CORESEARCH

FOR CIRCULATION AMONG MEMBERS OF CSIRO STAFF — NUMBER 130, MELBOURNE, JANUARY 1970

HAM MOON MONTH

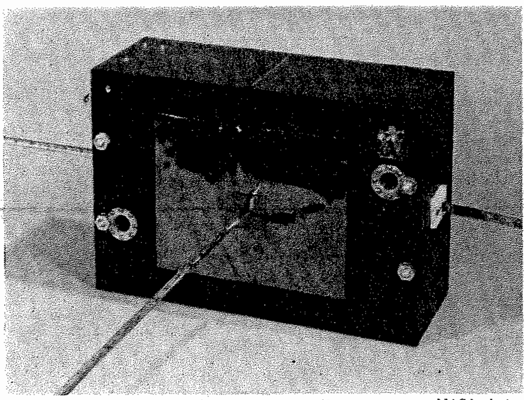
While radio enthusiasts around the world are tuning in to Australia's first amateur-built satellite this month, a group of Australian enthusiasts will be starting work on another satellite.

Project manager for the second satellite is Mr. G. L. Jenkins of the Division of Mechanical Engineering at Highett, one of the designers and builders of Australis-Oscar 5 which is due to be launched by an American rocket on January 15.

Oscar stands for Orbiting Satellite Carrying Amateur Radio, and four satellites in the series, built by amateurs in America, have been launched.

Australis-Oscar 5's successor, a multi-channel communications satellite which will bounce messages between amateur radio operators around the world, will be a joint Australian-American effort.

Its electronics will be built by Australian enthusiasts and it will be assembled, packaged, and powered by a group of American amateurs known as AMSAT.



Australis-Oscar 5 NASA photo.

Mr. Jenkins told Coresearch last month that the Australian group planned to start work on the new satellite early this month, and it was hoped that it would be in orbit within 18 months.

He said Australis-Oscar 5, designed to give amateurs experience in satellite techniques, was testing a number of innovations which it was hoped to include in the new satellite.

Australis-Oscar 5, a 19 inch by 12 inch by 6 inch box with two sets of steel tape antennae, was designed and built by a group of about 12 amateur radio operators—most of them members and ex-members of the Melbourne University Astronautical Society.

It was sent to the United States in June 1967 and will be launched by the American space agency NASA into an almost circular orbit about 1000 miles above earth on a Thor Delta rocket which will also put a professionally built weather satellite into orbit.

It will be the first amateur satellite launched by NASA. Oscars 1 to 4 were launched by the American Air Force.

Australis-Oscar 5 carries two battery powered radio transmitters. One will transmit in the 10 metre band with a frequency of 29.450 MHz and the other in the 2 metre band with a frequency of 144.050 MHz.

There is a command receiver on board which will make it possible to turn the 29.450 MHz transmitter on and off while the satellite is orbiting.

Two ground control stations are expected to operate in Australia, two in the U.S., one in Britain and one in New Zealand.

The command receiver will give amateur radio operators an opportunity to discover what problems are involved in ground control of satellites. It will also conserve power by allowing one of the transmitters to be turned off. Australis-Oscar 5's batteries are expected to last about 2 months.

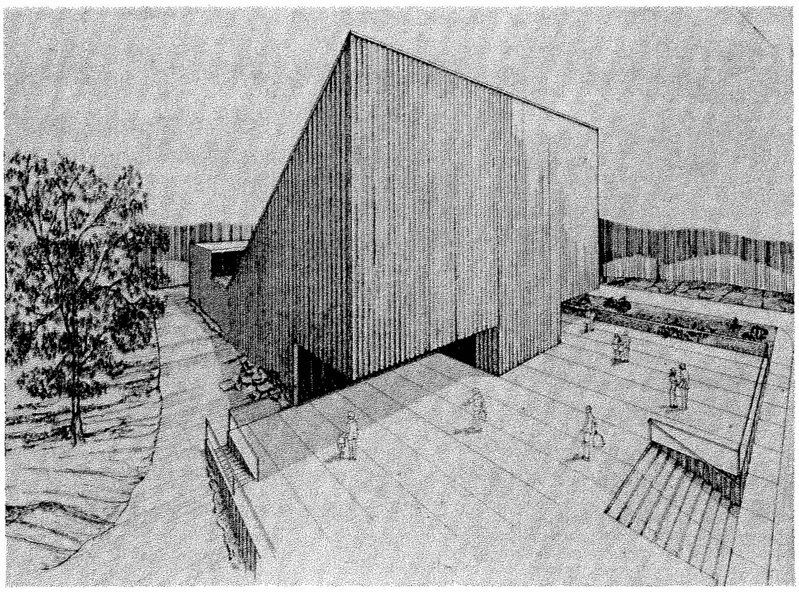
The satellite contains a magnetic stabilization system—a bar magnet—that the designers hope will line it up along the earth's magnetic field lines.

The aim is to stabilize the satellite so that signals can be received from it free from spin.

Three light intensity sensers on board will send back information which will show how effective the stabilization system is.

The sensers will be able to tell whether they are pointing at the Earth or into space, and the information they send back will enable the satellite's rate and direction of spin to be determined.

Australis-Oscar 5 will also send back readings of its skin and inside temperatures and the battery voltage and current.



New Library for Canberra

Tenders are expected to be called in April for this new home for the Canberra Laboratories Library and telephone switchboard. It is hoped that the building will be completed by about June next year.

The 92 feet long and 74 feet wide structure will be of rib, bush-hammered concrete. It will rise to an apex 60 feet above a terrace to be constructed at the front of the building.

The first floor will include a sundeck and a meeting room.

Skylights in the sloping roof and the windows surrounding the first floor sundeck will use one-way mirror glass which reflects the sun's rays but allows people in the building to see out.

The building will have accommodation for 56 readers at individual reading tables and about 100,000 volumes.

It has been designed to enable extension backwards if more space is required some time in the future.

The building was designed by the Department of Works, Canberra, and documentation is being carried out by the agent architects, O'Mahoney, Neville and Morgan.

Man and the Biosphere

Mr. R. A. Perry of the Rangelands Research Unit and Dr. L. T. Evans of the Division of Plant Industry were among about 70 scientists from all over the world who attended meetings in Paris recently to help plan Unesco's "Man and the Biosphere" programme.

They were members of working groups convened to help the Director-General of Unesco determine the nature, extent, and organization of the programme which will be a long-term intergovernmental and interdisciplinary examination of the use and conservation of the natural environment and its resources.

Establishment of the programme was recommended in September 1968 by a Unesco-organized intergovernmental conference of experts on the scientific basis for rational use and conservation of the resources of the biosphere.

Mr. C. S. Christian of the Executive led the five-man Australian delegation at the 1968 conference and was elected chairman of the conference's commission on science policy and science structure.

Projects in the programme, which is expected to begin in 1972, will be implemented mainly by individual countries. International organizations will provide coordination and stimulation.

Recommendations of the Paris working groups will be used in the preparation of a draft plan for the programme which will be considered by the General Conference of Unesco in October.

(Continued on page 4)

Gerry Lawson and Adele Samuel share a steak at the Parkville Animal Health Laboratory's Christmas barbecue at the Maribyrnong Field Station. A barn dance was held in the hay loft after the barbecue. More seasonal pictures are inside.

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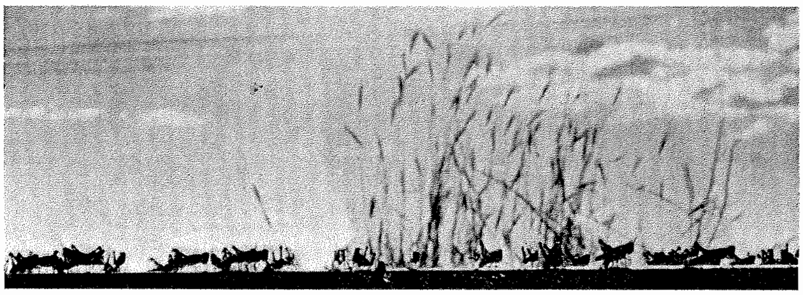


The Locusts Came to Feast

"The whole countryside is a sea of grass." That was Dr. D. P. Clark's description last month of the area round Trangie on the central western plains of New South Wales where locusts have been swarming in plague proportions.

"Swarms consist of millions of individuals all flying at the one time," he said. "If they are dense enough they look like smoke moving along."

He said thousands of millions of locusts were breeding and feeding in the affected area of about 2000 square miles in November. But there was plenty of grass for both locusts and stock, and as yet the locusts had caused no serious damage.

Dr. Clark, of the Division of Entomology, has been studying fluctuations in locust numbers and their causes in central western New South Wales and south western Queensland since 1965.

With scientists from Britain's Anti-Locust Research Centre, his aim is to find out as much as possible about the life of locusts as a step towards finding efficient control measures.

1965 was a drought year and the locust numbers were low. In 1966 there was a brief upsurge but no swarms developed. In 1967 rainfall was an all-time low and there were very few locusts.

In 1968 there was a partial recovery from the drought and December that year saw heavy rains in some parts of central western N.S.W. In February 1969 there was further rain and swarm production began.

In October there was as much rain as in the whole of 1967, and the lush pasture growth produced conditions ideal for the development of November's swarms of locusts. More swarms are expected when the next generation develops this month.

Dr. Clark, with four assistants from his Division and five scientists from the Anti-Locust Research Centre, studied the development of the November swarms and their activities from the State Experiment Farm at Trangie.

Below: A female locust drilling into the soil and laying eggs.

The scientists were particularly interested in the day and night-time movements of the locusts. In daylight, swarms of locusts move together in tight formation, but at night locusts take flight individually.

Day-flying swarms stayed close to the ground and were displaced with the winds, Dr. Clark said. The wind changed direction frequently in November and the overall distance travelled was small.

When they came to a river with trees along the bank the swarms tended to either stop or be diverted along the line of trees because they were flying below tree-top level.

"A few minutes after sunset individual locusts will just launch themselves up into the air," Dr. Clark said. "Ones that leave seem to have missed out on their evening meal. They seem to be more active if they have missed out on a meal."

These night-fliers were likely to travel considerable distances and could be concentrated by wind flows.

Cold fronts particularly tended to concentrate them. If they landed when they were bunched up they might breed in sufficient numbers to produce new swarms.

Changes in wind direction sometimes brought them to ground at night. Upward shining lights also brought them down.

"Perhaps they think they're upside down, change their flight posture, and down they come," he said.

The insects that have been swarming in central western New South Wales are Australian Plague Locusts, *Chortoicetes terminifera*. They are one of six economically important species of locusts and grasshoppers in Australia.

The difference between locusts and grasshoppers is one of behaviour. Locusts are species that from time to time occur as dense, strongly migrating swarms, whereas grasshoppers either never form swarms or form only loose swarms that migrate little. Four of the economically important species are locusts and the other two grasshoppers.

Because of their gregariousness and migratory propensities locusts are more destructive than the more individualistic and sedentary grasshoppers. When a species of locust is present at low density it behaves in the typical individualistic manner of grasshoppers. It is only when very high population densities are produced that the possibility of the development of gregarious behaviour arises.

A remarkable characteristic of locusts is that individuals which have gone through their development as members of a swarm differ in their colour pattern and in some bodily proportions from those that have lived a relatively solitary existence.

The trees operated as a trap, providing a good opportunity sometimes to attack large numbers in a small area with insecticide sprays.

The swarms landed for food at particular times of the day. Young adult locusts laying down fat in their bodies tended to eat most and were the ones that could do most damage to pastures and crops.

At night locusts flew higher and trees were no problem to them.

The Trangie bowling club lawn had suffered when this happened there in 1967.

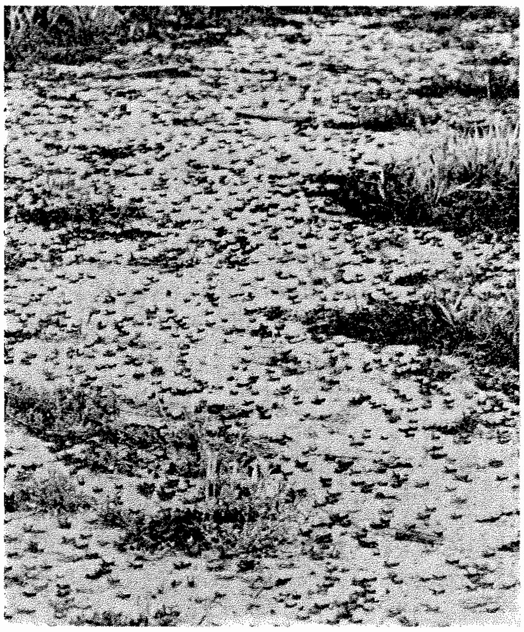
The scientists at Trangie used a helicopter to locate concentrations of locusts and make assessments of their numbers.

The noise of the helicopter caused most of the locusts in a swarm on the ground below to take to the air, and photographs enabling an estimate to be made of numbers in the swarm could be taken from the helicopter.

Photographs taken with cameras pointing vertically upwards from the ground could be used to estimate the number of locusts in an undisturbed swarm which were flying spontaneously.

The thousands of millions of locusts around Trangie did no serious damage in November because there was grass to spare and there were no crops at a stage where they were susceptible to locust attack.

The locusts did not migrate east to the Hunter Valley or south to the Forbes area as it was feared they might.



Above left: Locusts marching along a rail on the Peak Hill-Narromine railway line.

Above: A band of locusts on the ground in central western N.S.W. The locusts in both these photographs are hoppers, young locusts which have not yet developed wings.

But the next generation of locusts is due this month and these could do some damage to early-sown wheat and other crops in the central-west. And if the winds are unfavourable the locusts could migrate this time.

Dr. Clark said the prospects of beating locust plagues by means other than insecticide spraying did not look very promising.

And insecticides were not a good solution. They could destroy millions of locusts in one attack, but if conditions were favourable the survivors could multiply again to swarm proportions and the new swarms would have to be attacked with insecticides. Insecticide treatment was very expensive.

He said gradual changes in land use had alleviated the locust problem in some parts of the world.

Substitution of crops for pastures made land unfavourable for the development of locust swarms. But central western N.S.W. was a marginal area for crops and it seemed unlikely that there would be much increase in crop planting there.

