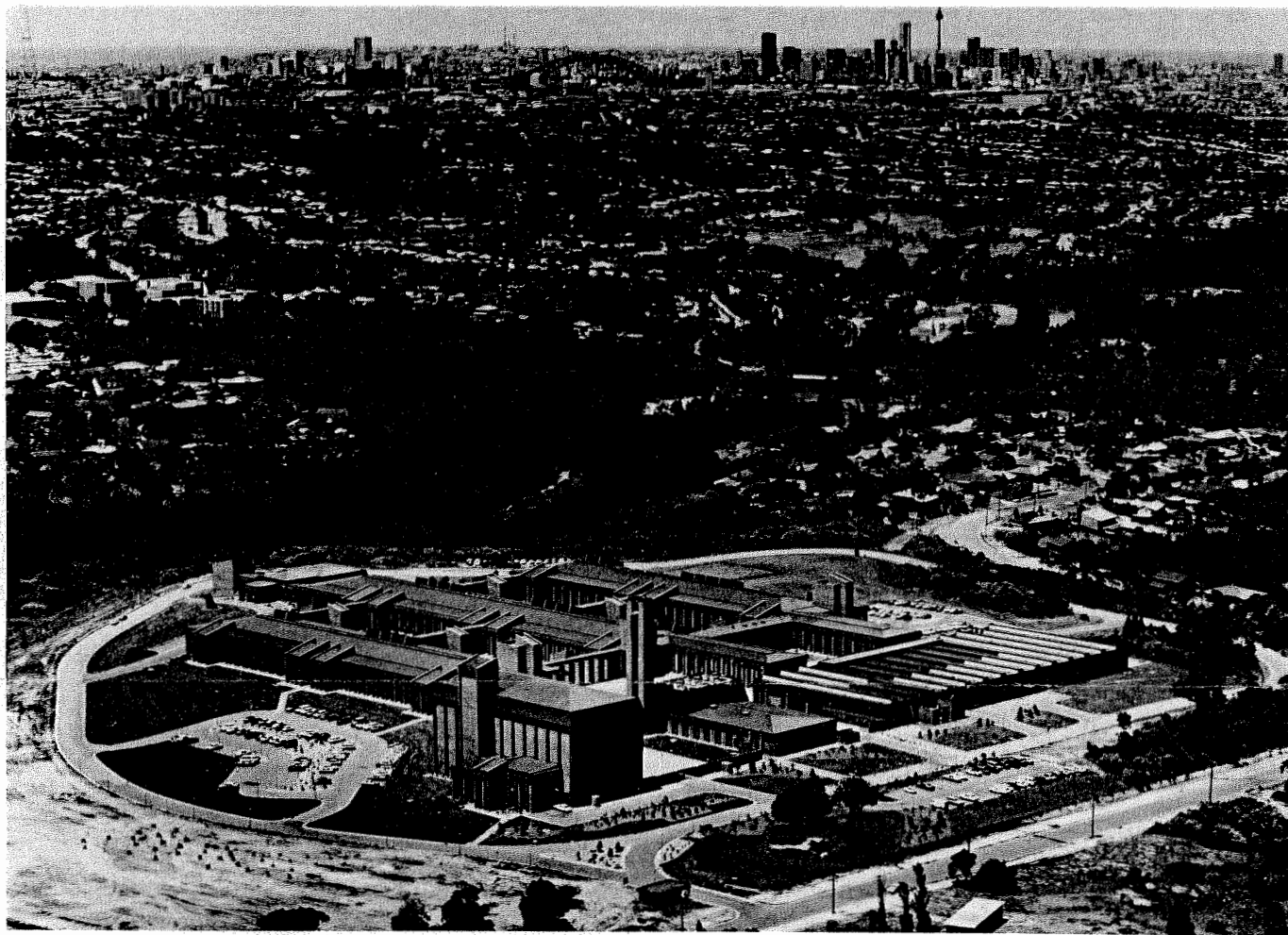


# CoResearch

*A publication for CSIRO staff*

*Jan/Mar 1979* **224**



*The new National Measurement Laboratory, photographed against Sydney's skyline.*

## Sir Zelman opens NML's \$27m home

### *World's most modern measurement laboratory*

The Governor General, Sir Zelman Cowen, officially opened the new \$27 million National Measurement Laboratory in the Sydney suburb of Lindfield on February 23.

In a ceremony in the High Voltage Laboratory, Sir Zelman pushed a button which unveiled a plaque several hundred metres away at the entrance foyer to the laboratory complex.

Guests listening to Sir Zelman's address were able to watch the unveiling on closed-circuit television — a technological touch appropriate to the world's most advanced standards laboratory.

#### **Culmination**

The ceremony was the culmination of 16 years planning, which began when it became obvious that the Sydney University laboratory, home to NML since 1938, was not large enough to accommodate the Laboratory's expanding role.

The high-precision nature of the laboratory's work required the site to be carefully chosen for minimal electromagnetic interference.

Electromagnetic interference is further suppressed by screening within the buildings themselves — wire mesh in the walls, and metal films on the windows, which also

reduces load on the airconditioning plant.

The three parallel two-story laboratory/office blocks, housing physics, applied physics and force laboratories and their office space, are oriented along an east-west axis to minimise solar heat loads.

The overall design of the complex was the result of extensive collaboration between CSIRO and Commonwealth Department of Housing and Construction planners.

Services to the laboratories are provided through underground tunnels running from a central plant room, while another underground tunnel provides sightlines of more than 80 metres for optical and photometric experiments.

All vibration-sensitive activities are carried out at or below ground level to minimise vibration — the site itself was chosen to be as free of vibration as possible.

East of the laboratory blocks, there is a 250-seat lecture theatre, an entry/display area, library, cafeteria and executive office area.

At the Western end of the laboratory buildings is the divisional administration building, and the single-storey laboratory services buildings.

At the north-western corner, directly adjacent to the main entrance, are the

central plant and high voltage laboratory buildings.

The central plant building supplies, via the underground tunnels, heated and chilled water for the computer-controlled air-conditioning equipment.

The tunnels also provide space for power reticulation, cables for the building services control system, compressed air and gases for use in the laboratories, and domestic and fire service water supply.

#### **Height limit**

The majority of the buildings on the site were limited to one or two storeys to prevent them overwhelming the surrounding houses and parkland.

The colour of external brickwork was chosen to match sandstone outcrops of the area, and other materials were selected to match the brickwork.

In his opening address, Sir Zelman described the laboratory as a big and important project, and congratulated all those who had laboured long and hard to bring it to fruition.

Sir Zelman said the success of the laboratory in developing new standards and sophisticated measuring systems had won it a substantial international reputation.

Referring to the findings of the Review Committee on the National Measurement Laboratory, Sir Zelman said a major thrust of the report was that there was considerable scope for increasing the contributions of NML directly to the Australian scene.

The committee had seen potential for greater involvement in physical problems relating to Australian industry and community needs, and for more extensive interaction with the Australian physics community in general, particularly in universities and other tertiary institutions, as well as in other CSIRO divisions.

#### **Innovations**

The Minister for Science, Senator J. J. Webster, said in his address to guests that the worth of the laboratory as a base for Australian measurement and standards systems was perhaps incalculable.

He gave examples of its innovations, and said the range of industrial collaboration, and products and processes resulting from it, were particularly impressive.

He said everybody should be proud of the practical and productive brand of Australian science emanating from the laboratory.

**Behind the scenes — P3.**

# The new faces at the top

## The new Executive members

These are the new members of the CSIRO Executive — three full-time members and five part-time, compared with five full-time and four part-time members under CSIRO's former structure.

The full-time members are appointed for a period of seven years, and part-time members for three years.

In the case of Mr V. E. Jennings, who has already served as a part-time member, the appointment will expire in March next year.



**DR J. PAUL WILD**  
Chairman of CSIRO

Dr Wild, 55, gained BA and MA degrees from Cambridge in 1943 and 1950 respectively, and in 1962 received a Sc.D from Cambridge.

He served as a radar officer in the Royal Navy from 1943-47, then joined the Division of Radiophysics in 1947 as a Research Officer. By 1961 he had achieved the position of Chief Research Officer. In 1966 he was appointed director of the CSIRO Solar Observatory at Culgoora. In 1971 he became Chief of the Division of Radiophysics. He became an associate Member of the CSIRO Executive in 1977, and a full-time Member in 1978. He was named Chairman of the Executive in 1978, and is also CSIRO's Chief Executive.

He had received numerous awards for his work in radio astronomy.

He is a Fellow of the Royal Society of London, and the Australian Academy of Science, and in 1974 was awarded the first Herschel Medal of the Royal Astronomical Society. Last year he was elected a Fellow of the Australian Academy of Technological Sciences.



**DR N. KEITH BOARDMAN**  
Full-time Executive Member

Dr Boardman, 52, gained B.Sc and M.Sc degrees from the University of Melbourne in 1946 and 1949 respectively, and a Ph.D from Cambridge in 1954. In 1973 he was awarded a Sc.D by Cambridge.

He joined CSIRO in 1949 as a Research Officer with the Wool Textile Research Laboratory in Geelong.

After briefly leaving CSIRO to take up an ICI Fellowship for study at Cambridge in 1953, he joined the Division of Plant Industry in 1955 as a Research Officer, rising to the position of Chief Research Scientist in 1968.

He was appointed a full-time Member of the Executive in 1977.

He was elected a Fellow of the Australian Academy of Science in 1972, and a Fellow of the Royal Society in 1978.



**MR DAVID J. ASIMUS**  
Part-time Executive Member

Mr Asimus, 46, gained a B.Ec from the University of Sydney in 1955, and in 1958 won a Nuffield Travelling Agricultural Scholarship to the UK.

In 1967 he was elected an Executive Member of the Graziers Association of NSW, and in 1970 was appointed a member of the Australian Wool Marketing Corporation. From 1970 — 73 he was a member of the Australian Wool Commission, and in 1973 was appointed a member of the Australian Wool Corporation. He became Deputy Chairman in 1975.

In 1976 he became Chairman of the Australian Wool Harvesting Program, and in 1977, Chairman of the Australian Wool Corporation Committee for Wool Research Allocations and Priorities.

In 1978 he was appointed Chairman of the Australian Wool Corporation Advisory Committee for Economic Research.



**DR WILLIAM J. MCG. (GREG) TEGART**  
Full-time Executive Member

Dr Tegart, 49, gained B.Sc and M.Sc degrees from the University of Melbourne in 1951 and 1955 respectively. He gained a Ph.D from the University of Sheffield in 1959.

He worked as a laboratory assistant and Technical Officer with the Division of Tribophysics between 1947 and 1955.

In 1955 he took up an appointment as a Research Fellow at the University of Sheffield, and later became a senior lecturer.

He was a Post-Doctoral Research Associate at Northwestern University, USA, from 1963-64, and in 1966 became Professor of Materials at the College of Aeronautics at Cranfield in the UK.

In 1968 he became Manager of BHP Melbourne's research laboratories, and in 1978 was appointed Executive Assistant to BHP's Chief General Manager.

He was elected a Fellow of the Australian Academy of Technological Sciences in 1976, and has been a member of numerous expert scientific committees.



**MR VICTOR E. JENNINGS**  
Part-time Executive Member

Mr Jennings, 51, gained a B.E. from the University of Melbourne in 1950 before beginning a career with Jennings Industries Ltd.

He was made a director of the company in 1960, and was Managing Director from 1965 — 72. From 1972 — 74 he was Chairman and Managing Director, with the title of Chief Executive Officer being added in 1977.

In 1973 he became a part-time Member of the CSIRO Executive, and was reappointed in 1978.

In 1971 Mr Jennings became a member of the Science and Industry Forum of the Australian Academy of Science. He is a Fellow of the Australian Institute of Building, a Member of the Australian Institution of Engineers, and a Life Member of the Australian Institute of Urban Studies.



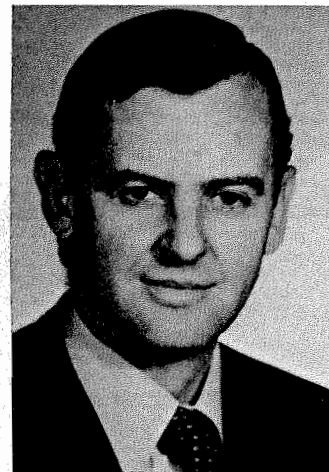
**MR RALPH K. R. MORRIS**  
Part-time Executive Member

Mr Morris, 44, received a B.Comm degree from the University of Melbourne.

In 1969 he became a partner in the national firm of chartered accountants, Price, Waterhouse and Co. In 1963 he became a member of the Australian Society of Accountants, and also the Institute of Chartered Accountants in Australia.

In 1969 he became a Fellow of the same Institute. More recently, in 1977, he became

a member of the Advisory Research Panel of the Australian Accounting Research Foundation.



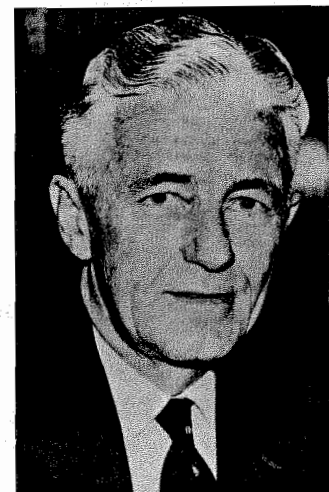
**MR HUGH M. MORGAN**  
Part-time Executive Member

Mr Morgan, 38, gained a Law degree from the University of Melbourne in 1964, and a B.Comm degree in 1966.

From 1958 — 62 he was a Judges Associate with the Commonwealth Industrial Court.

He joined North Broken Hill Ltd in 1965 after working as a solicitor for Arthur Robinson and Co, and in 1971 became Director of Marketing and Finance. In 1976 he became Executive Director of Western Mining Corporation.

In 1974 he became a Councillor on the Australian Mining Industries Research Association, and in 1976 became Councillor and Chairman of the Public Relations Committee of the Australian Mining Industry Council. In 1977 he became a director of ALCOA, Australia.



**DR WALTER L. HUGHES**  
Part-time Executive Member

Dr Hughes, 61, gained B.E and B.Sc degrees from the University of Sydney in 1939, and in the same year became NSW's Rhodes Scholar.

In 1949 he gained a D.Phil from New College, Oxford.

He was an assistant naval architect at BHP's Whyalla shipyard from 1939 — 46, and from 1951 — 54 was Officer-in-Charge of Ship Construction. In 1954 he became General Manager of Walkers Ltd, Maryborough. He became Managing Director in 1975, and Chairman in 1978.

In 1972 — 73 he was Chairman of the Australian Shipbuilders Association.

Institutes, Advisory Council, Planning Group — p4

# Historic plant collection comes 'home'

## Priceless specimens donated to Herbarium

Australian plants and flowers almost 180 years old, named by the eminent British botanist Robert Brown, and perfectly preserved, have been given to CSIRO's Herbarium Australiense in Canberra.

The plants were collected from around the Australian coastline by Robert Brown during his voyage from Britain with Matthew Flinders aboard the 'Investigator' between 1802 and 1805.

The collection has been donated by the British Museum (Natural History) in London which maintains the complete Brown collection.

The collection has been received by the Curator of the Herbarium, Dr H. Eichler, who will make it available for research. The Herbarium is the taxonomic botany research section of the Division of Plant Industry.

All specimens were in good condition and many are mounted with the original labels in Robert Brown's handwriting.

Robert Brown collected several thousand specimens of both spectacular and insignificant plants during his landings around the coast of the mainland and Tasmania.

Many of the specimens collected on the voyage were added to the collection of Brown's friend and colleague Sir Joseph Banks who had arranged the passage for him.

The specimens collected complemented those already taken by Banks himself during his earlier voyage with Captain Cook.

Many of the specimens had been taken from areas which were now unlikely to be still hosting the plant, because of the impact of settlement or industry.

Many of Robert Brown's specimens, which today still bear the names he assigned to them, were described in his book 'Prodromus', which was published in 1810.

The specimens now in Canberra will be mounted and made available to botanists for display before being incorporated in the main collection at the Herbarium Australiense.

Dr Eichler said the acquisition of the Robert Brown collection would be of considerable benefit to Australian botanists, who would be saved the time and expense of having to go overseas to study type specimens of Australian plants, or who often had to wait several months while they were sent to Australia for study.

He said the collection would be subjected to a major re-assessment to ensure the botanical descriptions of plants were brought up to date.

'The descriptions of Brown's day could not possibly have taken into account the requirements of today's botanists, no matter how comprehensive they were', Dr Eichler said.



Technical Officer Lyn Craven studies the type specimen of *Melaleuca incana* collected by Robert Brown.

## Soils booklet series catches the public eye

The release this month of the seventh booklet in the Division of Soils' series 'Discovering Soils' is expected to take sales of the highly popular series beyond the 150,000 mark.

The seventh title in the outstandingly successful series is 'Organic Matter and Soils' which goes into greater detail about the origin and role of organic matter in soils, already dealt with in lesser detail by several of the earlier titles.

Like the other booklets, it will provide readers with a lucid, well-illustrated, non-nonsense look at an aspect of soil science - in this particular case, an aspect which has often been subjected to myth and extravagant claims.

While the boom in Australian gardening has given great impetus to the books' sales, much of the credit for their success undoubtedly rests with the Division itself for perceiving the need for easy-to-read, concise information on soils in inexpensive booklet form.

While much of their content reflects research done in the Division, their editor, Kevin Handreck, went to considerable trouble to pull in relevant information from other sources.

Most gardening books today tend to be superficial in their treatment of the subject of soils, or look at it from only a single viewpoint. Collectively, the Soils booklets provide an unrivalled coverage of the subject

in layman's language.

From circulation figures, it is apparent that many people are buying each booklet in the series.

Not counting advance sales of 'Organic Matter and Soils', circulation for the first six titles now totals around 135,000.

The series began with a booklet for students, titled 'Soils', which was sent to every high school in Australia. It was printed by the Division itself, in a small run of 3000.

Further demand saw printing shift to the CSIRO Printing Unit, and sales now total about 20,000.

Subsequent titles used a more interesting format with better typesetting.

The current titles, with approximate sales, are as follows:

'Soils' 20,000; 'Soils, Australia's Greatest Resource' 14,600; 'Composting' 44,000; 'What's Wrong with my Soil' 16,000; 'Earthworms' 21,000 and 'Food for Plants' 17,000.

### Eighth title

In September an eighth title, 'When Should I Water?', is planned for release.

The seed company Arthur Yates and Co has bought a large number of the booklets to wholesale at their major seed outlets, and the Australian Government Publishing Service is also wholesaling.

## NML launched-with just a minor slip

Organisers of the National Measurement Laboratory opening took up the traditional pose on their knees the night before the opening and prayed that the plan they had devised for a remote control means to unveil the plaque would not fail.

The idea was for the Governor-General to push a button at the end of his speech in the High Voltage Laboratory, triggering a mechanism in the main foyer several hundred metres away and parting the velvet curtains covering the plaque.

The action was to be on camera relaying to four video monitors at the back of the official dais.

It had worked perfectly on every trial run. There was no reason to suppose anything could go wrong.

His Excellency began his speech and the organisers saw the curtained plaque show up on the four monitors. All systems were set to go.

Then disaster. With five minutes to go until Sir Zelman Cowen was timed to press the button the four screens went blank.

Hearts hit the concrete floor. The Chairman was going to have to use his prepared quip - he didn't have quite the same faith in the fail-safe plans as did the organisers.

The technician in charge of the operation

did some fast thinking. Only two things could have caused the blackout - someone had cut through the four cables (unlikely) or the electricity had somehow failed.

He took a punt on the electricity, plugged the whole thing into another circuit and immediately four pictures were back on the screen.

A later inquest showed the caterer had inadvertently plugged an extra urn into the same circuit and over-loaded the system.

The investigation also exonerated completely one NML staff member who, so the story goes, gave organisers a surprise during the first test run.

When the curtains were parted on that occasion, they revealed a charming female taken direct from 'Playboy'.

### 600 guests

More than 600 prominent industrialists, representatives of universities and learned societies, and members of CSIRO's staff attended the official opening.

There were also representatives from standards laboratories in England, France, New Zealand, Canada and the United States.

The High Voltage Laboratory, largest building on the site, was used for the occasion and a back drop of high voltage electrical equipment, part of a joint project with the State Electricity Commission, added atmosphere.

An unusual feature of proceedings was the presence of the Fleet Band from HMAS Melbourne. The services of the band were offered to the organisers by Rear Admiral G. J. Willis, AO, RAN, and the men not only provided the Vice-Regal salute but played incidental music before the event and during afternoon tea.

The Navy was also on hand to raise the Governor-General's standard which was flown over the Laboratory during the time His Excellency was at the site.

The band made a significant contribution to the success of the day, a fact which was appreciated by Sir Zelman who personally thanked them.

During the afternoon a number of NML staff were introduced to His Excellency, one of whom was an early Chief of the Division.

Now 85, Dr Briggs still has an office at the Laboratory and turns up two or three times a week to work. He still contributes to international research.

The Governor-General, accompanied by the Minister for Science and the Environment, Senator J. J. Webster, the Chairman, Dr J. P. Wild, the Director of NML, Mr. F. J. Lehaney, and members of the official party inspected four representative laboratories and were given an insight into the work of NML.

### Safety devices

Later His Excellency saw some examples of some of the safety devices designed by staff members which are proving beneficial in both medical and commercial areas.

The opening, which was followed by two open days, called for a tremendous effort on the part of all concerned. While senior staff in the Laboratory and the Canberra liaison officers were responsible for planning and organising the event, a great deal of help was received from many other people on the staff.

Police from the Chatswood police station were on hand to assist with traffic, while the Royal North Shore Hospital offered its services in case of an emergency, which fortunately didn't occur.



NML head Mr F. J. Lehaney, centre, and CSIRO Chairman Dr Paul Wild, left, welcome the Governor General, Sir Zelman Cowen, in the main foyer of the new complex.

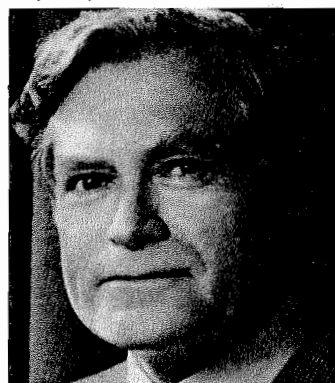


# The new faces at the top

## Institutes, Advisory Council, Planning Group

The first Directors of CSIRO's six new Institutes were appointed by the new CSIRO Executive in December.

All have taken up their appointments, with the exception of Dr J.R. Philip in the Institute of Physical Sciences, where Dr Alan Pierce will be Acting Director until early next year.



### INSTITUTE OF INDUSTRIAL TECHNOLOGY

Director: Professor Emeritus H. W. Worner formerly a full-time Member of the Executive.

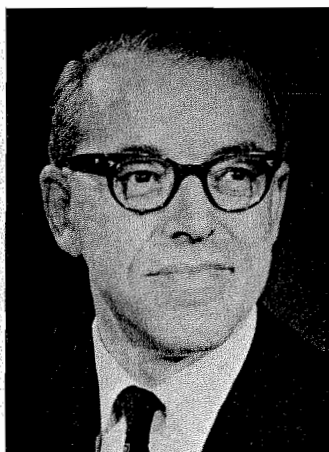
Divisions of Applied Organic Chemistry, Building Research, Chemical Technology, Mechanical Engineering, Protein Chemistry, Textile Industry, Textile Physics.



### INSTITUTE OF ANIMAL SCIENCES

Director: Dr K. A. Ferguson, formerly an Associate Member of the Executive of CSIRO.

Divisions of Animal Health, Animal Production, Food Research, Human Nutrition, Centre for Animal Research and Development, Molecular and Cellular Biology Unit, Wheat Research Unit.



### INSTITUTE OF BIOLOGICAL RESOURCES

Director: Mr M. V. Tracey, formerly Chief of the Division of Food Research. Divisions of Entomology, Fisheries and Oceanography, Forest Research, Horticultural Research, Irrigation Research, Plant Industry, Tropical Crops and Pastures, Wildlife Research.



Dr John R. Philip

### INSTITUTE OF PHYSICAL SCIENCES

Director: Dr John Philip, formerly an Associate Member of the Executive.

Divisions of Atmospheric Physics, Chemical Physics, Cloud Physics, Computing Research, Environmental Mechanics, Materials Science, Mathematics and Statistics, Radio-physics, Australian Numerical Meteorology Research Centre, National Measurement Laboratory.



### INSTITUTE OF EARTH RESOURCES

Director: Mr I. E. Newnham, formerly Director of the Minerals Research Laboratories.

Divisions of Applied Geomechanics, Land Resources Management, Land Use Research, Mineral Chemistry, Mineral Engineering, Mineralogy, Mineral Physics, Process Technology, Soils, Fuel Geoscience Unit.



### BUREAU OF SCIENTIFIC SERVICES

Director: Mr S. Lattimore, formerly Secretary (Research), Head Office Secretariat.

Central Information, Library and Editorial Section, Centre for International Research Cooperation, Central activities relating to information transfer and technology transfer, including Patents and Licensing Group, Writing and Conference Groups, Central Communication Unit (with the exception of the Media Liaison Group which will remain in CSIRO Head Office).



Dr Alan E. Pierce

Acting Director: Dr Alan Pierce.

Dr Pierce, formerly a full-time Member of the Executive, will be Acting Director of the Institute of Physical Sciences until February next year.

The newly appointed permanent Director of the Institute, Dr John Philip, will not take up his duties until this time because of overseas commitments.

The Planning and Evaluation Advisory Unit which will play a central role in research planning, will be led by Dr Don Weiss, formerly Chief of the Division of Chemical Technology.

The decision to establish the Unit followed Government endorsement of a recommendation of the Independent Committee of Inquiry into CSIRO.

The unit will be directly responsible to the Executive.

It will assist the Executive in developing broad strategies for the future and in the allocation of resources, and will also provide advice and assessment related to economic, industrial and social issues relevant to the Organization's work.

Mr Victor G. Burley, C.B.E., who retired last year as resident director of Cadbury Schweppes in Tasmania, has been appointed Chairman of the reconstituted CSIRO Advisory Council for two years.

Mr Burley leads the 25-member Council, drawn from a wide cross section of the Australian community, which will be a major source of independent advice to the Executive of CSIRO.

## We're a household name, but. . .

'CSIRO is a household word, but not many people know what they do.'

That quote came from one of the many visitors to the CSIRO stand at the Perth Royal Show last year, suggesting that such displays are a necessary part of CSIRO's communication and information transfer responsibilities.

In Western Australia, as in a number of other states, CSIRO is doing something about it. During the 10 days of the Perth Royal, more than 100,000 people were attracted to the CSIRO display.

The display was designed and produced by the Communications Group of the Division of Land Resources Management, with the aim of informing the general public not only about CSIRO, but about science in general.

The LRM group, which received strong personal support from the Division's Chief, Ray Perry, has previously been involved in CSIRO displays at the Brisbane Show and at Alice Springs.

The earlier displays provided valuable experience for the Perth Show, for example,

space was booked early in a premium area, among other stands which featured microwave ovens and Encyclopaedia Britannica — 'atmosphere' is essential if one wants to make the best of large crowds.

Planning for the show began very early in the year. There was a need for care in selecting from an extensive list of potential display topics, since experience had shown that attempts to cram too much into such an exhibit confuses the public.

The topics chosen were relevant to Western Australians, interesting, and capable of being displayed attractively.

They were: Fisheries and Oceanography's work on the western rock lobster and reef ecology, Entomology's work on the dung beetle, and LRM's work on Landsat imagery and salinity on farms (since it was an agricultural show).

Converting scientific information into understandable material for the public involved many long hours of collaboration between scientists and communicators, particularly graphic designer Maurie Woodward, recently returned from a Jubilee

Scholarship visit to the United States.

Stickers and show bags were ordered, posters of a Landsat image of Perth printed, dung beetles bred, lobsters captured, photographs printed, cartoons drawn and information leaflets collected from a number of Divisions.

Staff members and their families spent one Saturday afternoon rolling and wrapping in cardboard the 3000 Landsat posters, to simplify the business of selling them at the show.

A staff roster was drawn up to ensure that there was an expert at each separate display during the 10 days of the show. Each volunteer wore a CSIRO T-shirt and carried a supply of 'CSIRO — Science for Australia' stickers.

The stickers not only proved popular with children, becoming a common sight throughout the showgrounds, they also served as an 'icebreaker' to enable staff to initiate conversations with visitors to the stand.

Thousands of information leaflets from Building Research, Mechanical Engineering,

Food Research and Land Resources Management were given away at the information stand, and thousands of show bags containing project material were distributed to students.

Thousands of questions were answered, and where answers were unavailable, people were referred to CILES or specific Divisions.

Many questions related to building problems, and Harry Heath from Building Research was on hand to inform and capitalise on interest generated by DBR's stand at the Perth Homemaker's Show two months earlier.

Many VIPs visited the stand, including State Ministers and the Leader of the Opposition, Mr Tonkin.

LRM's Geoff Syme and Steve Kantola, assisted by the Central Communication Unit's Dorothy Braxton, conducted a lengthy survey to assess the effectiveness of this kind of display.

The Division is now awaiting results. This was a pilot study for a more extensive survey to be undertaken at the next Perth Show this September.



## Events

### Staff development

The Staff Development Unit conducted a series of programs in West Australia during November.

One hundred staff from the majority of Divisions located in the region participated in the courses including Group Dynamics, Counselling and Selection Interviewing, Secretarial Seminar, Pre-Retirement Planning and Telephonist/Receptionist Seminars.

The visit attracted a great deal of interest and many staff were involved in discussions aimed at identifying and developing strategies to meet individual and organisational needs. The Unit was pleased with the co-operation and assistance from Chiefs and all levels of Divisional and RAO staff.

After a series of meetings and visits to Divisions a WA Technical and Trades Staff Development Committee was established for the region.

This will supplement the existing regional committees in the other States

Included in these were scanning electron microscopy, microprocessors, chain-saw operation and safety, ceramic grinding and polishing, vacuum measurement and techniques, and many others.

Other major new programs developed and conducted over the past 18 months included purchasing, information and extension officers' seminars, pedagogical techniques, public speaking, translators conference, a workshop on draughting and preparation of data for display and publication, librarians' seminars, pre-retirement planning and a remote sensing seminar.

### Eucalypt book

Australia could take a lead from overseas countries in using eucalypts, the Minister for Science, Senator J. J. Webster, said when launching a new book, 'Eucalypts for Wood Production', at the Division of Forest Research in Canberra.

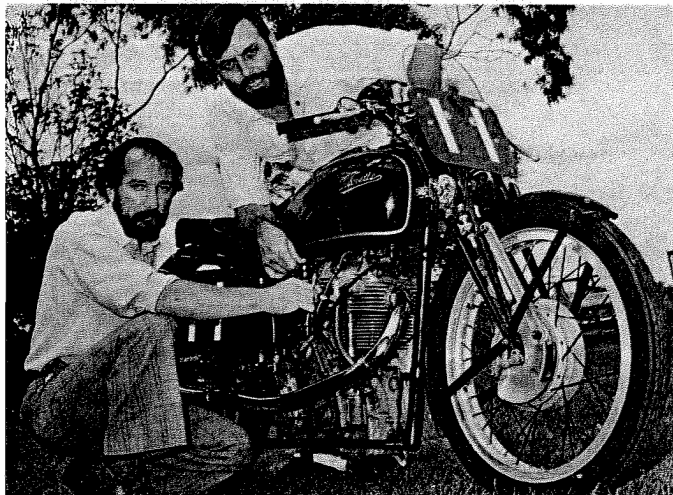
"Many overseas countries have recognised the potential of eucalypts, not only as a timber and fuel source, but also as a supply of charcoal for steelmaking, and for land reclamation and shelter belts," he said.

He said the wood and wood products industry in Australia provided significant direct employment, particularly in rural areas, for nearly 100,000 employees with industry sales worth \$508 million.

"Certainly any increased effort in wood production from eucalypts should lead to improved employment prospects and increased revenue both from national consumption and export markets," he said.

"The editors of this book, Dr Ted Hillis and Mr Alan Brown, have stated the case in strong terms.

"They say Australia has land available, some under forest and some abandoned farm land and that the necessary technical, scientific and management skills are on hand to grow and process eucalypt woods.



CSIRO Prospect technical officers Alan Cunningham, left, and Dennis Quinlan, look over Dennis' beautifully-restored 1939 Mk8 350cc KTT Velocette, the only one of its type in Australia.

Dennis will be riding the Velocette in a charity race meeting for pre-1962 motorcycles on Sunday, May 6 at Amaroo Park, which will aid the Autistic Children's Association.

