

'One obvious engineering application is the optimal design of underground repositories for nuclear wastes in deep unsaturated seepage zones in arid areas,' Dr Knight says. These design principles are now being patented as a prelude to their commercial exploitation.

Fertilizers gone with the wind

In the relative comfort of one of the Division's mobile field laboratories, Alan Jackson and Tom Denmead monitor data from an experiment on ammonia loss from flooded rice fields.

Nitrogen fertilizers are important but expensive inputs to many agricultural crops and so findings that more than half of the applied nitrogen fertilizer can sometimes be lost to the atmosphere as gas are cause for concern.

'Not only do emissions of nitrogeneous gases to the atmosphere represent an immediate loss of nitrogen to agriculture,' said Dr Tom Denmead, leader of the Division's physical ecology group, 'but they can also have a large impact on the environment — through pollution of surface waters, in aerosol formation, photochemical smog, and in the earth's ozone balance.'

Studying atmospheric pathways in the terrestrial nitrogen cycle is part of the group's overall program to investigate the biophysics of the plant environment.

The group's research has concentrated both on the development of unequivocal, non-disturbing methods for direct measurement of the fluxes of nitrogeneous gases between soils, water bodies, plants and the atmosphere, and on the influence of the physical environment on the exchange processes.

Recent work, in collaboration with several other Divisions, has concentrated on the processes of ammonia loss in irrigation agriculture.

'Some very interesting problems occur,' says Dr Denmead. 'These are associated with the volatility of ammonia in solution and involve considerations of solution chemistry and the mechanics of gas transfer across air-water interfaces.'

Research is concentrating on ammonia losses from urea fertiliser applied to flooded rice fields, but Dr Denmead sees broader applications for the work. 'The research is of significance in other contexts — for example, the evaporation of volatile pesticides applied to water bodies and the exchange of carbon dioxide, methane and oxygen between shallow waters and the air.'

Highly skilled technical staff

Workshop Manager Colin Hazelton. Colin and other technical staff provide the highly skilled support needed for the Division's experimental programs.

Thermodynamics of the out-of-doors

Thirty years ago the processes that transfer matter such as water, carbon dioxide, nitrogeneous gases, and energy, such as heat, through the continuum of soil, vegetation and the lower atmosphere were not well understood.

Knowledge was fragmentary, with soil physicists concerned primarily with soil transport processes, plant physiologists concentrating on plants; and micrometeorologists focusing on atmospheric processes.

A unified investigation of transport processes in the environment is based on the insight that matter and energy move in response to gradients in thermodynamic potential. The movement of water and soil through plants to the atmosphere is thus a flow down a gradient of potential through a three-dimensional array of variable resistances.

The Division's scientists have played a leading role in developing this unified approach to understanding transport processes in the soil-plant-atmosphere system. The soil-plant-atmosphere continuum thus provides a natural framework into which the Division's programs fit. These are: Soil Physics, Physical Ecology, and Micrometeorology, with the fourth program, Applied Mechanics, providing theoretical support to the three experimental ones.

The boundaries of the programs, however, are blurred and leaky, and there is much communication and collaboration across them. The recent work described in this feature illustrates the Division's approach to investigating physical processes operating not only in the complicated soil-plant-atmosphere system but also in engineering and industrial contexts.

Weather inside a forest

Understanding the factors that influence forest productivity, the water yield of forested catchments, and forest microclimate requires knowledge of how wind moves through and interacts with a forest canopy.

The Division's most recent field experiment to test theories of vegetation/atmosphere interaction was conducted in a eucalypt forest at Moga on the Braidwood plateau east of Canberra.

'Scruffy' or 'scabby' is how the Moga forest is commonly described, according to Dr Mike Raupach, one of the experiment's organisers. Although rainfall is adequate, the soil is poor so the forest is open with a sparse canopy about 12 metres high. 'Because the site is flat and relatively open it is ideal for studying turbulence within a forest, and the way in which the turbulence transfers heat, water vapour and carbon dioxide between vegetation and the atmosphere above,' says Dr Raupach.

A particular aim of the study was to determine the nature of the large eddies, or gusts of wind, that dominate the process of transfer between vegetation and the atmosphere. Because of the intensive instrumentation needed to determine the turbulence structure, much information was also obtained on the forest's climate — rates of heat transfer, evaporation, and heat storage, for example.

Analysis of the data is just beginning, but already some significant results have surfaced. 'The large eddies have some unexpected properties within the canopy,' reports Dr Raupach. 'Much of the air movement deep within the forest seems to occur by a kind of remote control, in which the large gusts above the canopy generate pressure fields that push the air around.'

'Evaporation from the canopy was almost entirely controlled by the stomatal behaviour of the leaves and the humidity deficit in the air, and not by the canopy aerodynamics or the amount of radiation falling on the canopy.'

The Moga forest experiment brought together expertise from four divisions. Collaborating with the Division's micrometeorology group, led by Dr Frank Bradley, were scientists from the Divisions of Forest Research, Water and Land Resources, and Plant Industry.

Even France got into the act, with Dr Yves Brunet, a visiting scientist at Environmental Mechanics, flying the tricolour at the top of one of the towers.

Garry Miller, high above the Moga forest canopy, adjusts a sonic anemometer. Yves Brunet, just visible in the canopy at the bottom left of the photograph, is at the top of a 12 metre tower.

Disc is proving a big hit

Testing the disc permeameter under severe conditions — on a cracking clay soil at Lake Tandau near Broken Hill.

It is often a long way from a good idea to a practical device.

For Dr Ian White and his disc permeameter, the path to realization extends all the way from his chaotic office in Canberra's Pye Laboratory to a stony desert north of Broken Hill.

The disc permeameter is a new device designed to measure a soil's hydraulic properties, information needed for engineering and land management applications. While measurements of these properties are routine in the laboratory, their reliable determination in the field raises difficulties.

The Division's soil physics group, led by Dr White, had often encountered problems in field measurements on crusted soils, cracking and saline soils, stony soils and in the materials of mining dumps and storage heaps. In addition, most conventional techniques require the driving in of rings or the boring of holes. The measurement errors associated with these activities are largely unknown.

Obviously a technique involving minimal soil disturbance was desirable. The key to the solution lay in a 20-year-old analysis by the Division of steady flow from a disc-shaped source of water placed on the soil surface, supplemented by geometrical comparisons based on the scattering analogue. These, together with recent theoretical insights by Dr White and his colleagues, and advances in experimental techniques by Mr Keith Perroux and Dr Mike Sully, led to the evolution of the disc permeameter.

'The field trials on fine sand were very successful,' Dr White reports, 'but that is a rather well-behaved soil. The real test for the disc permeameter is measuring the properties of problem soils — cracking and swelling clays, stony soils, and saline soils.'

For that test, Dr White, along with Dr Sully, Environmental Mechanics's Mr Steve Zegelin, and a collaborator, Dr Mike Melville of the University of New South Wales, travelled to Fowler's Gap, about 100km north of Broken Hill. 'It was the ideal site, ' according to Dr White, 'as it had all the problem soils within a radius of five metres!'

The disc permeameter passed all the tests, although the time needed to make the measurements (two or three hours per site) was longer than the 15 minutes found around Canberra.

Dr White is excited by the device's potential. 'The disc permeameter is extremely suitable for land management studies, particularly those aimed at predicting erosion susceptibility or effects of various agricultural practices, and for examining mining dumps. It is simple and easy to use, and it gives all the soil properties needed in an engineering sense.'

'In a microcosm this work reflects Environmental Mechanic's approach to problems.The interaction between theory and experiment, and the transfer of research results through collaborative work, are all essential parts of our *modus operandi*.'

Disc permeameters and the theory of the technique have already been distributed to State departments of soil conservation and agriculture, universities, and other CSIRO Divisions.

'Criticism from within CSIRO that we're an aloof bunch of theoreticians really gets up my nose' was Dr White's parting remark.

Water exchange on Mars predicted

During 1976, in connection with the Viking mission to Mars, NASA sought the collaboration of world experts in terrestrial soil physics and micrometeorology.

Since then the Division of Environmental Mechanics has been involved in studies concerned with the diurnal and annual cycles of water exchange at the Martian surface and with the distribution of ice in the Martian regolith (soil).

The Division has contributed to a number of colloquia on Martian water, and has accepted an invitation from NASA to contribute to the final wrap-up meeting on the Viking lander water data, in Houston in September.

On Mars, surface temperatures are about 90 degrees celsius less than on Earth and the denisty of saturated water vapour is only about one sixthousandth that on Earth. It follows that latent heat fluxes are a trivial fraction of total energy fluxes on Mars; so that the linkage between the energy balance and the water balance is extremely weak, whereas at the temperatures here on Earth the linkage is very tight indeed.

The Division's work gives a prediction of the profile of ice content in the regolith and how it changes diurnally and annually.

The low Martian temperatures affect the atmosphere also, causing carbon dioxide to condense in the polar region in winter. The expansion of the polar 'ice' cap changes the moment of inertia of the planet and its speed of rotation.

Viking data

The Division's analysis of this process predicts a speed of up to 40 milliseconds for the southern winter, which corresponds to an apparent shift of a fixed marker on the equator of Mars of 10 metres. Analysis of the Viking telemetry data is in progress elsewhere to test this prediction.

Weather survey in Moga forest, Canberra

Division's upwardly mobile young man

'Good training' is how Environmental Mechanics micrometeorologist John Finnigan describes his frequent trips up instrument towers during field experiments.

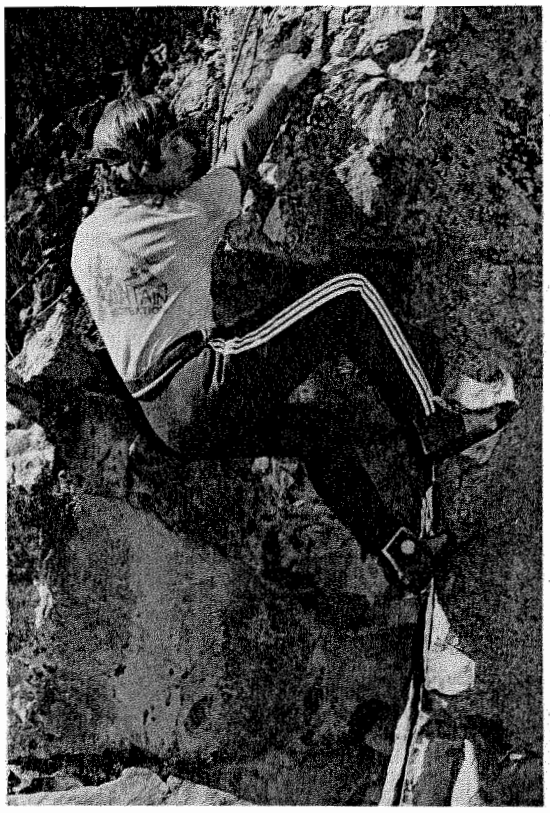
John is not only one of several outstanding young scientists in the Division's micrometeorology program, he is also one of Australia's most experienced mountaineers.

His early climbing career was built on a solid base of rock climbing in England and ice climbing in Scotland, followed by an ascent of the demanding Troll Wall in Norway and climbs in the Dolomites, the Kaisergebirge, and the Mt Blanc region of the Alps.

Despite his move to the earth's flattest continent in 1972, John has kept his sights on the vertical. With two trips to New Zealand's Southern Alps under his belt, he joined the Australian National University Mountaineering Club's 1978 expedition to Dunagiri in the Indian Himalayas. That climb was the first major Australian expedition to the Himalayas.

More recently, John has mixed meteorology with mountaineering on extended visits to NOAA's (National Oceanic and Atmospheric Administration — US) wave propagation laboratory in Boulder, Colorado. During breaks in work on the interaction between atmospheric gravity waves and turbulence, he has managed to fit in rockclimbing excursions to Eldorado Canyon, near Boulder, and mountaineering trips to the Rocky Mountains of Colorado and Wyoming.

What about the future? 'I'd like to make another trip to the Himalayas, perhaps in 1988. And, in the meantime, there are plenty of new crags around Canberra waiting to be climbed.' says John, who at age 39 is now climbing better than ever.



John Finnigan surmounts an overhang during a practice climb on a small rock outcropping on Black Mountain.

Musical meteorologists

Mike Raupach's scientific career has led him from Adelaide to Scotland and now to Environmental Mechanics in Canberra. His musical career has followed close behind.

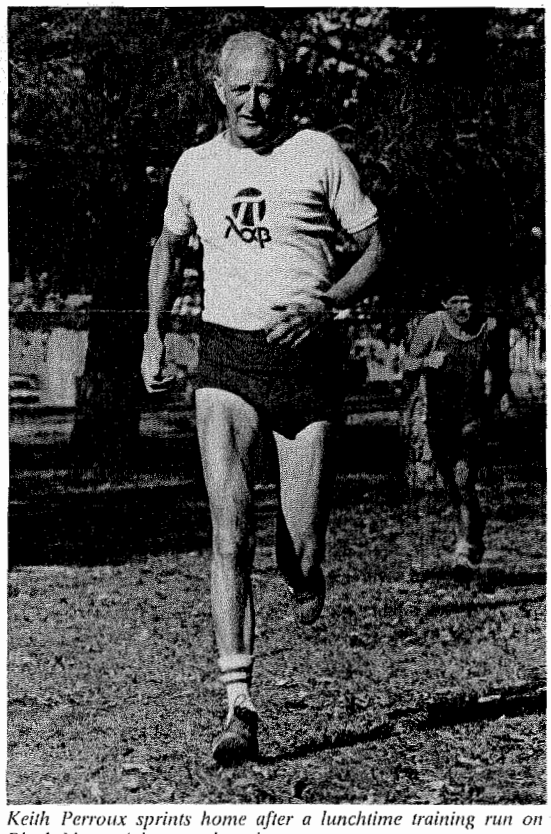
A self-taught guitarist at the age of 16, Mike broke into the Adelaide folk scene while he was a student at Flinders University. There he was involved in the production of stage music for university reviews and plays.

After moving to Canberra, Mike helped to organise a folk club, Blackbillys, which over the years has entertained hundreds of Canberra folk aficionados.

Mike now plays in a blues duo in folk concerts and festivals around Canberra, with an occasional spot on radio. And his travelling isn't over yet. Later this year he is heading off for six months of research in Britain and the United States — with guitar in hand, of course.

Mike's colleague, Peter Coppin, has also embarked on a career that mixes meteorology and music. Like Mike, Peter got his start in Adelaide, where he sang in boys' choirs during his school days and then joined the choral society at Flinders University during his studies there.

A crucial point in Peter's career came at the beginning of his honours year, when he had to choose between a career in science and a career in music with the South Australian State Opera Company. Fortunately for Environmental Mechanics, science won.



Keith Perroux sprints home after a lunchtime training run on Black Mountain's rugged tracks.

Black Mountain bards

John Philip's poems have been published in various Australian and overseas literary journals; and also in a number of Australian anthologies, the most recent Les Murray's Oxford Anthology of Australian Poetry. The following poem first appeared in Overland.

This Lady Counts

This lady counts in transcendental numbers:
the rational is not for her.

One and two and seventy-four
are monochrome and dull;

she, princess-like, prefers by far
bright jewels like e and π and $\sqrt[5]{101}$.

For her, $e + 3\pi$ eggs make a dozen
and sonnets have $10\sqrt{2}$ lines.

and on her special tree
are $\ln 5$ parrots and π^{e^2} leaves.

I love the glittering
imprecisions she demands.
Yet I am glad the number of her eyes, lips,
breasts, and nipples is rational and correct;
and that between her exact two thighs,
she settles for precisely one.

The irrepressible bard of the Division is Ian White, whose short story 'The Insidious Keaton' (*Co-Research* 290, April '86) was a winner in a recent ABC short story competition.

Patient Music

(with apologies to Ezra Pound's "Ancient Music")

SIRO is contracting in
Lhude sing, no quarter.
Critics rife,
external strife
And how muddied-up is
Water?
Sing no quarter.
Corporate plan and
marketing man,
An ague hath Headquarter
Bureaucrats rise, Divisions
demise,
Lambs bleat at the slaughter
Sing: no quarter!

60 is not a speed limit

Ask any Pye Laboratory inmate to name the most important qualification for working at Environmental Mechanics and he or she will likely respond 'being able to run up and down Black Mountain'.

Running is a tradition at the Pye Lab. The notorious Black Mountain Cup Fun Run was the idea of Environmental Mechanics's Colin Hazelton, who made the coveted Cup and continues to organise the race.

The Environmental Mechanics team, however, has never won the Cup; Pye Lab runners are known more for their persistence than their speed. Leader of the team is 60-year-old Keith Perroux, who began running with a lunchtime jog on Black Mountain in 1976 and hasn't slowed down since.

Keith's running career quickly moved beyond Black Mountain training jogs and CSIRO Fun Runs to distance running. He has finished 10 marathons, including the Australian Championships in Sydney, the Big M in Melbourne, and the Thredbo race — 'Australia's highest and toughest marathon'. The magic 3-hour mark has just eluded him, with a top time of 3 hours 3 minutes in the Olympic Way Marathon in 1984.

But Keith is better known at the Pye Lab for taking other members of the Soil Physics group on daring, impromptu runs. For example, a leisurely lunchtime run at the Bungendore field site turned into a race with irate construction workers after Keith led the troops across a freshly poured concrete railway crossing.

Distractions of a different sort greeted Keith on a midnight dash through the streets of Sydney after a soils science conference dinner. Running through Kings Cross, Keith and his mates were approached by a lady who offered them an alternative form of exercise.

Keith was heard to yell over his shoulder, 'We're too puffed!', to which she replied, 'I'll revive you!'

A Matter of Opinion

This month's contributor to the point of view column is the Chief Internal auditor, Mr Bernie Mithen.

"Oh — you're from CSIRO, the ...er, sugar refining people, eh?" is perhaps a less familiar experience today than it was when I joined the Organization in 1966. Despite mistaking the odd acronym, many people think that all organisations are fundamentally different. They'd say that an airline is obviously not a church, neither is a football club a pencil factory nor an orchestra an insurance company — so they're all obviously and basically different.

The auditor in me finds that proposition hard to accept — possibly because it sounds so sensible. But is seems to me that all organisations are fundamentally the same. Each is a group of people trying to do something together — whatever that might be.

Of course there are things that distinguish organisations from each other - purpose, size, age, ethnicity, structure, and culture among them. Most of those things could be used to distinguish the 'CSIRO group of people' from other groups. But making the distinction doesn't change the fundamental characteristic of any organisation as a group of people trying to do something together.

It's interesting to look at CSIRO with that perspective. One thing that emerges is that the combination of changes both in recent years (accountability, relevance) and now in contemplation (managed effort, communication) are shaping not only what we have been trying to do, but especially the way that we have been trying to work together. In particular, our corporate culture (common and shared set of values, beliefs, behaviours, etc.) is having to cope with changes that affect our view of ourselves as contributors to the CSIRO group effort.

CSIRO is changing from a research institution in which good science was promoted and its application pursued largely in fields of broad national significance, into an 'integrated corporation' which marshalls resources in pursuit of a plan of action designed to meet clearly specified corporate objectives for the same good science (i.e. both tactical and strategic).

In the 'institutional' CSIRO, its administrators traditionally 'took care of the tedium of administration' while scientists 'got on with the science'. Understandably, scientists in positions of local authority tended to be quite comfortable with that arrangement. As a result, there was arguably a tendency for questions of responsibility for decisions — especially about resource deployment — to be handled in terms of administrative and financial 'gatekeeping' rather than as important aspects of managing and reporting on Australia's research effort.

On the other hand, questions of authority to decide on direction and resource deployment tended to be seen in terms of scientific standing and local autonomy –a situation reinforced by the relegation of issues of responsibility to a protective administration. In fact, I'd say we would all recognise administrators who have been schooled as excellent 'minders'.

Corporate culture

I confess to feeling nostalgic about some characteristics of the 'institutional' CSIRO — especially the ready acceptance of excellence in research as the dominant element of decision making. But the environment of faith that allowed such ready acceptance has adopted some of science's empiricism, and now looks for evidence of managed effort in which authority and responsibility are co-located.

For CSIRO, that will mean some further modifications to our corporate culture. A recurring theme as suggested above, has been for scientists to be seen and treated as something of an ascendant tribe, though not necessarily at their own behest. If management means getting the best effort from people, and our Organization is a group of people trying to achieve something together, then our culture needs to

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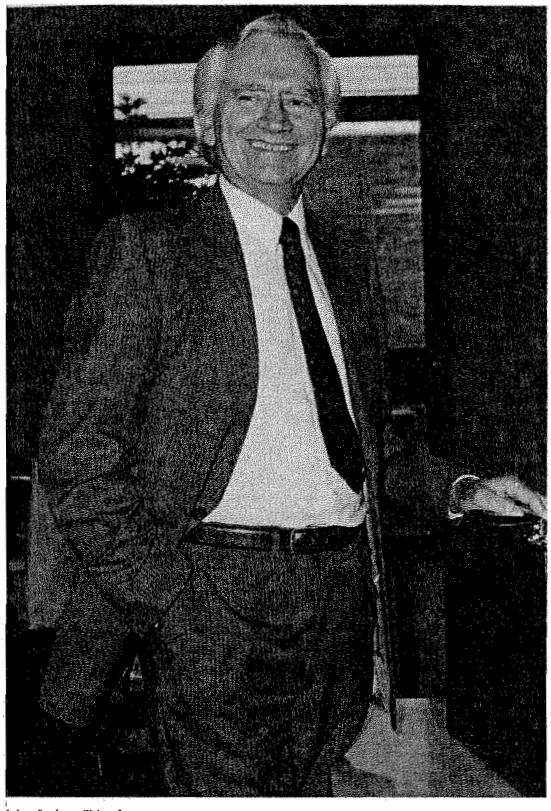
Applied Physics man to head NSC



Mr John Birch

The Scientific Assistant to the Chief at the Division of Applied Physics, Mr John Birch, left CSIRO recently to head the National Standards Commission.

Mr. Birch had completed 33 years with the Organization when he left to become Executive Director of the Commission.

He began his career with CSIRO in 1953 in the Heat Section of the then Division of Physics.

Mr Birch worked with the Low Temperature and Solid State Group on cryogenic problems — calibrating thermometers, vacuum testing, measuring heat conductivities and thermopowers at liquid helium and liquid oxygen temperatures.

In the late 1950s he took over calorimetry equipment for measuring heat capacities at low temperatures.

Mr Birch became the National Measurement Laboratory's first full-time Industry Liaison Officer in 1978. In 1980 he became Scientific Assistant to the Chief. This added a wide spectrum of additional responsibilities to his continuing involvement with industrial liaison.

Clyde Garrow retires after 46 years

The Manager of the Central Information service, Mr Clyde Garrow, has retired after 46 years with CSIRO.

Mr Garrow, who joined the Organization in 1940 as a 17-year-old junior clerk, had been manager of the Information Service since 1973.

In 1947 he became collector of public monies in CSIR and in 1950 was appointed Officer-in-Charge of the Finance Section, Accounts Branch, in Headquarters.

Later in 1950, Mr Garrow was appointed Technical Secretary, Wool Textile Research Laboratory.

This began as association with the laboratory, which became the Division of Protein Chemistry at the End of 1958, which continued for 19 years.

Mr Garrow spent 18 months on secondment to the International Wool Secretariat in London. He also served as scientific attache at the Washington Embassy.

In a letter to Mr Garrow, the Chairman, Dr Boardman said Mr Garrow had earned an 'enviable reputation'.

'Latterly, as Manager of the Central Information Service, you have helped the Organization reach the level of eminence in the fields of information and data base development which had been recognised by your professional colleagues throughout Australia,' Dr Boardman said.

'This has culminated recently in your appointment as Chairman of the Academy of Science's National Information Committee: a rare honour for one who is not a Fellow of the Academy.'

CSIRO medals to be awarded in October

Four CSIRO medals, including one for research performed outside of the Organization, will be presented in Canberra on October 8 this year.

The medals are awarded for outstanding research which makes a substantial contribution to the nation's development or to other national objectives.

Three of the medals will be awarded to CSIRO scientists and for the first time this year one will go to a researcher or reseach team from outside CSIRO.

The winners will be chosen by a selection committee comprising the Chairman, Dr Boardman, and Executive members Dr Geoff Taylor and Professor Adrienne Clarke, and Associate Member of the Executive Dr Michael Pitman.

The award ceremony will be held in conjunction with the Executive's meeting with Chiefs. The winners will receive a medal mounted on a plaque for display.

The inaugural awards were presented last year. They were won by Dr Peter Colman, of the Division of Protein Chemistry, Dr Raymond Jones, of the Division of Tropical Crops and Pastures, and Dr Graeme Ogilvie, of the Division of Manufacturing Technology.

Dr Colman's award was made for his outstanding research contribution in unravelling the molecular mechanisms involved in viral infection and immunity.

Dr Jones was awarded the medal for his findings on the cause and cure of leucaena toxicity in cattle. Dr Ogilvie won the medal for his work on the 'Synchropulse CDT' arc welder.

Queensland graziers want sack for animal libber

The United Graziers' Association of Queensland has called for the sacking of animal liberationist Ms Christine Townend from the CSIRO Advisory Committee on the Ethics of Animal Research and has threatened to withdraw future funding if Ms Townend remains on the committee.

At the UGA's annual meeting in Brisbane last month, the association's Sheep and Wool Committee chairman, Mr Mac Drysdale, said Ms Townend had publicly stated she wanted the demise of Australia's $3000 million sheep and wool industry and was not acting in the 'best interests of the committee or industry'.

Mr Drysdale said it was 'ridiculous for wool growers to be funding some of Ms Townend's activities through sheep and wool research money given to CSIRO'. In a letter to the Chairman, Dr Boardman, Mr Drysdale said the association felt so strongly about the issue that if 'Ms Townend is not replaced we will take steps to withdraw future funding to CSIRO'.

He said the industry would be happy to work with Ms Townend if she was 'genuinely interested in improving animal welfare, but her avowed aim was to bring the industry to its knees.' This was highlighted by her recent support of a world boycott on sheep and wool products in an attempt to stop the practice of mulesing.

The Queensland Country Women's Association has also expressed concern over Ms Townend's position on the advisory committee. The association's President, Mrs Del Lindsay, has also written to Dr Boardman asking whether Ms Townend would 'contribute to the effectiveness of the board.'

Ms Townend, who has been a member of the committee since it first met in February 1985, is one of two animal welfare society representatives and was nominated by the then Australian Federation of Animal Societies. The committee also includes two livestock industry representatives, two CSIRO officers, two professors of philosophy and a university medical researcher.

The committee advises the Executive on ethical and social issues associated with the use of animals in research.

The Acting Director of the Institute of Animal and Food Sciences, Dr Alan Donald, said the membership of the committee was designed to ensure that the Organization received the widest possible range of views about animal welfare matters.

However, the committee's role was purely advisory and CSIRO was not bound by its advice or by the views of its individual members. It was not a decision-making body and had no operational responsibilities in CSIRO.

He said CSIRO did not agree with Ms Townend's efforts to seek a ban on the mules operation which provides substantial life-long protection against blowfly strike in the breech region of sheep.

Dr Donald said it was acknowledged that the operation caused short-term pain to the animal but this had to be weighed against 'the much more stressful and painful condition of blowfly strike in which blowfly maggots invade the flesh of the living animal.'

'CSIRO and others are actively seeking alternative methods of protection against flystrike with the ultimate aim of replacing the mules operation and would expect rapid adoption of cost-effective and less painful alternatives when they are available. We do not support a ban on the operation as it is not in the best interests of the animals nor do we support activity directed at bringing this about.'

Dr Boardman will write to the United Graziers' Association and Country Women's Association explaining the role of the ethics advisory committee and expressing CSIRO's support for the mulesing operation until a satisfactory alternative can be found.

Mr Russell Lewis, left, and Dr David Ho hold blocks of concrete being tested on the Division's exposure rack. *Photograph: Peter Lee*

Building Research in Chinese journal

A Division of Building Research technical paper on the performance of fly ash in concrete will be the first CSIRO divisional paper published in China.

The paper written by Dr David Ho and Mr Russell Lewis will appear in the August edition of the Chinese journal *Cement and Concrete Products*.

left after coal is burnt for electricity generation. It has been used for many years to replace a proportion of the cement used in concrete mixtures.

Dr Ho said he had been asked to submit a paper when he visited China in 1984 to give a series of talks on the durability of concrete and the use of fly ash.

The need for a translator was solved last year when Ms Chao Yang Wang, of the Jiangsu Institute of Building and Construction spent six months with the Division.

Communication: not a case of 'I suppose so'

CSIRO's Director of Information and Public Communication, Mr Peter Dunstan, called last month for Australian scientists to stop treating public communication as a unwanted distraction from their 'real' work.

Addressing a luncheon meeting of the Australian Science Forum in Canberra, Mr Dunstan said he believed the Australian community had only a dim perception of the crucial role science and technology have in the economic well-being of the nation.

He outlined an 'action plan' restructuring the Bureau of Information and Public Communication into five units, but, he said, a shift in public awareness and knowledge could not be achieved without a significant increase in resources.

'If that means further resources will have to be diverted from strictly research activities, then so be it,' he said.

'The way I understand it, Australians accept that a certain amount of money must be spent on scientific research — but they do not fully understand that their own future well-being, and that of their families, is crucially dependent on the level of science and technology in industry.

'Similarly, I believe scientists accept that a certain amount of money must be spent on communication — but they do not fully understand that the future of their work is crucially dependent on their success or otherwise in communication the value of their work to the public.

'In both cases, it's an attitude that could be summarised as "I suppose it's necessary, but I wish it wasn't".

'What I am proposing is that both groups have to move away from the 'I suppose so' model to an 'I know so' model, surfing, the races or pastime, be it VFL, yachting, music, surfing, the races or watching 'Perfect Match'. And scientists must come to regard public communication as an integral part of their work — as familiar and important to them as operating a microscope or a computer terminal.

Mr Peter Dunstan

***CoResearch* is produced by the Science Communication Unit for CSIRO staff. It's also circulated to a number of people outside the Organization who are interested in CSIRO activities. Readers are invited to contribute or offer suggestions for articles. The deadline is the last Monday before the issue month. Editor: Liz Burden, PO Box 225, Dickson ACT 260. Ph: 48 4479.**

Matter of Opinion
Cont. from p.7

evolve from a status and procedure orientation to a function and result bias.

In that light, among the changes that 'administration' will recognise more is that it shares the objectives of research management rather than functioning as a 'minder', often operating to interpret external approaches to policy implementation or accountability. Unless a corporate system (eg. projects database, assets, credit management, overseas travel) delivers to the management of the research effort, its value to the Organization is marginal at best.

On the other hand, improving the utility of corporate systems calls for managers of research to become involved in that process. In particular, specification of their needs within a planned and coordinated environment that recognises the importance and value of administrative support is vital. It's not productive to insist on *first class support* and then criticise its absence: managers see decision support issues as part of their responsibility, they articulate views on them, receive competent advice and either participate in designing the solutions or become otherwise committed to them.

I'm sure that the view of administrators in CSIRO as 'mere accountants and lawyers' (*CoResearch* Nov. '85) is not widespread, and I'd bet that 'our contemplative staff' is an uncommon expression for CSIRO scientists. Certainly neither term is very useful in describing the people, much less their relationship.

Instead of the framework of those relationships being thought of as, say, '7250 or so people, including approximately 2500 professionals, with about $400 million each year, operating in some 120 locations, with headquarters in Canberra', CSIRO's culture seems to be on a path that will gradually 'internalise' an image as 'a group of people all dedicated to achieving excellence in Australian scientific and industrial research, and in its management and communication'.

So it is my impression that through some of the subtle and other more direct environmental changes that CSIRO is experiencing, our corporate culture is evolving as well. The challenge is for the team of champions to become a champion team.

CoResearch

60 Years of Science for Australia FEATURE PP.4-9

CSIRO's staff newspaper

No. 294 August '86

New lobby group

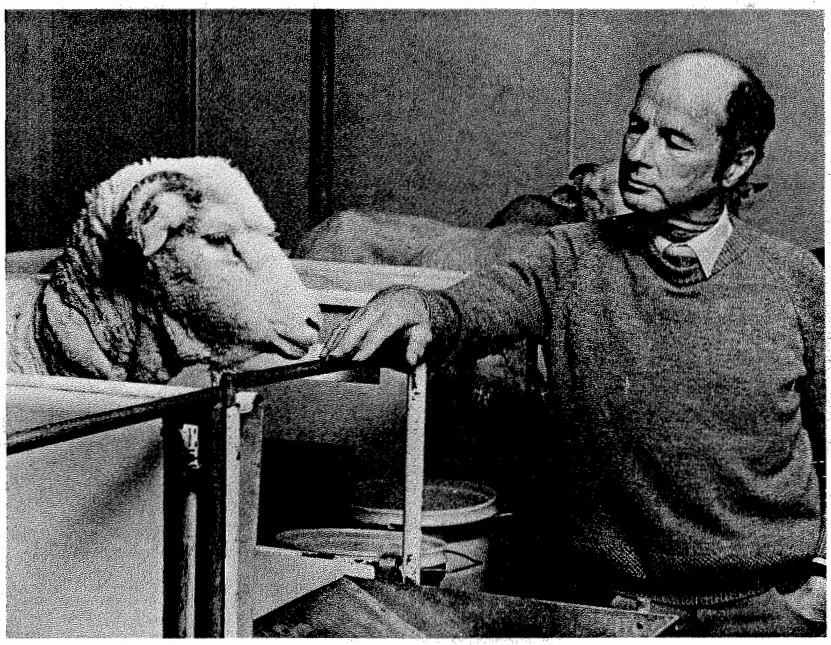
Moves to counter 'one-sided' animal lib publicity

A Division of Animal Production scientist has initiated moves to set up a national lobby group to counter the animal rights movement.

Dr George Alexander, a chief research scientist with the Division, said the group would aim to provide a focus for 'the many people in the community who oppose the extreme views of animal liberation'.

Letters had been set to some 250 organizations and government bodies and the lobby group was expected to include representatives from farmers' organizations, researchers, teachers and animal breeders, zoos, wildlife parks, circuses, and recreational groups associated with dogs and horses.

Dr Alexander said a meeting to formally establish the group would be held within a month. The group would aim to counter the 'one-sided and distorted' animal liberation publicity.



Dr George Alexander *Photo: Glenn Barker*

Motivation

He said he was motivated to start the lobby group following criticism of the Division's Prospect laboratory in a book by an animal liberation supporter. A paediatric research project which he was working on in collaboration with Westmead Hospital had been criticised because it involved animal research.

The successes of the animal rights movement in pressuring politicians to interfere with 'legitimate human activities involving animals' had also motivated him.

Scientists and other groups involved with animals had no effective lobby group to put their views. He hoped the new organization would develop good relationships with the RSPCA, which was a 'sensible, moderate group in most States'.

'Overseas there is bullet proof glass in laboratories, and in Australia as well as overseas laboratories have been broken into, records destroyed and individuals harrassed,' Dr Alexander said.

Australian farmers were under attack over practises like mulesing, and university veterinary courses were pressured to stop 'hands on' work with sick animals. Secondary schools were also under pressure to prevent 'hands on' experiences with animals.

'It will get worse here if we don't do something about it,' Dr Alexander said.

Dr Alexander said the use of animals in research had resulted in many vital advances in medicine including organ transplants, and vaccines against a wide range of human and animal diseases. Research involving animals had contributed to the development of antibiotics, heart pace makers, drugs for blood pressure, dialysis for kidney disease and many other medical breakthroughs.

The research often assisted animal welfare through new vaccines and husbandry techniques, and better anaesthetics.

Dr Alexander said it was wrong to portray animal experimentation as cruel. Much experimentation involved 'minimal interference with the animals and experimental animals rarely experience pain'.

'Animal experiments must be carried out with the welfare of the animal in mind,' he said.

'I think humans have an evolutionary heritage of using animals for their benefit. This is reasonable provided it is done in a humane, caring and compassionate way.'

Dr Alexander said he had been 'deluged' with telephone calls about the group.

'The strength of feeling on this issue is so strong that I think it will work,' he said.

The group is a private initiative of Dr Alexander and is not an official CSIRO body, although it has support among CSIRO staff.

The next 60 years: more challenging than the first

By
Dr Keith Boardman

The pre-eminent reputation of CSIRO among government research organisations worldwide owes much to the establishment of CSIR as an independent statutory authority outside the Public Service, and the foresight of the first Executive Committee.

The Executive Committee comprising two engineers, George Julius (Chairman) and William Newbigin, and a Professor of Chemistry, David Rivett, was appointed by the government in April 1926 — two months before the legislation was passed by parliament and the convening of the first meeting of the Council.

The powerful triumvirate persuaded the Council that the main problems to be tackled by the new organisation should be determined by the Executive Committee on the best advice available. The Committee should find the best people available to put in charge of the investigations and provide full opportunities to them to solve the problems. Rivett in particular was a strong advocate of scientific autonomy and insisted that the scientific experts should have the freedom to get on the job and not be controlled by committees.

The two most important issues facing the new organisation were how to concentrate the effort, and the balance between basic and applied research; issues which are still of prime concern to CSIRO today.

Cont. on p.8

Who says there's no life after 60?

CSIRO celebrates its diamond jubilee this year. To mark the occasion, we have a special six page feature in this issue of *CoResearch*.

Dear Editor,
I refer to the item on p.8 of the July 1986 issue which states that a Division of Building Research technical paper will be the first divisional paper published in China. Scientific and technical exchanges between China and Australia have beenb occurring for about 10 years, and it would be surprising if there were not earlier contributions from CSIRO staff in the Chinese technical literature.

One such paper from this Division appeared in *The Science and Technology of Membrane Separation, 5* (1), (1985), as a result of an ADAB funded visit to China by two staff from this Division in late 1983.

Dr B R Smith
Principal Research Scientist
Division of Chemical and Wood Technology

Dear Editor,
The Chairman, in his June '86 column, reported the 'very encouraging' acceptance of the Organization's Corporate Plan *Shaping the Future - A Strategy for CSIRO 1985-1990* by parliamentarians, industry, community and union leaders and the media. Such a favourable response, while no doubt heartening to those who produced the plan, surely was no surprise. Aren't these recipients the very people who pressured CSIRO and other public authorities into the corporate mould and who, by and large, regard the production of such plans as a measure of the dynamism, success and strength of an organisation?

A more dispassionate set of readers might require some evidence of the efficacy of such corporate plans. Are the recent performances of Australian industrial corporations pointers to their usefulness? More pertinent to CSIRO, can we demonstrate that any scientific or industrial research establishment has been more productive, its work more relevant, and has picked more 'winners' after the institution of a corporate plan?

Without doubt CSIRO must be responsive and alert to the needs of the Australian community, it must possess simple, scientifically achievable objectives and must strive to do the best job possible. But then these don't constitute a corporate plan; they are merely fulfilling our charter.

To some, corporate plans are obviously comforting. They convey the impression that the future is both foreknown and firmly in our control. To others they simply indicate that the present has slipped from our grasp. Will our corporate plan give birth to a 'better' CSIRO, or will it impose further strictures on creative and useful work? Will it, in addition, promote a general ossification and merely serve to feed what is already, in financial terms, CSIRO's highest priority area, CSIRO Headquarters? Alas, only time will tell!

Ian White
Division of Environmental Mechanics

Dear Editor,
The Australian Journals of Scientific Research, published jointly by the CSIRO Editorial and Publications Unit and the Academy of Science, are under threat.

Last year, the journals cost about $2 million to produce including all overheads and returned an effective $1.5 million via subscriptions and library exchanges. Unfortunately, these returns are not readily visible at Head Office, where the net cost of the journals is perceived to be $2 million rather than the $0.5 million that it is to the Treasury.

There is little doubt that an effective marketing drive would result in the net cost of the journals being substantially less than $0.5 million, a very modest sum when set against the several hundred million dollars that Australia spends annually on scientific research and when it is appreciated that a piece of research is incomplete until it is eventually published.

Given this modest net sum, it is surprising that Head Office continues to see the journals as a large financial drain; it is depressing that it does not see them as a national asset that should be fostered.

It puzzles us that Mr Peter Dunstan, Director of our Bureau of Information and Public Communication which contains the editorial unit, has been told that there is little support for the Australian journals amongst the divisions of CSIRO, a view that he has recently expressed to the Chairman of the Board of the Australian Journals of Scientific Research, and which he has used in justifying the seemingly negative attitude to the journals within the Executive.

We, the undersigned, are all members of the advisory committees of the various journals. We believe strongly that the journals are a national asset, that the present editorial system is an excellent one, that it is appropriate the CSIRO continue to publish the journals, and that there is great support for the journals amongst the scientists of CSIRO.

We exhort all readers to of *CoResearch* who share these views to let the Director of the Bureau of Information and Public Communication know about them, and, if he appears unreceptive, to write to *CoResearch*.

The situation is urgent. Some of the journals are falling well behind in their publication schedules because of current staffing difficulties. Their standing as reliable journals with an international following is in danger. If that standing is lost it will make it so much easier to close down some or even all of them, and we will have then taken a large step backwards towards the colonial way of thinking.

J B Passioura
Plant Industry
J T O Kirk
Plant Industry
K Norrish
Soils
B J Hill
Fisheries Research
W H Sasse
Applied Organic Chemistry
M Freer
Plant Industry
M M Ludlow
Tropical Crops and Pastures
S P Robinson
Horticultural Research

Dear Editor,
The brief note on the retirement of Mr David Roney in the April issue of *CoResearch* needs to be supplemented by a fuller account of the impact he had on minerals and energy research and, indeed, on the whole of CSIRO.

Dave Roney's move to the Division of Mineral Chemistry in 1966 was originally negotiated by Dr Jerry Price, then a member of the Executive and subsequently Chairman. Dave was Manager, Corporate Planning in Monsanto and Dr (now Sir Robert) Price wondered whether industrial planning concepts could be applied to a large research organisation. Mineral Chemistry, under Ivan Newnham, was the willing guinea pig.

As Planning Officer, Dave Roney directly influenced broad research themes through pre-research appraisals and economic assessments. Initiation of iron-ore research in CSIRO and expansion of mineral exploration research through the formation of the Division of Mineral Physics in 1972 were two important consequences of Dave's influence.

More pervasive has been the effect of the planning concepts and structures which Dave introduced. He initiated the concept of the Minerals Research Laboratories (MRL) with a Director, arguably the model for Institutes recommended for the whole Organisation in 1977 by the Birch Inquiry. Dave's planning function was extended to MRL at its formation in 1970 and thence to the Institute level in 1978. He was behind the first 5-year plan at Mineral chemistry as far back as 1970 and 15 years later all IEER Divisions had formal 5-year plans. He established inter-Divisional Programs and Sub-Programs in MRL in 1971 and later extended these to the Institute. the present IEER planning structures, comprising Institute goals and objectives, programs, program objectives, project statements, research activity proposal and termination statements are all the fruits of Dave's efforts.

Dave Roney made many other contributions at the Divisional level (he was always attached to Mineral Chemistry) but I wish to stress the larger influence he undoubtedly had. It is no secret that much of what he wanted to achieve was unpopular with researchers. I see Dave not as the cause of the sometines irritating duties connected with the planning process but as a vislonary preparing CSIRO for the inevitable community demands for relevance and accountability.

Tom Biegler
Acting Chief,
Division of Mineral Chemistry

Of equal concern

By Carmel Macpherson

I had a very pleasant surprise recently. I wanted some examples of poor documentation for appointment of staff and had to look through a considerable number of recent files before finding three samples of 'how not to write up a Recommendation for Appointment'! Two years ago I could almost have picked the top three on the pile.

This is proof to me of my fundamental belief that no sensible person wants to do a bad job nor would they wish to appoint the fifth best person if they could have the best. In setting out to remove non job related barriers to recruitment and progression of staff in CSIRO, obviously the entire selection process must be rigorously analysed. EEO has made recruitment/selection its priority area for the past two years and has run workshops in virtually all locations in Australia.

Has it been worth it? Without a doubt! Firstly, it enables me to mix with and talk to people at the coalface and forces me to confront the everyday problems of staff outside Headquarters. Secondly, as the Organization's greatest resource is its people, expenditure being about $7 in every $10 spent, then any procedures that help ensure quality recruitment must be worthwhile. The workshops are specifically aimed at teaching staff how to accurately assess the duties of a position and how to compile skillful selection criteria and interview questions.

A statistical analysis reveals that numbers of women in the Organization are increasing. Is this tokenism, positive discrimination? This is highly unlikely as our selection processes have never been more openly accountable. Thus, an aggrieved male who believes he was unsuccessful simply because a female was given preference has a plethora of grievance mechanisms available to him. To my knowledge not one grievance claiming positive discrimination has been lodged.