Biological control was another possibility. There was a small wasp which liked to place its eggs inside locust eggs. The outcome was young wasps and no locusts.

In some places this parasitic wasp had been able to reduce locust breeding quite spectacularly.

But where conditions were favourable for locusts to multiply to plague proportions the wasps could not keep up with them and they had little effect in checking an increase.

Dr. Clark is studying the possibility of breeding these wasps in captivity. At certain stages of locust increase it might be possible to reduce numbers by releasing large numbers of the wasps on locust egg beds.

Other creatures exert some biological control over locusts by eating them. Birds, snakes, foxes, and lizards are locust easters, but there are not enough of them to have any useful effect. Like the wasps, they cannot keep up with the breeding rate of locusts.

With Dr. Clark at Trangie in November were **Miss Z. Warloff, Mr. J. Roffey, Mr. M. Lambert, Mr. K. Wardhough,** and **Mr. F. Bullen** of the Anti-Locust Research Centre, and **Mr. B. Cameron, Mr. R. Lewis, Mr. J. Walker,** and **Mr. J. Dowse** of the Division of Entomology.

Below: Locusts on the wing in central western N.S.W.

The News in Brief

Gerald Durrell visits Wildlife

Mr. Gerald Durrell—zoologist, author, and television documentary maker — visited the Division of Wildlife Research in Canberra recently to renew acquaintances.

Mr. Durrell, who travels the world studying and collecting animals, is the author of My Family and Other Animals and 17 other books. He founded a zoo on Jersey in the Channel Islands in 1958 and is now director of the Jersey Wildlife Preservation Trust which runs the 800 animal zoo.

In 1962 Mr. Durrell filmed a B.B.C. documentary on kangaroos, called Two in the Bush, at the Division's Canberra headquarters and on field trips with Division staff. He has corresponded with the Division frequently since then.

Now he is on a 14-week wildlife-studying tour of outback Australia. Travelling with him are his wife, his secretary, Miss Ann Peters, and the chairman of the Jersey Wildlife Preservation Trust Fund-Raising Committee, Lady Saranne Calthorp.

Spinning Invention

Textile mill machinery employing a revolutionary CSIRO-invented method of spinning wool yarns has emerged successfully from extended laboratory trials.

The new spinning method was invented in the Division of Textile Industry and developed jointly by CSIRO and an Australian company, Repco Ltd.

Repco has exclusive commercial rights to the process under basic patents licensed from CSIRO.

Extensive mill trials are now under way. No machines will be offered for sale until these have demonstrated the ability of the machines to stand up to the arduous conditions imposed by industrial use.

The new machinery spins about 20 metres of yarn a minute—approximately 10 times the rate of previous machines. It is extremely compact in size compared with the traditional machinery.

Yarn produced by the new process has special characteristics that permit weaving of very light-weight as well as standard wool fabrics.

Stone Platt Industries Ltd, of England, marketers of a wide range of textile machinery, have been appointed world selling agents for the new machines.

The Platt group will have an option to manufacture the machines at a later stage under licence to Repco, and will co-operate in further research and development.

Polar Medal

The Press Officer, **Mr. H. P. Black,** has been awarded the Polar Medal by the Queen.

The medal, which originated in the Admiralty in London, is given in recognition of outstanding work in the Antarctic.

Mr. Black's award is for his work as Officer-in-Charge of the Australian National Antarctic Research Expedition at Wilkes base in the Antarctic in 1960.

Mr. Black led the first Australian expedition to explore the polar plateau inland from Wilkes. His party penetrated 230 miles inland and climbed to a height of 7000 feet with two weasels, a Sno-cat and six sledges.

He navigated for the expedition and carried out glaciological observations on the plateau surfaces and in glaciological pits.

At Wilkes base he studied profiles of wind velocity and snow transport in blizzards, accumulation of the Antarctic ice-cap, and the properties of the snow.

He also studied solar haloes, rare and beautiful phenomena caused by the sun's refraction and reflection from "diamond dust", minute crystals of ice floating in the air.

Mr. Black was also Officer-in-Charge of the Australian expedition on Macquarie Island for the International Geophysical Year in 1957.

Doctorates

Mr. C. S. Andrew of the Division of Tropical Pastures has been awarded the degree of Doctor of Agricultural Science by the University of Queensland.

Mr. I. W. Vallis of the Division of Tropical Pastures has been awarded the degree of Doctor of Philosophy by the University of Queensland.

Film Award

A recent CSIRO film, The Echidna (or Spiny Ant-Eater), has won a bronze award in the Australian Film Institute's annual competition.

Bowls First

CSIRO was included in the Commonwealth lineup for the first time in the 11th annual Commonwealth versus State Bowls Match held at the Melbourne Bowling Club last month.

The CSIRO four, **Mr. R. Ferguson** of the Head Office architects' office, **Mr. W. Revell** of the Division of Mineral Chemistry, **Mr. R. Venn** of the Division of Chemical Physics and **Mr. J. Little** of the Division of Applied Chemistry, won one game and lost three.

Forty-four 'fours' participated, and State defeated Commonwealth 936 to 900.

Ski Work

Pre-season work parties will begin at the CSIR Ski Club's Mt. Buller lodge on the Australia Day weekend, January 24-26, and at the Club's Falls Creek lodge on March 7-9.

Prospective numbers are expected to attend at least one work party. The co-ordinator of work parties is **Mr. J. Eltham** who can be contacted at the Division of Tribophysics.

Applications for membership in 1970 close on 28th February.

Community Aid

In the last 6 months Community Aid Abroad groups in Head Office and in the Divisions of Textile Industry, Forest Products, and Chemical Physics, have raised more than $2,000 towards their current overseas project.

The groups are planning to raise a total of $3,500 to help the Kubang Sepat Farmers Association in Kelantan, Malaysia, establish a credit co-operative for farmers.

Deadline

Contributions to the February issue of Coresearch should reach Mr. R. Lehane at P.O. Box 109, Canberra City, A.C.T., 2601, by Thursday, 15th January.

Left: Santa Claus and our photographer share the children's attention at the Division of Fisheries and Oceanography's children's Christmas party. The clown doesn't look too sad about being ignored.

Below: Santa and the youngsters at the Division of Animal Physiology's children's Christmas party.

INSTANT CHEESECAKE

One of the new foods the Division of Dairy Research is working on is an instant cheesecake designed to appeal to Japanese tastes. Our photo shows Miss Marie Rogers (left) and Miss Jane Henderson seeing how it's turning out.

SAFETY NOTES

Down to Earth

Some electrical equipment as it is delivered is potentially fatal for the user, and we have been fortunate in not having many serious accidents involving electricity.

The following are two examples of dangerous equipment received during November 1969.

Warburg apparatus made in Germany

This is both dangerously and illegally wired. The current return from the water heating element is via the earth line, and as a consequence any break in an earth connection causes the machine casing to become alive.

This is even pointed out in the instructions; ". . . such an arrangement necessitates the heating current circuit to be completed via the earth return wire. When exception is taken to this arrangement, the current required by the whole machine should be supplied by a double wound transformer".

A sample drier of local manufacture

The heating element was enclosed in a piece of flammable plastic which melted and allowed the element to contact the metal casing of the drier.

The machine was not earthed, the earth wire of the inlet power cord was cut off flush with the outer insulating sheath, and there was no provision on the machine for an earth wire connection.

If any other Divisions have these pieces of equipment, have them modified immediately.

And please make arrangements for **all** electrical equipment to be checked **before** it is brought into service.
It may be too late afterwards.

J. W. Hallam, Safety Officer.

APPOINTMENTS TO STAFF

Mr. P. R. Benyon has joined the Division of Computing Research to study general simulation problems in relation to digital computing systems. Mr.

Mr. BENYON

Benyon graduated B.Sc. from the University of Sydney in 1949 and B.E. from the same university in 1952. Since then he has been employed by the Weapons Research Establishment of the Department of Supply.

Dr. J. G. Ables has joined the Division of Radiophysics to carry out research in radio-astronomy. Dr. Ables graduated B.A. with honours from Knox College in 1959, M.Sc. from Oklahoma University in 1963 and Ph.D. from Oklahoma University in 1967. Since 1967 he has been a research fellow in the Department of Physics at the University of Adelaide.

Dr. T. C. Elleman has been appointed to a post-doctoral fellowship with the Division of Protein Chemistry to study the

Dr. ELLEMAN

breakdown of proteins during treatment with oxidizing re-agents and during irradiation. Dr. Elleman graduated B.Sc. with honours from the University of Bristol in 1966 and Ph.D. from the same university in 1969.

Mr. J. C. Bensink has been appointed to the Meat Research Laboratory of the Division of Food Preservation to study technological problems in the Australian meat industry. Mr. Bensink obtained his Diploma of Tropical Agriculture from the College of Tropical Agriculture, Deventer, Holland, in 1961 and graduated B.Sc. with honours from McGill University, Canada, in 1967. For the last two years he has been laboratory manager with Hygrade Foods Inc., Montreal.

Dr. D. B. Purser has joined the Division of Plant Industry to study animal production from ley systems. He will be

Dr. PURSER

stationed in Western Australia. Dr. Purser graduated B.Sc. with honours from the University of Western Australia in 1959 and Ph.D. from the same university in 1961. From 1961 to 1967 he worked at the Institute of Nutrition and Food Technology at Ohio State University and since then has been an Associate Professor in the Department of Animal Husbandry at Michigan State University.

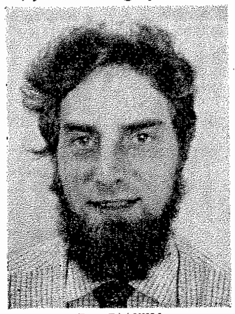
Mr. N. R. Sheppee has been appointed to the Division of Chemical Engineering where he will supervise the Divisional workshop, design specialized

Mr. SHEPPEE

equipment, and maintain and operate the Division's mechanical services. Mr. Sheppee obtained his Higher National Certificate in Mechanical Engineering from Dudley and Staffordshire Technical College in 1951. He has spent the last ten years as an engineer with the Department of Supply.

Dr. B. T. Steer, has been appointed to the Division of Irrigation Research to study the effects of the aerial environment on photosynthesis and the utilization of fixation products. Dr. Steer graduated B.Sc. from the University of London in 1963 and Ph.D. from the Department of Botany, Queen Mary College, London, in 1965. He has spent a year in the Department of Biological Sciences at Purdue University and two years at Brandeis University in the United States. He has spent the last year working at the University of Bristol on leaf metabolism during chloroplast development.

Dr. G. M. Smith has been appointed to the Division of Tropical Pastures to study the red, yellow and grey earth soils



Dr. SMITH

in North Queensland. Dr. Smith graduated B.Sc. with honours from the University of Leeds in 1964 and Ph.D. from the University of Cambridge in 1969.

Mr. R. W. Sutherst has been appointed to the Division of Entomology to study tick population on cattle and the effect of the external environment on host susceptibility. Mr. Sutherst graduated B.Sc. with honours from the University of Edinburgh in 1966 and since then has been studying for his Ph.D. at the University of Queensland.

Mr. C. G. Thomas has been appointed to the Division of Mineral Chemistry where he will undertake kinetic and heat transfer studies related to pellet

Mr. THOMAS

production from iron ore. Mr. Thomas graduated B.Sc. with honours from the University of London in 1967 and since 1968 has been working with John Lysaght (Australia) Ltd.

Mr. M. A. Zuiderwyk has joined the Division of Mineral Chemistry to work on the design, construction and maintenance of electrical instrumentation. Mr. Zuiderwyk obtained his Diploma of Radio Engineering from the Royal Melbourne Institute of Technology in 1968 and since 1960 has been

Mr. ZUIDERWYK

working as a technician and engineer with General Television Corporation Pty. Ltd.

Studying the Reef

A committee of the Australian Academy of Science has recommended that an advisory committee be appointed to recommend, co-ordinate, and seek financial support for basic long-term research on the biology and physical environment of the Great Barrier Reef.

The advisory committee would co-operate with interested bodies including CSIRO, the Commonwealth Department of Education and Science, the Great Barrier Reef Committee, the Queensland Government and its interested departments, the University of Queensland, and the Townsville University College.

It would also seek the co-operation of scientists from other countries.

The recommendation was made by a committee appointed by the Academy to consider the reported destruction of coral on the reef.

The President of the Academy, **Dr. D. F. Martyn**, who is Officer-in-Charge of CSIRO's Upper Atmosphere Section, announced the committee's conclusions and recommendations last month.

He said the committee felt there was a surprising lack of knowledge of the biology generally of the Great Barrier Reef and particularly of the biology of coral and of the Crown of Thorns starfish and its predators.

The committee found that in some parts of the reef the population of the Crown of Thorns starfish had increased considerably in recent years and this increase had been associated with more destruction of coral than was normal in these areas.

Only a small part of the Reef had been surveyed and the committee had been unable to ascertain the extent of destruction, Dr. Martyn said.

The committee had stressed, however, that the reef as a geological structure was not in danger and that the coast of Queensland would not suffer adverse effects as a result of the coral destruction.

The committee considered that it was not possible at present to attempt long term or widespread control of the starfish because practical methods were not available.

It said interim control measures — removing Crown of Thorns starfish by hand or destroying individuals on the reef —should be confined to established tourist sites.

YIPPIE FOR SKIPPY

(With apologies to Rabbie Burns)

Ye helpless mild marsupial beast.
A harmless tyke tae say the least.
Though squatters say ye often feast
On grass and shoots.
Until all natural growth has ceased
Through mangled roots.

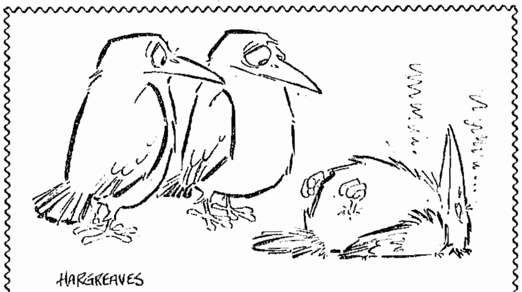
They claim yer scissor action bite
Can ruin their pastures overnight
And say they have a legal right
Tae tak' their aim
Along a spotting rifle's sight.
'Tsa bloody shame.