Dennis spent eight years restoring the machine to mint condition, and will be racing against other famous marques such as AJS, Norton, Matchless and BSA.

There will be 20 events for motorcycles, sidecars and three-wheelers manufactured

before 1962, and handicap races for pre-1950, 1941-50, 1930-40, 1920-30 and pre-1918 machines.

Riders and machines will come from nearly every State, and a feature of the day will be match-racing against a New Zealand team.

Dennis has invited interested CSIRO staff to turn up and sample the sights and sounds of an age when the British motorcycle was king and riders were stronger and braver.

He said the racing was in a good cause—there are more autistic children than blind children in Australia, and the cause of the problem is still unknown.

### Appeal by Trust

The Joseph William Gottstein Trust, established in 1971 to provide the Australian forest products industry with its own national education fund, has opened a \$100,000 appeal.

The fund, established to perpetuate the memory of CSIRO Forest Products scientist Bill Gottstein, killed in an accident in New Guinea in 1971, has sponsored 12 Fellows for studies in Australia and overseas since its inception.

The Trust's honorary secretary, Mr Jack Pattison of the Division of Building Research, says the extra funds are needed to further develop the sponsorship program and enable it to become self-sustaining.

Donations are tax-exempt, and donors have the option of a single contribution or equal amounts donated over the next three years. Inquiries should be sent to: Mr J. E. Pattison, Honorary Secretary J.W. Gottstein Memorial Trust Fund, c/- CSIRO Division of Building Research, PO Box 56, Highett, Victoria, 3190

### Landsat conference

The first Australian Landsat Conference will be held at Macquarie University in Sydney from May 21 - 25.

The conference is jointly organised by CSIRO and the Department of Science, in conjunction with Macquarie University, Indusat, and the Remote Sensing Association of Australia.

Work begins this year on the Australian Landsat station at Alice Springs, which for the first time will allow Australia access to real-time Landsat data instead of via tapes sent from America.

The conference will be oriented towards the use of Landsat imagery in the Australian context, and will include sessions for beginners as well as those familiar with the science of remote sensing.

Invited speakers from Australia and overseas will give papers on technical development, Landsat's applications in agriculture, land use and rangelands situations, and in geology, mineral exploration and mapping.

A large area is being set aside for commercial exhibitors to display equipment for image enhancement and analysis.

Further details on the conference should be sent to: The Conference Secretary Landsat 89 PO Box 136 North Ryde, NSW 2113

### Forage plants

CSIRO is organising a symposium on Genetic Resources of Forage Plants at Townsville from May 6-11.

The symposium which is expected to attract agricultural scientists from around the world, will cover the major scientific aspects of genetics work on forage plants.

The program will include the nature and distribution of world forage resources, adaption in forage plants, plant collection and maintenance, developing cultivated varieties from collections and handling data from large collections.

Proceedings from the symposium will subsequently be published in book form.

The symposium is being organised by the Division of Tropical Crops and Pastures. Inquiries should be sent to:

The Symposium Secretary  
CSIRO Division of Tropical Crops and Pastures  
Davies Laboratory  
Townsville, Qld.  
4810

### Benevolent Fund

The smallest deduction on the fortnightly payslip of about 66 per cent of CSIRO staff, a 10c subscription to one of four CSIRO Benevolent Funds, may be about to increase.

At the recent annual meeting of the four funds in Canberra, Mr Tony Nicholson, chairman of the Southern Fund, covering Victoria, South Australia, Western Australia and Tasmania, said the fund's annual general meeting had approved a 20c deduction rate.

It had been left to the fund's management committee to choose a time to introduce the new rate. The fund's reserves have declined significantly in the past two years.

Many members of the Queensland Fund also favour an increase to 20c, according to chairman Mr Don Morton. Queensland's membership is relatively small and the fund's reserves fluctuate more violently than those of the other funds.

Mr Morton also reported that many of his members believed the 10c deduction was 'trivial', while 20c was regarded as realistic and reasonable.

Dr David Goodchild of the Canberra Fund and Mr John Stephens of the NSW Fund said both their funds were opposed to an increase.

They said the combined reserves of the funds had risen to more than \$60,000, and drew attention to the fact that money had been easily transferred between funds in the past — for example, in the wake of the Brisbane floods.

They suggested that the possibility of a very steep and possibly unnecessary rise in combined reserves was undesirable, and were worried by an inevitable decline in membership if a new rate was introduced and some members, either by choice or forgetfulness, failed to complete new pay deduction authorisations.

The Queensland and Southern Funds, on the other hand, did not wish to depend on other Funds to maintain their reserves in the long term — as distinct from emergency situations.

They believed inflation and changing social conditions would make the need for an increase in all four funds apparent in the near future.

The meeting decided all funds would delay any increase until members had had time to consider an increase and express an opinion to local representatives.

The meeting also urged members to make their views known through letters to Co-Research.

### Resusci-Anne

There are probably about 6000 people in CSIRO who would not know what to do if you — you personally — stopped breathing because of an accident or cardiac arrest.

That's an oblique way of saying that nearly 1000 people in CSIRO do know what to do after having been through a cardiopulmonary resuscitation program organised by Ian Jackson of the Head Office Training Group.

One in seven might sound a comforting figure if you're in need of assistance, but it should be remembered that the trained people are located in pockets around CSIRO rather than being evenly distributed.

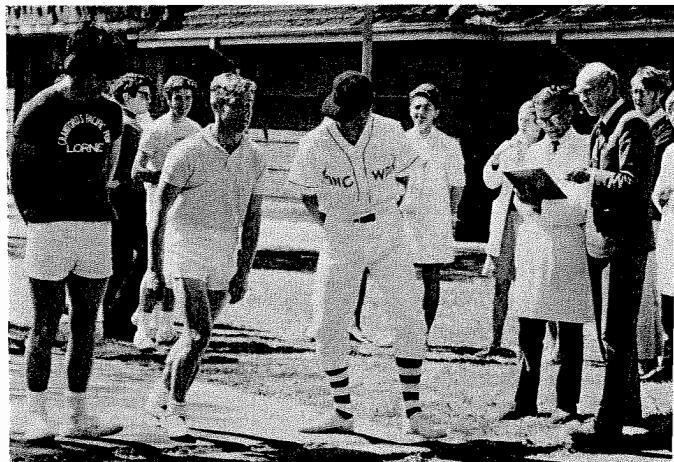
Training is carried out with the semi-bionic 'Resusci-Anne' a lifelike figure on which the techniques of resuscitation and cardiac massage can be demonstrated and practised.

The Training Group is buying more Resusci-Annes as funds become available, but is concerned that attendance at some of its courses indicate that people are unaware of either the need for, or availability of, training.

The Group feels such training is essential in laboratories, where the risk of pulmonary or cardiac arrest from accidental gassing or electric shock is relatively greater than in many other occupations.

Any person wishing to arrange training sessions in their area should contact their State Technical and Trades Staff Advisory Committee through their Divisional Liaison Officer, or contact Ian Jackson direct on 062-484454.

## Science at work



Moment of big drama at the annual CSIRO sportsmen's Carnival. The Division of Macrobioic Confectionery's fermented products program leader attempts a Limp Fall with Pike, degree of difficulty 2.7.

(Newspapers please note: This is a joke. Please do not ring for elaboration.)

## Top food science post

Mr J. F. Kefford, Assistant Chief (external Relations) in the Division of Food Research has been elected Secretary-General of the International Union of Food Science and Technology (IUFoST) for a term of five years.

IUFoST is a union with 42 member countries which seeks to promote international cooperation among food scientists, to encourage progress in basic and applied food science, to advance technology in the preservation, processing and distribution of foods, and to stimulate education and training in food science and technology.

In addition to major international congresses held every four years, IUFoST has sponsored some 40 symposia on a wide range of subjects from the basic to the very practical.

Many have resulted in published proceedings that are authoritative works in their respective fields.

IUFoST is now concerned as to how the immense range of experience available in its member organisations can be harnessed for the benefit of developing countries.



Dr Godfrey Lance, who was Chief of the Division of Computing Research until June, 1977, left CSIRO last month.

Dr Lance has been appointed the first Director of the Avon Universities Computer Centre, tenable at Bristol University in England.

The newly-established Avon Centre has just taken delivery of a new Honeywell Series 60/Level 68/DPS computer and the well known MULTICS operating system will provide interactive facilities for the Universities of Bath, Bristol, Cardiff and Exeter.

During his 16 years in Australia, Dr Lance made a noteworthy contribution to the computer scene, not only in CSIRO but throughout the Federal Government area.



Dr Bill Silvey, Tropical Crops and Pastures Liaison Officer in Brisbane is recovering from a visit by 13 Chinese agriculturalists. His careful planning made their visit to the CSIRO Cunningham Laboratory a great success.

The Chinese Animal Husbandry Group was led by Mr Seyinbayer, Vice Chairman of the Kirin Provincial Revolutionary Committee, Peoples Republic of China. During a three-week tour of Australia the party looked particularly at pasture establishment and management, and animal husbandry.

The day at the Cunningham Laboratory was busy but informal and enjoyable because all the arrangements went smoothly. The only slight hitch came when the delegation's favourite Chinese tea was left in the hotel and Shane Wynn had to rush back to get it.

Dr Ted Henzell, Chief of the Division, welcomed the group and outlined the pastoral scene in northern Australia. Dr Silvey then produced his trump card — a film 'Tropical Pastures for Australia' with a Chinese narration.

One former and one present CSIRO scientist were among recipients of Fellowships awarded recently by the Australian Institute of Agricultural Science.

Dr D. S. Riceman, a former Senior Principal Research Scientist best known for his research in South Australia's Ninety Mile Desert where he demonstrated the triple deficiencies of copper, phosphorus and zinc, was honoured for the second time by the Institute.

He was awarded the AIAS Medal in 1953.

Dr Albert Rovira, a Chief Research Scientist with the Division of Soils in Adelaide, and also an AIAS Medal recipient in 1972 for his work on the effect of microbes on plant nutrient uptake, was honoured again with a Fellowship.

Dr Rovira's current work is concerned with soil-borne diseases of cereals.

The awards, announced by Institute President Dr Ted Henzell, recognise outstanding contributions to agricultural research, education and administration.

Mr C. H. J. Johnson of the Division of Chemical Physics, Clayton, has been awarded a Doctorate of Science by Melbourne University.

The award recognises Dr Johnson's considerable contributions in the fields of statistical mechanics and of heat and mass transfer.

Mr Dennis Daly, a Scientific Services Officer with the Institute of Animal Sciences, as been appointed Senior Private Secretary to the Minister for Science and the Environment, Senator J. J. Webster, for a 12-month period.

Mr Peter Goodman of the Division of Chemical Physics has been awarded the degree of Doctor of Science by the Faculty of Science of the University of Melbourne.

The degree was conferred on Dr Goodman in December.

The subject of his thesis was 'Development of the Technique of Convergent Beam Electron Diffraction.'

Dr Goodman is a member of the Commission on Electron Diffraction of the International Union of Crystallography.

It was very well received and a copy went back to China with the Group.

The morning was completed with short talks on aspects of the Division's research by Ron Williams (plant introduction and breeding), Dr Roger Jones (plant nutrition, legume bacteriology, plant physiology and nitrogen economy), and Dr John Russell (tropical food and fibre crops).

Lunch was followed by a 40-minute coach trip to the Samford Pasture Research Station where there were demonstrations of removing the rumen contents of cattle, talks on pasture research and inspections of pastures.

Dr Gordon Hallsworth, who recently resigned from the Chairmanship of the former Land Resources Laboratories, has been appointed project director for the 'Fragile Soils Project' for 30 months.

The project, organised by the International Federation of Institutes of Advanced Study, is based in Stockholm.

Dr Hallsworth's group acts as a co-ordinating body for bringing together people with similar interests in soils research, and encourages sharing of information.

The Fragile Soils Project aims at developing links between six to a dozen centres, distributed throughout the semi-arid zone and the tropics, where studies are being made of biophysical and socioeconomic aspects of the use and conservation of fragile soils.

Dr Hallsworth was chairman of the Land Resources Laboratories for five years, and before that was Chief of the Division of Soils.

His official farewell in Adelaide last year was attended by more than 80 colleagues and friends.

## Rivett Medal to biochemist

Dr John Ballard of the Division of Human Nutrition has been awarded the prestigious David Rivett Medal for research in the biological sciences.

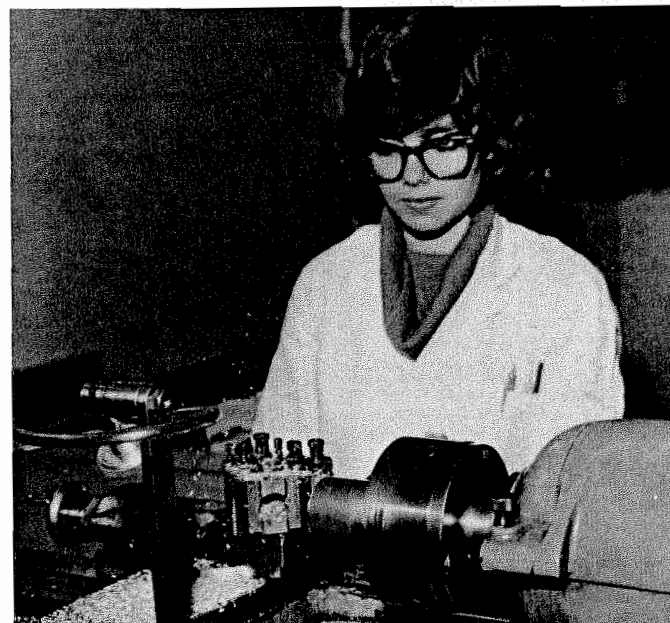
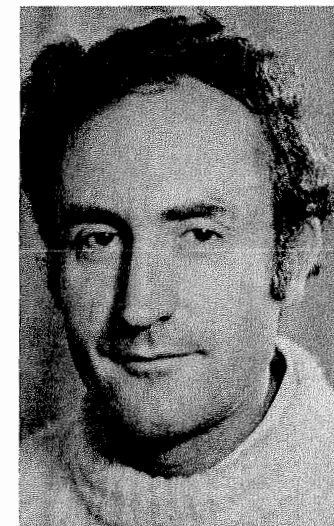
The medal, which was established by the CSIRO Officers Association to honour the memory of former CSIRO Chairman Sir David Rivett, is awarded every two years to an officer aged less than 40 who has carried out outstanding work in the Organization.

Dr Ballard's recent work has been concerned with understanding the biochemical adaptations involved in the appearance and regulation of liver-specific enzymes in developing mammalian liver.

In 1971, Dr Ballard shared the Mead Johnson Award of the American Institute of Nutrition.

A Senior Principal Research Scientist with the Division, he has published extensively in scientific journals and written a number of review articles and chapters in books.

He has also received the Edgeworth David Medal of the Royal Society of NSW in 1975, and the Boehringer Mannheim Medal of the Australian Biochemical Society in 1976.



The lady behind the lathe represents a large step for womankind in CSIRO — Kim Scott is the Organization's first female apprentice. Kim, 19, joined the Division of Chemical Physics late last year for a four-year term as an apprentice instrument-maker. She has previously worked as a drafting assistant and a printing assistant.

## People

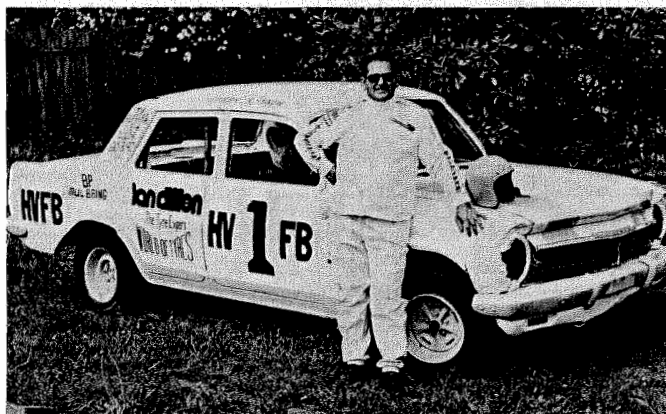
### Tom Grace to Tokyo

Dr Tom Grace, a Senior Principal Research Scientist with the Division of Entomology in Canberra, has been appointed CSIRO's Counsellor (Scientific) in Tokyo.

Dr Grace, who joined CSIRO in 1949 as a laboratory assistant, has spent two periods doing research in Japan during his career, and is familiar with both the language and customs of Japan.

He is best known for a classic paper in 'Nature' detailing a breakthrough in the *in vitro* culture of insect tissue.

*Division of Land Resources Management information officer and sometime gastronomy Justin Murphy surveys a saltbush salad recovered brief seconds before from a fistulated Shortborn bull during a field day west of Broken Hill. The fistulated animals are used to study how cattle graze the plant species of the saltbush community. The NSW Soil Conservation Service helped stage the field day on saltbush management in conjunction with LRM's Denitiquin Rangelands Laboratory.*



Barry Rayner's experience in 'wheeling' a large tractor-mower between the trees on the site of the Division of Food Research at North Ryde, may have helped him to become club champion of the Hunter Valley Fenda Benders Club which meets at Heddon Greta. In only 14 months since he took up the sport, Barry has collected more than 70 trophies including those for best driver, most consistent driver and the club championship.

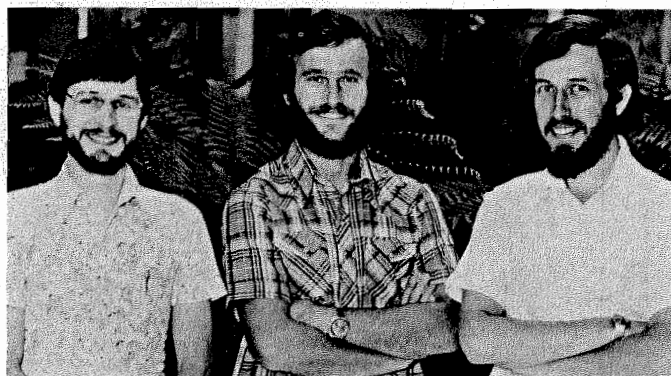
Barry loves old Holdens and started driving in a 1963 EJ model. Cars in the club are almost standard except for a light internal roll-cage; no heavy external barring is used. Races are run on a speedway circuit with no holds barred and provide plenty of thrills for spectators and drivers alike. A major aim of the club is to keep the cost of the sport low so that the average driver can take part in it.

Barry Rayner has been at Food Research for 18 years where he is a Handyman — obviously in more ways than one.

*The Film and Video Centre in Melbourne has raided Aunty's top drawer to acquire producer/director Tony Chen for its staff.*

*Mr Chen has worked in films for 16 years, most of it with the ABC as producer/director of films, documentaries and general television programs.*

*Mr Chen is a science graduate from the University of Queensland.*



The Division of Environmental Mechanics recently welcomed three new members.

Dr Michael Raupach, right, who is working with Dr Frank Bradley in micrometeorology, received his PhD from Flinders University and has been at the University of Edinburgh for the past 2 years as a research fellow. His interests include problems of turbulent transport over very rough surfaces and the effects of variable topography.

Dr Brent Clothier, centre, from New Zealand's DSIR (Plant Physiology Division), will be working with Drs David

On Friday, July 20, the Division of Environmental Mechanics will once again be running the Black Mountain Cup.

The prestigious annual event attracted 70 starters last year and looks like being even bigger in 1979 with more prizes and more categories.

The run, over 3.5 miles on the slopes of Black Mountain, starts at the Pye Lab car park at 12.45pm.

The organisers are looking forward to seeing some runners from Sydney and Melbourne this year and to make this more possible have shifted the date to a Friday.

Entomology are the current holders of the Cup, as they were the previous year. The cup is a team award and is won by taking lowest total time of the first 4 runners from each division.

Further information can be obtained from Greg Heath (062) 465692 or Col Hazelton (062) 465891.

## McMahon

In October, people will be paying for the privilege of reading the work of one of Australia's finest contemporary poets, Frank McMahon.

Frank will be publishing his first volume of verse during that month, but in the meantime has consented to publishing *gratis* in each issue of CoResearch.

Being a singularly modest person, Frank

believes the privilege to be his. While he labours under this misapprehension, CoResearch and its readers will continue to enjoy his elegant, evocative verse.

Frank was born and educated in the fertile vine and citrus country bordering the Murray River in South Australia — an environment which figures in his two offerings this issue.

Frank married in 1948, the same year he joined the Public Service. After completing an Arts diploma at Adelaide University in 1962, he was promoted to a position in Canberra.

He retired on invalidity from the Department of the Treasury after a long illness in 1968, and after his recovery joined CSIRO in 1973.

He began writing verse, mainly on the River Murray and Celtic areas of South Australia, in 1975.

Success came very quickly. He won several poetry prizes between 1976 and 1978, including the prestigious 1978 Bronze Swagman (the Banjo Paterson award) for bush verse.

His interests include writing, vintage cars, Australian history and the folklore of the River Murray.

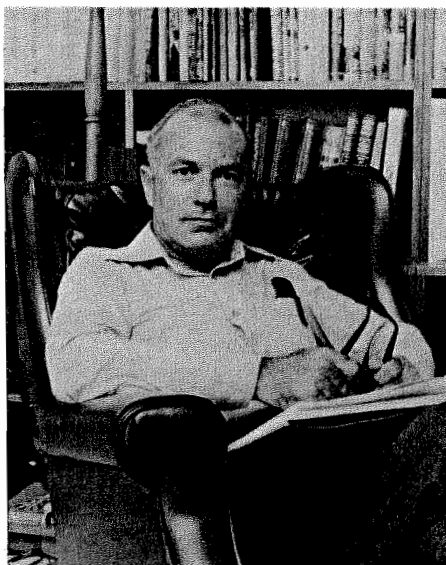
### LATE GETTING HOME

*When horizons widen, back off and shimmer down  
I'm half-way there and when  
this whiplash mallee sways  
its stunted clumps of strangled, grey bouquets  
and sand rasps round  
abraded pavements in a Drysdale town  
I'm home again.*

*A frieze of willows with their skirts cropped cow-mouth big  
still screens green channels, waves  
of pepper branches blow  
in ripples as their skirts are swung in slow  
blown bulas by  
a wind that ushers dust across the sky  
and sweeps the day.*

*No change. In each November citrus blossoms brown  
in furrows. Morning light  
still beads where sprinklers run  
and arc their stuttered benedictions on  
a drop-pocked ground  
and drifting mists still muffle river sounds  
in winter nights.*

*No change? The house is crumbled rubble and a sour,  
sharp reek of seepage blown  
across the orchard grows  
more acrid with each salting year and those  
who shared a loud  
unclouded camelot are quiet now.  
And I'm late home.*



### IF I COULD WRITE

*If I could write — these words would film your teeth  
and fur your tongue.  
February sand would sear your feet  
and glaze in bazed and cauldroned light that beats  
on cracking backs at drying racks beneath  
a Murray sun.*

*These words would rattle slatted lattice, spin  
in wind around  
verandabs, rasp the last of leaves that cling  
to Autumn vines, sweep drying greens and swing  
the Coleman lanterns through the dark. They'd bring in  
outside sounds.*

*If I could write — these lines would lie engraved  
with mirrored trees  
like those the river images when days  
drain slowly out like shrimp-tins. Weed-greened waves  
would suck at them and then these lines would sway  
and smell like reeds.*

*And smell like packing-sheds, spray, winter frost  
and drying-trays.  
These lines would breathe like sulphured apricots.  
Instead, with all their noise and colour lost,  
they creep here scentless, cold and mute across  
a silent page.*



# In defence of technology

## The space age wheel is here to stay

At first reading, 'Mr Highley's thoughtful article' (Oct./Dec. 'Perspective') on the evils of technology and the glories of pad and pencil appears to be yet another dig at that most fashionable of villains - Modern Technology. I might not have read it a second time, were it not for the following considerations:

The author might be taken seriously by outside observers of the Organization,

I am one of the research scientists who has the audacity to type his own papers into a computer console.

After the second reading, my opinion of the article was certainly raised, not because it is a fountain of truth, but because it is a piece of propaganda that would bring tears of envy to the eyes of Dr Goebbels himself.

The comments will certainly be read by some who might conclude that thousands of dollars are wasted on the inappropriate use of technology. For this reason, I would like to chew a bit on this literary masterpiece and see how much of it is digestible.

The article starts out with some common-sense statements concerning the saving of fuel and cutting of costs, but already we see that the line printer is tossing our library books into the street (the connection escapes me).

The comment about 'internal organizational feeling engendering rational decisions' also gives me the uneasy feeling that someone is about to make those decisions for me.

Next we have the hypothetical example of a man bound by the chains of technology, when he is forced to use computer storage because his department has run out of funds for filing cabinets.

Certainly, filing cabinets are often at a premium and computer costs are often hidden, but does anybody really think that anyone switches to computer storage because he can't get filing cabinets?

Let us take a real example of this kind of problem. We are involved in producing a catalogue of Australian beetles, with generic and specific names, authors, references to original descriptions, type localities, etc. The old 'tried and true' method would have us

1. Copy the data from the original reference onto a card with the 'good olde' pencil.
2. House the cards in about 50 drawers.
3. Make additional cross-referenced stacks for special purposes.
4. Make changes in cards as synonymies and generic changes are encountered.
5. Give the mess to a typist - hopefully one who knows some Latin and Greek and is familiar with handwriting styles.
6. Proofread all lists and correct them.
7. Send to publisher.
8. Check galley proofs.
9. Check page proofs.
10. Hope that the percentage of errors

will not be so great as to make the result next to useless.

With present computer facilities, the original data can be typed directly into the computer, with one proofreading.

All changes and additions are typed directly into the computer file in the proper place.

Automatic lists are produced on the line printer, organized in any way desired.

Typesetting commands are given to the computer and a final copy is produced which can be printed directly by offset methods. So much for card files.

The author then moves 'from conjecture to reality', and we are presented with two indisputable figures - the costs of printing Entomology's annual report by computer and by an outside typesetting firm.

The former was \$2400 in 1977 and the latter \$900 in 1978; the comment is also made that the more recent report would have cost about \$3000 by computer, because of rising costs and a somewhat longer text.

Again, the facts are certainly correct, while the conclusions and projections merely display the author's ignorance. Perhaps, the facts themselves should also be clarified.

The 1977-1978 Annual Report was typed and edited in the Division, and then sent in final form to an outside firm, which produced camera-ready copy with justified margins, but in continuous or galley form.

This was then corrected and cut up into pages here at the Division and sent to Melbourne for printing.

Cost and time estimates exclude both initial production of final draft and subsequent layout procedure.

Even if we ignore salaries, the time factor is important, given Mr Highley's statement about no time penalty in producing the report.

The 1976-1977 Annual Report was typed into a console connected to the CYBER 76 computer, and the final copy was produced with the III COMp80 device.

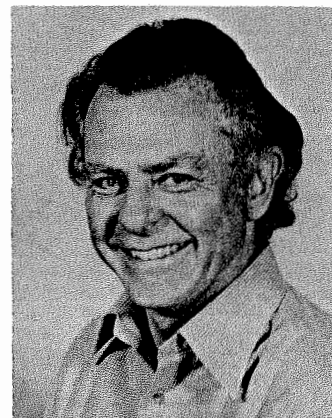
Cost estimates were based on total computer charges for the period. This includes all input and editing, plus storage charges, which may be relatively high when one has a large active file of information.

These charges were accumulating, for instance, while drafts were being reviewed by individual authors. Once the final draft with typesetting and layout commands was into the computer, the final product was produced in a couple of days.

The statement that a similarly produced report would cost \$3000 today is just not true. Although some computer costs have risen, advances in technology (that old demon again), as well as new and more efficient ways of using that technology, now allow us to do the same job at a much lower cost.

Also the pressures of a reduced budget (which did not exist during the production of the earlier report) have provided additional stimulus for developing new methods of reducing computer costs.

Examples include the use of lowest priority for jobs, library files, and BACK-UP and RETRIEVE options for placing files in deep storage. In addition we have the use of a PDP-11 computer, which was bought for the Mass Spectrometry Section but has spare capacity that handles many of our input and editing operations at a negligible cost.



John Lawrence is a Principal Research Scientist in the Division of Entomology and Curator of Coleoptera for the Australian National Insect Collection. In his own words he has never carted bread, plastered fibrously, refined copper, picked grapes, or sold encyclopaedias; he has done a little work with the computer.

This machine will produce line-printed drafts, but the data must be transferred to the main computer for production of review drafts and final copy. If we were to produce a 150 page annual report today (1976-77 was 141 pp. and 1977-78 was 96 pp. with smaller print) using the computer facilities available to the Division, the cost would range from \$650 to \$1000, depending upon whether the PDP-11 or CYBER 76 is used for input and editing. This is a far cry from \$3000.

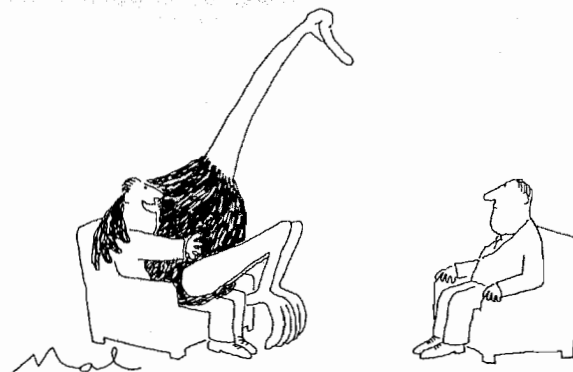
Finally, we come to the matter of research scientists typing manuscripts into the CYBER 76. Many researchers, who have any typing speed, compose at the typewriter, and then submit roughly typed manuscripts to the typists.

When the text is very difficult or repetitive, the editing devices of the computer are far quicker and more efficient than continual trips back and forth to the typing pool. Also, it is quite simple for the typists to use the computer consoles, which makes it possible for the researcher himself to make small changes in the text quickly.

This includes repetitive changes throughout a manuscript, which can be completed in a single operation.

I might add that once a research scientist becomes familiar with the computer facilities, he is in a better position to use all of the other programs available for processing data, such as those for writing keys and descriptions, as well as handling standard statistical procedures.

I can only conclude by saying that this apparently rational look at technological misuse is just another case of computer hysteria. Sorry Ed, the wheel is here to stay.



'Don't knock it if you haven't tried it.'

## Letters

Sir,  
The front page of *CoResearch* 223 (Aug./Sep.) shows how we must be ever vigilant against a Government which seems determined to reduce our numbers. Between the time the printer had set the headline and the first paragraph, we had lost another position (50 to 51!)

I have tried to keep this letter brief, pithy,....etc (CoResearch 223 Oct/Dec) so that it will attract (sic) a Golden Quill (whatever that is), but I'm just a little confused about what the writer gets (two Golden Quills?)

M. H. Jones  
Mineral Chemistry  
Port Melbourne

Sir,  
On November 22 I attended a pre-retirement planning seminar at Syndal and would like, through *CoResearch*, to compliment the organisers and speakers for a well-

planned, informative session. My compliments to the organisers must be tempered with a small criticism. I do not want to be identified with the trendies but the word "discrimination" springs to mind.

I felt that most of the proceedings were geared to aid those who are lucky enough to have a spouse.

Whilst the widows/widowers and unclaimed treasures (like me) share most of the problems envisaged by a retiree-with-spouse, our very 'aloneness' creates other areas of concern, one of which is the possibility of being over-looked.

In the planning of future seminars of this kind could we be given some attention without being made to feel 'different'?

I liked a little joke of one of the speakers-

"If the plural of mouse is mice  
What is the plural of spouse?"

The host Division (Applied Geomechanics)

deserves a compliment too for the fine catering service.

"Nonentity"  
(Name and address supplied)

Sir,  
I am delighted to find on the front page of my copy of *CoResearch* 223, just received, that the Institute of Physical Sciences of CSIRO will have a 'Division of Atomic Physics', presumably to resuscitate the old Bohr model of spherical atoms.

B. H. Neumann  
Mathematics and Statistics  
Yarralumla

Sir,  
I would like to say how much I appreciated Ed Highley's article in the last issue of *CoResearch*. Some of his arguments may explain a very sinister thing I noticed on the

front page of this same issue No 223.

Where the composition of the Institute is tabulated, only professional staff numbers are listed. Is this a prediction? Will the new Institutes be composed of professionals only, surrounded by their support machines?