Comparing June 1983 with June 1986, the following figures emerge: in the clerical/administrative ranks women at the AO1 level (c$24,000) have increased from 18 percent to 42 percent in 1986; AO2 from 21 percent to 30 percent and at AO3-7 from 2 percent to 10 percent. Women have increased proportionately at the research scientist level by 27 percent (47 to 59), at the experimental scientists level by 19 percent (151 to 180), at the technical officer level by 21 percent and at technical assistant level have decreased by three percent (men have similarly decreased by 18 percent).

Space does not allow me to go into all the permutations and computations of these figures and I constantly carry around with me Disraeli's exhortation that 'there are lies, damned lies, and statistics!' My annual report (duly scrutinised by one of Terry Speed's colleagues to ensure correct assumptions are being drawn! will obviously be much more detailed. Until the EEO Census is carried out, hopefully at year's end, we do not have relevant data on other target staff.

A quick calculation of the cost of any employee will reveal that a few hours skilfully spent at recruitment stage will

Cont. on p.11

CSIRO appeal

Help get a pump for Gohzo

Russell Porter from the CSIRO Film & Video Centre returned recently from an assignment in Zimbabwe. With this story he hopes to encourage staff to donate to a very worthwhiile cause.

There were over five hundred small African faces staring intently at the three strange, hairy Australians struggling to set up their film-making equipment.

It was hard to interpret their expressions at first, but when they began singing for us, in beautiful four-part harmony, there could be no doubt we were being genuinely welcomed.

The headmaster of Gozho school, Mr Chatikobo, announced to the assembly that they were privileged to have us visit them, since we'd chosen their school, of all in Zimbabwe, to make our film.

But to us, members of the Film & Video Centre crew, the privilege was ours. To be accepted with such hospitality was incredible, given the people's past experience of Europeans in the area.

During the war of independence, soldiers from the white Rhodesian regime had raided the school, looking for 'terrorists'. In retaliation for the villagers' non co-operation, the troops burnt the entire school library.

Today, over six years later, the children of Gozho school are still without books. In fact resources of any kind are in desperately short supply. We decided to offer some practical support, which is reason for this article.

Gozho is a village community in the southeast of Zimbabwe, in the so-called Communal Lands — the poorer, less arable half of the country which is still home to 70 percent of the black population.

The film we are making is part of Australia's contribution to the International Year of Peace. It's about the international impact of Australian tree species and the exchange of information between foresters and scientists here and in other countries — specifically Zimbabwe and China.

We went to Gozho school because it is a model for the new approaches to forestry being undertaken by the Zimbabwe Forest Commission.

The situation in most parts of Zimbabwe is not yet critical, but with fuel wood supplying the energy needs of over 80 percent of the rural population, and a population growth rate of three to four percent, a program of rural afforestation is a national priority.

The plan is to involve local people themselves in afforestation, and at Gozho (as in many other places in the Communal Lands), they're starting at the schools. On sloping ground at the top of the school yard, the children have planted and nurtured hundreds of healthy gum trees (*Eucalyptus grandis* and *camaldulensis*), and have established a productive nursery for raising seedlings.

Although indigenous species are preferred for cooking (the wood doesn't spit) and building, they are very slow growing. The eucalypts, by contrast, can produce good construction poles within about five years.

To keep their trees healthy, the Gozho children have taken a personal interest in their wellbeing, the older ones being responsible for their 'own' trees. Eventually the school woodlot will be the major wood source for the entire community and will also bring in a little extra money for school books and equipment.

During the dry season half the school spends up to half of each day tending the trees. Providing water for the seedlings is the most time consuming, since it all has to be carried by hand from the lake about a kilometre from the woodlot.

It's quite a sight to see an alligator line of small children weaving down the hill with old plastic bottles and tin cans, then struggling back up the hill to water the plants. It's a very wasteful process, not only of the children's time, but of water. By the time the kids get back to the top of the hill, the containers are half empty.

What's needed most of all, the headmaster told, us, is a pump, and enough pipe to reach the trees. It seemed to us in the film crew (Roger Seccombe ACS, cinematographer/director, Robert Kerton, sound recordist, and Russell Porter, scriptwriter/producer/director) this was a small way we could help the community.

Surely an organisation as large, (relatively) affluent and benign as CSIRO could find a way to bring about this small miracle for the people of Gozho. Among our 7500 co-workers there is undoubtedly enough goodwill to provide the necessary funds.

Travelling with us in Zimbabwe was a young African forester, David Gwaze, our guide, translator and friend. David is something of a miracle himself — from the shanty village of Seke, outside Harare, he managed to win enough scholarships to take him to Scotland and eventually to ANU where he graduated with a forestry degree.

David enquired about the most suitable pump and the costs involved. He found that the ideal petrol pump (there is no electricity of course) would cost Z$1136.20. Seven hundred meters of PVC pipe would cost Z$1232, bringing the total to Z$2368.20. At current exchange rates this is just over A$2000.

I enquired about the equivalent equipment here, but even with generous discounts from local suppliers the cost of freight and import tax would make it more expensive, and there is the additional problem of service and spare parts.

David Gwaze will be in Australia this month for an acacia workshop in Queensland, and we'll be including scenes of David there and at the CSIRO seed centre in Canberra, in our film. Details of how the money will be best spent will be discussed with him then.

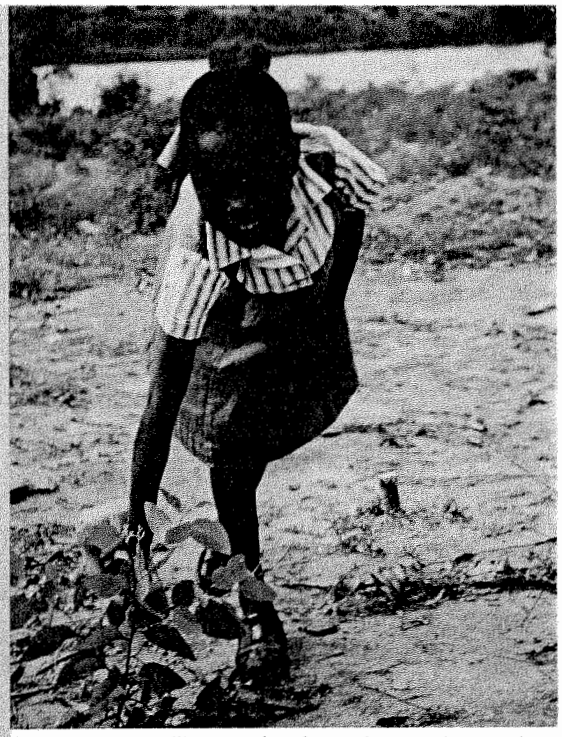
If only half the employees of CSIRO could contribute one dollar each, it would be enough to get the pump set up, arrange for regular service and provide enough fuel to keep it going. And if there is any left over, the money could help to replace the urgently needed books at the school.

I would like to think that this article is sufficient for at least one kind member of each division and unit in CSIRO to act as conscience stirrer and collector for the fund.

Contributions can be sent to Gozho Pump Fund, care of me, Russell Porter, at the Film & Video Centre, 314 Albert Street, East Melbourne 3002.

(Our film, tentatively titled 'Trees for Peace' is scheduled to be screened on the ABC Quantum program in October.)

On location...



'Watering the seedlings — a lot of wasted time and water...'

CSIRO Aircraft Facility to be managed by COSSA

COSSA's management plan for the CSIRO Research Aircraft Facility has been endorsed by the Management Committee.

Staff of the facility are being transferred to COSSA, which will manage and develop the facility as a space-related R&D platform for use by CSIRO, Australian and overseas agencies. COSSA will also be considering options for purchase of a smaller aircraft from 1988/89; a move which would lower operating costs and provide adequate facilities for continued R&D use, as well as facilitate operational flying.

COSSA is particularly excited about the potential for developing the facility as an operational platform. Two scanners have been acquired for use on the aircraft at a small additional charge: an upgraded Daedalus DEI-100 line scanner which operate in a dual channel infra-red mode or a 10-channel visible and near infra-red multi-spectral mode; and a short-wave infra-red spectroradiometer which is externally mounted and records spectra in the wavelength range 1.3-2.5um. A third airborne scanner will provide additional capabilities, and negotiations to get this are underway.

In the meantime, the F27 is to be kept busy. Potential bookings for 1986/87 include participation in two major overseas projects. One of these — the Equatorial Mesoscale Experiment (EMEX) — will involve collaboration with the Division of Atmospheric Research, as part of three experiments examining the vertical profile of the atmosphere over northern Australia.

Lyndal Thorburn at COSSA (062) 48 4554 would be happy to hear from anyone with suggestions regarding the future direction of the facility.

DBR may be called to give evidence

A company involved in legal action over tiling in a Melbourne hospital has threatened the Division of Building Research with a Supreme Court subpoena over footage contained in the latest video in the 'Building Tomorrow' series.

The video entitled 'Brick and Tile Failures' contains footage of building workers removing tiles from newly tiled bathrooms in the hospital. The failure of these tiles has become the subject of a Supreme Court action.

Bob Couper, head of DBR's technology transfer unit, said the Division had not yet received a subpoena. All parties to the dispute had been advised the video was available and staff were happy to discuss it.

The 10-minute video, which is part of a series designed to inform people working in the building industry of research at the Division, was released about a month ago.

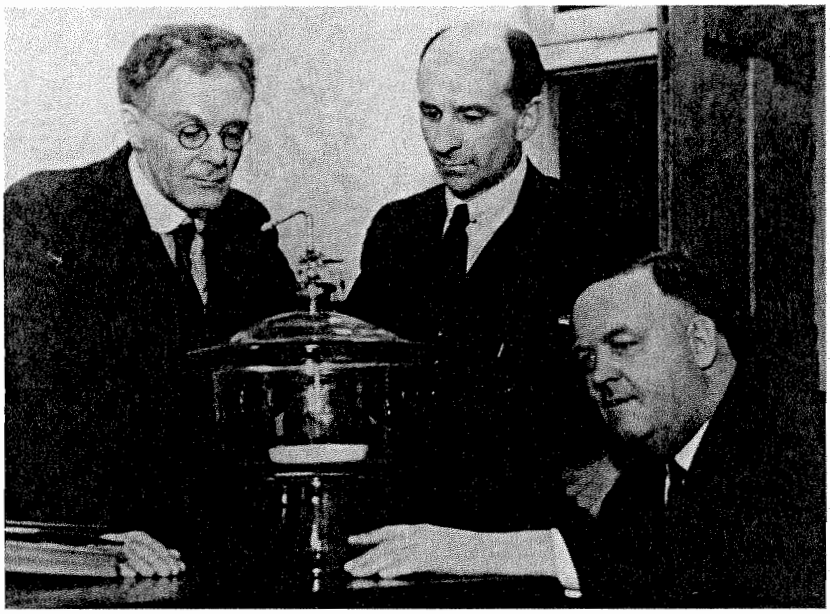
Russell Porter filming in Zimbabwe

The beginnings of our Organization

Some 70 years ago a group of scientists and industrialists battled, without staff, laboratories, equipment and with limited money, to set up what was to become Australia's premier scientific organization.

In 1916 the then Prime Minister, Mr W M Hughes, called together a group of distinguished people to work towards the formation of a scientific research institution.

From this meeting a temporary Advisory Council of Science and Industry was established and this body formed the nucleus for the forerunner of CSIRO — the Council for Scientific and Industrial Research (CSIR).



Julius, Rivett and Richardson

The Advisory Council faced considerable difficulties in the early years. It had neither laboratories nor research staff of its own; its financial resources were extremely limited. Nevertheless, it appointed a number of expert committees which did much valuable work in co-ordinating and stimulating research in existing laboratories.

A major achievement, in collaboration with the Queensland Board of Advice on Prickly Pear Eradication and the New South Wales Department of Agriculture, was the eradication of prickly pear. The spread of the plant at the rate of half a million hectares a year was eventually halted by the introduction of several natural insect enemies from North and South America.

little enthusiasm for further development. 'This Institute of Science and Industry is a ghastly mistake — a expedient for turning into private pockets public money that is needed for war.'

Having achieved an establishing Act the leadership of the ISI were frustrated by lack of funds and political support.

In 1925 the recommendations of a conference of scientific and industrial leaders and a visit by an eminent British science administrator, Sir Frank Heath, led to the transformation of ISI into CSIR in 1926. A few small rented rooms in a technical college in Melbourne housed its first laboratory.

CSIR had a governing Council which included representatives of each State and an Executive Committee was responsible for running the new organization.

for the benefit of Australia's primary and secondary industries, the Council decided to devote most of its limited resources initially to problems of agriculture and the use of forest products.

In the period up to 1940, CSIR built up divisions dealing with animal health and nutrition, soils, plant industry, fisheries, food preservation and transport, entomology and forest products.

A succession of useful discoveries helped the new organization gain acceptance by the industries it served and by the community generally. Notably the discovery that coast disease in sheep — a wasting disease — was caused by a cobalt deficiency. The CSIRO scientists developed a clever technique to administer a supplement to cure the disease. (see separate story)

Another success of this early period was the isolation of a vaccine to treat the highly infectious cattle disease, pleuropneumonia. This was coupled with the development of a specific and reliable diagnostic test.

'...this Institute is a ghastly mistake — an expedient for turning into private pockets money needed for war...'

These early successes fired enthusiasm and by 1917 a scheme had been drafted for a permanent institute, but at the crucial moment political support failed and it was not until 1920 that the Government created the Institute of Science and Industry from the Advisory Council.

The political climate of the time was reflected in *The Age* editorial in 1918. 'The Advisory Council has been in existence for two years. The main discovery it has made is that it has not had enough money to spend on itself.' And there was

The first Chairman of the Council and the Executive Committee was Mr G A Julius (later Sir George), a leading consultant engineer. The Chief Executive Officer was Professor A C D Rivett (later Sir David) who resigned the Chair of Chemistry at the University of Melbourne to accept the appointment. The third member was W J Newbigin, who died within a year and was replaced by Professor A E V Richardson, a distinguished agricultural scientist.

Although CSIR was established to undertake research

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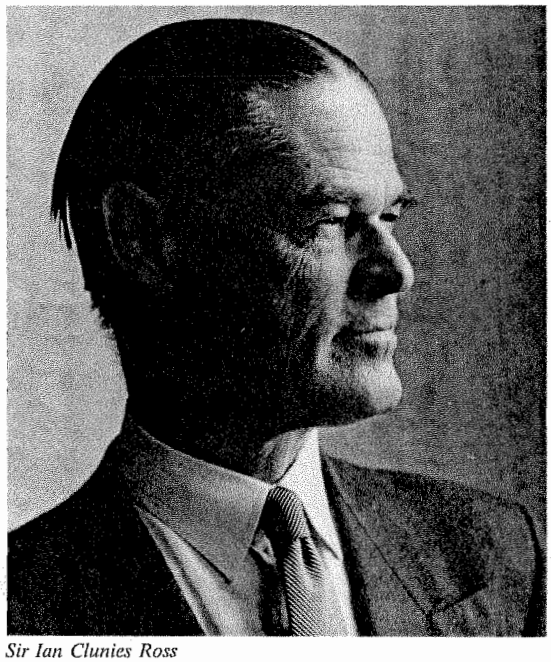


Sir Ian Clunies Ross

How the communist scare changed the face of CSIR

In 1949 the West was becoming increasingly paranoid.

The World War was over but a new conflict was to take its place — the Cold War. A hitherto little-known Senator from Wisconsin, Joseph McCarthy, made anti-communism the mark of the latter part of that decade in the US, and his influence was to continue well into the 1950s. Australia did not escape the rising tide of anti-communist fervour — and for CSIR the ramifications were profound.

Sir David Rivett was part time CSIR Chairman when the political storm broke in 1948. In Parliament, the Liberal and Country parties began attacks on the Labor Government, claiming that the universities and CSIR were employing scientists who were communists or had communist sympathies. It was alleged that important scientific information on atomic energy from the United States was being withheld because of security concerns.

The Opposition wanted CSIR brought more directly under control of the Australian Government. Sir David was caught in the line of fire, particularly when he advocated the return of CSIR to civil science and the establishment of separate defence laboratories to carry out secret research. During the war CSIR had abandoned its civil research program to concentrate on work to assist the war effort. Much of this work had been conducted under a veil of secrecy. Once the war was over Rivett was anxious to see the Council returned to its civil role. Rivett's remarks on this subject were taken out of context and this led to attacks in Parliament being directed at the Chairman himself.

Sir David was a man of considerable social conscience, and the personal attacks greatly affected him, said a later Chairman, Sir Frederick White (who was at that time a member of the five man Executive Committee which ran the day-to-day affairs of CSIR). White believes the Chairman was made a scapegoat and was very unwillingly caught up in an issue which was largely trumped up.

After seven years in opposition, the coalition was at last sensing electoral victory. The Opposition leader, Robert Menzies, used the anti-communist platform to great effect, and he ultimately led his party to Government in 1949.

Cont. from p. 4

Recent history: turbulent years

CSIRO has faced several periods of challenge and change, but the past few years have probably been the most turbulent in its 60-year history.

As the 1949 elections approached, the Prime Minister of the day, Ben Chifley, and the Minister in charge of CSIR, John Dedman, took the allegations about communist infiltration of CSIR very seriously. The less publicised but growing problem of administering CSIR under the existing Act was also evident. Rivett was held in high regard by the Government and it was largely through his efforts that Chifley and Dedman came to insist that only essential changes be made to the Science and Industry Research Act which had been in force since 1920 and amended to form CSIR in 1926.

White recalls: 'The old Act is interesting because it was one of those gentlemen's agreements which more or less said the Executive could do anything it liked provided the Minister approved. It meant, of course, that nobody really had defined the formal procedures which are really quite necessary in running any organization — especially one which had grown as much as CSIR had by 1948'.

'By the time we were accused of appointing communists, Dedman and Chifley were very worried indeed because they were already under vigorous attack in Parliament on the communist issue,' he said.

'Dedman used to say "how do I know you're not appointing communists? How can 25 people on the Council be responsible to me — it's ridiculous". Although White is sure the Minister was aware that the Executive Committee was 'not letting him down', the pressure in Parliament for accountability was intense.

'In those days, the Council was THE body — not the Executive, which was just a committee of the Council,' he said.

'It was obvious that the old Act was absolutely archaic and really didn't work. In the end, I'm sure Chifley was very sympathetic to CSIR and I know Dedman was. They didn't want to destroy the central nature of the new organisation — and they didn't.'

An independent report on proposed changes to the Act was prepared by the Chairman of the Public Service Board, Mr W Dunk, and the Director-General of the Department of Post War Reconstruction, Dr H C Coombs.

After the period of intense discussion at the time the report was being prepared, White was to play a major role in drafting the Bill for presentation to Parliament. The challenge was to formulate a Bill and the Cabinet, but which retained all the old provisions not objected to by Cabinet.

The new Act, proclaimed on 19 May 1949, formalised and altered administrative procedures without changing the existing scientific charter.

The Executive was given complete responsibility for the management of the Organization. It only had to go to the Minister in exceptional circumstances.

The Council was retained in much the same form but with a purely advisory role. Since there was no longer a governing council, the name was changed to the Commonwealth Scientific and Industrial Research Organization and the powers and functions of CSIR were transferred unchanged to CSIRO.

The events of 1948-49 were a severe blow to Rivett — particularly when the Minister turned to others for advice and commissioned the report by Dunk and Coombs. He was particularly 'devastated', said White, 'by the danger of this carefully nurtured institution being handed over to the Public Service Board'. This was one of the recommendations of the Dunk-Coombs report and despite bids by the Chairman and executive committee members to have it overturned, the recommendation was endorsed. 'The [Public Service] Board had no scientific experience; its administration, no matter how excellent for departments of state...was considered unsuited to a research agency where action is...fixed by imaginative achievement by individuals at any level of the staff.

'Fortunately CSIRO was spared this fate; the evidence of later years show that the scientific achievements of CSIRO and its contribution to national affairs continued unabated,' said White.

'...it was obvious that the old Act was absolutely archaic...'

Despite being distressed by the events of the 12 months leading up to the change, Rivett agreed to serve for a year as part-time Chairman of the new Advisory Council and remained a part-time member of that Council for a further six years.

Ian Clunies Ross became the first CSIRO Chairman on 19 May 1949, and White became Chief Executive Officer (he was to become CSIRO Chairman in 1959).

**See: Sir Frederick White, 'CSIR to CSIRO — the Events of 1948-1949', Public Administration, Vol. XXXIV No. 4, December 1975.*

Other quotes from Sir Frederick arose from an interview conducted by the CoResearch *editor.*

The new era began with the review of CSIRO headed by Professor Arthur Birch, which reported to the Government in 1978. It was the first independent review in the Organization's history.

The report led to grouping of Divisions into research institutes to improve co-ordination and interaction between Divisions, and the establishment of the Planning and Evaluation Advisory Unit.

But within a few years, more far-reaching questions emerged about the relevance and effectiveness of Australian science, 80 percent of it Government-funded and half of it performed by CSIRO and the country's 19 universities.

The change reflected both broad international shifts in social and political attitudes to science and specific events: a more realistic view of science and its limitations; demands for greater accountabity as science's impact on society grew and the international recession drew tight Government purse strings; the industrial impact of the revolutions in computer, robot, space and biological technologies; the impact of a drought and low world prices on Australia's traditional exports.

CSIRO, as Australia's largest research establishment, was the focus of early questioning. Research priorities came under fire, with scathing attacks from several quarters. A science policy analyst, Dr Stuart Macdonald, said at a major conference in June 1983 that CSIRO was so remote from the realities of the recession and so sheltered from the changes in the structure of the Australian economy that it was on Australia's traditional exports; and the election of a Labor Government.

'Swift change of direction — no matter who is at the helm — is impossible. For a nation seeking just such a change of course and rapid acceleration, CSIRO - like a grand old battleship, too expensive to convert and too valuable to scuttle — seems to exemplify the costs of the existing Australian research structure.'

The criticism of Australian science was reflected in the 1984 Budget, which was described by Professor Birch, then President of the Australian Academy of Science, as 'disastrous' for science. CSIRO's operating funds for continuing research were cut in real terms.

The Budget provoked CSIRO, and the scientific community in general, to put its case far more vigorously.

The then Chairman of CSIRO, Dr Paul Wild, argued that CSIRO was changing to make its contribution, especially to manufacturing, more effective. It was the industry itself, and government, that were not doing enough to encourage technological innovation. 'Australia is sinking, scientifically and technologically, in a mire of negativism and apathy,' he said in a widely reported speech to the Australian Manufacturing Council in September 1984.

The debate contributed to the introduction of some of the most important initiatives by the Government in science and technology in recent times, including the 150 per cent tax incentive for R&D expenditure, a new offsets policy, a National Industry Extension Service and a new industrial R&D grants scheme.

It also led the Government to set up an inquiry by ASTEC, the Australian Science and Technology Council, into almost every aspect of S&T in Australia, including CSIRO. ASTEC recommended that CSIRO remain a single body but that the Executive, Advisory Council and State Committees be replaced by a corporate- style Board and other advisory mechanisms.

CSIRO has itself introduced major changes in the last three years to improve the focus, evaluation, management and usefulness of its research. These measures include the setting up of the commercial company Sirotech Ltd, the CSIRO Office of Space Science and Applications (COSSA), the Division of Information Technology, the Bureau of Information and Public Communication, and the adoption of a corporate strategy for 1985–1990.

According to the Chairman, Dr Keith Boardman, these initiatives and the Government's response to ASTEC do not represent a change in CSIRO's primary role, but rather a change in emphasis — a move to make the Organization more effective in it's role'.

'The debate about CSIRO that has been a feature of the past few years may now subside. But the outcome of that debate is not "business as usual". The staff of CSIRO now face a greater challenge than at any other time in the Organization's 60-year history.'

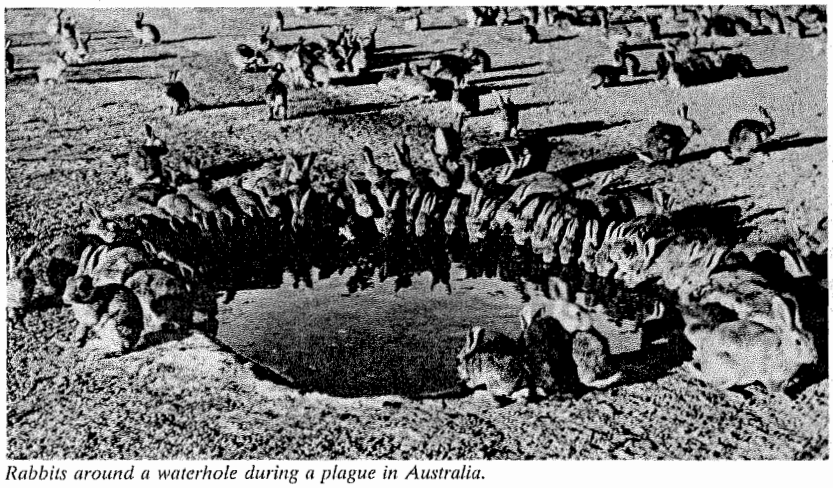
'The challenge is not only to maintain excellence in scientific research. It is now also one of striving to ensure that the nation receives the maximum benefit, economically and socially, from that research.'

The site of CSIRO Headquarters in Canberra before building started. HQ is on Limestone Avenue — irreverently called Tombstone Avenue by some divisional people.

Sir Frederick White, pictured here with the new HQ building in 1970, was Chairman of the Organization from 1959 to 1970.

Myxomatosis research

Periodic plagues of rabbits stripped vast tracts of land and caused major economic losses to farmers in Australia before the myxoma virus was released. Use of the virus in this country had first been suggested as early as 1919 by a Brazilian virologist, but it was to be some years before the control measures were taken up. 'Myxo' soon proved its worth, as Mr Bernard Fennessy from the Division of Wildlife & Rangelands Research outlines in his contribution:



Rabbits around a waterhole during a plague in Australia.

Fifty years ago CSIR started research to find a solution to the rabbit problem in Australia. In 1936 field experiments with myxomatosis for biological control of rabbits started under Dr Lionel Bull of the Division of Animal Health. They were centred in a low rainfall area of South Australia. After disappointing results over several years the experiments were discontinued in 1943.

A new series of experiments commenced in 1950 under the direction of Dr Francis Ratcliffe, officer-in-charge of the then newly formed Wildlife Survey Section, precursor of the Division of Wildlife and Rangelands Research.

This time the study sites were close to the Murray River near Echuca, Corowa and Albury. It was expected that conditions there for the production of mosquitoes to spread myxomatosis would be better than had been the case in the earlier trials in South Australia.

During 1950 unusually heavy rains fell and many mosquitoes were produced, and as a consequence a major epidemic of myxomatosis developed. It spread rapidly and drastically reduced the rabbit population which had numbered hundreds of millions. Large scale outbreaks of myxomatosis occured during the next few years and pastures began to recover from the severe damage caused by rabbit grazing. A reflection of this was a production increase in wool and meat in 1952-53 worth about $68M.

Detailed study

Researchers in the Division of Wildlife and Rangelands Research, in collaboration with workers in other divisions, the Australian National University and State departments, began a long study of aspects of changes in the relationship between myxomatosis and rabbit populations. This work included: the detailed study of populations of several species of mosquitoes; research on the natural development and spread of less lethal strains of the myxoma virus; attempts to counter this by the re-introduction of more lethal strains; and the monitoring of changes in the genetic resistance of the rabbit population to the disease.

The results have provided a sound base for making the best strategic long-term use of myxomatosis which is still an important controlling factor in rabbit populations.

Coast disease control

'Coast disease', caused by a cobalt deficiency in sheep, had baffled sheep graziers for years. It took a determined effort by CSIRO scientists to crack the mystery of this costly illness. This brief account is summarised from an item in Surprise and Enterprise, a history of major CSIRO achievements:

In 1937, for the first time, South Australian farmer Bob Dawson watched his spring crop of lambs not only survive but thrive.

The land was at Robe in the State's south-east. Dawson's father had taken it on in 1877 and it had looked pretty promising then — with good rainfall and easily cleared scrub.

But settlers in the Robe district soon found that their sheep lost their appetites and their wool became 'steely' and dead-feeling. If the sheep were not moved inland every year they became anaemic, lethargic and wasted until, often, they died.

The settlers called this mysterious ailment coast disease.

In 1928 a scientist with CSIR's Division of Animal Nutrition, Dick Thomas, mapped one of the areas affected by coast disease and concluded that the soil would be deficient in heavy metals, some of which were essential animal nutrients.

But it was the Division's senior biological officer, Hedley Marston, who isolated a cobalt deficiency as the cause of the disease.

In 1934 Marston dosed disease affected sheep with cobalt nitrate and achieved for the first time a clear-cut cure.

Marston enlisted the help of Bob Dawson and his property to test the quantities and frequencies of dosing.

Salvinia control

CSIRO's 'hall of fame' in biological control includes skeleton weed, St John's wort, the Sirex wood wasp and various aphids, scale insects and vegetable bugs.

The tradition has been continued in the 1980s with one of the world's great triumphs in 'biological control': the discovery and successful introduction of a weevil to clear up the troublesome water weed, Salvinia.

Only a few years ago, Salvinia was choking dams and irrigation canals throughout Queensland and northern NSW,

Since the introduction of *Cyrtobagous singularis*, a 2mm-long weevil from Brazil with a ravenous appetite for Salvinia, Queensland has been liberated from the weed, and in northern NSW the weed is expected to be no longer a problem by the end of the coming summer.

More spectacularly, the very lifeblood of a large community in New Guinea's Sepik River region has been saved by the successful introduction of the weevil there.

Sirospun

CSIRO has long been involved with research to assist the textile industry. The Division of Textile Industry supplied this story:

Sirospun is a spinning technique developed at the Division and released commercially in 1980.

Sirospun produces fine worsted yarns in a single stage by combining spinning and twisting into a single operation. Normally these processes are performed in two stages. Sirospun therefore offers manufacturers significant increases in productivity, both through higher production rates and a shorter processing route. All that is required is a simple modification to the conventional ring spinning frame.

Traditional worsted weaving yarns are produced in two stages — spinning and twisting. Sirospun produces a weavable yarn in one stage.

Originally developed at the Division of Textile Industry, Sirospun was jointly perfected by a consortium which includes the International Wool Secretariat (IWS). The process is now in use worldwide on more than 130 000 spindles.

The scientific advances made t history would be impossible to the interests of avoiding a long we have chosen just a few projec In future editions we will look a of endeavour by the Organizatic

Gulf pra

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Research milestones

The scientific advances made by CSIR/CSIRO over its 60 year history would be impossible to outline in detail in this feature. In the interests of avoiding a long and superficial list of milestones, we have chosen just a few projects to present in a little more depth. In future editions we will look at some of the myriad of other areas of endeavour by the Organization.

included: the detailed study of populations of several species of mosquitoes; research on the natural development and spread of less lethal strains of the myxoma virus; attempts to counter this by the re-introduction of more lethal strains; and the monitoring of changes in the genetic resistance of the rabbit population to the disease.

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Gulf prawn survey

The Gulf of Carpentaria prawn survey of 1963-1965 is perhaps the most famous of all the projects and involvements of the (then) Division of Fisheries and Oceanography. Dave Rochford, at the time of his retirement as Chief, was quoted as saying that 'marine biologist Ian Munro's work on prawn stocks in the Gulf [was] the most important' of the Division's contributions to Australian marine science (*CoResearch*, October 1980). Here Dr Munro, the project leader, tells the story:

The survey created history in that it was the first properly conducted scientific investigation in Australia that led directly to the development of a major fishery. Prawn surveys elsewhere had led to commercial fisheries, but these had relied on the trawler masters' initiatives in prospecting wide areas. It was the scientific approach, together with systematic observations over a continous period, that led to the stocks which became the basis of the the Gulf fishery.

The survey was also unique because the biological and environmental data were collected in areas virtually uninfluenced by man's activities. Not only had there been no commercial fishing in the Gulf, there had been no urban development, mining or other industrial activity around its shores.

CSIRO was entrusted with the planning and conduct of a two year field operation under the general supervision of a committee.

The last weekend in July 1963 marked the beginning of the transition of the peaceful and virtually unknown fishing and hunting resort of Karumba to a busy commerical fishing port. The research team took up residence and the chartered survey vessel *Rama* arrived along with five Bundaberg trawlers and another independent boat *Kestrel*.

Within two days *Rama* was to undertake the first of her 122 cruises. The last finished on July 27, 1965 after carrying out 2324 experimental trawls within an area of approximately 25 000 square kms and accumulating a mind-bending quantity of data. These same data were still being processed 20 years on.

CSIRO appointed a project leader but on the eve of commencement he opted for a position in commercial life, and I was asked to fill the gap. Until that day I had been completely preoccupied as a fish taxonomist and I had roughly one week to rearrange my life and family affairs. Neither the technical assistants or myself had any familiarity with prawns other than gastronomic. With [Division scientist] Bill Dall's 1959 revision and a pound of prawns from a Cronulla fish shop we took our first lesson in penaeid anatomy and identification.

CSIRO and Queensland technicians found themselves working under different salaries and awards for identical work. Prawn trawling involved day and night work and often long shifts. These inequities plus boredom caused friction and dissatisfaction. Climatic conditions were trying with high ambient temperatures and sandflies in the dry months and extreme humidity and mosquitoes during the summer wet.

Sea-going conditions also were unattractive. *Rama* was an untried 14.6m wooden trawler brand new from the builder's yard in Bundaberg. She was designed for daytrip work and not for prolonged surveys in the tropics.

Shore accommodation comprised a cottage on stilts, serving as living quarters, laboratory and office. There was a small kitchen and bathroom, one dormitory and a tiny room which was used as office, radio room, chart table, library and bed space for the project leader.

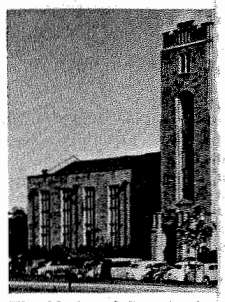
It took time and persuasion to rectify conditions but after suffering the first two months I returned via Brisbane driving a utility truck with a load of building materials and two extra technicians.

It was known that tiger, blue-leg king, Endeavour and banana prawns were to be expected in the Gulf and it was thought that effort would be devoted to trawling at night for the first named three species.

The abundance of juvenile banana prawns around the river mouths suggested the availability of large schools of banana prawns concentrated in tight balls. By analogy such balls should have been available within a kilometre or so of river mouths. Stocks of the nocturnal species were located quickly and the earliest of yield tests were conducted near Mornington Island in early September. Banana prawns in very small numbers had showed virtually everywhere during day and night while juveniles proved to be extremely abundant in coastal shallows during summer. However it took until late May 1964 to find the first ball of 600lb.

More and more schools were found and some quite spectacular lifts made during the final pilot scale joint operations, seaward of the Smithburne River.

The survey had served its purpose and despite the elusiveness of the banana prawns it was proved they could support a sizable commercial fishery, while the nocturnal species could provide subsistence during the off season. The satisfaction of achievement came only towards the end of two gruelling years of intensive effort and optimistic endeavour.



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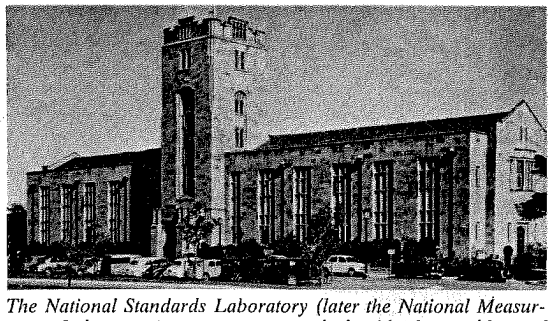


The National Standards Laboratory (later the National Measurment Laboratory) was set up to deal with the problem of inconsistencies in standards of measurement in Australia.

Remote sensing

CSIRO was quick to realise that remote sensing from aircraft or spacecraft is a technology essential to island continent Australia. By what other means could a small nation efficiently manage eight million square kilometres of largely inhospitable country that provides resources vital to its economy, not to mention 11 million square kilometres of coastal zone? This story has been supplied by COSSA:

CSIRO's involvement in remote sensing exemplifies the particular contributions that multi-disciplinary research and development can make to the national economy. Remote sensing is a technology that requires great breadth of expertise for its application. CSIRO, working in collaboration with industry, government and the universities, has provided the breadth needed to make the remote sensing story in Australia a successful one.

Just consider a few highlights:

In 1975, the Australian mining industry, in collaboration with CSIRO, started R&D work on the use of the LANDSAT satellites in mineral exploration. By 1979, major contributions had been made to the discovery of two major mines and, continuing the research partnership, the Australian mining industry has gone to to lead the world in the application of remote sensing to exploration.

CSIRO research into the use of LANDSAT imagery to map the Great Barrier Reef led to development of the analysis system BRIAN, which reduced mapping costs by an estimated $20 million. In partnership with an Australian company, the system is now commercialised as micro-BRIAN and is being sold throughout the Asia/Pacific region.

In collaboration with Carr Boyd Minerals, CSIRO developed an extremely sensitive airborne resource scanner that is now in extensive commercial use. It is mounted on light twin-engined aircraft.

The scanner will have many uses in mineral exploration, forestry, fishing and environmental monitoring. A new company has been floated to further develop and market it.

While Australian success in remote sensing has been a joint effort, the Organization's ability to conduct research across a broad front and to take early initiatives — such as building the first digital enhancement system and indigenous satellite reception facility and developing advanced scanners — have provided the impetus and critical mass essential to the rapid development of the field.

Atomic absorption spectrometer

Called 'the most significant advance in chemical analysis this century', the atomic absorption spectrometer has proven its worth beyond measure. Dr (now Sir) Alan Walsh got the idea which became the basis of the project while working in his garden. Here's his story:

The atomic project originated in the chemical physics section of the Division of Industrial Chemistry in March 1952. Why, A. Walsh asked himself, were molecular spectra usually recorded as absorption spectra and atomic spectra as emission spectra?

The answer was astonishing. Atomic absorption spectra appeared to offer many striking advantages over emission spectra, particularly when used for elemental analysis. A new but simple method of measuring atomic spectra was developed, and some of the predicted advantages demostrated by Barbara J Russell and J P Shelton.

The results appeared to violate basic tenets of spectroscopy and the first published papers were ignored or read with great suspicion.

In 1958 D J David (Division of Plant Industry) and E J Allan (New Zealand Department of Agriculture) demonstrated the great power of the method in the analysis of plants and agricultural materials. No firm was willing to produce the CSIRO spectrometer but three small firms in Melbourne were persuaded to manufacture various components of a simple 'working man's' instrument designed by CSIRO. These 'do-it-yourself' units proved highly successful and finally in 1962 encouraged production of a complete instrument.

Within a few years more elemental analyses were being carried out in Australia by atomic absorption than by all other methods combined. They became extensively used in innumerable branches of science and technology, particularly in mineral analysis, agricultural research, environmental control and metallurgical investigation.

Australia now has a thriving spectroscopic instrument industry. Such can be the consequences of curiousity-oriented research — of the type CSIRO used to be encouraged to carry out!

Radio astronomy

Former Chairman Dr Paul Wild was in at the start of the radio astronomy research in Australia. Here's his story:

I suppose nothing luckier can happen to a young would-be researcher than to find himself working in a brand new field which has yet to establish itself as a recognised and respected branch of science. Such was my good fortune in 1948, only a year after I had joined the radiophysics laboratory of CSIR. The field was called 'solar and galactic noise', later to be aggrandised with the title of 'radio astronomy'. There were a couple of dozen of us, more or less equally divided between research and technical staff, but we worked in seven or eight small teams, each of two or three people working on a different project.

I began working with one TA, Bill Rowe, and we spent a year building our own equipment — called a dynamic radio spectrograph — with an assortment of the heavy-looking valves, condensers and other radio components that characterised that era. With the aid of Keith McAlister and the RP workshop we built a rhombic aerial made of wood and wire, with a winch-controlled rope system to point it in any direction.

Then one day in 1949 we set up our field station near Penrith railway station at a place chosen for its low radio interference. Our lab was an ex-wartime trailer. We kept the aerial pointed towards the Sun and photographed the cathode-ray-tube display when anything interesting happened — ie. when the Sun erupted with a burst of 'noise'. Each day we travelled to Penrith by train — neither of us had a driving licence in those days. After four months of this we closed down the station and came back to the lab at Chippendale to analyse the results, which were published as four scientific papers. It was typical of all the teams working in that group that our equipment, our results and our conclusions would start a new line of research, eventually to be taken up (usually in much more opulent surroundings and with much more substantial budgetary provisions) in laboratories and observatories around the world.

So much of the credit for this highly successful 'small science' style of research goes to our research leader, Joe Pawsey. Joe, a self-effacing and highly perceptive and intuitive experimental physicist, was himself fortunate to have done his PhD at the Cavendish Laboratory in Rutherford's time, and obviously something of Rutherford's style had rubbed off.

Years after those early days, you could no longer obtain front-line results with improvised apparatus thrown together. They now give you posh, well-equipped air conditioned laboratories to work in and computers to automate your research and process your results. It is all a great improvement — but not nearly such fun!

CSIRO's Major Industrial Contributions

Established Industries
wool
hardwood pulp and paper
solar water heating
coal
non-ferrous metals
diecasting
leather and hides

Emerging Industries
scientific instruments
biotechnology
advanced ceramics
silicon chip design
space

From chaff to staff

Stableyards are rarely connected with scientific research.

But a stable was where Jack Cummins began his long and distinguished career with CSIR and later CSIRO.

The year was 1929 when the now retired 84-year-old scientist was an assistant research officer with CSIR's Division of Forest Products.

The Division was caught in a bureaucratic battle at the time with administrators fighting over its location: some wanted Canberra, others NSW.

Jack and his chief, I H Boas, favoured Victoria because of its close proximity to a large timber industry but they both knew there was limited space in CSIR's grandiose national headquarters in Albert Street, East Melbourne.

There was only one solution — convert vacant stables and servant quarters behind the gold boom mansion into temporary divisional laboratories.

'We scribbled out our plans while the CSIR executive council met in East Melbourne and presented these to the group when they finished,' Jack recalled,

'Everyone was so impressed, they agreed to it on the spot.'

Within weeks, chaff had been exchanged for staff and Jack was hard at work.

'I remember there were rickety old stairs we had to use and it got pretty cold too but the important thing was, we'd got started. When you're young, you can tackle anything.'

This pioneering spirit and willingness to confront problems head-on — and solve them — explains why Jack Cummins was one of the select few to attract CSIR's attention after it was formed in June, 1926.

An Executive of three academics headed this successor to the Institute of Science and Industry and received advice from a range of committees comprising scientists and business leaders.

CSIR was also keen, however, to have an educative role and allocated money to send five research students to work overseas on specific fields including food preservation, agriculture, animal health and forestry.

Jack, a graduate of the University of Western Australia and an officer with the WA Forests Department, leapt at the chance to study further overseas and answered CSIR's research work advertisement.

'Much to my surprise, I got it,' he said, 'I can tell you, I felt marvellous.'

Mr Jack Cummins

Two years of study at an American forest products laboratory followed, an experience that convinced Jack of the need for scientists to be actively involved in industry.

'The United States has always been more innovative in the science area because American universities encourage university staff to be consultants in industry.'

Jack brought this message back when he returned to Australia on the eve of the Depression and joined CSIR's fledgling Forest Products Division.

Instead of hibernating in the stable-cum-lab, he got out and about familiarising himself with people in the timber industry.

Jack recalls visiting one timber merchant in Spencer Street (where *The Age* now stands) and finding the proprietor unwilling to admit he had any problems with his wood-drying process.

'Once we explained what we were trying to do as scientists, he admitted he was in a hell of a mess.'

Forest products research may sound specialised but Jack's work with CSIR in the early 1930s was as expansive as the eucalypt forests he studied.

'In my field, you had to be a bit of a chemist and a bit of a physicist, a botanist, a micologist and an engineer. These days, of course, everything is so much more specialised.'

Jack welcomes this trend towards specialisation — 'We've got scientists today doing some marvellous work' — but he regrets the CSIRO's shift today towards 'top heavy administration' and 'inflexible' working arrangements.

'We faced a lot of work in the early days but the hours didn't matter,' he said.

'There was so much enthusiasm among the scientists that we'd take our holidays to fit in with our work instead of the other way round.'

This enthusiasm pervaded the highest echelons, according to Jack.

One man in particular stood out for his dedication and ability — Dr A D C Rivett.

Dr Rivett, a full time member of the CSIR Executive, a former Professor of Chemistry at Melbourne University and, in the words of Jack Cummins, 'the Organisation's strongest force.'

'He was an academic all his life and always in search for scientific truths. In no way would he have anything to do with secrecy in science.'