These squatters' claims have been denied
By some who say the blighters lied.
And wanted tae obtain yer hide
For selfish use.
Yer grazing habits they described
As lame excuse.

Will no one curb those heartless coots
Who don their flash safari suits
And organise relentless shoots
Wi' murderous gun.
Tae use yer hide for making boots
Or just for fun.

Let not yer heart be filled with woe
For some will see ye get a go,
Such as the CSIRO,
They'll curb these habits.
They're on the fauna's side ye know.
Just ask the rabbits.

Jock Currie, Forest Products



"He was just remarking how odd it was that with radioactive fallout building up, pesticides in all our food, air and water pollution, diminution and destruction of environments, the tension of living in the fourth interglacial period—he had never felt fitter."

Man and the Biosphere

(Continued from page 1)

Mr. Christian told Coresearch last month that the first need recognised by planners of the programme was for countries to assess the current state of their environments and resources.

Then it was necessary to recognise where technology had already achieved positive gains and to ensure that such approaches were applied wherever appropriate.

Changes in the composition of the atmosphere, water quality, soil fertility, vegetation productivity, and other elements of man's environment, including aesthetic aspects, had to be monitored so that problems could be defined as they arose.

Many problems could be alleviated using available information, but it was important to assess where additional knowledge was most urgently needed for resources to be managed in the best interests of mankind. Research programmes should be planned to obtain this knowledge.

Man, as an intrinsic part of the environment, not only endured changes in it but was also influenced physically and psychologically by the changes, Mr. Christian said.

"So there is a need to study the consequences to man physically and mentally".

Research needed to take in the impact of urban development, as well as the effects of changes in natural resources and other aspects of the environment, on man's well-being.

"Man is not inherently used to crowding and the noise, vibration, and pace of urban life, and it is considered that these are affecting man's physical and mental health", he said.

"There is a need to study the impact of all this on man physically and mentally, and man's reaction to these changing conditions".

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A FLEA IN THE DAY OF THE GINGKO

The world's oldest discovered fossil flea was unearthed recently at Koonwarra in southern Gippsland, Victoria.

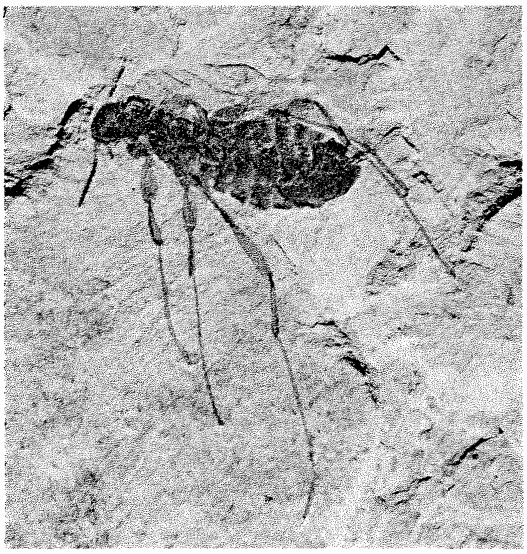
It is about 120 million years old, 80 million years older than the oldest fossil flea discovered previously. Human fossils date back less than two million years.

The excellently preserved flea was found by Monash University scientists who were crushing siltstone in search of fossil fish. It is being examined by **Mr. Edgar Riek** of the Division of Entomology who studies fossil insects as a spare time project.

The Koonwarra flea is different in important ways from today's fleas and it lived in a very different Gippsland.

Its abdomen and genitalia are like those of modern male fleas, but it has much longer feelers on its head, longer and differently bristled legs, and a slightly longer body than its modern counterparts.

It lived near a shallow, freshwater lake not far from a range of high, possibly snow-capped mountains.



The Koonwarra Flea

A lot of the ground in the area was bare, grasses had not yet evolved, ferns were widespread, and the dominant tree was the gingko rather than the gum.

The nut-bearing gingko tree no longer grows in a natural habitat anywhere in the world, but in recent millenia it has been preserved and cultivated in Chinese monastery gardens and specimens have been replanted all over the world.

Mr. Riek told Coresearch last month that the Koonwarra flea's long thin legs suggested that it lived on the outer surface of a sparsely-haired animal unlike today's fleas which burrow through their hosts' fur.

The long feelers on its head supported this view. Modern fleas had much shorter feelers allowing them to burrow efficiently into fur.

If the Koonwarra flea did not burrow, its hosts' fur must have been short or thin so that the flea's mouthparts could reach the skin and penetrate it for feeding.

He said no direct evidence had been found of any furred animals living in Australia more than 30 million years ago. But the Koonwarra flea is indirect evidence that they roamed Gippsland 120 million years ago.

They could not have been grazing animals like kangaroos or wallabies because there was no grass to graze.

Probably they were insect-, root-, and earthworm-eating marsupials, Mr. Riek said, possibly predecessors of the modern bandicoot.

He said the Koonwarra flea was an important and lucky discovery, and the chances of finding another like it were remote.

Only two fossil fleas had been discovered previously, both of them near the Baltic Sea. They were about 40 million years old and quite modern in their structure.

He said the Koonwarra flea had apparently fallen off its host, drowned in the lake, floated on the lake surface, and then settled gently into the sediment at the edge of the lake.

The sediment had built up around it eventually forming the siltstone that preserved it as a fossil.

Tribophysics Chief

Dr. J. R. Anderson, Professor of Chemistry at Flinders University, Adelaide, since 1965, and Chairman of the University's School of Physical Sciences since 1967, has been appointed Chief of the Division of Tribophysics.

He succeeds Dr. W. Boas who retired last year after 22 years with the Division—20 of them as Chief.

Dr. Anderson, 41, graduated B.Sc. with first-class honours from the University of New South Wales in 1950. He was

Dr. ANDERSON

awarded a Royal Dutch/Shell Commonwealth Postgraduate Scholarship and gained his Ph.D. from the University of Cambridge in 1954.

In 1955 and 1956 he was Lecturer in Physical Chemistry at the University of N.S.W. and from 1957 to 1964 Senior Lecturer and Reader in Physical Chemistry at the University of Melbourne.

Most of his research has been directed towards obtaining a better understanding of the reactions of gases at and with metal surfaces.

Dr. Anderson was Visiting Scientist at the General Electric Research and Development Center in the U.S.A. in 1968-69, and worked there on the application of low energy electron diffraction to metal surfaces.

In 1969 he was Visiting Professor at the University of Caen, France.

GOLF

The Division of Forest Products 1970 Golf Competition will be held at the Patterson River Country Club on March 18. Interested CSIRO golfers can address enquiries to the Secretary, DFP Amenities Committee, P.O. Box 310, South Melbourne.

RETIREMENT

Mr. N. P. H. Graham of the Division of Animal Health's McMaster Laboratory retired last month. He had been with the Laboratory since 1932 except for a period with private industry between 1948 and 1957.

Mr. Graham was associated initially with the control of ectoparasites, particularly the blow fly, and he had much to do with the development of the modified Mules operation used in the prevention of blow fly strike in sheep.

He solved the complexities of the problem of maintaining effective insecticide concentrations in dips of the newer insecticides and evolved a method of continuous replenishment with insecticide which is now standard practice.

One of his most important contributions was in field studies of foot-rot and foot-abscess. His work contributed significantly to the success of the Laboratory's studies on the epidemiology and transmission of foot-rot.

NEW YEAR HONOURS

Dr. D. F. Waterhouse, Chief of the Division of Entomology, was created a Companion of the Order of St. Michael and St. George (CMG) in the New Year Honours for public service.

Chief of the Division since 1960, Dr. Waterhouse has been active for more than 30 years in the fields of insect physiology, biochemistry, and toxicology.

His contributions to entomology have been recognised by a number of earlier honours and awards including his election as a Fellow of the Australian Academy of Science in 1954 and of the Royal Society in 1967.

He has represented Australia at various overseas conferences on entomology and has served on a number of expert advisory panels established by United Nations agencies to deal with such problems as resistance of insects to pesticides and insecticide residues in foods.

Dr. Waterhouse was Secretary (Biological Sciences) of the Australian Academy of Science from 1961 to 1966, and is now Chairman of the Academy's National Committee for Biological Sciences.

He is Chairman of the Council of the new Canberra College of Advanced Education and was a member of the Interim Council which preceded it.

Dr. WATERHOUSE

Dr. Colin Barnard, who retired from the Division of Plant Industry in August last year,

Dr. BARNARD

was created a Member of the Order of the British Empire (MBE).

Dr. Barnard won a world-wide reputation in the horticultural field for developing a system of forecasting yield in vines that has proved of tremendous value to the Australian dried fruits industry and for other work on fruit growing.

During World War II he did important research on the production of medicinal drugs of plant origin, and after the war initiated a survey of the pharmaceutical properties of Australian native plants.

Later he undertook a series of anatomical studies of cereals and grasses which established him as one of the world's most competent plant anatomists.

Dr. Barnard initiated the Australian Herbage Plant Registry and edited "Grasses and Grasslands", a major work on the biology of grasses and the problems of pasture establishment, maintenance and improvement.

He was secretary of the A.C.T. branch of ANZAAS for 20 years and served on the Council of the former Canberra University College.

Mr. G. M. Stiff of the Division of Chemical Physics was created a Member of the Order of the British Empire (MBE) for public service.

Mr. Stiff has taken an active part in the Division's team led by Mr. D. A. Davies working on the development of engines for the ruling of diffraction gratings and on the progressive development of methods and materials suitable for the production of master diffraction gratings over a wide range of specifications.

Diffraction gratings, containing up to 1,000 or more straight and parallel grooves per millimetre, are essential components of most spectrophotometers used in chemical analysis, including the atomic absorption spectrophotometers developed by the Division.

As a result of research and development in the Division, Australia is now one of the few countries in the world where diffraction gratings are produced commercially, and substantial numbers made in Australia under licence to CSIRO are sold overseas.

Mr. STIFF

S(cor)

Signals from the Sky

by Dr. E. G. Bowen

There is traditionally a close link between navigation and astronomy and it is no coincidence that the first great navigators came from the Mediterranean, the birthplace of astronomy as we know it today.

Men like Vasco de Gama, Magellan, and Columbus are inevitably linked in our minds with the names of Galileo and Copernicus.

The science of navigation has therefore grown up in close kinship with astronomy, and the celestial navigator in particular has developed his craft in close association with the optical astronomers.

In addition to the visible Universe there is also a radio Universe. The material which is distributed through space is capable at different times of radiating over the whole electromagnetic spectrum, and it is just as easy to receive radio as light signals from the active or excited constituents.

It does not follow that the strongest radio signals come from the brightest optical objects. On the contrary, bright objects like the undisturbed sun or some of the distant stars are not good radio emitters.

As a general rule, the strongest radio signals come from highly disturbed regions, where stars or galaxies have been rent apart by gigantic explosions, where old stars are in the throes of death, or young stars are being born.

Radio astronomy has grown up in dramatic fashion over the last 20 or 25 years and a full account of this new science would fill several volumes.

I will give a few examples only of the remarkable discoveries which have been made and are still being made in this field of science.

THE SUN

The quiet or undisturbed Sun is not a good generator of radio waves and is quite difficult to detect.

However, it is occasionally disturbed by sunspots or by flares which appear on the surface. These events are accompanied by enormous increases in the radio signals generated by the Sun.

They are easily detected by receivers on Earth and have been extensively studied in recent years. One of the most powerful instruments built for this purpose is the Radioheliograph at CSIRO's Solar Observatory near Culgoora in New South Wales.

In general it is found that the most spectacular radio events occur in the Sun's corona, which may be regarded as the Sun's atmosphere and consists of an extremely hot electron gas perpetually boiling off the surface of the Sun.

The particles involved in these events travel out from the corona and spray out into the solar system. They travel at speeds of 500 to 1,000 kilometres per second and reach the Earth about 24 hours later.

This article is a precis of a talk titled The Radio Astronomer's Universe given by Dr. Bowen, Chief of the Division of Radiophysics, at a meeting of the Institute of Navigation. Dr. Bowen was the Institute's first President.

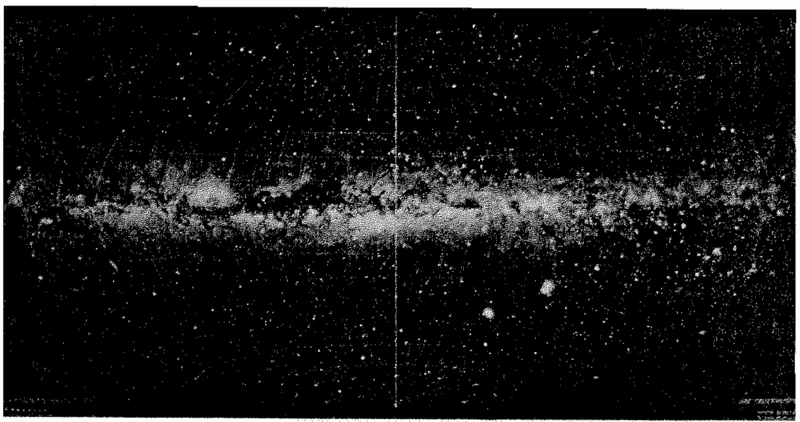
When they enter the Earth's atmosphere they manifest themselves as the aurorae of polar regions, give rise to ionospheric blackouts which interfere with long-distance radio communication, and cause magnetic storms.

The effect of these particles would be disastrous to astronauts if they were unprotected in space or engaged in a moon walk, and great care has been taken to see that they have not been caught in exposed positions when such events have recently occurred on the Sun.

Below: The Crab Nebula in the constellation Taurus. Near the centre is a pulsar which emits light and radio waves with a period of 30 a second.

THE LOCAL GALAXY

Beyond the Sun and the solar system perhaps the next most interesting region is the Milky Way, or the local Galactic System as it is more correctly called.



Above: A 360 degrees view of the sky showing the concentration of stars extending around the earth in the plane of the Milky Way.

Right: A plan view of the Milky Way system as it would be seen by a traveller in outer space.

This is a vast concentration of stars and gas and dust circling the whole earth so that it can be observed in the northern and southern hemispheres.

It provides visual evidence that we are inside a vast saucer-shaped assembly of stars.