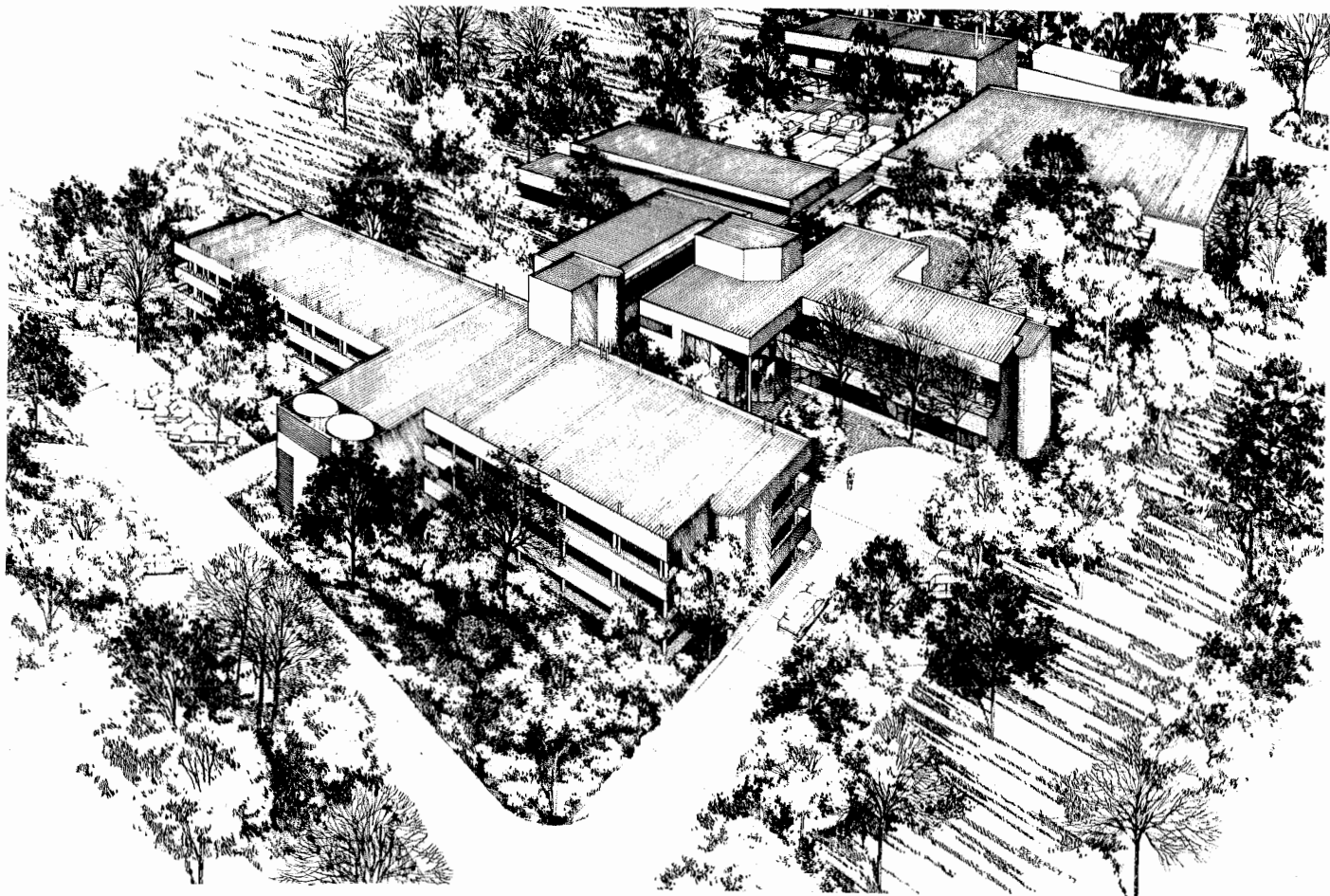
Where are all the others? Are they to be cast adrift upon the sea of technology, (a sea no doubt swarming with ravenous microfiche), sucked into the vortices of data bases, line printers and word processors, or crushed mercilessly under avalanches of computer printout and xerox copies?

For a paper which purports to be published in the interests of all CSIRO staff I should have thought *CoResearch* would have displayed greater sensitivity and regard for the feelings of all staff rather than to have published a list in such a form.  
Anne Jack  
Librarian  
NML

# CoResearch

*A publication for CSIRO staff*

April/June 1979 **225**



## \$9.1m. laboratory for Clayton

*Need 'urgent' says Public Works Committee*

The Parliamentary Standing Committee on Public Works has recommended to Federal Parliament that work should proceed on a \$9.1 million laboratory complex for the Division of Chemical Technology at Clayton.

The committee's report described the need for the new complex as urgent, because the Division's existing premises overlooking the Yarra River in South Melbourne contained many unsafe features, were overcrowded and could not be expanded or adapted to meet the high technical standards desirable for the type of research being undertaken.

It said the new complex had been designed to ensure control over temperature, cleanliness, vibration, solar penetration and to provide safe working conditions for scientific research.

The proposal represents the third stage of a plan by CSIRO to establish a complex of laboratories at Clayton, adjacent to Monash University.

The first two stages involved the transfer from Fishermen's Bend to Clayton of the Divisions of Chemical Physics and Chemical Engineering (now Mineral Engineering).

The Chemical Technology complex will comprise organic and general chemical laboratories, technical laboratories for large-scale research work, and prototype industrial process bays for organic chemistry, general chemistry and pulp and paper processes.

It will also include workshops and stores, and accommodation for administrative staff and support facilities — including offices for members of the Division of Mathematics and Statistics.

Evidence presented to the committee said the buildings on the South Melbourne site reflected the original research requirements of the former Division of Forest Products, being designed for work of a physical and engineering nature.

The majority of buildings were of timber, were poorly ventilated, and constituted a major fire risk. Over the years, the buildings had slowly subsided on their timber pilings into the Yarra River flats upon which they had been built.

The laboratories experienced problems with dust, dirt, air pollution and vibration associated with their siting in an inner-city industrial area with heavy traffic.

The Department of Housing and Construction investigated the feasibility of demolishing the present buildings and building a nine-storey tower at a cost of \$8.5 million, but this was rejected because of hazards associated with some of the research, and the massive disruption it would have caused to research programs.

The new Clayton research laboratories will be accommodated in two three-storey wings containing standard laboratory modules, with support facilities including instrument, cold and constant temperature rooms and storage facilities.

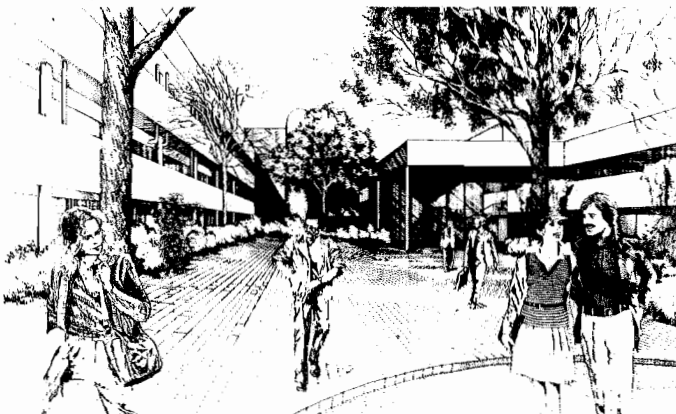
The administrative services will be accommodated in a two-storey building, and the section to be occupied by the Division of Mathematics and Statistics personnel will contain computer facilities.

One proposal put to the committee suggested the new laboratories should be located in the country, perhaps in Gippsland, but it was felt the site would not be

close enough to industry with which CSIRO was co-operating, would not be close to a university, and would involve the re-location of staff.

The Standing Committee's proposals must next be approved by the full Parliament, and Parliament then allocate funds, before work on the Clayton laboratories can begin.

*An artist's impression of the new home for the Division of Chemical Technology at Clayton. Below — the entrance to the forecourt of the complex.*



# Jan walks the comeback trail

*And she's making medical history*

Division of Forest Research receptionist Jan Shawyer recently agreed to do a 'small interview' for a Canberra suburban newspaper to promote a local sports centre where she was training.

She didn't know that small interview would catapult her into the glaring spotlight of the national press, and was overwhelmed by the result.

Jan, 27, is making a comeback from one of the most devastating conditions which can afflict a human being, and one universally regarded as irreversible - quadriplegia.

Ten years after a simple fall during school sports paralysed her from the neck down, Jan has become the first woman in Australia to walk after an injury of such severity.

Jan was living in the small town of Bookham, near Yass at the time, and according to doctors was very lucky to survive the ambulance trip to Canberra. She subsequently spent 10 months in Sydney's Prince Henry Hospital, where she was advised that she would probably be confined to a bed for the rest of her life.

From Sydney she went back home to Bookham for eight months, and then spent another eight months at Canberra Hospital undergoing physiotherapy and occupational therapy.

Like most quadriplegics, Jan refused to accept the gentle but pervasive message throughout her treatment that even small goals might be unattainable.

She was irked by the impersonal physiotherapy treatment she received, and was disappointed with its results. It seemed those

trained to help lacked something essential - the empathy of her family and friends, who couldn't help.

Jan and her family moved to Canberra from Bookham, and she has been working with the Division of Forest Research at Yarralumla for 5½ years.

She believes that her job and the contact it gives her with people has helped tremendously, but her biggest breakthrough came early this year when she found somebody prepared to tackle her problem both professionally - and personally.

She went to Kippax Sportsworld in the Canberra suburb of Holt, and began training with physical education instructor Fred Driscoll. She has made considerable progress and hopes to be able to discard her crutches and walk by herself by the end of this year.

'I believe if I had had somebody like Fred helping me from the beginning I would be back to normal now,' Jan said.

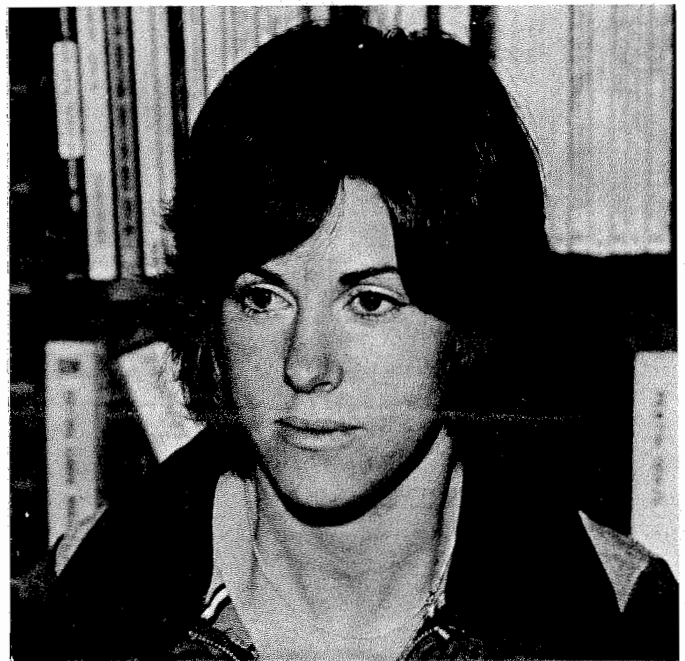
'He has the knack of making people want to do something for themselves.'

Jan can now walk around the gymnasium with Fred's support, and has discarded her wheelchair, except for shopping.

Jan faces the problem of all para- and quadriplegics, that of finding nerves which were not irreparably damaged by her accident, to link mind and muscle again.

She is naturally left-handed, but has found that her right side is making a faster comeback than her left.

Jan has already surmounted some of the statistical hurdles applied to quadriplegia, and believes she can make substantial further progress.



She attributes much of her success to the support given by her family - her father drove from Yass to Sydney every weekend during her 10 months in Prince Henry Hospital.

The next time you ring the Division of Forest Research in Canberra, don't be fooled by the soft voice of their receptionist - the lady is as tough as teak.

## A duplication . . .

The Chief of the CSIRO Division of Mineral Engineering, Dr D.F. (Kelly) Kelsall, has also been made Chief of the Division of Applied Geomechanics.

In announcing the appointment, the Chairman of CSIRO, Dr Wild, said the two Divisions would maintain their separate identities.

Both were based in Melbourne, although the Division of Applied Geomechanics also had laboratories in Adelaide, Cobar and Mackay.

Dr Kelsall is recognised internationally for his work in the field of mineral processing.

He joined CSIRO in 1959 after a distinguished career in Britain, attained his Ph.D. in 1969 and was appointed Chief of the then Division of Chemical Engineering - now the Division of Mineral Engineering - in 1974.



## . . . a confirmation

Dr F.A. (Lex) Blakey, who has been Acting Chief of the Division of Building Research since the retirement in May last year of Dr R.W.R. Muncey, has been appointed Chief.

Dr Blakey's appointment is for five years. He joined the Division in 1949, after post-graduate study at Cambridge University which led to his Ph.D. in 1949.

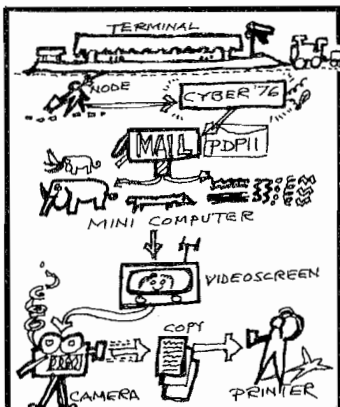
He had earlier graduated from the University of Western Australia as a Bachelor of Engineering.

He was appointed an Assistant Chief of the Division in 1968, and in 1974 spent two years on secondment to the then Federal Department of Housing and Construction, during the establishment of its building technology and sociology division.

In 1971 he was made a Fellow of the Australian Institute of Building.



## COMTEXT is the latest word



COMTEXT is a little difficult to describe. Calling it a computer-based photo-type-setting and composing package is not very instructive, and does it no justice.

Perhaps it could be more loosely regarded as a hybrid printer and composer with an elephantine memory and the search capability of a bionic ferret.

Its most impressive feat to date has been to compile, index and print a job beyond the powers of mortal men, the massive Australian Research Directory containing project descriptions, the names of project leaders and project keywords of research

being undertaken in every Australian university and college of advanced education, for an all-up price of just \$12.50.

Human indexers had previously shied away from the task. COMTEXT handled it with comparative ease, a mere appetiser for the much larger task to come of adding CSIRO and other publicly-funded research programs, and private industry research to the already lengthy document.

The Australian Research Directory is actually printed on microfiche at 250 pages per transparency, and it runs to 18 transparencies.

COMTEXT offers users the option of storing printed information directly on microfiche, or 'hard copy' bromides which can be sent directly to a printer for duplication in normal size.

Who invented COMTEXT, how does it work, who operates it and who are the potential users?

COMTEXT is the product of research by the Division of Computing Research in Canberra, and the Computer Resources group of companies. It is the most sophisticated and powerful photo-composing and typesetting facility in Australia, being 'driven' by the behemoth brain of the CYBER 76 computer, the largest computer in Australia.

Because COMTEXT is plugged into the CYBER 76, anybody with a terminal attached to CYBERNET's electronic 'tendrils' throughout Australia is a potential user.

Invariably, a gulf exists between the

people who design the package and the potential users - the computer people don't really know what the user's requirements are, and the users don't know how it all works.

Forming a link between the two groups is the Information Systems Development Unit of Head Office's Administrative Systems Section.

The Unit's task is to develop skills in using COMTEXT, to evaluate its potential, and to pass on the expertise to potential users, either through seminars and training courses, or through the production of a handbook.

COMTEXT is a versatile tool. It will produce anything from the hard copy for a conventional book through to one-off, time-consuming lettered and ruled forms - for example, order books or flextime sheets.

It will do this in a big range of type fonts, ranging in size from 4 to 36pt, in half-point increments, each with light, medium, bold and italic faces. Special fonts with scientific symbols are also available.

Within this framework, the featureless typed page can be transformed into an easy-to-read, well-spaced document from which information can be obtained visually in less than half the time - in short, COMTEXT presents information in a highly legible form.

After all the material for a particular task has been fed into the system, COMTEXT can be instructed to hunt for certain key words in the text to be indexed, along

with page numbers. It will automatically re-index if pages are deleted or inserted. Time savings are enormous.

The whole process begins with the terminal operator entering the text or design of the material to be printed, with appropriate setting instructions.

This information goes to the CYBER 76 computer which re-shapes it into a form acceptable for the mini-computer controlling the generation of type.

However, the Cyber must contact the mini-computer through the intermediary, the PDP 11, which translates Cyberese into minicomputerese.

The minicomputer selects the required font(s) and generates the shape of the printed page, and then displays it on a video screen, from which a camera produces microfiches or bromides.

COMTEXT is suited to producing both long- and short-life documents - but its specialty is producing master copies of documents which may be required for re-printing, or printing and storing documents which undergo frequent updating, such as the Australian Research Directory.

The Information Systems Development Group operates primarily in a research rather than a service capacity, and isn't looking for work to put on COMTEXT.

However, anybody in CSIRO who would like more information on COMTEXT should contact the Unit's leader, Ms Pat Ward, on Canberra (062) 484158 or the Division of Computing Research's user-assistance number, (062) 433333.



# 22 men named to Advisory Council

## Industrialists, academics prominent

The Minister for Science and the Environment, Senator Webster, has announced the appointment of 22 members of the reconstituted CSIRO Advisory Council.

Senator Webster said the Advisory Council, under the Chairmanship of Mr Victor G. Burley, would be a major source of independent advice to the Executive of CSIRO.

The new members were drawn from a wide cross-section of society and were senior and respected persons in the fields of industry, tertiary education, government and community interests.

"The creation of the new Advisory Council is a vital step in the strengthening of the links between Government-funded scientific and industrial research as conducted by CSIRO, and the Australian community," he said.

"Its members include the Chairmen of the six CSIRO State Committees which are soon to be established.

"These committees will provide grass roots contacts with industry, centres of education and the community generally."

Through their Chairmen they would be an important source of advice to the Advisory Council, which in turn would advise the CSIRO Executive on:

- the objectives of CSIRO and the priorities to be followed to achieve them;

- industrial and economic matters bearing on CSIRO's work; and
- the identification of those interests of the Australian community that may be furthered by CSIRO.

The reconstituted CSIRO Advisory Council is one of several initiatives taken by the Government after its decision last year to restructure the Organization.

Enabling legislation passed last year made provision for the Advisory Council to comprise a part-time Chairman and up to 24 other part-time members.

Appointments are for varying periods up to five years, with provision for renewal for one additional term.

The Government is still exploring the choice of up to two other members to bring the Advisory Council to its full strength of 24.

None of the 22 appointees is a woman. Arrangements have also been made for observers from the Australian Science and Technology Council (ASTEC), the Department of Finance and CSIRO to attend Advisory Council meetings.

The 22 members whose appointments will date from 1 July are:

### Chairmen of State Committees:

Mr Alexander Boden, company director and science writer — as Chairman of the CSIRO New South Wales State Committee.

Mr Laurence Brodie-Hall, director of mining companies — as Chairman of the CSIRO Western Australian State Committee.

Mr Kenneth E. Gibson, Managing Director and Deputy Chairman, A.C.F. and Shirleys Fertilizers Ltd. (retired) — as Chairman of the CSIRO Queensland State Committee.

Mr John Harris, Managing Director, Adelaide and Wallaroo Fertilizers Ltd. — as Chairman of the CSIRO South Australian State Committee.

Mr Jan Kolm, Executive Director, ICI Australia Limited — as Chairman of the CSIRO Victorian State Committee.

Professor Peter Scott, Professor of Geography, University of Tasmania — as Chairman of the CSIRO Tasmanian State Committee.

### Members without specific State connections

Professor L. Michael Birt, Vice-Chancellor, University of Wollongong.

Professor Frank Fenner, Director, Centre for Resource and Environmental Studies, Australian National University.

Mr John Heussler, grazier and President, United Graziers' Association of Queensland.

Professor Peter Karmel, Chairman, Tertiary Education Commission, Canberra.

Mr John C. Kerin, Member for the Federal Electorate of Werriwa, New South Wales.

Dr Godfrey Letts, veterinary consultant

**Editor's note:** It is understood a considerable number of women candidates were considered for appointment, and that the Chairman of the Advisory Council would welcome further suggestions for the appointment of women either to the Advisory Council or to State Committees of CSIRO.

and pastoralist, Darwin.

Sir Ian McLennan, chairman of companies and previously Chairman of Broken Hill Proprietary Co. Ltd., Victoria.

Mr Jack Michael, Executive Director of the Association of Professional Engineers of Australia, Victoria.

Dr Brian Scott, Managing Director of W.D. Scott and Company, Sydney.

Senator Andrew Thomas, Western Australia.

**Commonwealth Department representatives**  
Sir Alan Cooley, Secretary, Department of Productivity.

Mr Neil Currie, Secretary, Department of Industry and Commerce.

Dr John Farrands, Secretary, Department of Science and the Environment.

Professor Peter Fink, Chief Defence Scientist.

Mr Ivan Smith, Deputy Secretary, Department of Primary Industry.

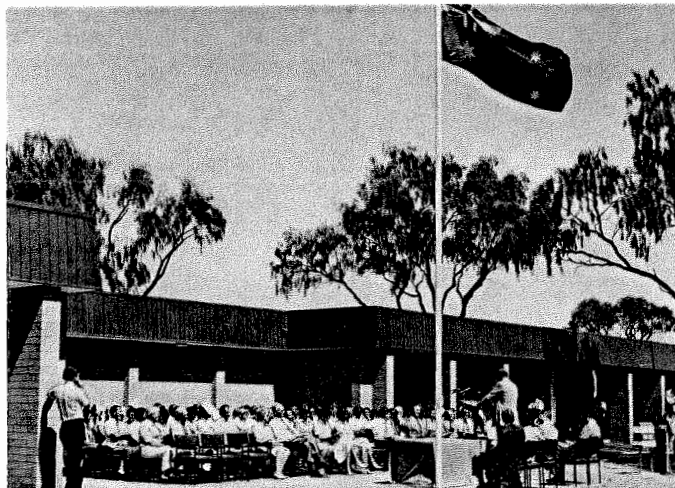
Mr Alan Woods, Secretary, Department of National Development.

**Observers:**  
Professor Sir Geoffrey M. Badger, Chairman of Australian Science and Technology Council.

Mr J.H. Garrett, Deputy Secretary, Department of Finance.

Dr J.P. Wild, Chairman, CSIRO.

## New research lab, central location



The Prime Minister, Mr Fraser, opened CSIRO's newest research complex, the \$750,000 Central Australian Laboratory, in Alice Springs in April.

The laboratory will house Division of Land Resources Management staff studying Australia's vast rangelands — arid or semi-arid areas which cannot naturally sustain crop production or pasture improvement.

It will also provide accommodation for the Australian receiving station for LANDSAT — the earth resources satellite, which will provide real-time images of Australia's surface for a variety of scientific purposes.

The Central Australian Laboratory is located five kilometres south of Alice Springs.

While research carried out there will be directed to the problems and welfare of the Central Australian region, it will also establish principles for management of natural resources in other rangeland regions. The complex has three wings:

- a laboratory wing with three laboratory areas, a constant temperature room

- and eight associated staff offices;
- an administrative wing housing three staff offices, a general office area, reception, foyer and computer room;
- a services wing accommodating a library, photo interpretation room, conference/staff lunch room, kitchen, toilets and air conditioning plant room.

The computer centre will be linked with the CSIRONET system at Black Mountain in Canberra later this year.

The Department of Housing and Construction awarded a contract for the project in May 1977 to Universal Constructions Pty Ltd and practical completion was achieved on target in November 1978.

Many interstate and local guests attended the opening ceremony.

They included the Minister for Science and the Environment, Senator J.J. Webster; the Minister for Housing and Construction, Mr R.J. Groom; the Chairman of CSIRO, Dr Wild; and the Administrator of the Northern Territory, Mr J. England.

## Lo-flo shapes up as a high flier

The Division of Textile Industry has won the first Engineering Excellence Award of the Victorian Division of the Institution of Engineers, Australia, for its new Lo-Flo scouring process.

The award will be made annually by the Institution for Victorian projects that have engineering excellence.

The winning process — one of nineteen projects submitted for the Award — was invented and developed totally by the Division.

It enables wool to be washed without producing a highly polluting waste water.

It not only helps to protect the environment but also improves the economics of scouring as it allows twice as much wool grease to be recovered from the waste waters as normal.

### Lanolin

Wool grease is sold by the scourer for refining to lanolin, a product which is widely used in cosmetics and pharmaceuticals.

Two Lo-Flo scouring machines are now in operation commercially, one in Brisbane and the second in Keighley, England.

In accepting the award on behalf of the Division, Dr George Wood, leader of the Lo-Flo team, said that five years ago, many people — himself included — would have

held the opinion that new advances in wool scouring were very unlikely.

"Yet here we are in the middle of an exciting project that has forced our research into such diverse subjects as multistage countercurrent extraction, the stability of emulsions and suspensions, and the theory of detergency", he said.

"I believe this development could not have taken place without the long background of research in wool scouring that is part of our laboratory."

### Background

"This background enabled several small pieces of knowledge, gathered over a long period of time and unimportant in themselves, to be assembled into a new idea that has led to a significant technological advance," he said.

"Perhaps the lesson to be learned is that the value of knowledge can never be finally assessed — what is unimportant today, may be crucial tomorrow," he concluded.

Dr Don Taylor, Chief of the Division, and Mr Tony Pearson, an Experimental Officer on the Lo-Flo project, also attended the ceremony held in Melbourne on 23rd April before about 250 members and guests of the Institution of Engineers.

Dr George Wood, second from left, leader of the Lo-Flo research team, receives the Engineering Excellence Award from Mr J.B. Crellin of the Institution of Engineers, Australia. At left is Dr Don Taylor, Chief of the Division of Textile Industry, and at right is Mr Tony Pearson, a member of the research team.



# Xinjiang : Hot, but so hospitable

## They asked about Sir Alan Walsh

Bureau of Scientific Services science writer Jeff Culnane, his Chinese wife Pui Tin and children Candice, 8, and Nicholas, 7, recently undertook a lengthy overseas trip during which they visited South America, England and Switzerland before flying on to China. Here, Jeff records his impressions of the visit to China.

We went to Xinjiang province in far north west China towards the end of September, after spending a month in South America and two weeks in England and Switzerland. The Chinese and Swiss governments had just signed an aviation agreement in which it was agreed that China Airways would have a once a week flight from Zurich to Urumqi, leaving Zurich at 6pm every Thursday and flying to Urumqi via Belgrade, arriving on Friday morning at Urumqi, and Peking at 4 o'clock on Friday afternoon. We stayed one week in Urumqi and then picked up the same flight a week later to go on to Peking to stay in the three-bedroomed flat of Tin's brother in the eastern suburbs of Peking.

The 'Xinjiang Uygur Autonomous Region' is a 'minority nationality' autonomous region as the Chinese call it, where the population consists of the following nationalities: Uygur, Khalkhas, Kazakh, Tajik, Hui, Mongolian, Tibetan, Uzbek, Russian, Tartar, Xibe and Daur. The capital Urumqi is beside the huge arid mountain range called Tienshan (Heavenly Mountain), that separates the edge of the Gobi desert from the Tarim Basin. The population of the province is 10 million and the capital has 800,000 people.

We spent two days in Tuluhan, (population 162,000, of which 110,000 are Uygurs) an oasis in the desert some 200 km from Urumqi.

It was then that Mr Shen, a foreign ministry official who accompanied us on our excursions during the week, said that he would like me to deliver a lecture to a group of scientists the following day. The subject was to be science management and recent scientific developments in Australia.

Our program was too busy for me to have time to prepare this lecture with one day's notice, so I resigned myself to just turning up and delivering it off the cuff.

We were very busy. Upon our return from Tuluhan, China's hottest and lowest place (40° for four months and 17mm annual rainfall and 150 m below sea level) we went to a minority nationality cultural performance.

We were delayed getting back to Urumqi because the copper fuel line in our Guizhou mini bus (provided for the four of us for the whole week with our Uygur driver, Turson Musar) broke in the middle of the desert and, although Turson repaired the fuel line, we ran out of petrol shortly afterwards and had to flag down two Red Army trucks and milk their tanks to get us back.

When we hit the sack at the end of the cultural performance, we had to rise early for our five-course breakfast and head off for the Urumqi teaching hospital.

After lunch and a rest I received the 'leading person' from the Provincial Science Bureau and we sat down in the lounge suite in my room over cups of tea and then I went down for the big event.

To my horror, when I entered the meeting room on the second floor of the hotel, 150 people started clapping as I walked up to the front.

In front of me was a table with two microphones, tea cup, confectionery, cigarettes, water jug and tumbler and at the side a blackboard with chalk and duster.

I outlined the structure of CSIRO and made mention of the fact that we have 37 Divisions just as the Chinese Academy of Science has 37 research institutes.

I outlined the management structure of the Organization and then I took a Division (Applied Organic Chemistry) as an example to explain how many professional scientists, technical people and support staff made up a typical Division.

Then I started on recent developments in science. I mentioned InterScan, modern mining techniques, coal conversion, solar energy.

Mr Shen had told me they were interested in wood preservation, but time did not permit me to get going into that because the interpreter could not handle technical terms so I had to deliver my talk at a low level.

When question time started, I received three questions on paper, one in English, two in Chinese.

One asked what Dr Alan Walsh was doing. I was able to tell them that he was recently retired, that work was continuing on atomic absorption spectrometry in the Division of Chemical Physics, that he was in good health and had become a member of the Royal Society. I also explained the recent developments in AAS including dry sample technique and I gave a simplified explanation of how AAS works.

I explained how CSIRO patented their invention and the machine was now commercially sold, initially by Varian-Techtron.

The next question was about scientific exchanges between Australia and China and I was able to list these.

The third question was what was my work before becoming a science writer and so I gave them an outline of my work in high performance liquid chromatography.

I was thoroughly exhausted after this show and tucked into the evening meal and a bottle of Beijing Xian Pijiu (Peking Draught) before going to the movies to see a fairy tale about seven sisters in Heaven.



Some 200km from the provincial capital, Urumqi, a peasant on a donkey travels slowly through gibber desert and blistering heat towards the oasis of Tuluhan. In a past age, silk caravans traversed the same route.



The Culnane family sits down for a briefing at the Five Star People's Commune in the Tuluhan oasis, with watermelon and tea for refreshment. The commune, of 34,000 people, produces cotton, wheat, sorghum and melons, and boasts five million trees which help moderate the extreme heat of the area. From right are Mr. Shen, the commune leader, a Han-Uygur interpreter, and Reyli Mutuo Hui.



The ancient city of Gao Cheng, established in the 1st Century BC, flourished because of its position on the Silk Route, but was abandoned in the 15th Century. Ancient poems refer to Flaming Mountain, seen on the left.



The CoResearch feature 'Perspective' exists as a forum for staff to express viewpoints on matters of interest to staff of the Organization, even if the subject does not impinge directly on CSIRO's affairs. Contributions may be 'straight' or satirical, and the viewpoints conventional, divergent or even unorthodox. 'Perspective' is seeking authors, and they should write to the following address:

The Editor,  
CoResearch  
PO Box 225, Dickson ACT, 2602.  
Travelled overseas or to some out-of-the-way area in Australia lately? Other people in CSIRO may be interested in what you saw, and your impressions of the places you visited. CoResearch is seeking illustrated articles of the type submitted by Jeff Culnane on P4, which should be sent to:  
The Editor  
CoResearch  
PO Box 225, Dickson, ACT  
2602

# Lobster's long-odds odyssey

*From 300,000, just two survival tales*

The Division of Fisheries and Oceanography's western rock lobster research program in Perth is winding down after providing a wealth of information essential to the management of the \$30 million fishery.

The program during its lifetime became a model for close co-operation between science and industry, and contributed substantially to the Organization's image in Western Australia.

The western rock lobster, *Panulirus longipes*, became perhaps the most intensively studied marine creature in Australia, simultaneously attracting the attention of CSIRO, the WA Department of Fisheries and Wildlife and, to a lesser extent, the WA Museum.

The attention was quite warranted, however — the lobster is the most valuable single-species fishery in Australia.

Despite the intensive studies, many questions about the lobster remain unanswered.

Why, for example, does a sedentary creature which spends the whole of its juvenile and adult life on coastal reefs undertake in its larval stage an open-ocean initiation test in which the odds against survival are vanishingly small? (An estimated two larvae of the 300,000 which hatch from a single female lobster's batch of eggs makes it to adulthood).

And why does the larval lobster go through no fewer than nine different forms before assuming its adult shape?

Dr Bruce Phillips, who headed the research program in its later stages, said the most difficult task had been defining the movement of larval lobsters during the nine or more months between hatching and their re-

turn from the ocean at the puerulus stage (the phase at which the larval lobster first becomes identifiable as a lobster), to settle on coastal reefs.

A general picture has been developed which shows the effect of ocean current and wind on the movement of larvae.

After hatching from eggs carried beneath the female lobster's tail ('berries') the larvae move out from the reef zone into the open ocean under the influence of winds which blow away from the shore at night.