Jack followed Dr Rivett's example during his subsequent career with CSIRO by establishing scientific liaison bureau.

This bureau forged closer contacts between the research organisation and Australian and international business communities.

The end result was the practical application of valuable scientific work.

These days Jack enjoys a quieter life at his home in Kew but his interest in science — and the CSIRO — remains undiminished.

'Rivett used to say if you worked for the CSIR, you had to be worthy of it. I still firmly believe that.'

The challenge of the next 60 years

Cont. from p.1

Although it was agreed that the emphasis should be on applied work of national importance in support of the rural industries,, Rivett was concerned to achieve a healthy balance between work on immediate problems drawing on existing knowledge, the accumulation of new knowledge and the establishment of new principles.

Julius, a distinguished engineer and inventor of the automatic totalisator, did not always see eye to eye with Rivett, but by all accounts they formed a powerful team; Julius with his keen interest in the application of science and technology and understanding of business and economic affairs, and Rivett, the brilliant academic with his understanding of the ethos of scientific research and his organising ability. In 1927 Richardson, a distinguished agriculturalist and Director of the Waite Agricultural Research Institute, joined the Executive Commitee in place of Newbigin, to achieve a better disciplinary balance.

My recent reading of the early history of CSIR made me aware that the funding restraints on CSIRO over the past few years are not new; in fact they seem minor compared with the shock of 1930 when the CSIR Executive Committee was informed by the government that in view of the financial position of the Commonwealth, it would be necessary for CSIR to carry on until 1932 with what remained in the trust account.

This meant a cut in the 1930/1931 estimates from £257 000 to £163 000, and there were no new capital works. The Executive Committee ranked its sections in priority order for funding; top of the list was Head Office and library!

To meet Australia's changing economic circumstances in the 1930s, the necessities of the war effort in the 1940s and the post-war expectations of science and technology as the vehicle for greatly improved living standards, CSIR/CSIRO extended its activities to include research of relevance to mining, secondary industry and many other areas of community interest, including conservation of the natural environment and radioastronomy. The Organization can be proud of its many important contributions to the development of the nation, some of which are mentioned in this jubilee issue.

As we enter the next 60 years, it seems that the challenges facing the Organization are even greater than in the past. The dramatic decline in Australia's trading position has highlighted the need to make Australian industries more competitive and export oriented. It is also important for Australia to increase the export value of its rural and mineral industries by local processing. There is increasing recognition of the importance of research and innovation in achieving these objectives.

Most industrial countries have selected the same broad areas of research for special effort — areas such as biotechnology, new materials, information technology and space technologies. Australia, including CSIRO, must focus the research effort and take advantage of our strengths in natural and human resources

I see this concentration of effort as the greatest challenge facing the Organization in the next few years. It is often argued that concentration of effort can be counter-productive since one cannot predict the outcome of research, particularly basic research. But a small country like Australia with a total R&D effort less than one-half that of the biggest private R&D performers in the US cannot spread its effort too thinly.

Selecting priorities for strategic research must be based on economic as well as scientific judgements, and involve interaction with our customers and collaborators to ensure our research results are more quickly applied. The divisional advisory committees and Sirotech have important roles to play in assisting this process.

The nation will not obtain the full benefit of CSIRO's strategic research without a considerable strengthening of R&D effort in the private sector. The government is optimistic, however, that its recent industry policy initiatives including the 150 percent tax incentive for R&D and a new offsets policy will stimulate R&D in the private sector. I believe many firms in the private sector are becoming more aware that CSIRO is an extremely valuable resource, and there is much more scope for collaboration.

In some ways, the Organization has almost come a full circle in the composition of its governing body.

The new Board of CSIRO with only one full-time member, the Chief Executive, bears resemblence with the Council of CSIR, but differs in that the Chairman of the Council was also Chairman of the Executive Committee.

I am confident that CSIRO can continue in the Julius-Rivett tradition of the first Executive Committee with the balance of effort between strategic basic research and problem solving tactical research shifting from time to time to reflect the needs of the nation and the level of contributed funds from industry.

Staff remember the early years

Tom Greaves, an entomologist, was with CSIR/CSIRO from 1930 until 1967. Here he tells of the 'pioneering spirit' of some of the early officers at Black Mountain:

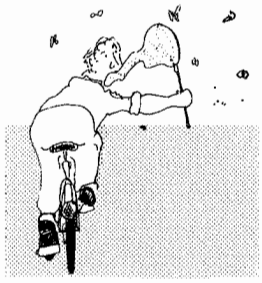
Two divisions of CSIR — Entomology and Plant Industry — were established in Canberra in 1929. As two laboratory buildings were under construction during 1929 and part of 1930, the research staff had to work in a variety of buildings.

Dr R J Tillyard, the Chief of Entomology, did much work in a glasshouse at the back of his house at Red Hill, and one of his assistants, Mary Fuller, used to ride a horse from Gorman House in Braddon to Red Hill.

In 1930 the Entomology building was finished and it was used temporarily to house both divisions until the second building was completed.

When I was appointed to Canberra in October 1930 the staff of Entomology was housed in the ground floor of the building and we were fortunate to have a number of underground labs to carry out experiments.

The two lab buildings were in a wide open area on the eastern side of Black Mountain. There was no public transport to the labs and it was necessary to have your own transport or make a 1½ km walk across the paddocks from Civic centre.



Few people had cars — mostly the chiefs and senior research officers — and it soon became obvious that the pushbike was the best method of travel to work. A great number of assistants lived in Queanbeyan and they used to race in each day with some very fast times.

The official transport for the whole of the CSIR staff was one car — a 1928 Chevrolet tourer which had to cope with all field work and administration such as pay days, etc.

To avoid all this uncertainty in travel it was arranged that we should use pushbikes and use our own lightweight camping gear, to make us independent of the official car.

When CSIR provided a tent we were given a camping allowance of four shillings a day and we had to provide our own food. The only way we could get food to the area was to order it through the Brindabella mailman. In addition there was a bike allowance of 2½d (2c) a mile for each of the first 20 miles and 1d (1c) a mile after that.

Things were very tight financially and it was a battle of wits to get repaid for some tools or camp equipment which was lost. The local secretary had been trained at the Commonwealth Serum Labs, a financially depressed department, and he was very loath to part with money for lost equipment. We often replaced the lost articles ourselves rather than create a mass of paper work.

After the completion of the laboratories, greenhouses and other buildings, money became available for other vehicles.

Much more work was done as additional vehicles were made available to staff. I thoroughly enjoyed the work throughout those pioneering times, and it was certainly less tiring than pushing a bike.

Peter Moglia from the Division of Building Industry says he's the longest serving member of CSIRO who's still employed the the Organization. Here's his contribution:

I can't for the life of me remember their names, for which I hope they will forgive me if they read this, but my two associates (associate = fellow office-boys) at the Head Office of CSIR at 314 Albert Street certainly taught me a thing or two about the workings of a bureaucracy and how to beat a system. Should I go on? Does the Statute of Limitations offer protection against retribution for minor (well, we thought they were minor) transgressions after 45 years? I hope so, otherwise I'm sunk.

Three-one-four was populated by some Very Interesting People (VIPs) in 1941. For starters there was Sir George Julius and/or Sir David Rivett, who seemed to be forever seated behind enormous desks in enormous panelled rooms off an enormous hall near the front door. This was the only place where we tried to display some dignity, although perhaps that was because we were scared stiff.

I'm not sure now who was really responsible for us, and I can't imagine that anyone would have stood in a queue for the privilege, but we had two regular duties that we answered to Mr Yarr for: opening the mail in the morning and dispatching it at night. 'Opening the mail' is a ritual that is taken for granted by those inside the system, but to me, coming straight from a production line at the Munitions Factory, it was a revelation.

It started with opening the letters, by hand of course, and without damaging the stamps, someone recorded their existence in a Big Book, someone else read them and made a learned judgement on who they were to go to (a decision that often had nothing whatever to do with the name on the envelope), another got out the Relevant File if there was one or made one up if there wasn't, and eventually one of us was sent off to deliver them. There was an air of urgency about the whole operation, and very often some mild controversy in the office about which file the letter belonged in. This was years before copying machines, and if a copy was needed it would have to be typed by the girls in the typing pool. I couldn't understand why all this proceeded at such a frantic pace until one day the whole process took a bit longer than usual and I took a letter to Dr Wark at about 11 o'clock

Retired CSIRO officer Buck Taylor, who worked in the Canberra RAO purchasing office, remembers the time when CSIRO 'subsidised' the John Curtin School of Medical Research:

The Australian National University was in its early growing stages in the 50s, and the then Prime Minister, Robert Menzies was asked to officially open the John Curtin School of Medical Research.

A last minute inspection of all the new laboratories in the school revealed the huge number of empty glass shelves and cabinets, so there was a hurried appeal to the CSIRO Regional Office and stores for the loan of jars of chemicals, winchesters of fluid and cartons of glassware to 'window dress' the new laboratories. The senior storeman (Tom Rudd) and his small staff at CSIRO helped to load dozens of very scarce and imported A.R. chemicals (remember World War II was less than a decade past), plus great quantities of imported analytical glassware into the 'hungry' vans from the University to be placed in the very visible shelving of the school. The official opening was a great success, and after a few days when the visiting academics and VIPs had departed, Tom sent his two assistants to the John Curtin School to collect the loaned supplies. He had quickly marked 'CS' on all labels from CSIRO with a crayon and told his staff to retrieve all 'CS' marked stores. But the staff were frustrated because the laboratory staff at the John Curtin School had no knowledge of the loan and all were convinced this was some low trick to deprive them of the basic needs — and in any case the CS mark merely indicated that these supplies had been forwarded from 'Chemical Stores' ANU. A lot of rude words were said on both sides, but not more than 10 percent of the supplies ever came home to Black Mountain.

This contribution comes from retired CSIRO employee, Mr A F Gurnett-Smith, who between 1966 and 1976 was secretary (agricultural and biological sciences) and secretary (research) and later became OIC of the Centre for Animal Research & Development, Bogor, Indonesia.

In the early 1960s I became involved in accompanying plane loads of politicians on visits to development projects and seeing what CSIRO was doing, especially in the northern parts of Australia. One year I went with Liberals and the next with a Labor group, and so on.

One hot afternoon in Townsville it was felt politically expedient to mix with the locals and Lowth's Hotel seemed as good a place as any. Before long a slightly unsteady Townsville-ite came up to me and over the din shouted in my ear "hey mate, what electorate do you come from?". My reply was that I was a "hanger on and came from CSIRO". He gave a grunt and disappeared into the crowd. A few minutes later he came back and with a perplexed look said "where is this *suicide row*?".

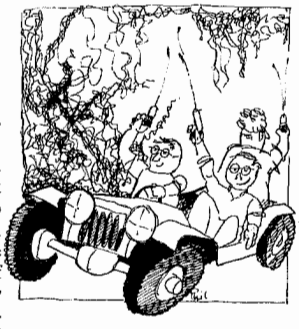
Many people don't believe me when I tell this, but I hope you will.

Here Herman Haantjens offers an anecdote which should bring back some memories for people who took part. Mr Haanjens was with (in order of appearance): the Division of Plant Industry land research and regional survey section; the Division of Land Research and Regional Survey; the Division of Land Research; the Division of Land Assessment; the Division of Land Use Research; the Division of Water and Land Resources; and, he assures us, the 'Division of Aquatic Acrobatics'. He has called his contribution 'Bureaucratic? Not in those days!'

In 1957, when we were surveying the land resources of the eastern highlands of New Guinea, whites were still a source of amazement in this densely populated region. Particularly this bunch of five crazy guys, who were not after gold, land, labour or women, but careered all over the place, crashing their clapped-out 4WD through rotten bridges, scaling precipitous heights, cutting themselves on sword grass or sinking deeply into peatswamps. Yet, miraculously, these newcomers never got lost and could even tell the locals a thing or two, thanks to the magic large, square pictures from which they were inseparable.

Staying in 'resthouses' we were constantly mobbed by curious crowds (men only, of course), counting the reconstituted peas on our plates, mouthwatering at the bullybeef rissoles served *ad nauseum* by our cook, whistling through their teeth upon seeing us cleaning ours, and starting through holes in the wall at our ghostly white bodies under the canvas shower bucket.

Enjoying even less privacy than the Windsors, we telegraphed Phil Rawlinson, AO of Land Research in Canberra, to airfreight up to 10 water pistols. They arrived three days later, no questions asked, no forms filled in, no customs or security checks, no nothing. And we ate and showered in peace with our loaded weapons at the ready, for a highlander fears nothing more than cold water. Yet to this day, I wonder who had more fun, the drenchers or the drenched.



***CoResearch* was inundated with anecdotes from staff or former staff for this section of the feature. Apologies to contributors whose stories weren't used — we will keep them for another time.**

Retirements

The Division of Applied Organic Chemistry lost two of its finest professional talents with the recent retirement of Dr John Lamberton, a chief research scientist, and his wife Dorothy, the Division's librarian.

John graduated from Sydney University with Honours in 1945, and spent a year as temporary assistant lecturer at the University of Queensland before moving to Melbourne University where he gained a PhD in 1950. Following a year at Liverpool University, John was appointed as a research officer in the Division of Industrial Chemistry in August of 1951. Throughout most of his career his foremost interest has been natural products (mainly waxes and alkaloids) in which he became a world authority, publishing over 200 papers.

During the last year of his employment, John led a group synthesizing agricultural pesticides for exploitation through the CSIRO/Du Pont Joint Venture. His wide knowledge of organic chemistry coupled with a first-class experimental technique formed the basis for his extraordinary ability to solve scientific problems.

Dorothy graduated from the University of Western Australia and moved to Fishermen's Bend as an Assistant Librarian in December 1954, soon after marrying John. She became librarian-in-charge at Fishermen's Bend after Miss Barbara Brown and developed the library into the finest collection of organic chemical literature in Australia. As well as her duties as librarian, Dorothy acted as information officer and was even known to suggest research projects for the Division's attention.

John and Dorothy have retired to Gosford in New South Wales.

Dr Ernest Bendit retired as Chief of the Division of Fossil Fuels and from CSIRO in June after 31 years with the Organization. Dr Bendit joined the Division of Textile Physics in 1955 after teaching physics at the University of NSW. He had already started some fundamental work on the physics of wool keratin at the university and his subsequent studies brought him an MSc in 1955 and a PhD at the University of London in 1967. In later years he turned his attention to the measurement of some basic properties of single wool fibres and pioneered a new approach to this problem. In the turbulent 1970s when the Division of Textile Physics had to reorient its research programs, Dr Bendit had to completely change fields. In 1979 he was asked to lead a group from the Division which had been redeployed to work on mineral and energy studies in collaboration with the Minerals Research Laboratories at North Ryde. That group became the physical technology unit in the Institute of Energy and Earth Resources. In January 1984 Dr Bendit was appointed Chief of the Division of Fossil Fuels when that Division was merged with the physical technology unit. Dr Bendit made many lasting academic and practical contributions both to wool science and the mineral industry.

Mr John Kiel, an administrative officer with the Regional Administrative Office Melbourne recently retired after nearly 43 years with the Organization. John started as a messenger in May 1943 and moved through a number of clerical/administrative positions but over the last 23 years he has been the back-bone of the salaries section. His detailed salaries knowledge, his ready assistance and his dry wit will be missed by all RAO and Divisional Administrative Staff.

The officer-in-charge of the Brisbane building and properties section, **Mr Ray Brooks** retires next month. Mr Brooks, an architect, joined CSIRO in 1961. He worked on a variety of projects including animal houses and laboratories for the Division of Animal Health, and on the original Floreat Park laboratories. Mr Brooks resigned from CSIRO in 1969, but rejoined the Organization in 1974.

Dr Jack Delminico, a chief research scientist at the Division of Textile Industry, has retired after 34 years with CSIRO — including eight as the Division's Assistant Chief. Dr Delminico joined Textile Industry in 1952.

His research resulted in publications on wool setting which are now standard references on the subject. His contribution to textile research was honoured in 1977 by the award oof a Fellowship of the Textile Institute (UK).

Dr Coogan, AM

A CSIRO scientist who has played a leading role in science and industry liaison, Dr Clive Coogan, was awarded an AM (Member in the General Division of the Order of Australia) in the Queen's Birthday honours in June.

Dr Coogan, the foundation Chairman and currently Director of the Australian Scientific Industry Association (ASIA), was cited 'for services to science and CSIRO'.

Dr Coogan joined CSIRO as a research scientist in the Division of Chemical Physics in 1951, later becoming leader of the solid state chemistry section and, in 1978, Assistant Chief.

In 1980, he joined the Bureau of Scientific Services (now the Bureau of Information and Public Communication) as executive scientist, science and industry liaison.

He was the first member of staff (with Ray McInnes) to become a member of CSIRO Advisory Council (1973-79), and is a member of the joint committee of CSIRO and the AVCC.

He has served on numerous educational and government committees, including AIRDIB and the scientific industry steering committee of the Department of Science, and has led trade missions on scientific instruments to China, Germany and France.

Vale John Eley

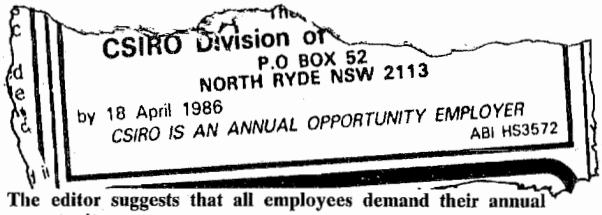
Friends and former colleagues of Division of Textile Industry experimental scientist **John Eley** will be saddened to learn of his untimely death on 29 June. A graduate of Adelaide University in 1947, John worked with the South Australian Department of Mines before joining the Adelaide wool processing firm of G H Mitchell and Son in 1951, gaining industry experience which was later to be very valuable to CSIRO. In 1968 he joined the Division as an experimental officer and has since worked on research involving such projects as self-twist spinning wool, wool processing on short staple equipment and, more recently, worsted card productivity.

CSIRO counselling network now complete

The appointment of Miss Deidre Wise as personal counsellor at the Marine Laboratories in Hobart has completed the CSIRO network of counsellors around Australia.

CSIRO counsellors are now based in all major capital cities to offer confidential personal assistance to all staff and their families.

The counsellors also visit the Organization's sites outside the capital cities.



The editor suggests that all employees demand their annual opportunity now

The Sirens wave the flag for CSIRO

CSIRO sirens take on high-tech

A team of six 'CSIRO sirens' comprising Captain Jenny Stauber, Kerrie Mann, Debbie Alewood, Jan Chipperfield, Ann Atkins and Carol Callaghan flew the flag for the Lucas Heights Research Laboratories in the ladies' race at the recent rubber raft regatta on Sydney's Woronora River.

The girls, all members of the Division of Energy Chemistry, paddled a hastily engineered bunch of tyres, held together by wood, plastic and approximately 600 meters of string (which coincidentally was the length of the course).

They were not disgraced when beaten into 7th place (out of 20) by a bunch of hi-tech craft. Trials in the site swimming pool obviously helped in fine-tuning both the team and the raft.

Many local spectators, unaware that CSIRO had a foot in Lucas Heights, are now better informed. Next year a more sophisticated craft is planned and maybe the men will have a go too.

Rave reviews for trees book

The new book on conserving and propagating trees in Australia — Think Trees Grow Trees — has received high praise from a number of reviewers around the country.

The book was prepared by a team of scientists including seven from CSIRO (see *Co-Research* 289, March 1986).

One of the co-authors, Dr Wilf Crane from the Division of Forest Research, said more than 40 review copies had been mailed out.

A press review in Tasmania by farming and horticultural correspondent Peter Cundall said '...this is an unhesitating and quite shameless demand that every landowner or farmer should race down to the nearest bookshop and buy a copy immediately — it is one of the most valuable and remarkable books I have read in years...it should be in every farmhouse, living room — in fact everyone should have a copy. I insist you buy it...'.

John Colwill on the ABC radio program Science Bookshop said 'it was a very readable mixture of theory and practice which breaks new ground and hopefully will help preserve the old'.

Judith Turley in a recent issue of the Canberra and Southeast Regional Environment Centre journal *Bogong* said it gives a wealth of information about trees in the Australian environment'.

The headmaster of Crestwood High school near Sydney sent a letter saying 'I am so impressed with it that we shall be buying multiple copies for staff and student courses in Geography'.

Dr Crane said all that is needed to make the book a best seller is 'a little marketing' and better availability. At present it is not generally stocked by non Government bookshops, although some individual stores have copies.

It is available through Australian Government bookshops and the Institute of Foresters.

ASTEC report

Staff groups welcome Govt decisions

CSIRO staff associations have welcomed the general thrust of the Federal Government's decisions on the Australian Science and Technology Council (ASTEC) report on the Organization.

The president of the Officers Association, Mr Roy Bond, said the OA agreed with most of the recomendations endorsed by the Government, particularly those relating to research.

However, it opposed the decision not to have a staff member appointed to the new Board and would seek to have it reversed.

The chairman of the Chiefs' Committee, Dr Trevor Scott (from the Division of Animal Production), said chiefs would have varying views but 'most would be pleased' with the outcome.

The president of the CSIRO Technical Association, Mr Ross Rebgetz, said the Association welcomed the Government's announcement and 'eagerly awaited' the Board's decisions on staff matters.

And the assistant federal secretary of the Australian Public Service Association, Mr Paul Wright, said APSA was 'happy with the outcome in general'.

Mr Bond said the Government had left a lot of the industrial relations questions to the incoming Board and 'that is satisfactory at this stage'.

'Our major concern is that the Government did not support an effective method of industrial democracy,' he said. 'We wanted a staff representative on the Board and we consider the Consultative Council an inadequate substitute.

'The OA is not just interested in industrial relations. We need to participate in matters of science policy and will continue to work towards that.'

Mr Bond said the association welcomed the proposed voluntary retirement scheme but believed it should be available to all staff. Mr Rebgetz said any scheme should include technical officers.

In its efforts to have a staff representative appointed to the Board, the OA will not have the support of APSA. However, the Technical Association supports appointment of a staff representative.

Strong argument

Mr Rebgetz said there was a strong argument for a staff rep when the Board was going to be making decisions about the management of staff.

Mr Wright said APSA did not believe a staff rep should be appointed to the Board and the Consultative Council was 'adequate' to deal with most industrial relations issues.

'We do say that one of the Board members should be appointed following nomination by the ACTU,' he said. 'It is desirable to ensure there is someone on the Board who has broad industrial relations experience.

In other organisations where a staff member had been appointed to the board it had been a failure because there was too much potential for conflict of interests.

Mr Wright said the APSA would be putting the case for an ACTU nominee to the ACTU and asking it to negotiate with the Government on the appointment.

All work and no play...

Cathy Flanagan, left, and Karen Embrey with their snow creation. Photo: Thor Carter

There was no chance of Jack or Jill being dull at the CSIRO Marine Laboratories in Hobart on 25 July when the heaviest snowfalls in 65 years virtually brought Tasmania to a standstill.

Only about 30 of the 200 or so staff were able to report for duty as many areas were isolated and roads were closed even in the inner city district. It was a case of 'survival of the fittest' — or so the 'fit' ones claimed.

Such an extraordinary occasion called for at least a few minor diversions, including the construction of a snowman at the entrance to the laboratories. Receptionist Cathy Flanagan and stenographer-secretary Karen Embrey braved the elements to add their personal touch.

There was some consolation, however, for those who actually made it to work — telephone systems were jammed as a result of the chaos, so there weren't even local calls to interrupt trains of thought.

Needless to say there were plenty of stories to tell when life returned to normal the following Monday.

Research areas for tackling wildfires identified

A recent CSIRO workshop on fire ecology in northern Australia identified research problems to be tackled before ecologically based fire management plans could be made.

The workshop, held at the Organization's Central Australian Laboratory in Alice Springs at the end of May, was sponsored by the Institute of Biologiccal Resources. The aim was to boost communication between CSIRO staff and other researchers and land managers concerned with fire in the north.

A feature of the event was the participation of representatives from most government agencies responsible for fire management in Western Australia, Northern Territory and Queensland, as well as people involved with both conservation reserves and pastoral country.

The major research problems outlined by participants included: the study of long term responses of fire prone environments to continued burning, to identify implications of changes in slowly shifting environmental factors; how to integrate a range of data to improve forecasting of ecosystem responses, and especially increase knowledge of responses by fauna; and how to provide advice on critical data sets that have sufficient information for managers to monitor progress of burning regimes.

Major management problems were also identified, including ways of improving communication between researchers, managers and administrators at all levels.

For further information on the outccome of the workshop, contact Dr Stephen Morton, Division of Wildlife and Rangelands Research, Alice Springs.

EEO

Cont. from p.2

more than pay dividends later. A technical assistant, indefinite, gaining normal promotion, will cost the Organization well over $1 million. A scrappy two pages, minus selection criteria, is just not good enough for an investment by the Organization of some millions of dollars. If EEO can save one poor appointment per year then the Organization's investment will be justified.

Chief being sought for new water division

A new Division of Water Resources Research, with major laboratories in Canberra and Perth, will be set up following a worldwide search for a Chief.

The Chairman, Dr Boardman, said the new Division would be formed from elements of the Divisions of Groundwater Research, Water and Land Resources and the hydrology group of the Division of Soils. About 200 staff would be involved in the reorganization.

Staff with expertise in land resources who will not transfer to the new Division will join other divisions.

Dr Boardman said the establishment of the Divison reflected the importance CSIRO attached to research into the use and management of water and the Organization's to support and work with the major Australian water authorities.

Water research was a high priority area within CSIRO and the new Division would lead to better co-ordinated and enhanced water research in Australia.

'The Division of Water Resources Research will be responsible for developing CSIRO's role in in the nation's water resources research,' Dr Boardman said.

'Its objectives will be to develop new or improved practices for the management of Australia's water resources including the maintenance of the quantity and quality of water supplies and the disposal of waste water. It will also work on projects of major national importance with substantial agency or user support.'

The Division will be established when the Chief takes up the position and the Divisions of Water and Land Research and Groundwater Research will continue until then. In the interim, the Director of Energy and Earth Resources, Dr Alan Reid, as Chairman of the Organization's water sector policy committee will be responsible for the initial development of the new Division.

'Long distance' tuna

It was no ordinary southern blue fin tuna that fishermen on the Japanese long- line fishing vessel, the Fususeki-Maru No. 27, hauled aboard on June 10 last year.

One of the tuna pulled aboard that day had travelled the longest distance of any tuna tagged in CSIRO's Southern Blue Fin Tagging Program.

A 6kg tuna, aged about two and a half years old, tagged off Bermagui, NSW, on August 6, 1968, was recaptured by the Japanese vessel south-west of Cape Town - almost 13,000 kilometres from the point of release.

Scientists at the Division of Fisheries Research hope to be able to determine the route taken by the fish, which weighed 68kg and was nineteen and a half years old when caught by Mr Yoshiyuki Miyake.

Since 1959 almost 62,000 southern blue fin tuna have been tagged off the NSW, South Australian and West Australian coasts. Returned tags, such as the one from the 'long distance traveller' now being studied at the Marine Laboratories in Hobart, help scientists to check on the movement of tuna, the growth rate, natural mortality rates, the fishing and stock assessments, interaction between fisheries and the interchange between schools.

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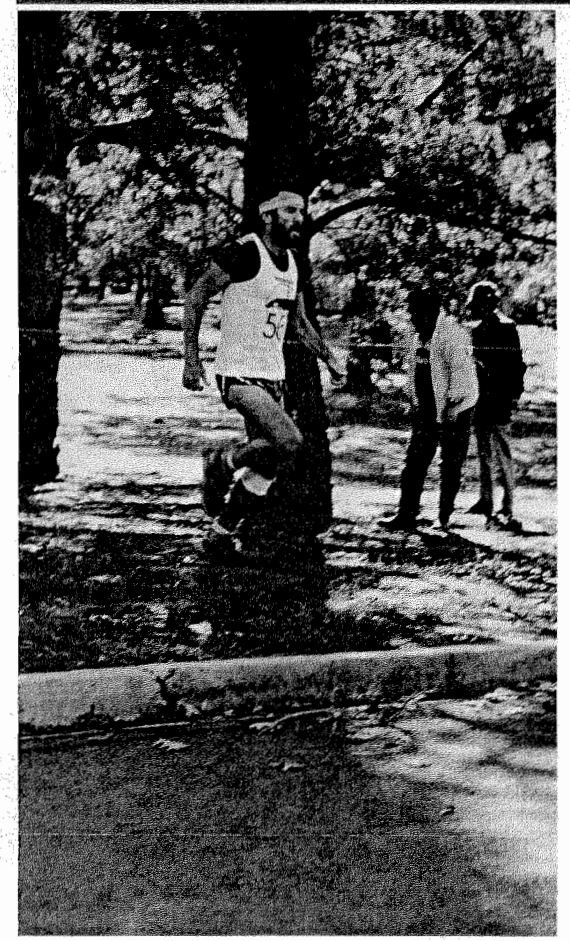
CoResearch **is produced by the Public Communication Unit for CSIRO staff. It's also circulated to a number of people outside the Organization who are interested in CSIRO activities. Readers are invited to contribute or offer suggestions for articles. The deadline is the last Monday before the issue month. Editor: Liz Burden, PO Box 225, Dickson ACT 2602. Ph: 48 4479.**

PI victorious in 10th anniversary Black Mountain Fun Run



Our photographer can't be accused of favouring winners. This photo is of Roger Farrow of the Division of Entomology, who came 27th in the 10th anniversary Black Mountain fun run.

The Division of Plant Industry consolidated its current dominance of the annual Black Mountain Fun Run with a team victory for the second year in a row.

The PI team received the coveted Black Mountain Cup for its performance in the race late last month. Water and Land Resources came second and Forest Research was third.

In the individual scores, PI entrant Allen Miller was victorious, although he was well outside last year's record time of 18mins 8.7secs by his PI colleague and nationally ranked runner Peter Berney. Berney didn't run in this year's event. Miller scored a time of 21mins 19.5secs. Second individual was Mick Crowe from Forest Research and third was Mike Sully from Environmental Mechanics.

Early Cups had been dominated by top-class runner Rosemary Longstaff (nee Bell) from Entomology, who won the inaugural event in 1977 and went on to score wins in 1980 and 1983, and seconds in 1978, 1979 and 1981. Longstaff didn't run this year — in fact only two women did, with Sue Cuddy from Water and Land Resources being the first home.

Of the 10 races in the series, Entomology has won five, but now PI is coming to the fore with three team wins — in 1981, 1985 and 1986.

In the age categories the first runner over 40 years was Terry Speed, Chief of the Division of Mathematics and Statistics. Mike Jeffery from Entomology took out the over 50 class, while Keith Perroux from Environmental Mechanics was first home in the over 60s class.

Individual winners received bottles of wine supplied by the race sponsor, Sirocredit, who also provided ANU Sports Union vouchers as prizes in an associated competition.

New research solves long standing mystery

There has been a major breakthrough in coathanger research. This (unaccredited) item arrived via Jenny Thurmer at the South Australian Museum and Penny Greenslade at the Division of Entomology.

I'm sure we've all observed that wire coathangers tend to multiply between one observation and the next. Sociologists thought that this was just another example of crowding behaviour, but it took a biologist to find the true explanation, which lies in linking the coathanger phenomenon to a parallel but opposite one: the disappearance of wire paper clips from drawers in which several have been seen previously. The explanation is devastatingly simple: the paper clip is the larval form of the wire coathanger.

The metamorphosis and migration from desk to wardrobe are rarely observed and are presumed to occur in the early morning hours. (Similar phenomena are apparent among the newly evolved plastic coathangers and their larval form: the plastic paper clip.)

The reason wooden coathangers are an endangered species now becomes obvious: there must be some widespread infertility disease within the species, since no larval forms of the wooden coathanger have been observed in recent times.

The original observation of the crowding behaviour of wire coathangers under confined conditions has led to other interesting studies. Tupper and Ayer (1980) used this example as a model in their study of the apparently similar crowding behaviour of left-overs in refrigerators, which (as is commonly observed) multiply when the door is closed. However, Balfe (1982) has reported that, unlike coathangers, confined left-overs display the following unique behaviour patterns: (i) Like does not reproduce like; each new left-over is different from every other left-over, and (ii) containers with contents of greater affect (more tasty or more perishable) migrate to the back of the refrigerator, regardless of size, shape or fit-with-top of the container, as soon as the door has been closed.

Aussie football challenge

The Division of Building Research is challenging other divisions in Victoria to a social game of Australian Rules football.

At present, the Division stands undefeated because the RAO failed to field a side.

DBR says the only guidelines for the match are that women are welcome to play, and 'please no football "ringins".' The game would be followed by a team shower (only kidding...) and a BBQ.

For further information please ring Peter Westgate on 556 2289.

CoResearch

CSIRO's staff newspaper

No. 295 September '86

Journals to continue

CSIRO will continue to publish the Australian Journals of Scientific Research but will seek to put them on a sound commercial basis.

The Director of the Bureau of Information and Public Communication, Mr Peter Dunstan, said CSIRO had proposed a new agreement between the Organization and the Australian Academy of Science. The proposed agreement involved a major marketing effort to support the journals.

The journals, published jointly with the Australian Academy of Science, cost about $2 million to produce in 1985-86 and returned almost $500 000 in revenue. They are also used in an exchange program in which the Organization receives publications from overseas institutions.

Mr Dunstan said the journals were a valuable resource for Australia and CSIRO wanted publication to continue but on the terms of the proposed publication agreement.

The major elements of the basis for agreement are:

. universities and other user groups contributing towards the cost of publication;

. reducing typesetting and other costs;

. increased subscription revenue and quotation of overseas subscriptions in United States dollars;

. a positive marketing plan involving more aggressive promotional support, a wider network of distributors, possible paid advertising and regular price reviews.

'The combination of more cost-effective production, increased revenue and contributions from the major beneficiaries of the journals on the "user pays" principle is expected to provide the stability necessary for the continuation and enhancement of the journals,' said Mr Dunstan.

The publications involved are the Australian Journals of Agricultural Research, Biological Sciences, Botany, Chemistry, Marine and Freshwater Research, Plant Physiology, Physics, Soil Research, Zoology and Australian Wildlife Research.

Federal budget

CSIRO not singled out for cuts, but funding falls in some areas

'It will be a tight year, but it won't be a disastrous year'.

This statement by the Institute of Energy and Earth Resources secretary Dr Nevil Byrne, appears to sum up the reaction of the institutes to this year's federal budget allocation to CSIRO.

Unlike the 1984 budget, which was a particularly difficult one for the Organization, this year the axe fell across the board. In the case of CSIRO, salaries and operating funds have dropped by about 1.5 percent in real terms this year.

CSIRO's overall funding just about kept pace with inflation. About two weeks before the budget, $5 million was lopped by the Expenditure Review Committee from the CSIRO estimates. The Organization's allocation for 1986/87 is $364.1 million, an increase of $27.4 million on last year's $336.7 million.

The allocation for salaries and operating costs is $329.6 million, up from $306.6 million last year. However, this includes a special provision of $5 million for the early retirement scheme.

Funding for buildings and major equipment was $34.5 million, compared with $30.1 million last year.

Total estimated expenditure for CSIRO in this financial year, including revenue and contributions from industry and grants bodies, is $451.6 million. Last year the actual expenditure was $418.3 million.

The Executive will allocate a further $4.8 million to the growth areas.

Institutes have been asked to shield growth areas from any cuts, leaving non protected areas to take the brunt. However, it seems some institutes will, through necessity, allow small reductions to flow on to growth areas in some instances.

The erosion of budget funding over the past decade means the Organization has ever-decreasing resources at a time when demands are growing. Some of the division chiefs contacted by *CoResearch* painted a gloomy picture of cuts to operations — and staff — as a result of operating funds continually falling behind the inflation rate.

Here's what CSIRO's five institutes had to say about this year's budget:

Dr Nevil Byrne, IEER: 'I think the important thing is our capital equipment has been run down. When you get a declining budget it is much easier to put off buying major capital items such as analytical equipment, than it is to reduce staff.

'These constant delays in buying equipment are starting to have a serious impact on the effectiveness and efficiency of our research. All our divisions badly need major items of equipment.

'We've made it an Institute policy that, although the Executive has given us money for items of equipment, we've also added extra money as an Institute priority. This year we won't be able to do that.

Mr Alan Charles, Institute of Animal and Food Sciences: 'It will be a difficult year.

'In order to provide the resources needed to maintain momentum in growth areas, even protected programs will probably suffer some reductions, and unprotected programs may lose up to five percent of their resources.

Dr Andrew Pik, Institute of Physical Sciences: 'There is a hope that CSIRO will increase its contributions from outside, especially with the 150 percent tax deduction incentive and the new arrangements for offsets.'

He said some divisions had suffered particularly badly this year and there would have to be significant cuts in some operations.

Mr Keith Avent, Institute of Biological Resources: 'The Executive has worked very hard at reducing its commitments, and the Institute is looking at things in the same sort of way — we're trying to minimise the impact of institute level needs on the divisions.

'We are trying, in these tight times, to minimise the more traumatic aspects of funds management so divisions can get on with their work as much as possible. The other side of that coin is that we will be looking to negotiate with divisions for more redeployment of resources within and between divisions on an agreed basis, rather than using the mechanism of pulling funds out and putting them back in.'

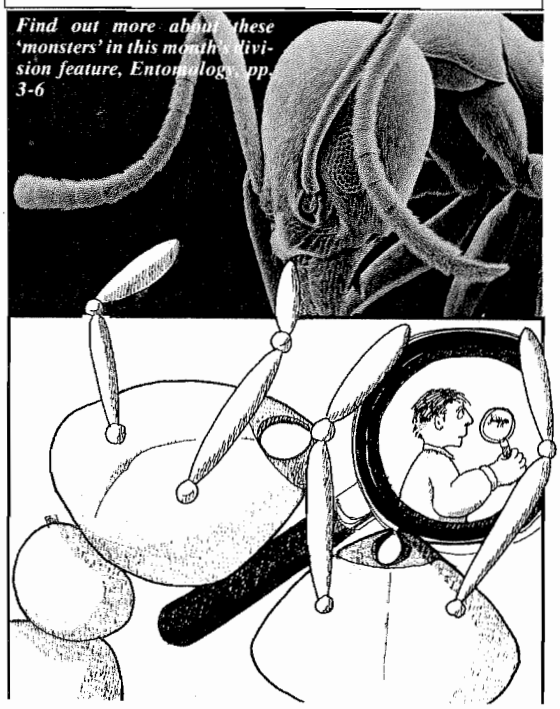
Dr Bill Whitton, director of the Institute of Industrial Technology: 'From IIT's point of view it was good that the budget contained strong incentives for the improvement of productivity and competitiveness of Australian manufacturing industry. These incentives included: 150 percent tax concession for industrial R&D; other grants for industrial R&D (GIRD); support of the National Industry Extension Service (NIES); and continuation of the management and investment companies (MIC) program.

'With limited funds it's essential for CSIRO to complement the increased effort by private industry through collaboration and careful selection of areas for research growth.'

Budget hardships are being compounded for many divisions by the imposition of heavy charges for the Cyber 205 'super computer' at CSIRONET. Divisions in all institutes except Animal and Food Sciences have been told to come up with a total of $1.2 million. This is the result of an Executive decision to have the divisions use and pay for the Cyber.

Dr Pik said 'divisions who responded well to management committee calls last year to use the Cyber under the merit scheme are now being penalised and forced into paying for it — and in most cases they really don't want to use it'. IPS has shouldered the major part of this responsibility, and will have to pay out $500 000.

Dr Byrne at IEER said 'the Institute will be required to pay $300 000 [for the Cyber] whether we like it or not. That of course is putting a big dent in our equipment budget'.



Find out more about these 'monsters' in this month's division feature, Entomology, pp. 3-6

From the Chairman

A column by Dr Keith Boardman

The worsening of Australia's balance of payments in July and a further devaluation of the Australian dollar coincided with the final deliberation of Cabinet's Expenditure Review Committee on the 1986/87 budget.

The continuing downward trend in the economy undoubtedly increased the resolve of the ERC to reduce the budget deficit by a further pruning of government expenditure. CSIRO's share of the additional cut was $5M, plus $1·5M, the latter representing the salaries of 30 positions as our share of the 0·5 percent general staff reduction in the public sector. It was fortunate for CSIRO that the ERC at an earlier meeting had accepted our offer to slow down the construction of the Australia Telescope, to meet an earlier reduction of $4M in CSIRO's forward estimates. The final result which represents a cut in real terms of about 1·5 percent in salaries and operating expenses was not as bad as it might have been.

In discussing the budget at its August meeting, the Executive agreed that the Organization should take a positive stance and further enhance those areas which had previously been identified for growth; particularly information technology and generic manufacturing technologies, but also space science and technology, water resources research, raw materials processing and human nutrition. Inevitably, this means reductions in some areas of low priority, and the phasing out or termination of programs.

The Executive confirmed its support for an early separation incentive scheme, even though the benefits of the scheme had not yet been approved by the government at the time of the Executive meeting. However, the Executive recognised that the special government allocation of $5M in the budget towards the cost of the scheme is likely to be far short of the total payments to staff, including long service leave, recreation leave and benefits under the scheme. It will be necessary to leave positions vacant for the requisite periods to meet the excess costs.

Sirotech recently conducted two very successful technology marketing workshops in Melbourne and Sydney and the response of senior staff was excellent. The objective of the workshops was to improve the appreciation by CSIRO researchers of market forces and the factors which limit the successful exploitation of a new product or process. The discussions at the workshops indicated a lively interest of many staff in the commercialisation of CSIRO research and technology, including the assessment of markets, the selection of commercial partners, the valuation of intellectual property and revenue retention from royalties and licence fees.

Some concern was expressed about the possible effects of commercial agreements on CSIRO's core research, and the freedom to publish. I believe it is vital for CSIRO scientists to be able to publish their research findings in the international literature and to interact with the international scientific community. It is essential, however, that potentially valuable intellectual property is not disclosed, either at an open seminar or in a scientific paper until it has been assessed and where appropriate provisional patents taken out. We must also respect the view of any commercial partners on the timing of publications.

I am writing this column a few days before leaving for overseas. The itinerary includes brief visits to the USA and Canada before going to Scandinavia, and returning via Tokyo. The main purpose of the trip is to visit small to medium sized hi-tech companies in Finland, Sweden and Denmark, to gain information on the relationship between indigenous R&D and imported technology, the extent of collaborative research, the importance accorded to R&D by boards of companies, and the methods used by companies to keep abreast of scientific advances and market opportunities. The private sector visits will be complemented by some visits to universities, research institutes and government bodies.

A Keith Boardman

Chairman Keith Boardman and 1986/87 budget

Letters to the Editor

More letters on p.7

Dear Editor,

I wish to clear up some confusion in your *CoResearch* article, Aug '86 concerning the life-cycles and phenology of coathangers. You state 'there must be some widespread infertility disease within the species, since no larval forms of the wooden coathanger have been observed in recent times'. This is simply untrue; it is an assumption which arises from the further (implied) assumption that wire or plastic coathangers and wooden coathangers are phylogenetically (and taxonomically) related and, therefore, are likely to have similar larval forms. The facts are that any similarity between wooden and other forms of coathangers are now known to be the result of convergent evolution.[1] the phylogeny and ontogeny of wooden coathangers is quite distinct and, so far as we can ascertain, diverged from the metal and plastic varieties no later than the late Mechanozoic cra. During the (earlier) middle Mechanozoic, wooden coathangers showed an amazing diversity and vigour of speciation; many padded, carved, hinged and other bizarre forms (now rare) are known from these times.[2]

It has been recognised for some time that the larval forms of wooden coathangers are, in fact, wooden clothes-pegs.[3] The evidence for this is the opposite of that used to determine the larval forms of metal coathangers which was a linking of opposites — this is a linking of similar phenomena. A time-series sampling of the contents of any typical peg-basket will reveal a steady decline in the number of healthy wooden pegs and an increase in the number of weed species (plastic pegs). This, of course, has led to a decline in the number of wooden coat hangers. Any attempt to encourage the conservation of the intrinsically and aesthetically 'better' wooden coathanger, must therefore, concentrate research on the reasons why peg baskets are so attractive to invader species of the plastic persuasion. Research proposals of this nature should be before the Executive shortly.

As with other forms, the metamorphasis and migration of larval forms remain obscure, but, because of the differences between the species, is expected to show specific and generic peculiarities. Finally, on this point, I draw your attention to the delicate balance which exists where three species share a single niche (in this case, a wardrobe). Wooden coathangers are best adapted to handle a superior style of good clothing, whereas the plastic coathanger is well adapted to intermediate, clinal or gradational clothes and any old junk can be chucked over a wire coathanger. Given the observed decline in wooden coathangers in this country I think it is safe to conclude that the sartorial habits of most Australians leaves much to be desired.