It is a sobering thought that a radio wave which takes one and a quarter seconds to reach the Moon, eight minutes to reach the Sun, or half a day to cross the solar system would take no less than 100,000 years to travel from one side of the Milky Way to the other.

The instrument most frequently used for galactic (and extra-galactic) studies is the steerable radio telescope, a prime example of which exists at the Australian National Radio Astronomy Observatory at Parkes.

It has been found that there is a narrow band of radio sources coincident with the Milky Way, although there is far from a one to one correspondence between the bright visual objects and the brightest radio sources.

The radio telescope's view of the Galaxy supports the concept of our being inside a vast saucer-shaped collection of stars, a vast island galaxy floating in space.

But what would we look like seen by a celestial observer millions of light years away in space?

Radio astronomy can give a partial answer to this; by measuring first the distribution of mass in the local system and then its relative velocity it is possible to construct a map of the Galaxy seen in plan view. The result is illustrated on this page.

We are in fact a spiral galaxy, like a giant catherine wheel spinning away interminably through space.

THE CRAB NEBULA

Most radio sources do not coincide with conspicuous visual objects, but there are exceptions and I will deal with one of these.

In 1948 it was found that the third strongest radio source in the sky corresponded exactly in position with the Crab Nebula in Taurus.

This is a remarkable object within the local galaxy which was observed to explode by Chinese astronomers in the year 1054.

For several weeks it was the brightest object in the sky, so bright that it could be seen with the naked eye in daylight. Its intensity gradually decreased while its diameter increased.

Today, some 900 years later, it is still expanding and Mount Wilson photographs taken ten years apart show the violent motion in the outer parts of the system.

What we see in the Crab Nebula is the remains of a gigantic explosion in which an object many times the size of our Sun disintegrated and spread its remnants through space. The radio signals we receive are continuing evidence of matter tearing itself asunder.

PULSARS

The majority of radio sources radiate what is referred to as random noise signals; that is, apart from momentary fluctuations which can be large, they radiate at the same signal level, day in, day out, and from one year to the next.

They carry no intelligence in the usual meaning of the word and the information about the nature of the source of the signal can only be extracted from characteristics like the spectrum, the polarization, and in some cases the Doppler shifts which can be found.

It has been tacitly understood among radio astronomers that if one of these signals was found to vary in a systematic way or especially if it were pulsed, we should look at it very closely indeed for evidence of another civilisation endeavouring to communicate with us from outer space.

Just two years ago, scientists at Cambridge in England indeed found a source which was emitting sharp pulses once every 1.2 seconds.

A remarkable feature of these pulses was their extraordinary time stability—a few parts in 10^{10}, or better than a crystal controlled clock.

Between 30 and 40 of these objects are now known, all within the local galaxy. Their periods vary from 50 pulses a second to one in three seconds, with a majority concentrated around 1.2 or 1.3 seconds.

It quickly became clear that the signals did not come from other intelligent beings, but were the natural radiation from stellar objects of a unique kind.

The prevailing view is that the signals come from so-called neutron stars — stars consisting of one of the basic constituents of the atom, stripped of charge and stripped of surrounding electrons.

They represent a tremendous concentration of mass in a small space. Their size is probably a fraction of that of the Moon and their mass equivalent to 10,000 or 100,000 Suns.

They have an intense magnetic field of the order of 10^{12} gauss (the Earth has a field of 0.5 gauss) and they spin at an extraordinary rate, the fastest doing no less than 3,000 revolutions a minute.

Clearly this is not matter as we know it — otherwise it would tear itself apart.

The magnetic axis does not coincide with the spin axis, and the body sprays out radiation only in the direction of its north and south poles. It is presumed that we receive a pulse as a pole spins across the direction of the Earth.

One of the most interesting of these is an object near the centre of the Crab Nebula. It pulses 30 times a second, giving alternately a large and a small pulse.

Soon after its discovery, astronomers on the 120-inch telescope at Lick Observatory found that this particular star also emits light pulses in the same phase as the radio pulses and in the same large-small sequence.

The last chapter in this story is that it also emits X-rays, again in the same pulse sequence.

Truly an extraordinary situation in which virtually identical pulses are radiated from the

(Continued on page 4)

Rhino Horn for Wool Research

Sometimes the most unlikely object can tell you things about something that the something can't tell you about itself.

That is why the Division of Textile Physics was very glad recently to be given a 15lb. White Rhinoceros horn by the Natal Parks Game and Fish Preservation Board, Pietermaritzburg, South Africa.

Rhinoceros horns don't look much like sheep's wool, but chemically the two substances are very similar. Both consist of the fibrous protein, keratin, and rhinoceros horns have physical properties that simplify study of some properties of this material.

Dr. Leo Lynch of the Division (pictured with the horn) told Coresearch last month that the value of rhinoceros horns for wool research was that they provided solid masses of highly aligned keratin fibres.

"A rhino horn is in effect like matted hair forming a solid structure," he said.

Scientists are using portions of the horn for basic research into a number of properties of keratin fibres. Dr. Lynch is using Nuclear Magnetic Resonance techniques to study the absorption of water vapour by the fibres.

He is interested in finding out how the motion of absorbed water molecules depends on its direction with respect to the fibre axis.

Nuclear Magnetic Resonance equipment enables scientists to observe the movement of water molecules in fibres.

But for some of Dr. Lynch's experiments a cylinder of packed fibres 3 cm long and 1 cm in diameter is needed, with the fibres all aligned in the plane of the cylinder.

This is very difficult to form from wool, but it can be easily cut from a rhinoceros horn.

Rivett Memorial for College

A memorial to Sir David Rivett and his sister Eleanor is to be established at Queen's College, University of Melbourne.

The memorial will be a section of the college library devoted to Asia and Australia's relations with its neighbours.

Sir David, who died in 1961, was Chief Executive Officer of CSIR from 1927 to 1945 and Chairman from 1946 to 1949. Earlier he was Professor of Chemistry at the University of Melbourne.

Eleanor Rivett was involved in education in India for 40 years.

The trustees of the fund launched to establish the memorial library are Dr. O. W. Parnaby, Master of Queen's College, Mr. Rohan Rivett, Sir David's son, Professor E. W. Gault, and the Reverend J. K. W. Mathieson.

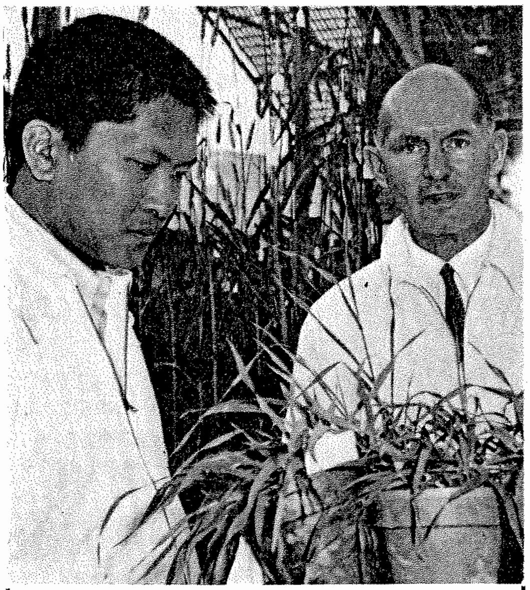
They believe the library could become a major research centre attracting scholars with widely differing interests, including diplomatic, literary, historical, and commercial.

"It is thought that an initial purchase of 1,000 to 2,000 volumes, many of them obtainable only in Asia, might concentrate on India and to a lesser extent on Singapore, Malaysia, and Indonesia", the Reverend Mathieson said in a statement issued on behalf of the trustees.

"Gradually a Pacific section embracing the islands and extending round to China and Japan might be established."

He said the trustees hoped to have the funds needed to establish the library by August next year. Contributions would be welcomed and could be sent to The Master, Queen's College, Parkville, Victoria 3052.

Cheques should be made payable to "Queen's College, University of Melbourne (Eleanor and David Rivett Memorial)".



Prince Namgyal Wangchuk of Bhutan visited the Division of Plant Industry's Ginninderra Experiment Station and phytotron last month. During a tour of south-eastern Australia the Prince, who is his country's Minister for Trade, Commerce, and Industries, also inspected a variety of farms and agriculture-based small engineering firms. Our picture shows him in the phytotron with Dr. F. H. W. Morley.

PAPERMAKER

Dr. H. G. Higgins of the Division of Forest Products has been elected the fourth President of the International Association of Scientific Papermakers.

He took office at the beginning of this year.

Dr. Higgins, who is Officer-in-Charge of the Division's paper science section, has been particularly interested in fibre and paper physics and more recently in the chemistry of pulping processes particularly as applied to Australian woods.

The International Association of Scientific Papermakers was founded in 1959. It has members in many countries engaged in pulping and papermaking activities, including Britain, Canada, U.S.A., Sweden, Norway, Finland, Holland, Germany, Israel and Japan, as well as Australia.

DEADLINE

Contributions to the March issue of Coresearch should reach Mr. R. Lehane at P.O. Box 109, Canberra City, A.C.T., 2601, by Thursday, February 12.

Dr. Head wins Syme Prize

Dr. A. K. Head of the Division of Tribophysics is one of three scientists awarded the David Syme Research Prize for 1969.

The prize is awarded annually by the University of Melbourne for original research work in biology, physics, chemistry, or geology judged to be the best produced in Australia during the preceding two years.

Dr. HEAD

Preference is given, other things being equal, to original research of value to the industrial and commercial development of Australia.

Dr. Head shares the 1969 prize with Dr. R. Colton, a senior lecturer in inorganic chemistry at the University of Melbourne, and Professor A. J. Pittard, a professor of microbiology at the University of Melbourne.

Dr. Head recently developed a method whereby a computer can generate a half tone facsimile of the image of a crystal defect as seen in an electron microscope.

His prize was awarded for work on this method.

The process is now used in many laboratories to assist in the identification of electron micrographs.

Dr. Head has published papers on a variety of other subjects including internal stress and crystal defects, optics, a design for a radio telescope, a method of refrigeration by selective cooling, and the application of computer images in electron microscopy.

NEWS IN BRIEF

Doctorates

Mr. I. F. B. Common of the Division of Entomology has been awarded the degree of Doctor of Agricultural Science by the University of Queensland.

Dr. R. D. Hughes of the Division of Entomology has been awarded the degree of Doctor of Science by the University of London.

Unesco Seminar

Mr. H. A. Haantjens of the Division of Land Research was a co-director of a Unesco regional seminar on Ecological Methodology and Conservation in South-east Asia held in Bangkok recently.

Illustrator

Mr. Frank Knight of the Division of Wildlife Research has drawn the illustrations for a new book for pre-school children.

Called "Finger Plays and Action Rhymes", the book was written by Mrs. Paul Winer, who teaches at a pre-school at the Australian National University in Canberra.

It contains more than 50 rhymes written to be dramatized by the children with finger movements and imitations of animals. Mr. Knight's drawings illustrate these dramatizations.

Dr. Smith

Dr. G. M. Smith has been appointed to the Division of Soils, not the Division of Tropical Pastures as stated in last month's Coresearch.

Table Tennis

Two Division of Forest Products table tennis teams won the premierships in their grades and another was runner-up in its grade in the 1969 Victorian Table Tennis Association competitions.

The winning teams were: B2 grade — **Trevor Hilton, Dick Donaldson,** and **Warren Seaman;** D5 grade — **Yoshikazu Yazaki, David Sanderson,** and **John Yuritta.**

SAFETY NOTES

Shattering Experience

It is widely believed that you can prevent or at least reduce the chances of your windscreen being shattered by stones thrown up by passing vehicles if you brace it with one hand.

A lacerated wrist was the outcome of this belief in an accident at one of our Divisions recently.

A major glass manufacturer has carried out experiments to test the belief and found that bracing makes a windscreen more, not less, likely to shatter.

The tests showed that the more rigidly a piece of toughened glass is supported, the lower the velocity a missile requires to fracture the glass.

Tests have shown also that patent shock absorbers for windscreens do not work.

These are stuck on to windscreens and consist essentially of a rubber suction cup with an internal rubber button which is supposed to disperse shock waves created by stones hitting the windscreen.

Experts say the best way of protecting a windscreen is to fit a plastic or wire gauze protector.

In any event if a stone is thrown up at your windscreen it is surely wise to have both hands on the steering wheel to maintain control of the vehicle.

Back again

Every year back injuries are major contributors to our accident record.

Give us a break and don't break yours while shifting or lifting.

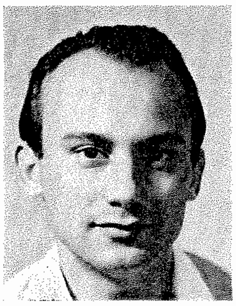
L.C.R. Thompson, Safety Officer.

APPOINTMENTS TO STAFF

Mr. G. Lindeyer has been appointed to the Division of Physics to carry out research on interferometry, coherent optics, and holography. Mr. Lindeyer graduated M.Eng.Sc. last year from the University of Technology, Delft, Holland.

Mr. LINDEYER

Dr. E. R. Rumbo has been appointed to a fellowship in the Division of Physics where he will carry out research on solid state physics. He recently gained his Ph.D. from Cambridge University after graduating B.A. from the same university.



Dr. RUMBO

Mr. J. S. Armstrong has been appointed to the Division of Plant Industry as a systems analyst to develop agricultural production systems incorporating biological, managerial and

Mr. ARMSTRONG

economic variables, and to assist research workers with computer programming. Mr. Armstrong graduated B.Sc. with honours from the University of Manchester in 1956. After lecturing in electrical engineering and computing at Heriot-Watt University he came to Australia to work as education officer with the Division of Computing Research from 1964 to 1967. Since then he has been with the Forestry Department at the Australian National University.