The minute larvae join billions of other small organisms which make up a plankton 'soup' in the upper, light-penetrated parts of the ocean.

The lobster larvae, called phyllosoma ('leaf shape') feed on smaller planktonic organisms and are in turn fed upon by other organisms.

During the day, wind direction reverses, and plankton near the surface are carried back towards the shore. The net effect of this toing-and-froing, however, is to carry the larvae out into the open ocean, where they will spend nine to eleven months. During this period they grow, and gradually change shape by frequent moulting.

After entering the third developmental stage, the larvae undergo a behavioural change, and begin to spend more time below the surface zone.

The direction of movement now changes. The larvae only come under the influence of offshore winds when they follow plankton to the surface zone at night, and for the rest of the time are carried back towards the coast by the oceanic current.

When they reach the coastal zone, the larvae, which by this time have undergone



a final change to become the puerulus stage, break out of the current and swim strongly towards the coastal reefs where they will settle and begin developing into adults.

The two-stage odyssey is further complicated by the direction of the ocean current, which is in fact slowly rotating clockwise in an enormous circle called a gyre.

On the outward journey, the lobster larvae are carried slightly southwards by the gyre. Periodically, small counter-eddies peel off the main gyre and larvae caught in these may never find their way back to shore.

Those which do live to make the return journey from mid-ocean are carried northwards slightly, in the gyre, and then eastwards toward the coast, breaking out shoreward as the current begins to swing southwards again. (see diagram)

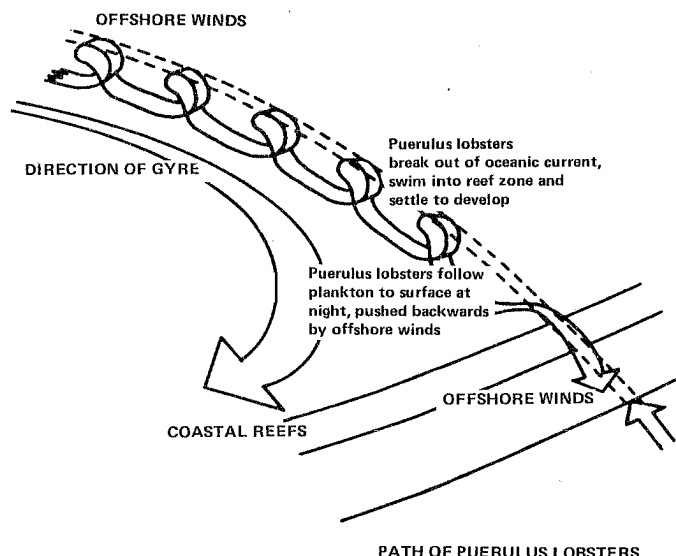
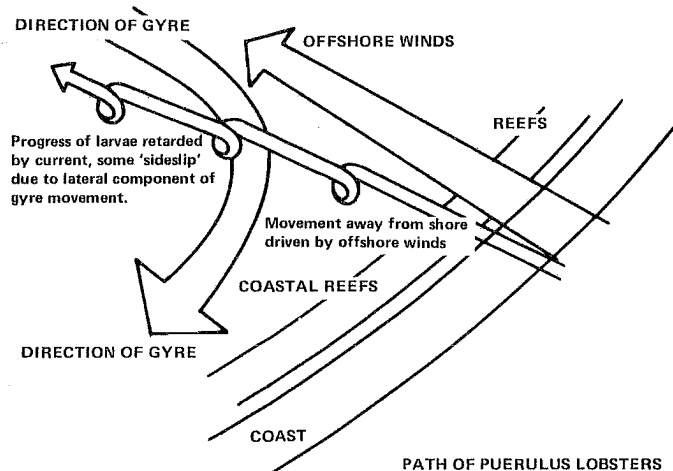
Just how far westward the larvae penetrate the Indian Ocean is a mystery — some may

even approach the African coast as the current swings northwards and finally eastwards back towards Australia.

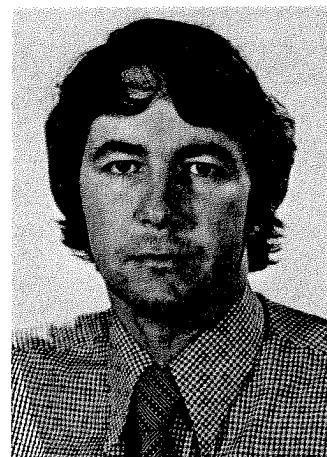
The western rock lobster bears no more than a superficial resemblance to another species which lives in the Red Sea. It is not impossible that the two species may have come from the same ancestral stock, distributed by the gyre millions of years ago.

Perhaps the most puzzling question of all is how the puerulus senses the right time to leave the current which has dictated its life for the past nine months, to swim to shore to settle.

The cues used by the Puerulus are unknown — but it is known that for some reason, it ceases to be a passive passenger on its oceanic merry-go-round and swims strongly and with remarkable purpose to the reef — where its future, from a gastronomic viewpoint, can be predicted with much greater certainty.



## Pawsey Medal for versatile physicist



Dr Greg Clark, a Principal Research Scientist with the Division of Mineral Physics in Sydney, was recently awarded the Pawsey Medal by the Australian Academy of Science for distinguished research in experimental physics.

Dr Clark's research has been applied to problems as varied as air pollution, the effects of dietary deficiencies among aboriginal children, solar energy and isotopes. The award was presented to Dr Clark by the President of the Academy, Dr L.T. Evans, during the Academy's Jubilee Ceremony in Canberra in March.

The Pawsey Medal commemorates the late Dr J.L. Pawsey who pioneered the use of radio techniques in astronomy and other physical problems.

It is awarded to scientists under 36 years of age for distinguished research work carried out mainly in Australia.

Dr Clark's award was in recognition of his research work into solid state physics.

Born in Tasmania in 1945, he graduated B.Sc. from the University of Tasmania

(1st Class honours) in 1964.

His initial research at the Australian National University, where he completed his PhD in 1968, was in nuclear physics.

After three years at the UK Atomic Energy Authority in Harwell, England, Dr Clark joined the Division of Mineral Physics in 1972.

Here he used nuclear techniques to study solid state physics, with particular emphasis on geological materials.

His research in this field helped clarify some of the problems that arise when lead isotopes in zircon are used to date rocks.

Dr Clark played a vital role in the early stages of an air pollution study in Sydney by the CSIRO Division of Process Technology.

In this instance scientists needed to measure minute traces of elements in samples of air and Dr Clark was able to adapt an ion bombardment technique to provide analyses at previously unattainable low levels.

In a project for the Royal Melbourne

Childrens' Hospital, Dr Clark helped develop methods of measuring chromium at very low levels in human blood — a project now aimed at establishing the effects of dietary deficiencies among aboriginal children.

In the field of energy research Dr Clark has developed techniques for establishing and understanding the structure of chrome-black solar absorber surfaces, in terms of optical and thermal properties.

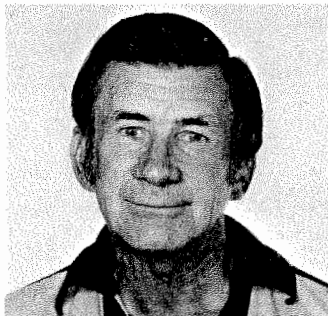
He has also been studying isotopes in various Australian uranium deposits to assist in their mining and treatment, and to provide information on how they were formed.

In 1976 Dr Clark was invited by the Oak Ridge National Laboratory in the USA to work on the application of ion beams to solid state sciences. In his 18 months there he was involved in the initial development work on the use of high-powered lasers for annealing of ion implanted semiconductor materials.



## People

### 43 years . . .



Yes, you can survive 43 years in CSIRO's administration without losing hair or having it turn grey — Tom Lewis, laboratory Secretary at the Division of Animal Health's McMaster Laboratory in Sydney is proof enough.

At the time of his retirement earlier this year, Mr Lewis was 10th on the list of CSIRO's longest-serving officers (there are 34 officers who began duty before January 1, 1940).

He began duty in 1936 as an assistant in the Canberra office serving the Divisions of Entomology and Plant Industry.

Ten years later he transferred to the Division of Fisheries, Cronulla, as Senior Clerk for the Division, and in 1958 he moved to McMaster, where he became Laboratory Secretary in 1968.

After the Division's Chief, Dr A.K. Lascelles, introduced a policy of changing Officers in Charge every three years at the Laboratory, Mr Lewis became responsible for 'breaking in' the new men to the mysteries of its financial affairs.

The Lewis family is still well-represented in CSIRO. Two of his brothers, Ernie and Bob Lewis, are Senior Technical Officers with the Division of Entomology — Ernie has 35 years service and Bob 25 years.

### . . . and 42



One of CSIRO's longest-serving scientists, Mr George Hubble, has retired after 42 years as a pedologist with the Division of Soils.

Mr Hubble during his long career with CSIR and then CSIRO served under all four Chiefs of the Division of Soils, and under all the Chairmen of the Organization.

He graduated from the University of Adelaide in 1936 and was one of the very first soil surveyors appointed under Mr J.K. Taylor to continue the detailed surveys of the Murray Valley irrigation areas.

After a brief secondment to the Queensland Department of Agriculture and Stock in 1938, he served with the RAAF during the war.

He subsequently moved to Tasmania to become involved in soil surveys and land use recommendations of areas selected for post-war settlement.

Mr Hubble moved to Queensland in 1948 as Regional Soils Officer in the newly-formed Plant and Soils Laboratory in Brisbane.

The extensive knowledge of Queensland soils which he accumulated over three decades was reflected in the first soil map of the state in 1960.

He has made national contributions to soil classification and survey techniques, and was a major contributor to the Handbook of Australian Soils.

Upon his retirement, his colleagues presented him with a set of wood-turning tools and a mounted spade and auger to mark his years of soil study.

CSIRO recently appointed a new archivist. He is Colin Smith, a former South Australian with a keen interest in cultural conservation. He comes to CSIRO via a post-graduate archives diploma course at the University of NSW, and positions in the ANU Archives of Business and Labour, and the Australian Archives.

The previous CSIRO archivists were Wally Evans and Kevin Green. They developed a close cooperation with two very historically-aware CSIRO registrars — Phil Knuckey and John Graham.

The archivist's job is to select those records (files and minutes mainly — but also photographs, sound recordings, computer tapes etc) which are likely to be of permanent historical or other interest; to provide for their physical preservation in an archival repository; to develop systems for their retrieval as required; and to conduct a reference service for both CSIRO and the general public.

Because of his involvement in information service, the archivist is attached to CILES. However, he works mostly with administrative and records officers, with whom he has a joint concern to see orderly systems of record retirement, whereby registries are cleared of unwanted material and destruction is governed by a considered and informed policy.

Registries are not the only sources of CSIRO archives. Of almost equal importance, but rather less amenable to routine procedures, are the personal office holdings of CSIRO scientists and policy makers.

These collections usually contain a great deal that is cognate to CSIRO, mixed with a certain amount that is strictly personal — and some material that is both. And they are continually being 'disposed of' when officers move, change jobs or retire — in most cases without reference to the archivist.

Mr Smith says it is often debatable whether the CSIRO archivist has any right to examine or accession such material, but says it is quite clear that he needs to be advised and consulted (along with the relevant record officer and librarian) when its disposal is undertaken. Despite the delicacy and complexity of such situations, it is usually easy enough to make arrangements which are entirely satisfactory to all parties.

Mr Smith says the archivist cannot, on his own, build a collection that will adequately document CSIRO's distinguished history. He needs the help of all the Organization's Chiefs and Indians to bring to light material of archival value.

CSIRO's archivist can be contacted in Canberra at the AMP Building on 484677.

Dr Ted Radoslovich, a Principal Research Scientist with the Division of Soils in Adelaide, has been made an honorary life member of the CSIRO Officers Association.

Dr Radoslovich was president of CSIROOA for the two years between 1974-76, and gave valuable leadership to the Association during the so-called 'Connor crisis', when large numbers of CSIRO staff faced the prospect of being transferred to the Public Service with the hiving off of CSIRO's energy and minerals research to the Department of Minerals and Energy.

He accepted legal advice to take out writs to prevent the transfer, and during the hectic days of the crisis his close contacts with Senator Steele Hall helped the Association to lobby effectively among parliamentarians in Canberra.

The life membership conferred on Dr Radoslovich recognises 'long and distinguished service to the Association'.

Apart from his 29-year membership of the Association, Dr Radoslovich served in various official capacities on its council between 1961 and 1979, and is currently a member of its Finance and Administrative Systems committees.

His dedication was probably no more evident than during an air transport strike, when he rode a motorcycle through rain and shine from Adelaide to Melbourne in 14 hours to represent the Association at a private conference.



At a recent function at the CSIRO Dairy Research Laboratory, staff and other well-wishers farewelled Dr B.S. Harrap, (left) and his wife.

Dr Harrap officially relinquished his role as Officer-in-Charge of the Dairy Research Laboratory, Division of Food Research, Highbett, Victoria, to transfer to the newly formed CSIRO Centre for International Research Co-operation in Canberra.

During his seven years as Officer-in-Charge of the Dairy Research Laboratory, Dr Harrap was faced with many challenging problems because of the rapidity of changes in those years.

He maintained a good balance in allocation of resources to both the short-term problems of industry and those longer-term aspects likely to provide advances in dairy science and the basis of development as the economic climate improved.



The Division of Entomology at Black Mountain, Canberra, recently farewelled Dr K.R. (Dick) Norris, Associate Chief, who retired after 41 years service. Dr Norris joined the Division of Economic Entomology, CSIR, on May 31, 1937, as a temporary research officer in Western Australia.

During his career he applied his powerful biological skills to the solution of problems concerning a number of important agricultural pests — red-legged earth mite, lucerne flea, buffalo fly, cattle tick, sheep blow fly, and screw-worm fly — often for long periods in isolated places.

However, his major entomological love became the taxonomy of the Calliphoridae, (blowflies) which he will continue to study in the Division as an Honorary Research Fellow.

Because of his vast fund of knowledge in this field, Dr Norris was often called upon by health and forensic authorities to perform identifications of a grisly nature.

He was made an Assistant Chief in 1965, and in recognition of his unique contributions to the Division of Entomology, became Associate Chief in 1977.

His absence as a full-time member of the Division will be keenly felt.

No matter what important task he was engaged in, Dr Norris would always make time to advise or help a colleague.

He is also a master scribe, and perhaps missed as much as the man himself will be his trusty pen, 'Excalibur', from which flowed immaculate prose in the service of the Division and its staff.

Dr Harrap left the Laboratory having established a sound structure based on four research groups with most relevant sets of projects, which should provide a major contribution to dairy science and the needs of industry in the next few years.

Mr L.L. Muller is acting Officer-in-Charge at the Dairy Research Laboratory until the appointment of Dr Harrap's replacement.

At the same function, staff took the opportunity to farewell Mr M.V. Tracey who was formerly Chief of the Division of Food Research which includes the Dairy Research Laboratory. With the regrouping of CSIRO Divisions into Institutes, Mr Tracey was appointed Director of the Institute of Biological Resources.

Dr J.H. Christian will be acting Chief of the Division of Food Research until a new Chief is appointed.

Kevin Smith, The Divisional Administrative Officer at Horticultural Research in Adelaide, has been awarded an Anzac Fellowship for 1979, to enable a six month study visit to New Zealand, commencing in early July.

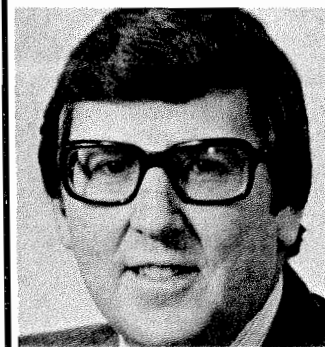
The Fellowship will allow Kevin to study administrative organisation and science management, primarily within the NZ Department of Scientific and Industrial Research.

He will also make some study of administration in laboratories of the Ministry of Agriculture and Fisheries and in University research laboratories.

Mr Smith will take special interest in the management structure within the DSIR Head Office and research laboratories.

He will initially spend a two month period at the DSIR Head Office in Wellington, followed by a working period of two months at the Divisions of Biochemistry and Plant Physiology at Palmerston North.

The final two months will incorporate study visits to laboratories attached to the Mount Albert Research Centre at Auckland and the Lincoln Research Centre, Christchurch.



Former Executive Member Sir Ian Wark received an unusual birthday present when he turned 80 last month — a degree of Doctor of Arts and Sciences Honoris Causa from the Victoria Institute of Colleges.

Sir Ian, who served on the Executive in the early 1960s, was Chief of the former Division of Industrial Chemistry.

## Events

### Biosphere reserve

In modern-day publishing, there's nothing like an 'event' to put a new book before the public eye — hence the popularity of media receptions and jetset tours by authors around the world.

Just occasionally, the 'event' doesn't have to be manufactured, as is the case with the soon-to-be-published CSIRO book 'Kosciusko Alpine Flora'.

Very conveniently, the United Nations Educational, Scientific and Cultural Organisation (UNESCO) has declared the Kosciusko National Park a World Biosphere Reserve, one of only five such reserves in Australia.

World Biosphere Reserves are areas of natural and man-modified land that provide opportunities for both national and international research into problems of environmental management.

Each reserve is selected to provide representative samples of natural plant and animal communities around the world, and to safe-

guard the genetic diversity upon which the continued evolution of their species depends.

The Kosciusko alpine region, where CSIRO's Division of Plant Industry has carried out a decade of study, represents the essence of UNESCO's qualifications for declaration of a biosphere reserve — it is a unique area botanically, and one where European man and his grazing animals have had a severe and long-term impact on a fragile environment.

The attention which the UNESCO declaration will focus on the Kosciusko National Park will inevitably create a public demand for information about the biological resources of the region which should be fulfilled by 'Kosciusko Alpine Flora'.

The book is the result of a decade's work by Alec Costin, Dane Wimbush, Max Gray and photographer Colin Totterdell — one of Colin's photographs for the book featured on the front of last year's CSIRO annual report.

CSIRO's Chairman, Dr Paul Wild, and the Prime Minister of Papua-New Guinea, Mr Michael Somare, received honorary doctorates from the Australian National University in April.

Dr Wild received an Honorary Doctorate in Science for distinguished creative achievement as a scholar, while Mr Somare received an Honorary Doctorate in Law for distinguished creative contributions in the service of society.

In September the ANU will also confer an Honorary Doctorate of Science on Professor Sir Rutherford Robertson, a former CSIRO Executive Member, who retired last year as Director of the ANU Research School of Biological Sciences.

Dr Brian R. Loveys, a Senior Research Scientist at the Division of Horticultural Research in Adelaide, was awarded the P.L. Goldacre Award at the annual meeting of the Australian Society of Plant Physiologists in Canberra recently.

The award honours the memory and attainments of Peter Goldacre, a foundation member of the Society and is made on the merit of original research in one area, published during the three years prior to the year of award.

Dr Loveys's research investigated the intracellular location of abscisic acid (ABA), a plant growth hormone, in relation to its sites of synthesis in stressed and non-stressed spinach leaf tissue.

### 24-carrot joules

The Division of Land Resources Management, in collaboration with the Western Australian Department of Agriculture and Murdoch University, is organizing a Workshop entitled 'The Impact of Changes in Energy Costs on the Rural Sector of the Australian Economy'.

The Workshop will be held in Bunbury, WA, from October 14-19.

It aims to examine the implications of the changing energy situation, especially oil, for rural areas.

Invited papers will give basic data on energy use in terms of both joules and dollars.

The implications of changes in energy costs to farm incomes will be examined in

detail.

Measures to conserve energy and to produce energy in rural areas are to be considered.

In the final sessions the participants will be asked to develop energy policies for rural areas and to identify priority areas for research.

Inquiries should be directed to

Mr R. A. Rummery,  
Division of Land Resources Management,  
CSIRO,  
Private Bag P.O.,  
WEMBLEY, WA, 6014.

Telephone: 387 4233  
Telex: 92178

CSIRO last month received a visit from a group of staff and students from the National Defence College of Thailand, one of the most important military colleges in Asia.

The Royal Thai Embassy had requested that as part of the group's field trip to Australia, it be briefed on the role and management structure of CSIRO, and some of the main objectives of the research programs.

The 17 staff and students of the National Defence College are all high ranking members of Thailand's administration and armed services.

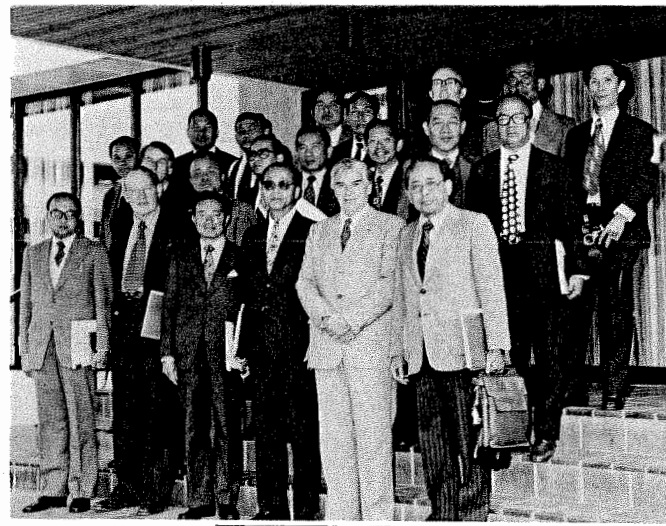
They were accompanied by the Royal Thai Ambassador, His Excellency Mr

Wichet Suthayakom, and three attaches from the Royal Thai Embassy.

At Head Office, the group met Mr P. F. Butler, First Assistant Secretary (Science Liaison), Mr H.C. Crozier, First Assistant Secretary (Administration) and Dr J. B. Allen, Senior Assistant Secretary (Liaison).

Mr Butler, Mr Crozier and Dr Allen spoke briefly on aspects of CSIRO's research and administration, and a film on the scope of CSIRO's research was shown. The visitors were given literature dealing with CSIRO's structure and functions.

The visitors felt that the visit was successful and profitable, and expressed their appreciation by presenting Mr Butler with a plaque.



FROM TRIAL HILL — BAROSSA

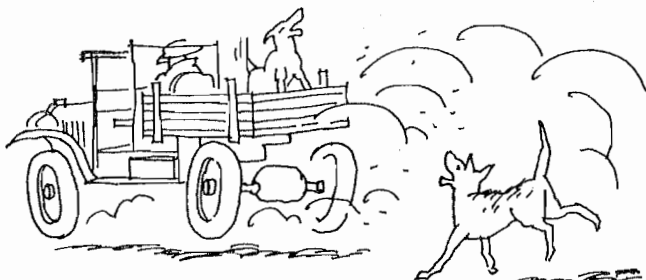
Distance creeps up closer with the years.  
Irreverent sounds  
of Sunday-thunder interrupting bells  
are muted now  
and mutter at the morning. Only here  
my bands feel clearly still and touchings tell —

of needle-cushioned ground where churchyard pines  
have turpintined the wind —  
of egg-shell husks  
on wizened pepper-berries, tissue thin —  
the rasping touch of fretting, flaking crusts  
of paint on scraping gates that let me in  
through walls that seem to grow in valleys sown  
with bluestone seeds. Warm-mortared walls that store  
the summers of their growing in behind  
the surfaces of bessian-textured stones.

And hand-remembered valley-patterns lie  
within the crystal skins  
of grapes in ruin —  
in burs of borebound seeds — or in the thin  
and crumpled trumpets of Salvation Jane,  
like silk in fingers — in the rust on rims  
where spring-cart wheels decay near gates — in round  
and time-stained grains where hand-smoothed, bausfrauded pews  
stand dustless, bushed and warmed in patches by  
arched sunshafts letting diamond-patterns down.

Although familiar scenes seem further and  
some sounds have drained  
away from concords that the morning brings,  
this land remains  
within the span of recognising bands.  
We never seem to lose the feel of things.

### McMahon



"WHERE'S SCHELL?"

He certainly detested George Schell's dog.  
The words "where's Schell?" would catapult him round  
the tankstand. Hedgehog-backed, thyroid-eyed  
he'd rumble there, ears sifting wind for sounds  
of George's Chev-four truck that clattered by  
on wheezing, steamed excursions into town.

Gates shuddered as he raced towards the road  
and as he rasped beneath the bottom rails  
he left a fringe of chocolate coloured hair  
along the splintered wood. His bellow trailed  
his progress like a shadow pausing where  
he scraped against the ring-lock netting nails.

And so the Chev-led tumult trundled on.  
While Schell pawed roaring circles round the tray  
Choc barked his bakas from the dust that flowed  
around their bawling progress storeward. Waves  
of foamed invective faded as George towed  
his raucous dustcloud slowly through the haze.

He'd lumber homeward from his mobile war  
parched barkless and his back the balder from  
one more encounter with the netting gates.  
Back underneath the tankstand he'd lie prone,  
eyes beaded roadward, swivel-eared, and wait  
for sounds of George's rattling journey home.

When I returned last year I ran my hand  
along a weathered slab of yellow box  
that forms a bottom rail. The hair had gone.  
But then so had the house and George and Choc —  
these thirty years and more. One gate alone  
remains and rattles in its rusted lock.

But now it's just the wind.

Two more offerings are presented from the  
pen of CSIRO's resident poet, Frank  
McMahon. Again they record impressions of  
his spiritual home, the Barossa Valley. The  
illustration to 'Where's Schell?' is by former  
CSIRO graphic artist David Marshall, who is  
illustrating Frank's first book of poems  
(see back page letters).



# Don't be harsh on 'soft science'

There was another argument going on in the corridors recently about the 'soft sciences' — the social sciences as its proponents politely insist.

One of these arguers held up for approval his version of the Birch Report comment: that social sciences should not be pursued by CSIRO 'unless it was absolutely unavoidable', thus pouring scorn on the idea that social sciences are of value.

Indeed, this fellow denied that they are even sciences.

According to the Encyclopaedia Britannica, social scientists concern themselves with human behaviour and its social and cultural aspects; economics, political science, sociology, social and cultural anthropology, social psychology, and social and economic geography.

Until the nineteenth century, it had not occurred to anyone (especially to scientists) that human behaviour was a fit study for anyone, except perhaps the clergy.

Certainly dehumanised science made marvellous discoveries and poured knowledge into the lives of wondering humans.

And practical men have been able, usually as spin-offs from untargeted research, to create something men can use from this 'pure' research.

But why is it considered infra dig to look to science to be a bit more subjective, instead of coldly objective all the time?

Why is it charming that a distinguished mathematician writes little books for children in his spare time (under a pseudonym of course), but somehow silly and pretentious when a distinguished painter conducts serious chemical experiments in a well-equipped laboratory in his spare time?

We are told that one of the reasons social sciences are not scientific is that they are not subject to scientific method, to rigorous appraisal, to replication, to absolute proof.

It's all very 'airy-fairy'. Yet observer bias is an accepted phenomenon in even the hardest of sciences.

It would seem to this biased observer that an impatience with the methodology of

social science can lead the straight and narrow scientist along some pretty primrose-strewn paths.

The simple number-crunched unemployment statistic —  $X\%$  — looks neat and accurate on paper, worked out on a computer with replicable results, using one set or another of proven data.

But talk to a jobless human being and see how the datum he provides alters your attitude. If that sounds sentimental, read about the genesis of the *Bulletin of the Atomic Scientists*.

Perhaps to some social scientists, their work does have an element of emotion, perhaps compassion or similar feelings of kinship with their central preoccupation.

And of course one cannot easily quantify human emotions — pain, passion, love, patriotism, and so on. But behaviour can be predicted and measured.

And one very seriously questions the efficiency of a research programme which would investigate, for instance, the origins and processes of a crop failure without giving cognizance to its primary interest — someone goes hungry, and hunger hurts.

The author of this issue's 'Perspective' preferred to remain anonymous. While CoResearch encourages contributors to identify themselves, anonymity can be permitted in certain circumstances on the basis that the 'Perspective' column is not unlike an expanded Letter to the Editor, a feature which does allow writers to remain anonymous if they provide name and address to the Editor. As the author's contribution is somewhat brief, an external perspective which some of us may find relevant is included in this issue.

## New deals : Sleight of hand?

*'Tis said that a change is as good as a holiday, but one suspects a good many of us would have preferred the holiday to the changes of recent months — or at least would have preferred to go away while the changes were effected. Is ReOrganization worth it? This excerpt from 'New Scientist' may throw some light on the matter.*

Unpleasant but necessary actions can be comfortably avoided because it would not be appropriate to take them till After the Reorganisation.

There is always the golden get-out for every devoted Changemaker that the Reorganisation may never, in fact, be put to the test because, at the end of three years of turmoil, the whole thing may be dropped because the Unions Don't Like It.

But if by some sad luck, the Reorganisation is introduced and it turns out to be a bloody sight worse than the one you had before, the Changemaker can always put off the day of the chopper by using the magic phrase that all will assuredly be well When the Reorganisation Has Settled Down.

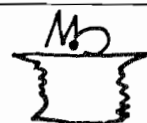
During which period he prudently gets himself transferred far away to some other disruptive project from which safe distance he can muse upon the opinion of a leading British management consultant that an unmistakable symptom of death-wish in any commercial organisation is adherence

to the precept "When in utter doubt about what to do next, let's reorganise".

Among the traits which doom modern man to be less happy than the lower animals is his restless desire for change. Middle management executives heavily afflicted by such manic love of organisational turmoil in their top brass may take some small comfort that theirs is no new tribulation.

In AD 66 Gaius Petronius complained that "We trained hard—but it seemed that every time we were beginning to form up into teams, we would be reorganised. I was to learn later in life that we tend to meet any new situation by reorganising, and a wonderful method it can be for creating the illusion of progress while producing confusion, inefficiency and demoralisation."

Doctor Johnson later noted the same malaise in our eighteenth century, reporting that "Such is the state of life that none are happy but by the anticipation of change. The change itself is nothing; when we have



made it, the next will is to change again."

And this St. Vitus syndrome still flourishes better than baytrees today, and the frantic Changemakers abound at every political, industrial and commercial hand.

The major delusion that afflicts the Changemakers is that "Change is Progress." This aberration stems from their tribal tenet that "All Present Systems are Inefficient", and that "All Proposed Systems are Perfect".

This they can prove to their demented selves and to gullible managing directors because the shortcomings of any present system are perforce apparent in practice, whereas the failings of any proposed system are invisible, thus allowing only its supposed virtues to be profitably lauded.

When O and M (Organisation and Methods) was the great postwar bandwagon, its downier practitioners, on the foregoing principles, reduced all reorganisations of large-scale national undertakings to two simple laws.

The first — "If It's Decentralised, Centralise It"; and the second — "If It's Centralised, Decentralise It".



The oscillating application of these two processes by successive Changemakers is responsible for the currency of the later O and M precept that "Every Large Organisation Repeats Its Structure Every 25 Years".

It takes the Changemakers something around fifty years to bring the factory methods of a major industry to full circle; as just exemplified in the automobile industry where the long-worshipped assembly line is progressively being abandoned, and a return is being made to that old-fashioned and previously inefficient system of team assembly of a complete product.

It will only be a few more years before the nimblest Changemakers will be lauding the obvious advantages of cottage industry.

Changemakers also work hard to foster the illusion that they are Men of Action.

In fact, they are Abettors of Inaction, because nothing so capably reduces gainful effort and progress towards a firm's objectives as a root-and-branch office reorganisation.

The pleasures of drawing up new organisation charts are much preferable to the hardships of actually producing anything.

## Science at work

The pitiful aftermath of a youth dissipated in pot-smoking is graphically recorded as an unidentified addict attempts to graduate to smoking grass trees. In this terminal stage, symptoms include chronic melanism and dire xanthorrhoea.



## Letters

### Poetry

Sir,  
Thank you for publishing two of Frank McMahon's poems in your Jan-Mar. issue. They were superb.

I look forward to the publication of his collection in October. Perhaps (if sufficiently many people are interested) CoResearch could arrange for CSIRO staffers to purchase the volume through some central address. Particular volumes of poetry are notoriously difficult to locate, even in good bookshops.

Ron Sandland  
Div. of Mathematics and Statistics  
Cronulla

EDITOR'S NOTE: CoResearch will notify readers when Frank's book is published. Any staffer wishing to purchase it should then write to him at Head Office, PO Box 225, Dickson, ACT, 2602, and Frank will be delighted to autograph copies if the buyer wishes.

'CoResearch' is produced by the Science Communication Unit for CSIRO staff. It is also circulated to some people outside the Organization who have a professional interest in CSIRO activities. Members are invited to contribute or send suggestions for articles. The deadline for material is normally the first day of the month preceding publication. Material and queries should be sent to the Editor, Box 225, Dickson, A.C.T. 2602. Tel. 48 4476 Editor: Graeme O'Neill.