In conclusion, I deplore the introduction into your article of the work relating to the habits of refrigerator leftovers. These activities are purely behavioural and, hence, belong in one of the infamous soft science journals, such as 'Social Studies on Electrotropic Technogrubs' or similar. Digressions into such areas of dubious, so-called science can only serve to cloud the important issues of coathanger evolution, habits, growth and development which are of immediate practical concern to all Australians. Historically, it has been this ability to extract utility from the *hard* sciences which has formed the basis of CSIRO's scientific reputation and which will carry it into the twenty-first century.

Notes

1. *P Thomas, unpubl., 1986.*
2. *C G Thomas (my mum), pers. comm., 1957.*
3. *As no empirical evidence exists on this point, statistical techniques have been used. Iterative Assertion has been found to reduce the probability of effective contradiction to almost zero when the number of iterations exceeds one million.*

Paul R Thomas
Division of Forest Research

Dear Editor,

In a letter to *CoResearch* (August, p. 2) the Director of the Bureau of Information and Public Communication is credited with the view that 'there is little support for the Australian journals amongst the divisions of CSIRO. The undersigned scientists in the Division of Entomology believe this view to be greatly mistaken.

We wish to state categorically that we regard the Journals overall, and particularly the Australian Journal of Zoology, as extremely valuable, high quality outlets for our published work. Indeed, their international reputation constitutes a major source of the high standing of CSIRO and Australian science in the international community. We would regard it as a major disaster for ourselves and for CSIRO if the Journals were to be abandoned, curtailed, or placed under an editorial regime less experienced and less attuned to the Australian scientific scene than at present.

We cannot consider the net cost of producing the Journals as at all excessive, having regard to the statutory obligation of CSIRO in the publication field. However, should that be brought into question, we would argue that the cost should be set against that that would be incurred, in escalating page charges and reprint costs, if we had to publish in overseas journals (one journal in our field now charges US$80 per page).

We have in the Australian Journals of Scientific Research a highly effective local product in which we can feel pride. If comparable journals can be published by the Scandanavian countries, Holland and Switzerland, surely the task should not be beyond Australia's capacity.

K H L Key

[This letter was signed by 31 other scientists at the Division of Entomology. See story on page 1 about this issue.]

Dear Editor,

At a recent meeting of the heads of the various Divisions and Units represented at Lucas Heights, concern was expressed at a perceived decline in the news coverage in the new format of *CoResearch*.

In particular the value of the Monthly Division Feature was questioned. Whilst the articles are of some interest the effort involved in producing each article is considered to be detracting from the breadth of coverage of the rest of the publication. Surely the primary role of a staff *newspaper* is to print topical articles, not historical features, and should reflect the diversity of activity of the Organization. This was always one of the attractive features of previous *CoResearch* publications.

To emphasise the point, there used to be a standard invitation extended to all staff to submit articles to the editor, together with deadline dates and a contact address. This is now missing.

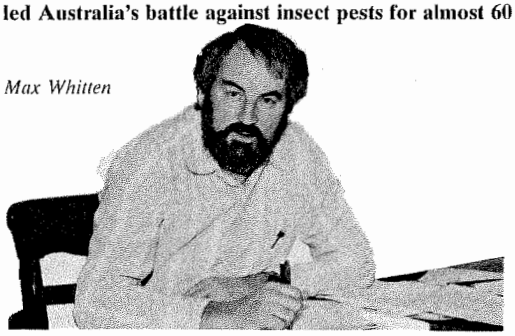
We wonder if other staff feel that the new *CoResearch* is missing the target.

P G Alfredson
Chief, Division of
Energy Chemistry

[Editor's note: the invitation for people to contribute to CoResearch appears, as usual, on the back page.]

Battle against insect pests goes on

The Division of Entomology has led Australia's battle against insect pests for almost 60 years and is still going strong.



Dr Max Whitten

According to the Chief, Dr Max Whitten, the Division is working to identify and study Australia's major insect pests in order to devise new and improved control methods, and to research the biological control of weeds.

'The Division's research is focused around insects and exists because insects are economically important and effect the livelihoods of people in many different ways,' he said.

Its research emphasised the development of new approaches and management strategies designed to avoid total reliance on conventional pesticides.

Research on biological control, physical control methods, genetic manipulation, the use of insect pheromones and other novel approaches constituted a large proportion of the Division's work.

Dr Whitten said the Division's work affected all industry sectors — primary, secondary and tertiary — and the community generally.

The Division is divided into seven sections — taxonomy, which includes the Australian National Insect Collection; stored products; pathology, behaviour and physiology; molecular biology; insect pests of plants; insect pests of livestock and man; and biological control of weeds.

There are also units concerned with electron microscopy, computing, technical and taxonomic illustration, electronics and photography. The Division is spread over nine Australian and six overseas sites.

'In justification for this Division we have large returns in economic and community benefits, and also cultural benefits through greater knowledge of an environment that is increasingly more fragile,' he said.

Dr Whitten said the Division was 'unusual, particularly among the biological divisions, in the high level of outside support we receive.'

Entomology is 35 percent industry funded including about $0·8 million towards the operation of the Stored Grain Research Laboratory (see separate story).

The Division's success in controlling the world's worst water weed, salvinia, would 'probably go down as the most successful biological control program in the world as yet, certainly the most spectacular'.

'Ours is one of the few CSIRO divisions to have undergone an independent cost-benefit analysis. The outcome of that and our subsequent achievements represent a record that the Division's staff are proud of,' Dr Whitten said.

The return to Australia each year is well in excess of what is put in and that is without placing a value on our taxonomic work. The successful biological control of skeleton weed, several water weeds, the lucerne aphid and sirex wasp, the use of pheromones to control oriental fruit moth, the development of integrated management techniques for the control of insecticide-resistant mites in orchards, the evaluation of new chemicals for the control of termites, the use of parasitic nematodes to control blackcurrant borer and the many successes of the Stored Grain Laboratory are all concrete examples of this.'

Dr Whitten said that as custodian of the Australian National Insect Collection the Division was developing understanding and appreciation of insects 'many of which are of great beauty and much interest to man'.

'This Division has a long tradition of contributing to understanding of insect biology, physiology, behaviour and ecology.'

Insect taxonomy was an important part of the Division's work and was vital to the success of almost all applied entomological research.

'Areas of biological control and ecology cannot develop without good taxonomic work and yet some people outside of the Division see it as an anachronistic luxury.'

Dr Whitten said the Division had an important role to play in conservation issues.

'Insects have a very significant role in many habitats. Termites, for example, eat more grass than sheep or kangaroos in arid Australia.

'People are interested in conserving the environment and I think we will see a greater role for us in community ecology as a result of this. I also believe that our involvement in tropical entomology will increase as interest in the largely untapped potential of the north increases.'

Textbook is Division's contribution to the Bicentennial

Australia's premier textbook on insects is being revised and expanded as the Division's contribution to the Bicentennial.

The Insects of Australia — A Textbook for Students and Research Workers is a standard text for entomology students in Australia and overseas and is used internationally as a reference book. The 1000 page book has comprehensive accounts of the anatomy, biology, evolution, and fossil history of insects, and chapters dealing with the taxonomy of all the insect orders represented in Australia, together with keys enabling identification to family level, and hundreds of detailed illustrations.

The book, prepared by the Division and published by Melbourne University Press in 1970, is now being revised and will be published by MUP in 1988. This edition involves many new illustrations, new keys and updated information on the biology and evolution of insects.

First Canberra, then the world

The Division of Entomology is widely spread, with laboratories not only in Australia but around the world.

The Division's headquarters is housed in one of the ACT's oldest public buildings.

The scientists based in Canberra carry out research into a wide range of subjects including insect biology, behaviour, ecology, pathology, genetics, biological control and stored grain research. The Canberra laboratory is also the site of the Australian National Insect Collection.

The Division's other Australian research projects are based in Sydney, Brisbane, Rockhampton, Darwin, Perth, Adelaide, Melbourne and Hobart.

The overseas laboratories are based in:

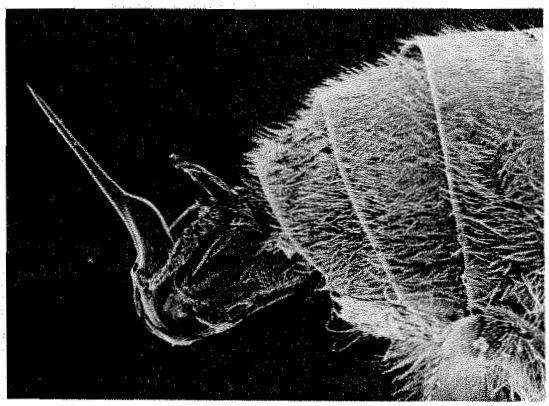
. Port Moresby, Papua New Guinea, for screw-worm fly investigations;

. Montpellier, France, for research into the biological control of weeds;

. Acapulco, Mexico and Cape Town, South Africa, for weed-control research;

. Cordoba, Spain, for dung beetle studies.

The Division's laboratory in Pretoria, the CSIRO dung beetle research unit, was officially closed on 1 September following withdrawal of industry funds.



The amazing world revealed by the scanning electon microscope is illustrated in this photo of a bee sting.

Research benefits for farmers

Farmers must be alerted to the value of research, according to the head of the Division's 'insect pests of livestock and man' section, Dr Philip Spradbery.

Dr Spradbery said there were 'very real financial incentives' in research and farmers should be aware of this.

The section researchers the control of sheep blowfly, buffalo fly, bush fly, screw-worm fly and the European wasp.

The Australian Meat and Livestock Research and Development Corporation had recently cut its contribution to CSIRO research funds. This had forced the 'untimely' closure of the Division's dung beetle research in Pretoria, South Africa, the revision of other projects and led to many redundancies of experienced staff.

'We do not criticise the AMLRDC for putting its money into off-farm areas but without industry support, our involvement in production research must be decreased and farmers should be aware of this,' Dr Spradbery said.

The cost of research to the producers is very little compared with the potential benefits.

The section's screw-worm fly group in Papua New Guinea, financed by the Department of Primary Industry, was a 'very cheap insurance policy' for farmers. The unit was designed to produce sterile screw-worm flies for release if needed to eradicate the fly from Australia given early warning of its introduction.

'I believe researchers must make farmers more aware of the funding problem and how it is affecting CSIRO and its work for the man on the land. We have to get out there and make sure farmers know about what we are doing and who is the beneficiary. Farmers should also become more involved in where their money is going.'

Using nature against nature

Millions of bugs in the Ads National Insect Collection

The Division has a long and distinguished history of using insects and plant diseases against weeds.

CSIRO research into the use of insects for biological control of weeds goes back to early this century.

Notable recent successes include the almost complete control of salvinia using a weevil, the control of water hyacinth, water lettuce and alligator weed by a variety of insects, the control of a form of skeleton weed by a rust fungus, and the control of St John's wort in most areas of its distribution.

The Division, often in collaboration with or supported by State Departments of Agriculture or equivalent, is now evaluating potential agents for control of a long list of weeds, including common heliotrope, ragwort, blackberries, onion weed, docks, sorrels, spiny emex and silverleaf nightshade in southern Australia and giant sensitive plant, *Hyptis* and *Sida* in the north.

Biological control agents are specially selected organisms that are natural enemies of the weeds. Careful testing ensures that when they are brought in from overseas, they will act only against their 'target', leaving useful plants unaffected.

A great advantage of biological control is that once released the control agent becomes self-perpetuating and self-dispersing: it does the job itself, with little or no further intervention.

Dr Ernest Delfosse, a research scientist working on Mediterranean weeds, said: 'The effect is never to totally eliminate the pest, just to keep its numbers and density below the economic threshold at which it is a nuisance'.

Perhaps the most spectacular recent example of biological control was the dramatic effect of a tiny Brazilian weevil on salvinia — one of the world's worst water weeds. The weevil was found, introduced and released by a Brisbane-based research team led by Dr Peter Room.

The weevil has controlled salvinia infestations throughout Queensland, leaving lakes and water courses clear and unpolluted.

The research team was awarded the 1985 UNESCO Prize for controlling salvinia in the Sepik River in Papua New Guinea. This work is now being extended to Sri Lanka and east Africa.

Biological agents have often demonstrated their value but not without controversy.

The program to control the weed Paterson's Curse, or Salvation Jane, is probably the most controversial in the history of biological control, according to Dr Delfosse.

He expects this to be resolved soon but it has been a long and expensive process.

In 1980, two beekeepers and two graziers applied to the High Court to stop the release of insects to control Paterson's curse, on the grounds that it was a source of pollen, nectar and in drier areas, fodder.

Paterson's curse is highly toxic to grazing livestock, reduces pasture productivity and crop yields and requires high chemical control costs. Current control methods are ineffective.

Impasse

To find a way out of this impasse, the Government introduced the Biological Control Act, the first in the world, to weigh individual rights against the potential benefit to the community.

After considering 582 submissions, the Industries Assistance Commission estimated the benefit of biological control of Paterson's curse to be $150 million over 15 years, compared with costs of only $17 million.

The United States and Canada are studying the Australian Biological Control Act closely as a model. The Act's significance for Australia goes beyond Paterson's curse to provide a legal framework for all future biological control programs, and to remove a threat to the legality of the many programs instituted in a legal vacuum in the past.

The Division of Entomology has responsibility for the Australian National Insect Collection, the world's largest and most comprehensive collection of Australian insects.

Known to those who work there as the ANIC, the collection comprises about five million specimens ranging from insects the size of a grain of sand to giant moths. Most are dry mounted and pinned, and housed in some 12 000 cabinet drawers, but there is also an extensive collection of slides, alcohol-preserved specimens and some live colonies.

The head of insect taxonomy and general biology, Dr John Lawrence, said thousands of specimens were added to the collection each year.

'But despite the impressive size of the collection it represents only a small proportion of Australia's insect species.'

Conservative estimates put the number of Australian insects at some 110 000 species of which perhaps only 65 000 species had so far been preserved in collections.

Only about 45 percent of Australian insects were named. According to the staff at ANIC there is still a very big part of the job to do.

In addition to being a part of the national heritage, the collection is also a practical tool for applied entomology, and is the primary data bank for taxonomic and biological information about Australian insect fauna.

The 23 staff members of the taxonomy section gather information on the composition, distribution and biology of Australian insects, classify them and systemise this knowledge for research use.

This work had numerous applications. 'For example, you often need to be able to accurately identify an organism that is destroying crops before developing strategies to control it,' Dr Lawrence said.

Insects that are very similar in appearance can have totally different feeding habits and life histories. There are several examples of failed control measures because of incorrect identification of the insect concerned.'

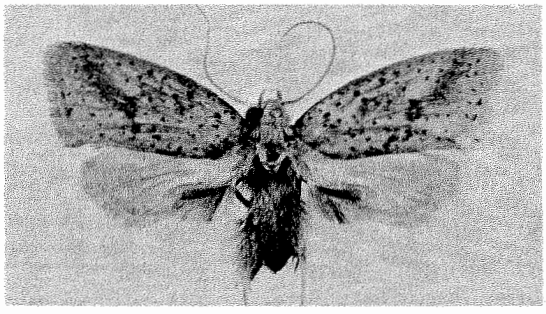
The collection started with the foundation of the Division in 1928. It has grown through specimens collected by staff members and by collections often donated by amateurs.

ANIC staff also undertake collecting expeditions to bring back specimens from far-flung Australian ecosystems.

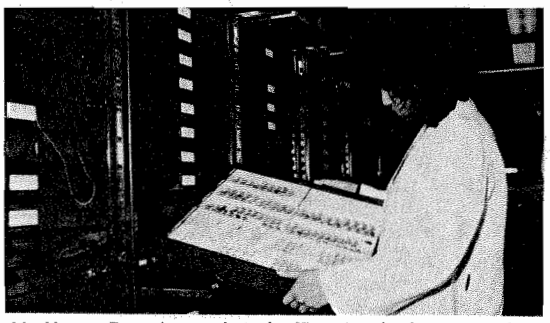
The latest expedition to the remote Iron Range National Park in far north Queensland involved team leader Dr David Rentz, Dr Don Colless, Dr Andrew Calder, Mr Tom Weir and Ms Josephine Cardale.

Mr Weir said the trip was organised to collect in an area renowned for its close faunal and floral associations with Papua New Guinea. The work involved long hours of day and night collecting, photographing and audio recording of insect sounds. But, of the 20 000 specimens that were collected and now need to be sorted — many will represent new species and will form a record for this still relatively undisturbed site.

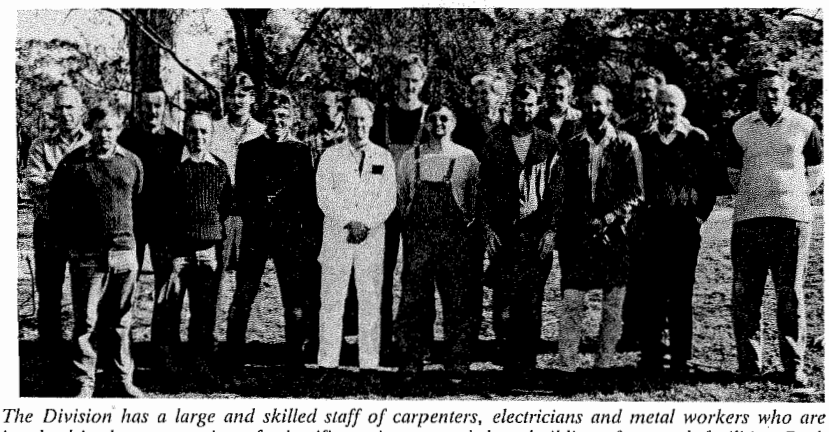
Australian entomologists are in the enviable position of still being able to locate new families of insects. Dr Ebbe Nielsen, the curator of lepidoptera (moths and butterflies), has recently identified an entire new group of moths. Dr Lawrence has done likewise with beetles and considerable publicity has already been given to the Cooloola monster — a new family of cricket-like creatures from northern Queensland named by Dr David Rentz; and Nothomyrmecia, a rare and primitive ant located in South Australia by Dr Bob Taylor and his colleagues. For entomologists Australia is still a frontier zone.



Dr Ebbe Nielsen at the Division recently identified a whole new group of moths, of which this is an example.



Ms Vanna Rangsi, a technical officer involved in research on Lepidoptera, with one of the hundreds of drawers of insect specimens held in the Australian National Insect Collection.



The Division has a large and skilled staff of carpenters, electricians and metal workers who are involved in the construction of scientific equipment and the rebuilding of research facilities. Back row: Mike Jeffery, Reg Motbey, Steve Holyland, Peter Minogue, Ed Rompa, Claude Eayrs, Craig Webber, Neil Eustice. Front row: Graeme Taylor, Wally Baran, Ron Squires, Ged Warren, Martin Massa, Roger Williams, John Pocknall, Max Albiez, Rolf John.

New industry agreement for stored grain facility strengthens user links

The Division's Stored Grain Research Laboratory is set to maintain its position as a world leader in grain storage and pest management research with a new industry agreement.

The agreement, which will be signed soon, continues the laboratory's 50 percent industry and 50 percent CSIRO funding arrangement — a major vote of confidence by users of the group's research when one considers the $1.7M annual budget for this group.

Head of the laboratory, Dr David Evans, said the agreement involved CSIRO, the Australian Wheat Board and, for the first time, bulk handling authorities throughout Australia.

The revised agreement would open new avenues for research with the bulk handling authorities interested in a range of grains including barley, oats, sorghum, peas and lupins.

For the first time, industry would provide additional funds for liaison and extension activities to strengthen communication channels with user groups.

Close industry links would also be maintained through a stored grain research council, established to set research priorities and policy, and a stored grain management committee to identify industry problems and to assess progress in tackling them. These will replace the existing stored grain liaison committee.

The laboratory was established in the early 1970s following agreement between the Australian Wheat Board and CSIRO to set up a national centre for research on stored wheat.

Dr Evans said the laboratory had pioneered many areas of now accepted technology. A multi-disciplinary approach to industry problems had been greatly strengthened by the incorporation of the former agricultural engineering group at Highett.

'What we are concerned about is Australia's reputation as a supplier of good quality, insect-free grain,' he said.

'This is a $3000 million industry. We provide a sort of insurance policy against losing international markets by helping the industry maintain important non-price attributes such as freedom from insects and low levels of pesticide residues.'

Some of the laboratory's research achievements included:

. major contributions to the evaluation and registration of 12 alternative grain protectants that have enabled supplies of insect-free grain to be maintained in spite of the problem of resistance to insecticides;

. the development of sealed storage techniques enabling improved residue-free pest control through the creation of unfavourable modified atmospheres or fumigation;

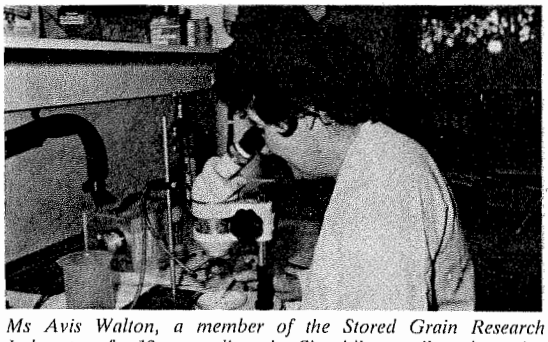
. the development of a rapid heating process to disinfest grain at export terminals which is now in use at a pilot plant at Dunolly, Victoria;

. extensive basic work on the biology and behaviour of grain pests and research into heat and mass transfer process in stored grains;

a new method of applying insecticides onto clay dust which is mixed with the grain. The clay dust is easily removed and leaves virtually no insecticide residue;

. the development of PVC-covered grain bunkers as a cheap method of sealed storage used to store almost 300 million tonnes of wheat in 1985 alone.

Dr Evans said the economic value of alternative pest management, storage techniques and other long-term benefits was hard to quantify precisely but 'must be very high'. For example, the savings ($2M) from the introduction of bunker fumigation in NSW alone during 1984-85 was far more than the Australian Wheat Board's current contribution to the laboratory!



Ms Avis Walton, a member of the Stored Grain Research Laboratory for 12 years, dissecting Sitophila *weevils to determine their sex as part of research on stored grain insects.*

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Managing insects with genetic engineering

Genetic engineering is expected to reveal a range of new insect management techniques.

The Chief, Dr Max Whitten, said the Division was committed to exploring the potential of molecular biology and genetic engineering in pure and applied entomology.

The Division is working with Dr Howells' laboratory in the biochemistry department at the Australian National University on developing gene transfer techniques.

Dr Whitten said genetic engineering techniques could be used to improve beneficial insects or to engineer a pest to work against itself. The techniques are also being used to study and modify insect pathogens and may help to identify new categories of pesticides.

'Dr Rob Saint and his team are looking at how development occurs in insects and at the very early signals that trigger differentiation and segment formation,' Dr Whitten said. 'If we know what those signals are it might give us new methods of control.

'We can even learn about differentiation in other animals, including man, by looking at genes in insects because some of the genes for development in higher animals are very similar.'

Other groups, headed by Drs Alan Lohe and John Oakeshott, are studying gene structure and regulation in insects and how gene products affect behaviour.

'If we understand the molecular control of behaviour then it may open some novel areas of pest management,' Dr Whitten said.

'Molecular biology provides us with a very powerful tool for looking at relationships between species and is yet another tool the taxonomist can use to unravel long-term problems of evolutionary relationships.'

Nematodes fight insect pests

Billions of tiny worms called nematodes are one of the newest biological weapons against insect pests.

Dr Robin Bedding and his team at the Division's Hobart laboratory are devising methods of rearing the near-microscopic nematodes and using them to control pest species of insect.

The nematodes, together with the special bacteria they carry, invade the body of an insect and kill it. The nematodes survive in the soil and once established provide prolonged pest control.

Dr George Rothschild, the Assistant Chief, said the Division had pioneered techniques of mass rearing nematodes and work by Dr Bedding and his team had led to a number of patents. There was considerable collaboration with industry, including Biotechnology Australia Ltd.

The technique has been very successful with blackcurrant borer now almost entirely controlled in Tasmania by nematodes.

An earlier major success for Dr Bedding's team was nematode control of the Sirex wood wasp. This wasp, which once threatened pine plantations, has been suppressed throughout its range.

Dr Rothschild said molecular biology studies were now being undertaken by Dr Ray Akhurst and Dr Rob Saint in Canberra to see if nematodes could be made resistant to drying — one of their major limitations — and if the form of bacteria they carried could be stabilised.

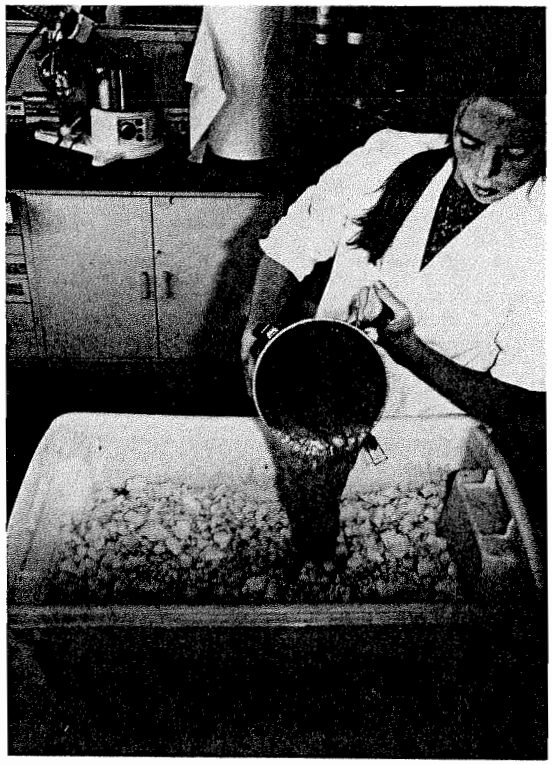
The list of potential targets includes pasture and sugar cane scarab beetles, borers in bananas and rice, and termites, as well as major beetle pests affecting the ornamental industry.

'Provided you can give them the right environment, nematodes are a very potent control method,' Dr Rothschild said.

'Now we have very good mass rearing techniques they are also very competitive, particularly for high-value cash crops.'

Dr Rothschild said fungal infection was another method of controlling insect pests. The Division's research by Dr Richard Milner and his team in Canberra was directed towards fungi known to attack aphids and had more recently focused on the use of metarhizium — a fungus which affects a range of insects including scarab beetles.

There was also research into more effective ways of using bacteria to infect insects.



Ms Wendy Edwards at the Hobart Laboratory, 'Stowell House', mixing chicken offal macerate with crumbed sponge for use in the mass rearing of nematodes — all part of a day's work.

Hitting fruit moths below the belt

Division of Entomology scientists have achieved major successes in using insect pheromones as control measures.

Pheromones are chemical substances released by insects to communicate with one another.

Scientists with the Division have developed a control method using a synthetic version of the sex pheromone of the oriental fruit moth — a significant pest of peach and nectarine orchards in Australia and overseas. The technique has been commercialised by Biocontrol Limited in collaboration with the Division.

Polythene tubes filled with the synthetic pheromone are attached to the trees. These tubes release the chemicals into the air and the male moths become so confused by the false scent trails that finding a female is almost impossible.

This product — known as Isomate-M — is now used in Australia and the United States.

Dr George Rothschild, now the Assistant Chief but who was closely involved in the pheromone work, said synthetic insect pheromones opened a wide range of potential control methods for rational pest management without the disadvantages of systems based solely on pesticides.

Potential target

The codling moth was an important potential target for pheromone control as was the Heliothis moth species — probably the major pests of horticulture and agriculture affecting cotton, wheat, sunflowers and many other crops.

Dr Rothschild said research into pheromones and other aspects of insect behaviour was a vital part of the Division's work.

Research on Heliothis is also an Institute of Biological Resources priority area, involving both the Division of Entomology and the Division of Plant Industry. The entomologists are interested in the insects' ecology, behaviour and the genetics of pesticide resistance.

Bugs become monsters under the electron microscope

A world of tiny monsters — that is often the view revealed by the scanning electron microscope.

Mr Colin Beaton, the officer-in-charge of the Division of Entomology's electron microscopy unit, and his team bring to life the tiniest creatures in extraordinary detail.

The unit operates two microscopes — a scanning electron microscope with useful magnification from 10 to 100 000 times and a transmission electron microscope capable of seeing large molecules magnified some 250 000 times.

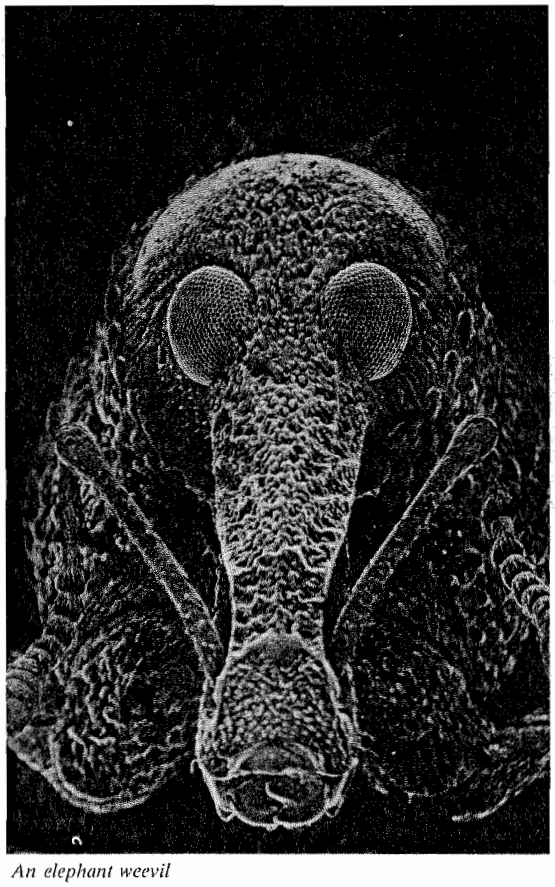
Its facilities and expertise are widely used by the Division's scientists and scientists from other divisions and outside CSIRO.

The microscope unit can reveal details of insects vital for identification or research into new management methods. Many scanning electron micrographs of insects will be included in the revision of the textbook, *The Insects of Australia*.

Mr Beaton said the close-up view provided by the scanning electron microscope allowed insects to be 'easily illustrated and interpreted'.

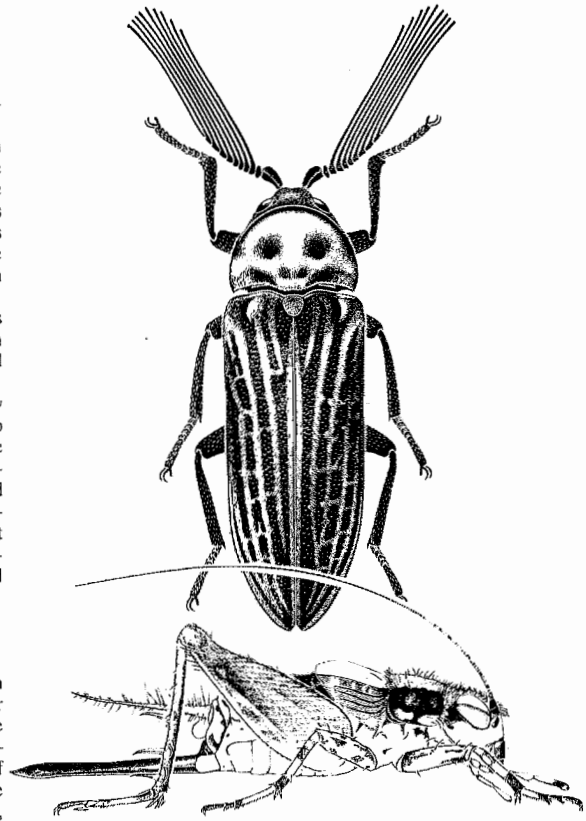
'These pictures mean something to people — it is the picture and the thousand words story,' he said.

The unit has won a number of awards for its electron micrographs and is often asked for examples of its work for exhibitions.



An elephant weevil

Art without artistic licence



A world free from hairy insects must be the secret wish of the Division's three taxonomic illustrators — Mr S P Kim, Ms Anne Hastings and Ms Sandy Smith.

Taxonomic illustrators are responsible for the beautiful and intricate drawings of insects that illustrate textbooks and scientific papers. The drawings show at a glance a picture of an insect more detailed than any conventional photograph.

The illustrators can spend days looking at a specimen through a microscope to produce the particularly accurate drawings. They are now heavily involved in doing the hundreds of new illustrations for *The Insects of Australia* (see separate story).

But taxonomy is art without artistic licence. The illustrators produce exact scientific drawings. Hence the problem with hairs.

The illustrators have their favourites — Sandy likes grasshoppers and crickets and Anne has been busy on a wasp series. But as Kim commented, 'if you are creating some 150 drawings a year each there is not a lot of time to concentrate on favourites'.

No escape for insects from technology

Radar, kites and gas balloons do not at first sight seem to be elements of applied entomology.

But they are, in fact, central tools for the insect migration unit.

The unit, which includes Drs Alistair Drake and Roger Farrow, Mr John Dowse, and Mr Peter Harris from the Division's electronics unit, uses radar equipment they have largely built themselves to track flying insects, especially moths and locusts.

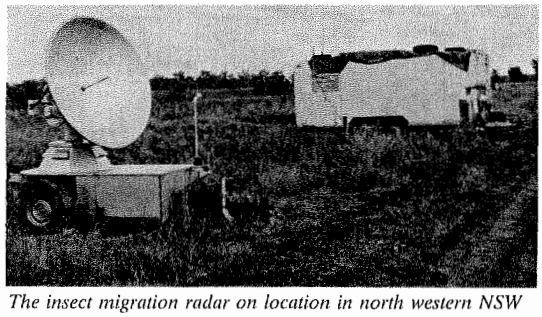
The radar equipment, which is mounted on a trailer and towed around Australia, can 'see' an individual moth two kilometres away.

Not satisfied with radar tracking, the unit also nets its insect quarry. Small migrating insects and spiders invisible to the radar are caught in a large airborne net which is lifted some some 200 to 300 metres by a kite or on windless days by a gas balloon.

The unit has collected millions of migrating organisms, including tiny aphids, spiders flying with the help of a piece of silk and the wind, locusts and various moths.

Dr Drake said insects often travelled some 200 to 400 kilometres per night and Australian insects could reach New Zealand under very favourable conditions.

The unit, which is one of only five or six of its type in the world, aims to discover which insects migrate, where they come from and go to. Important information when many crops are vulnerable to insects which originate hundreds of kilometres away.



The insect migration radar on location in north western NSW

More letters
Cont. from p.2

Dear Editor,
Lisa Kanis, with Maike and John-Peter, wishes to thank all those who contributed towards the beautiful flowers expressing friendship and sympathy, on the death of Dr Andrew Kanis of the Herbarium Australiense. As the card accompanying the flowers merely stated 'from your friends and colleagues in CSIRO', we hope this way of expressing our gratitude will reach everyone of these friends and colleagues. The flowers are various shades of yellow, with blue irises, and truly lovely to behold.

Lisa Kanis

Dear Editor,
I was recently able to assess the scientific judgement of 10 of my colleagues and was unpleasantly surprised. It arose out of a news item relating to the results of a medical scientist who had claimed to have discovered evidence that crystallisation can be affected by chemical reactions which are taking place nearby. He had claimed to have eliminated the obvious mechanisms for this phenomenon and had concluded from his results that the phenomenon was occuring via a very low level, low frequency electromagnetic field linking the two reactions.

Intrigued by the implications of his claim I sought out copies of the three latest of his 100-odd publications. He did seem to have carried out a lot of tests to eliminate the more obvious causes of the phenomenon. In view of the fact that his experiments involved several disciplines (including biochemistry, crystallography and physics) it would be difficult to find a research group, other than in CSIRO, with the expertise to duplicate his work. I therefore thought that perhaps someone from CSIRO might be interested in observing this phenomenon and perhaps exploring it further.

Because I work in a division which has a lot of expertise in two of the disciplines involved in the discovery I raised the subject with 10 of my scientific colleagues for their opinions. With one exception they stated quite categorically that the claim could not be valid. Various rationales were offered to explain why the medical scientist must have been wrong. 'The field hasn't been discovered before therefore it couldn't be there'. . . 'the type of crystal growth observed has not been observed with sodium chloride so it must be due to some other cause such as an impurity'. . . 'his statistics must have been bad'. . . 'there have been many similar claims in the past and all have since been disproved'. . . 'I'm from the University of NSW. We are hard-nosed scientists over there and we would not take such claims seriously'. Only one agreed with my comment that an unbiased scientist should not prejudge a claim by one of his colleagues without looking at the evidence presented to substantiate the claim.

What has gone wrong with the scientific community when it has replaced its original spirit of inquiry with closed-minded dogma? My understanding of the process of judgement is that there are three approaches which might be used to form an opinion on the validity of a claim:

1. accept a claim without question and without analysing evidence offered — ie. to be gullle — in the religious context, to have faith;
2. reject a claim without question and without analysing evidence offered — ie. to be sceptical — in the religious context, to be an atheist;
3. make no judgement on a claim until evidence offered has been analysed, then make a tentative conclusion which may have to be modified later in the light of new evidence — in the religious context, to be agnostic.

I believe that either of the first two of these approaches is invalid for a scientist. Yet nine of my 'scientific' colleagues used the second approach and only one took the third.

It may well eventuate that the claim of a hitherto undetected field influencing crystallisation is found to be invalid. But that will be demonstrated only by open-minded scientists who set out to duplicate the experiments and find another explanation.

In my submission to the ASTEC enquiry into CSIRO last year I was critical of several aspects of the medical profession on the grounds that many of their claims are not justified on the evidence available; and much excellent work has been rejected because its conclusions did not fit into conventional wisdom of what a particular disease is. This is especially so in relation to the degenerative diseases of cancer, heart disease and arthritis. I suggested CSIRO scientists would be well placed to sort out some of these conflicting claims, because they are more scientific. After this recent experience I am not so sure.

Don Benjamin
Division of Applied Physics

Dear Editor,
It will be interesting to see how many complaints you receive from our rampant feminists or our vocal equal-opportunists about the harrassment in your front page cartoon (No. 294) or is this merely a creative example of positive discrimination?

M H Jones
Division of Mineral Chemistry

Christine Townend remains on advisory committee

The Executive has rejected rural industry calls to sack animal liberationist Ms Christine Townend from CSIRO's Advisory Committee on the Ethics of Animal Research (CACEAR).

The decision follows calls by a number of rural bodies for Ms Townend to be dropped from the committee because of her campaigns against livestock industry practices, particularly mulesing and the live sheep export trade.

At its August meeting, the Executive reaffirmed the Organization's support for Australia's rural industries but said CSIRO had a responsibility to listen to all views.

The Chairman, Dr Boardman, said CSIRO recognised the 'importance of rural industries to Australia's economic welfare, and the high level of co-operation between these industries and CSIRO over the past 60 years,' he said.

He said membership of CACEAR was designed to ensure CSIRO received the widest possible range of views on animal welfare matters. However, the Organization did not necessarily agree with the views of anyone on its many advisory committees.

'CSIRO believes the committee has an important role to play in avoiding the polarisation and emotionalism that has occurred in other countries over animal welfare, and in providing a forum for discussion of animal welfare issues in CSIRO', he said.

Dr Boardman has written to a number of graziers' associations and livestock industry councils explaining the Executive's decisions.

In his letter Dr Boardman said the Executive had discussed CACEAR's terms of reference and decided on the adoption of an extensive preamble setting out CSIRO's position on research using animals.

The preamble said the members of the committee accepted CSIRO's need to carry out animal research to reflect the Organization's statutory responsibility as well as the realities of society's present use of animals.

Dr Boardman said in the letter in response to specific changes demanded by the animal liberation movement that he believed the mules operation on sheep to be 'ethically justifiable and economically necessary' and would not support calls to have the procedure phased out until 'cost-effective and less painful methods' were available.

He opposed threats to boycott Australian sheep products unless the export of live sheep was stopped. However, he believed improvements should be made to the conditions under which live sheep were transported and that for ethical and economic reasons this should eventually be replaced by the carcase trade.

The Executive also decided to press for a review of the need for the controversial LD 50 (lethal dose 50 percent) test used to assess the toxicity of new chemicals.

CSIRO is not using the LD 50 test, but has used it in the past to establish the toxicity of naturally occurring plant or microbial substances suspected to be the cause of domestic animal diseases, and the toxicity of pest control agents to both target and non-target species.

'The LD 50 test causes considerable suffering to the animals. It is a crude test which is rarely ethically or scientifically justifiable,' said Dr Boardman.

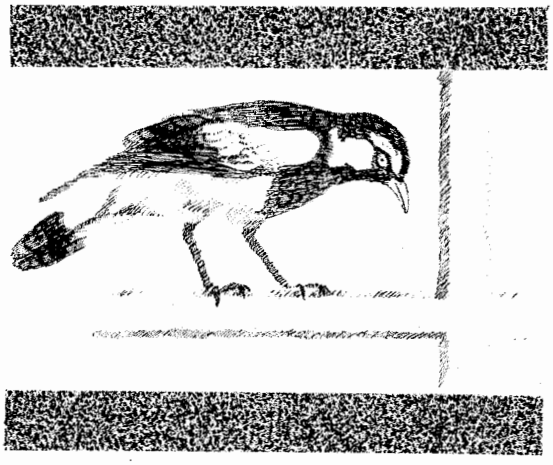
The Executive accepted a staff recommendation to set up a mechanism for handling internal and external complaints about particular animal experiments. The Executive has also decided to strengthen the role of the Animal Welfare Liaison Group (AWLG) in advising the Executive on CSIRO animal welfare policy following complaints from staff that they were not having enough input in this area. The AWLG comprises the chairpeople of CSIRO's 17 on-site animal care and experimentation ethics committees.

August CoResearch

***CoResearch* would like to apologise to readers for the production errors in the August issue. Particular apologies to Peter Moglia from the Division of Building Research, for leaving off the crucial last lines of his story about the urgency of mail sorting at the Albert St Head Office of CSIR. For those wanting to know how it *should* have finished, here it is:**

'...I took a letter to Dr Wark at about 11 c'clock instead of the usual 10. No, Dr Wark, I don't know why Records takes so long to get a letter from Mr Yarr's desk to yours. Yes sir, the mail is opened at 9. Yes sir, 9 from 11 is about 2. Yes sir, the records office is only one floor down. Yes sir, no sir. Slowly I began to see the point of the urgency in the office, and to understand why my two colleagues often seemed to get caught short at odd times'.

Mustard puts end to 'vandalism'



Some time ago, the Division of Building Research enquiry service was asked how to prevent white cockatoos tearing Western Red Cedar window frames to pieces. They were told one answer to the problem was to smear mustard over the areas under attack.

Now there's a rash of houses in the eastern suburbs of Melbourne having the putty pecked out of the new window frames by mudlarks etc. The local kids were blamed at first, until one glazier observed that as quick as he put the glass in, birds were pecking it out on the other side.

The solution was of course ...good old HOT English mustard. Applied to the putty surface it quickly educates the birds in the error of their ways, and thus gives the putty enough time to harden. Next thing some bright manufacturer will be selling mustard flavoured putty.

Retirements

The Division of Environmental Mechanics marked the end of an era last month with the retirement of **Mr Keith Perroux.** Keith joined CSIRO in 1964 as a member of the technical staff of the Division of Plant Industry. Three years later he transferred to the Agricultural Physics Section of that Division, the forerunner of Environmental Mechanics.

In 1971, when the Division of Environmental Mechanics was formed, Keith joined the Soil Physics Program. His expertise in experimental work, particularly in difficult field situations, has proved invaluable to the program for the past 15 years. In addition to working at field sites throughout Australia, he spent a year with the Chainat Agricultureal Research Project in Thailand in charge of soil physics section of that project.

Keith achieved the 'impossible' in 1979 when, despite his lack of a degree, he was reclassified from senior technical officer to experimental officer. The process, even more difficult than being appointed a chief, required the recommendation of a review committee comprising three people of at least professorial status.

###

Mr Fred Fraser has retired from the Division of Human Nutrition, after a career of more than 30 years. Mr Fraser was a senior technical officer with the Division.

###

Dr Bert Anderson, chief research scientist and assistant Chief at the Division of Textile Industry, has retired after 33 years with CSIRO. After working as a research chemist with Kodak A/Asia, Dr Anderson joined Textile Industry in 1953 as a research scientist. Over a lengthy period he was involved with the discovery and application of a number of important wool textile processes including shrinkproofing and self twist spinning.

Between 1975 and 1978 he served on secondment as scientific counsellor at the Australian Embassy in Tokyo. On his return to Geelong, Dr Anderson's research involved the basic mechanisms of wool scouring, and he identified for the first time the presence of a proteinaceous non-keratinous material on the wool fibre which has important implications for wool scouring.