Mrs. Elizabeth Ribes has joined the Division of Physics where she will study solar magnetic fields and their relationships with various solar phe-

Mrs. RIBES

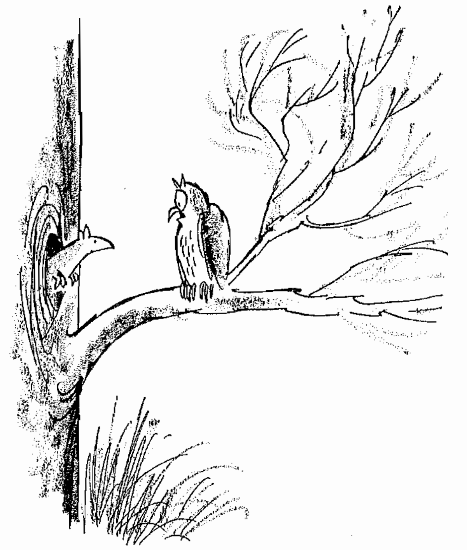
nomena. She is a graduate of the University of Paris and has been a research worker in the Section d'Astrophysique Observatoire de Paris.

Dr. D. R. Barras has been appointed a post-doctoral fellow in the Division of Horticultural Research in Adelaide where he will study fruit biochemistry, particularly the changes that occur in ripening grapes. Dr. Barras graduated B.Sc. from the University of Melbourne in 1962 and Ph.D. from the same university in 1968. He spent 1969 as a post-doctoral fellow with the National Research Council of Canada, Ottawa.

Dr. J. C. Ribes has been appointed to a post-doctoral fellowship in radio astronomy with the Division of Radiophysics. Dr. Ribes graduated from the University of Paris in 1964 and recently completed his Ph.D. there.

Dr. RIBES

Mrs. Deanne Carlos has joined the Division of Animal Genetics to carry out research on viruses. Since graduating B.Sc. from the University of Sydney in 1964, Mrs. Carlos has worked at the Royal North Shore Hospital, Sydney, and at the Battelle Memorial Institute, Geneva.



"Extinction is when you don't learn to live in man's environment."

'Saturday Review'

Dr. R. W. D. Rowe has been appointed to a post-doctoral fellowship in muscle science with the Division of Food Preservation. Dr. Rowe graduated B.Sc. with honours from the University of Hull in 1964 and Ph.D. from the same university in 1967. Since then he has been a research fellow in the University's Department of Zoology.

Mr. P. B. Scholefield has joined the Division of Horticultural Research at Merbein to take part in research on mechanical harvesting and trellising of grapevines. Mr. Scholefield graduated B.Ag.Sc. from the University of Adelaide in 1967 and during 1968 and 1969 was a teacher in agricultural science with the Education Department of South Australia.

Dr. J. P. F. M. van Eerd has joined the Division of Food Preservation to study factors affecting the stability of emulsions based on meat proteins and the utilization of meat proteins in manufactured products. Dr. van Eerd graduated B.Sc. from the University of Nijmegen, Holland, in 1966 and Ph.D. from the same university in 1969.

SIGNALS FROM THE SKY

(Continued from page 2)

one source over the whole electromagnetic spectrum from radio waves to X-rays.

The external galaxies can just be detected as radio sources, but the normal, undisturbed nebulae are not conspicuously strong radiators.

EXTRA-GALACTIC RADIO SOURCES

Outside our own Milky Way system lies a further collection of island universes, each consisting of its stars, its gas, and its dust.

Many are spiral in shape and they are separated by immense reaches of empty space.

The nearest of them, the great Andromeda nebula, is two million light years away, and similar objects can be seen in ever-decreasing sizes out to 100 times that distance.

It seems to require a catastrophic event, the birth of a new star or the death of an old one, to give an outstanding radio source.

Left: The great spiral nebula in Andromeda. This is the nearest of the external galaxies, lying at a distance of 2 million light years from our own system.

QUASARS

True to form, radio astronomers have again turned up a prime mystery in the most distant reaches of the Universe.

For many years some of the strongest radio emitters could not be identified with visual objects, due very often to an uncertainty in position of the radio source.

Over the years the accuracy has been improved and it turns out that many of these objects appear not as galaxies but as individual star-like objects—the so-called quasi-stellar objects or quasars.

They appear to be at immense distances, thousands of millions of light years away; and if this is so, they are literally the most energetic light and radio emitters in the Universe.

Nuclear forces simply could not account for the enormous energy of these objects and some other source has to be invoked.

This leaves gravitational energy as the only likely source —the energy released when so much mass had accumulated in one place that the atoms literally collapsed within themselves.

What we may be witnessing is the collapse of the central part of a galactic system, with the consequent release of fantastic amounts of radiant energy.

The story of quasars is by no means complete and a great deal still has to be learnt about their properties and behaviour.

But we seem to be getting a glimpse of events which occurred thousands of millions of years before our own solar system was formed, and of objects which are far beyond what was regarded as the limit of observation only a few years ago.

CONCLUSION

The story of radio astronomy is a continuing one, and wonders no less remarkable than those described are yet to unfold.

It is probably too early yet to guess what the impact will be on conventional navigation. I think it would be fair to say that the effect on terrestrial navigation will be small.

However, it may be of immense importance to navigators in outer space, and this is where the next developments may be expected to take place.

Future travellers in space will not be alone; they will be surrounded by radio emitters, each sending out its own clearly identifiable signals which will surely guide them on their way.

Sun Power Talks

An international conference on solar energy will be held in Melbourne from March 2 to March 6.

More than 60 papers will be presented by participants from Greece, Pakistan, India, U.S.A., Canada, Britain, Belgium, Israel, Japan, Hungary, Chile, Ceylon, U.S.S.R., Burma, Turkey, Nepal, and France, as well as Australia.

Subjects discussed will include the use of solar energy in developing countries; commercial uses of solar energy such as in water heaters, air heaters and solar cells; uses of solar energy in building and agriculture, including air conditioning and refrigeration; solar distillation; high temperature processes; radiation measurement, processing, solar simulation and photobiology; and general research.

The conference is being organized by the Solar Energy Society whose president is Mr. R. N. Morse, Chief of the Division of Mechanical Engineering.

It will be held at the National Science Centre at Clunies Ross House, Melbourne.

There will be a post-conference tour to Alice Springs with visits to solar energy installations at Griffith, Adelaide, and Coober Pedy on the way.

People interested in attending the conference can contact the Conference Organizer, 1970 International Solar Energy Society Conference, at P.O. Box 26, Highett, Victoria, 3190.

IDLE MONEY

If you have any money sitting idly by, why not put it to good use? Invest in the CSIRO Co-operative Credit Society at the attractive interest rate of 6% a year. The Society's Manager, Mr. Joel Belkin, will be glad to hear from anyone with money to invest. He can be contacted at Head Office, 314 Albert Street, East Melbourne.

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CORESEARCH

FOR CIRCULATION AMONG MEMBERS OF CSIRO STAFF — NUMBER 132, MELBOURNE, MARCH 1970

THE FASTEST YARN SPINNER

Two hundred representatives of the wool textile industry gathered at the Geelong laboratories of the Division of Textile Industry on February 10 to see machinery that can spin worsted yarn ten times faster than conventional machines.

The new machines are the outcome of research and development following the suggestion by Mr. D. E. Henshaw of the Division of a novel approach to the spinning of worsted yarn. This approach formed the basis of what has come to be called self-twist (ST) spinning, an entirely new concept in textile processing.

With conventional spinning, production rates are limited to about 20 metres of yarn a minute from each spindle, but with self-twist spinning a speed of 220 metres a minute can be achieved.

The new machinery, incorporating self-twist spinning, is the outcome of nine years of research and development including five years of close collaboration between the Division of Textile Industry and Repco Ltd.

Repco has spent about $500,000 on development of the machinery and is setting up a manufacturing plant at Huntingdale, Melbourne, which will produce machines at a rate of one a day under licence to CSIRO.

In the new machines, two strands of fibres pass between a pair of rubber rollers, rather like the rollers in a laundry wringer, which rotate at high speed.

The rollers slide rapidly from side to side as they rotate and the strands are twisted in alternate directions by the rubbing action of the rollers.

As the twisted strands emerge from the rollers they are immediately combined so that they twist about each other to form a stable two-ply yarn.

The first self-twist machines built in the Division used rotating discs with arcs of rubber arranged to insert twist intermittently as the strands were pulled between them.

These machines enabled yarn to be produced from which satisfactory fabrics were woven, but they had disadvantages and limitations as continuous production units.

These problems were overcome after Mr. G. W. Walls of the Division suggested that rubber-covered reciprocating rollers be used to impart the twist.

The new machines have a floor area only one fifth of that of conventional spinning machines, use less power, are easier to install, clean and maintain, and are much quieter.

Self-twist spinning is particularly suitable for producing very fine yarns for use in lightweight fabrics, and shrink-resistant light-weight fabrics can be produced more economically with yarns spun on the new machines than with conventional yarns.

More than 40,000 yards of worsted fabrics have already been made in commercial mills using self-twist yarn spun in the Division. The fabrics are identical both in appearance and performance to cloth woven from conventional yarn.

Work is in progress on the possible application of self-twist yarn to knitwear.

Three of the new machines, built by Repco, have been undergoing trials in Australian textile mills and their performance to date has been highly satisfactory.

Two have been flown to Britain for demonstration and assessment.

Further production runs under industrial conditions will be needed before the full economic advantages of self-twist spinning can be properly assessed.

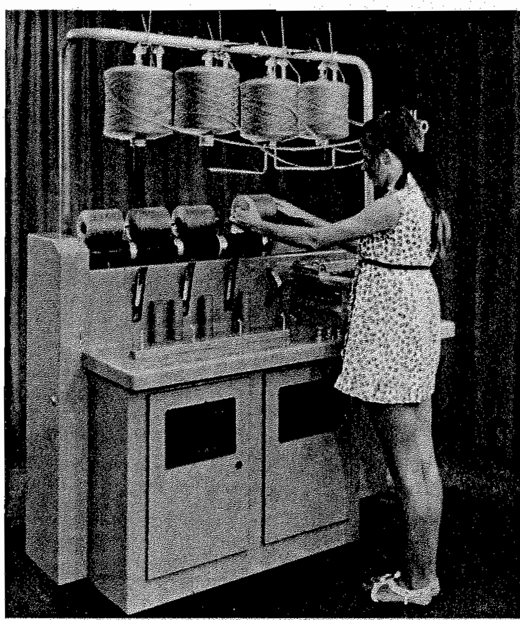
Repco has concluded an agreement with Stone-Platt Industries Limited, a leading British manufacturer of equipment for the textile industry, under which the British company will undertake the sale and servicing of self-twist machines on a world-wide basis.

The agreement also provides for the possible manufacture of the machines in Britain under licence at a later stage.

The Chief of the Division, Dr. M. Lipson, said in a statement to Coresearch that the project had reached its present stage only through teamwork and enthusiasm involving large numbers of the Division's staff.

"People of diverse backgrounds and with a wide range of technical skills have contributed constructively to the development," he said.

"Their valuable continued support to the research staff has made this development possible."



Our picture (above right) shows Miss Rosalind Kimber of the Division with one of the new machines.

POLYUNSATURATION

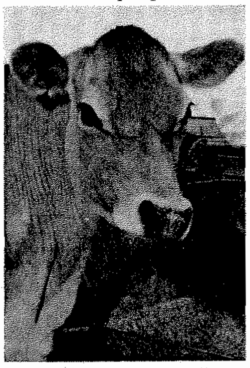
". . . But will you still love me when I've been polyunsaturated?" asked the moon-struck cow of her beau in the Melbourne "Newsday" cartoon.

"Chicken chops from sheep are 'possible'," the Sydney "Sun-Herald" said in its headline. "Cows may eventually produce strawberry-flavoured milk," the paper's report began.

"The Advertiser" in Adelaide invented the term "poly-cow", which could confuse a public brought up on Daisy and caged birds called Polly.

The press gave a lot of space to CSIRO's announcement of the development of a process for manipulating the proportion of "soft" (polyunsaturated) to "hard" fats in cattle and other ruminant animals.

"The Canberra Times", under the headline "CSIRO butters up buyers", said housewives may soon be buying polyunsaturated butter that spreads easily after refrigeration. A number of other papers emphasized the same prospect.



This is "Cow Number 2", one of the animals involved in the ruminant fat-manipulating project at the Division of Animal Physiology.

Some papers led their reports with the prospect that polyunsaturated dairy, beef and lamb products might prove important to medical researchers investigating the relationship between nutrition and animal health.

The fat-manipulating process was developed by the Division of Animal Physiology in conjunction with the Division of Dairy Research.

Most fats in pasture plants and in many stock feeds are polyunsaturated, but when a ruminant eats them they are changed to hard fats by bacteria in the rumen (the first compartment of the animal's stomach).

The animal absorbs these hard fats, and this accounts for the low levels of polyunsaturated fats normally present in ruminant tissues and milk.

In the new process, the proportion of polyunsaturated fats in a ruminant's system is manipulated by giving the animal a special feed supplement which provides soft fats in a skin of soluble protein protected by treatment with formalin from bacterial action in the rumen.

These soft fats are absorbed by the animal's digestive system, and the degree of an animal's polyunsaturation can be controlled by the quantity and type of supplement added to its diet.

A pronounced increase in the proportion of polyunsaturated fat has been found in milk within 24 hours of introducing the supplement. Proportions of up to 30 or 40 per cent of polyunsaturated fats have been obtained compared with two to four per cent in normal milk fat.

Lambs fed with the supplement for three weeks have shown a polyunsaturated tissue fat level four to five times greater than that measured in pasture-fed lambs.

Control of the composition of milk fat could provide a range of butters with different melting points.

It is possible that fat-soluble substances such as vitamins, anti-oxidants which enhance keeping qualities, and flavourings could be incorporated in animal products using the same technique. These potential applications have not yet been investigated.

Textbook on Insects Launched

A comprehensive textbook on Australia's insects was launched last month by the Chairman, Sir Frederick White, at a special reception in Canberra.

One of the guests at the reception was Mrs. Patricia Tillyard, widow of the first Chief of the Division of Entomology, Dr. R. J. Tillyard, who wrote the celebrated text "The Insects of Australia and New Zealand" published in 1926.

Mrs. Tillyard prepared the coloured plates for her husband's book.

The new book, "The Insects of Australia", is the first full scholarly work on the subject published since Dr. Tillyard's study.

Written by 30 Australian and overseas specialists, the book was commissioned and sponsored by the Division of Entomology and published by Melbourne University Press.

It was edited by Dr. I. M. Mackerras of the Division.

Launching the book, Sir Frederick said it was a remarkable piece of work on the part of everyone concerned.