# CoResearch

A publication for CSIRO staff

July/Sept. 1979 226



## Budget : Another belt-tightener

*We'll have to do more with less in '79-'80*

The 1979-80 Budget has put further pressures on the already strained resources of CSIRO.

The Organization received a Budget appropriation of \$155.6 million, comprising \$152.5 million for salaries and operating costs, and \$3.1 million for major items of equipment, minor building work and developmental expenditure.

The total represents an increase of \$9.6 million over last year's expenditure of \$146 million, but a significant proportion of this increase is to meet full-year costs of projects begun in 1978-79. These costs, amounting to nearly \$3 million, are for: the salaries and operating requirements of the Materials Research Laboratory (Maribyrnong) being transferred from the Department of Defence to CSIRO; the additional costs associated with the provision of research support to the Department of Primary Industry in its role of monitoring and managing resources of the Australian Fishing Zone; additional costs associated with the fitting out and operation of the F27 aircraft acquired by CSIRO in 1978/79 for the work of the Division of Cloud Physics; increased costs associated with the planning and development of the Australian

National Animal Health Laboratory at Geelong;

costs associated with the occupation of new accommodation; and the full year salary costs of 60 apprentices employed by CSIRO in 1978/79 as part of the Commonwealth Apprenticeship Training Scheme.

The remaining additional funds of about \$6.6 million represent an increase of 4.5 per cent on expenditure last financial year, and provide for inescapable increases in salaries resulting from National Wage decisions.

The key point of the Budget is that CSIRO received no extra funds to offset the impact of inflation on its operating costs.

CSIRO has estimated the Organization's internal inflation rate runs at two to three points higher than the general inflation barometer, the Consumer Price Index.

Just to keep pace with inflation, CSIRO needed about \$5m more than it received this year—or \$5.5 million if the internal inflation rate were to be accommodated.

The cumulative effect of the current and two previous Budgets which had a similar impact, has been to substantially erode the Organization's economic position

relative to 1976-77, when real-terms increases in funding ceased.

In the past two years CSIRO had managed to adjust to a requirement to do more with less, and the strategy adopted by the Executive for the current financial year continues to reflect the problems imposed by dwindling funds.

In an effort to maintain the flexibility essential to research programs, the Executive has 'called in' 3 per cent of total funds from Divisions, which will be made available for reallocation within the Institutes, Bureau and Head Office.

There will also be a call-in of 1 per cent of staff positions (about 60 positions) from the Institutes, Bureau and Head Office, which will be available to the Executive from July next year for redeployment to priority areas.

The Institutes have been told there must be a shift of 2 per cent of total salary costs into operating costs.

This effectively removes the staff ceiling under which CSIRO has operated in recent years and replaces it with a 'financial ceiling', which even further constrains the number of staff which the Organization can employ.

The constraints which have been imposed on new positions will ensure that existing staff continue to be adequately supported.

The more public picture projected of CSIRO funding in the past few years has been one of growth—but such growth is limited to specific areas and has almost invariably involved new and continuing commitments or a redeployment of funds into priority areas.

There has been almost no growth in funding of day-to-day research programs, which are in decline in many areas.

One bright spot in this year's Budget is that construction will begin on the \$9.1 million laboratory complex for the Division of Chemical Technology at Clayton, Victoria.

### INSIDE

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Entomology wins fun run — P 4

The most courtly of games — P 5

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## Lucerne team produces a \$50m payoff — Continued on P 2

The picture accompanying this article is worth a thousand words. And its subject matter is worth at least \$50 million.

It shows a seedbox containing the remains of Hunter River and CUF lucerne seedlings, devastated by spotted alfalfa aphids and blue-green lucerne aphids.

Immediately adjacent, green and healthy despite identical attention from the aphid hordes, is SIRIVER, one of two new aphid-resistant lucerne varieties produced by CSIRO's Division of Plant Industry in a crash breeding program that began only 18 months ago.

The two new varieties, SIRIVER and SIROTASMAN, promise one of the most spectacular payoffs in the history of Australian science—a return of \$50 million a year for the beleaguered grazing and lucerne hay industries of southern Australia for an investment of about \$100,000.

The first figure represents the estimated losses to the industry caused by aphid attack in the first year after the two pests were first discovered in Australia.

There are less obvious costs to be added to the \$50m loss—the importation of semi-resistant lucerne from overseas, forced reduction in stocking rates because of feed shortages, and the almost unquantifiable

loss of soil nitrogen normally contributed to Australia's poor soils by healthy lucerne crops, through symbiotic fixation.

The figure of \$50m represents a single year's losses to the \$100m-a-year hay industry, so the ongoing benefits of the new lucernes will be substantially larger.

The new varieties will be released soon to selected growers for seed increase programs. A substantial amount of seed should be available to growers in autumn 1981, and an amount equal to Australia's total requirement could be available the year after.

The development of SIRIVER and SIROTASMAN represents a triumph of the plant breeder's art.

They are the product of a quite brief, intensive selection program from parent varieties which had limited or no resistance to the aphids—the extensively grown Hunter River (non-resistant) and the imported American variety CUF101 (semi-resistant).

The use of Hunter River as a parent was based on its proven record as a variety suited to a wide range of Australian conditions, and also on the availability of root-rot resistant lines from a previous breeding program involving CSIRO's Division of Tropical Crops and Pastures and the



# New-look Advisory Council meets

## Public must also contribute—Minister

CSIRO Advisory Council Chairman, Mr Victor Burley, left, talks with the Minister for Science, Senator J.J. Webster, and the Chairman of CSIRO, Dr Paul Wild, during a break in the Advisory Council's first meeting.

The new-look CSIRO Advisory Council, with a membership drawn from industry, tertiary education, government and community interests, met for the first time in late July.

The 23-member body, headed by Mr Victor Burley, will be a source of independent advice to the CSIRO Executive on research priorities and objectives.

The Minister for Science, Senator J.J. Webster, said Australian industrialists and the community generally had a responsibility to contribute to and cooperate with CSIRO in achieving the Government's aims in the fields of scientific and industrial research.

He said one of the most important functions of the Advisory Council would be to offer constructive criticism as well as advice on matters given prominence in the amended Science and Industry Research Act, under which CSIRO operates.

These included:

- A greater emphasis on research and development to serve national needs as perceived by the Government, industry and the community.

- A corresponding increase in the transfer of CSIRO know-how, both in terms of scientific advice and practical technology, to industry and other community sectors.

At a dinner evening at University House after the meeting, Advisory Council members listened to an address from Sir Ian McLennan, former BHP Chairman, and himself a Council member.

Sir Ian spoke on two subjects—the Ian Clunies Ross Memorial Foundation, and the development of Australia's minerals industry in the past three decades. Following are excerpts from his speech:

...I was a member of one of the earliest CSIRO Advisory Councils. I think they were started under the Chairmanship of Sir David Rivett in 1949 or 1950. Then along came Ian Clunies Ross and Fred White. The first Advisory Council under Ian's Chairmanship was in 1952 or '53, and I was a member of it....

Ian Clunies Ross and Fred White made a magnificent team, and CSIRO greatly progressed under their leadership.

Thinking of all this leads me to two broad subjects to talk to you about tonight.

The first is the Ian Clunies Ross Memorial Foundation and what it stands for.

It was formed closely following Ian's death and on the initiative of Fred White.

He got a group around him to consider what to do to perpetuate the memory of a great man. I was fortunate enough to be one of the group.

Many things were considered. It so happened that at the time I was involved with both the Australasian Institute of Mining and Metallurgy and the National Safety Council, and I was greatly concerned with the poor facilities in the way of office and meeting places they had.

Fred and I talked this over and so was born the National Science Centre in Melbourne, opposite the University.

It has been an outstanding success, has spread to Adelaide, and Perth in a lesser way and is now contemplating a major development in Brisbane.

I have said all this as a prelude to talking about the scientific and technological societies of Australia. There are no less than 102 accredited to the ICR Foundation, and the tremendous work they do is insufficiently recognised.

They nearly all have inadequate monies for their purposes. They have been heavily hit by inflation—and they depend substantially on voluntary work by a few of their dedicated members.

It behoves us all to see that they are fostered and helped. They are a tremendous force for good in the community.

I would hardly think that there is one scientist with CSIRO that is not a member of at least one society and most are members of many.

Maybe this Advisory Council could give its consideration to this subject at some future meeting.

The second broad subject that came to my mind was the development of the mineral



industry in this country since the days of the first Advisory Council, and some thoughts flowing from this.

Let us first look in broad perspective at some of the major minerals and what has happened to them.

**Iron ore:** In 1950 Australia had relatively few resources and indeed the export of iron ore was banned. Now we are a major world source exporting nearly 100m tons/year—that is, when the mines work.

**Coking coal:** In 1950 Australia's known resources of coking coal were relatively small. Now we are a major exporter.

**Bauxite:** From being a country with no bauxite mines we have now become the most important world source of this mineral and this, together with our relatively cheap energy stemming from our steam-coal and lignite deposits, is making us the major world producer of aluminium metal.

**Manganese ore:** We had practically none in 1950. Now we are a world source.

**Nickel:** the same applies.

**Copper:** Our resources were inadequate in 1950. Now we are a large exporter.

**Petroleum:** In 1950 we had for all practical purposes no petroleum resources. Now we supply 70 per cent of our needs and

export about 1 million tons of LPG per annum.

What a list!

It covers nearly all the basic minerals man requires. We are indeed a lucky country and the question must arise—do we act collectively as if we deserve all this good fortune?

I think the answer in some respects must be no, and I will give two illustrations.

We have a considerable unemployment problem and this is particularly distressing for young people.

Our major provider of employment is manufacturing industry and we have let this languish—take just two examples: ship-building and heavy engineering, and electronics.

A bad feature of this state of affairs is that we cannot, (or do not), offer a place in which to live to so many of the unfortunate of this world.

Sooner or later this state of affairs will have to change.

We are profligate in the use of liquid fuels and indeed perhaps all energy.

Our children and their children in particular will not thank us for the situation we leave them.

## Lucerne team produces a \$50m payoff – cont.

Continued from P 1

Queensland Department of Primary Industries.

The Plant Industry team, headed by Dr Ross Downes, crossed these with high resistance lines selected from CUF101.

Hybrid plants with high aphid resistance were crossed again to the improved Hunter River plants.

This provided seedlings that were 75 per cent Hunter River and with the proven characteristics of Hunter River plus intense aphid resistance.

These and their descendants gave rise to the new variety SIRIVER which is essentially aphid-resistant Hunter River.

In the breeding research program the plants to be tested were sown into seed boxes which were carefully labelled. After one week, the seedlings, all of them at this stage green and healthy, were heavily infested with both types of aphid, specially bred by the team for use in the plant selection process.

The aphids have a dramatic effect. The sequence of events witnessed dozens of times by the CSIRO researchers, is as follows:

Within days, the bright green leaves become streaked with yellow as the aphids, usually under the leaf itself, suck the plant's juices.

In 10 days, only the strongest plants survive.

The row of previously healthy Hunter River seedlings used as a control has become a strip of brown and withered leaves, the CUF 101 variety, with some resistance, is also heavily attacked.

Of the remaining CSIRO plants, one or two of the strongest are transplanted into individual pots for cultivation to form the breeding stock for the next generation.

They are grown to maturity in a temperature controlled glasshouse.

Since the plant breeding program must go on regardless of the season, special sustenance was provided to encourage bees to continue to pollinate the plants in winter when natural activity would not occur. A glucose liquid attached to the hive gives extra food during times when the bees would be dormant.

Pollination takes place in the glasshouse and, if necessary, can be carried out manually by the scientists themselves.

After pollination and seed set, the plants are allowed to mature and the seed is removed for drying.

In the laboratory, the seed is rubbed and cleaned to remove its papery covering before being labelled and prepared for another series of plantings.

The entire process, which takes up to four months from sowing to harvest, was repeated five times during the development of the two new varieties.

About a million plants have been grown in the seed boxes. As well, hundreds of cuttings for seed increase programs have been taken from plants showing a strong degree of resistance.

Two streams of CSIRO research have been directed at the aphid problem.

The Division of Entomology released an imported wasp which predated upon the aphids within a few months of the first aphid discovery.

The Division of Entomology is also studying the effects of a number of fungus diseases to which the aphids are susceptible.

The Chief of the Division of Plant Industry, Dr Jim Peacock, commenting on the success of the breeding program, said the breeding of specific resistance into plant varieties had always been an important part of the work of plant geneticists.

While biological control and the use of



The Chief of the Division of Plant Industry, Dr Jim Peacock, listens as Dr Ross Downes explains to the Minister for Science, Senator J.J. Webster, how the new lucerne varieties were bred.

insecticides played an important role in plant management, there was great value in being able to 'build in' resistance to a specific threat, he said.

Work will continue on the development of new resistant varieties, against the eventualty of new aphid biotypes 'breaking through' the resistance of the new lucerne

types and posing a future threat to the industry.

The Australian biotype of the spotted alfalfa aphid is itself one of these 'break-through' types, as the lucerne industry discovered to its cost in 1977 when lucerne varieties resistant to the aphid in America were imported as seed into Australia and succumbed to aphid attack in the field.

# CSIRO defines the ultimate metre

*And it will 'nail' the speed of light*

The standard metre, the basis of length measurement in the metric system, is about to undergo what may prove to be its final metamorphosis thanks to the Division of Applied Physics and that versatile tool, the laser.

The business of precisely defining a metre began with two lines inscribed on a platinum-iridium bar in Paris in 1870.

The metal standard has succumbed to science and technology's demands for increasingly greater precision in measurement.

The present standard metre is defined as being equal to 1 650 763.73 wavelengths in vacuum of orange-red krypton-86 light.

It really exists only as a definition, as will its successor.

The metal metre's problem was thermal expansion and contraction and the provision of support systems to prevent it distorting under its own weight.

The krypton-86 standard, though much superior, is still not precise enough for modern scientists because of the finite, though extremely small, spread of the wavelengths from the lamp source used to reproduce it.

Dr P. Hariharan of the Division of Applied Physics Optics Group has recently returned from an overseas visit in which he represented Australia at a meeting of the Consultative Committee for the Definition of the Metre (CCDM).

The meeting proposed a new definition: the metre is the length equal to the distance travelled in a time interval of  $1/299\,792\,458$  of a second by plane electromagnetic waves in a vacuum.

Although this definition appears quite different, in practice the new standard would be created in much the same way as the present one—with the exception that in place of the krypton-86 lamp there would be a stabilised laser.

The Optics Group at Applied Physics is among the foremost in the world working with stabilised lasers—lasers in which the wavelength of the coherent light of the beam is controlled with extreme precision—greater precision than is possible with the light of a spectral lamp source.

The new metre definition has several hurdles to pass, including final ratification by the General Conference on Weights and Measures, the international body controlling measurement standards.

The definition itself represents a big step towards the standard-maker's ultimate goal of defining standards in terms of immutable quantities.

The metre standard if accepted will be defined by a universal constant—the speed of light in a vacuum, and a time interval, which with modern caesium clocks can be measured with greater accuracy than any other quantity.

The definition also fixes the value of the

speed of light, meeting the wishes of the world astronomical community, which occasionally quibbles about the final digit in the figure of  $299\,792\,458(?)$  kilometres per second.

The final wording of the CCDM proposal closely follows that put forward by the Division of Applied Physics itself, although Dr Hariharan stresses that the development of the standard is an international project.

The products of research by the Optics Group into three-dimensional full-colour holograms, another child of laser technology, have also greatly impressed overseas workers.

One hologram taken overseas by Dr Hariharan has been left in the New York Museum of Holography, where it is being displayed in the exhibition 'Light Years II'.

Other holograms, also of a type which can be viewed with a conventional rather than a laser light source, have been left in a historical hologram collection at the University of Besancon, in France.

## Insecticides development

CSIRO's potent insecticidal esters will be developed for commercial use in a joint program with two major chemical companies—Roche-Maag Limited of Australia and Nippon Kayaku of Japan.

On initial testing, the insecticidal esters developed by CSIRO's Division of Applied Organic Chemistry in Melbourne are very potent insecticides, yet appear to have no effect on mammals.

Roche-Maag and Nippon Kayaku were chosen from some 36 companies from around the world who submitted proposals for further evaluation and commercial development of these compounds.

Sydney-based Roche-Maag Limited is publicly listed with Australian shareholders and is a member of the world-wide F. Hoffmann-La Roche Group based in Switzerland.

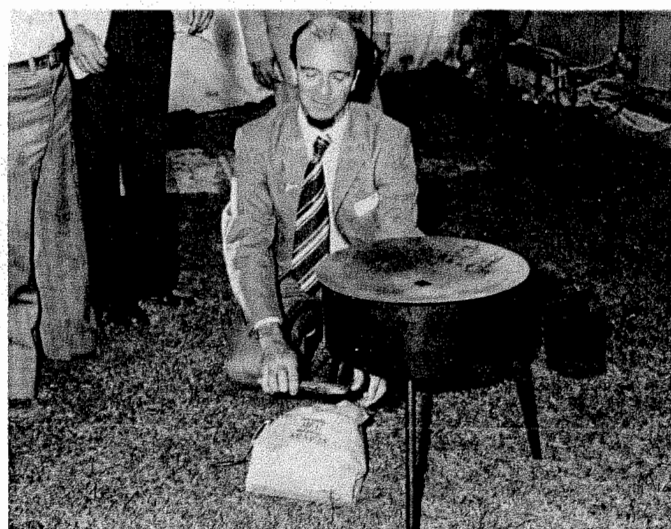
Nippon Kayaku, Co Ltd, one of Japan's prominent chemical manufacturers, operates

world-wide, and supplies agrochemicals to a number of Australian companies.

CSIRO considered that the best prospects for further development and world-wide exploitation of the compounds would be provided by collaborating with and licensing both companies jointly.

During testing and development programs, particular regard will be given to insect pests like blowflies, weevils, mites and ticks, considered by CSIRO to be of major importance in Australia, and to the prospective establishment of some basic manufacturing facilities in Australia.

Because of the complexity of testing to meet the rigid safety and effectiveness requirements before new compounds could be registered for use in Australia and overseas, it will be some time before they become available commercially.



## Mineralisation discovery

A CSIRO research project, aimed at providing the mineral exploration industry with a better understanding of how and why minerals occur in particular geological environments, has uncovered indications of a new mineralisation occurrence in central-western NSW.

The research, conducted by mineralogists from the Sydney laboratory of the Division of Mineralogy, has detected traces of minerals containing nickel, copper and cobalt in outcrops of ancient volcanic rock.

The rocks occur in a 450 million years old formation called The Rockley Volcanics in a 1000 square kilometre area south of Bathurst.

The research team recognised ultramafic volcanic rocks in the area resembling those which surround nickel deposits at Kambalda and other places in WA.

Small quantities of pentlandite, chalcopyrite and cobaltite, the ore minerals of nickel, copper and cobalt, are disseminated

throughout The Rockley Volcanics.

The CSIRO scientists identified the minerals using a newly acquired instrument called an energy dispersive micro-analyser.

This, attached to an electron probe, allows the composition of tiny mineral grains in rocks to be determined accurately.

While assays of samples so far examined show that the traces of nickel, copper and cobalt are not of ore grade, the area now merits further attention in the light of this new information.

CSIRO has advised the NSW Department of Mineral Resources and Energy, the authority which controls mineral exploration rights in the State.

This is a routine procedure when CSIRO minerals research, which in this instance is designed to provide industry with improved concepts of the origin and distribution of mineralisation, turns up something which might be of commercial interest.

## At last, the CH<sub>4</sub> chop

After a short communication with Prometheus, the Greek god of fire, Irrigation Research Chief Dr Paul Kriedemann struck no snags in lighting what may well be Australia's first methane-powered barbecue at Leeton recently.

The occasion was the commissioning of the Leeton Co-operative's pilot scale methane digester, designed by Dr Alan Lane of the Division of Food Research.

The methane digester produces methane from the cannery's fruit wastes, and is able to handle up to a tonne of wastes per day—

a twentieth of the total output.

Full-scale digesters based on the same design will help food processing industries reduce the problem of waste disposal, and will also reduce a reliance on liquid fossil fuel for process heating.

The commissioning ceremony was attended by Leeton and Wade Shire Council officials, officials of the Leeton Co-operative, and officers from the Divisions of Irrigation Research and Food Research, including the Acting Chief of Food Research, Dr J.H.B. Christian.

## Clayton calibration

The CSIRO Division of Applied Physics (formerly the National Measurement Laboratory) has established a Melbourne branch.

For the next few years, the branch will be located in the Central Science Block at Monash University, Clayton; in a well-equipped laboratory which was formerly used as a senior teaching laboratory.

The establishment of the branch laboratory of the Division will extend the calibration facilities available in the Melbourne area to industry and other sections of the community.

The staff of the laboratory will be available for consultation on problems involving physical measurement or the application of physics so that the resources of the Division of Applied Physics, whether located in Melbourne, Sydney or Adelaide may contribute to the needs of industry and the community in Melbourne.

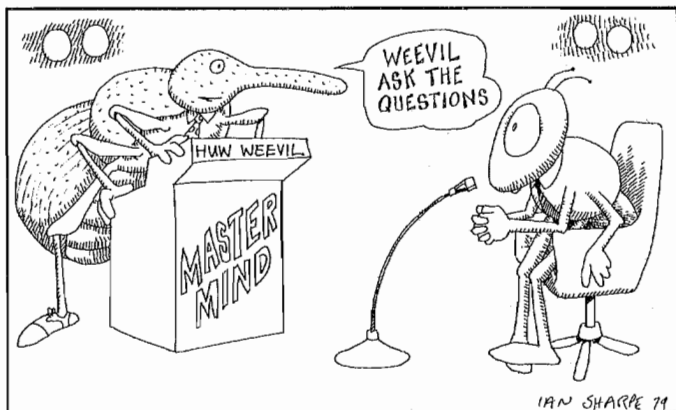
The Branch Laboratory will initially have facilities for calibration and research in the areas of engineering metrology, physical metrology and electric measurements.

The installation of equipment in the new laboratory began in late July.

Although it will be some time before the laboratory is fully operational, particularly as the required temperature control will not be available for the first few months, the Officer-in-Charge, Mr E.R. Harrison, would be pleased to receive enquiries either by phone on 03-543-5711 or by mail at the Division of Applied Physics, Central Science Block, Monash University, Clayton, 3168.

Among the considerations which led to the decision to establish Branch Laboratories were the realisation that the Division's potential for assisting industry was known much more widely in the Sydney, Newcastle and Wollongong areas than in other centres of industry, and the withdrawal of the Materials Research Laboratories, Maribyrnong from top-level calibration and standards activities.

The establishment of branch laboratories of the Division of Applied Physics is consistent with one of the recommendations of the Independent Inquiry into CSIRO.





## Entomology fliers rule mountain again

The fliers from Entomology have done it again—for the third year running they have taken out the teams prize in the Black Mountain Fun Run.

However, Entomology's dominance of the event was seriously threatened for the first time this year, with the first four places going to four different Divisions.

Chris Barnes of Environmental Mechanics broke the race record of 21.59.0 set last year by Dave Bagnall of Plant Industry, coming home well ahead of the field in 21.56.6.

Rosemary Longstaff (nee Bell), who won the first Fun Run and was just shaded for first last year, was second this year in 22.22.5, spearheading the Entomology team.

Food Research's Helmut Panhuber took a slice of the glory with a third placing in 23.1.2—Food Research sent a four man team from Sydney, hopefully presaging greater involvement by CSIRO Divisions based outside Canberra in future Black Mountain Fun Runs.

Food Research finished fourth in the teams event, behind Entomology, Environmental Mechanics (also second last year) and Land Use Research.

The teams event, which is decided on the

total elapsed time for the first four runners of each team, proved very close.

Entomology (Rosemary Longstaff 2nd, Roger Farrow 5th, John Feehan 11th and Colin Beaton 12th) recorded a total time of 1.34.26.3, to the 1.35.57.1 recorded by Environmental Mechanics (Chris Barnes 1st, Phillip Ford 9th, Brent Clothier 14th, David Smiles 15th).

David Smiles, the new Chief of Environmental Mechanics, is claimed by his Divisional staff to be the fastest Chief in CSIRO—at the venerable age of 42, he was only a little more than three minutes behind the winner.

Equally fleet among the mature runners was Keith Perroux, also of Environmental Mechanics, who at 53 turned in a time of 25.43.0 for 19th place.

The oldest runner in the field, Frank Sebesta of the Canberra RAO, finished 53rd in the field of 71 in a time of 29.42.6, and immediately signed up for next year's event.

Narelle Perroux, a non CSIRO runner, was second woman home in 28.39.2, with Margot Bahr of Land Use Research third in 30.53.8.

Organisers are hoping for a larger representation from female runners next year—there were only eight in the field.

Frank Sebesta, the oldest runner in the field, heads towards the finish line in the Black Mountain Fun Run, leaving many younger runners in his wake.



## Big attendance for Landsat '79

Landsat '79, the first Australasian Landsat Conference, held recently, was a great success, with its target of 300 Australian and overseas delegates being exceeded by 85.

Landsat is the name of a series of satellites (three so far) put into orbit by NASA to help discover and monitor the land resources of Earth.

Sensors on board the satellites view the Earth in wavelength bands in the visible and infrared portions of the spectrum.

They measure the brightness of 80 metre square sections of the land in each band and assign a numerical value to them. This information is transmitted back to receiving stations and stored on tape.

Landsat '79, organised by CSIRO and the Department of Science and the Environment, was held to instruct in and promote the use of Landsat data in the Australasian context.

Next year, a Landsat receiving station at Alice Springs should start operating and Australians will have access to up-to-date information on land conditions.

At present there is a lengthy delay in receiving recorded information from America as Australia has to take its place in the

queue of countries without receiving stations.

The Divisions of Mineral Physics and Land Resources Management contributed money and staff for the Conference, which was held in Sydney. Dr Jon Huntington from Mineral Physics was Co-Chairman with Dr Barry Powell from Science and the Environment.

Dr Andy Green from Mineral Physics was in charge of arrangements for the technical program and five guest speakers from America.

The lectures at the conference were designed to meet the needs of both experienced and new users of satellite data. A "beginners course" was held on the first day to cover basic concepts and terms.

The conference was opened by Senator Webster, the Minister for Science and the Environment, and the conference dinner next day at the Sydney Opera House was enlivened by an uproarious illustrated talk by cartoonist Bruce Petty.

A trade exhibition was held in conjunction with the conference and this drew delegates and many outsiders to its colourful arrays of satellite pictures and flashing TV screens.

Three CSIRO Divisions contributed to this: Computing Research, Land Resources

Management and Mineral Physics.

The undoubted hit of the CSIRO display was LRM's fifth-scale model of a Landsat satellite, suspended from the ceiling.

The success of Landsat '79 has encouraged plans for another similar conference at a different venue, to be held after the receiving station begins operation.

A special poster with a Landsat picture of Sydney in colour was produced for sale at the conference as a souvenir.

The Division of Mineral Physics is now selling these on behalf of the Conference at \$1 each.

Copies can be purchased on the spot at Mineral Physics (Sydney) and some are available at Land Resources Management (Perth) and the Department of Science and the Environment (Canberra).

Mail orders can be sent to Mineral Physics in Sydney and should include money for postage and packing.\*

Money orders and cheques should be made out to the "CSIRO Landsat 79" fund please.

\*Sydney posters postage and packing: 75c per tube (each tube can contain 1-5 posters). Orders of over \$50 are sent post free surface mail.



One of the regular faces at the Black Mountain Fun Run every year in Canberra is Phillip Bruce, of the Division of Computing Research.

Phillips doesn't run, but as an experienced officer of the St John's Ambulance Brigade he's a handy man to have around the finish line as some of the medium-rare entrants in the Mountain stakes reel towards the tape.

Phillip has been with the Brigade for 12 years, and his service was recently recognised with the award of the Service Medal of the Order of St John.

He began as a cadet with the Brigade at the age of 13 in 1960, and is now Divisional Officer (Cadets) with the Woden Combined Cadet Division in Canberra.

## Bogor needs some simple English

CSIRO's largest overseas project urgently needs books and magazines in English.

The Centre for Animal Research and Development at Bogor, Indonesia is a joint Australian Indonesian project, funded through the Australian Development Assistance Bureau and aims at establishing an animal research institute of international standard in Indonesia.

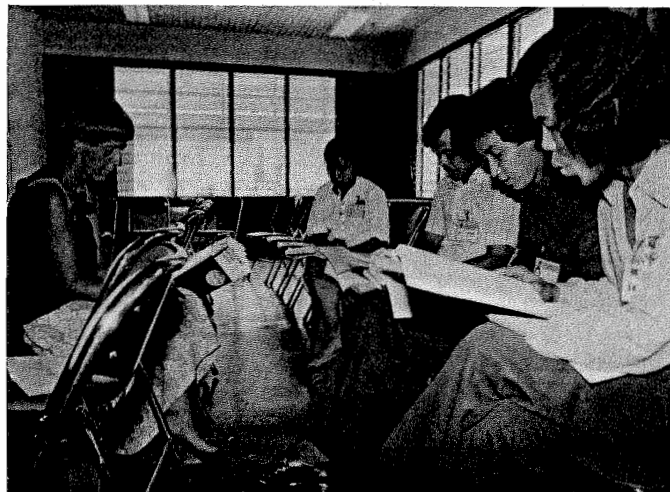
More than 100 Indonesians are learning English from seven teachers including expatriate staff and their wives.

A good knowledge of English is a must for trainees coming to Australian universities.

It also improves communication within the project and enables the local staff to read overseas journals.

The coordinator of the English program Miss Rosa de Lima Kristiawati S.W. is trying to establish a mini library stocked with easily read books and magazines. Material can be sent to:

Secretariat  
Centre for Animal Research and  
Development  
CSIRO,  
PO Box 225,  
Dickson ACT 2602.



Mrs Jennie Reed, wife of the Bogor site electrician, conducts a lunchtime conversational English class.

## Electronics meeting

The first Gaseous Electronics Meeting will be held on February 21 next year at the School of Electrical Engineering, Sydney University.

The meeting is also supported by the Division of Applied Physics and the Australian Institute of Physics.

Gaseous electronics research in Australia has made a significant impact internationally, but there is a need for the various groups to interact and become aware of where they can contribute to one another.

In particular there is room for cooperation between the physics groups, who examine basic transport phenomena, and electrical engineering groups.

If the meeting is successful it is proposed to hold further meetings bi-annually.

Enquiries should be addressed to:

Dr R. Morrow,  
CSIRO Division of Applied Physics,  
National Measurement Laboratory,  
PO Box 218,  
Lindfield, NSW 2070.

# Tennis : Our men play the real thing

*New lease on life for the most courtly game*

Deep in the heart of Tigerland—the Melbourne suburb of Richmond—where the hot pie rubs shoulders with shalish, lassagne and burek, lies the greatest sporting anachronism in Australia.

Within a modern citadel sculpted in off-form concrete repose two magnificent Royal Tennis courts, opened in 1975. They were the first courts to be opened anywhere in the world for more than half a century.

If it can be said that CSIRO perspiration is frequently shed on the polished floors of the court, it is equally true that the very stonework of the building is steeped in CSIRO sweat.

The late Dr Stewart Bastow, a member of the CSIRO Executive, was the club's president during the 1960s, and a key figure in reviving the ancient game from near-oblivion to the comparative eminence it enjoys today.

In the dark post-war days the only court in Melbourne was in Exhibition Street, half a mile from CSIRO's former head office in Albert Street. The court had been built the previous century, and was one of only two in Australia—Hobart also has one of even greater antiquity.

In the 1950s the club had dwindled to just 20 members, and legend has it that Dr Bastow would sometimes excuse himself from Executive meetings to undertake 'urgent business'—filling in when a member had been left in the lurch by an opponent not turning up.

Dr Bastow spent many hours making the hand-made balls (tightly-wound cloth strips secured with string and covered with all-wool Melton cloth) essential to the game.

Ultimately he died on the court contesting the final of the annual Golden Racquet championship tournament—but he had managed to turn the tide for the club before he went.

Today the Melbourne club has a membership of about 70, and includes no fewer than six present or former CSIRO personnel among its active players.

They are the former OIC of the Chemical Engineering Section of Industrial Chemistry, Dirk Zeidler, who is now Chairman of ICIANZ; former CSIRO Safety Officer John Bray; Tim Bastow and your author, from Chemical Physics, and Nick Alexander, OIC of the Film and Video Centre.

New full-time Executive Member Greg Teggart is also an active member.

What is Royal Tennis, Real Tennis? Dear Reader, let me fool you not, it is not the game of Borg, Connors, Kramer and Emerson, although their game derives from it. It is the game of Henry VIII, Charles V, Cardinal Richelieu and Shakespeare to boot.