He was appointed assistant Chief in 1984.

###

Mr Laurie Muller has retired as officer-in-charge of the Dairy Research Laboratory (part of the Division of Food Research). Mr Muller joined in 1958 as a technical secretary, and he went on to participate in a variety of research activities, including recombined dairy products and whey utilisation. During his time as OIC, a number of major commerical developments were brought to fruitation, including those based on his specialist area of membrane technology.

###

Dr Ron Hackman recently retired from the Division of Entomology after more than 41 years with CSIRO. Dr Hackman's expertise in chitin biochemistry and other areas of protein biochemistry had earnt him an international reputation. His insect cuticle research was frequently cited by scientists in the field and will continue to influence studies for many years.

###

Ms Zenta Liepa also retired from the Division after 36 years of dedicated and distinguished service in the field of insect taxonomy in Australia and in particular Diptera (flies), under the late Dr Paramonov and current ANIC dipterist Dr Don Colless. Zenta was employed in the early 1950s as an assistant to Dr S.J. Paramonov, one of the first full-time, professional taxonomists employed by the Division. She rose to the ranks of Senior Technical Officer, at a time when female STOs were, to say the least, rare. Before her retirement she was manager of Diptera in the Australian National Insect Collection.

Gozho appeal

Donations have been pouring in to the Gozho pump appeal announced in the last Co-Research. *At presstime, the total stood at $550 — but there's still a long way to go yet. Contributions should be sent to: Russell Porter, CSIRO Film & Video Centre, 314 Albert St, East Melbourne VIC 3002.*

###

***CoResearch* is produced by the Public Communication Unit for CSIRO staff. It's also circulated to a number of people outside the Organization who are interested in CSIRO activities. Readers are invited to contribute or offer suggestions for articles. The deadline is the last Monday before the issue month. Editor: Liz Burden, PO Box 225, Dickson ACT 2602. PH: 48 4479.**

Ms Chris Hodges, new senior storeperson at the Division of Forest Research, is quietly making the point that a woman's place is everywhere.

Chris is probably the first woman appointed by CSIRO to oversee a divisional storeroom.

Before joining CSIRO, she was assistant spare parts manager at Canberra car dealer Slaven Motors.

After a week spent adapting to her new role, she started planning an upgraded storeroom system 'to make operations here more viable', she said. This involves numbering all items and carefully monitoring stock movement.

Chris sees it as 'an opportunity job' and hopes eventually to work with computers. Already, plans are underway at the Division to list all storeroom items on computer and deduct things as they are distributed.

'Genes in action' — chromatin techniques on display

In 1969, Professor Oscar Miller, now of the University of Virginia, started to develop techniques for spreading chromatin — techniques which permit the visualisation of genes in action.

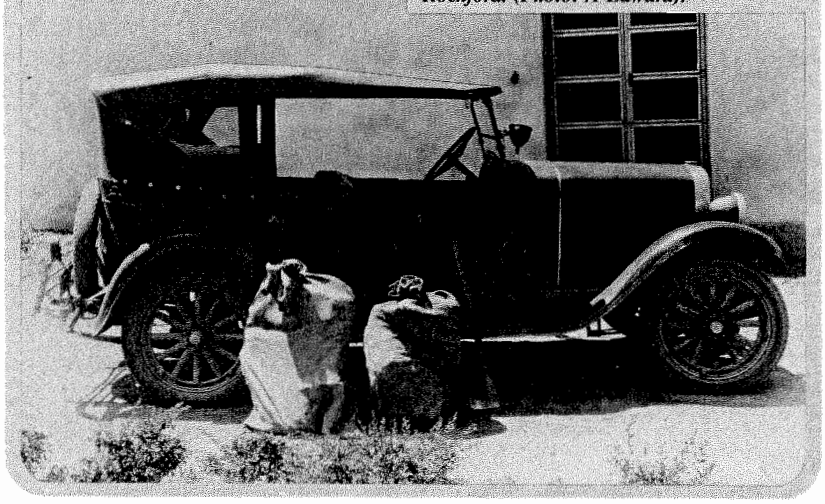
Professor Miller is now a senior Fulbright Fellow, visiting Dr Ron Hill at the Division of Molecular Biology for collaborative studies on chromsome structure and function.

With Dr Hill and Dr Margaret Mott — also of the Division — Professor Miller recently arranged a one-day workshop on chromatin-spreading techniques using transmission electron microscopes (EM). It was held at the Division's laboratories at North Ryde, and attracted participants from the ANU, the University of Sydney and from other CSIRO divisions.

Subsequently, a similar workshop was held at the Division of Animal Production, with Professor Miller and Dr Mott demonstrating the techniques to members of that Division.

For further information on the technique, contact the Division of Molecular Biology in Sydney.

Readers may recall, in last month's 60th anniversary feature, Tom Greaves' story about transportation problems faced by CSIRO staff in the 1930s. Rex French, head of the Black Mountain garage, is a bit of a history buff, and he dug out this photo (below) of the 1928 Chevy referred to by Tom. It was the first CSIRO vehicle at Black Mountain. Inset: members of the Siret Club for retired CSIRO officers reminisce as they read the historical feature. Back row, left to right, Jim Sleeman, Eddy Mackay, Chris Christian, Jack Coombe. Front row, Jack Cotterill, Buck Taylor, Den Banyard, Barry Flint, Tom Greaves, Ron Rochford. (Photo: A Edward).



1928 Chevy, first CSIRO Black Mountain vehicle

CoResearch

CSIRO's staff newspaper

No. 296 October 1986

Jones tells Parliament:
'Big improvement in CSIRO links with manufacturing'

CSIRO's most important role was to work closely with industries in which research and development played a central role, the Minister for Science, Mr Jones, said last month.

Introducing CSIRO's new legislation into Federal Parliament, Mr Jones said the Organization would play a major part in restructuring and revitalising high-technology manufacturing and in supporting the emerging information and space technology industries.

The Organization's research would also continue to benefit the resource-based primary industries, particularly by adding value to export products and by tailoring them to meet specific overseas market needs.

'The Government is looking to CSIRO to play a role in assisting industry to a much greater export orientation, as well as to continue support for our more traditional industries,' Mr Jones said.

The Science and Industry Research Legislation Amendment Bill, which is expected to be debated this month, makes a number of changes to CSIRO including the establishment of a new corporate-style Board (see *CoResearch* No.293 July '86).

Mr Jones said the Organization was the 'single greatest reservoir of technical skills and knowledge this nation possesses'.

'It is precisely because the Government places great store by CSIRO and has great expectations of it that we are introducing this new legislation aimed at carrying the Organization into the next decade in the best possible shape.'

Mr Jones said CSIRO was being encouraged to take on more short-term problem solving projects to be paid for largely by the companies concerned.

But it was not intended that CSIRO substitute for industry performing its own research and development, rather that it stimulate industry to do more for itself.

'The major emphasis for CSIRO with its own funds will remain...contributing to future industrial development through longer-term strategic research.'

Mr Jones said the Organization had 'substantially improved' its interactions with manufacturing industry over the past few years and growth in this research area was a trend he expected to continue.

Changes to the top structure were an important element in building closer links between CSIRO and industry and the community.

'I am very optimistic about CSIRO's future. This legislation will give impetus to the positive changes that have already taken place within the Organization and will also reflect the Government's desire to enhance CSIRO's responsiveness to community needs,' Mr Jones said.

COSSA welcomes space initiatives

The Director of COSSA, Dr Ken McCracken, has welcomed the establishment of a National Space Board to co-ordinate Australia's efforts in space-related technology research and development.

Dr McCracken, who is one of the seven members of the new board, said he was looking forward to working with the other board members towards getting a 'viable and innovative Australian space industry off the ground.'

The Federal Government announced its response to the Madigan report, 'A Space Policy for Australia' last month.

'It's important to realise that now at last we have a clear government policy statement on Australian involvement in space and the key element in this policy is the development of industrial competence in space technologies,' Dr McCracken said.

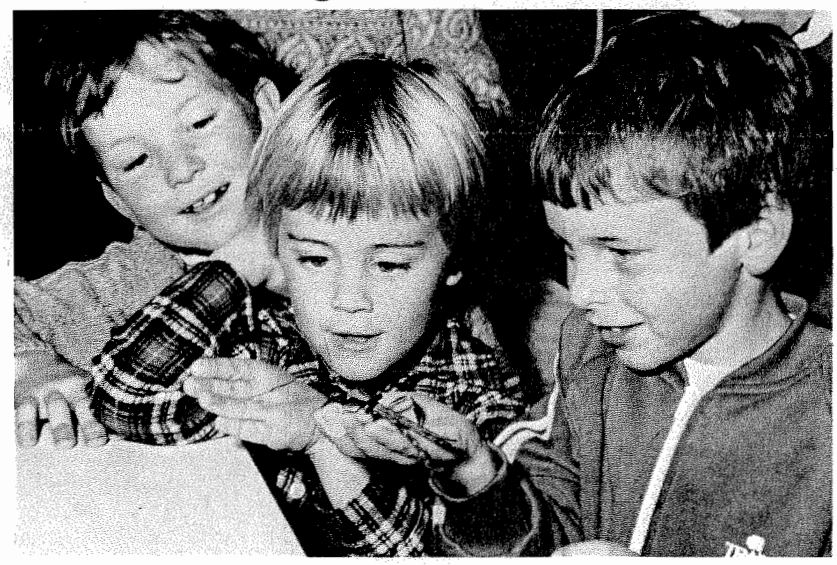
'We need this competence to service our own substantial requirements for spacecraft systems and to break into the enormous world market for space and ground-sector equipment with a revitalized Australian industry.'

Australia was expected to make substantial outlays for satellite communication, remote sensing and navigational systems over the next decade, probably of the order of $350-500 million a year by 1995.

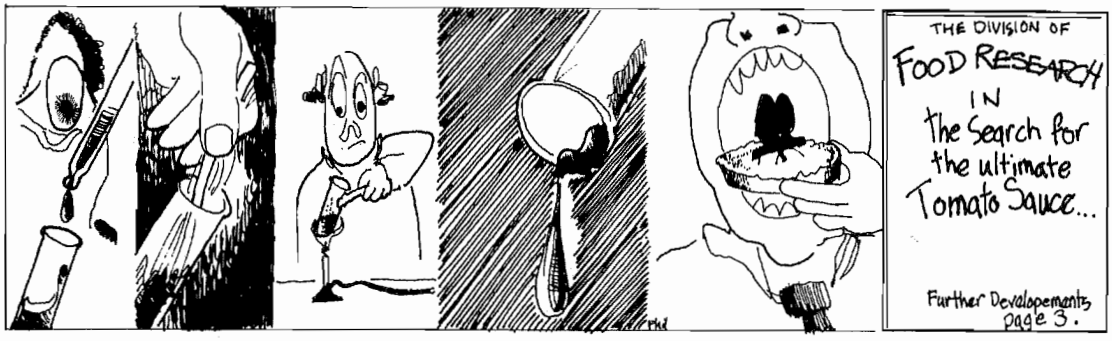
Dr McCracken said the new policy, together with CSIRO efforts and the recent taxation, offset and R&D initiatives, was targeted at positioning Australian industry to become partners in international consortia to supply those needs.

'The relevance and management of space R&D in CSIRO was strongly supported by the Madigan committee,' Dr McCracken said. 'COSSA will continue to work in concert with the Government's space industry development efforts, now managed by the National Space Board.

Entomologists of the future?



The wonder of insects and the fascination of the public in things entomological are easily seen on the faces of these young visitors at the Division of Entomology Open Days in September. Over 6000 people explored the Australian National Insect Collection, learnt about insects on gum trees, termites, dung beetles, biological control of insects and weeds and many other aspects of the Division's work — a resounding success despite the long queues and crowds. The most popular exhibits? Somewhere between the colour and excitement of the Collection and, of course, the spiders. (Photo: John Green).



From the Chairman

A column by Dr Keith Boardman

On my visit to Sweden, Denmark and Finland I found a widespread recognition among companies of the vital role of research and development to their competitive positions.

Scandinavian companies must be able to compete internationally as the local market is too small to fund the R&D necessary to upgrade existing products and processes and develop new ones. The level of R&D in the private sector in Sweden is particularly high, amounting to some two percent of GDP, with a further one percent funded by government. Scandinavian firms in high technology areas such as microelectronics, robotics, specialty chemicals, medical and scientific instruments or pharmaceuticals typically spend from 8 to 12 per cent on R&D.

Most firms appear to be very selective in the choice of projects for their in-house R&D. The R&D is closely integrated with other functions, particularly marketing, is based on the skills and competence of the company, and strongly influenced by the ability of the company to achieve a reasonable market share for a product.

Much of the research is mission- or project-oriented, although many companies carry out some basic research, if for no other purpose than to maintain a dialogue with scientists nationally and internationally. The majority of firms visited informed us that they regard interaction with universities, both local and foreign, and government-funded pre-competitive research as important to gain an awareness of advances in science and technology, and of emerging technologies relevant to their businesses.

The governments of the Scandinavian countries place great importance on the encouragement of start-up companies (seed companies), built around new ideas and new technologies. For example, the Swedish Government assists seed companies by the provision of low rental premises at special centres (incubation centres) and by loans of up to 50 percent of operating expenses. Loans are repayable with interest only if the enterprise is successful. Existing industrial firms strongly support the encouragement of these seed companies as the basis for potential new industries, even though they might form 'spin-off' companies of their own for the development innovative new products. It is recognised that small companies are playing an increasingly important role in technological innovation.

Incubation centres are often located in close proximity to a tertiary education institution and staff are encouraged to develop their ideas into new processes or products, either on a full-time or part-time basis. Throughout Scandinavia the patent rights to discoveries made in the universities or technical universities belong solely to the individual.

Peter Donaldson and I found the visits to a representative cross-section of some 20 firms in Sweden, Denmark and Finland extremely valuable and stimulating.

We gained an insight into the factors which have led Scandinavian countries, particularly Sweden, to achieve a high degree of industrial innovation with production of high quality products competitive on world markets.

If Australia is to emulate these countries more investment in R&D will be necessary, particularly in the private sector. A much stronger R&D effort by the private sector would certainly facilitate the application of the more broadly based research in CSIRO for the development of innovative products and processes.

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Geoff Taylor has opted to leave the Executive on 10 October, and return to the ANU as a research fellow. After a long and distinguished career with CSIRO spanning 30 years, Geoff was appointed Director of the Centre for Resource and Environmental Studies at the ANU in 1980. He joined the Executive in May 1982.

Geoff has played a vital role over the past four years in overseeing the expansion of CSIRO research in support of manufacturing industry, the formation and operation of Sirotech and the establishment of the CSIRO-manufacturing industry collaborative scheme.

On behalf of all staff I thank him for his valuable contributions to CSIRO and wish him well in the future.

K Keith Boardman

Health matters

Allergic to your work?

Dr John Graham of the OHS unit has started a pilot study of staff in several divisions who may be at risk of developing allergies to small animals, either in association with laboratory work or from specimens collected in the field.

This study follows a similar survey last year of staff at the Division of Entomology, where significant sensitisation to insects was found.

Dr Graham will be examining conditions in a number of animal houses and discussing symptoms and work methods with staff concerned. Many people who develop early stage allergic reactions often don't associate their symptoms with work exposure. Often flu-like symptoms are ignored as being just another common respiratory tract infection.

Where the potential for allergic reactions exists, prevention is very much better than treatment. Once sensitised, it's often very difficult to reduce exposure sufficiently to prevent further health problems.

For instance, several staff at the Division of Entomology have been found to be sensitised to a range of insect species in follow-up tests.

Minimising exposure to animal hair, dried faeces and cage materials are the main preventative measures. Improved ventilation systems and vacuum cleaning techniques also have a role to play, with the use of personal protective equipment very much the last resort.

With proper attention to design and operating procedures it's possible to maintain laboratory animal houses with minimum health risks to staff. Several divisions have achieved good results — at one or two others, though, even the safety officer is unable to enter the animal house without breaking out into a sneezing and eye-watering episode.

Small animal colonies and their maintenance are an important part of CSIRO's work in many divisions. Not only is the safety and welfare of the animals a current issue, but also the health and welfare of those who care for them. Identification of potential problems followed by revised work procedures, education and limited medical monitoring of at-risk staff is the way to deal with the problems.

If you think your work may be causing allergic reactions then bring this to the notice of your local OHS committee. Be it blowflies, mice, grasses, mangoes or any other biological material, the potential exists for you to be allergic to your work.

Occupational overuse injuries — update

The Management Committee has endorsed policy circular 86/29 dealing with RSI and related repetitive and static muscle-load injuries. A range of administrative and advisory procedures are being issued along with the policy circular and all staff should examine these in relation to their own working environment. It's not only users of screen-based equipment who are at risk. Staff working with microscopes, pipettes and electronic instrumentation can develop overuse injuries, as can cleaners, gardeners, staff who work in stores areas, etc.

Learn to manage your work situation and avoid potentially painful and stressful physical overuse injuries. Since October 1985 a further 65 cases have been reported within CSIRO and of these, over half are from staff in the technical/scientific/research designations.

Much of the recipe for prevention rests in your hands. Read the policy circulars and guidelines to find out how you can better manage your work situation.

Gary Knobel

CSIRO logo

Dear Editor,

At a time when we are celebrating our 60th anniversary I feel it is appropriate that there should be available to all staff throughout the Organization a "T"-shirt/sloppy joe with a CSIRO logo on it. And since one is not available I offer this design as a suggestion and ask others to put forward their ideas.

It has become apparent looking through *CoResearch* at events staff participate in, that a logo would promote CSIRO and give staff a feeling that they belong to the whole of CSIRO and not just their division.

The design features the standard letterhead, a slogan (advancing Australia) and the circles serve as a background.

Finally, at a time when we are asked to communicate more, and over the next few years as the Bicentennial approaches and there is a focus on Australia, we would be more united and improve our image if a logo was available to be used on "T"-shirt/sloppy joes.

Philip Sharp
Division of Radiophysics

Editor's note: work on a corporate logo for CSIRO is now underway.

Salvinia weevil

Dear Editor,

I was disappointed to read in *CoResearch* No. 294, page 6, that the name *Cyrtobagous singularis* had been used for the weevil that achieved biological control of the aquatic weed, salvinia, in Australia and Papua New Guinea. The correct name for this weevil is *Cyrtobagous salviniae*.

The identity of the two weevils, and the reasons why only one is a valuable biological control agent for salvinia, have been the subject of research by scientists in CSIRO. The weevil mentioned in your article, *C. singularis* was entirely unsatisfactory for controlling salvinia when introduced to southern Africa. By contrast, control of salvinia is now being achieved in Africa with *C. salviniae*, since its recent introduction.

The discovery of the weevil *C. salviniae*, previously unknown to science, was one of three key factors that led to awarding of the UNESCO Science Prize to six CSIRO scientists in 1985.

D P A Sands
Division of Entomology

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More Letters to the Editor on p.7

Food Research aims for priority status

The Division of Food Research is endeavouring to get 'priority' status starting from the next financial year (1987/88).

A recent external review — the first for 19 years — recommended the research at the Division be designated by the Executive as a growth area.

Chief, Dr John Christian, said a submission being prepared by the Division would press strongly for this action, in the interest of better serving the huge Australian food industry.

Manufacturing industry is already a priority area, but a large chunk of that sector — food — is not included.

The food processing industry constitutes more than 20 per cent of all Australian manufacturing, and is in fact the largest single component of the sector. It provides tens of thousands of jobs and is a substantial exporter.

Like other CSIRO divisions, Food Research is suffering from funding problems. The favourable review now provides ammunition for the Division joining the CSIRO growth areas.

The review report said in part — 'in view of the prospective pre-eminence of the processed food industry within the manufacturing sector, the committee believes it would be in the national interest for strategic research for the food industry be accorded a higher priority in CSIRO'.

Dr Christian said, 'We clearly have an opportunity to secure more funds now.'

The great majority of the 127 projects current at the time of the review were recommended for continuation by the review committee. The seafood group in Tasmania was removed from Food Research and became part of the Division of Fisheries Research — something Dr Christian and his colleagues were not too happy about.

'I can see what the committee was attempting to achieve — to encourage a producer group to understand the processing side of the industry,' he said.

'But we are disappointed about the move — it somewhat weakens our base as the centre of research in food processing.'

The Division covers all food research areas excluding seafood and those dealt with by the industry-backed institutes of bread, wine and sugar. It does work in collaboration with these institutes on particular projects.

Division Chief Dr John Christian.

'We haven't felt that we could consolidate into a few areas of excellence — as many divisions have done — because we believe we have a responsibility to maintain expertise through as much of the food industry as possible,' said Dr Christian.

'This means people working in some of these areas are virtually not supported at all.

'We hope the new initiatives for expansion will reverse this to some extent,' he said.

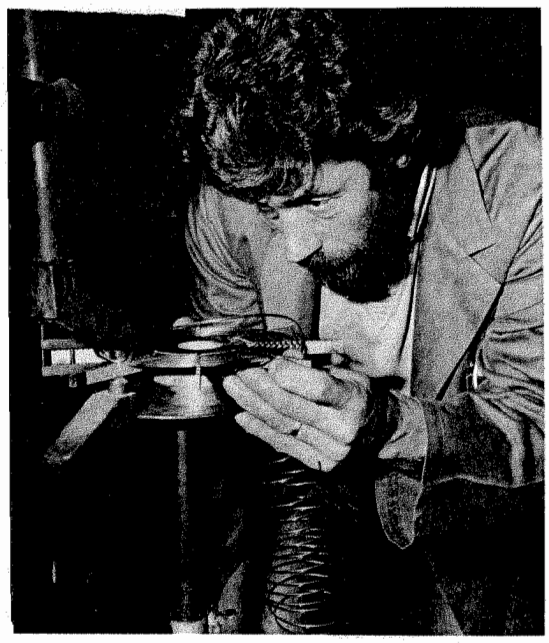
The Division's role in the industry has changed in the past 20 years, especially regarding meat, fruit and dairy products. It is now geared towards improving quality and developing processes to improve productivity, and increasing the range of specialised products.

Many food companies lack the depth of technical and research expertise available at the Division, and while this makes the Division's work all the more important, it also creates problems in technology transfer. Many companies stick with the processes and techniques they know about, rather than employ some of the novel methods developed at Food Research.

Despite this, the Division receives about 10 000 inquiries each year, of which around 60 per cent are from the food and related industries, with nearly half coming from companies with more than 100 employees. Government departments and consumers each account for 12 per cent, with the remainder from educational institutes, students and the media.

*Dr Christian is nearing the end of his term as Division Chief — he finishes on 31 December, after more than seven years in the role.

Interviews are now underway to find a new Chief, and the appointment is expected to be announced soon.



Senior laboratory craftsman Mr D J Noice building part of the Counter Current Extractor.

Varied research

The Division of Food Research is split into three laboratories.

Meat Research is conducted at Cannon Hill in Brisbane (MRL), while the Dairy Research Laboratory (DRL) is based at Highett in Melbourne (see separate stories).

Dr Alan Johnson is Officer-in-Charge of the Food Research Laboratory (FRL) at Ryde in Sydney's north west. He is also Assistant Chief of the Division.

The FRL has the most varied research program of all the Division's laboratories. Some of these are outlined elsewhere in this feature.

'We serve a very diverse industry, and this is reflected in the diversity of programs,' Dr Johnson said.

Basic studies on mechanisms of taste and smell are conducted virtually side-by-side with applied work on shipping of produce or the examination of new tomato varieties.

Currently, about 10 percent of funding for the FRL comes from outside — although industry funding is considerably higher at the DRL and MRL.

One of the aims of the FRL is to develop new ways of adding value to food products by further processing. New technology is constantly being developed or evaluated for use by food manufacturers.

Unfortunately, new processes developed at the FRL are not always taken up by industry.

An example of this is the 'flame spin steriliser' for canned foods. This is a process originally conceived in France but considerably refined by the Division.

While considered to be an excellent way of sterilising canned food (backed up by a series of taste tests which showed considerable acceptance for the products processed in this way), the Australian food industry is yet to take up the technology — being loathe to pay for an expensive conversion.

Of course, there have been many successes in technology for the industry — the most frequently cited being the Counter Current Extractor (CCE) which has commercial application in a number of food extraction procedures.

Liaison criticised

In the largely favourable review report, there were some criticisms of the Division concerning liaison between the FRL and industry.

The two other labs, because of the focus of their work, tend to have close links with the industries they serve. However, the FRL has a much broader range of research.

'Unlike Meat Research and Dairy Research, at the FRL we don't have a specific market,' said leader of the liaison and extension group, Keith Richardson. The MRL and the DRL both have considerably more outside funding than the Sydney laboratory.

'The review urged the formation of an industry advisory committee, and this is being set up to cover a broad spectrum of the industry.'

'One of the major functions of the liaison group remains alerting industry that a development has occured,' said Mr Richardson.

The Division's Food Research Quarterly is a useful means for informing industry of new developments, as are the periodic seminars on, for example, microbiological techniques.

'These seminars are aimed at technical people in the food industry, and are very successful,' he said.

Divisional representatives also attend conferences regularly to maintain contact with the industry.

The liaison group is now actively trying to get articles about research developments into business journals.

Liaison work has been hampered in recent times by significant losses of staff working in research areas clearly identifiable with parts of the food industry. For example, there is now no work at all being done on frozen foods, said Mr Richardson.

Problems tackled these days tend to relate mostly to cost and packaging.

Mr George Fisher is a member of the liaison team and he is very active in dealing with consumers as well as industry.

In the early 1970s, when the liaison group was being extended, it became clear that while the Division was working closely with industry, it was not seen to be doing much for the consumer.

'Many in the Division held the opinion that by serving the food industry, the Division was ultimately serving the consumer,' said Mr Fisher.

When it was seen that this was not always the case, the Division started producing a wide range of brochures aimed at informing the public about how to handle food in the home.

How sweet it is — but how do you measure it?

The objective measurement of sensory perceptions such as taste and smell is at the same stage now as the early, arbitrary thermometers were in the 17th century, according to Dr Bob McBride at the FRL.

It took another 200 years for a valid, equal interval temperature scale to be developed — although hopefully precise sensory measurement is not quite so far away.

Dr McBride's work on perceptions of flavour of food is complicated by the fact that no universally accepted measurement method has been devised. At present, there are three scales in use — none of which is related to the others, and the debate about which is the best has been raging for years.

He believes the so-called 'rating' scale is the most useful of the three. Put simply, this relies on testers on a taste panel being asked to rate substances on a scale ranging from, say, extremely sweet to no sweetness as all.

Dr McBride is an experimental psychologist, and uses principles based on physics first formulated last century by the scientist who coined the description 'psychophysics' — Gustav Fechner.

The term refers to the means of relating the internal psychological world to the external physical world. Psychophysics lost momentum after Fechner, and it was nearly 100 years before it was taken up again.

Sensory evaluation started in the United States during the Second World War, as a result of observations by armed services' quartermasters.

'The morale of troops correlated with the quality of food they received,' said Dr McBride. This highlighted the lack of research on human responses to food, and led to a new wave of sensory investigations.

Now, extensive sensory testing is carried out on a wide range of foods. The research covers the whole spectrum from basic to applied.

The average tasting panel has about 30 people who participate in 10 sessions. There are four samples to taste, and four questions about each.

'This means there are about 4800 responses in a routine test,' said Dr McBride.

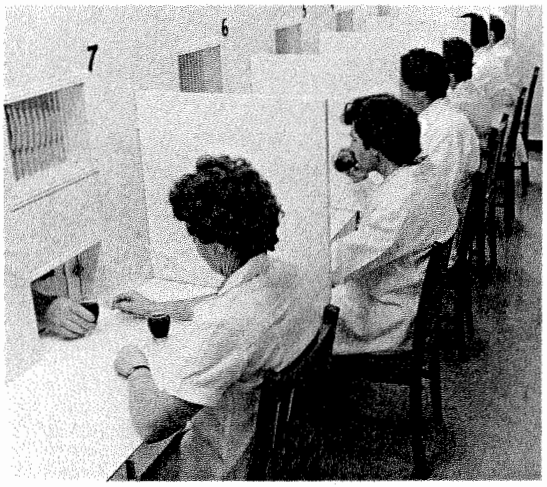
Testers sit in little booths with hatches through which food samples or solutions are passed to them. They then record their responses on a questionnaire form.

Soon the procedure will be computerised, with tasters pressing a button to respond to a particular sample. At present, questionnaire responses have to be collated and the information fed into the computer.

A major research program involves testing for degrees of sweetness in sugar solutions. This work is directly relevant to sections of the food manufacturing industry.

Consumer acceptance of such sweeteners as corn syrup (used extensively in the United States) needs to be gauged so manufacturers can gear their products correctly to public demand.

The aim is to develop a model of the sweet receptor sites on the tongue, to predict exactly what the sweetness will be in a given sample. This has both basic and applied scientific importance.



The taste test booths at FRL. Was it red wine on the menu?

Research direct to industry

The FRL group with perhaps the greatest contact with industry is Applied Food Science, led by Mr Peter Board.

Many of this group's projects arise directly from requests from the food processing industry, but others are undertaken because they seem likely to meet the future needs of the industry.

'We have the most heterogenous group in the Division,' said Mr Board. 'We work on the processing and packaging of food and the disposal of waste materials. Also, we are involved in food engineering, the physics and engineering of food transport and the production of biologicals for use in the food industry.'

Some recent research into photochemistry has resulted in new techniques for removing oxygen from enclosed spaces. These techniques have applications in the packaging of foods and have led to new rapid techniques for increasing the barrier properties of plastic packaging materials.

'We use a pigment system to absorb light energy, which is transferred to oxygen molecules to produce a "singlet" state of oxygen, which is highly reactive.

'This then reacts with organic materials, the oxygen is removed and carbon dioxide is produced.'

Certain foods, such as peanuts in plastic bags, become rancid if exposed to oxygen.

Commercial application of the photochemical work is being explored in a collaborative arrangement with Sydney University and Oxoid, a British company.

Apart from its long-term research projects, the Applied Food Science Group also responds to the short-term problems of industry.

'For example, we provide an advisory service to the canning industry on heat sterilisation processes which are designed to ensure cans are shelf stable,' said Mr Board.

'We also advise on corrosion and staining problems and on the structure and integrity of the hermetic seals on cans and other food packages.

'The group has a food processing pilot plant where industry can arrange to carry out trials.

'One of our recent successes in collaboration with an Australian company, was the devopment of a microbiological process to produce citric acid. This process is now being brought into production,' said Mr Board.

'The significance of this is that Australia can now become independent of imported citric acid used in, for example, soft drinks and confectionary.'

New insights into the sense of smell

Work on olfaction, or the sense of smell, is an example of research to establish basic scientific principles which also directly benefits people.

Dr David Laing conducts olfactory work at the FRL, which is providing important basic data on the perception of odour by humans. This has wide implications, not only for the food industry, but also for medicos.

One of the applied spinoffs from work in the lab is the encapsulation of odorants in 'scratch and sniff' strips for instant and simple testing of sensory problems, in conjuction with 3M (Aust.) Pty Ltd.

Using 14 smell-impregnated strips, the technique is now undergoing clinical trials at Concord Hospital in Sydney on patients with thyroid deficiencies. This condition is known to cause diminished smell and taste capabilities.

The patients are being tested before and after treatment with the hormone thyroxine, which restores sensory abilities in hypothyroid cases. The strips provide an excellent check on the progress of the treatment.

'The test is also under review for inclusion in the health screening procedures of Medicheck which would provide a large volume of data on the level of smell dysfunction in the community, information on illnesses and diseases that affect the sense of smell, detect illnesses where smell may be used as a tool in early diagnosis, and determine social, behavioural and nutritional consequences of the loss of smell,' said Dr Laing.

Dr Laing's main work is to provide data on the role smell plays in the perception of flavour. The other component in this equation, taste, is researched by Dr Laing's colleague Dr Bob McBride (see separate story).

'We are interested in how odour and taste interact to produce flavours, and in knowing what makes people like or dislike the result,' said Dr Laing.

'The idea is to develop a system, from rules formulated in the laboratory, to predict the important odours which produce the flavour characteristics.'

He is keen to know whether 'processing' of odour occurs in the nose or in the brain.

To answer this question, multi-disciplinary research looking at behavioural and physiological responses to olfactory stimulation is in progress. Humans are used to determine behavioural responses, while animals (especially rats) are used to determine the physiological base.

Panels of people are tested several times by getting them to note their responses to odours presented to them through Teflon tubes in testing booths. One of the important discoveries established with panel tests has been that certain odours are able to suppress others. **Cont. on p.5**

Giving modern tomatoes old fashioned flavour

Most people enjoy tomatoes, which are a standard component of many dishes.

However, in recent times the flavour of tomatoes has come in for quite a bit of criticism in the media.

Labelled bland, boring and unlike the way tomatoes *used* to be, the humble red fruit has certainly had some bad press of late.

Since 1981, the FRL has conducted a series of investigations into the characteristics of the tomato, aimed at assisting breeders, growers and marketers to provide consumers with the best possible product.

The most recent experiments have investigated the role of smell in determining the acceptibility of tomatoes.

Dr Barry McGlasson has been involved in tomato research since 1981, and has regularly been asked to comment in the media on the subject.

'We are trying to come up with an objective procedure for measuring the quality of tomatoes,' he said.

In the recent experiments, Dr McGlasson was looking at the way smell and taste interact to form flavour.

Using experienced panelists (mostly from the Division), he presented chopped tomatoes in a jar for sniffing.

The tomatoes had been left covered in the jar for a short while to enable the tomato volatiles (ie. the substances released from tomatoes when they are cut, which produce the smell) to accumulate. The panelists were then asked to rate the aroma.

Secondly, the panelists were asked to taste the tomatoes with their noses pinched, and again rate their responses.

After this, they were asked to 'apply all the senses in the usual way' — smelling and tasting.

'Indications are that aroma really does make quite a big difference,' said Dr McGlasson.

Major breakthrough in dairy research

Finding out what causes food allergies

Foods which are a pleasure for some people to eat may be dangerous and even deadly for others.

The vexed problem of food allergies is one of the many facets of the nature and production of food examined by researchers at the Division.

Scientist Mr Don Barnett is currently looking at allergies to legumes, especially peanuts.

'Peanut allergy can be potentially fatal in some cases,' he said.

'The medical profession has little in its diagnostic and treatment armoury to assist those with high sensitivity to peanuts, or other foods.'

Humans have been aware of the curious phenomenon of food allergy since the time of Hippocrates.

However it wasn't until 1906 that the scientific concept of allergy as an abnormal reaction to a substance in the food was acknowledged and any systematic study was undertaken.

Mr Barnett is aiming to find the common factor, if any, which triggers allergies, and thereby assist the medical profession in treating allergy victims. It is believed that most individual allergens in various foods are proteins or glycoproteins — although in some cases the offending substances may come from an additive.

He is involved in some continuing work with the Royal Alexandra Hospital for Children and the Royal North Shore Hospital in Sydney, examining allergic reactions.

The exact numbers of people affected by food allergies is rather uncertain. In fact, published figures have varied between 0.3 and 60 per cent of the population.

It's generally agreed that the incidence of so-called 'immediate hypersensitivity' (reactions in minutes or hours after ingesting the food) is probably confined to about one in a 100 people.

Symptoms such as hives, stomach cramps, headaches and asthma are most common in cases of food allergy.

However, a much more dangerous reaction, observed in a few people, is anaphylactic shock.

This sudden shock reaction causes faintness, drop in blood pressure and collapse — and even death if not treated.

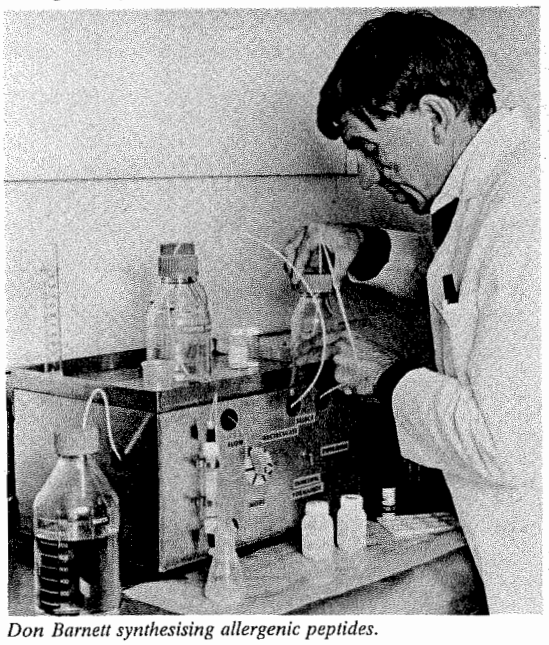
While a variety of foods can cause anaphylactic shock, Mr Barnett has been particularly looking at a more common offender — the peanut.

Peanuts are a popular snack food in Australia, but in some countries they constitute an important part of the total dietary protein.

Studies have shown that peanut oil does not cause allergic reactions and the source of the problem can be tracked down to the legume's protein constituents.

However, there is still much to be learnt about the properties in peanuts and other foods which produce allergic reactions. None of the present diagnostic tools for determining allergic reactions in people are completely sound.

Mr Barnett says the only reliable method of treatment at present is for afflicted people to completely avoid the offending food. This is difficult when it is a major diet component or when the constituents of prepared foods are unclear.



Don Barnett synthesising allergenic peptides.

Ensuring quality from the farm to the consumer

The Division has a post-harvest research program to help ensure quality control of produce both on the farm and once it has left the farm gate.

Research is concerned mainly with post-harvest problems in the storage and handling of some of the major fruit crops in Australia, developing new strategies for storage of fruit and vegetables and evolving methods for the storage and handling of new or previously under-utilised tropical and other fruits.

As part of this work, an officer from the New South Wales Department of Agriculture is located at the Division to offer advice to user groups, as part of a joint project.

She is Ms Sheila Spraggon, who acts as a contact between researchers and the industry. She deals with the whole market chain from growers to wholesalers to retailers.

For instance, she and her colleagues advise on the storage of fruit on the farm, wastage minimalisation and the best forms of transportation.

All crops except cereals are dealt with — fruit, vegetables and flowers.

Cereals are looked at by the Wheat Research Unit and the independent Bread Research Institute, located in an adjacent building on the North Ryde site.

'The Division fits into the system very well,' she said. 'We have no trouble talking with people, and they realise we are here to help.'

One of the most important aspects of post-harvest handling she assists with is temperature control. She said nearly all fruit and vegetables should be kept at low temperatures except some tropical fruits which are susceptible to chilling injury. Research is continuing to understand the nature of different crops and how they should be treated for optimum quality and presentation at the point of sale.

'Temperature control is very important. If there is poor management of this, the fruit or vegetables don't last long and a lot of money can be lost,' she said.

Ms Sheila Spraggon

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The transportation group handles food with care

The Division is involved in nearly all facets of food production, including transportation.

This is a complex area because of the wide variety of foods to be shipped — many over long distances — and the differing conditions required for each type.

Transportation methods for food cargo travelling within Australia and from Australia to overseas destinations are examined. A common problem faced by exporters is that foods may change temperature while travelling from one climate through to another one.

The transportation group is part of Applied Food Science. Here are some examples of work of the team, led by Dr Alister Sharp.

The Fantainer

The Division's successful 'Fantainer' cargo container arose out of research into the problems of exporting onions.

Until the 1980s, onions sent on the five- to seven-week journey from Australia to Europe travelled first class — in refrigerated transport which was not always available in sufficient quantities.

A better system was needed if this trade was to expand.

Ventilation of the onions is the most important factor in long term storage, and some open-sided containers were tried. These were placed above deck, exposed to wind — and, more damaging, rain.

The only way of ensuring ventilation and protection from rain in a container is to use a fan — hence the Fantainer.

A removable fan was placed at the end of the container and a false, open floor fitted inside the standard cargo container for air to freely move beneath and through the onions.

The fan is removed at the end of the trip to revert to the standard container.

The first experimental Fantainer of onions was shipped from Tasmania to the UK in 1982. Since then the number of Fantainers used increased from 100 in 1983 to about 740 in 1986.

This means around 40 percent of all Australian export onions are currently shipped in Fantainers.

The Ventainer

Transport from one climate to another has always been a problem for the shipping industry because of the risk of damage from condensing moisture.

A series of experiments on the problems of ventilating food cargo started in 1977 at the Division, in conjunction with the Department of Primary Industry of Papua New Guinea.

These examined how to prevent condensation damage to cocoa and coffee exported from PNG.

The outcome of the experiments was the Ventainer.

Like the Fantainer, this is based on the standard steel general-purpose container in use around the world.

Ventilation openings are formed by cutting into the walls. These are backed by baffle plates, welded in place, which stop water entering.

The advantage of using simple vents on existing containers is that they can be easily cleaned and inspected for quarantine clearance, and no special stowage pattern is needed to ensure the cargo doesn't obstruct airflow through the vents. The interior and exterior dimensions of the container are unchanged.

Olfaction

Cont. from p.4

Dr Laing is also involved in a project with the Sydney Institute for Early Childhood Studies, to look at taste and smell responses in very young children.

'We don't know the extent of the ability of taste and smell at birth, or how these senses develop as children get older,' said Dr Laing. 'Indeed, we don't know at what point children reach the adult level of taste and smell response.'

The research project will aim to identify what taste and smell sensations are present. 'If we know, then food manufacturers will be able to develop infant foods best suited to childrens' needs,' he said.

Testing children is not easy, but the experiments will be presented to them as games.

It's likely Dr Laing will use the 'scratch and sniff' strips mentioned earlier.

Apart from determining the flavours children would like in their food, the work will also enable the development of tests to tell parents of any taste or smell problems in their children.

Major breakthroughs in dairy research

The dairy industry in Australia has upgraded and diversified enormously in the past few decades.

At the heart of this development has been the Dairy Research Laboratory (DRL) — part of the Division of Food Research.

There has been a plethora of major breakthroughs by scientists at the laboratory. Because of close contact with the industry it serves, most of the developments are readily taken up and put into practice.

A good example was the technology for recombined dairy products, which has been extremely successful in South East Asia as well as Australia.

Work on separating the components of milk and recombining them in new ways dates back to the Second World War at the (then) Section of Dairy Research. This work has continued and resulted in such products as recombined milk, sweetened condensed milk, butter, etc.

The research in this area was taken up by the Australian Dairy Corporation and ultimately led to the establishment of recombining plants to manufacture the products in a number of countries in South East Asia. The project has provided an outlet for Australian non-fat milk powders and anhydrous milk fat.

DRL maintains close liaison with Asia Dairy Industries, providing assessment of recombined products from South East Asia and new technology from laboratory research programs.

For example, DRL was involved in the development of recombined instant full-cream milk powder which was subsequently manufactured in Indonesia, using the sophisticated technology developed at the laboratory.

One of DRL's most important services to industry is the provision of 'starter' cultures for cheese manufacturers. These cultures contain the organisms required to ferment milk during manufacture into cheese.

However, there is a problem — the bane of cheese manufacturers — 'bacteriophage'. These bacteria attack the starter organisms, preventing production of cheese.

The laboratory has developed a system for selecting phage-resistant starter strains in factories, and this is estimated to have saved cheddar cheese manufacturers $3.5M annually.

It is a continuing quest. A senior scientist said it's unlikely bacteriophage will be eliminated entirely — just controlled as much as possible.

Here, briefly, are some of the other major projects, past and present, at the laboratory:

. Upgrading of the manufacture of acid casein (milk protein). Casein was originally used as an industrial raw material for glues. New machinery and processing techniques were developed to improve quality yield. Casein is now a valuable ingredient in many foods.

. Mechanisation of cheddar cheese manufacture. The milling, salting and hooping machine, Bell Siro III, and the cheddaring machine Bell Siro II, were world firsts. They assisted in the rationalisation of cheesemaking in Australia and in the reduction of manufacturing costs.

. Production of tailor-made milk powders. Manipulation of processing techniques was successful in providing the bread industry with a form of skim milk powder that could be added to a standard recipe without any reduction in loaf volume. Other milk powders have been developed for specialised applications, in particular in recombining.

Whey utilisation. Whey contains a high proportion of milk solids and represents a major problem of disposal without polluting the environment. The use of membrane technology has been expanded to recover the solids and provide a wide range of byproducts for . High-yield cheese equipment. The laboratory has several major collaborative agreemajor collaborative agreements relating to the application of ultrafiltration (UF) techniques to cheesemaking. The new UF process for manufacturing natural hard cheese will increase cheese yield by about eight percent — and that means considerable financial gain for manufacturers. The Division now has an agreement with a major US cheese producer to establish a full-scale plant for the use of UF cheese base in processed cheese.