"It will make a great contribution to the science of entomology and the teaching of entomology in the future," he said.

The Chief of the Division, Dr. D. F. Waterhouse, told the reception that the book described Australia's 54,000 known insect species.

He said a similar number probably still remained unrecognised. About 80 per cent of all animals were insects.

The book deals with general features of insects and entomology as well as summarizing present knowledge of Australia's insects.

It contains 2,400 specially prepared illustrations, nine coloured plates, and a bibliography of more than 1,000 entries.

Below: Mrs. Tillyard and Sir George Currie at the reception.

S(COR)

Building Research Look-In

"Today's Research — Tomorrow's Building" was the theme of a "Look-In" held at the Division of Building Research on February 16, 17, and 18.

More than 30 large and detailed exhibits, including some working models, were on display during the three open days.

The Look-In was designed to show architects, engineers, builders, and others the Division's work for the building industry. More than 2,000 people attended.

The displays covered the materials, techniques, design, and planning aspects of building research.

The Look-In was opened by the Minister for Education and Science, Mr. Nigel Bowen. It was his first official function concerned with CSIRO.

Mr. Bowen said there had to be close contact and collaboration between research and industry if industrial research was to be effective.

Building research and the building industry were in close contact in Australia, and he hoped this relationship would continue to grow in strength and effectiveness.

"In an industry of the size and importance of the Australian building industry, constant improvement and development of design, techniques, and materials are vitally important," he said.

"They are important not only on functional grounds, but also on economic grounds, and on aesthetic grounds."

He said it was estimated that nearly three thousand million dollars were spent on building in Australia in 1968–69. The industry employed more than eight per cent of the male work force, and national expenditure on building represented nearly 11 per cent of Australia's gross national product.

"In the light of these statistics, the importance of research by CSIRO and the other groups engaged in building research in Australia becomes very apparent," he said.

"The effects of even small improvements in particular processes and materials can, when applied throughout an industry of this size, be magnified to an extent where they become of very great significance indeed."

Mr. Bowen recalled that the Division of Building Research had celebrated its 25th anniversary at the end of last year.

"During the whole of that period the Division has been led by its present Chief, Mr. Ian Langlands, and I am sure that he must look back and reflect on these 25 years with considerable satisfaction, although from talks I have had with him earlier today I am equally sure there are no elements of complacency in his reflections."

Among the Look-In displays were new ceramic materials developed from waste products and exhibits demonstrating sound insulation, testing of building structures, and heat comfort in houses.

Our photo shows Miss Andra Holmes examining part of an exhibit.

Biographer and Poet

Mrs. Marjory O'Dea of Canberra has been appointed to Head Office to write a biography of the first Chairman of CSIRO, Sir Ian Clunies Ross.

Sir Ian, one of Australia's most famous scientists, was appointed Chairman when CSIR was reconstituted as CSIRO in 1949. He died in June, 1959.

Mrs. O'Dea is joint author with Professor Sol Encel, professor of sociology at the University of New South Wales, of a book expected to be completed this year on the conditions under which scientific discovery and invention have taken place in Australia.

She developed an interest in science policy studies while working during 1965 and 1966 as assistant to Professor Encel, who was then a reader in Political Science at the Australian National University.

She maintained this interest after she joined CSIRO in 1967 as special assistant to Dr. J. E. Falk, Chief of the Division of Plant Industry, and has written several papers on aspects of science policy.

A children's adventure fantasy by Mrs. O'Dea, "Six Days between a Second", was published last year and was widely acclaimed by reviewers. Another children's book is under way.

Mrs. O'DEA

Mrs. O'Dea also writes poetry, and one of her poems, "On a Theme from the Golden Legend", won the Poetry Magazine Award of the Poetry Society of Australia in 1968. It is published for the first time in this issue of Coresearch.

PROFESSOR NORMAN

Dr. M. J. T. Norman has left the Division of Land Research to become Professor of Agronomy at the University of Sydney.

Dr. Norman joined CSIRO in 1956 to carry out research into pastures and their utilization by cattle at the Katherine Research Station in the Northern Territory.

He moved to the Canberra headquarters of the Division in 1959 and took over responsibilities for pasture work at the Kimberley Research Station in addition to his programme at Katherine.

In 1967 he shared the Brodie Memorial Prize for his work on pastures, forage crops and cattle feeding in northern Australia, and he was appointed Assistant Chief of the Division in 1968.

Dr. Norman wrote more than 60 individual or joint papers during his period with CSIRO.

DEADLINE

Contributions to the April issue of Coresearch should reach Mr. R. Lehane at P.O. Box 109, Canberra City, A.C.T., 2601, by Thursday, March 12.

On a Theme from the Golden Legend

Pope Felix caused to be built in Rome a great church in honour of two saints. This church had for its caretaker a man, one of whose legs was entirely eaten away by cancer. And it happened that, in his sleep, this pious man saw Saints Cosmas and Damian appear with ointments. And one said to the other: "Where can we find some fresh flesh to put in place of this rotten flesh we are going to cut off?" The other saint replied: "They buried a Moor today in the cemetery of St. Peter in Chains — let us take one of his legs and give it to our servant!" And the two saints proceeded thus: after having given the Moor's leg to the caretaker they carried to the former's tomb the leg of the sick man.

Jacobus de Voragine: The Golden Legend.

Man to the impossible becomes
Accustomed by degrees. His mind succumbs,
Like some small stone, to constant dripping through
The centuries and, in submission to
The shadow, to the glance and to the glint
Of allegory, of symbol and of hint,
Characters and places and events
Coagulate at length to arguments.

Cosmas and Damian, the Arabian twins,
Hover just where a troubled shade begins;
Double as guardians of that narrow pass
Which leads into the canon of the mass;
So I have often wondered why this pair,
Of all contenders, should be stationed there.
Yet, viewed aright, and what more apposite
Objects of contemplation than this flight
Of fair physicians, feathered in paradise,
Were ever furnished to confuse the wise;
These pioneers of spare-part surgery
Whose legend is both wish and prophecy?

To have gone, as they did, from a land that brags
Of fine physicians and still finer nags
To Syria to study medicine
Seems curious, though not so curious when
Recalling that not only prophets know
The merits of that constant ebb and flow
Which leads to honours. Spruced-up, in the ranks
With actors, academics, mountebanks,
Physicians look particularly well —
Possess a sort of showmanship, a spell,
A dash of learning of an arcane kind —
In part sensational, in part refined.

This little knowledge being a dangerous thing,
Cosmas and Damian, while journeying
Homeward, decided that their expertise
Required some garnishing. Upon their knees —
Or so the story goes — they sought to make
Assurance doubly sure, to have their cake
And eat it; for each bow obtain a pair
Of rustless, mothproof strings; together share
The best of all worlds possible. And lo!
When all their prayers were spent, they had to show
A most appropriate credit in resources —
The gift to cure not only men but horses —
Then, like a pair of pennant flags unfurled,
They hurtled forth into an ailing world
Where (wish-fulfilling gloss upon the facts?)
It's said they charged no fees. These fiscal pacts
Involving God inevitably lead
To speedy martyrdom. Why not indeed?
Most saints are quite impossible alive.
Indigenous doctors could not long survive
In competition with this sure-cure brace
Of undercutting scabs. The breakneck pace
Was soul-destroying! It was little wonder
That by some chance or calculated blunder,
Or some due process, Emperor Diocletian's
Persecution tackled twin accretions . . .
The medical fraternity relaxed;
Enjoyed the luxury of being taxed . . .

So far so good, then, for the medicos.
Though other people could no longer choose
Physician-surgeon-pediatrician-vet
Economy twin-packed for self or pet.
Not long, however, and the fun began;
Eternal fall-out for the common man.

Now, with two heavenly doctors to adore —
Double Kildares on which gently to pour
(For cure of pains, cricks, twitches and malaise)
Prayers, pleas, petitions — these were happy days.

The treatment, as before, entirely free,
Events progressed, therefore, predictably:—
The Medicis annexed them for their patrons:
Pope Felix, urged by eager Roman matrons,
Devised a church for Damian and Cosmas,
The saints who had arrived simply because
They were, in truth, so obviously gone,
So actively extinct, in absence shone
With a conspicuousness beyond attack
Of the most holy hypochondriac.

(Ever be blessed the timeless twins on call
Keeping perpetual clinic for them all!)

The years passed till one, Justinian, was
Caretaker at Sts. Damian and Cosmas;
A deacon and a dear, a proper man,
Swept (as he swept) into a larger plan
Which so progressed one day he had to beg
A cure himself — for cancer of the leg.

Habits die hard, it seems, even in heaven.
A surgeon once will always be a surgeon.
If one must take a limb, one needs a limb —
No limbs out of celestial air for them!
Cosmas recalled how, just that day, he saw
'Them' burying a well-proportioned Moor.
'One of his legs will neatly do the trick.
First cut Justinian's off and then we'll stick
The new one on.' What earthy elegance,
Panache, elan! What happy nonchalance!
So matter-of-fact, so coolly Devil-may-care
(One rather hopes he did), running repair
Of barber-surgeon never equalled it.

By luck they happened on an excellent fit.

Fra Giovanni of Fiesole,
The painter whom the brighter critics say

Seemed to be blessed with an angelic eye
(The other one on what the trade would buy)
Captured the moment of its putting on:—
Cosmas and Damian, reluctant to be gone,
Float, alphabetically, from left to right,
Crimson-capped heads in clots of golden light.
If ever twins came from a single egg
This pair did (clothes and all). The glossy leg
Seems not yet portion of the sleeping man.
However, one is much relieved to scan
The breathless scene, to note the heavenly twins
Have happened on a right one, that the shins
And thighs are properly aligned, and that
Justinian — a pleasant man and pat —
Chaste-folded arms upon his chest, still smiles
Serenely as he sweetly dreams the whiles
Of what has happened and is yet to come.

It will be held, quite properly, by some
A dream should be like sweat and not like rain,
Should ooze from inside, for few can sustain
The blow of dreaming what has really been.
Justinian did however, it would seem,
With energy and admirable aplomb.
One sees him stand and put his slippers on
(He'll have to stoop through Giovanni's door)
One wonders if he'll pinch to make quite sure
The new leg works — is not a fake;
Is adequately joined — and if he'll take
A glass of water from that bed-head flask
And, as he drinks and feels the trickle, ask
If the moisture will eventually seep
Into the dark flower of his curious sleep.

Meanwhile the pair performed one task beside
(A gentle courtesy which is denied
The current cadavre-donor of spare-parts,
Being quite a challenge to a surgeon's arts)
They gave the Moor Justinian's rotting limb
Which, at that stage, was adequate for him.

(Impeccable, angelic quid pro quo:
A place for all that had a place to go:
And what pied beauty, wild and unexpected,
Will be the day the pair are resurrected!)

The immediate sequel bristled complications.
Beginning with the happy man's relations,
The distant ones quite frankly disapproved —
Would have preferred the ghoulish thing removed
Even (their ardour, one observes, was grim)
If this also involved removing him.
His near and dear were somewhat less extreme.
Still, each one cooked up some convincing scheme —
Like merchant-seafaring or work at night —
For keeping the dear deacon out of sight.
Friends feared to look, for when they looked they saw
Death, retribution and decay — much more,
Let it be said, that we would see
Though they saw only half the prophecy —
And with a rough, perceptive accuracy,
Having snuffled out the smell of sanctity,
They shunned, as only pious people can,
That worst of odours in that Christian man.
His wife felt an intruder shared their bed
And though well past her prime her head
Filled with inordinate, unnerving dreams
Of licorice allsorts, jesters, motley beans —
Here, in this last, anticipating Mendel
Though a Lamarckian error made her spend all
Her days in fearful thought of aged Sarah —
And nowhere a geneticist to spare her . . .

The leg itself, not used to being shod
Or sheathed in hose, at best was feeling odd;
An alien member in a homely harbour,
Its every dance became a dance macabre.
Unwittingly the duo had exhumed
A piece of carnal charnel; had presumed
All legs alike, which happens to be wrong.
This leg was made to lead, not tag along.
Its sole repined for hot Moroccan sands,
Its knee to bend to muezzin's commands
And the demanding and disturbing thigh
Dreamed first of horses then of houris. High
In the hip the brave bone wasted for
Press of the hanger of a scimitar.
The whole so cruel, I think that I would rather
Othello's leg on Desdemona's father.

And yet, when all was seen, was said, was done,
The job could not have been a neater one.
Justinian's post-operative pain
Was not within the leg but in the brain.
For him no corn, no bunion and no gout
And no rejection, only nagging doubt
Which most times operated at a pitch
It surfaced only as a pleasant itch.

Year followed year, meanwhile the strange leg grew
So much at home that it was almost true
He did not own the leg, the leg owned him.
Like some stray cat whose every sniffy whim
Reorganizes a suburban home
This leg had trained him till he had become
Quite imperturbable. And journeying
Out and beyond his dream as though on wing
He overshot his temporal situation —
Censure of friend, acquaintance and relation —
And warmed and waxed and superhumanized
And thought and sought and so self-realized
(His left leg knew just what his right leg did)
Achieved a balance he could not keep hid.
It permeated all his attitudes.
Rendered immune to decent platitudes
He made tame wild and found familiar strange.

Few dared disruption; most stayed out of range.

So, when he died, his confreres had no choice
But bear his death like Christians and rejoice.
And when they laid him out they saw the flaw
But not the brilliance he had suffered for —
The symbiosis both in flesh and mind
Which joined him to the Moor and all mankind.

Marjory O'Dea.

DAD'S TOTE

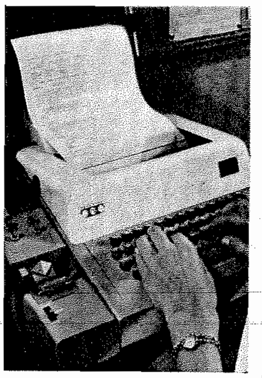
TOTE was put to work recently by the Division of Computing Research to facilitate simple communication through DAD with the Division's powerful Control Data 3600 computer in Canberra.

DAD (Drums And Displays) is the computer's monitor or "operating system" and supports six TV-like display consoles and eight remote typewriter consoles.

TOTE (Teletype Oriented Time-sharing Editor) is a "subsystem" of DAD and was designed to make it as simple as possible to enter and run a small program on the computer via a remote typewriter console.