With one possible notable exception, Royal Tennis is the oldest ball game in the world, with at least 500 years on the meter, and maybe many more, all depending on the fastidiousness of your definition. Certainly Royal Tennis was flourishing in France and England in the 15th century, but the game of 'trijots' was going strong in market square and courtyard in France in the 13th century, and a fortiori Johannes Cinnamus about 1153 was describing the Byzantine game played with a broad curved implement with a network of catgut. Even so, the Chippewa Indians with their version may have been first off the rank. Who knows?

Your present narrator was inveigled into membership, after joining to play Squash, when Dirk Ziedler's partner failed to materialise and his feelings of CSIRO mateship got the better of him! One game is sufficiently intriguing to spring the trap.

The game has always attracted a fair sprinkling of scientists. That Royal Society President and man-about-town, Samuel Pepys, was a fan; G.P. Thompson, co-discoverer of electron-diffraction, was the patron of the Cambridge Real Tennis Club; and Lord Rayleigh worked out the explanation of the Magnus effect while watching a game.

Rayleigh had just witnessed the rare occurrence of a ball, after striking a side wall at a glancing angle, curving in flight to strike the same wall again. The phenomenon of the curved flight of a spinning ball, described earlier by Magnus, was given a mathematical legitimacy by Rayleigh in 1877.\*

The starting point of my tale is that Melbourne has recently built the first two courts to peep cautiously into the world for about 60 years, while Hobart (Tasmania) has gracefully slid into the second century of use of its court.

Australia once mustered, for a brief moment of glory, four courts: two in Melbourne and the century-old court which hovered between the living and the dead as the wreckers prepared to move in. Alas it is no more, but its beautiful bluestone slabs live on in some of our gardens.

What prompts people to perpetuate this anachronist game and to build incongruous play-pens in the New World? (Dr Freud need not answer.) How can this dodo game survive in the heartland of Australian Rules, and not a stone's throw from the MCG? The answer is that it's a very good and demanding game.

Royal Tennis was first played with the hand, then both catgut string bats and bats like one-sided drums with parchment faces came on to the scene later. In fact it became a scandal that precious manuscripts were making their way to the literary knacker's of the bat-maker's workshops in Paris about the start of the 16th century.

Of all the kin, lawn tennis is the luckiest to get on to the ground, so to speak, as it was originally destined to be played on ice!

One evening in 1873 a hot flush developed (no doubt) in the mind of Major Wingfield, because by 23 February 1874 he had lodged papers for a patent on a nightmare of a game, which he called 'Sphairistike' to be played on ice on a court (divided by a sagging net like that of Royal Tennis) with an hour-glass figure, 8 yards wide in the middle and 10 yards wide at the ends.

Short of the Montreal Canadiens the game was impossible, but he must have soon come down to earth and the game was tried on lawn in 1874.

Even so 'Sticky' as it was called (the most U of UK still call it that) might have been strangled at birth but for a peculiarly fortunate set of circumstances. Croquet had swept across England and had cleared many a vicarage lawn of prized trees, pushing flower beds before it, until every country house, parsonage or genteel villa had its croquet court.

But the craze went out like a light about 1874. The All England Croquet Club tore up the hoops and turned some of their lawns into 'sticky courts'. They held their first Wimbledon championship in July, 1887. In a year or two the mallet had been forever buried and it became the 'All England Tennis Club' and Wimbledon was the catgut Mecca.

The first few Wimbledons were bizarre affairs, with a queer melange of the rules of sticky, real tennis and the Marylebone Cricket Club's version of lawn-tennis (MCC ground at Lord's near Regents Park in London is the epicentre of cricket still, but it then had two real tennis courts, one of which remains). The net resembled the 'real' thing being 5 feet high at the sides and 3 feet 3 inches at the centre.

Which way was I pointing before I got lost? Let me try again to tell you about the Melbourne courts. The first was built in 1881, with the remaining few bob of the affluence with which Melbourne was endowed by the '51 gold rushes. Although the nuggets of the bonanzas of Ballarat, Bendigo and Beechworth soon made Victoria a kind of Antipodean Croesus and every unwholesome trend and fad in English architecture was slavishly copied with additions of gratuitous colonial bad taste 'they' couldn't have had a real tennis court on the checklists. This oversight was not corrected until 1881, when the Melbourne Tennis Club was formed, opening its court the next year and pinching Thomas Stone, the professional from Hobart (leading to some years of acrimonious relations between the two clubs).

Stone was born within Hampton Court Palace, on the fringe of London and grew up playing on the beautiful real tennis court which Henry VIII, no mean player in his young or pre-corpulent days, had built in 1579.

The Melbourne club lurched backwards and forwards from boom to doom repeated-



*Estasy mingles with contempt upon the handsome features of an 1880s Royal Tennis devotee as he prepares to deal severely with a lob from a pathetically wishful opponent.*

ly. As early as 1886, it was meeting financial troubles by forming the Melbourne Tennis Club Limited, but later that year Queen Victoria, whose rake of a son Edward was no mean fist at tennis, graciously bestowed her patronage and the soubriquet 'Royal' on the Club, which would look pretty way-out with 'Limited' on the other end, so all limitations were forthwith discarded.

In 1959 it offered the club as a going concern to the Melbourne Cricket Club, which did not know a gem when it saw one, and later to a sinister multi-national corporation for their staff social club, but they too gave the thumbs-down sign.

But in the 60s the game came to life again, and many a man found to his amusement that he had become a member of the club due to stealthy staff work by the members. The old court was distinctly in the CBS of Melbourne, and the building of an underground railway, now burrowing under the city, meant that future city rates would sky-rocket well beyond the means of the Club.

The solution was to sell the site, and rebuild at leisure as near as possible to the city centre on lower-cost land. Selling at a peak in property values, the club has built two magnificent courts in the modern idiom in the inner city suburb of Richmond, with a brace of squash courts and a swimming pool and modern cons like long plate-glass windows beyond the dedans seating so that the game may be shared with the drinking members in the lounge beyond.

Now in '78 we have about 500 members, and about 500 games per week, more than at any other place in the world. Perhaps the final accolade is that the Royal Tennis Club of Bordeaux in France followed suit, selling its prize Central Business Area court after consulting the Melbourne club, and rebuilding a fine new court on the city's outskirts.

The whole project needed some research. Who could be consulted who had actually built a court? Fifty-nine years sorts out the mere men from the immortals!

The bounce of the ball on the various concrete was assiduously measured, the dimensions of other courts studied, and trial patches of colour tested on the walls of the old court. Special attention was paid to the lighting, both natural and artificial.

Only a madman would try to describe a tennis (real, royal and court) to someone who has not actually seen it for himself. Sheer disbelief and confusion inevitably

accompany the description and the perceptive reader will have noted that being a coward I have procrastinated till it has become inevitable.

The serious student takes himself to the article on 'Tennis' (note that!) in the Encyclopaedia Britannica. But in brief you have a net in the middle, a sloping pent-house roof about 7 feet high running around three sides of a huge room with very high walls (the court is bigger than a lawn tennis court), and every here and there other nets built into the walls, like the long one at the back of the court called the dedans. The floor is marked in yards and the second bounce is recorded for a replay of a point, called a 'chase'. See?

Tennis has been the sport of kings even if it is hard to find an active 'regal' player today. The contributions of annointed heads to the game are various. Louis X died of a chill contracted after playing a game in the forest at Vincennes in 1316; Charles V thought the game so sublime that he vainly tried to prevent the plebs playing it; Henri II was the best player in France in his day; Charles VI had a kind of private loony-bin tacked on behind a court dedans in which he whiled away insane hours watching the action; Louis XIII was a tennis buff and played a multi-media game against Philip IV of Spain with Cardinal Richelieu 'Marking'. (Louis won.)

He built the court in Versailles in 1686, and thus had it ready in good time for the good citizens of the French Revolution to make notorious use of it.

Meanwhile in England Edward III tried to proscribe the game in 1365; Charles I spent £20 on racquets and balls in 1610; Leicester came close to a duel with Essex when he borrowed Elizabeth I's kerchief to mop his sweaty brow in a most unseemly, unchivalrous manner; and Henry VIII was a redoubtable player, restoring Hampton Court Palace to give him an excuse for tacking a court on.

Sometime later, back in Melbourne, plebs dedicated to the conservation of history, settle into the annual tournament for the Bastow Trophy awarded for the winner of the A Grade Handicap. I'm sure Stewart Bastow would have enjoyed encouraging the handicapped as he did in CSIRO! —CLIVE COOGAN.

*\*On the Irregular Flight of a Tennis Ball' Messenger of Mathematics, VII, pp. 14-16, (1877).*

## Three new Chiefs named

Dr Lewis T. Chadderton, an internationally recognised solid state physicist has been appointed Chief of the Division of Chemical Physics.

Dr Chadderton, 41, Professor of Physics at the H.C. Orsted Institute of the University of Copenhagen, succeeds Dr Lloyd Rees as Chief of the Melbourne-based Division. Dr Rees retired in May last year.

Professor Chadderton will bring to the Division a great deal of international experience as a physicist, and at 41 becomes one of CSIRO's youngest Divisional Chiefs.

After working at the Cavendish Laboratory in Cambridge, Professor Chadderton was appointed in 1966 as resident physicist at the North American Rockwell Science Centre in California.

During this period he worked on research into the general area of radiation damage and its effects, and studied the physics of the moon's surface.

He also acted as a consultant during the Apollo space missions.

At the same time he became editor of the journal 'Radiation Effects' which is published internationally. Professor Chadderton was appointed to the University of Copenhagen in 1972 and was awarded a Doctorate of Science in 1973.

Dr David Smiles, a soil physicist, has been appointed to head the Division of Environmental Mechanics.

Dr Smiles 42, succeeds Dr J.R. Philip, who has been appointed Director of the Institute of Physical Sciences from February 1980.

Dr Smiles heads a Division which has become a centre for research into the

physical processes of the natural environment, carrying out research on soils, plants and the lower layers of the atmosphere.

The work of the Division is important to agriculture, mining, meteorology, pollution control and building design.

Dr Smiles has himself made significant contributions to an understanding of water flow in swelling clays, and has also carried out other important research in the understanding of particulate slurries.

He recently headed a team which studied ways of leaching excess salts from soils in irrigation areas to prevent salt build-up and crop damage.

Dr John Christian, recognised internationally as an authority on the microbiology of food, has been appointed to head the Division of Food Research.

Dr Christian, 54, succeeds Mr Michael Tracey as Chief of the Sydney-based Division.

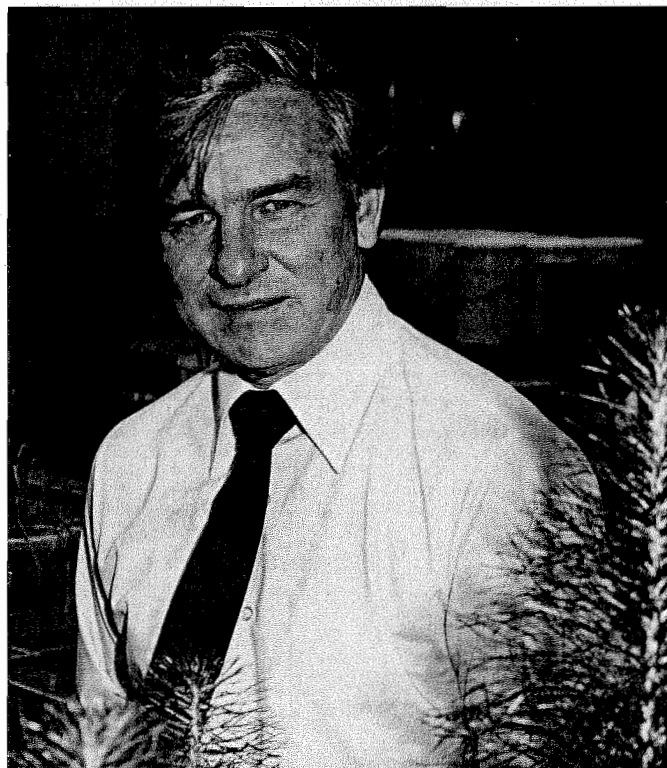
Mr Tracey has been appointed Director of the Institute of Biological Resources.

Dr Christian has been associate Chief of the Division since 1971.

He joined the Division of Food Research in 1951 after graduating from the University of Sydney as a BScAgr. He completed his PhD from Cambridge in 1956 on a CSIRO post-graduate studentship.

Dr Christian is a member of the World Health Organisation's expert advisory panel on the microbiological aspects of food hygiene and was Chairman of the panel in 1975.

He is a foundation member of the Australian Academy of Technological Sciences and has lectured by invitation in many countries on aspects of food research.



Mr Glynn Bowen, Assistant Chief of the Division of Soils in Adelaide, has been awarded a Senior Research Fellowship by the New Zealand National Research Advisory Council.

He will spend eight months at the NZ Forest Research Institute in Rotorua.

He will work in the area of nutritional physiology and will collaborate particularly with tree physiologists and tree nutritionists toward a better understanding of integration of soil-tree systems.

The work is aimed at identifying parameters of the tree which are capable of manipulation to maximise productivity.

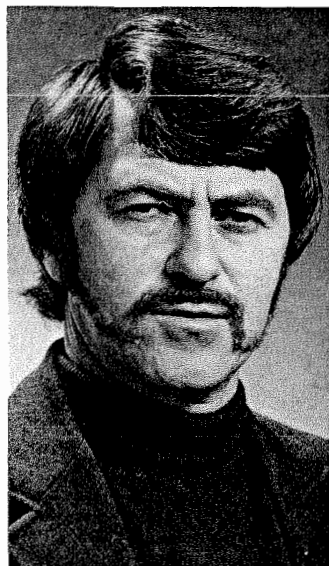
Studies on nitrogen and phosphorus relations of tree systems will receive special attention because of the importance of these elements to growth of Australian

exotic and indigenous forests and Mr Bowen will also examine other aspects of forestry research at the New Zealand Forest Research Institute which may have relevance to Australian forestry research.

He has studied for many years the effects of soil micro-organisms on the uptake of nutrients by plants.

In particular, his work led to the now routine practice of inoculating all *Pinus radiata* seedlings with mycorrhizal fungi—a practice that can increase seedling growth severalfold.

He continually reminds his colleagues that all plants growing in natural soils always have microorganisms associated with their roots, and that in studying the nutrition of plants one is really studying the nutrition of plant/microorganism associations.



Mr John Leeder, a Principal Research Scientist at the CSIRO Division of Textile Industry, Belmont, Geelong, Australia, has been awarded the degree of Doctor of Applied Science by the Council of the Victorian Institute of Colleges.

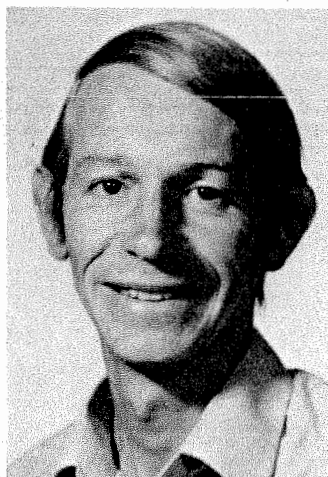
The award has been made in recognition of his research work on the wrinkling of wool and related topics.

The Institute regards this work as being a distinguished contribution to knowledge. It is only the second award of this type made by the Institute since 1973.

Mr Leeder has published over 50 scientific and technical papers over the past 20 years describing research work on the chemical, physical and histological structure of wool and its relationship to aesthetic end-use properties such as wrinkle recovery, abrasion and the sorption of water.

Much of the work has involved chemical treatments designed to improve these important properties.

Some of the results of his work have been put to practical use in establishing tests and standards for the recovery of wool and wool-blend garments from wrinkling.



Brian Lee, Senior Writer of Ecos magazine, departs from CSIRO in October.

He will not be moving to another employer. Instead he proposes a life of lotus-eating in the rugged world of freelance scientific journalism.

Brian, anonymous writer of half of the content of every issue of Ecos to date save two, has been part of the magazine from its inception. He feels that he is leaving a lousy child.

Bob Lehan, the other original writer of Ecos, took over as Senior Writer in September.

Before participating in the birth of Ecos, Brian cut his teeth as a science writer on Rural Research.

He does not intend to vanish into oblivion. Rather he wants to develop ways of informing the public—both local and overseas—about Australian science.

He intends to strengthen his ties with New Scientist magazine, with which he spent some months in 1978, and with other scientific publications.

In addition, he expects to be doing contract work for CSIRO, the Australian Academy of Science and other scientific institutions.

Perhaps Institute Directors and Chiefs will spare him a thought should they have a task that needs a science writer.

## Leucaena mystery

Dr Raymond Jones, Officer-in-Charge of the CSIRO Davies Laboratory, is currently on an overseas visit which will include ten countries.

He is visiting the International Research Institutes in the Philippines (rice), India (tropical grain and pulse crops) and Columbia (pastures).

Links between CSIRO and the International Agricultural Research Institutes are growing and this visit will serve to strengthen these links and to gain a deeper understanding of the relevance of their work in Australia.

He is also visiting other research establishments and universities in India, Africa, UK, and US to study approaches and techniques which are being developed to study the relation between pasture and animal production.

Some of these countries are making increasing use of improved varieties of the leguminous shrub leucaena (*Leucaena leucocephala*) which was sent as seed from the CSIRO Davies Laboratory and the performance of this material will be studied.

Dr Jones will undertake experiments with leucaena at the University of Hawaii during a three-month stay.

The object of these experiments is to understand the reason for the apparent lack of toxic effect of this valuable legume on ruminants in Hawaii compared to the very severe effects noted in his own experiments at the Kimberley Research Station in the Ord.

Dr Jones considers the possibility that ruminants in Hawaii have a population of

rumen micro-organisms which are capable of breaking down the toxic compound mimosine to a different, and non-toxic, end point than those in Australia.

If the theory proves to be correct then Australia may need to 'import' these micro-organisms to overcome the problems encountered with intensive use of this leguminous shrub as cattle feed.

Dr Trevor Cole of the Division of Radio-physics has been jointly awarded the Edgeworth David Medal of the Royal Society of NSW.

Dr Cole, who shares the award with Dr M.G. Clark of the Clinical Biochemistry Unit, Flinders University Medical School, was described by the Society's Council as a person eminently qualified for the award through his outstanding contributions to astrophysics.

Dr Cole, a graduate of the Universities of Western Australia and Cambridge, joined the Division in 1972.

His development of the acousto-optical spectrograph has been an essential contribution to both millimetre wave astronomy and dynamic solar spectroscopy.

He is currently engaged on research into coherent optical electro-optical and magnetic techniques of information processing and applying them to the study of scintillation, the detailed mapping of the radio sky and to ultrasonic imaging.

He has a further interest—the search for extra-terrestrial intelligence.



## WA Medal to naturalist

Dr Dominic Serventy, formerly officer-in-charge of the Division of Wildlife's Research Station near Perth, has been awarded the Royal Society of Western Australia Medal for outstanding service to the State.

Dr Serventy has carried out extensive field research among Aborigines in the desert and Northern Territory, and among detribalised people in many parts of Australia.

He is one of Australia's leading naturalists and is an authority on seabirds. He has been associated with the WA Royal society since 1924.

Dr Albert Rovira, a Chief Research Scientist with the Division of Soils in Adelaide, has been made a Fellow of the Australian Institute of Agricultural Science.

Dr Rovira is an expert on the structure of the rhizosphere, and has taken a particular interest in wheat root diseases.

He has worked closely with wheat farmers, providing them with practical help by lecturing on wheat root diseases and related topics, and by organising symposia and workshops to acquaint farmers with the results of scientific research relevant to their livelihoods.

Dr Rovira has previously been awarded the Australian Medal of Agricultural Science in 1972.



The Governor-General, Sir Zelman Cowen, invests CSIRO's Secretary (Administration), Mr L.G. Wilson, as an Officer of the Order of Australia recently in recognition of his public service to science.

Mr Wilson was one of five CSIRO recipients of awards in the Queen's Birthday Honours list.

Dr L.T. Evans of the Division of Plant

Industry and also President of the Australian Academy of Science, was also made an Officer of the Order of Australia.

The other awards to CSIRO personnel were: MBE—Mr J.A. Pattison, Division of Building Research; AOM—Mr K.McAlister, Division of Radiophysics; BEM—Mr L. Julius, Division of Applied Organic Chemistry.



Those unsung retrievers in the great hunt for knowledge, CSIRO's librarians, whoop it up occasionally. Frances Barnes, librarian at the Stowell headquarters of CSIRO in Tasmania, recently supervised a major reorganisation of the Stowell library, and celebrated the occasion with CILES' Peter Dawe, left, Tasmanian Regional Laboratory OIC Geoff Stirk, and CSIRO Advisory Council Chairman, Victor Burley, right.

## Book honours Dr Boas

The 75th birthday of Dr Walter Boas, Chief of the Division of Tribophysics between 1949 and 1969, has been marked by the publication of a commemorative volume, 'Physics of Materials'.

The volume, published jointly by CSIRO and the Department of Mining and Metallurgy of the University of Melbourne, contains a biography on Dr Boas and 34 articles by former students and research colleagues in Australia.

All the authors are well known for the research on the topics they discuss, and the book represents up-to-date comment on many aspects of the physics of materials.

It covers such fields as the physics of plasticity in metals, alloys and minerals; the structure and properties of interfaces; surface physics and the chemistry of solids; electron microscopy and diffraction; and neutron diffraction and electron loss spectroscopy.

The recommended price of the volume is \$30, but CSIRO staff can obtain it from the following address at \$22.50, post paid: CSIRO Editorial and Publications Service PO Box 89 East Melbourne, Victoria, 3002.

## McMahon

### ASH-CAN TO CARTHAGE

Lorenzo:

In such a night  
Stood Dido with a willow in her hand  
Upon the wild sea banks, and waft her love  
To come again to Carthage

The Merchant of Venice: Act V — Scene 1

Sometimes I find  
that Carthage lies a driveway's length away.  
Tonight, for instance, moon-and-wind-filled, falling  
autumn and a booting in the eaves. A time  
to wonder if the temple-owls are calling  
Dido's name from high in pediments. The kind  
of night that hides high, raking spars  
and fresh-stepped masts of ships. A wind to lean  
in, lift your face to and forget that there  
is nothing but a garbage-can between  
the asphalt and the stars.

In such a night  
a sailor waits disguised as a Suburban  
standing in his ash-canned driveway, listening  
to the gutters and the eaves. A sailor watching  
in the sand-barred dark beneath the whistling  
rigging, waiting for the flare of signal lights —  
and then the scrape of keels. This time with sounds  
of leavings in the wind is mine and though  
they'll hold an eight-hour mortgage on my soul  
tomorrow, now is freehold and I'll row  
the towers of Carthage down.

At such an hour  
the wind has kick-of-tillers in it and  
the tide is rising just beyond the grating  
litter of a season sweeping round  
the spill of street lamps. Work is waiting  
in some century ahead of me but now  
I'm togaed in a towelling gown and stand  
one foot in Autumn and the wind-burned  
effigies of leaves and one in Virgil still;  
the only Trojan in the world who turned  
again to Carthage with a garbage-can.

## Enlightenment

For those of us who toil in other vineyards the work of our scientific friends is something of a closed book.

Scientific discoveries interest us, as far as we are able to understand them and we realise, dimly, how much science affects and improves our lives.

But it rarely gets us in the way it would, say, a person who has devoted half a lifetime to scientific work.

I say 'rarely' because there are exceptions—and I ran across one the other day.

We were standing in a tomb in County Meath, Ireland. No great thing, perhaps, as tombs go; a circular stone chamber about 6m across with a massive corbelled ceiling tiering up into the half-dark.

But it has a special feature. A sill, or fanlight, has been set over the outer doorway. At sun-rise on December 21, the mid-winter solstice, a shaft of sunlight strikes through



the sill, along a 20m passage-way, between two leaning stones and onto the centre of the tomb's floor.

For about 17 minutes on this day, and only on this day, the whole chamber glows with reflected light.

Now no one knows why the builders sited this sill so carefully and, of course, there is nothing like not knowing to get wondering going.

I wondered if they wanted to let their ancestors know that their sun-god had not deserted them.

Perhaps the answer was simpler; that they merely wanted to show their forebears that they had not forgotten them.

But one thing was clear, even in that half-light—whatever the answer, those people cared—and cared enough to labour for generation after generation to build a hill to house their dead and to build it in a way that let the sunlight in on the most sacred day of their year.

Then our archeologist went on—'Carbon 14 dating techniques have established that this section was built about 3200BC.'

It was then that science got to me. I was standing in a building far older than the great pyramids of Egypt. And I thought again about that sill and about the people who built it—the people who cared—5000 years ago.

Perhaps I needed something like this to make me realise that I owed yet another thing to scientists. To the archeologists who excavated and measured the sill and sunlight; and to the physicists who measured all of those five thousand solstices.

I felt that, all in all, I owed a great deal to them—to them and their Carbon-14.

### FOSSIL SEA-SHELLS — MORGAN, SA

Time-trapped there — like photographs in stone  
they lie where shimmering limestone cliffs  
bake in the day. Wave-patterned sand-hills drift  
in red, grit-littered wind.  
Where windmills spin  
and suck at dust, dams pock the plains and lie  
cruck-patterned underneath  
a February sky.

When these things lived they lay in green here.  
Waves weren't scoured in sand, they flecked the light  
that filtered fatboms down. The sand was white.  
Weeds swayed the way the tide ran,  
shadows fanned  
across the ocean floor as currents swirled  
on shoreward through a clean,  
deep, sea-dimmed, silent world.

And now if some strange, unkind twist in time  
restored their sparks of life, I doubt they'd find  
the climate to their taste — or like the view.

# Towards a low-energy future

*It may be easier to think small*

Dr Mark Diesendorf is a senior research scientist in the Division of Mathematics and Statistics. One of his research interests is windpower (computer simulation of large and small-scale systems, windspeed statistics). He is also secretary of the Society for Social Responsibility in Science (ACT) and editor of three books on science and society published by SSRS: 'The Magic Bullet', 'The Impact of Environment and Lifestyle on Human Health' and 'Energy and People'.

CSIRO scientists are currently performing research and development in a wide range of energy technologies.

Areas under investigation include coal mining, and liquefaction, oil shale, advanced batteries, the production of liquid fuel and methane from crops and crop residues, uranium geology, solar heating and cooling, and windpower.

This diverse work on a mixture of non-renewable and renewable energy sources is performed with two contrasting backgrounds—first, the high energy, high technology scenarios implicit in the energy policy reports of such bodies as the National Energy Advisory Committee, the Australian Science and Technology Council, the Institution of Engineers and the Senate Standing Committee on National Resources.

There is a growing public interest in renewable energy sources and low energy lifestyles.

It is often stated by high energy proponents that a low energy society is not feasible in the foreseeable future. In particular, it is claimed that none of the solar technologies could make a significant contribution to energy use before the year 2000.

However, a close examination of the high energy scenarios reveals great problems involving the long timescales needed for the development of very large, capital-intensive, commercially unproven technologies.

On the other hand, the main obstacle to making a transition to a low energy future do not appear to be technical, but rather institutional in nature.

Hence, many of the latter obstacles could be hurdled by introducing inexpensive fiscal, administrative, legal and educational reforms.

This article is based on a small sampling from a forthcoming book: 'Energy and People—Social Implications of Different Energy Futures', to be published in October by the Society for Social Responsibility in Science, (PO Box 48, O'Connor, ACT 2601).

## Part I: A High Energy Scenario for Australia

The main axioms or presuppositions of the Australian energy policy reports, in order of priority, seem to be:

- (i) that the dominant role of the individual private motor vehicle should and will be maintained;
- (ii) that energy use will increase by factor of 2 to 3 over the next 20 years;
- (iii) that there should and will be a shift in the pattern of energy consumption to give electricity a greater share of the cake;
- (iv) that renewable energy sources can only play the role of minor supplements, to be mainly used in isolated rural areas, in the foreseeable future;
- (v) that energy policy should be determined by technical and short-term economic criteria.

Australia's main energy problem is now well-known: although the nation is currently producing about two-thirds of its oil consumption from indigenous oil-wells, within ten years (unless there is a major new discovery in Australia), these wells could be so depleted that, to preserve the motor transportation lifestyle, it may become necessary to import the equivalent of two-thirds of current consumption.

The result of applying axioms (i)–(v) to Australia's energy problem leads to the following general policies:—

First, an overwhelming emphasis is placed on the development of industries to convert Australia's vast coal reserves into oil. The production of oil from shale, methanol from coal and methanol from North-west Shelf natural gas are also favoured.

Second, there is high priority to further develop the mineral export industries—such as (a) the production of bauxite, alumina and aluminium and (b) uranium mining, enrichment, possibly reprocessing and even storage of the world's radioactive wastes—justified by the hope of using these exports to pay for part of the oil imports during the period while coal liquefaction is developed.

Third, the option to develop nuclear power in the long-term (post year 2000) is maintained, despite the realisation that it is expected to have negligible impact on Australia's fuel supplies for the foreseeable future.

Fourth, energy policy committees offer the advice that Australia should play a 'watching brief' while most of the R & D for renewable sources is performed over-

seas even though much of that R & D is relatively inexpensive.

Fifth, the roles of conservation, and the impact of social/institutional changes in general upon energy use, are neglected, as are the social implications of different energy policies.

The major problems of such high-energy scenarios go beyond the substantial environmental and health impacts of the coal industries and the (incomplete) nuclear fuel cycle.

They also entail serious doubts about the sheer physical (and economic) possibility of developing the industries in time to substitute for the rapidly diminishing reserves of natural petroleum. Consider, for example, coal liquefaction:—

To construct one plant, capable of providing for 5 to 10 per cent of current crude oil consumption, would take about 11 years, and would cost billions of dollars. Assuming that there were no major problems with the first plant, a crash program to provide just two-thirds of the current oil consumption from coal would take 25 - 30 years, according to the Institution of Engineers' report (1977).

Even if an industry, producing enough oil to meet current demands, could be built up over the next 35 - 40 years (and the high-energy scenario envisages a considerable growth in oil consumption beyond the current level), the total coal requirements for such a program would demand an enormous growth in Australia's coal production.

The known reserves of coal preferred for pyrolysis and hydrogenation might only be sufficient to meet 1976 liquid fuel demand for 17 years.

Thus the coal liquefaction solution might provide too little, too late for a high-energy society.

There are already other large and growing demands upon Australia's coal: further growth in base-load electric power generation for domestic use, exports of steaming coal, and the allocation of coal to the foreign-owned aluminium industry. Thus, total readily-renewable coal reserves which might last (say) 800 years at current levels of consumption could shrink to 80 years, in a high-energy scenario with exponential growth.

Specific coals for specific purposes could run short in a few decades.

Presumably, this is the reason for the mysterious presence of the nuclear power option, generally considered to take the form of fast breeder reactors, in the third general energy policy mentioned above.

Readily recoverable coal could be in such great demand in the first decade of the next century, that there may not be enough for local electricity production.

Yet because of development timescale and other problems of the fast breeder reactor, it could not make a significant contribution to electricity generation until well into the next century.

There are no operating commercial fast breeders in the world today although there are several prototypes.

There is no commercial-scale reprocessing of spent oxide fuel, although small quantities are being reprocessed at La Hague in France. The doubling time for breeding plutonium in a fast breeder is now believed to be 25 to 50 years, i.e. longer than the expected working life of the reactor.

As a consequence, the anticipated 60-fold theoretical improvement in uranium utilisation by breeders would not be realised in practice for 50-75 years or more. Thus fast breeders could not ensure an adequate self-sustaining level of plutonium production until after that period of time. (see



D. Merrick, Nature, 264, 596).

The notion that uranium mining, enrichment etc could make a significant contribution to Australia's foreign exchange earnings rests on the gamble that there will indeed be a big world market for uranium in the medium-term.

However, as the result of the economic, environmental and safety problems of nuclear power, and a growing public opposition, the industry is almost at a standstill in all countries except France, the Soviet Union and South Korea.

In addition, with the new Canadian uranium mining developments, there will shortly be a temporary glut of uranium on the world market.

Even if a market can be established for Australia's uranium, a second gamble remains. There is no guarantee that the Organisation of Petroleum Exporting Countries will always be willing or able to provide Australia with petroleum, even if we could pay for it with the earnings from mineral exports.

The capital costs of the high-energy technologies are very large. Since the technologies are mostly unproven at the commercial scale, and the timescale problems are significant, massive investment into these areas could involve considerable financial risk.

Even if these gambles were successful the national economy would be distorted and the labour-intensive sectors such as health, education and welfare could suffer.