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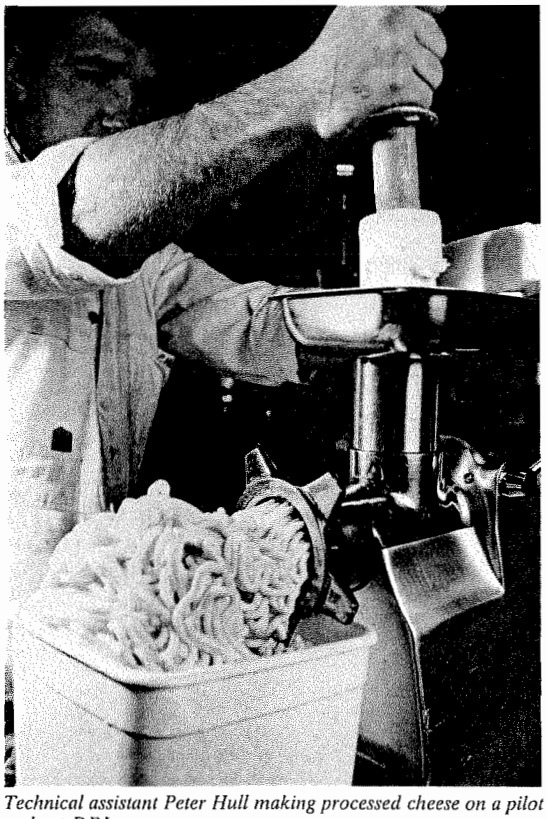
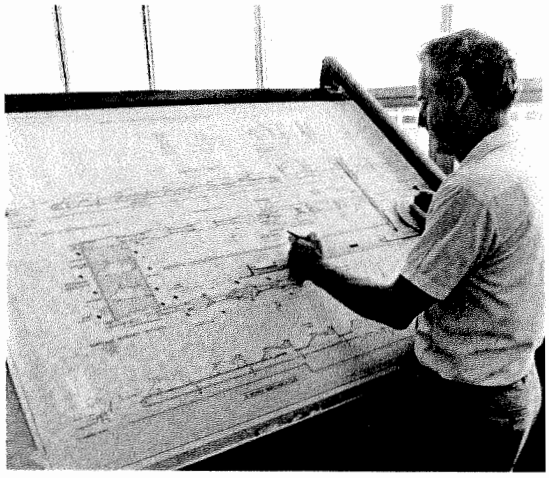
About 35 percent of DRL's funding comes from outside the Organization.

The laboratory's major collaborative partners are: APV International and APV Bell-Bryant (UF for cheese manufacture), Asia Dairy Industries (recombined dairy products), Miles Laboratories/ Sumitomo Chemical Co (lactose hydrolysis), Dairy Research Council (cheese research, whey utilisation and protein-adjusted milk powders) and the Oilseeds Research Committee (isolation of sunflower protein).



Technical assistant Peter Hull making processed cheese on a pilot scale at DRL.

The Meat Research Laboratory



Mr Bob Tritcher, one of the engineering group, working on a design for new meatworks plant equipment.

The Division's Meat Research Laboratory, with a staff of about 80, is situated on a 15 acre site at Cannon Hill, a suburb of Brisbane.

It is strategically placed between three of south-east Queensland's major abattoirs, and much field work is carried out at those sites — particularly the Metropolitan Regional Abattoir 10 minutes away.

The MRL also has its own small abattoir.

A series of cattle and sheep pens, in which single animals can be weighed and killed for experimental purposes, is available on site. Methods of humane slaughter, and other processing technology, are investigated at this facility.

The lab uses more meat for experiments than can be obtained from its own abattoir, so much of it is brought in from the nearby slaughterhouses.

This is needed for research into tenderness, storage life, packaging, irradiation and a range of other areas of interest to the meat industry.

The lab is involved in all stages of meat production, from the time the animals leave the farm gate until the meat is presented for sale.

In fact, one of the projects involves evaluating retail display cases for suitability to display meats.

Colour, presentation and appearance are the principal factors affecting the sale of meat from refrigerated display units. The last two depend on the butcher, but retention of the attractive bright red colour of beef and the characteristic colour of lamb and pork is dependent on efficient operation, lighting and location of the refrigerated display unit.

A survey was undertaken by the MRL in various butcher shops around Brisbane.

It was found that there was a basic lack of knowledge and understanding of refrigeration performance of display units, as well as the effects of display lighting and other sources of heat on the condition of the meat.

Many shops were using window display 'cold plates' which exposed meat to light and higher temperatures, contributing to the deterioration of the appearance.

The results of this work have been made available to the meat industry.

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Steroids from animal bile

One of the many research areas to attract commercial interest has been the work on converting animal bile into products for making pharmaceutical steroids.

This project is progressing well, and commercialisation of the process through an Australian company is being finalised.

Some of this work has been undertaken in collaboration with the University of New South Wales.

The biotechnology team has been fermenting cattle bile to produce 'intermediates' needed for the synthesis of the steroids.

Cattle bile collected at Australian abattoirs is usually sold, virtually unprocessed, overseas. By adding much greater value to this byproduct, a more lucrative export product will be available.

Pharmaceutical steroids are usually derived synthetically and are quite expensive to produce. The biological approach promises high efficiency and reduced production costs.

More letters Cont. from p. 2

Declining standards

Dear Editor,
For some time now the standard of proofreading and layout in *CoResearch* has been deteriorating to the extent that I used to look forward to the monthly challenge of jumping from column to column trying to maintain continuity (and the sense) of the text.

But I am one of your victims now, and I no longer think it's funny. As a result, your readers will never know what Dr Wark said to the office-boy. They will be denied the lurid details of the relationship that existed between office-boys and typists in 1941, and between what's-his-name and you-know-who. Will they ever find out how many typewriters Miss Thomas demolished each month? Or what was being screened at the Times Theatrette during office hours? Why typing pools should be reinstated? Or exactly what Audrey was doing when Jack Bourne took his famous photograph at the office picnic? Too late. It's all been edited away, and rather crudely if I may say so.

Now it doesn't really matter what *CoResearch* thinks of, or did to, my (invited) contribution. What does matter is that the technical standards of *CoResearch* and other publications are declining, a situation brought about, I believe, by diminished resources and unrealistic cuts in staff levels that leave the remaining devoted few to work their guts out trying to achieve the impossible. I certainly hope that those responsible for *CoResearch* don't like things the way they are any more than I do.

I would be a disaster if other, more important, areas of CSIRO were to suffer the same fate for the same reasons.

Peter Moglia
Division of Building Research

Journals suggestion

Dear Editor,
In the August 1986 issue a letter from eight CSIRO scientists urged support for continued CSIRO funds to be allocated for the publication of the Australian Journals of Scientific Research. I have heard many CSIRO scientists question whether CSIRO should be obligated to continue to pay for these publications.

Surely at least a partial solution is to introduce page charges. In our Division we willingly pay page charges for the cost of publication of research results in the most appropriate journal anywhere in the world. The cost of publication is part of the cost of doing research and universities should recognise this as well as CSIRO divisions.

J J Lowke
Division of Applied Physics

Features okay

Dear Editor,
In his letter to *CoResearch* (September 1986), Peter Alfredson questions the new format of *CoResearch*, in particular the monthly Division Feature.

Whilst I appreciate that *CoResearch* is primarily a staff newspaper, it should be pointed out that many of us who work in industry rely heavily on the newspaper as a source of information.

CoResearch in its new format, especially the Division Feature, is most useful and I have, on several occasions, circulated copies widely in my organisation.

Keep up the good work.

Shaun G Coffey
Executive Director
Cattlemen's Union

Chasing hares

Dear Editor,
Could Don Benjamin (*CoResearch* No. 295) perhaps recognise that it is the right and responsibility of his colleagues to each use his/her own best judgement as to the area of work which is most likely to advance our knowledge annd understanding?

If his colleagues make a mistake and miss an opportunity, they will no doubt kick themselves later, but if they chase every hare that springs they are unlikely to get much productive work done at all.

K R Makinson
Retired (Textile Physics)

'Rampant' feminists

Dear Editor,
M H Jones' use of the word 'rampant' (*CoResearch* No. 295, Letters to the Editor) implies that CSIRO feminists are:
1 unrestrained or violent in behaviour;
2 growing or developing unchecked;
3 (heraldic, of a beast) standing on hind legs, the right foreleg raised above the left;
4 (of an arch) having one abutment higher than the other.
(Source: Collins Concise English Dictionary, Australian Edition)

I would simply like to quote Rebecca West, who wrote in *The Clarion* in 1913 that 'I myself have never been able to find out precisely what feminism is; I only know that people call me a feminist whenever I express sentiments that differentiate me from a doormat...'

Nancy Mills Reid
Division of Energy Chemistry

CoResearch welcomes letters from any reader on topics of interest. However, space restrictions now mean we will have to ask you to limit your letters to 200 words if possible. Although we endeavour to publish letters in the issue after they are received, when space is at a premium, preference will be given to shorter letters.

EMEX aims for more accuracy in tropical weather forecasting

The Division of Atmospheric Research is collaborating with the Pennsylvania State University and other overseas institutions on a major experiment in northern Australia early next year.

The Equatorial Mesoscale Experiment (EMEX) will investigate heating in tropical cloud clusters to define the effect these clouds have on the vertical heating (ie. temperatures of the different layers) of the atmosphere in tropical regions.

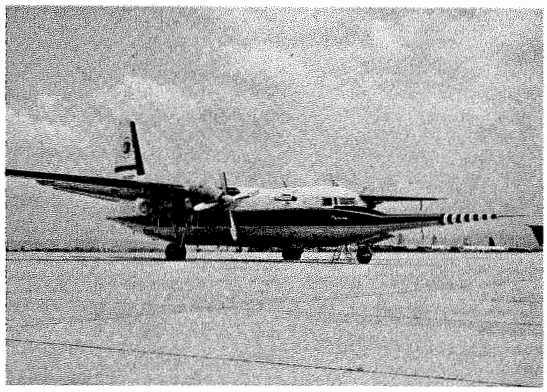
One of the aims of the experiment is to enhance the accuracy of weather forecasting in the tropics.

EMEX will run from 1 January to 15 February and will coincide with two independent but complementary experiments in the same region: the Australian Monsoon Experiment (AMEX) aimed at defining the structure of the northwest monsoon; and the Stratospheric-Tropospheric Exchange Program (STEP), which will examine interactions between the stratosphere and the troposphere.

AMEX is being co-ordinated by the Australian Bureau of Meteorology Research Centre, and STEP by the US National Aeronautical and Space Administration.

It's expected all three experiments will be closely co-ordinated. A consortium of US university, NOAA, NASA and CSIRO scientists are co-operating to plan and implement EMEX and will work together in the subsequent analysis of the results.

The primary goal of EMEX is to find where the air in the atmosphere is heated by condensation of water vapour and where the atmosphere is cooled by evaporation of rain. Large-scale numerical weather forecast models are very sensitive to this heating profile. EMEX and STEP together will investigate certain relatively localised phenomena in greater detail, while AMEX operations will concentrate on the nature of a detailed and near-continuous monitoring of the wider tropical atmosphere through the whole of the joint exercise period.



The CSIRO F27 research aircraft which will play an important role in the EMEX project.

The main observational platforms for EMEX will be a WP-3D aircraft which is being provided by the National Atmospheric and Oceanic Administration in Washington DC, an L-188 Electra aircraft supplied by the National Centre for Atmospheric Research in Boulder, Colorado, the CSIRO F-27 research aircraft and a dedicated research ship from the People's Republic of China.

The key CSIRO participant is Dr Brian Ryan from Atmospheric Research, who believes the experiment will provide unique data for studying convection in tropical Australia.

'The role of the F-27 is to collect data that will allow us to study how the convection modifies the lowest kilometre of the atmosphere,' Dr Ryan said. 'These observations, combined with those from the NOAA P-3 and the NCAR Electra, will allow us to document the life cycle of the convective clusters and obtain valuable insights into the chemistry of the tropics.'

Two other research areas will be greatly enhanced by EMEX data. Each of these is important in Australia and each is an extension of the research objectives of the Division of Atmospheric Research. The first is the study of processes forming the precipitation associated with the cloud clusters. For the first time in Australia it will be possible to calculate the 'precipitation efficiency' of such a system. Knowledge of the precipitation efficiency of major rain bearing systems is an important ingredient for long-term water management policies.

Secondly, contributions will be made to knowledge of tropical atmospheric chemistry. The F-27 will collect air samples that will be analysed for trace gases by the Division. At present, very few such measurements have been made anywhere in the world and it's expected they will provide valuable insights into the chemistry of the atmosphere over the tropics.

Gozho appeal a great success

This item has been contributed by Russell Porter from the CSIRO Film & Video Centre.

The response to the article in the August *CoResearch* to help the people of Gozho in Zimbabwe has been quite wonderful.

It has affirmed my belief that CSIRO is made up of many big-hearted and socially conscientious people.

On behalf of the people in that struggling but optimistic African community — thank you very much. At the time of writing (25 Sept.) over $1700 has been received and more is promised. We seem certain to reach the $2000 target.

Special thanks to those who have rallied and prodded their colleagues in institutes, divisions and units. Donations have ranged from 50 cents to over $100.

I'm afraid I haven't had time to acknowledge each contribution personally — we have been frantically trying to finish the film (which features the Gozho children) in time for its 21 October program date.

Some people have (quite reasonably) asked for receipts for taxation purposes. The position is a little unclear. According to the Taxation Department, only donations to recognised overseas funding bodies are eligible for tax deductions. To get registratrion as an international charity is a very complex affair. Approval must be gained from two Ministers of the Crown, and notice must be placed in the Government Gazette. It could take many months, and even then it seems the Gozho Pump Appeal is unlikely to qualify.

If people *do* want receipts (and care to try the Tax Department) please contact me at the Film and Video Centre.

Some useful suggestions have come from among our technical boffins. One is for a solar-powered pump and the other for something called the Tyson Pump, which featured on Beyond 2000 recently. I'm following up both suggestions and have written to David Gwaze in Zimbabwe to see what's feasible there.

Once again, thanks to all who have contributed. And to those still thinking about it — there's still time.

Vale Ivan Newnham

Mr Ivan Newnham, former Director of the Institute of Energy and Earth Resources, died on 4 September. A memorial service, which many CSIRO people attended, was held on 10 September in Melbourne.

Ivan Newnham was not an ordinary man. Beyond his outstanding scientific abilities he had an energy and vision that enabled him to make a significant impact during his 37 years of service with CSIRO. A detailed account of his career with CSIRO appeared in *CoResearch* July 1984, before his retirement in November 1984.

For the record, Ivan joined CSIRO in 1947 after working as a metallurgist in industry and became Chief of the Division of Mineral Chemistry in 1961. He became Director of the Minerals Research Laboratories in 1971 and then first Director of the Institute of Earth Resources (later Energy and Earth Resources) in 1978. Unfortunately Ivan had to retire early as Director in December 1983 due to ill health but remained a member of CSIRO until his 65th birthday in November 1984.

But a summary of the stages in his career doesn't reveal the considerable impact Ivan made on his colleagues. Some of those closest to him have shared their memories for this article.

Dr Geoff Taylor, previously a member of Mineral Chemistry and MRL, now a member of the Executive, attributes Ivan's success in leading and motivating people to throw themselves wholeheartedly into new endeavours to his genuine interest in, and concern for, people. 'He was the best listener I've ever met. He concentrated intently on what anybody wanted to tell him and so took in what was said — and often more importantly, what was left unsaid. And he remembered all these conversations, sometimes to the surprise of the people concerned. If there was an achievement in the workshop or some success

Mr Ivan Newnham

in a research project, Ivan was quick to share genuine pleasure in this.

One of Ivan's most significant actions was the introduction into CSIRO of research planning. Dr David Koch, now Chief of the Division of Minerals and Geochemistry in Perth, used to work in Mineral Chemistry and succeeded Ivan as Chief in 1971. His first impression of Ivan, which he says gave an indication of things to come, was at a seminar at the Division of Industrial Chemistry in the 1950s. 'Ivan had just returned after a successful period in the US during which he pilot planted, and negotiated a $250 000 licencing agreement for, a process he had developed for separating hafnium from zirconium.

'His experience overseas had a tremendous influence on his outlook and in the seminar he pointed out that CSIRO's attempts up to that time to commercialise research were amateurish and there was a need to focus our research effort and establish research teams to meet practical objectives. Nearly 30 years later this has been accepted as an important requirement for CSIRO.'

'Ivan appreciated the problems of industry and oriented the research in his laboratories towards solving those which had national economic relevance. The respect and admiration that industry held for him is reflected in the fact that he was awarded his AO for his contributions to the minerals industry. However, despite his strong belief in the need for industrial input into research, Ivan insisted this was not a substitute for excellence in research.'

One of his early moves as Chief in the 1960s was to appoint a planner from industry, Mr David Roney, to help the Division identify needs of industry and develop strategic plans and objectives to meet them. David Roney continued this role through the MRL and Institute days until his recent retirement. He particularly remembers Ivan's high standards. 'He sought excellence; in his own research and later as an administrator, in the staff of the divisions for which he was responsible. He believed in the need for researchers to have access to instruments of the highest quality and gave high priority to the funding of new facilities.

'Front-line science was his joy; encouraging scientists one of his great strengths. He could not suffer fools gladly. He encouraged discussion of the plans he intended to pursue and would react positively to well reasoned argument.

Dr Alan Reid, who also worked in Mineral Chemistry and succeeded Ivan as Director of the Institute, regards him as one of the most gifted organisers of scientific endeavour in Australia. 'The present preeminence of CSIRO in satellite remote sensing applications owes much to Ivan's vision in the establishment of the Division of Mineral Physics. He was also responsible for the framework in which the Division of Energy Chemistry was created, oversaw the transformation of the Division of Chemical Engineering into Mineral Engineering and established a personal reputation with the minerals industry that guaranteed industry's interest in CSIRO work.'

Although illness marred his short retirement, Ivan continued to work, coming into his old Division regularly to be involved in some research and, latterly, mastering the intricacies of a personal computer so he could write a history of the Division. He was also able to spend much of this time with his family. Our sympathy goes to his wife, Yvonne, daughters, Merilyn and Vivienne, and his grandchildren.

Jenifer North, IEER

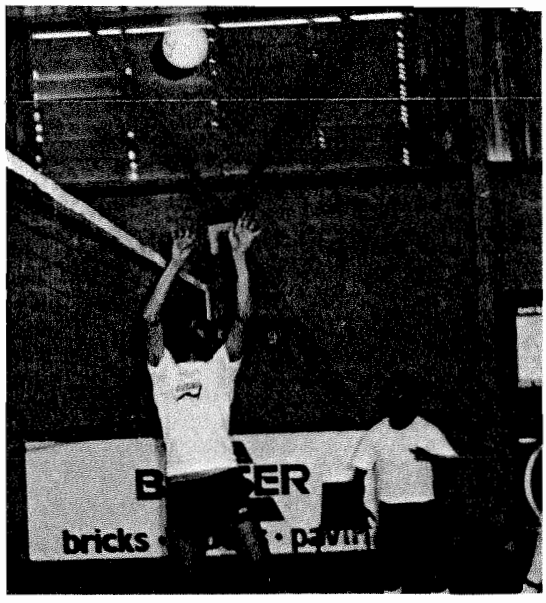
Retirements

Hans Jaeger retired from CSIRO after 31 years. Hans joined the Division of Tribophysics (now the Division of Materials Science) as a senior technical officer in 1955 and retired as principal research scientist.
with the State Electricity Commission of Victoria and then with ICI before joining CSIRO. He was made an EO in 1957, and at the same time crossed another major hurdle when the Royal Australian Chemical Institute recognised his diploma from Essen and accepted him as an Associate.

Over the ensuing years, Hans showed particular skills in developing techniques for the deposition of thin metal films of different orientation in ultra high vacuum. Shortly after Tribophysics acquired its first electron microscope around 1959, Hans became an addict of direct observation of defect structure by transmission electron microscopy, a technique he used and developed for his research projects throughout the rest of his career in CSIRO. In the early 1960s it was recognised that Hans, now an EO3, should be reclassified as a research scientist as his original contributions of ideas, experimental work and interpretation were clearly outstanding. He crossed the difficult barrier between EO3 and SRS in 1969.

Hans' interest in defect structure in thin metal films and epitaxy of various thin film combinations resulted in a series of classical papers with Dr Linda Bruce. In recent years, Hans extended his research to supported metal catalysts and to zeolite structures and has added X-ray diffraction to his repertoire of techniques.

In the past few years Hans has been the Division's information officer.
the role of information officer for the Division.



CSIRO took out the Gold Award at the Townsville Pacific Festival social volleyball tournament recently. The team from the Davies Laboratory plays every week in an informal competition held at James Cook University. It comprises Laurie Conlan, Alan Neish, Delia Waterhouse, Anne Sumpter, Rodney May, Dan Gibson and a visiting scientist from China, Liang Zhonjun. They decided to enter the weekend tournament for 'a bit of fun' — no-one expected to take out first place. After losing the first match to Computing Science from the Uni, they fought back all the way to win every match following so they could play Computing again in the final. This time CSIRO made no mistakes and defeated them two games to nil to take home first place among the 16 teams competing.

Obituary: Dr David Bishop

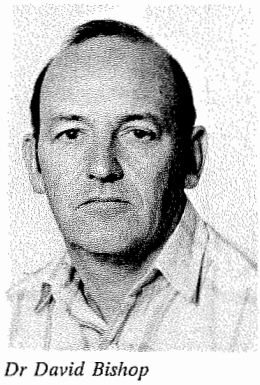
Dr David Bishop, senior principal research scientist at the Division of Food Research, died recently as a result of an accident while involved in his hobby, scuba diving. Dr Bishop had been a member of the plant physiology unit of the Food Research Laboratory for over 18 years, based initially at Sydney University and more recently at Macquarie University. He was an outstanding scientist with an international reputation in the field of lipid chemistry.

At one time Dr Bishop was particularly interested in lipid metabolism in photosynthetic organisms that live in symbiotic association with clams and corals on the Great Barrier Reef and he made several significant discoveries in this field. He was able to use his expertise in scuba diving in this work.

Dr Bishop's international reputation resulted in invitations to attend major overseas conferences and to work in overseas laboratories. This was also reflected in the number of visiting scientists working with Dr Bishop.

David Bishop will be sorely missed by his friends, colleagues and the international scientific community.

George Fisher



Dr David Bishop

CoResearch
CSIRO's staff newspaper
No. 297 November 1986

Major personnel changes foreshadowed

CSIRO personnel management practices will undergo significant change aimed at achieving greater flexibility and efficiency, the Chairman, Dr Boardman, told Chiefs last month.

Some of the changes now being considered included streamlined appeals arrangements, better procedures for dealing with surplus and inefficient staff, a simplified clerical/administrative structure, and speeding up the selection and recruitment process.

Dr Boardman said the Federal Government's plans to improve efficiency in the Public Service were under examination to see how they could best be adapted to meet CSIRO's needs.

The General Manager (Personnel), Mr Kevin Thrift, said changes would only be made after full consultation with staff associations. The proposed changes were discussed at the October meeting of the Consultative Council. The council is made up of management and union representatives.

Dr Boardman told Chiefs that the present appeals arrangements were often 'cumbersome and complex' and a proposal to substitute in house review for formal appeals for a wide range of complaints was under consideration.

'Other appeals will be similarly scrutinised. Appeals against having an appointment terminated while on probation, appeals against compulsory invalid retirement and promotion appeals in the clerical/administrative area are just some which will be re-examined,' Dr Boardman said.

Ways of streamlining the current 'complex and lengthy' procedures for dealing with surplus staff would also be considered.

Dr Boardman said procedures for dealing with inefficient staff would be simplified and different strategies for identifying and dealing with inefficient staff would be developed.

'To simplify and speed up recruitment and selection processes, especially for those categories of staff which are common in the public service, we will be examining changes announced by the Government and we will also examine our own procedures,' he said.

'. . . we are watching the Public Service Board's progress with a proposal to simplify the clerical/administrative structure by grouping 48 separate classifications into five. And our early separation incentive scheme is now with the Minister for approval.'

Dr Boardman said CSIRO was passing through a period of substantial change in order to meet the challenges posed by Australia's economic problems.

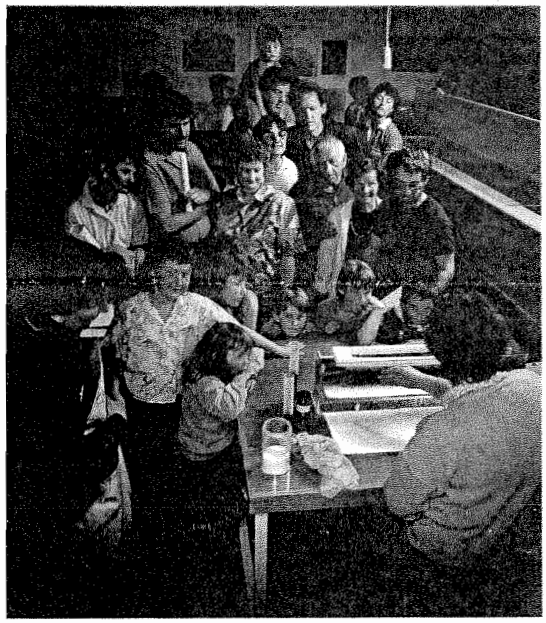
The challenge facing CSIRO was two-pronged. The first was to focus on the areas of research that were most likely to benefit Australia, leading ultimately to an improved trade performance.

Broadly speaking, CSIRO's research effort should include more emphasis on technology-based manufacturing, agricultural and mineral processing and multisectoral technologies.

The second was to improve the transfer of research results to users and to help build industry's own research and development capability.

cont. on p.7

Lab open days



Dr Judith Holyer demonstrates mixing in the ocean to visitors to the Marine Laboratories in Hobart. More than 6000 people visited the laboratories during the first open days at the complex. Report page 2.

CSIRO Medals awarded

Research in the widely differing fields of diamond recovery, remote sensing, industrial computer systems and wool textiles has been recognised in this year's CSIRO Medals.

The recipients of the medals are Dr David Jupp, from the Division of Water and Land Resources in Canberra; Dr Dieter Plate, from the Division of Textile Industry in Geelong; Dr Myles Harding from the Division of Manufacturing Technology in Melbourne; and Dr Mark Schapper and his team from Advanced Technical Development, CRA Ltd. This is the second year that the awards have been made.

The CSIRO Medals represent peer recognition of a researcher's contribution to the Australian community through achievements in either basic or applied science. Dr Schapper's team is the first recipient of a medal for research carried out in a non-CSIRO laboratory. This external award will be presented annually from now on.

The medals were presented by the Chairman of CSIRO, Dr Keith Boardman, at a Chiefs' meeting in Melbourne.

The team led by **Dr Mark Schapper**, Managing Director, Advanced Technical Development, CRA Ltd, has developed novel equipment for recovering diamonds from the Argyle deposit. The equipment is technically and economically superior to its predecessors and it is a significant factor in the efficiency and profitability of the Argyle Diamond Mine in which CRA Ltd is a joint venture partner. This major Australian mining project will shortly be producing 25 million carats per annum, adding some $150 million to the national economy.

The X-Ray Recovery Machine uses an X-ray induced optical method to sort diamond from very large tonnages of valueless material. Under Dr Schapper's leadership, the development team took equipment from the original idea and the early conceptual stages, through design, engineering and construction, and, finally, to successful commissioning at the plant.

The recovery machine has set new world standards for this type of equipment and represents an impressive team achievement for Australian mineral processing technology.

Dr Dieter Plate is the main inventor of the Sirospun process and, in addition to establishing its scientific basis, was the leader of the CSIRO team responsible for its commercial introduction in collaboration with Repco Ltd and the International Wool Secretariat.

This process — now in wide use throughout the world — has yielded substantial cost savings, primarily in the conversion of the fine Australian wools to yarns. These savings are currently estimated at $40 million per annum.

The process has also enabled the production of new lightweight products from these wools and has accordingly had significant impact on their demand and hence their price. Sirospun was crucial to the International Wool Secretariat's 'Cool Wool' marketing program and has yielded royalties for both CSIRO and its developing partner.

Dr David Jupp came to the then Division of Land Use Research in 1976 with a background in mathematics which he applied to spatial analysis of natural resource data.

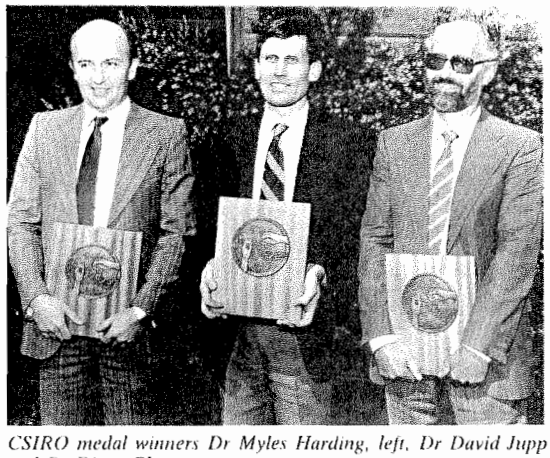
He played the primary role in developing remote sensing research in the Division and the BRIAN (Barrier Reef Image ANalysis) system is the realisation of the novel methods and algorithms he created.

The joint undertaking by the Great Barrier Reef Marine Park Authority, CSIRO and the Australian Survey Office in applying BRIAN to reef and shallow water mapping was led by Dr Jupp.

The significance of the success of this effort is recognised world-wide.

His further development of micro-BRIAN has produced one of the most powerful and versatile micro-computer based image analysis systems — the system is marketed by Microprocessor Applications Pty Ltd.

cont. on p.7



CSIRO medal winners Dr Myles Harding, left, Dr David Jupp and Dr Dieter Plate.

There is no Division Feature in this issue of *CoResearch* as the editor, Liz Burden, is ill. The feature series will resume in the December issue with a feature on the Division of Oceanography.

From the Chairman

A column by Dr Keith Boardman

The recent announcement by the Prime Minister of the Government's intention to introduce reforms into the Australian Public Service to achieve greater staff flexibility and improve effectiveness, and the release of a report on the efficiency and effectiveness in Higher Education by Senator Ryan, are indicative of the greater scrutiny of public sector performance by the Government.

Reforms in the Public Service will have an important bearing on the eventual response of the Government to the ASTEC recommendation that the statutory relationship between CSIRO and the Public Service Board should be broken. Our relationship with the Public Service Board is to be examined further by our Minister in consultation with the incoming CSIRO Board and staff associations and the Minister is required to report back to Cabinet.

The Executive has been concerned for some time about the flow-on of policies and rules devised for the Public Service to CSIRO without sufficient attention being paid to the appropriateness of these policies and rules to a research organization. There has been increasing pressure also from the staff associations to adopt Public Service procedures in areas such as classification appeals, grievances, redundancies and management initiated retirements. These procedures are now to be examined within the Public Service.

The strategy document released by CSIRO in September of last year identified the need for better management practices in the Organization and more flexible staffing policies. The productivity, effectiveness and reputation of CSIRO is critically dependent on our ability to continue to attract staff of the highest quality, and provide appropriate recognition and rewards for their achievements and performance.

I believe that we should be re-examining our personnel policies and procedures to achieve greater flexibility, and provide greater incentives to improve mobility within CSIRO and between CSIRO and industry, and CSIRO and tertiary education institutions. It is widely recognised that the non-portability of superannuation is a potent inhibitor of movement between institutions, and it is to be hoped that some progress can be made to overcome this problem.

More flexible superannuation arrangements are of particular importance for staff on term appointments and CSIRO will be examining alternatives to the present scheme for this category of staff.

A committee chaired by Dr Henzell has been established to make recommendations to the Executive on annual performance reviews for all staff, and rewards for individual and team achievements.

Staff training and development are of increasing importance in view of the ever increasing rate of technological change, and to improve CSIRO's management skills at all levels.

Dr Hatch of the Division of Plant Industry and I are editing a new volume for the series 'The Biochemistry of Plants'. The task has brought home to me the enormous progress that has been made in the past five to ten years in the molecular basis underlying plant processes and in the isolation and determination of the structure of genes, and understanding gene expression. New methodologies, many highly automated with the aid of microprocessors, are behind these advances, and staff must continually update their skills to maintain their effectiveness.

Debate on the Bill to amend the Science and Industry Research Act has been delayed, but I am still hopeful that the Bill will be passed by both Houses in the current session of Parliament and the new Board appointed before the end of the year.

K Keith Boardman

Crowds flock to Labs

More than 6000 people visited the Marine Laboratories in Hobart during the first open days at the complex held on 16, 17 and 18 October.

The laboratories are the headquarters of the Division of Oceanography and the Division of Fisheries Research.

School groups made up a high percentage of the visitors on the Thursday and Friday, with a surprisingly large number of elderly guests on all three days. On Saturday nearly 150 people were through the doors before the official opening time of 10am.

With scientists from both divisions among researchers on cruises in RV Franklin and FV Soela, it was left to 120 or so staff on weekdays, and about 50 who volunteered their services on Saturday, to man the exhibits, give demonstrations and talk about research work.

Dr June Olley, of the Seafood Technology Unit, Division of Fisheries Research, guides young visitors to the Marine Laboratories who were taking part in fish tasting demonstrations.

Since staff first started moving into the complex two years ago the main attention has focused on getting equipment operational, newcomers settled and programs re-established. Until recently the buildings were rather sterile in appearance, but they have taken on a new guise with posters and photographic enlargements on corridor walls, additional permanent displays, and, generally, a more lived-in appearance.

The communications officer at the Marine Laboratories, Jennifer Pringle-Jones, would like to hear from any CSIRO staff planning open days, with a view to exchanging ideas.

Retirement: Dr Dick Brock

Dr Dick Brock, assistant chief at the Division of Plant Industry, retires on November 21 after 40 years with the Organization.

A farewell dinner will be held at the Federal Golf Club in Canberra on November 19. Anyone interested in attending should contact Mary Volpato on (062) 46 5816.

Dear Editor,

CSIRO some time ago concluded that many of the problems which beset CSIRO were attributable to its tarnished public image. Consequently the Organisation, Divisions and individuals were encouraged to lift CSIRO's image and resources were redistributed to this end.

This prescription for curing CSIRO's perhaps psychosomatic ills is not without the possibility of serious side effects as the findings of the Presidential Commission on the explosion of the space shuttle Challenger indicate.

Cal Tech's eminent physicist Richard Feynman, a commissioner, separately addressed the question of how it was possible for NASA to ignore warnings of serious dangers. His analysis summarised in August 1986 *Scientific American* makes pertinent reading for the 'new' CSIRO.

Feynman suggests 'that the fundamental cause of NASA's systematic over-confidence was that a major role of NASA management was to get funding from Congress . . . they painted too rosy a picture of what could be accomplished with current technology . . . by exaggerating what they said they could do, they got in a position where they didn't want to hear too much about the truth . . . it was hard for information to come up. But we know information was there at the lowest levels. Why engineers are at the lowest levels I have no idea, but the guys who know something about what the world is really like are at the lowest levels of these organisations . . .'

Feynman concludes 'For a successful technology, reality must take precedence over public relations for nature cannot be fooled'.

This particular tragedy does not, of course, gainsay our efforts to build CSIRO's image. Rather Feynman's analysis is a cautionary tale for all engaged in public relations. As well it illustrates the dangers of an isolated 'top-down' management.

John Knight, Ian White
Division of Environmental Mechanics

Dear Editor,

May I comment briefly on two of the letters to the editor in the September issue?

1. Lisa Kanis' letter of thanks relating to the death of her husband, an outstanding taxonomist with the DPI *Herbarium Australiense*, made me aware of the regrettable absence of an obituary of Dr Kanis, in contrast to the nearly two columns devoted to employees who retired from CSIRO alive. Mind you, I am not assuming this is an oversight on your part.

2. Whilst generally agreeing with Don Benjamin's letter about gullibility, scepticism or patient probing in research, I fail to see why he should seek to reinforce these distinctions by drawing parallels with religious attitudes.

Firstly, both gullibility and reflex-scepticism stem from thoughtlessness and rigidity, but this is often not true for religious faith, and almost never for atheism. Eg. I have gradually moved to a position of atheism over a very long period of time, precisely through the process of, as D B puts it, 'questioning and analysing the evidence offered'.

Secondly, since D B considers the 'probing' attitude the only correct one in science, he must, as a corollary, think agnosticism the only correct religious attitude. Personally, I regard it as the worst one. It either shows indifference (why bother?), impotence (can't make up my mind), or it is a case of having a bob each way. Whilst one can build a coherent world view on either faith or atheism, any such view based on agnosticism must be inherently wobbly.

Herman Haantjens
Broulee

Letters **cont. on p.4**

New $2·6 million plant lab opens

The Minister for Science, Mr Jones, last month officially opened the new $2.6 million plant molecular biology laboratory at the Division of Plant Industry in Canberra.

The laboratory contains advanced equipment and facilities for plant genetic engineering experiments. It is named the O.H. Frankel Building in honour of the eminent plant geneticist, Sir Otto Frankel, a former Chief of the Division.

Mr Jones said the Division of Plant Industry had established an international reputation for the quality of its research, and its work was of vital importance to Australian agriculture.

At the opening the Chief, Dr Jim Peacock, announced that the Division had taken an important step towards producing Australia's first genetically engineered agricultural plant — a lucerne containing a gene for a high-sulphur protein that could substantially increase wool growth in sheep.

Dr Peacock said a research team led by Dr Don Spencer and Dr 'TJ' Higgins was in the process of transplanting a gene from the common pea into lucerne cells. These transgenic plants are expected to contain a sulphur-rich protein, pea albumin.

Sheep eating the lucerne would obtain this added protein sulphur in their diet leading to greatly increased wool production.

Mr Jones said genetic engineering of plants offered Australian agriculture the prospect of developing novel food products for specialist export markets.

'We can now think about modifying the nutritional properties or other qualities of the end product, and tailor it to changing consumer tastes and market shifts,' he said.

Molecular biology could greatly expand the range of genetic material available to plant breeders because it made possible gene transfer between plants that do not interbreed in nature — it was even possible to transplant useful genes from animals and bacteria into plants.

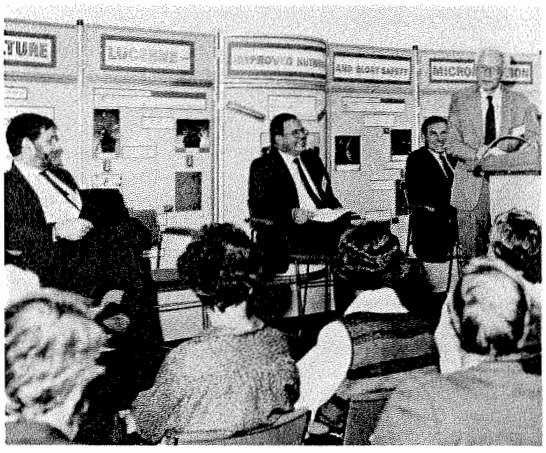
It could also reduce the long lead times associated with traditional plant breeding. An established crop variety which succumbed to disease could be fitted with an appropriate resistance gene and reintroduced to cultivation in less time than the decade it usually took to develop a new variety.

Mr Jones urged molecular biologists to collaborate with plant breeders and to tell farmers about their work. He said that the level of awareness of potential change among farmers was fairly low, at a time when genetic engineering was moving rapidly from its fundamental phase into practical applications.

Mr Jones said he was proud that the Division of Plant Industry enjoyed international stature for its research.

'It (the Division) embodies the search for excellence that Australia must pursue for its future economic prosperity,' he said.

'This new laboratory provides first-class facilities for modern biological research, and I am sure the public investment in it will be repaid many times over.'



The Minister for Science, Mr Jones, left, the Chief of the Division of Plant Industry, Dr Jim Peacock, and Dr Ernest Jaworski, of the Monsanto Company, listen to the eminent plant geneticist, Sir Otto Frankel, at the opening of the Division's new plant molecular biology laboratory.

Sunlight makes a high-tech mural

'Solaris', a prototype kinetic sun mural went on display at the National Measurement Laboratory of the Division of Applied Physics at West Lindfield last month.

Designed and created by Mr Stan Ostoja, with sponsorship from the Australia Council and in association with the Division through the artists-in-residence program, 'Solaris' uses sunlight, mirrors and lasers to create a coloured mural.

The idea of using the sun as the source of controlled light, colours and shapes originated probably even before the time of the Egyptians. But 'Solaris' belongs very definitely to the twentieth century, with CSIRO scientists and skilled staff giving Mr Ostoja the benefit of their knowledge, help and advice.

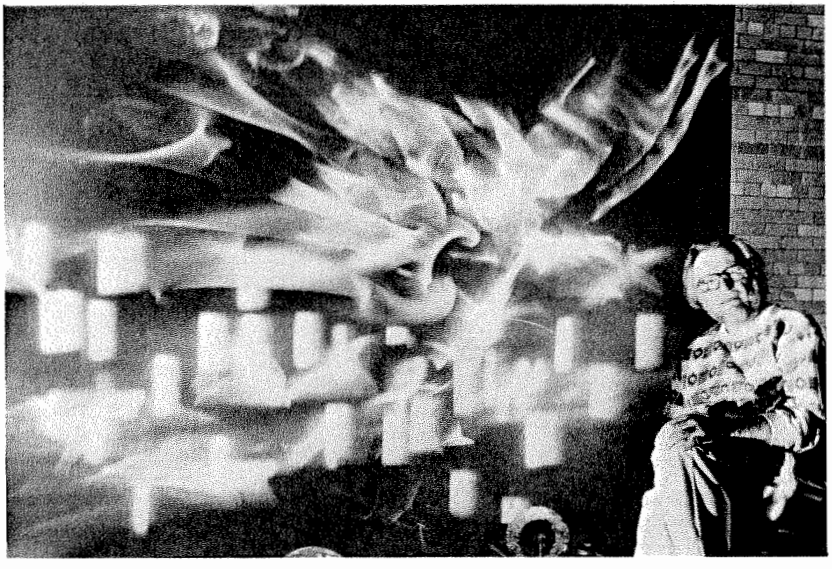
The light source for 'Solaris' is projected into the room using mirrors, and is directed through a series of large prisms to produce spectra which are collected by more than 200 small mirrors. From there the light is reflected in different directions, some of it is projected directly onto a screen, producing coloured patterns, or via different types of specially designed distorted and vibrating mirrors. Six small lasers are also incorporated, and together the different components create a beautiful ever-changing mural.

The prototype was originally meant to use only the sun's light and energy, but budget and time restrictions forced the use of artificial light which can later be subsituted by natural light.

Always interested in the interplay of sound and colour, Mr Ostoja has included a specially designed synthesizer in the exhibit. The synthesizer, activated by the sunlight, produces pre-programmed sounds that are involved in the exhibit. This sun mural is a further step in Ostoja's fascination with the free correlation of sound and image.

Mr Ostoja was born in Poland in 1922 and came to Australia in 1949 after starting his artistic training in Germany. He continued to study at the National Gallery Art School in Melbourne and went on to receive several awards in painting, films and photography.

In the 1960s and '70s he directed his 'Sound and Image' experimental theatre, mostly for the Adelaide Festival of Arts. He has produced several laser concerts based on a similar idea, the last one in the Adelaide Festival Amphitheatre in April of this year.



Mr Stan Ostoja with 'Solaris'.

CSIRO on display at Field Days

Scientific developments have made a big difference to life on the land, but there's plenty more to come — that's the message CSIRO is taking to this year's Australian National Field Days in Orange, NSW, from November 11–13.

CSIRO is guest exhibitor at the 1986 Field Days, and has chosen the occasion to convey some idea of the revolutionary changes in store for agriculture over the next decade or two.

Announcing the details of CSIRO's exhibits, the Chairman, Dr Boardman, predicted that the combined effect of new developments in satellites, computers and genetic engineering would be to change agriculture in 'ways that are hard to imagine today'.

'CSIRO has been responsible for hundreds of important advances in agriculture during its 60 years of existence, but our best is definitely yet to come,' he said.

'We are keeping pace with, and in some areas world leaders in, the exciting new field of genetic engineering.

'In future, although we're planning to do less traditional rural research, we'll be doing much more in the new high-technology areas. Particularly, we'll be looking for new ways of adding value to rural products before they're exported.

'Involvement in high-technology and value-added areas is the best way of ensuring that agriculture continues to play an important role in Australia's future.'

CSIRO's Orange Field Days display will comprise nine major themes:

- Genetic engineering;
- Computers in agriculture;
- Remote sensing;
- Wool research;
- Control of weeds and pests;
- Soils and water;
- Animal health;
- Quality of agricultural products;
- New plants and crops.