Using TOTE a novice programmer or an experienced programmer new to DAD can sit down at one of the computer's typewriter consoles and within minutes be programming under DAD even though he knows nothing about the system.

He doesn't need to know much about TOTE either. TOTE is self-documented, and typing in the word "HELP" causes the subsystem's command words to be printed out, and described in detail if the user wants this.



A remote typewriter console being used with TOTE.

A simple example which a programmer may tackle to gain experience with TOTE is also provided.

TOTE's language consists of only 12 command words. One of them, "RUN", takes care of the system formalities in entering the program, processing it, and returning the results on the user's typewriter.

Other command words allow the programmer to alter his program by inserting, replacing, or deleting lines, and rerun it so that the effect of the alterations may be seen more or less immediately.

TOTE allows programmers to write their programs in any of the four programming languages, Kwiktran, Fortran, Algol, or Compass.

DAD was designed and implemented in the Division four years ago, and since that time many subsystems have been incorporated, allowing programmers to use the typewriter and display consoles to communicate directly with the computer to enter and edit their programs, and to request immediate attention from the computer to process the job.

These other subsystems, which are in heavy use, require of their users a knowledge of DAD and details specific to the system, and the Division of Computing Research felt there might be a need for a more "simple-minded" subsystem for running or testing small programs where the lack of access to the full computing facilities available under other subsystems would be offset by

TOTE was designed to fill this need, and the authors, Mr. Peter Hanlon and Mr. Henry Hudson of the Division, would like to hear the comments of programmers who use TOTE.

New Lead in Paper Chase

The Central Library in East Melbourne has acquired a set of the Science Citation Index published by the Institute for Scientific Information, Philadelphia, U.S.A.

The SCI consists basically of listings of articles published in a particular year (Source Index), and the references cited in these papers (Citation Index).

It is now available for use either by personal visit to the Central Library or by submitting requests for searching, through Divisional Librarians.

The Source Index lists current articles alphabetically by author, giving the full title, joint authors, bibliographic details, and the number of references cited.

The Citation Index is also arranged alphabetically according to the author of each cited document. Under each surname, the authors of documents which contain references to the cited document are listed.

The SCI began publication with a limited coverage of the journal literature of 1961 and 1964. Since that time it has appeared annually and now covers about 2,300 journals which are claimed to be the most important and representative in the fields of science and technology.

The SCI is not intended as a substitute for traditional bibliographic indexes, but as a new means of information searching.

In Brief

Dr. Day

Dr. M. F. C. Day of the Executive has been appointed chairman of a committee established by the Federal Government to plan the Institute of Marine Science to be built at Townsville.

The Prime Minister, Mr. Gorton, announced the establishment of the institute in his election policy speech last year. He said research in the Great Barrier Reef area would be one of the institute's first priorities.

Degrees

Mr. W. W. Bryan of the Division of Tropical Pastures has been awarded the degree of Doctor of Agricultural Science by the University of Queensland.

Dr. R. A. Wooding of the Division of Plant Industry has been awarded the degree of Doctor of Science by the Victoria University of Wellington.

Fellowships

Dr. G. M. Polya, a CSIRO post-doctoral studentship holder working at Cornell University, New York, has been awarded a Queen Elizabeth II Fellowship.

He will study the biochemical basis of water or salt stress in plants at the Australian National University, Canberra.

Dr. N. S. Scott of the Division of Food Preservation's Plant Physiology Unit has been awarded a Nuffield Commonwealth Travelling Fellowship for 1970.

He will do research in the Botany Department of Edinburgh University, Scotland.

Honour

Mr. H. H. Wilson who retired last year as laboratory secretary at the McMaster Laboratory of the Division of Animal Health, has been awarded the Imperial Service Medal.

SAFETY NOTES

A proper belting

A safety device can only be effective if it is used correctly.

So it is with seat belts. Correct belt adjustment is very important.

If the buckle is on the wearer's abdomen it can cause severe internal injuries in a collision. Belts should be adjusted so that the buckle is well down on the hip, and most will easily allow for this amount of adjustment.

Fatal injuries caused by seat belts always attract considerable attention but it is worth recalling some facts.

A survey made by Volvo into fatal crashes showed that only three out of 52 people killed were wearing belts. (The three were all travelling faster than 60 m.p.h.)

The Road Research Laboratory in Britain has shown that unbelted passengers are twice as likely as belted passengers to be seriously injured in an accident.

So belt up, but do it properly.

A proper lacing

Are your seat belts properly laced? It is not uncommon to find that the belt has been laced the wrong way round and that it will easily slip from the buckle.

This condition has already been the cause of one fatality in the Organization and the writer has found it necessary to re-lace his own belts.

Next time you get into your car it would be worthwhile trying a simple static strain test which will quickly show whether belts are correctly laced.

Running in

There is more to running in a car than is generally known. Most people are careful about the engine but what of those replacement tyres?

A new tyre is stiff when it comes from the mould and needs some fairly gentle treatment to make it safe for use.

Racing drivers always "scrub" their tyres with a few practice laps before the start of a race and the same treatment is advisable for ordinary cars.

Expert advice is that 50 miles per hour should not be exceeded for the first 50 miles of travel on new tyres.

It is possible to damage new tyres beyond repair by fitting them to an already run-in vehicle and driving fast up the highway.

L. C. R. Thompson, Safety Officer.

New Appointees

Miss Carolyn Askey has joined the Division of Animal Genetics to carry out biophysical research on macromolecules and subcellular particles. Miss Askey graduated B.Sc. from the Victoria University of Wellington, New Zealand, in 1968 and M.Sc. from the same university in 1969.

Dr. Kathy Bowmer has joined the Division of Irrigation Research to initiate a research programme on the

Dr. BOWMER

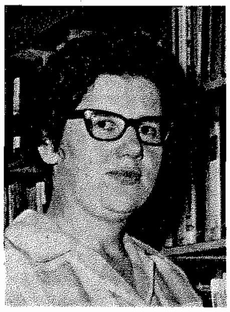
pollution effects of residual herbicides in soils and irrigation water. Dr. Bowmer graduated Ph.D. recently from the University of Nottingham where she carried out studies on the persistence of atrazine herbicide in the soil.

Dr. B. B. Carrodus has joined the Division of Forest Products to study sapwood-heartwood transformations and

Dr. CARRODUS

ageing of woody tissues. Dr. Carrodus graduated M.Sc. with honours from the University of New Zealand in 1952 and D.Phil. from the University of Oxford in 1965. From 1958 to 1962 he was a research fellow at the University of Adelaide, and since 1965 he has been a senior research fellow in the School of Forestry, University of Melbourne.

Miss Helena Hicks has been appointed librarian at the Division of Irrigation Research. Miss Hicks is a B.Sc. graduate



Miss HICKS

of the University of Sydney. She has worked with the Public Library of N.S.W. and been Librarian in charge of the Veterinary Science Library at the University of Melbourne.

Mr. B. V. Johnson has been appointed to the Division of Land Research where he will work on the development of systems for the automatic recognition and mapping of land attributes from numerical

Mr. B. V. JOHNSON

data derived from aerial photographs. Mr. Johnson graduated M.Sc. from the University of Alberta last year.

Dr. D. L. Johnson has been appointed to a post-doctoral fellowship in fluid state physics in the Division of Physics. Dr. Johnson graduated M.Sc. from

Dr. D. L. JOHNSON

the University of British Columbia in 1967, and Ph.D. from the same university in 1969.

Mr. P. M. Kennedy has joined the Division of Animal Physiology to investigate biochemical aspects of ruminant energy and nitrogen exchange. Mr. Kennedy graduated B.Sc. with honours from the University of Adelaide in 1967 and since then has been working in the Department of Animal Physiology at the Waite Agricultural Research Institute.

Dr. C. W. Ward has been appointed to a post-doctoral fellowship in organic chemistry in the Division of Protein Chemistry. Dr. Ward graduated B.Sc. from the University of New South Wales in 1964 and Ph.D. from the same university in 1967. Since then he has been working in the Department of Zoology at the University of Massachusetts, U.S.A.

Mr. J. K. Washa has joined the Division of Animal Health to study mechanisms of immunity to blood-borne protozoa. Mr. Washa, who graduated B.S. from the University of Wisconsin in 1963, was a research assistant in the Radiobiology Department of the University of Wisconsin's Medical School from 1967 to 1969. Before this he spent a year in Sydney as a science teacher at Cranbrook School.

Mr. K. M. Scott has been appointed to the Division of Mineral Chemistry to carry out geochemical research in ore genesis. Mr. Scott graduated B.Sc. from the University of Adelaide in 1969.

Dr. E. O'Loughlin has joined the Division of Irrigation Research to study methods of optimizing the hydrological system of the Murrumbidgee Irrigation Area. Dr. O'Loughlin received his early training

Dr. O'LOUGHLIN

in fluid mechanics and civil engineering at the University of New South Wales where he graduated M.Eng.Sc. He graduated Ph.D. from the University of Iowa in 1965. Since then he has undertaken studies of river and stream flows in relation to flood mitigation and examined beach erosion problems in Australia.

Dr. P. G. Whitmore has been appointed to a post-doctoral fellowship in the Division of Protein Chemistry to undertake electron microscope studies of fibrous proteins. Dr. Whitmore graduated B.Sc. with honours from Leeds University in 1966 and Ph.D. from the same university in 1969.

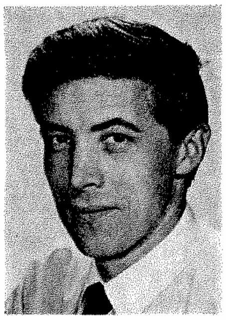
Miss Judith Williams has joined the Division of Fisheries and Oceanography to work on the compilation and analysis of data on prawns in northern Australian waters. Miss Williams graduated B.Sc. with honours from Flinders University last year.

Dr. P. F. Walsh has joined the Division of Forest Products to study critical strength and deflection characteristics of light timber structural frames. Dr. Walsh graduated B.E. with honours from the University of New South Wales in 1963 and Ph.D. from the same university in 1967. He spent a year as a research engineer with the

Dr. WALSH

N.S.W. Department of Main Roads, and for the last two years has been a lecturer in the Department of Structural Engineering at the University of N.S.W.

Dr. W. A. Low has joined the Rangelands Research Unit to study the ecology of cattle with particular reference to behaviour, effect of grazing on the environment, reproductive patterns, factors of mortality,



Dr. LOW

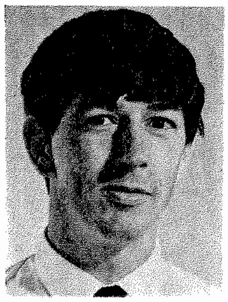
and competition with other herbivores for food. Dr. Low graduated M.Sc. from the University of British Columbia in 1963 and Ph.D. from the same university in 1969.

Miss Anne White has joined the Division of Animal Physiology to study digestion and intermediary metabolism of protected protein in ruminants in relation to growth and meat production. Miss White graduated B.Agr.Sc. from the University of Queensland in 1964 and M.Agr.Sc. from the same university in 1968. Since then she has worked as a demonstrator in the Department of

Miss WHITE

Animal Husbandry at the University of Queensland.

Dr. V. N. E. Robinson has been appointed to the Division of Textile Industry as an electron microscopist. He will be concerned particularly with the study of fibre surface



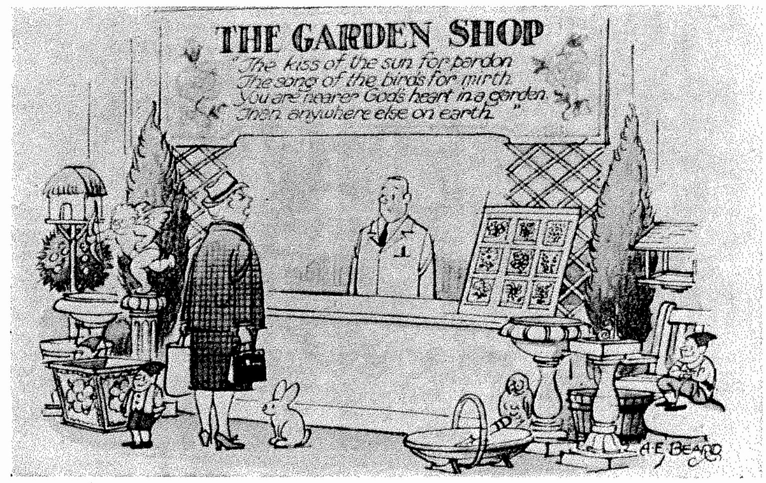
Dr. ROBINSON

properties. Dr. Robinson graduated B.Sc. with honours from the University of Western Australia in 1965 and Ph.D. from the same university in 1969.

Miss Denise Madill has joined the Division of Animal Physiology to study endocrine response to physiological stimuli and the endocrine con-

Miss MADILL

trol of intermediary metabolism. Miss Madill graduated B.Sc. with honours from the University of New South Wales last year.



"Tin of Killo, packet of Pestdoom and a quart of Liquideath".

NOTICES

Work in Washington

A vacancy exists for a stenographer in the Office of the Australian Scientific Attache in Washington.

Any CSIRO staff or friends of staff interested in the position should contact Mr. D. Young at Head Office. Applicants should be able to write shorthand at 100 words a minute and type at 60 words a minute. The salary is $US5,316. Fares to and from Washington will be the responsibility of the appointee.

CSIR Ski Club

The first General Meeting of the CSIR Ski Club for 1970 will be held on March 19 at the Division of Protein Chemistry beginning at 7.45 p.m.

March is the main work party month at the club's Mt. Buller and Falls Creek lodges. The co-ordinator of work parties, Mr. John Eltham, can be contacted at Melbourne 34-1614.

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CORESEARCH

FOR CIRCULATION AMONG MEMBERS OF CSIRO STAFF — NUMBER 133, MELBOURNE, APRIL 1970

Dr. D. F. MARTYN

Dr. D. F. Martyn, President of the Australian Academy of Science and Officer-in-Charge of CSIRO's Upper Atmosphere Section, died last month at the age of 63.

In a research career spanning more than 40 years he made many important contributions to upper atmosphere and ionospheric physics and to knowledge of the propagation of radio waves.