In 'The Poverty of Power', Barry Commoner has noted that already in the early 1970s the capital required to support US energy production amounted to one-quarter of all capital invested in US business as a whole and that this fraction was expected to reach one-third within the period 1975-85.

Thus, following a high-energy scenario could lead to serious socio-economic problems over the next few decades.

In addition, we might have to face a severe oil drought in the early 1990s (if there is no major local oil strike before then and OPEC cuts off exports), a shortage of natural gas in the late 1990s (assuming large exports from the North-west Shelf) and a shortage of some important types of coal around the year 2010.

This prospect alone should provide sufficient justification for serious consideration of a low-energy future for Australia, based, first and foremost, on energy conservation; second, on preservation of food production and distribution; third, maintenance or creation of key resource and manufacturing industries, under Australian control; and fourth, the rapid development of medium-scale renewable energy sources.

Next month:— Part II: The Transition to a low-energy future.

## Science at work



'Walk on it, Smitty? Hell, one mouthful of that stuff and you'd run on it.'

'CoResearch' is produced by the Science Communication Unit for CSIRO staff. It is also circulated to some people outside the Organization who have a professional interest in CSIRO activities. Members are invited to contribute or send suggestions for articles. The deadline for material is normally the first day of the month preceding publication. Material and queries should be sent to the Editor, Box 225, Dickson, A.C.T. 2602. Tel. 48 4476 Editor: Graeme O'Neill.

# CoResearch

*A publication for CSIRO staff*

Oct/Dec 1979 227



CSIRO's new staff-management forum, the CSIRO Consultative Council, met for the first time recently. Its members are, from left to right standing: Arnold Martin, Dick Desmond, Bruce Cook, Carole Popbam, Paul Wright, Graham Brown, Phil O'Brien, Frank Whitty, Linda Meech and John Mitchell, and seated, Michael Tracey, Ian Whiting, Kevin Thrift, Keith Boardman, Gratton Wilson, Barry Rawlings, Jack Ikin and Les Wilson. An article on the meeting is on Page 2.

## Flexitime schemes under review

### *Decision on permanent scheme*

CSIRO staff will probably know by the end of next year whether they are to get a permanent system of 'flexitime', and if so, what system will be adopted.

Since 1975 virtually all CSIRO staff have had some exposure to flexible working hours or modified attendance schemes in one form or another on an open-ended trial basis.

Since October 1977 the Executive has had a commitment to review these trials, and a sub-committee of the new CSIRO Consultative Council has been formed to provide a forum for discussion between management and staff representatives.

The Consultative Council sub-committee on flexible working hours will probably report to the Executive in the latter half of 1980.

Although flexible working hours schemes have been operating only on a trial basis throughout the Organization, most staff have now accepted them as part of the fabric of working conditions and would probably be reluctant to abandon the schemes, some of which have been designed and adapted to specific working environments.

It is highly unlikely that staff would have to revert to a fixed working week when the trials end.

The fact that flexible or modified working hours are already well entrenched in the Organization is likely to be prominent in the minds of both the Consultative Council and the Executive when a decision is being made on a permanent scheme.

The present 'standard' framework for flexible working hours comprises a band-width work period from 8 am to 6 pm, with core times between 10 am - 12 noon, and 2 pm to 4 pm.

The flexible periods, that is, the time when staff may opt, with permission, to be absent or present, are 8-10 am, 12 noon-

2 pm, and 4-6 pm, with a minimum lunch break of 30 minutes.

A fortnightly settlement period, coinciding with the pay period, has been chosen. Staff have been able to accumulate unlimited credits during the settlement period, and have been able to go 'into debt' for up to 8 hours in a settlement period.

The maximum credit-debit carryover to the next settlement period has been 10 hours.

Several Divisions, among them the Division of Building Research, have used an alternative scheme, involving a nine-day fortnight, with each member of staff working a longer fixed period each day than the 'standard' 7 hr 21 min, and taking a three-day weekend every second week.

In practice, staff are rostered off on either the Friday or Monday of one of the two weeks for administrative convenience.

Within some of the flexible working hours trials, there is also sufficient leeway to allow staff to take a nine-day fortnight, by working a little longer on most days and compiling the necessary credit.

In some Divisions, this practice became so popular that a rostering system for three-day weekends also had to be employed.

In some country areas, CSIRO staff have been working with a fixed-width lunch hour, since the opportunity for recreation during lunch hours is limited by remoteness.

At the Kimberley Research Station in Kununurra, WA, staff have been given the option of starting work as early as 6.30 am and working all their core time during the morning period, so that where possible they may leave work during the hottest part of the day.

In one city area, staff have opted to take a fixed 45-minute lunch break, to provide a little extra time for shopping after work, while in another city, staff use the optional 2-hour lunch break for midday shopping.

Interest in changed attendance arrangements was first shown in 1972-73 by the RAO Brisbane, the Division of Building Research, and the National Measurement Laboratory.

In 1973, the Divisions of Building Research and Chemical Technology (then the Forest Products Laboratory) each sought the introduction of a fixed nine-day fortnight. Trials were initiated in late 1973.

In 1974 the National Measurement Laboratory and the Armidale Research Station both began trials of a flexible hours system

with an optional 9-day fortnight.

In 1975 the Executive agreed to an extended flexible working hours trial in CSIRO generally, using the parameters of the NML model, but allowing Chiefs and unit leaders to develop their own versions within these parameters.

Although some Divisions were initially reluctant to become involved in any system, virtually all Divisions and Units have now experimented with some form of flexible working hours.

## Executive change

Armidale cattle breeder and grazier Mr Phillip Wright, 46, has replaced Mr David Asimus on the CSIRO Executive.

Mr Asimus resigned as a part-time Member of the Executive after being appointed Chairman of the Australian Wool Corporation.

The Minister for Science and the Environment, Senator J.J. Webster, said Mr Wright was a highly respected member of the Australian and international beef industry and would bring with him a wealth of expertise and experience which would be of considerable benefit to CSIRO.

Mr Wright, apart from his grazing and Hereford breeding interests, is also Chairman of New England Aviation, an air charter and trading business, and Deputy Chairman of Superair, a large agricultural aviation business.

Mr Wright was a member of the Australian Meat Board for 12 years and Deputy Chairman for seven, when he led delegations to many parts of the world.

As a member of the Meat Board he was involved in Department of Trade missions to Europe, the East, and North America.



Mr Phillip Wright

He is currently a member of the Science and Industry Forum of the Australian Academy of Science, the Commonwealth Council for Rural Research and Extension, the Australian Meat Research Committee, and the Australian Meat and Livestock Corporation's Producers' Consultative Group.



# New Division to aid manufacturers

## Laboratories in three capitals

CSIRO is to establish a new research Division designed specifically to provide a focus for the needs of Australian manufacturing industry.

The new Division, called the Division of Manufacturing Technology, will be developed initially from the existing production technology group of the Division of Materials Science.

It is scheduled to become an entity by 1 July 1980 and will have scientists working in Adelaide, Melbourne and later Sydney, in close collaboration with industry.

Announcing this, the Chairman of CSIRO, Dr J. Paul Wild said the Organization's Executive had decided to create the new Division to stimulate CSIRO's research in the manufacturing industry area.

'Manufacturing industry accounts for about one-fifth of Australia's Gross Domestic Product,' he said.

'There are about 37,000 manufacturing establishments operating in Australia, 70 per cent of which are in NSW and Victoria with a great concentration in Sydney and Melbourne.'

'Most of these firms are small, with those employing less than 100 people accounting for about 30 per cent of manufacturing industry employment.'

It is appropriate that CSIRO provide a focus for the industry, with the emphasis being on research to assist firms to improve their productivity through improved technology.'

Dr Wild said that, unlike the rural industry, where State Departments of Agriculture represented large identifiable 'customers' of CSIRO research, involving relatively few products, manufacturing industry represented many medium to small customers and a wide diversity of products.

'The Division of Manufacturing Tech-

nology will be part of CSIRO's Institute of Industrial Technology,' he said.

This Institute conducts scientific and technological research and development aimed at increasing the efficiency, competitiveness and scope of Australian secondary and tertiary industries in the national and international markets.

'Initially the new Division will concentrate on the metallurgical aspects of metal forming—casting, forging, machining, surface finishes and welding.'

'This work will be of key importance to a diverse number of local industries, many of which are small and wholly Australian-owned.'

'The new Division will also provide a nucleus on which to build further research in manufacturing technology, encompassing non-metallic materials as well.'

'Matters to be investigated will include the development of light, materials-saving components through rigorous design and process control, and the use of alternative materials to achieve weight and energy savings.'

Dr Wild said the Division would, as resources became available, 'contract-out' part of its research and development work to private industry and associations.

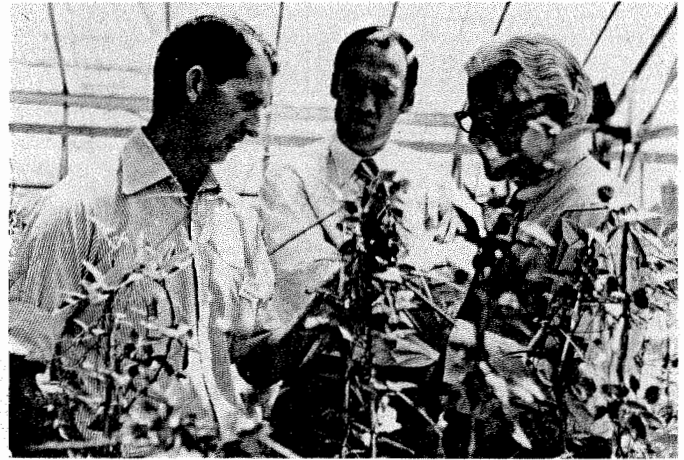
This would allow CSIRO formal access to production equipment and specialist industrial skills necessary for its research, and supplement the variety of informal arrangements currently in use.

'The Division of Materials Science from which the new Division will stem has developed a high reputation for its expertise in the basic engineering analysis of manufacturing processes,' he said.

'By redeploying some of its resources the Organization is making it possible for a further strengthening of this field of research in the new Division.'

Dr Wild said the Division of Materials Science would then be freer to concentrate on its research into catalytic chemistry which was providing a key focal point for the petrochemical and fuel conversion industries.

One such project the Division was working on involved the development of a catalyst which would change liquified petroleum gas into motor spirit in one process.



The new travelling Executive may be coming soon to a laboratory near you—and not necessarily with any advance notice. The Executive has so far held meetings in Perth, Melbourne and Brisbane, and will meet this month in Sydney, combining business with a familiarisation program in the Organization's laboratories. After its Brisbane meeting in November members visited laboratories at Cannon Hill, Long Pocket and St Lucia, where staff were all warned several weeks in advance of the impending visit, and then travelled to Cleveland, where they weren't warned until an hour beforehand but still impressed the visitors. At St Lucia, Mr Ralph Morris (centre) and Dr Walter Hughes (right) had Dr Bob Clements of the Division of Tropical Crops and Pastures explain the Division's breeding program on the tropical legume *Centrosema*.

## Big gains from pine breeding

Researchers at the Division of Forest Research, Canberra, have successfully bred pine trees able to produce 18 per cent more wood than trees used previously in commercial plantations.

The improvement could be worth around \$20 million a year to forest owners, or \$125 million a year to Australia's timber industry.

Dr Ken Eldridge, head of the genetics section, said the Tallaganda Seed Orchard near Canberra had provided the improved genetic material to make this demonstration of gains possible.

Genetic work in seed orchards over the past twenty-five years had led to quite dramatic improvement in volume and form of *Pinus radiata*, the pine trees most widely used in Australia's commercial plantations.

A seed orchard is a special plantation where selected trees are planted to virtually 'package' good genes and multiply them in

large amounts of superior seed.

'This is the first time anyone has been able to put a figure to the gain we felt quite sure we had at Tallaganda', Dr Eldridge said.

'We are very pleased to find that in each of these trials the seed orchard seed is better than what we call the 'control' seed, this being seed from randomly selected trees in young plantations in the ACT.'

'At a Jervis Bay test site, trees grown from seed orchard stock have over the past 10 years grown to 30 per cent bigger than control trees from ordinary plantation stock.'

'Another test site showed 18 per cent improvement,' Dr Eldridge said.

To test the 'well-bred' trees from seed orchards, researchers gave a score according to stem straightness, branching, and forking, as well as measuring height and diameter—all factors contributing to the final value of the

timber.

'In practical terms we have found that industry and the forest services can produce about 20 per cent more wood volume on a given area—or they can plant less area for the same volume.'

'The trees we have now are from only the first generation of selection. We are sure that this increase can be repeated in the second and later generations of selection.'

'Unlike improvement in growth from fertiliser, once you have a genetic improvement you can maintain it, and increase it again.'

Each 1 per cent gain that tree breeders make is worth about \$1 million annually to the forest growers.

If one puts it in terms of milled material the kind of improvement we can make each generation is worth approximately \$125 million per year,' Dr Eldridge said.



'It is hoped that a continuing and increasing effort will be made within your Division to maintain the Organization's current accident rate. — Extracted from a recent Head Office circular letter to the Divisions, titled 'Safety Performance 1978-79'.

## Consultative Council meets for first time

CSIRO's new Consultative Council, which provides a formal forum for management and staff, met for the first time in October.

The Council was created by the Government under the Science and Industry Research Amendment Act. Its role is to consider and to report to the Executive on any matter affecting, or of general interest to, the officers of the Organization, particularly in the area of terms and conditions of service.

CSIRO Executive Member Dr Keith Boardman is Chairman of the Council and Mr B.G. Cook is Deputy Chairman.

Also present at the first meeting were: Dr G.D. Brown (CSIRO Officers Association), Mr R.T. Desmond and Miss C.E. Popham (CSIRO Technical Association), Mr J.W. Ikin (CSIRO Laboratory Craftsmen Association), Mr P.A. O'Brien (Administrative and Clerical Officers Association), Mr P. Wright (Australian Public Service Association, Fourth Division Officers), and Mr L.S. Wilson (representing other inter-

ested associations and unions).

Representing the Executive were: Dr A.E. Martin, Dr B. Rawlings, Mr K. Thrift, Mr M.V. Tracey, Mr I.D. Whiting, Mr F.J. Whitty and Mr L.G. Wilson.

Mr J.F. Mitchell and Miss L.M. Meech attended as members of the Council secretariat.

Procedures for the advertising of vacancies in CSIRO were discussed, mainly from the viewpoint of clerical and administrative vacancies.

The Council agreed upon terms of reference for a sub-committee on technical change, after considering a report on this subject from an ad hoc committee.

The Council considered the first report of its sub-committee on staff counselling, which was concerned mainly with arrangements for personal counselling in CSIRO. The same subject will be discussed again at the next meeting.

Arrangements for the handling of temporary transfer appeals by clerical and adminis-

trative staff were considered.

The Council noted that a review was progress in CSIRO on flexible working arrangements, and also considered interim reports from its sub-committees on the employment of women, and on remote localities.

The terms of reference agreed to by the council for its sub-committee on technological change were as follows:

- In the context of—
  - (a) CSIRO's need to acquire, adapt and develop technology in order to successfully fulfil its responsibilities under section 9 of the Science and Industry Research Act 1949 as a national scientific research organisation.
  - (b) CSIRO's opportunities to utilise technology to enable its operations to be carried out with economy and efficiency, and
  - (c) the welfare of CSIRO officers who may be affected by the introduction of such technology; examine the consulta-

tive procedures which should be followed when introducing technology to the Organization and make recommendations to Council for the establishment of guidelines for consultation embracing such matters as:

- retraining and redeployment
- job satisfaction
- staffing levels
- occupational safety and health
- employment conditions
- staff involvement and
- monitoring processes.

Inquiries about the work of the Consultative Council, including any of the matters discussed at the October meeting, can be directed to Mr J.F. Mitchell, Acting Secretary (062-484442)

The next Council meeting will be held in Sydney on April 16.

# Scientist survives air crash

*... and courts death a second time*

Dr John Kowalczewski may be forgiven if he elects to make his next overseas trip by boat.

John, Assistant Chief of the Division of Mechanical Engineering at Highett, Victoria, escaped from the wreckage of a Swissair DC-8 which crashed at Athens Airport on October 7, only to find himself in an even more harrowing situation a few days later.

John and his wife Alma were on long service leave in Europe when John resumed duty for two weeks to fly to Peking where he was to address scientists of the Academia Sinica (the Chinese Academy) on economic aspects of solar energy use.

They boarded the Swissair DC-8 in Geneva for Athens, Bangkok and Peking.

Athens Airport had been experiencing heavy rain, and as the DC-8 landed it overshot the end of the runway, ploughed through a fence and plunged into a deep gully, and broke in two.

The pilot had been applying full reverse thrust to the engines in a vain attempt to prevent the overshoot, and this may have been a factor in the immediate outbreak of fire in all four engines.

Fourteen passengers in the rear quarter of the aircraft which broke away from the main section on impact, were killed by the fire.

The fire prevented the wing exits from being used, and all the surviving passengers had to leave by the single front entrance via an emergency chute.

John and Alma were in the first row of economy seats, well forward in the aircraft. There was little panic and all the 140 passengers in the intact front section were clear of the aircraft within a few minutes.

The Kowalczewskis lost their luggage in the crash, including the slides and text of the talk which John was to deliver in China.

With John minus his jacket and Alma minus her shoes, they were held for seven hours at Athens Airport with other passengers while accommodation was arranged.

John obtained a replacement copy of his talk from his Division, but the slides could not be replaced at short notice.

Two days later, John and Alma were the only two people on the original flight to continue their journey, except for seven Chinese returning to China.

They caught a Swissair DC-8 to Bombay to make a connection the following day with an Ethiopian Airlines Boeing 727 flight.

However, the Ethiopian Airlines flight to Peking was delayed with mechanical problems, and the Ethiopians working with Indian engineers took 10 hours to prepare the jet for flight.

Half an hour into the flight, the inevitable happened.

The captain's voice came over the intercom with a message which John remembers very precisely—'Ladies and gentlemen, I have a profound announcement to make..'

The pilot said the aircraft had developed a fuel leak, and was returning to Bombay.

John said the announcement was more frightening even than the actual crash at Athens. The Ethiopian aircraft jettisoned excess fuel, and limped back to land safely at Bombay.

After a further delay of a couple of days, John and Alma caught a Japan Airlines flight to Peking via Tokyo, arriving in Peking exactly a week late.

They arrived in Peking to a welcome of garlands of flowers, usually reserved for diplomatic staff.

It seemed their decision to continue on to Peking after the Athens crash had greatly impressed the Chinese, and had made front page news with headlines, roughly translated, reading 'Famous Australian scientist Still Coming to China After Air Crash'.

John successfully delivered his talk, substituting chalk and blackboard for slides, to scientists in Peking, Shanghai and Canton, and then he and his wife caught a train to Hong Kong.

From there, they made the hop back to Australia under the protection of the red Qantas kangaroo—vastly reassuring, according to John. Qantas flight staff knew the Kowalczewski's story, and did everything they could to make the flight a comfortable one.



John and Alma Kowalczewski with the Director of the Guangzhou Institute of Energy Resources (in Mao jacket) and some of the Institute's staff.

## Wheat research grants

The Wheat Industry Research Council has made grants of more than \$410,000 to CSIRO for research into wheat during 1979-80.

The money will be spent on eight projects being undertaken by five different CSIRO Divisions.

One of the new wheat research projects was the development of an integrated system for early generation assessment of wheat quality—a joint venture between CSIRO's Wheat Research Unit and the Victorian Wheat Research Institute.

It has been prompted by the fact that as world wheat buyers become more selective, the need to produce and market wheat

possessing the correct balance of grain protein, grain hardness and dough mixing and handling properties is critical.

Selection for these three important wheat quality characters should begin in the early generation of wheat breeding programs.

Since this is impracticable using currently available procedures, this project aims to develop an integrated system for quality assessment.

Another new project is aimed at better understanding of the reasons why yields from direct drilled crops—involving minimal or zero tillage—are sometimes lower than crops sown by conventional tillage.

## Six for Academy

Six CSIRO scientists and one former scientist with the Organization have been elected to the Australian Academy of Technological Sciences.

They are Dr John Possingham, Chief of the Division of Horticultural Research; Dr Ted Henzell, Chief of the Division of Tropical Crops and Pastures; Mr Harry Minnett, Chief of the Division of Radio-physics; Dr Ken McCracken, Chief of the Division of Mineral Physics; Dr Don Taylor, Chief of the Division of Textile Physics; Dr Geoff Taylor, Officer-in-Charge of the Fuel Geoscience Unit, and Dr Bill Scott, formerly Officer-in-Charge of the Meat Research Laboratory of the Division of Food Research.

Fellowship of the Academy is accorded to men or women who have clearly demonstrated their achievements in the technological sciences to the benefit of the Academy.

One of the major criteria for election is leadership of an innovative team successful in major scientific engineering or technological endeavour—tacit recognition of the calibre of research conducted within the Divisions or Units headed by the six new Fellows.

Fellows of the Academy are divided into four major groups—Applied Physical and Engineering Sciences, Applied Biological Sciences, Engineering, and Industry and the Community.

The Academy of Technological Sciences was inaugurated in 1976, with a key objective of promoting the application of scientific knowledge to practical purposes in Australia, and providing a forum for discussion and advice to Government and the community in relation to the application of scientific knowledge.



David Tongway, a soil chemist from the Division of Land Resources Management, is a member of a small but enthusiastic group in Australia who build and fly Wakefield planes.

The Wakefields are rubber powered and take their name from Lord Wakefield who donated a perpetual trophy for the world championship in 1928. The championship is contested every second year.

Australians have participated in the

championships since the end of World War II and this year David was manager of the eight-man Australian team contesting events at Taft, California.

The team put in the best ever Australian performance returning with second place in the world championship, third place in the power section of the Sierra Cup and 19th places respectively for the glider and power sections of the world championship.

David took fifth place from 68 starters in

the Sierra Cup, the second most important event on the world calendar and held immediately after the world championship and seventh place in the Juan Rivotto international.

In Wakefield championship competitions each competitor makes seven flights chasing the elusive upward thermals endeavouring to fly for the maximum three minutes during each flight.

# Samar sizes up CSIRO's PR

SAMAR RABADI is a publicity officer with the Royal Scientific Society of Jordan. During the past six months she has made an extensive study of how Australian science functions, with particular regard to the way science is served by public relations. Samar's visit was made under the auspices of the Australian Development Assistance Bureau, and she spent much of her time observing CSIRO. In this article, she records her impressions.

For some time before I came to Australia, I knew the possibility of coming here was there but for a long time nothing was definite. With short notice, less than a week, in fact, I was asked to pack and leave for Australia.

I panicked, I knew nothing about Australia apart from its basic geographical facts that go back to my high school days.

My efforts to build up some background within a short time were in vain. I was stuck with the fact that I was going to be confronted with a whole different culture, people, and world, a world of which I had no preconceptions.

I still remember the puzzled look on my new friends' faces who received me at Fairbairn Airport in Canberra, considering the energy I must have emitted after that long flight.

They drove me around Canberra. Next morning by 6.30 I was already having a walk around Canberra; I loved it for its refined planning, and beauty. To my astonishment I learnt later that many people around Australia disagreed with me.

The early reactions I got from people made me realise that I was a welcomed visitor; I still remember Graeme O'Neill and his companion who were waiting for me next day at Tullamarine.

They passed me and decided they were looking for a 'less Australian girl', after that I knew I would have no worries.

My program is coming to its end, and I have been requested to put down my impressions about my trip for CoResearch and, all of a sudden, I am unable to pass any professional judgments.

I am still overwhelmed by what I have learnt. It has been an excellent cultural and public relations exercise.

Over a six months period I have been absorbing public relations perceptions, approaches, means and target audiences at CSIRO, some Federal and State Departments, big private companies, the Uni-

versity of New South Wales, museums, and independent information agencies.

In order to appreciate the overall communication activities, I spent some time with the other end recipients of PR messages such as journalists, the Press Gallery at Parliament House, the Australian Broadcasting Commission, and attended one of the farmers' community events in Goulburn.

The first thing I noticed was that labels are important to people involved in PR. They are concerned with what to label themselves.

Apparently there is an agreement on labels within each category of organisation. In most cases labels gave some light on the means and the target audience of the PR exercise.

At CSIRO the term 'liaison officer', whether the person is dealing with information, media or 'communication', seems to be the popular label.

These officers are concerned with dissemination of information about CSIRO research. Sometimes the communication process is handled in an impersonal manner, and as one-way traffic.

I must say here that public relations at CSIRO is very much a reflection of the Chiefs of Divisions' philosophies of public relations; how it can help them, or how important it is for their Divisions.

That explains why at some Divisions, public relations is very active and progressive, and very negligible at others.

Cutting back on the CSIRO budget would probably push its Chiefs to seek partial financial funding for their projects from industry or somewhere else, or get involved in Government lobbying to keep money coming to CSIRO. Both alternatives need good public relations programs.

At the Department of Agriculture in New South Wales the term 'publicity officer' is very popular although some people seem to be keen on changing their labels, because publicity is a minor element in their work.



Samar Rabadi talks with NSW Agriculture Minister Mr Don Darrin

I was impressed by the publicity officers' efforts to get through to the farmer communities, as these communities seem to be very challenging, and a difficult target audience to reach. The publicity officers working within this frame have to be good to survive.

At the University of New South Wales, the Public Affairs Officers are heavily involved in internal communications, considering the size of the staff and students as they have to put two different messages to keep people informed of what is going on at the university.

On the other hand they are involved in external communications, TV, radio and press.

'Community Liaison Officer' is a separate title within the Public Affairs Department. The main responsibility of this person or persons is to promote university activities among community members.

Apparently public relations has progressed at the University of New South Wales since it became obvious that inter-universities competition in getting student funds and raising public interest in their programs was very strong.

I always felt that good public relations is

tied with business-mindedness; therefore, you have to translate your goals and aims in commercial terms. Maybe you have to sell your organisation and sell its research or activities.

I did not know how correct my feelings were until I spent some time at private companies. Their 'Public Affairs Departments' usually have a sizeable budget, and they have direct access to the top man.

They have to work as early warning radars, their programs are of more preventive nature than 'We will worry when the time comes', or 'Cleaning up the mess'.

Their tools are numerous. They deal with their target audience in a personal manner. As a PR officer I think we have to compete with private companies' public relations in their professionalism.

I would like to sum up by saying that a big responsibility lies on the shoulders of PR officers, and this demands from them a great deal of devotion, dedication and interest in their work.

For what I have learnt I owe a lot to each person I have met in Australia.

I am fascinated by their humbleness, modesty and dedication.

## Call for world nitrogen studies

More information is urgently needed on the behaviour of nitrogen in soils, plants, animals and the atmosphere in different regions of the world to help show how to maximise the efficient use of nitrogen in agriculture, forestry and natural ecosystems, and how best to use land.

This was the conclusion of an international workshop on nitrogen cycling held recently in Sweden, at which four CSIRO scientists presented papers.

They were Dr Glynn Bowen (Soils), Dr John Freney (Plant Industry), Dr P. Khanna (Forest Research) and Mr Rob Wetselaar (Land Use Research). Dr Ted Henzell and Dr Ian Vallis (Tropical Crops and Pastures) also submitted a paper, but did not attend.

The workshop concluded that the skilled application worldwide of knowledge on nitrogen cycling had the potential to increase production of food, fodder and fibre, and to maintain sensitive natural

vegetation, without wasteful and possibly damaging leaching of nitrates to drinking water or escaping of nitrogen oxides to the air.

The workshop was sponsored by the Scientific Committee on Problems of Environment (SCOPE) of the International Council of Scientific Unions, The United Nations Environment Program (UNEP), and the Swedish Council for Planning and Coordination of Research.

It brought together ecologists, agriculturists, silviculturists, microbiologists, biochemists, soil chemists, plant physiologists and mathematicians to examine problems concerned with nitrogen, one of the vital elements in the growth of living organisms.

Participants recognised the need to obtain more food for the steadily increasing world population, but from decreasing areas of productive land and without environmental damage.

If these objectives are to be met, it will be necessary to make more effective use of nitrogen from soil, biological nitrogen fixation and fertiliser.

Many present fertiliser practices are relatively inefficient and fertiliser is expensive, both in terms of energy and economics.

There is little information on the consequences of the use or misuse of fertiliser on different soil types, and some of the nitrogen in fertiliser remains unused.

Some 'management practices' used in forest areas or other areas of natural vegetation such as burning, felling or grazing, release nitrogen from soils, plants and trees.

This 'escaped' nitrogen and the unused nitrogen from fertiliser can enter drinking water or the atmosphere and cause problems.

Despite the large amount of new information presented, and the understanding

it generated, members regretted there was insufficient data to construct accurate ecosystem, regional, national, or global balance sheets for nitrogen.

Because of this it was not possible to predict with certainty which fertiliser and management practices are most likely to give rise to problems, or to foretell where they will occur.

The extra data required is complex and will involve analysis of climate, water, soils, plants and animals.

Such information can only come initially from large-scale experiments involving water catchments, forests or farms, serviced by multi-disciplinary scientific teams.

The workshop concluded that understanding the nitrogen cycle was a world problem which must rank, both for importance and the need for finance, with projects such as those concerned with cancer and energy conservation.

## Review : Alpine Flora

Australia needs more books like 'Kosciusko Alpine Flora'.

Too many of us gazing from city offices at vistas of European elms, oaks or poplars remain unaware of the fact that this continent has arguably the most unusual flora on our planet, the legacy of 200 million years of evolution in partial or complete isolation from other continents.

For too many Australians, the flora remains a grey-green blur seen from the window of a car speeding between our island cities.

From television and from books, our children imbibe the same predominantly European view of the plant world that so marked the attitude of our early settlers.

The 70's have seen a new environmental

awareness emerging, partly in response to the sometimes intolerable pressures of city living.

But the agoraphobic Australian is not easily induced to leave his suburban haven. Before venturing into the wide open spaces, he needs to know in advance what he will encounter.

Therein lies the importance of this book by Alec Costin, Max Gray, Colin Totterdell and Dane Wimbush.

At one level it offers the reader a preview of what he will see of the Australian flora and its setting if he visits the starkly beautiful Kosciusko alpine area. This will be enough for some.

But the book also offers an explanation of how the Kosciusko area functions—the

ecologist's insight, a deeper and perhaps more rewarding understanding of the complex geological and biological events of the flora's genesis.

In short, it not only tells what can be seen, but offers a way of seeing it.

The book is unquestionably worth the long years of study which its authors put into it. Its text is lucid and holds the interest, while the casual or professional botanist will find the plant key which occupies much of its length indispensable.

If there is a disappointment, it is a relatively minor one.

Anybody who has seen the original photographs by Colin Totterdell could not fail to have been impressed by their knife-edge clarity, which gives the subjects a three-

dimensional quality. They are obviously the work of a brilliant craftsman working at the limits of his skill.

The printer has failed to capture this quality; the photographs are merely excellent where they might have been exceptional.

It is a pity the quality of the dust-jacket photograph of the Anemone Buttercup could not have been reproduced in the book itself—a comparison between dust jacket and text photograph will demonstrate the loss.

But to repeat—this is a relatively minor flaw and the book remains an invaluable achievement.

GRAEME O'NEILL



# Taking technology to China

## Victorians set the pace

by Clive Coogan Assistant Chief, Division of Chemical Physics

"Too many books have been written about America by authors who have spent only a year, or a month or even a week there. This book will not suffer from that defect as its author has never been to America!"

Thus quoth Alex Atkinson in the preface to his book "Across America by Rocking Chair", the most subtly accurate insight into the USA that I have read. This present chronicle of a minute fragment of the long history of China is written by an author fully endorsing Atkinson's approach.

Early this year it became apparent in odd conversations with people in the business of manufacturing scientific instruments in Australia, that they coveted the market of China, but did not know how to go about entering that market, or felt that their firm was too small to have the wherewithal to tackle it.

After about the half dozenth talk of this kind I suggested that we should get all the interested parties together and have an informal chat about it.

Another 10 talks further on we decided the chat would become a full-blown one-day seminar in CSIRO, Canberra.

With the full co-operation of the Department of Trade and Resources, CSIRO thuswise ran a one-day seminar on "Selling Australian Scientific Instruments to China" in the Head Office Conference Centre on May 31 this year.

Opened by the Chairman of CSIRO, it was well-attended by leading members of the instrument companies from all over Australia.

Barry Neal, Australian Trade Commissioner in Peking, came back to Australia to speak at it. Greg Burns, lately returned from Teheran (where he had, as Trade Commissioner, witnessed horrifying scenes of splendid wines being poured down the sewers prior to being strained through kidneys) and destined to be Trade Commissioner in Peking from October 1979, spoke on the prospects for Australian instruments in China.