The genetic engineering display will highlight a number of new techniques for breeding livestock and agricultural plants using direct gene transfer, including work on high-sulfur plants and modified growth hormone in sheep, as well as the generation of new plant varieties using techniques of somacloning and protoplast fusion, cloning plants to produce disease-free grapevines, direct manipulation of cattle embryos to produce twins and the production of animal vaccines and diagnostic kits for plant diseases.

cont. on p.7

Of Equal Concern

Case A: June has been a technician for 17 years. She has watched those about her promoted over her. Her supervisor is of the opinion that June reached her 'career ceiling' many years ago and is lucky to be where she is. An analysis reveals that female turnover in the laboratory is high and that maternity leave is not a factor. June lodges a complaint alleging 'less favourable treatment' on the basis of sex and marital status.

Case B: Michael is a epileptic. He had one grand mal seizure three years ago but has been meticulous with his medication and has since been seizure-free. Michael has noticed that he has not been on any field trips or conferences since his seizure.

What should these people do? Have they suffered direct or indirect discrimination? Let's assume for the sake of the argument that both have suffered 'less favourable treatment' and that the result of this is that neither has progressed at the rate that would have been expected of people with their qualifications and skills.

How can this be redressed? One solution might involve promoting them to the level that, given past performances, they should be at. But does this really solve the problem? Having already been disadvantaged it won't be long before those gaps affect future advancement. In short, both would be in need of 'positive discrimination' — an extra boost of training and development to get them to the level of skills and expertise they should have had if no discrimination had occurred.

An analogy from the school sector makes the point more clearly. If your child has a hearing problem that is disregarded for two years and is forced to repeat grades, then simply promoting her or him to Grade Five won't really help in the long run. Your child requires extra teaching to fill those gaps.

The solutions in June and Michael's cases could be anything from back-dated promotions, extra staff development opportunities or monetary compensation. Conversely, of course, neither charge may be sustained — ie. their lack of progress and/or opportunities may not have had anything to do with sex, marital status or disability.

There is an argument for positive discrimination (ie. one section/group being temporarily given extra resources over another group) — if it can be demonstrated that they have, through no fault of their own, been disadvantaged in the past.

I raise this because there appears to be such confusion about 'equality' and 'sameness'. The answer is not to treat our staff, colleagues, children in exactly the same way because their needs and skills can differ markedly. It is equality of opportunity that is the goal. Different inputs may be required in order to ensure equal opportunity to compete for outputs.

Carmel Macpherson
EEO Officer

Back to the bench

Geoff Taylor's decision to resign from the CSIRO Executive was met with a mixture of sadness and joy — sadness on the part of those he has worked with because of the nature of the man and the significant contributions he has made to the Organization, and joy for Geoff because he was returning to the 'bench' to resume his research career that had been interrupted some years before.

Geoff's file is documented with testimonies to his personal qualities and abilities dating from when he began his career with the Organization in 1955 as a research officer in the Division of Coal Research at North Ryde until his appointment as Officer-in-Charge of the Fuel Geoscience Unit, the position he held until he left the Organization in 1980. Geoff left CSIRO to become Director of the Centre for Resource and Environmental Studies at the Australian National University. This was a relatively short experience as in May 1982 he was invited to rejoin CSIRO as a full-time member of the Executive.

Geoff's chief areas of responsibility, in addition to the activities of the institutes which reported to him, were finance and administration, information and communication, the expansion of reseach in support of manufacturing industry, the 'commercialisation' of CSIRO and its

Dr Geoff Taylor

research. Under these umbrellas he was given a basket of formidable tasks.

He was one of the chief architects of Sirotech; he chaired a committee of review into CSIRO's administration and played a major part in the overseeing of the implementation of the decisions of this committee; he was also a member of the external communication review committee, some of the decisions of which are taking shape in the new Bureau of Information and Public Communication.

Geoff's successful contributions to these and many other areas were undoubtedly enhanced by the moderating influence and air of rationality he was able to bring to his work and his ability to relate with ease to all people, irrespective of rank. His gentle, unassuming and undemonstrative manner often belied his innermost feelings. Perhaps, though, on the rare occasion, the flushed cheeks were not strictly attributable to the inefficient air-conditioning and the CSIRO Tarrango.

Geoff's career is unusual in that he has turned full circle. He has been awarded a post-retirement fellowship with the Institute of Energy and Earth Resources and his work at the ANU Research School of Earth Sciences will complement that of his colleagues at North Ryde and other relevant IEER divisions. He is understandably very excited about his 'new' research career in the field of coal petrology where he enjoys world recognition.

Geoff has also promised himself (and his wife Nancy) some relaxation. Over the past couple of years Geoff and Nancy have put a lot of energy into their 'ranch' on the Murrumbidgee near Canberra. At a gathering last month, Geoff's colleagues wished him well and he was presented with a range of gifts geared to his new life. To see Geoff Taylor in an Akubra 'Man from Snowy River' hat left little doubt that he will settle into this side of his new life.

Faye Nicholas

Research on show

Photograph: Phil Potter

Dr Trevor Scott, Chief of the Division, left, and Ms Rhonda Foley, Experimental Scientist, explain the Division's research.

The Division of Animal Production recently staged a display of its research work at a shopping centre near its laboratory in Sydney.

The purpose of the display was to acquaint the general public with some of the benefits which arise from the research, in particular with regard to food and fibre. It also revealed the importance of these industries to the Australian economy. Staff volunteers, including technical staff, scientists, and the Chief, Dr Trevor Scott, manned the display over the three days.

Letters
cont. from p.2
Dear Editor,

I wish to add to the apparently regular 'coathanger series' (*CoResearch* Aug & Sept '86). Shelltox Pest Strips have also led to the demise of the wooden coathanger — the fumes decay the wood, but not the plastic or metal coathangers (1) and they also eat electromagnetic emanation from the CRUX (an astronomical, not anatomical, term), comets and such-like (2)... hence the observation that Halley's Comet didn't *cometh* as brighteth as expecteth (3).

In addition, and not wanting to put a dampener on the theories, though somewhat provoking, of P. Thomas (*CoRes.* Sept), I must point out that the larval forms of wooden coathangers are, in fact, wood dowelling pieces from old wooden furniture and *not* from wooden clothes pegs. The latter are actually the larval forms of wooden step ladders which are fast becoming extinct (5), just like their cousins the dinosaurs (4). Hence, as old wooden furniture pieces are becoming rare so too are wooden coathangers, in association with the effects of various pest strips hung in wardrobes. The reason wooden furniture with wood dowling is becoming rare is that the modern practice of making furniture is by banging and screwing (these are engineering and not anatomical terms) wood furniture together with nails, screws, staples and such. Sometimes foregoing the use of wood altogether by using such abhorent material as modular plastic, aluminium, which is a more suitable material for making masts for 12 m yachts (6), particularly in Western Australia, fibreglass, this is also useful for yacht making (7), or rotten apples, these are macerated, dried and made into a paper brick sort of material by a modern Australian biotechnology company (8).

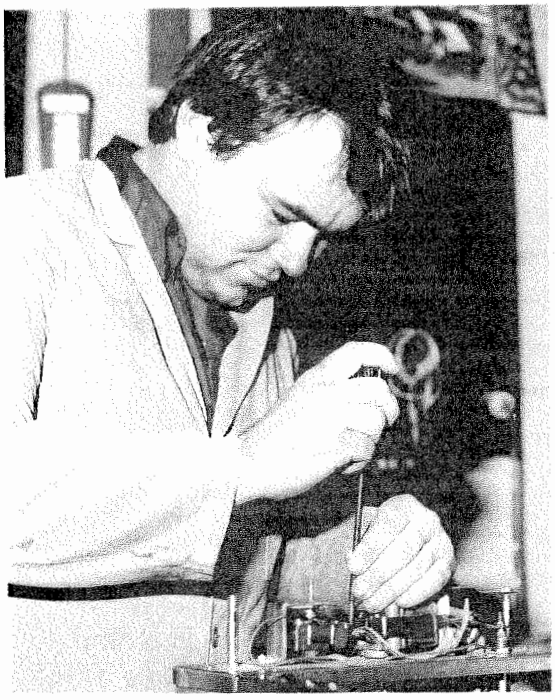
This modern method of furniture making also explains the occurrence of metal coathangers — you guessed it, the larval forms of metal coathangers are, in fact, screws, nails etc which fall out of modern-day furniture. The preponderance of plastic coathangers is likewise explained — the larval forms of plastic coathangers are chips broken off from modern modular plastic furniture. I sincerely hope this note has shed some light on the 'wooden coathanger larval stage' mystery thriller.

Notes:
1. Yarrakong the Wobblegong (1987, in preparation)
2. E.T. (1983, pers. comm.)
3. M Pearce, unpubl., 1986
4. Dan the Dinosaur (2.7x10⁶years BC, footprint message in northwest Australian dinosaur shale deposits)
5. Termite Colony, Yalgoo, WA (1986, inscription on an old railway side step-ladder)
6. The winner of the 1987 America's Cup challenge (1986, pers. comm., by time warp message from King Kong via Alpha Centauri ex Lost in Space crew)
7. Kiwi America's Cup syndicate (1986, yacht designer's top secret drawings)
8. This is such a top secret process that it can't be divulged (or eaten) until after the America's Cup has been decided (or melted down?).

Martin H Pearce
Division of Forest Research

Mr David Purchase of the Division of Wildlife and Rangelands Research has retired after 29 years with CSIRO.

Mr Purchase joined the Division in 1957 and worked initially on aspects of parasitology and the behaviour of rabbits. He transfered to the Australian National Antarctic Research Expedition for 4 years and on returning to the Division was responsible for the Australian bird-banding and bat-banding schemes.



Craig Simmons, a former apprentice with the Division of Plant Industry in Canberra.

Award winners

Two CSIRO apprentices have won awards for their work.

Craig Simmons, formerly of the Division of Plant Industry, has won the Canberra 'Apprentice of the Year' award for electrical fitting.

Craig excelled in his technical studies and this coupled with his manual skills enabled him to complete his apprenticeship in three years.

After completing his apprenticeship, Craig left CSIRO to work for the ACT Electricity Authority and is now working for Wormald International Pty Ltd.

Andrew Taylor, an apprentice with the Division of Mineral Physics and Mineralogy, won top electronics apprentice in NSW and came third in the overall NSW 'Apprentice of the Year' awards.

Andrew, 21, has been with the Division for nearly 4 years. He received medals, certificates, prize money and an educational cruise on one of the Navy's ships

River research program

The Minister for Resources and Energy, Senator Gareth Evans, inaugurated a new research program in Albury-Wodonga on 24 October as a cooperative venture between CSIRO and three other bodies.

The new Murray-Darling Limnological Research Program will investigate the physical, chemical and biological conditions of the river and its surrounds.

It will involve the Australian Water Research Advisory Council, the River Murray Commission and the Albury-Wodonga Development Corporation.

Dr David Mitchell, Officer-in-Charge of CSIRO's Centre for Irrigation and Freshwater Research at Griffith will be director of the new program.

Speaking at the inauguration, Senator Evans said the facilities at Albury and Griffith would be used to mount the most comprehensive research program on a river system yet undertaken in Australia.

'This cooperative venture will result in the establishment of a $1·2 million research program at Albury and the continuation of a coordinated $500 000 program at Griffith', he said.

Dr Mitchell said the Murray-Darling was Australia's largest river system, draining more than a million square kilometres of land, or about one-seventh the total area of the continent.

'About 90 per cent of the Murray's water is used in irrigation, so an important aspect of the Limnological Research Program will be the investigation of the effects of irrigation and urban run-off on water quality, including salinity,' he said.

'Life forms, such as microscopic algae and zooplankton, affect things like the colour and smell of shire council water supplies

'Associated studies will be conducted to investigate the efficiency of water use by irrigated crops. Billabongs and riverine wetlands will also be studied, and their use as a possible waste water treatment mechanism investigated.

'The natural flooding regime of the River Murray has been drastically altered by the construction of dams and weirs. Periodic artificial flooding of the River Murray may be necessary to preserve its wildlife and water conditions.

'The community needs more reliable information about the impact of such events so that it can make sensible choices.

Marine labs take to the water

A crew from the Marine Laboratories in Hobart is taking to the water with racing, not research, in mind.

Eight staff members from the laboratories, including the Chief of the Division of Oceanography, Dr Angus McEwan, will sail the 46ft masthead sloop 'Balandra' in this year's Sydney to Hobart yacht race.

This is the first time a CSIRO crew has taken part in the race and skipper Mr Andrew Forbes said they hoped to promote the Organization's 50-year history of involvement in marine research.

The crew members are either from the Division of Oceanography or the Division of Fisheries Research. They have chartered the yacht from its owner, Mr Gerd Hennicke, a Hobart businessman.

Five of the sailors-in-training are experienced sailors and the others have been learning the ropes during cruises each weekend for the past month.

Mr Forbes said in the past the yacht had done well in 'fairly heavy weather'. 'So if we want to do well we will be looking for a fairly boisterous race,' he said. The 'Balandra' will leave Hobart for Sydney on December 12 for the race which starts on Boxing Day.

For a number of years, a representative of the Division of Oceanography has attended the pre-race briefings at the Cruising Yacht Club in Sydney, to present the latest information on the position and strength of the East Australian Current for the benefit of the sailors. This year, the 'Balandra' crew hope to demonstrate that it is the interpretation of this information, particularly the satellite imagery of sea-surface temperature, that can be used to advantage in avoiding adverse currents and using favourable currents along the route.

The 'Balandra' with its CSIRO crew.

Ansett has donated air travel for the crew members who cannot afford the time to sail 'Balandra' to Sydney for the race. Sirocredit, the CSIRO credit union, has donated $1000 to help fund the crews' efforts but more help is needed.

T-shirts, windcheaters and badges all featuring a commemorative logo are available. The T-shirts are available in all sizes and cost $9 each. The windcheaters cost $20 for adult sizes and $15 for children's sizes. Both are available in red, white or navy. The 50th anniversary badges cost $2 each.

Cheques or money orders should be made payable to 'CSIRO Balandra Syndicate' and sent to Andrew Forbes, CSIRO Marine Laboratories, GPO Box 1538, Hobart, Tasmania, 7001. Add $1.50 for postage and packing for orders of T-shirts and windcheaters and 50 cents for badge orders.

For further information telephone Andrew Forbes on (002) 20 6300 or Tim O'Sullivan on (002) 20 6223.

Churchill fellowships

In addition to the usual fellowships to be offered by the Churchill Trust in 1988, three additional fellowships have been sponsored for study in particular fields.

The Samuel & Eileen Gluyas Churchill Fellowship will be for study and research into the pastoral industry, particularly as it applied to the tropics, with preference being given to residents of North Queensland.

The Australian War Memorial has decided to sponsor a Churchill Fellowship for study on an aspect of museology.

John Swire & Sons has sponsored a fellowship for study relating to the Australian cotton industry, to be awarded next year for tenure in 1988. Any aspect of the industry would be suitable for study.

The Churchill Trust is seeking applicants for fellowships in any field, as well as these sponsored fellowships. Applications close on 28 February 1987 and selections are made in June. Enquiries should be directed to GPO Box 478, Canberra ACT 2601.

Apprentice fruit grower wins Frost Memorial award

Suzanne Cox, an apprentice fruit grower at the Merbein Laboratories, Division of Horticultural Research, is the first woman to receive the Arthur Frost Memorial Award.

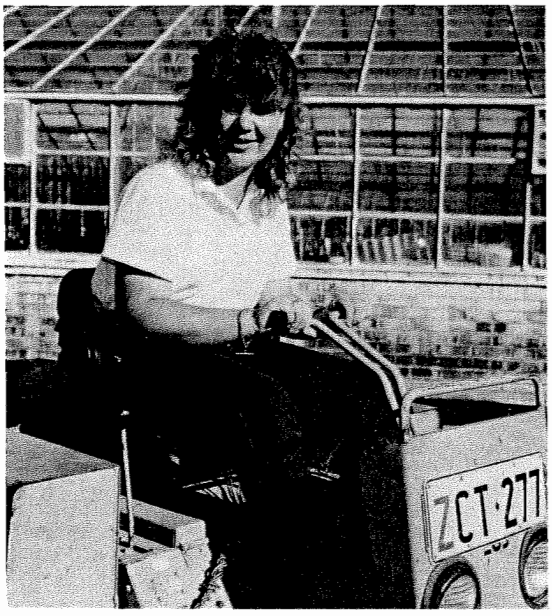
The award is made annually to the CSIRO apprentice who has achieved the most significant improvement in all-round performance in their final year.

Ms Cox is 19 and has been working at the Division for nearly five years. She said that she really enjoyed her work which involved two-days-a-week laboratory work with the salinity group, and three days in the winery.

'The award came as a complete surprise,' she said. 'I didn't even know that I'd been nominated. The first I knew of it was about two months ago when I was called into Rob Walker's office (the Officer-in-Charge of the Laboratories) and told that I had won, I was delighted.'

It was also news to Suzanne that she was the first woman to be given the award. 'That's excellent!,' she said. 'When I applied for the apprenticeship, I didn't think I had much hope as I thought then that it was a guy's job. Then at the end of my first year I received the Express Irrigation Services Award for the best first year fruit grower, and now this.'

Suzanne's future is at present uncertain, but she knows exactly what she'd like to do, carry on working for CSIRO!



Suzanne Cox, winner of the Arthur Frost Memorial Award, at work at Merbein.

The award was established as a memorial to Arthur Frost, a supervisor at the Division of Textile Physics at Ryde, Sydney.

Mr Frost took a keen interest in the work of apprentices.

Obituary: Dr Judith Howard

CSIRO lost one of its brightest personalities with the untimely death on 23 September of Dr Judith Anne Howard at the age of 51. Judith joined the Division of Food Preservation from high school as a technical assistant in the microbiology section, and worked there for 24 years.

She became an Associate of the Sydney Technical College, graduated with a B Sc degree from the University of NSW, and obtained her Ph D from the University of Melbourne.

Her research interests were first in the field of water relations of bacteria, particularly staphylococci and salmonellae, and she was involved in pioneering studies of solute concentrations within halophilic cells.

Judith's Ph D studies marked the Division's entrance into microbial genetics and she returned to Sydney to commence a study of the genetics of bacterial psychrophilism.

During this latter period, she served for many years as honorary secretary to the Australian Society for Microbiology, playing a central role in its incorporation as a professional society. Through such activities she was well known to most of Australia's microbiologists.

In 1982, after bearing and raising her two daughters, she returned to CSIRO, this time to the Division of Molecular Biology as scientific assistant to the Chief with a particular brief to help with editorial communication and patent matters.

Her breezy and friendly manner and her absolute commitment to the aims of the Division made a lasting impact on its staff.

For the last year of her life, during the progression of the terminal disease that she was determined to defeat, she continued to work as enthusiastically, and to our outside world, as cheerfully as ever.

Never did she complain of her own difficulties and pain but was always concerned for the affairs of the Division and its staff.

The last major task she completed was the writing and production of the Division's 1985 biennial report. By general concensus it is the most imaginative and best annual report that the Division has yet produced and perhaps it is a fitting epitaph to a very gallant lady.

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Vale Stan Johns

Dr Stan Johns of the Division of Applied Organic Chemistry died on the morning of 19 August after a prolonged illness. He is survived by his wife, Julie, and their three children, Jenny, Sue and Kathryn.

Stan was born in Cessnock, NSW, on 8 July, 1935, and completed his secondary education at Cessnock High School. He obtained his BSc (Hons) degree at the University of NSW and then went as a NSW State Cancer Council scholar to the University of Sydney to study for his PhD degree.

He joined the CSIRO Division of Organic Chemistry as a research scientist on 1 July 1964 and remained with that Division and its successors until his death. Stan was promoted to senior principal research scientist in 1978.

Stan's first paper was based on his Honours thesis and appeared in 1960. His 164th will be published some time in 1987.

Stan was one of the pioneers of nuclear magnetic resonance spectroscopy in Australia. He has made other major contributions to chemistry in the study of the structure and function of biomembranes and the structure and conformation of polymers.

Another great contribution to chemistry in Australia was his ability to demonstrate the application of various nuclear magnetic resonance techniques to solve diverse chemical problems.

Stan was an enthusiastic contributor to the Royal Australian Chemical Institute. His involvement started with the formation of the organic chemistry division and culminated in his term as honorary general secretary from 1980 to 1984.

Stan Johns will be remembered for his contribution to chemistry and to the profession. However, we his colleagues will also remember his laughter and voice, how he argued with us, usually passionately, how he organized things with us, was angry with us when we messed things up, praised us when we got it right and all the time was loyal to us.

Ian Willing
Tom Spurling

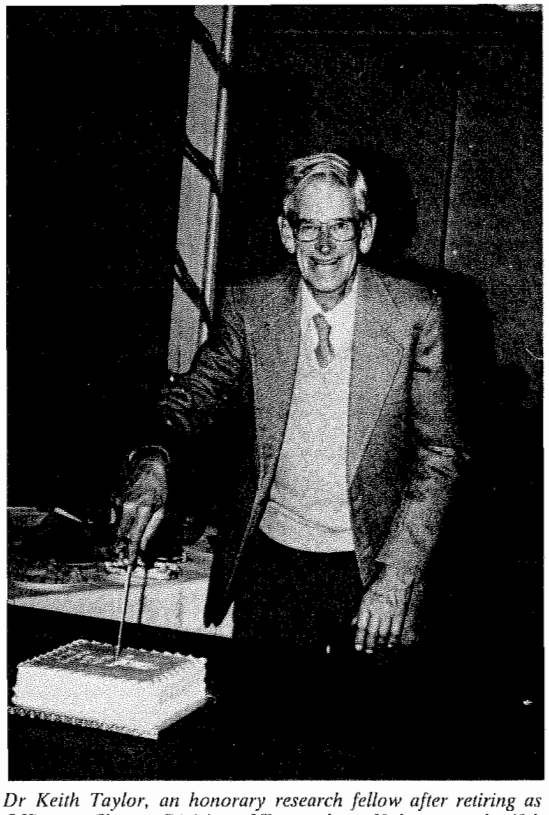
40 years at Stowell celebrated

Staff at the Tasmanian Regional Laboratory recently celebrated 40 years of CSIRO occupation of Stowell, a mansion in Hobart's historic Battery Point area.

Stowell, which was built in 1831 by Captain John Montagu, a veteran of the Battle of Waterloo and private secretary to Governor George Arthur, boasts a colourful history including ghost stories and squatters.

CSIRO acquired the site on 10 January 1946 but it was not until August 1947 that the squatters were evicted. As far as can be ascertained, the first CSIRO occupant was Mr A.M. Olsen, of the Division of Fisheries Research, who occupied the flat at Stowell on 9 August 1946.

This was enough evidence for staff at Stowell to hold a birthday party — a dinner attended by about 60 past and present staff held on 30 August.



Dr Keith Taylor, an honorary research fellow after retiring as Officer-in-Charge, Division of Entomology, Hobart, cuts the 40th birthday cake.

Dr Smith, I presume?

The following article describes a chance meeting of CSIRO colleagues in one of Australia's remotest spots — the far north of the Kimberley region of Western Australia.

The giant triangle picked out by Derby, Wyndham and the Aboriginal Community at Kalumburu on the northernmost tip of Western Australia is about half the size of Victoria but apart from a few cattle stations and one or two small Aboriginal settlements, is almost uninhabited.

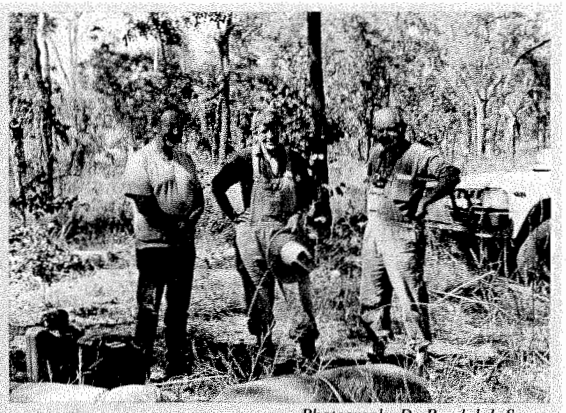
Of the dozen or so quite large rivers that drain the region in the wet, the Drysdale is the largest and most remote. The track from Derby to Kalumburu crosses the Drysdale roughly in the middle of the triangle and this is arguably the most remote spot in the entire continent. From the river crossing a diminishingly visible bush track meanders downstream for five or six kilometres and vanishes on the southern bank.

On Thursday, 17 August, 1986, Dr Dick Smith from the Division of Human Nutrition and Randy Spargo from the WA Department of Public Health, midway through the 700 km two-day rough-ride from Derby to Kalumburu, turned downstream onto the side track to boil the billy.

They stopped when the track petered out and while Spargo rubbed two sticks together, or whatever it is they do up there to light a fire, Smith, caked from head to toe in red Kimberley dust, shouldered his camera and set off for the river. Coming near to it the scenic perfection was marred for a second time by a dungaree-clad figure who bounded out from behind a tree and, determined to brazen it out, strode forward with hand outstretched.

Both of course thought the other was either the irate owner of the vast Drysdale Station, out mustering, or an even more irate ranger patrolling his Aboriginal reserves. The latter species though rare, seems ubiquitous.

Eyeball to eyeball Dungarees boomed, 'Rowley, CSIRO' and both collapsed on the ground, roaring with laughter and kicking their legs in the air.



Photograph: Dr Randolph Spargo

Dick Smith (left) with husband and wife team Eleanor Russell and Ian Rowley share a billy of tea near the banks of the Drysdale River after a chance encounter in the far northern part of the Kimberley region of Western Australia.

Hail fellow, well met. Ian Rowley and his wife Eleanor Russell, both from Wildlife, were making their annual observations on a rare species of bird that has a base camp right there. The purple crowned wren (better known as *Malurus coronatus*) is a lovely little creature that they have been banding and recording for five years for a few days each year at this spot.

Dick Smith and Randy Spargo have been working on the nutrition of Aboriginal children in the Kimberley region also for five years and were completing their five weeks on the road with a visit to Kalumburu, a kind of tropical paradise on the Timor Sea only about 500 km from Timor itself.

Given the remoteness of the region, the extremely sparse population density (around three persons per 1 000 square kilometres) and the exquisitely unlikely location well off the main track, we asked our statistical colleagues what was the probability of the meeting. 'One' they said crossly.

Personnel changes
cont. from p.1

Meeting this challenge had ramifications for every facet of CSIRO' operations: resource distribution, project management, funding patterns, and staff management — including retraining, redeployment , voluntary retirement and in some instances, retrenchment.

'CSIRO faces profound change,' Dr Boardman said. 'Without in any way belittling the Organization's past contributions to Australian industry and the community, CSIRO faces a greater challenge now than at any time in its history. If we fail to meet the challenge, I do not believe the Organization will last to the next century.'

Dr Boardman said the Organization was in the process of adopting a more commercially oriented approach to its financial operations. Improvements included accrual accounting, better computer systems, financial management training programs and improved project management.

Dr Boardman said there was 'much scope' for better project management in the Organization: in the setting of objectives and time-frames and the allocation of resources which were commensurate with the aims of the project, and in better annual reporting.

Field Days
cont. from p.3

The **remote sensing display** will show seven ways in which remote sensing can help rural industries: vegetation monitoring for bushfire risk assessment; using satellite images to provide an estimate of final crop yield; Micro-BRIAN for crop monitoring and soil erosion mapping; prediction of soil erosion in rangelands; assessing fertiliser use on pastures; monitoring drought; and monitoring salinity.

The **computers in agriculture display** will feature four CSIRO-developed computer-based farm management systems, SIRATAC, SIRAG-CROP, GRAZPLAN and the Australian Feeds Information Centre.

The **wool research display** will include demonstrations of 'biological defleecing', and a display of woollen outfits worn by the 1986 Australian Commonwealth Games team, made from yarns spun using the new CSIRO 'Sirospun' process.

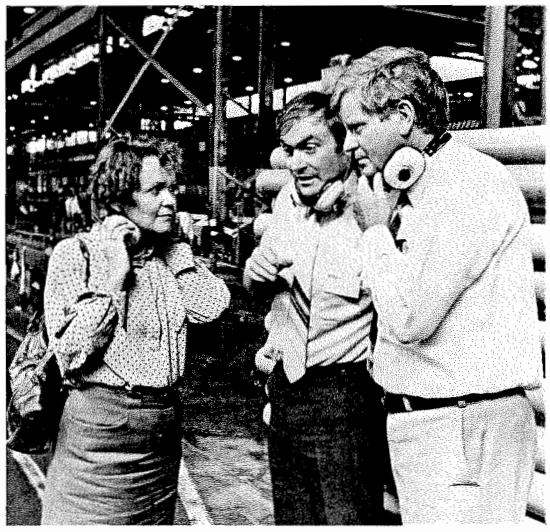
The **soils and water display** will include an experimental battery-powered device which could offer an explanation for the success of the traditional art of water divining. Another feature will be 'The Murray Darling Hotel', at which visitors will be able to taste water samples from different sites along the Murray/Darling River system.

The **animal health display** will give visitors a unique chance to 'see inside' the Australian Animal Health Laboratory at Geelong. Staff from AAHL will bring a model which incorporates lights and slides to give the next best thing to an actual tour through the Laboratory.

The **quality of agricultural products display** will include a demonstration of the 'Stirring Number System', a new method of on-the-spot measurement of sprout damage which will allow more efficient marketing of grain and help achieve maximum returns for growers. A new process of removing undesirable pigments from edible vegetable oils, which should prove very valuable to oilseed processors, will also be displayed, and visitors will have the opportunity to taste biscuits made using sunflower milk

The **new plants and crops display** will include samples of new CSIRO-developed white and black grape varieties used for dried fruit and wine, and displays of wine made by Brown Bros from 'Tarrango', another CSIRO grape variety. Also on display will be live plants of a new drought-tolerant grass just released in Queensland and based on research by CSIRO and the Queensland Department of Primary Industry.

State Committee visit



The NSW State Advisory Committee visited the Illawarra region on 24 and 25 September as part of its regional awareness program.

The visit included inspections of BHP's Cordeaux colliery, Metal Manufactures, port facilities and the Illawarra Technology Centre.

A dinner for civic dignitaries and business leaders was held in the historic Gleniffer Brae manor and after-dinner speakers were member of the Executive, Dr Michael Pitman, and Rear Admiral David Martin.

Dr Susan Hayes (left) and Dr Kevin Sheridan (right), members of the NSW State Advisory Committee, with an employee of Metal Manufactures on a tour of the company's plant.

CSIRO Medals
cont. from p.1

Dr Jupp's innovative research, its prompt and practical application to natural resource systems as well as its successful commercialisation all contribute to this award of a CSIRO Medal for 1986.

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During his five years with the Division of Manufacturing Technology **Dr Harding** has been responsible for conceiving and developing the key elements in two projects which have a clear lead over existing technology and promise very substantial markets both in Australia and overseas.

The first of these developments is a high-speed industrial vision-processor now being manufactured and marketed by Vision Systems Ltd. The other is a discrete event computer simulation package which has been applied successfully to some major new Australian manufacturing facilities and for which a commercial enterprise is currently being established.

Although he had no previous experience in either technology, in late 1981 Dr Harding agreed to lead a project to develop VSLI (Very Large Scale Integrated circuit) implementation of an industrial vision system. Within a very short time he had developed and verified new algorithms for connectivity analysis. A world-wide market survey was commissioned and this confirmed that these developments were well ahead of the existing technology and promised significant improvement in cost/performance when compared with the most advanced systems currently available. Vision Systems Ltd is now marketing the vision system.

During 1984, in response to a specific request from PA Technology, Dr Harding developed a simulation program to model a complex palletizing operation for W.D. & H.O. Wills. Following on the success of this work the same approach has been applied to a number of large industrial systems.

Wilderness area under threat

A 13-day walk through the heart of the MacDonnell Ranges is quite an achievement on its own. But for two CSIRO officers it also turned up some remarkable discoveries including evidence of animals thought to be extinct in the area.

Experimental scientist Grant Allan and senior technical officer Graham Griffin, both based at the Division of Wildlife and Rangelands Research, Alice Springs Laboratory, travelled from Mt Zeil (the highest mountain west of the Great Divide) back to Alice Springs.

The walk started on 2 June, after the two were driven to Mt Zeil. They spent their first night on the summit of the mountain, 4955 ft above sea level and 3000 ft above the surrounding plains.

Next day they proceeded to Mt Razorback, then on to Mt Sonder, Mt Giles and eastwards.

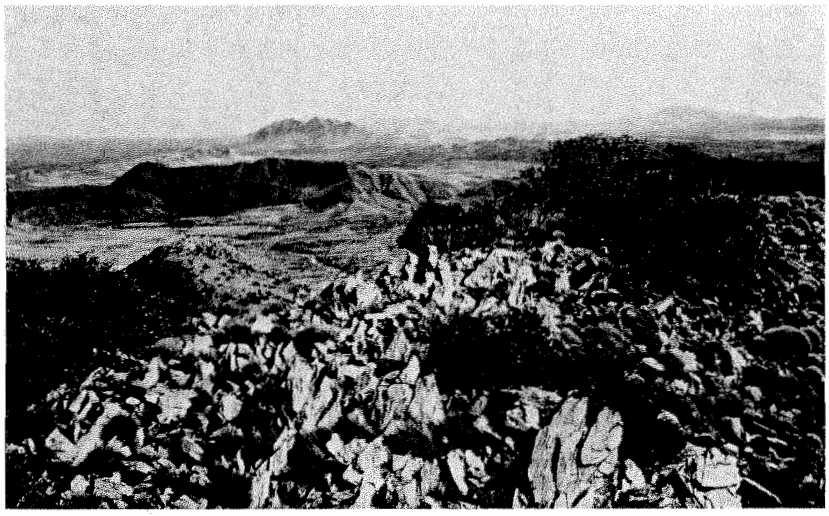
'We effectively walked the width of a full 1:250,000 map sheet,' Graham said. 'This may not seem too grand for hardened bushwalkers except that it is in a rather arid environment and the range country is very difficult walking.

'The ground is very rocky, steep and covered with spinifex, a very prickly grass which has lots of unique ecological features but is still prickly!,' he said.

'In the high range country we were fortunate to find many places where Europeans, at least, rarely if ever go. We saw many plant species that are considered rare or only occur as relics in restricted habitats.

'These habitats were narrow south-facing gorges with perennial water. In them we found ferns, bottlebrushes, lillies and many other "high rainfall" species.

'We also found evidence of populations of central rock rats — thought to be locally extinct — and brushtail possums,' he said.



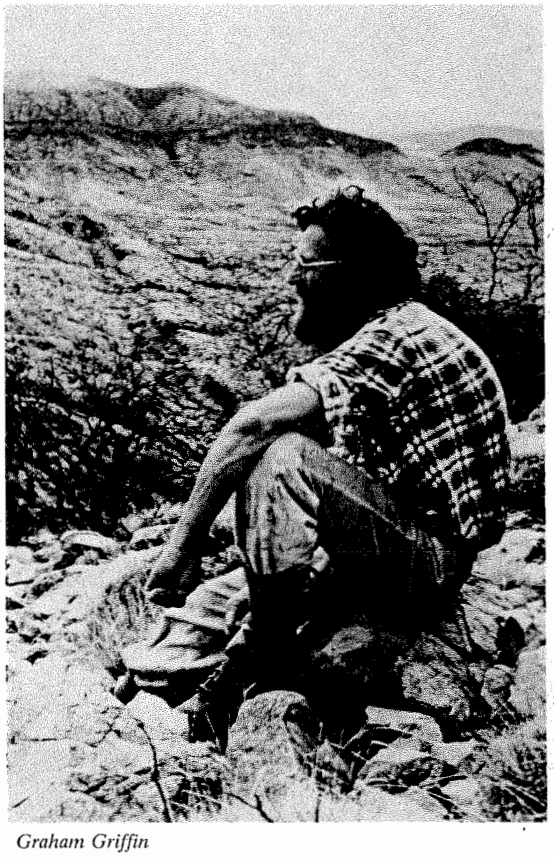
Some of the rugged country in the MacDonnell Ranges.

These exciting discoveries were the 'icing on the cake' in what was a very illuminating trip for Grant and Graham. Perhaps the most important thing brought home to them was the need for preservation of this unique wilderness area.

'These habitats were isolated from the impact of feral animals because of their rugged topography, although some gorges were accessible to these animals, particularly horses and cattle. In gorges where the horses had reached the effect was devastating,' Graham said.

'Plants were grazed right down and trampling had finished most of them off. It was tragic to think that these animals are of interest to nobody, yet they are permitted to go on destroying unique habitats. We saw the area at the end of a dry period, and while there was still ample water to support these feral animals, they had eaten all the food in the area and were consequently dying in huge numbers.

'The crime is the destruction of habitat for no economic gain but with a great deal of native plant and animal loss.'



Graham Griffin

THERMODATA anniversary

This year marks the 10th anniversary of one of the longest running projects in the Division of Mineral Chemistry — the THERMODATA system

This computer-based system was developed by Dr Alan Turnbull, based on work at the UK National Physical Laboratory (NPL), in an effort to make thermodynamics less tedious and more useful for evaluating chemical processes. Over the past decade, the system has provided industry, university and CSIRO researchers with a large data bank of thermodynamic information and a variety of application programs, available nationwide via the CSIRONET computer network.

This was one of the first systems of its type in the world and is still at the forefront of international development.

The original NPL databank has been updated and now includes data from many sources, such as the US National Bureau of Standards and Bureau of Mines. There has been close collaboration with the European SGTE data group, resulting in a newly revised data bank to be available soon. Altogether, over 8000 data sets are available, covering such properties as heat capacity, free energy, activity, volume and critical properties for a wide range of substances. Also in preparation is a data bank of thermodynamic properties of solutions.

A bibliographic data base of over 2000 references is already available to provide a source of material for the solution databank.

Efforts have been made from the outset to make THERMODATA easy to use even for non-experts. This has been achieved with a free-form natural language operating system, a comprehensive set of manuals and many examples of useful calculations. The system also provides a self-contained graphics package for the presentation of results on graphics terminals or plotters.

Further assistance to users of the system is provided by a new publication edited by Dr Turnbull, entitled *THERMODATA UPDATE*, a series of research papers covering recent developments in applied thermodynamics.

If you think THERMODATA could help you, contact Dr Turnbull or Mr Mike Wadsley at the Division of Mineral Chemistry, Port Melbourne, Victoria.

New CSIRONET directory

CSIRONET has issued a user directory for its electronic mail system, *MAIL.

It has been produced in response to many requests from clients, and lists users by organisation and surname, with a contact telephone number.

Because it's designed for use in conjunction with *MAIL, the directory doesn't include postal addresses. These may be retrieved from *MAIL online.

The first edition is based on registration information provided by *MAIL users. Not all CSIRONET users are represented, only those who entered their names and/or addresses. All *MAIL users are urged to enter their name, address and phone number and to keep this information up to date. Updated editions of the directory will be issued regularly.

Copies of the 64-page directory may be obtained through the on-line document ordering system or by contacting the publications assistant at CSIRONET. Ask for Reference Manual 53.

DBR sets a record

The Division of Building Research believes it may have set a record with the sale of 40 000 information sheets in just eight weeks.

The popular information sheet is the Division's 'Guide to Home Owners on Foundation Maintenance and Footing Performance'. The guide was prepared by Dr P.F. Walsh with advice from the Standards Association of Australia Committee on Residential Slabs and Footings.

***CoResearch* is produced by the Public Communication Unit for CSIRO staff. It's also circulated to a number of people outside the Organization who are interested in CSIRO activities. Readers are invited to contribute or offer suggestions for articles. The deadline for contributions is the last Monday *before* the issue month. Editor: Liz Burden, PO Box 225, Dickson ACT 2602. Ph: 48 4479.**

CoResearch

CSIRO's staff newspaper

No. 298 December '86 — January '87

New Board announced

Wran's our man

The former NSW Premier and former Federal President of the ALP, Mr Neville Wran, has been appointed to head CSIRO as the part-time Chairman of the new corporate-style Board.

Mr Wran and the eight other part-time members of the new Board, which includes a mix of scientific and business skills, took up their positions on 5 December.

The Minister for Science, Mr Jones, said the present Chairman, Dr Boardman, had been appointed acting full-time Chief Executive, pending advice from the Board on a permanent appointment.

The new Board members include the head of the Walter and Eliza Hall Institute of Medical Research, Sir Gustav Nossal, and the Chairman of the Business Council of Australia, Sir Roderick Carnegie. Sir Gustav, Sir Roderick and Mr Wran have been appointed for five years.

The other new Board members are Mr Bill Mansfield, assistant secretary of the ACTU; Mr David Hoare, the Chairman of Bankers Trust Australia; and Dr Tony Gregson, an organic chemist and farmer from Victoria's western districts. They have all been appointed for four-year terms.

Mr Neville Wran.

Three part-time members of the present Executive have been appointed to the Board for three years. They are: Professor Adrienne Clarke, of the University of Melbourne; Mr Graham Spurling, the managing director of Mitsubishi Motors Australia Ltd; and Dr Kevin Foley, a management consultant

The appointment of the Board follows the passage of new CSIRO legislation through the Senate.

Mr Wran, who said he was 'delighted' with his new job, met Dr Boardman for the first time in Sydney late last month. Mr Wran said the Board would meet before Christmas to establish an agenda for next year.

'The Board's primary role will be to align CSIRO's research priorities closely to national objectives. If Australia is to survive economically it must develop manufacturing and service industries as competitive and innovative as its agricultural and mining sectors. CSIRO's research is crucial to achieving this objective.'

'CSIRO is one of the world's most highly regarded national research organizations, and one of Australia's most respected public institutions. The task of the new Board will be to ensure that Australia gets the greatest benefit from this excellent resource.'

Announcing the new Board, Mr Jones said: 'Cabinet has chosen a very powerful Board. I am confident that it will not only maintain CSIRO's tradition of excellence but extend it into manufacturing and service areas. All members have been appointed for their personal abilities rather than as representatives of particular sectoral interests.

'Neville Wran, after 10 years as Premier of New South Wales, brings to the chairmanship intelligence, drive, energy, deep sense of national commitment, ability to formulate policy priorities and to be a highly visible and effective spokesman for the Organization. We were fortunate to secure his services.'

Mr Jones thanked the retiring members of the Executive for their contribution to the 'revitalisation and redirection of CSIRO' and the Chairman and members of the Advisory Council and State and Territory Advisory Committees for their 'valuable advice'.

'Fears that CSIRO will be confined to short-term problem solving as if it was a type of superior panel-beating shop are groundless. The commitment to excellence will not only remain, it will be enhanced.'

Dr Boardman said he believed the new Board was outstanding in terms of the breadth of experience and knowledge they would bring to CSIRO.

'Mr Wran as the new Chairman has a broad range of skills in administration and policy formulation and has extensive contacts with political and business leaders. He will be very valuable in CSIRO's dealings with the bureaucracy, politicians and businessmen, areas where CSIRO is determined to develop better communication.

'While his experience in science and technology is limited, I have no doubt that on his past performances he will very quickly grasp the key issues involved.'

The President of the CSIRO Officers Association, Mr Roy Bond, said the association had made a submission to the Government on the appointment of the Board.

'Firstly, the Chairman should be an eminent scientist who can act as a figurehead for science and for CSIRO. Secondly, there should be staff participation on the Board. The Government has ignored both of these requests,' he said. However, the association will co-operate with the Board to put forward the views of professional staff at the policy-making level.

The Chairman of the Chiefs' Committee, Dr Warren Hewertson, said Mr Wran had considerable experience of the States' initiatives in fostering new industries. 'His pragmatic background and record of achievement should bode well for the the Commonwealth and States to initiate new ventures of national significance.'

The new members of the Board

Sir Gustav Nossal: One of Australia's most eminent scientists and Director of the Walter and Eliza Hall Institute in Melbourne.

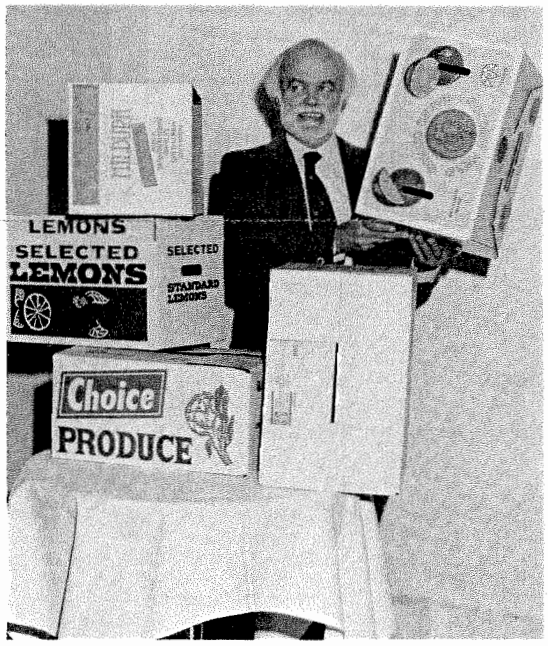
Sir Roderick Carnegie: Chairman of the Business Council of Australia and formerly chairman and managing director of CRA Limited.

Mr David Hoare: Chairman of Bankers Trust Australia and AUSSAT, deputy chief commissioner of OTC (Aust) and with considerable expertise in the service sector, banking and communication.

Dr Tony Gregson: One of Australia's most distinguished organic chemists and formerly an associate professor of chemistry at the University of New England before leaving academia six years ago to become a full-time wheat farmer.

Mr Bill Mansfield: Assistant secretary of the ACTU and formerly federal secretary of the Australian Telecommunications Employees Association and ACTU nominee to the Committee of Inquiry into Technological Change in Australia 1978-80.

'High-utility low tech' invention earns 1986 McLennan award



A leaning towards 'industry-sized experiments' may well have played a crucial role in the development of an award-winning process for manufacturing waxed corrugated-cardboard boxes.

Mr John Coleman from the Division of Chemical and Wood Technology, inventor of the process, has taken out this year's Sir Ian McLennan Achievement for Industry Award. The Advisory Council established the award last year to recognise outstanding contributions by CSIRO scientists to Australian industry.

Mr Coleman believes that wherever possible, industry tests should have top priority.

'Finally things have to work in the real world,' he said. 'You need to temper the scientific approach with a measure of blacksmithing. It helps if you are an opportunist as well.'

He describes the waxing line, which produces boxes some five times faster with less than 20 per cent of former labour requirements and 20 per cent less wax, as an example of 'high-utility low-tech'.

The Victorian Minister for Industry, Technology and Resources, Mr Robert Fordham, presented the award late last month at a ceremony in Melbourne. The award includes a commemorative medal and an overseas study visit.

An Australian engineering company, Andax Pty Ltd, is manufacturing and exporting the waxing machines. The value of machines sold so far is $5.5M and a smaller model has generated additional sales worth more than $1M.

From the Chairman

A column by Dr Keith Boardman

Recently, I had the opportunity to have discussions with Dr William Miller, the President of the Stanford Research Institute (SDI) and attend his address to a reception hosted by the Business Council of Australia and the Australian Science and Technology Council.

The main theme of his address bore a remarkable resemblance to the prophetic views expressed by our Minister in *Sleepers, Wake*, and expounded forcibly by him over several years.

The world economy has moved from a resource base to a knowledge base, with the message that no country today can effectively shield itself from world economic trends. There is increased emphasis on human capital and new knowledge with research becoming more important, but with the need to move basic research more quickly to the marketplace. The rapid advances in science and technology and the increased competition between countries mean that technologies are outdated more rapidly, and major retraining of the workforce, including scientists, is necessary. Dr Miller mentioned that the private sector in the USA is spending more on training and retraining than does the higher education sector.

Dr Miller said it was important for the private sector to increase its R&D, both intramural and extra-mural. If this is valid for the USA it is certainly a vital necessity for Australia with its low level of private sector R&D. Dr Miller considered that a role for government was to join with the private sector in making available accessible technologies.

###

It was a pleasure for me to revisit the Project for Animal Research and Development (PARD) near Bogor, Indonesia, but there was a measure of sadness in taking part in a closing ceremony and tree planting (a eucalypt) to mark the end of the direct involvement of CSIRO staff after 12 years in the ADAB-funded project. Warm tributes were paid to the contributions and dedication of the successive Australian project leaders, and to the two main champions of the project throughout, Professor Hutasoit (now junior Minister for Agriculture) and Dr Ken Ferguson.

The research output of the laboratory has continued to grow steadily with the return of Indonesian scientists after training in Australia. CSIRO can be proud of its achievements in providing Indonesia with a first class animal production research facility . It is important, however, that the strong links of goodwill, friendship and co-operation which have been built between CSIRO and Indonesian scientists be maintained by regular contact.

Dr Ferguson and I were given a very great honour in a traditional North Sumatra Butak ceremony when beautiful hand-woven capes (ulos) were presented and placed on our shoulders by Professor Hutasoit. The talented Indonesian staff of the laboratory provided an evening of great entertainment in honour of the departing Australians, including a legend play, dancing and singing, with a moving rendition of auld lang syne.

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I would like on behalf of the Organization to express my appreciation of the outstanding contributions made by part-time members of the Executive to the performance of CSIRO. Over the years we have been extremely fortunate in being able to attract outstanding Australians, leaders in their own fields, to serve in the Executive and give their valuable time to contribute both inside and outside Executive meetings.

I would also like to pay tribute to the valuable work of the Advisory Council and State Committees, and the contributions they made to debate on important issues in CSIRO and to the decision-making process.

I wish all staff very best wishes for Christmas and the New Year.

A Keith Boardman

Big market expected for pump

A CSIRO-invented industrial pump which will find worldwide application in the manufacture of silicon chips and scientific instruments was shown to the November meeting of the CSIRO Executive. ***Story and photo on page seven.***

Health matters

A Noisy Lot

At the recent seminars on hearing protection, staff of the Occupational Health and Safety unit and many divisions were surprised at the extent and variety of noisy areas within divisions. Apart from obvious areas such as workshops, operations involving sample grinding, feed preparation, etc, generated noise levels often in excess of 115 dBA — about equal to jet engine noise!

With the recent issue of the CSIRO hearing conservation policy, the scene is now set for a concerted effort towards identification and control of noise at work.

We must all remain aware, however, that noise from recreational sources such as rifle shooting, hi fi equipment and rock concerts all add to our total noise exposure. Noise induced hearing loss is insidious and irreversible.

Audiometric testing of staff in at-risk areas (and other staff by invitation) will start in July next year, although a number of divisions have already commenced their own audiometry program.

Two Year Follow-Up Review

A follow-up review of the OHS area has been completed and will be presented to the Executive (Board) early in the new year. The 1983 review committee, chaired by Professor Craig, presented a blueprint for improved occupational health and safety within CSIRO. Much has been achieved in the interim with formation of new OHS committees, improved staff consultation, etc. The follow-up review does, however, highlight a number of key management and resource areas where further action is required. Copies of the review will be circulated to all divisions and units as a basis for further action.

Microscopy Study

A consultant ergonomist is being engaged by the OHS unit to study a variety of CSIRO microscope workstations. An increased incidence of occupational overuse injuries and postural disorders have been reported by staff spending long periods observing, dissecting, etc.

The consultant has been asked to produce a 'code of practice' which will highlight equipment, furniture and operational aspects designed to minimise health risks to staff.

Results are expected to be available early in 1987.

Farewell

The unit will be saying goodbye to Dr Cherilyn Tillman in mid Januaary. Cherilyn is leaving to take up the newly created position of OHS manager at Monash University.

Her experience and highly professional approach to occupational hygiene and OHS matters in general will be sorely missed. Maybe staff at our Clayton divisions will be able to keep in contact with Cherilyn in her new domain.

Gary Knobel
Manager OHS

Letters to the Editor

Dear Editor,

I had no idea when reading a press cutting earlier this year, describing how scientists cry 'Eureka' at the moment of insight, that I might one day have cause to hope for such an event to happen.

I was advised recently that one of my grandsons had Duchene muscular dystrophy (DMD), a genetic disorder. The only hope for DMD sufferers and their families is that a research breakthrough occurs.

Being an employee of CSIRO, I am aware of CSIRO scientists' achievements and I thought, perhaps naively, that a letter in *CoResearch* may lead to consideration of the DMD problem in 'off-duty' moments by my scientific 'colleagues', thereby increasing the chance of a solution being found.

Fred Lowson
Headquarters

Dear Editor,

In reply to Philip Sharp's letter (*CoResearch* no. 296) re. CSIRO logo, the Division of Textile Industry Social Club has been providing a windcheater/T-shirt with CSIRO logo for approximately eight years.

Philip's (and the editor's) knowledge of this service suggests our advertising has not been successful. May I indicate that our garments are of highest quality and the logo (see below) has been enthusiastically accepted by CSIRO members and visitors, especially overseas visitors.

If Philip and other readers would like to contact us we would be happy to supply as many garments as requested.

R H Smith
Division of Textile Industry

Science for Australia

CSIRO

Dear Editor,

Some of you might be interested in this version of the story of the Gordian knot.

Once upon a time, long, long ago, there was a large group of philosophers, alchemists, mathematicians, astrologers and others seeking Ultimate Truth. This army descended on the town of Gordium, widely rumoured to give much gold to scholars. But the way was barred by a rope across the road, with a large and intricate knot of Social Relevance in its centre. An aged sage in attendance told them the only ones worthy to untie the knot would be those whose studies had the greatest social relevance, as defined by zealots of the far left and of the far right.

Despair was written on every face as they examined the knot. Then their leader cut through it with his sword.

CSIRO needs the effrontery to tell society that a lot of research will not have much apparent or forseeable relevance, but that such studies should be supported anyway. There will always be some projects that can attract external funds, but there will also be others that have no chance of doing so. It is difficult to see how astronomy, for example, could be funded by groups with commercial gain in mind. Most projects in CSIRO fall between these two extremes.

As they say in the army, time spent on reconnaisance is rarely wasted. CSIRO is engaged in discovering more about the natural world. A small part of this research will result in discoveries of spectacular practical value. Much research will be useful to some extent. Some will never be of any practical value. How do we tell which research will be a winner? If we knew that we would not need to do any. **Cont. on p.7**

At the forefront of major advances in Australian marine science

Oceanography is one of the newest divisions in CSIRO. Its creation in 1981 arose out of the recognition of the urgent need for improved understanding of the huge area of ocean (more than seven million square kilometres) for which Australia became responsible following the declaration of the 200 nautical mile Australian Fishing Zone in 1979.

This need had been highlighted by a number of high level Federal Government committees on marine science in the late 1970s, and by the CSIRO Ocean Sciences Review Committee, which recommended the separation of the former Division of Fisheries and Oceanography into two divisions.

CSIRO's involvement with marine science dates back to 1936 and the establishment of a fisheries section. In the early 1950s the Division of Fisheries enlarged its work to include physical and chemical observations of the ocean, and a Division of Fisheries and Oceanography was formed in 1956. This continued until the separation.

The two divisions moved from Cronulla to new Marine Laboratories on the Hobart waterfront during an 18 month period beginning early in 1983. At the same time, funds were provided for a multi-purpose research vessel, the *Franklin*.

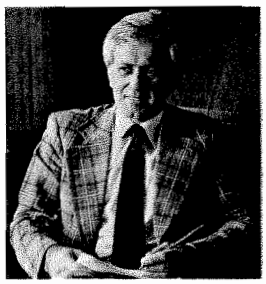
The Marine Laboratories now comprise the Division of Oceanography and the Division of Fisheries Research, which have separate scientific identities but share support facilities.

CSIRO designated oceanography a high priority growth area from 1980-84, and the division is now Australia's principal deep-sea oceanographic research facility.

It is headed by Dr Angus McEwan, a Fellow of the Australian Academy of Science and Australia's delegate to the Scientific Committee of Oceanic Research (SCOR). Before his appointment as the foundation Chief, Dr McEwan was a chief research scientist in the Division of Atmospheric Research.

The Division of Oceanography employs 81 scientific and support staff.

CSIRO meets Australia's main need for civilian oceanographic research in coastal, open and oceanic waters. The work provides information essential for territorial management, resource development and commercialisation and technology transfer (including marine instrumentation, space technology and numerical modelling). Fisheries, offshore construction, pollution control, navigation, climate research, defence and search and rescue operations are among activities assisted by the work.



Dr Angus McEwan

As the principal civilian institution in Australia capable of large-scale oceanographic research in the field, particular responsibility is taken for studies beyond the charter, capability, resources or expertise of other national organisations.

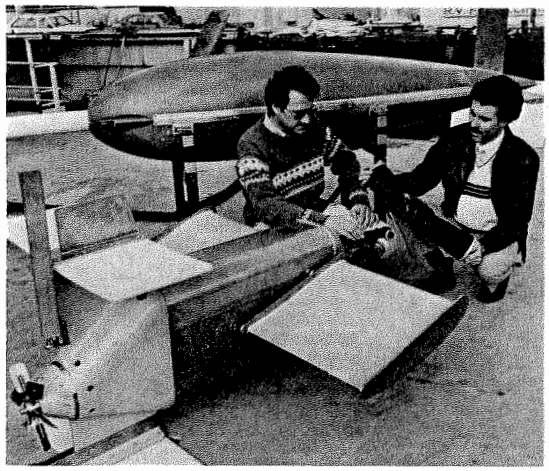
There are two major programs: physical oceanography, involving studies of the properties, structure and movement of Australian regional seas, and chemical oceanography, which deals with the characterisation of water masses and chemical processes in the oceans.

The Division conducts research throughout the Australasian region. Current areas of investigation include the equatorial western Pacific Ocean, the Coral and Tasman seas, Bass Strait, the Indian Ocean off Western Australia, the Timor Sea and the Gulf of Carpentaria.

The Division of Oceanography is young in years, but what it lacks in age is made up for in the enthusiasm of its staff who have come from many parts of the world to contribute to, and derive benefit from, what is regarded as one of the most productive and challenging periods in the history of Australian marine science.

The Submersible Data Logger in use for fisheries research. Photo: Thor Carter.

Wombats and Bunyips among new ocean research tools



Dr Trevor McDougall, right, senior research scientist in the small-scale ocean processes section, and Mr Alex Papij, OIC electronics, examine Bunyip equipment on deck of RV Franklin before the first trials in August this year.

Several instruments developed recently by the Division have attracted both national and international interest. The Division has a policy of actively pursuing commercialisation of instrumentation or techniques developed for research purposes.

The Submersible Data Logger (SDL), a versatile instrument for measuring several important water variables including salinity and temperature, is now being manufactured commercially by Yeo-Kal Electronics of Sydney. The SDL, a sealed cylinder fitted with sensors, can withstand harsh environments and permanent immersion.

It transmits data and charges its batteries inductively, through a plastic case. As a result, the unit needs to be opened only when sensors are being fitted for different applications. This minimises the corrosion problems of more conventional instruments and the necessity for trained operators, power supplies and the other paraphernalia that usually makes field measurements expensive, difficult and prone to failure.

Released commercially

The SDL was released commercially in 1986 and is already proving useful to scientists, including researchers in the Antarctic, environmental consultants and government departments concerned with rivers, water supplies and fisheries.

The WOMBAT (Weather Ocean Monitoring Buoy with Argos Telemetry) is a new type of marine meteorology buoy. The first one has just entered service and is another example of Australia's potential to produce more of its own marine equipment.

The original design from the Woods Hole Oceanographic Institution in the United States was modified for Australian conditions. It is discus-shaped, three metres in diameter, with a closed hull and central well for carrying instruments and batteries.

The WOMBAT is more stable and durable than other buoys in use in Australian waters, especially in areas with strong currents.

The Division has continued the 'Australian theme' with BUNYIP, a towed instrument for making rapid measurements of ocean turbulence. It can travel at greater depths than any similar instrument and is programmed to move in an undulating, saw-tooth flight path, which enables scientists to obtain horizontal as well as verticle profiles of the water column.

Freely falling instruments in general use only provide vertical profiles of the water column — and they are also very time consuming to retrieve.

Development of BUNYIP, which has just had its first trials, has put Australia at the forefront in the study of small-scale oceanic processes.

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This feature is designed to present a cross-section of activities at Oceanography and is not intended as a directory to the Division's research.

'The pride of the fleet' a valuable facility for marine scientists

The Oceanographic Research Vessel *Franklin* is the pride of the CSIRO fleet. She was commissioned in 1985 and is operated by the Division of Oceanography, with Hobart her home port.

Built at a cost of $12.2 million by North Queensland Engineers and Agents Pty Ltd of Cairns, the *Franklin* is a national facility available to all marine scientists investigating Australia's oceans.

She is managed by Associated Steamships Pty Ltd of Melbourne, with cruise schedules and scientific programs determined by an independent National Facility Steering Committee.

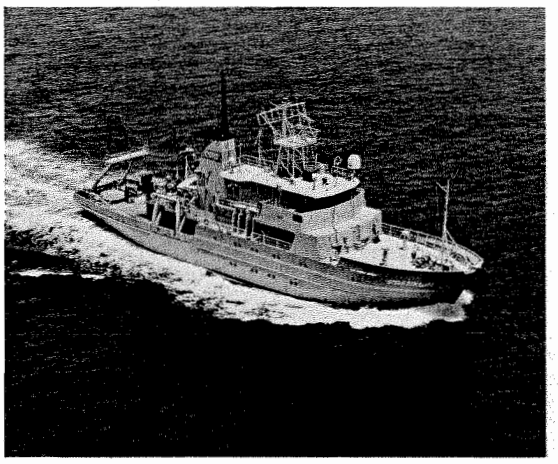
The 55 metre vessel has facilities for 12 scientific and/or support staff and 14 officers and crew.

Designed specifically to meet Australian requirements for a flexible, multi-purpose oceanographic research platform, the *Franklin* works mainly in the nation's territorial waters. However, her range of 7500 nautical miles (14 000km) also enables her to work in equatorial and subantarctic latitudes.

During her first year of operation, she was involved in a joint Australian-American Western Equatorial Pacific Ocean Circulation Study, studies of the deep bottom fauna of the Barrier Reef Shelf and adjacent Coral Sea, the origin of water masses in the eastern Coral Sea, changes in the earth's magnetic field between the continent and the ocean, and currents off eastern Australia and in the Tasman Sea. In 1987 she will participate in a multi-disciplinary study of the Leeuwin Current off Western Australia.

Work areas include a wet laboratory, chemistry lab, biology/general purpose lab, operations and computer rooms, electronics workshop, photographic darkroom, drawing office and library.

Franklin is equipped with an extensive range of state-of-the-art equipment, including an Acoustic Doppler Current Profiler, a powerful scientific computing network and a high accuracy Global Positioning System. There is also an INMARSAT satellite communications system which receives sea surface temperature images processed by the Division's satellite ground station in Hobart. With the aid of these images, *Franklin* now can be directed to surface features of interest revealed by imagery — another advance for what is already a high technology vessel of which the Division is justifiably proud.



RV Franklin

Division's futuristic HQ harmonises with historic environs

The CSIRO Marine Laboratories, Hobart.

The Division's headquarters occupies a prime site on the Hobart waterfront and architects from the Federal Department of Housing and Construction who were responsible for the futuristic design of the four new buildings paid special attention to the need for harmony with the nearby sandstone structures and historic environs.

Development of the complex in its conspicuous location, and the influx of personnel to Tasmania, has highlighted in the State the role and work of CSIRO around the nation.

In line with this increased awareness, the Division has adopted a higher profile in terms of community interaction. Journalist Jennifer Pringle-Jones, who has represented Tasmania in various capacities both in the media and in organisations such as the National Australia Day Council, was appointed in February 1986 as the Division's first full-time communication officer.

Closer links are being developed with local, State and Federal governments, industrial and commercial sectors of the community through events such as decision makers' functions. Small groups are invited to visit key research areas and to meet CSIRO staff associated with the programs. On a wider scale, the Marine Laboratories were opened to the public for the first time in October this year. As a result, at least 6000 people are more familiar with research being conducted in the complex.

Extensive media coverage of Divisional activities this year has included a segment on the ABC Quantum program, a series on the ABC Radio Science Show, stories in national daily newspapers and speciality publications, plus frequent reports in Tasmanian newspapers, ABC and commercial television and radio.

Communication group

A communication and information group established at the Laboratories includes scientific assistants to two chiefs, a scientific editor, a graphic artist, illustrator and photographer from the illustrations section and representatives of the Bureau of Information and Public Communication and the CSIRO regional laboratory in Battery Point, Tasmania.

Communication is very much a two-way affair and the Division is building on the solid foundations laid in the past two years to ensure that the community benefits from the increased CSIRO presence in Tasmania and, at the same time, that the Organization fosters input and advice from 'outside concerns'.

New initiatives to boost links with maritime industry

Offshore oil and gas production, shipping and fishing are major industries that rely heavily on knowledge of oceanic conditions on Australia's continental shelves.

While most research groups within the Division have links with various sectors of the maritime community, the oceanographic applications group is the major formal interface with maritime industry. The most important component of its work comprises the development of numerical models of several areas of the Australian continental shelf such as Bass Strait and the North West Shelf.

These models, which provide predictions of currents and sea levels associated with tides, winds and storms, are of considerable benefit to the offshore oil and gas industry. They also find application in the investigation of environmental problems caused by oil spills and ocean fallouts.

The group hopes to further strengthen the Division's links with maritime industry, and a number of initiatives are being pursued.

'Yes, but what do you do?'

When the going gets tough there are always some lighter moments to recall.

During open days at the Marine Laboratories in October this year some staff members were left wondering just what their work really involves. The following 'gems' are among the questions and statements with which they were confronted...

'And do you do any research here?'

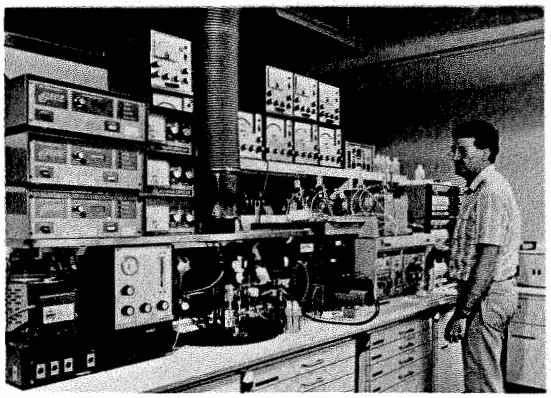
'I guess that doesn't work because it's man-made.'

'Where can I get cheap test tubes?'

'How about putting these young children in suspended animation?' (During a particularly busy period)

'Who would like to see my photo of 1929 whaling — one of me drinking a cup of tea on a whale's back?' (This enquirer was referred to Fisheries Research).

Chemical oceanography research uncovering useful new information



Dr Denis Mackey with equipment used for trace metal analysis.

Chemical oceanographers study the fundamental processes that affect the distribution of chemical compounds and elements found in different water masses.

Most of the compounds of interest are present in seawater at such low concentrations that highly sophisticated equipment and techniques must be used to collect and analyse samples.

Current research topics include studies of the effects of varying concentrations of trace metals, inorganic nutrients and organic compounds on the production of new biomass in the sea. For example, trace metals can be either nutrients or toxic to marine life, depending on concentration and speciation.

Other work involves the use of chemical constituents of marine organisms to trace food-chain relationships, and elucidation of the structure of dissolved organic carbon in seawater and the effects of this carbon on the growth of phytoplankton.

Members of the chemical oceanography group trace the origins and movements of water masses by the use of such chemical marks as nutrients and metals. This is useful, among other things, for studies involving the recruitment of southern bluefin tuna larvae of the North West Shelf and investigations of water-mass movements in the Tasman Sea in relation to the recruitment of lobsters and crayfish.

The Division is involved in the development of specialised techniques for measuring compounds at ultra-trace levels, and in studies of the sources and fates of organic compounds in coral reef and Antarctic waters and sediments. In this section, scientists examine the ways different bacterial groups degrade natural and pollutant compounds.

The information obtained by chemical oceanographers is directly relevant to studies of physical, biological and geological processes.

Jennifer Pringle-Jones, left, and Brita Hansen — a graphic artist in the illustration section — discuss the work involved in preparation and erection of a two metre high model on oceanography and applications of research in Australia. The display was made for the open days at the Marine Laboratories and is now a permanent fixture in the complex.

Sea/atmosphere interaction has profound effect on our climate

The oceans strongly affect climate — and Australia's climate is very sensitive to the temperature of the surrounding oceans.

The sea and atmosphere act strongly on one another in the tropics and this is believed to play a major role in year-to-year variations in the earth's climate.

One of the objectives of the large-scale oceanography and climate program is to understand why sea temperatures vary in our region.

The International Council of Scientific Unions, Intergovernmental Oceanic Commission and the World Meteorological Organisation have organised a major 10-year Tropical Ocean Global Atmosphere Program (TOGA). Between 1985-94 scientists from a number of countries, including Australia, the United States and France, are studying temperature changes in the ocean to increase understanding of the cause of oscillations of the ocean/atmosphere system, and to gauge the predictability of the system.

The Division is participating in TOGA by collecting sea level observations at stations in the tropical oceans, especially around Papua New Guinea, and sub-surface temperature observations along merchant shipping routes.

It has signed an agreement with the NOAA Office of Climate and Atmosphere Research aimed at co-ordinating international efforts involving the ocean temperature observing network.

Co-operative program

For some time the US, Australia and France have informally operated a co-operative program with merchant ships from which expendable instruments are deployed to record ocean temperatures to several hundred metres depth. However, this program suffered from lack of a reliable resource base. This will be rectified as a result of the new agreement, and plans for the future include the establishment of an international centre for the archiving and analysis of data from the program.

An international workshop was held in the Division at the end of November to plan further development of the volunteer merchant marine observer network.

Many studies indicate that heat storage in the upper ocean is the factor that controls the Southern Oscillation, a global seesaw in air pressure with its ends in the eastern and western Pacific. When this is coupled with El Nino, characterised by the warming of normally cold water currents off the South American coast, there are disastrous climatic changes in many parts of the world, including drought in Australia. The last episode in 1982/83 caused nearly $4 billion damage in Australia and $12 billion worldwide.

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Big waves can generate lots of megawatts

Dr Chris Fandry, left, explains the wave rider buoy to visitors.

In July 1985, the Division began to measure waves off Cape Sorell, near Strahan, on Tasmania's west coast. These waves have a 'fetch' (the distance in which waves have to grow) that is one of the longest in the world.

One reason for measuring ocean waves at a particular spot is to assess the wave climate (long-term description of the waves) in the locality. This information is particularly important to engineers designing marine structures such as wharves and oil drilling platforms: they need to know what sort of waves to expect statistically during the lifetime of the structure.

The energy carried by waves is another important aspect of wave climate. Energy from the wind over vast areas of the ocean is accumulated by waves, which carry it for long distances. The Norwegians have demonstrated that this wave energy can be converted reliably and economically into electricity.

CSIRO research has shown that the average power dissipated by waves along 53km of the west coast is equal to Tasmania's total installed hydro-electric capacity — currently 2055 megawatts.

The waves off Tasmania are measured with a Waverider buoy. This is attached to a fixed mooring with a rubber cord that leaves the buoy free to follow the water surface without allowing it to drift out of radio range. An accelerometer inside the buoy monitors the vertical acceleration of the buoy. The height of the buoy above mean sea level is computed electronically from the acceleration, and this information is continously broadcast by the buoy's radio transmitter and antenna.

On shore, the radio signal from the buoy is received and converted into digital form by a radio receiver. The receiver is interrogated by a microcomputer, which accepts the digitised wave-height data and saves it for display as needed. The largest wave recorded by CSIRO scientists in the 12 months to June 1986 measured 16.78m (55ft)from trough to crest. This occurred on 29 July 1985.

Chris Fandry & wave rider buoy

298-1986/87

Satellite technology keeps tabs on ocean buoys

The Division uses buoys tracked by satellite to reveal ocean current patterns and to relay environmental information.

The program began in 1972 when a CSIRO spar buoy carrying a transponder was tracked by the French 'Eole' satellite. From 1975 the tracking was done by NASA and since 1980 it has been done by the French 'Service ARGOS'.

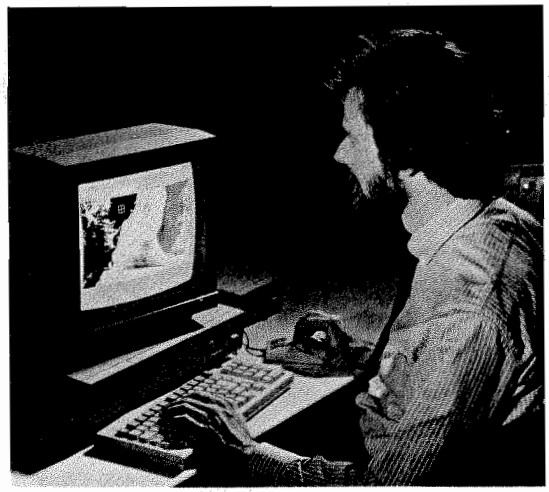
The buoys have been used with notable success to reveal, among other things, the dynamics of the Leeuwin current and the eddies of the East Australian current system.

The buoys, which have evolved over the years into a torpedo shape, are locked to the ocean currents by parachute sea anchors or drogues at the end of 50m tether lines. The transmitters for the buoys are bought from France and the circuits for solar charging the batteries and for temperature measurement are designed and built in the Division in Hobart.

Pressure sensor

It is planned to add an atmospheric pressure sensor as a module to the present buoy. In addition, a prototype drifting buoy incorporating a vertical profiler is being built to log temperature and depth on a probe that is lowered by a small solar-powered winch twice daily to a depth of 100m. On its return to the surface, the probe will transfer data to the buoy's microprocessor system via an inductive link. It will be charged in the same way. This link was developed for the Submersible Data Logger designed by the Division.

Thirty-five torpedo buoys have been used from the tropics to the Southern Ocean, with 30 being deployed in a joint CSIRO/RAN study of the East Australian Current from 1985-87.



Mr Paul Tildesley studies NOAA images.

More than a century of oceanography experience between them

Left to right, George Cresswell, Stuart Godfrey, Jim Dal Pont, Dave Crooks and Fred Boland.

What is youth without experience? Five Divisional members who have seen and contributed to many of the changes over the years are George Cresswell, Stuart Godfrey, Jim Dal Pont, Dave Crooks and Fred Boland. They have served a combined total of 114 years, and their areas of expertise include buoys, moorings, chemical analysis and computers.

David and Jim were the first to join oceanographic ranks, back in the late 1950s. Jim worked as a technical assistant in the hydrology section of the Division of Fisheries and Oceanography in Cronulla, where he analysed samples of seawater for chlorinity, oxygen and nutrients. Later he moved to the chemistry section where work over the years has included method development and analysis of suspended matter in seawater, investigations of mercury in the food chain and methods of determining this element in seawater, studies of metals and nutrients in pure water and, currently, determination of the copper complexing capacity of seawater.

Dave started computerising the data processing in the hydrology section at Cronulla in 1958 and when computers became more generally used he changed from data processing to giving program advice.

The first computer he worked with had 2000 words of memory and a card punch. Today, the equipment has eight megabytes of memory and discs with several hundred megabytes of store.

His main project at the moment involves programming eight microcomputers for data logging on board RV *Franklin*. He hopes to have an acceptable version within a month.

George, now a principal research scientist, and Fred, who heads the buoys and moorings section, have shared a number of experiences, especially during cruises on RV *Sprightly* during the 1970s. It was an important period that resulted in improved understanding of the Leeuwin Current off Western Australia and the East Australian Current, but some of their anecdotes also are worth recording. Fred has the distinction (and the considerable envy of his colleagues) of never missing a meal, whatever the weather conditions, for the entire 11 years of the *Sprightly* charter.

Then there was the occasion when the oil-fired stove in the galley caught fire. George reports that the pilot was very cool and collected, and when the smoke became too thick in the wheelhouse he simply opened all the portholes while continuing to say things like 'steer eight zero'.

George has played an important role in the development of satellite-tracked buoys and is one of the investigators for the 1986/87 Leeuwin Current Interdisciplinary Experiment (LUCIE). This has three aims: to better describe the current and to understand the processes that drive it, its role in the combined ocean/atmosphere system and in the life cycles of commercially-important marine species, and to build mathematical models for current predictions.

Moored instruments and drifting buoys are being used extensively for LUCIE and, as Fred points out, the Division's assets — including 40 current meters, 13 acoustic releases, eight tide gauges and two automatic weather stations worth a total of more than $850 000, are a far cry from the main equipment of a decade ago — 10 current meters built by the Division at a cost of $600 each.

Times have changed in other ways too. It's hard to believe that one vacancy could be advertised and three people would get the job.

That is what happened, though, back in 1969 when a copy of *Nature* carried an advertisement for the Division of Fisheries and Oceanography. A physicist or mathematician was required for studies of the East Australian current, and Stuart Godfrey, George Cresswell and Dave Webb all applied for the position.

'It had the ring of come and see the world,' said Stuart. 'To our surprise we were all taken on board. I concentrated on theory, George on observation, and Dave, who later went to the UK, did tidal work.'

In those days Stuart was among only three oceanography theoreticians in Australia. Counting students, there are now about 50 around the continent. As principal research scientist in the large-scale ocean dynamics and climate program, Stuart has a key role in one of the Division's most important areas of research.

Remote sensing revolutionises knowledge of ocean currents

It is generally well known that remote sensing plays an important part in the mapping and management of the Australian continent.

What is probably less well known is that data from environmental satellites are revolutionising knowledge of ocean currents around Australia because of their unrivalled ability to provide extensive spatial and temporal coverage.

The Division of Oceanography has developed a remote sensing facility to receive and process data from advanced, very high resolution infra-red radiometers on board the NOAA series of satellites, from geostationary meteorological satellites and from the Nimbus 7 spacecraft operated by NASA. Nimbus 7 carries a Coastal Zone Colour Scanner (CZCS) which senses subtle changes in the colour of ocean waters, enabling scientists to correlate information on the chlorophyll content in the surface layer with biological activity.

Information from the NOAA satellites includes data relayed from drifting buoys and emergency beacons.

The infra-red NOAA images, produced as coloured maps covering thousands of square kilometres of ocean at one time, show variations in the sea surface temperatures of as little as 0.2 degrees C, and features such as eddies, currents and fronts can be clearly distinguished.

The infra-red images are being used for an increasing number of applications by a wide variety of people, including oceanographers studying ocean currents, marine biologists studying ocean productivity, fishermen and yachtsmen.

CSIRO's largest ever exhibit

Orange Field Days a 'great success' for the Organization

CSIRO's $135 000 exhibit at last month's Orange Field Days appears to have succeeded in boosting relations between the Organization and sections of the rural community.

A conservatively-estimated 40 000 people visited the stands over the three days of the event, and among those surveyed for their response there was 'almost universal praise'.

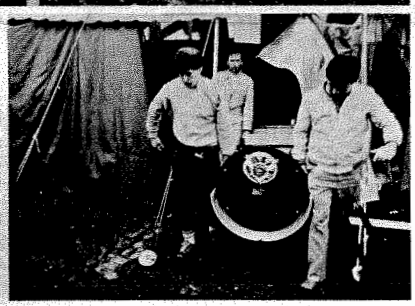
Research and information staff from 19 divisions participated and were on hand to speak to visitors and demonstrate various processes, such as biological defleecing of sheep.

Mr Nick Alexander, head of the CSIRO Film & Video Centre and co-ordinator of the survey of responses to the CSIRO exhibit, said direct contact between staff and a user group, and the presence of the Chairman Dr Boardman, generated considerable goodwill.

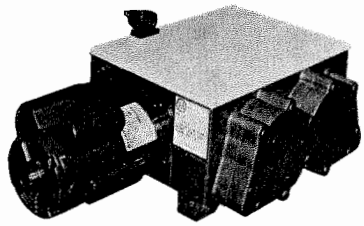
However, he pointed out the benefits will be 'mostly intangible'.

Project manager Dr Michael Dack said a large part of the success of the exhibit can be attributed to its 'corporate' nature. Nine major themes were identified, cutting across divisional and institute boundaries. These were: biotechnology, animal health, wool research, computers in farm management, remote sensing, quality of agricultural products, pests and weeds, soils and water and new pasture and crop plants.

Here is a pictorial account of CSIRO'a largest exhibit ever:



Vacuum pump Cont. from p.2.



The result of more than 15 years' blood, sweat and tears, the pump was presented to the Chairman, Dr Boardman (centre) by the international marketing manager of the US scientific instrument company, Varian Associates, Mr Kirk Nelson (left) and one of the three inventors, Mr Eck Bez.

CSIRO will be paid a royalty of nearly six percent on the pump, which will be manufactured in the US by Varian. It is estimated that royalty payments will grow to millions of dollars a year when the product gains a firm market foothold in a few years. CSIRO was unable to find an Australian manufacturer with sufficient research capacity, business resources or marketing expertise to commercialise the invention.

One Australian company, Repco Ltd, with which CSIRO has successfully collaborated on other projects, tried to develop the pump for two years, but decided late in 1979 not to proceed.

The pump is expected to gain a significant share of the $100 million-a-year US market for vacuum pumps, and will also be marketed in Europe and Asia. It was invented by Mr John Farrant, Mr Bez and Mr Karl Balkau of the Division of Chemical Physics. Its unique advantage is that it eliminates the need for cumbersome and elaborate safeguards against possible leakage of oil-derived vapours.

Letter Cont. from p.2

If our species persists for another million years, the cumulative benefit of research is so enormous as to be almost infinite. A pay back period on research effort of 10, 50, 100 years is nothing. We will only live to see a tiny part of the benefit, but we in our turn have benefited from experimentation in the past, by people now long dead.

The problem is to connect such an idea with short-term politics.

David Erskine
Centre for Irrigation and Freshwater Research

Gellie appointed to head SRI

Dr Warren Gellie, leader of the integrated manufacturing program in the Division of Manufacturing Technology since its inception in 1981, has been appointed director of the Sugar Research Institute. Dr Gellie left CSIRO last month to take up his post in Mackay, Queensland.

New ABC science series

The ABC will launch a new television series devoted to natural science early next year.

Called* David Smith's Earthwatch, *it will premiere on Monday, 16 February at 5.30pm. The 30-minute program will be hosted by a leading Australian zoologist, Dr David Smith.

The program will extend the scope of the current Earthwatch documentary series, and will cover worldwide environmental and conservation issues, as well as present a range of natural science topics.

Vale Alpo Metso

Mr Alpo Metso, *a senior technical officer with the Division of Fisheries, died recently. A colleague from the Division of Oceanography, Dr George Cresswell, supplied this obituary:*

More than any other person in the labs, he was one you felt you never really knew. And yet, he and I had a working relationship which lasted 15 years. He would build the satellite-tracked drifting buoys and I would use them.

Legends are made of the degree of his meticulousness and of his fairness to CSIRO.

Attention to detail meant that a buoy he built would, for example, put up with three years of pounding in the southern ocean while drifting from New Zealand to Chile, relaying to the satellite its position, battery voltage and sea surface temperature accurate to a 10th of a degree.

Alpo built more than 60 buoys. Many of these were rebuilt by him after they had been washed ashore and returned to us. Four of his buoys are now working in the open ocean; one is five years old.

As to being fair to CSIRO, he was to a fault. He would work many extra hours and weekends if he felt it necessary, and not tell anyone. He wouldn't claim for relocation expenses when he and his wife moved from Cronulla to the new lab in Hobart. Working for CSIRO was for him a great privilege.

Alpo came to Australia from his native Finland in 1970 and spent a year fitting two-way radios in cars. He then applied for a position with the lab.

He had spent time as a fitter in a factory, a member of the armed services and coastguard, a telegraphist, a shipboard radio operator and a technician for a company that installed and serviced equipment in lighthouses and beacons.

Alpo's concentration at his bench was total. He would frown and scowl as he peered into his circuitry. I would come along and he would stand up and break into a lovely smile, and then I would would try to penetrate his shyness and get him to talk about what he'd been doing.

He was 52 when he died.

Staff video wins national award

At the International Television Association's recent annual presentations, the second CSIRO *Connections* video was awarded a 'Silver Mobie' for best program in the category 'Organisational News'.

The Mobies are awarded to programs which 'combine creativity with high production skills resulting in a program that clearly and successfully communicates the message to the target audience'.

The ITVA will now enter *Connections* and other Mobie winners in the finals of the International Video Festival to be judged in Washington DC next May.

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***CoResearch* is produced by the Public Communication Unit for CSIRO staff. It's also issued to a number of people outside the Organization who are interested in CSIRO activities. Readers are invited to contribute or offer suggestions for articles. The deadline is the last Monday before the issue month. Editor: Liz Tynan, PO Box 225 Dickson ACT 2602. Ph: 48 4479.**

Retirements

Joan Jones has started long-service leave prior to retirement from the Division of Radiophysics. Joan arrived on the scene in 1974 and within a day or two we realised a veritable powerhouse of energy had been installed in the general office. The frantic speed and high accuracy of her typing was something to marvel at. In no time Joan became involved with the Benevolent Fund, the staff club, organisation of meetings — in fact whatever activity needed a boost around the lab.

Her ability at setting up the secretarial side of meetings was noticed by various presidents of the Astronomical Society of Australia and Joan was often invited to 'run the show' at many of the annual general meetings of the Society.

She took on the part-time job of business manager and increased the overseas subscriptions to the Proceedings of the Society from around zero up to nearly 300 during her term of office recently completed.

Joan has served on the editorial staff of SANA Update — the monthly newsletter of Scientists Against Nuclear Arms — since its inception in 1982. She intends continuing in that role during her retirement.

Dick McGee

The Assistant Chief of the Division of Chemical Physics, **Dr John Willis**, has retired after a career spanning 38 years with the Organization. Dr Willis joined the Chemical Physics section of the CSIR Division of Industrial Chemistry in 1948. His early work was on the infrared spectroscopy of molecules but in 1958 he joined Mr (now Sir) Alan Walsh in developing his new technique of atomic absorption spectroscopy. He was involved in developing AA methods of chemical analysis in a wide variety of fields and assisted many Australian laboratories to set up and use the new methods. Analytical atomic spectroscopy has remained his main scientific interest. In 1983 he was the first recipient of a medal established by the analytical chemistry division of the Royal Australian Chemical Institute.

He has been an active member of the Officers Association from the time he joined CSIR and served as branch treasurer and then chairman of the Victorian branch in the early 1950s. He was the OA's vice president and advocate between 1958 and 1962, at the time of the work-value cases for EOs, SSOs and engineers. He served as president in 1970-72 and was elected an honourary life member of the Association.

AATS admits five new CSIRO Fellows

The Chairman, Dr Boardman, was among five CSIRO members admitted as Fellows of the Australian Academy of Technological Sciences at its recent annual general meeting.

The others elected were: Dr John Raymond Freney from the Division of Plant Industry, Dr Albert Rovira from the Division of Soils, Dr Hari Sinha from the Division of Mineral Chemistry and Dr Brian Sowerby from the Division of Mineral Physics.

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New Sirotech arrangements

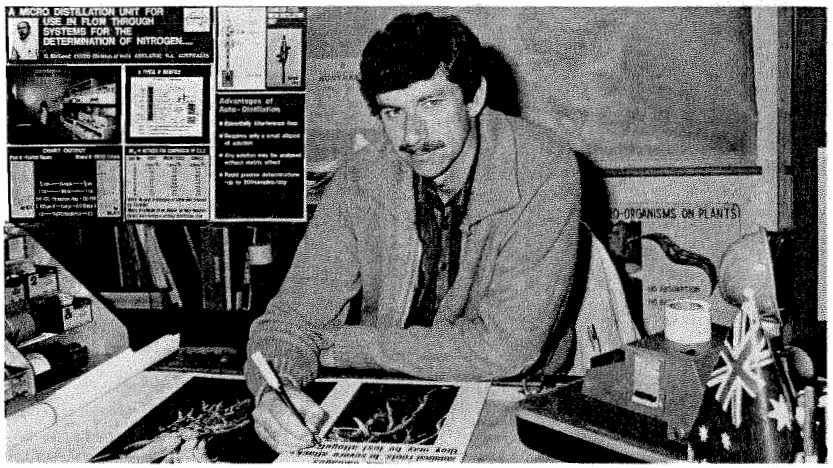
Sirotech has announced new structural and reporting arrangements.

The marketing and the technology communication divisions have been combined to form the marketing and technology transfer division.

In addition, three new groups have been formed, all reporting to the general manager. These are:

1. *Bio-Ag* — John Grace has been appointed business manager of this group, which will cover areas such as primary products, primary industry processing and vaccines.
2. *Minerals, Manufacturing and Information Technology Group* — Allan Foster is now business manager of this group, which will cover market areas such as mining and mineral processing, engineering products and information technology and electronics.
3. *Communications Unit* — Nancy Patton has been appointed manager of this unit, which will produce technology transfer journals such as Techlink and the innovation directory, arrange commercial awareness seminars and produce promotional materials requested by divisions, other clients and Sirotech.

CSIRO display gets overseas commendation



Staff in the drawing office of the Division of Soils in Adelaide, led by David Wright, are noted for the quality of their work. The specially coloured slides they produce for divisional scientists to use at seminars always generate very favourable comment and requests for information about the techniques used to produce them. Team member Greg Rinder has taken a particular interest in producing eye-catching displays. One of these, prepared for Stan McLeod of the Division, was judged to be the best in its section at the recent International Soils Congress in Hamburg, West Germany. Main photo shows Greg at work, while the inset shows the winning poster display.