China expert, Jim Kibel, whose family has been trading with China for more than 20 years, a member of the Canton Cricket Club, (a whimsically named group of international China experts) also spoke from his somewhat different perspective.

Dr Chris Mullins, of Varian Techtron, then recently returned from a sales trip through China, gave us the benefit of that case-history.

Most of the rest of the day was taken up by extensive discussion and planning future action.

By the close of play, the meeting had set up a committee to undertake planning of future action both on the China front and within Australia.

The people present said that this was the first meeting which had brought together diverse groups in the sector to talk about co-operation, and they wanted to see this continued.

A number of deals had been conceived over lunch, and joint problems had been discussed.

The body which resulted is called, most appropriately, ASIA — the Australian Scientific Industry Association — which will be launched nationally very soon.

At present it is in the throes of incorporation and the planning of initial activities.

As might be expected, high on the list of future activities is an Australian scientific instrument manufacturer's trade mission to China, but other planned activities such as

a specialized information service rate highly also.

Committees need Chairmen, and habitually choose the least fleet of foot and slowest at evasive action for that task, and so I became Chairman of ASIA, a job presumably a little higher in protocol ranking than that of the late Chairman Mao. You may take it that this article constitutes my first and only publication of "thoughts".

Another insight into China, and a valued personal relationship, came with the visit of Professor He (pronounced "Ho") Shouan to the Division of Chemical Physics in April. He (not pronounced "Ho") told us that he (n.p.H) had come to observe our laboratory and to incorporate its valuable points into his laboratory in the Institute of Physics in Peking.

Fascinatingly, He (p.H) told us that our freedom to pick up the telephone and speak to a colleague in another Division or Institute, without sending the message up the hierarchical tree, across and then down the other Institute's tree was novel to a Chinese visitor, and he was quick to perceive the value of this.

We had a lot of talk about the possibilities for Australian instruments in China.

Yen Ip, our very own CSIRO China and HO expert, of the Division of Chemical Technology, was at his Puckish best in helping us with the two-way interpretations on that visit and struck up such a rapport with He (p.H) that they were last seen disappearing into the setting sun to do Melbourne over together.

The stage was thus set, the soil tilled, the sail trimmed and the land reconnoitred, for a chance remark to bear some fruit.

Your author, tired hack of the pen, happened to hear on a local grapevine that the Premier of Victoria, the Hon. R.J. ("Dick") Hamer would lead a trade delegation from Victoria to China in August and that plans had not yet gelled. With a head a-buzz with chinoiserie, your reporter suggested to Mr Hamer and his advisers that Victoria might well present a high-technology image to China different from the usual "wheat, wool and hides" profile, by taking with him a collection of "vest-pocket" scientific gear of some merit, made in Victoria of course, for giving to appropriate people in China (Melbourne is the scientific instrument "capitol" of Australia). This suggestion was received with enthusiasm.

It is from acorns that mighty oaks grow (\*incidentally if any reader would like an infant oak tree from the assemblage under my Quercus please let me know) and the idea outgrew the vest-pocket and soon transcended even the hip-pocket.

In the event Premier Hamer took about a dozen items with him, and gave them to the Chinese Academy of Science in the person of the Deputy Secretary-General, at a party he gave to say "thank-you" to his Chinese hosts at the Australian Embassy in Peking.

You may have seen it and them on the ABC news on the evening of August 23.

He also presented the Academia Sinica with three CSIRO films, "A New Look at the Sun" (dubbed in Mandarin); "The Long Shot that Paid Off" re atomic absorption, in English; and "The Grating Rulers", re diffraction gratings, in English.

The latter two referred to the atomic spectroscopy equipment represented by the GBC AA Spectrophotometer and the Varian Techtron gratings and spectrophotometers.

for Scientific and Industrial Research (CSIR) and was responsible for establishing the distinctive character of CSIRO which is still evident in CSIRO today.

The medal is a bronze disc 6.4cm in diameter whose design was taken from the memorial plaque of Sir David at the entrance hall of the laboratory named after him at the Division of Chemical Physics in Clayton, Victoria.



The Hon. R.J. Hamer, Premier of Victoria, bands over the 'Made in Victoria' scientific instruments to representatives of the Academia Sinica at the Australian Embassy in Peking. Identifiable in the photograph are the Webster computer, the Rauehuss water conductivity meter, the GBC atomic absorption spectrometer, which was subsequently given an Australian Industrial Design Award, and the Mac Dhui oxygen probe.

The instruments comprised: a minute needle threaded with a nylon micro-filament together with other instruments used in nerve surgery (Microfine); a special "thumb-tack" with a thermometer sensor in the point and electronics in the head, for measuring the temperature of blood in the arteries in open heart surgery (R.M.I.T.); a design-award winning rotary vacuum pump (Jigtool); a new type of subcutaneous nerve stimulator (Ramsay Surgical); a vacuum gauge running from atmospheric to  $10^{-6}$  mm (whatever that is in pascals) from Dynavac; a new yellow sports-model atomic absorption spectrophotometer from GBC Scientific Instruments; an oxygen-sensing probe for furnaces etc. (Mac Dhui in association with CSIRO Materials Science); a hand-held electrodeless water conductivity meter from Selby Scientific, to a Chemical Physics design; diffraction gratings from Varian Techtron; a fast-response reaction-bonded thermocouple sheath from Novatech Australia, (in association with Chemical Physics); the world's micro-est syringe (delivering  $0.5 \mu\text{l}$ ) and gas chromatographic gear from S.G.E.; and a mark-sense card computer from Webster Electronics (in conjunction with Monash University) for teaching high school and University students to programme and for use in small industry.

The computer was accompanied by an offer of a Webster-Electronics engineer to lecture in China on the computer hardware and its maintenance and a Monash computing lecturer to lecture Chinese computer experts on the software and then to give specimen courses to Chinese students.

This offer was quickly taken up, the lectures have been given, and the lecturers feted!

The instruments were chosen with an eye to novelty, excellence or uniqueness, and were very well received by the Chinese.

Instead of the usual "he, hum" (Chinese expression, n.p.H), "Make room in the basement" which one feels that State exchanges of gifts often evoke (or should evoke) there was genuine appreciation.

At the end of the Embassy party, Australian officials approached the Academy professors present and said "Don't bother about the instruments tonight. We will repack them in the morning and send them to the Academy. No worries".

This was countered by the Chinese equivalent of "Not on your — life, we will repack

and transport them. They have come this far without accident and we want to ensure they survive en route to the Academy Institutes."

The Premier's party, which contained a number of businessmen with experience of China, was very successful and has set up a special, sister Province relationship with Kiang-Su, of which Nanking ("Southern Capital") is capitol and Shanghai is the port.

Mr Wu, the dynamic leader of that Province, has been invited to visit Victoria this year, and undoubtedly cultural, commercial, technological and scientific exchanges will follow of benefit to China and Australia.

"What", the cagey reader asks "about the danger of the Chinese copying our instruments and selling their copies at cut-throat rates? They have no patent system".

What indeed? All the firms participating in the sortie were aware that this is a remote possibility, but China is in the course of setting up its own patent system and has its own code of honour about copying—it does not sell abroad, but manufactures for consumption within China only, to alleviate its foreign exchange difficulties.

The possibilities of joint venture with the Chinese on manufacture of some instruments is very attractive.

Many of our instruments will find a market in China in terms of their excellence, and are not easy to reproduce because, as their Australian makers know to their chagrin, of the length of the tail on the learning curve.

Well, this article might not have been all you wanted to know about China but were afraid to ask, but it does indicate interactions of great importance emerging for Australian science.

China plans to have 800,000 professional scientists by the end of the century—about 400 CSIRO's! At a modest 1 per cent of the scientific supplies needed as Australia's market fraction this would lead to about \$100 million p.a.

As our caravans of modern Marco Polos traipse across China wooing that market, I have no doubt we will learn much from Chinese science, which has learnt to survive on a shoestring.

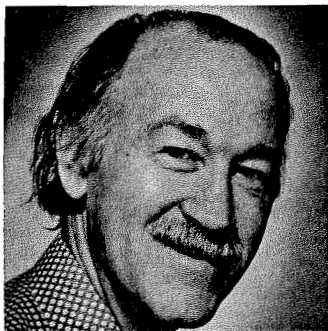
Is this what CSIRO has in mind as it sends a high level deputation to China at the end of the year? Be that as it may, we all look forward to the opening up of continuous communication with our colleagues there.

### Rivett Medal applications

Applications from CSIRO research staff are being sought for the 1980 award of the David Rivett Medal.

The David Rivett Medal is awarded biennially to a young CSIRO officer for outstanding research carried out within the Organization, being awarded alternately for work in the biological and physical sciences.

Sir David Rivett was Chief Executive Officer and later Chairman of the Council



One of CSIRO's most distinguished scientists, Dr Milton Moore, has retired after a 41-year career with the Organization.

Dr Moore was made an officer of the Order of Australia in 1976 for his services to Australian science and in the same year was made Minister (Scientific) in London, a post which he held until his retirement.

Dr Moore graduated as a B.Sc.Agr. (Hons) from the University of Sydney in 1937, gained an M.Sc.Agr. from the same University in 1950, and then a D.Sc.Agr. in 1962.

He began his CSIR/CSIRO career as an assistant Research Officer with the Division of Plant Industry in 1938, and rose to become a Chief Research Officer in 1956 and an Assistant Chief.

His chosen discipline was ecology—he was in fact a pioneer in the field, and was among the first to use an ecological approach to the problem of controlling weeds in Australian crops and grazing lands.

He was also among the first to be concerned with the ecological consequences of agricultural activities, and gave further impetus to the study of vegetation and the environment by founding the Ecological Society of Australia.

Dr Moore joined the Division of Tropical Pastures in 1966, and then founded the Woodland Ecology Unit in 1971, which subsequently became a part of the Division of Land Use Research.

He became Federal President of the Institute of Agricultural Science in 1958 and was made a Fellow of the Institute in 1965.

Dr Moore gained a reputation as an outstanding agricultural scientist and was a world authority on the ecology of grasslands.

Late in his career Dr Moore led the Woodland Ecology Unit in studies of the impact of man on woodlands and forests.

His team also made a major study of the problem of restoring vegetation and stabilising soil in an Army tank training area in Puckapunyal, Victoria—probably the largest single revegetation project ever undertaken in Australia.

He will return to Australia briefly from England to attend farewell ceremonies in his honour.



Mrs Veronica Henry has retired from full-time research at the Division of Land Resources Management, Deniliquin.

Mrs Henry has been awarded an Honorary Research Fellowship which will allow her to continue the evaluation of lucerne cultivars in established trials at the Falkiner Memorial Field Station.

As CSIRO's only woman plant breeder Mrs Henry has become extremely well known and respected for her contribution to the development of lucernes tolerant of the heavy clay soils of the Riverina, crown and root rot, and more recently aphids, all of which have assisted the lucerne industry in Australia.

Her work formed the basis of the current breeding and selection program being conducted by the NSW Agriculture Department which resulted in the recent release of the improved Falkiner variety Nova.

During the coming 12 months Mrs Henry will continue to collaborate with the Department plant breeders.

Mrs Henry joined CSIRO in 1955 and worked initially within the Division of Plant Industry later transferring to Land Resources Management.

Earlier this year, Mrs Henry, then Miss Veronica Rogers, was awarded the MBE by the Queen for her services to CSIRO.

She was farewelled from full-time research with CSIRO at a dinner in her honour in Deniliquin.

Amongst those attending were past Officers-in-Charge of the Riverina Laboratory, Mr Lockie Myers and Mr Ron former Divisional Administrative Officer, Mr Jack Patterson; Dr Jim Davidson, a research scientist formerly based in Deniliquin and now in Canberra; plant geneticist Mr Hunor Daday; Professor Max Whitten from Melbourne and Director of the McCaughey Institute, Professor Geddes.



Dr K. Rachel Makinson has been appointed Assistant Chief of the Division of Textile Physics, the first woman to achieve this distinction in CSIRO.

Dr Makinson's research work has been mainly in the field of wool shrinkage, and she was made a Chief Research Scientist in 1977 in recognition of her elucidation of the basic causes of felting shrinkage in woollen fabrics and of the mechanisms by which shrink-resist treatments work.

She graduated with a double first at Cambridge University shortly before the beginning of the 1939-45 war.

For a few years she worked in the School of Physics in the University of Sydney in various capacities, including lecturing in radiophysics to prospective radar officers in the three services.

She joined CSIRO in 1944 as an Assistant Research Officer, and was seconded for a period to the University of Sydney to work with a small team concerned with the development of modulation controls for radar.

Subsequently, she turned her attention to elucidating the physical properties of wool, initially in the Division of Physics and from 1953 in the Division of Textile Physics at Blaxland Road, Ryde.

She has recently published a book which is the standard reference covering all aspects of the felting, friction and shrinkproofing of wool.

She was a member of the Interim Australian Science and Technology Council (ASTEC) appointed by the Labor Government in July 1975, and is currently a Vice-President of the CSIRO Officers' Association.

Her interests outside work are bushwalking, gardening and Australian flora and fauna. She lives at Pymble and has two sons and three grandchildren.



Sally Atkinson has retired after nearly 38 years in the Division of Radiophysics, proving that women in CSIRO can be just as durable as their male colleagues.

During this period she served with six Chiefs and acted as secretary to three of them: Taffy Bowen, Paul Wild and Harry Minnett.

When she joined Radiophysics in 1941, the Division was engaged on secret radar development.

After the war a major reorganization of the Division took place to apply the enormous advances in radio and electronic techniques to peacetime applications such as radio navigation, electronic computers, particle accelerators, cloud physics, and the investigation of radio emissions from space.

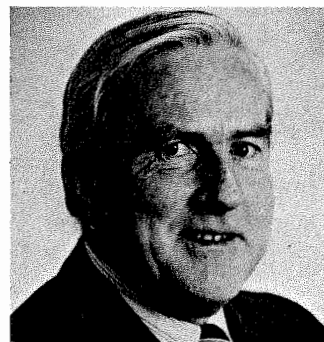
Sally watched the latter grow rapidly from a scientific curiosity into the 'big science' of radio astronomy.

In 1968 she moved with the Division from the grounds of Sydney University to the present site at Epping, where she now lives. She saw the Cloud Physics Group set up as a separate Division and took part in the drama of the development of the Interscan microwave landing system.

Until the day of her retirement Sally acted not only as secretary to the Chief but also as office manager and supervisor of technical filing. She was also a key figure behind the scenes of many scientific meetings and conferences.

As recognition of her contribution to CSIRO Sally was awarded the British Empire Medal in 1978, appearing in the same honours list as her then-Chief, Paul Wild.

To mark her retirement Sally was presented with a set of travel bags and binoculars.



Mr Bill Keating, an Experimental Officer from the Division of Building Research, has been awarded a Fellowship by the Gottstein Memorial Trust.

The trust is the major educational trust of the Australian forest products industry, and honours a former CSIRO employee, Mr Bill Gottstein, who was killed in a logging accident in Papua New Guinea in 1971.

Mr Keating, who is also the foundation secretary of the Institute of Wood Science, has maintained a continuing interest in the communication of new technology to Australia's forest products industry.

With the Institute of Wood Science he has played a lead role in arranging technology transfer seminars in most States, which have been related to a wide range of industry activity and problems.

As a Gottstein Fellow, Mr Keating will visit the UK to study aspects of timber technology education in that country, relating this knowledge to the development within Australia of improved educational activity at sub-professional level.



CSIRO radio astronomer Jon Ables briefs Film and Video Centre director Tony Chenn during shooting of a brief documentary film titled 'A Tour of the Parkes Radio Telescope' recently, as cameraman Roger Secombe checks the light in the control room of the radio telescope. The documentary was produced to give visitors to the Parkes Visitors Centre an opportunity to see how the facility operates—members of the public are not able to inspect the big dish itself. Jon's brief metamorphosis into an anchorman for the film was highly successful.

## TWO VIEWS - BAROSSA

(Mengler's bill)

You'll take this place away!  
This view is portable. You'll find  
yourself unpacking it a year from now  
and half a continent between. Your mind  
will colour-slide a day invaded by  
wild irises and sparaxis grown loud  
in churchyards. Mengler's bill  
will be with you when next October happens  
east of here. The patchwork patterns  
fence-stitched on the valley floor will fill  
the space between your eyelids and your eyes.

(Hilde's kitchen)

Remember yesterday?  
You saw this hillside through  
the light that Tamarisks filtered in between  
the starch in curtains. Light improved  
by strudel, kuchen and the smoke-blown  
Mettlers scent of stove-enamel - sharp, clean,  
wood-warmed smells. A light that ran  
through German blessings on the wall and spilled  
across the day you took away a bill,  
packed shadow-patches cast by Tamarisks and  
brought sparaxis and stone-walled churchyards home.

## PHOTOGRAPHS - LOCAL HISTORY

Their names  
were household words and in that little time  
when I believed in things their lives became  
Arthurian with telling, fables  
from a Lyonesse that seemed  
to lie between the light and night, half seen,  
like shadow shapes that lamps on tables  
cast where kitchen walls join beams in ceilings,  
indistinct perhaps, but real as feelings.

They wear  
their silence like their suits - uneasily.  
These men who coloured in an era stare  
back monochromed, their faces shut, their hands  
superfluous on knees. Their lives  
lie bleached in laundered stories. Years creep by  
in grey, unfocussed prose. This history stands  
in need of kitchens, myths and lamps revealing  
emphasising hands outlined on ceilings.



## WORLD'S END CREEK - BURRA

Nothing passes here—not even time,  
or if I've used the years they seem  
recycled now. This same  
inverted landscape has remained  
within this stream  
reed-screened and clear  
since early yesterday when I was nine  
and January-free and came  
to squander some of summer. Change  
has been impeded here.

It's strange to see unaltered vistas from  
the early thirties lying there beside  
reflections of a face that's getting on.



Dr June Olley of the Tasmanian Food Research Unit, blended with the aboriginal art work in the foyer of the Centre for Animal Research and Development in Bogor recently. Dr Olley was visiting the centre during time-out in the proceedings of the Indo Pacific Fisheries Council Workshop on Fish Silage, which was being held in nearby Jakarta.

This is a kind of review of the first book of poems by Frank McMahon, who works at Head Office.

I don't know a thing about poetry, and I'm not at all sure what I like. You can see from that brazen opening that I am right to call this a 'kind of review'.

Poetry has always been hard to define. I thought I could recognise it when the last words rhymed, and the lines bounced along metrically.

I even mastered the complex mathematics of Gerard Manley Hopkins' "sprung metre".

But I could never abide the parsonical, prissy, plum-throated way of reading poetry aloud. And if it didn't rhyme, and its metric measure was elusive, I could never understand how it wasn't prose.

So I never read poetry, except by chance. My first encounter with Frank McMahon's poems was when he mentioned having written a new one.

He gave me a copy of it, and explained a little of the background. Like all his work, it grew from his memories of life in the Irish/

Welsh/German/Cornish outback of South Australia.

I would have thought such a background likelier to produce rather stark literature, peopled with hobgoblins and piskies, a kind of Wagnerian gardengnomish genre.

To my surprise, Frank's imagery worked directly on my own memories of growing up in the industrial north of England, producing word pictures of experiences we had shared though thousands of miles apart.

Maybe South Australians can more easily identify with the poems, but they are certainly not exclusive or parochial.

I think Frank McMahon's poems are marvellous. What gardener could resist my favourite line when he's ankle deep in compost— "I'm digging colour into summer".

If you don't buy a copy of his book, you're missing a treat. At \$3.50 a copy, direct from the author at Head Office, you can have a year-round pleasure on your bookshelf.

DORIS LEADBETTER

## Letters

Sir,

As members of CSIRO with interests in economics, we are embarrassed when our colleagues are criticised by members of the economics profession (e.g. Search 10 (1979) page 67).

We are equally embarrassed when misleading and inappropriate economics are used in CSIRO publications.

We cite, as an example, the reporting of costs and benefits to the breeding programme for aphid resistant lucerne on page 1 of Coresearch No. 206.

There are established procedures for calculating costs and benefits which are used in industry, government and research. We hope that all in CSIRO will learn to use them and avoid further criticism to themselves and embarrassment to us.

David Bennett  
John Thomas  
Land Resources Management  
Wembley, WA.

efficiency of oil-engines have awakened a recognition of the importance of all questions touching the economic production of liquid fuels."

"The supply of hydrocarbon oils from wells cannot support the rapidly growing demands for liquid fuels and lubricants for many years more."

These statements were not extracted from contemporary publications but from Bulletin No. 24 *The Production of Liquid Fuels from Oil Shale and Coal in Australia*, R.E. Thwaites, Institute of Science and Industry, Melbourne 1923.

A prophet without honour in his own country?

C. Garrow  
MANAGER  
Central Information Service  
Melbourne

Sir,

Was it a typographical error or the use of some such reference as "1066 and all that" that has your correspondent Clive Coogan claiming that Henry VIII built a Royal Tennis court in 1579?

Reputable histories generally agree that Henry VIII's reign came to an end in 1547. There is also a consensus of opinion among them that Henry was given the magnificent Hampton Court Palace to placate his jealousy over the previous, Wolsey, who surpassed the King in the splendour of his residence.

Because of this incident, among many others, one feels that Henry VIII's repu-

tation as a Royal Tennis player may have been somewhat overrated.

Even in Henry's less corpulent days those closest to the royal presence well knew it was better to flatter than to raise the royal ire.

Henry could well have been a leader in the field of gamesmanship.

Sir Thomas More well knew the value of maintaining the royal friendship.

When More could not agree to Henry's sporting inclinations in the matrimonial field he was sentenced to death.

By royal favour the sentence was commuted to one of beheading.

As More commented, "God keep my friends from such favours".

One can only hope that the exponents of Royal Tennis these days are less drastic in dealing with their opponents both on and off the court.

P. R. Smith  
Mineral Chemistry  
Port Melbourne

Sir,

Today we received our pay slips with the endorsement "WELL DONE JEZZA".

After investigation, we found that Jezza is not an employee of CSIRO, nor is he involved in science in any shape or form.

He is the captain-coach of a local football team who apparently won a pot on a previous Saturday.

We are not anti-football, but we strongly object to the waste of funds, in these times of severe restraint, in advancing this trivia.

Sir,

"Civilization on its Material Side Rests on Fuel".

"The rapid depletion of the world stocks of petroleum, the extraordinary increase in the use of oil-fuels, and the advancing

One might argue that the computer could equally have tapped out, "Well done Mike", when England thrashed Australia in last summer's Test series.

It might also have proclaimed "Well done Bubbles Whiteley" for an unbelievable performance at the Mineral Chemistry Social Club Dinner Dance!

"Well done David and John"  
Mineral Chemistry  
Port Melbourne  
(names supplied)

P.S. This letter was written during our lunch-time.

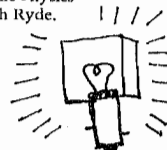
Sir,

In your publication No. 226 I notice a one thousand times error in the speed of light.

The units used were kilometres per second and should be metres per second.

I also see the same error in the "Courier Mail" (Brisbane) Oct 30 1979 via the CSIRO Press clipping service.

George Gray  
Textile Physics  
North Ryde.





# Blueprint for a low-energy future

## Social change also necessary

Dr Mark Diesendorf is a senior research scientist in the Division of Mathematics and Statistics. He is secretary of the Society for Social Responsibility in Science (ACT) and editor of three books on science and society published by the SSRS: 'The Magic Bullet', 'The Impact of Environment and Lifestyle on Human Health' and 'Energy and People'. This article is the second part of his discussion on alternative energy sources. The first part was published in the previous edition of CoResearch.

The severe constraints on the timescales needed for the development of very large, capital intensive, commercially unproven technologies of a high energy future (e.g. coal liquefaction, fast breeder reactors, nuclear fusion, solar satellites and huge arrays of mirrors feeding power from deserts to cities), lead inevitably to serious consideration of a planned transition to a low energy future.

In a low energy society, based on energy conservation and a careful matching between energy source and end-use, the medium scale solar technologies—fuel alcohol from biomass, industrial solar heat, photovoltaic cells and windpower—could play a significant role well before the year 2000.

They could become the mainstay of a low energy society (one which uses, say, half the present per capita energy).

However, they would only be a small pimple on energy demand in a high energy society (two or three times present level of consumption).

### Transport

Alcohol produced from crops and crop residues could provide at least 10 per cent of the current level of liquid fuel demand in Australia by 1990.

At this penetration, it would not be necessary to develop marginal land.

In a low energy society, one would not seek to run 6 million motor vehicles on power alcohol but rather to secure essential fuel requirements; for agriculture, for transporting food crops to rural railways and possibly for urban passenger buses.

Coal-fired locomotives would be reintroduced to rural railways in order to transport food to the cities, while electric delivery vehicles would handle distribution within the cities.

The railway links between the major cities like Sydney, Canberra, Melbourne, Adelaide in coal producing regions could be electrified.

The private motor car, with its legacy of accidents, pollution and alienation, would be allowed to fade slowly from the scene.

No doubt its passing could be drawn out by transfusions of methanol produced from coal and natural gas.

Meanwhile, revitalised public transport systems, supplemented with the bicycle and the moped, and the redevelopment of local communities would reduce our dependence on the private car.

Socio-economic developments—such as petrol rationing, banning private cars from inner city areas, increased registration fees for 'gas guzzlers', strengthened priority lanes

for buses and reorganised railways—would all assist in this transition.

### Heat

Research and development programs in solar heating at temperatures below 150°C is proceeding rapidly and could be widespread for industrial as well as domestic purposes in the medium-term, i.e. before the turn of the century.

If, for instance, 30 per cent of heat demand could be supplied by solar heating, this would amount to 15 per cent of Australia's current total end-use energy.

For comparison, in countries heavily committed to nuclear power, this source only contributes 2-3 per cent of total energy use, after nearly a quarter of a century of commercial operation.

In existing houses in the colder parts of Australia, which are not oriented towards the sun, the initial emphasis would be on cost-effective insulation, encouraged by low interest loans, as is current practice in California.

Socio-economic changes, such as revision of building codes and the removal of sales tax from insulation and solar heating/cooling systems, would be required.

Incentives could also be given to construct new houses according to good passive solar design and to encourage medium-density housing, situated near public transport links and supplied with community heat storages.

### Electricity

Electricity provides about 13 per cent of Australian end-use energy.

In the next 20 years or so, coal will continue to be the main source of electricity.

Nevertheless, two renewable sources—windpower for high-power requirements in the electricity grids of Western Australia, Tasmania and South Australia and in isolated townships, and solar photovoltaic cells, for local low-power requirements—could reach the point of mass manufacture within 10 and 5 years, respectively.

The developmental work still required for windpower is minor, and the main constraints upon development are non-technical ones such as the unrealistically low price for the competing conventional fuels like natural gas and high interest rates on the capital required.

Once these impediments are overcome, wind systems can be constructed and deployed very quickly: for large wind generators, the construction time and the time needed for paying back the initial energy investment are both only one year.

The development of solar photovoltaic cells still requires some important technical breakthroughs, in order to reduce the cost and the energy inputs, such as a cheap process for mass producing the amorphous silicon cell and a cheap system incorporating sunlight concentrators which does not overheat. Once such developments are achieved, photovoltaic cells may be able to compete economically with mains electricity.

Since the amorphous silicon cells are expected to have an energy payback time of only two years they too could proliferate rapidly.

Demand modification—encouraged by inverted tariffs for electrical energy used, higher 'rental' charges for high-power

circuits, cheaper rates for domestic circuits with interruptible supply and higher rates for large industrial uses of continuous power—may have considerable potential for encouraging conservation.

### National sovereignty

Natural gas is a valuable fuel for industrial and domestic heat and for transportation. Instead of exporting 75 per cent of gas from the major field of the North-West Shelf, we should surely keep 75 per cent to assist our transition.

An enormous growth in the export of high-grade coal, in the form of aluminium, is just commencing.

By charging an appropriate export levy on aluminium, the Federal Government could simultaneously collect a fair share of the enormous profits of that industry for the Australian people and could reduce the growth of such exports to a level which preserves sufficient low cost coal for our own transitional electricity and transportation requirements.

At present both the Federal Government's general revenue and the profits of the multinational oil companies are receiving a considerable boost as a consequence of the policy to lift the price of indigenous oil to world parity.

It would seem to be only fair that these excess profits, taken together with the aluminium levy proposed above, be earmarked specifically for the development of public transport, energy conservation, renewable energy sources and for other means of alleviating the impact of rising fuel prices on the poorer sections of the community.

### Conservation

Overseas studies suggest that it is far cheaper to save a watt than to produce an extra watt, that there are more potential jobs in energy conservation than in energy production and that conservation can be implemented more quickly than new energy production technologies.

How much conservation is feasible? Matching patterns of energy end-use to energy sources, in quality as well as quantity, is necessary.

For example, the production of low temperature heat is, in general, a thermodynamically inappropriate use of a high-grade form of energy such as electricity.

However, the above approach, though necessary, may not be sufficient for coping with circumstances (e.g. around the year 1990) when 60-70 per cent of our oil supplies could be suddenly cut off.

Perhaps we should also consider what measures could be taken now to ensure survival under such discontinuities. This would involve working from the bottom up, to determine what is really essential, rather than making technical fixes from the top (i.e. 'normal industrial activity') down.

First, food production and distribution would have to be maintained—this could be fuelled on ethanol from biomass and on as indicated above.

Second, we would wish to preserve some of the centralised services—electric power, water, sewerage etc.

Third, the maintenance of essential industries might be chosen.

But what industries are really essential? Do we need to drink soft drinks or could we



survive on fruit juice or even plain water?

Does one State, Tasmania, really need to devote 30 per cent of its total electricity generation to one firm, which employs relatively few people?

It should be clear on the basis of examples given in this article that, in making the transition to a low energy society, many of the changes required are not technological but rather are institutional, economic and legal in nature.

Such socio-economic changes require value judgments to be made. Hence, they should be open for the widest possible public discussion.

They should not be decided by 'experts' behind closed doors. Federal and State governments, community groups and individuals should all have the opportunity to contribute to energy policies.

Personally, I would stress the importance of keeping open a range of energy options, both for the nation as a whole and for various communities within Australia. To meet the requirement for survival, I feel that essential social changes are the re-introduction of community life in suburbs and towns and the eventual reversal of the existing trend for the whole population to move to the major cities.

The motor car and its freeways, the construction of huge regional shopping centres, jobs which require people to shift home frequently, nursing homes for the aged and television have destroyed much community spirit and support and have made people even more dependent upon the motor car and centralised distribution systems.

A return to community involvement—primarily at the local neighbourhood, but also in the suburban and regional centre—could play a fundamental role in facilitating a stable transition to a low-energy future and diminishing the ill-effects of an energy crisis.

As a bonus, the general quality of life would also be improved, and dependence on alcohol, analgesics, psychoactive drugs and other 'magic bullets' would be reduced.

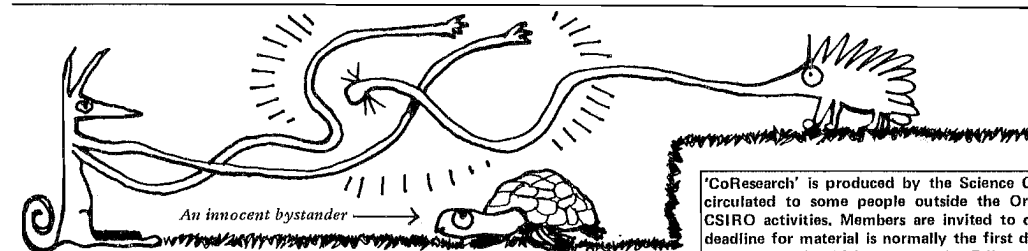
Already there are signs of a spontaneous flowering in community activities—child-care, food cooperatives, self-help groups, community buses, craft groups, community workshops, organic growers and learning exchanges—to name a sample.

Local councils and governments, State and Federal, can assist in this process by reducing institutional, legal and financial constraints upon such developments.

### Further reading

M. Diesendorf (Ed.): 'Energy and People', Canberra Society for Social Responsibility in Science (1979).

D. White et al. 'Seeds for Change', Melbourne, Patchwork Press (1978).



A far-reaching consequence grapples with an all-embracing concept.

'CoResearch' is produced by the Science Communication Unit for CSIRO staff. It is also circulated to some people outside the Organization who have a professional interest in CSIRO activities. Members are invited to contribute or send suggestions for articles. The deadline for material is normally the first day of the month preceding publication. Material and queries should be sent to the Editor, Box 225, Dickson, A.C.T. 2602. Tel. 48 4477 Editor: Graeme O'Neill.