The Chairman, Sir Frederick White, said Dr. Martyn was one of Australia's most distinguished scientists.

"His scientific researches on the earth's upper atmosphere brought him world renown and contributed greatly to Australia's outstanding reputation in geophysics," Sir Frederick said.

"In his long career in CSIRO he set a standard of excellence in research greatly admired by his colleagues."

Dr. Martyn was born in Scotland in 1906. After graduating B.Sc. from the University of London in 1926 he undertook research at the University of Glasgow on oscillations in radio valves.

He obtained his Ph.D. from the University of London in 1929 and came to Australia the following year to take up an appointment with the Radio Research Board.

His research on the ionosphere soon gained world recognition, and in 1936 the University of London awarded him the degree of Doctor of Science.

Early in 1939 Dr. Martyn was sent to England by the Commonwealth Government to obtain full information for Australia on the development of radar, then a matter of the highest secrecy.

On his return, CSIR established its Radiophysics Laboratory in Sydney to carry out research and development on radar, and Dr. Martyn was appointed Chief of the Laboratory.

In 1942 he was seconded to the Department of Army as Director of Operational Research.

Two years later he returned to the Radio Research Board and began a programme of research on atmospheric and solar physics at the Commonwealth Solar Observatory, Mt. Stromlo, near Canberra.

His work on tides in the upper atmosphere and on solar radiation, together with his earlier research, led to his election as a Fellow of the Royal Society, London, in 1950.

Dr. MARTYN

In 1956 he transferred his research activities to Camden and established a small laboratory there.

This became the CSIRO Upper Atmosphere Section in 1958, with Dr. Martyn as Officer-in-Charge.

Dr. Martyn received many high honours for his contributions to science.

In 1947 he was awarded the T. K. Sidey Summer-Time Medal and Prize by the Council of the Royal Society of New Zealand for research on electromagnetic radiation, and the Sir Thomas Ranken Lyle Medal by the Australian National Research Council for research on the ionosphere.

In 1951 he was awarded the Walter Burfitt Medal and Prize of the Royal Society of New South Wales and in 1954 the Charles Chree Medal of the Physical Society of London.

He became a Foundation Fellow of the Australian Academy of Science on its creation in 1953 and served on many of its committees.

He was elected President of the Academy in May last year.

For the past 11 years he had been Chairman of the Australian National Committee for Space Research.

After World War II Dr. Martyn played a leading role in the work of various international scientific organizations.

He was appointed Chairman of the United Nations Scientific and Technical Sub-Committee on the Peaceful Uses of Outer Space in 1962 and retired from that position recently.

He was a member of the Executive Committee of the International Council of Scientific Unions, and had been a Vice-President of the International Union of Radio Science as well as president of its commissions on radio astronomy and the ionosphere.

In 1962 he was elected the first Australian Fellow of the International Academy of Astronautics.

New Counsellor for U.S.

Professor H. C. Webster, professor of physics at the University of Queensland, has been appointed Counsellor (Scientific) to the Office of the Scientific Attache, Washington.

As well as being responsible for the functioning of the office as a whole, he will have a particular interest in matters arising out of the Australia/U.S. science agreement.

Professor Webster was a research physicist with the Radio Research Board from 1933 to 1937 when he joined the University of Queensland as lecturer in biophysics.

He was seconded to the CSIR Division of Radiophysics in 1940, was appointed Scientific Research Liaison Officer in London in 1941, and returned to the Division of Radiophysics in 1943.

In 1945 he rejoined the University of Queensland, becoming Associate Professor in Radiation Physics in 1946, Professor of Physics in 1949, and Acting Deputy Vice-Chancellor in 1969.

Professor Webster will leave Australia towards the end of May to take up his new appointment. Before then he will visit CSIRO Divisions in Sydney, Canberra, and Melbourne.

Cable will Carry Love Scent Clues

A quarter-mile coaxial cable laid recently between the Divisions of Entomology and Computing Research in Canberra could hasten the development of new control methods for some of Australia's insect pests.

The cable will connect the Division of Entomology's high resolution mass spectrometer through a small computer with the Division of Computing Research's powerful Control Data 3600 computer.

The computer link will speed up enormously examination of the output of the mass spectrometer.

Among the substances analysed in the spectrometer are pheromones, chemicals insects use to communicate with one another.

Pheromones enable insects to recognise their own kind, signal alarm, indicate where to go for food, attract the opposite sex, and regulate castes in the social orders.

If they were available synthetically, pheromones would have a potential use in insect control free from the risk of widespread chemical contamination of the environment.

One possibility could be the use of a synthetic scent-trail pheromone to disrupt termites in their foraging.

However, before synthetic pheromones can be produced the chemical compositions of the natural pheromones have to be determined, and this problem is complicated by the fact that only very small quantities can be isolated for analysis.

Mass spectrometers, which are valuable tools in the analysis of complex organic compounds, use up the substances they analyse as they analyse them, so if only small quantities are available it is vital that the analysis be carried out quickly.

The computer link will enable analyses to be carried out hundreds of times faster than they can be now.

In the mass spectrometer, the substance to be analysed is vaporized and the molecules ionized. The ions pass in a beam through a magnetic field and are separated according to their masses.

The masses of the ionized molecules can be measured to accuracies of about three parts in a million, making it possible to work out what atoms make up each molecule.

A mass spectrum, however, is likely to contain readings for several hundred ions. Determining precisely the mass of any one of them by manual methods can take about 20 minutes, and there is usually not time to make accurate measurements of the masses of more than a few of the ions.

The computer link will be able to record a complete high resolution mass spectrum in half a minute and give an accurate mass value for each ion in about five minutes. It will also be able to determine what combinations of atoms fit each mass value.

The problem of storing mass spectra will also be simplified. The Division of Computing Research will be able to store them in digital form on magnetic tape.

The link was devised by Mr. C. D. Gilbert of the Division of Computing Research and Mr. C. G. Macdonald, head of the Division of Entomology's mass spectrometry unit.

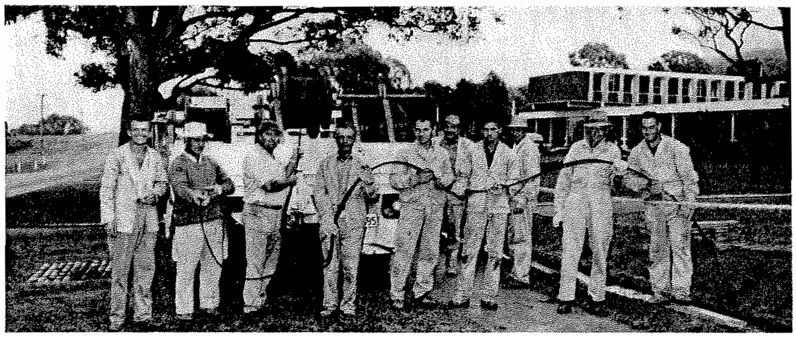
A small Raytheon 706 computer in the mass spectrometry unit will receive the output of the mass spectrometer and make preliminary calculations. Its output will be fed along the cable to the Control Data 3600 which will do the rest of the processing.

The mass spectrometry unit provides a mass spectral service to the Division of Plant Industry as well as the Division of Entomology.

One of the main users of the service is the Division of Plant Industry's plant chemotherapy group which produces compounds that it hopes will be biologically active and useful, for example, as herbicides or fungicides.

Right: The cable trench is treated with insecticide.

Below: The cable layers pause for a photo break.



THE DIARY OF A BOFFIN

An account of some of the day-to-day activities of a highly-paid scientist.

by "a highly-paid scientist"

I suppose it happens to all staff in Divisions without an Information Officer, but I feel I have more than my fair share of enquiries from the great general public.

Every second day it seems that somebody's child spills "Orangeade" or ball-point ink on the carpet (invariably described as "brand new") and rings CSIRO about it.

Then there are the drop-ins who arrive on your doorstep without any appointment and invariably catch you in the middle of a series of instrument readings.

DRIPPED BLOOD

Today's guest plunged his hand into the bag he was carrying and withdrew the exhibit to illustrate his problem.

Out came a freshly-flayed rabbit skin which dripped blood over my desk. His problem concerned fleshing rabbit skins, the first stage in fur coat manufacture.

A similar problem came by telephone when the school biology course was revised. A firm specialising in the preparation of biology exhibits and well able to cope with its usual order for one or two cat skeletons was swamped by an order for 300 mounted skeletons.

It was Friday and midsummer, a delivery of 150 dead cats was en route from Sydney — how could they be turned to skeletons promptly on a mass-production basis?

My advice to hire cold storage space while experimenting on one or two animals was rejected, a forty-gallon oil drum must be full of digesting cats that week-end.

TECHNICOLOR

Animals seem a perennial theme — for example, there were the twin girls each of whom was given a white rabbit for Christmas. As one rabbit looks much the same as another rabbit, there were family quarrels as to which girl owned which rabbit.

So mother wrote to CSIRO asking how she could dye one rabbit tail pink and one blue. That was easy, I have had long experience at producing technicolor sheep for films and for advertising.

At least this mother had the courtesy to write a note of thanks for the highly successful advice, few people bother.

I cannot willingly face green carpets, they always remind me of yellow spots, a disease to which they are very prone as blue dyes are on the whole more fugitive than yellow ones.

The spots used to be associated with babies or other domestic pets, but recently the trend has changed.

"Say something in computerese."

"Saturday Review"

Since bigger and better bleach was added to every scouring powder, the zealous house-cleaner can do desperate damage with unnoticed spillage.

The seriousness of this was brought home to me when a carpet contractor faced a claim for many "kilobucks" from the builder who found yellow spots all over the carpet throughout a new, large block of home units.

I asked a worried man what contractors had entered the house after the carpeting was finished. A professional house-cleaner had followed!

The carpet layer was so impressed by my prowess that he rang soon after with his next problem: white bugs on his tomato plants.

My newly-acquired reputation as a highly-effective problem-solver promptly vanished, I know nothing of entomology.

When James Robertson of Edinburgh died his loss was felt far beyond his close friends and relatives. He was sadly missed by Scottish exiles in Melbourne to whom he exported bag seasoning of excellent quality.

This material is essential if a vital portion of the bagpipes is to be kept supple and air-tight.

A troubled pipe-major consulted CSIRO about it, and last I heard the glorious music (or dreadful noise) was being successfully produced with the aid of Australian-made bag seasoning.

Some of the oldest and apparently simplest problems can be very humbling to a scientist who scratches the surface and finds how little he knows.

Great-grandmother rubbed a candle over her flat-iron to prevent it sticking. Today specialist firms sell "smearing wax" for application to the large rotary ironing machines of big laundries. Without wax, the linen adheres to the rollers, overloading electric motors and jamming equipment.

A shortage of special wax threatened the supply of sheets to hospitals: one laundry irons 900 sheets per hour for a 16 hour day, and the machine was jamming.

FEET ON THE GROUND

Empirical tests were carried out to find which locally-available wax was most successful at reducing the electrical demand of the motors, while the appropriate Division was consulted on just what was the function of smearing wax.

Three theories were proposed, tested, and proved incorrect.

I still do not know just what the wax grandmother used really does, but I know what keeps the laundry ammeters at their lowest reading — at an annual saving of $5,000 compared with conventional waxes.

Contact with people's problems keeps one's feet on the ground, and it is encouraging to find the high reputation CSIRO has with the public. Few trivial queries arise; nearly every caller has a real problem and deserves help quite apart from the public relations aspect.

Freud Eggs

"When a person exclaims, 'Boy, do I feel like a steak today!' he may mean it quite literally. He may feel exactly like a large slab of meat: soft, raw, heavy."

So says an article in the February issue of "The Sciences", the journal of the New York Academy of Sciences.

The article contains many more insights into the relationship between eating habits and personality traits.

About asparagus eaters it says, "Subjects who spontaneously attack and eat the tip first are likely to be immature, fearful and dependent, unable to defer gratification even briefly.

"Those individuals who proceeded from stem to tip rated high in such personality parameters as frustration-tolerance, self-security and confidence.

"In the American psycho-social tradition, they showed faith in the future, confidence in the Judeo-Christian ethic, and a conviction that delayed gratification is morally correct."

On eggs, the authors found, "Several of the students, speaking of their reactions to poached eggs, wondered if they had really been born yet."

The article, titled "Freud Eggs" contains statistical evidence, citations, cross-references, and discussion of control groups.

The editor of the journal told Time magazine, "Once in a while it's nice to run something to get us out of the groove of reporting straight science." The article was a "put-on".

A newsreel film commissioned by the Australian Wool Board and showing the latest wool fashion creations was released for cinema screening late last month. Part of it was shot at the Prospect Laboratory of the Division of Animal Physiology, and a Coresearch cameraman was there to catch Mr. Phil Dority filming Miss Lucinda Strauss displaying some creations in a paddock.

Death of Mineralogist

Dr. G. F. Walker, a Chief Research Scientist in the Division of Applied Mineralogy, died after a cardiac operation on February 17.

A graduate of Aberdeen University, he worked in the ceramic industry and at the Macauley Institute before joining CSIRO in 1951.

He was intensely interested in the interactions of mineral surfaces with ions, water molecules and organic materials, and published extensively in this field.

Dr. WALKER

The expanding layer-lattice silicate, vermiculite, was his favourite experimental model, providing precise basic data of great value in the subsequent elucidation of problems concerning the behaviour of clay minerals in many situations.

He gained a D.Sc. in 1960 for his initial work on vermiculite and later became a world authority on the extensive subject of the complexes that can be formed between clays and organic molecules.

In 1969 he was nominated President Elect of AIPEA, the International Association for the Study of Clays.

A thorough humanist, stimulating in debate and interested in a very wide range of topics, his company will be deeply missed.

In Brief

Accreditation

Mr. H. G. Baas-Becking, who is in charge of the illustrating section of the Division of Plant Industry, has been awarded accreditation with the Australian Cinematographers' Society.

Among films submitted with his application for accreditation were several made in the Division of Plant Industry for research purposes and demonstrations.

Mr. Baas-Becking has worked at the Division since 1964 and has shot about 30,000 feet of research film.

Before joining CSIRO he worked at the Foundation for Film and Science in Holland, where he specialised in animation and special effects.

Computer Fellows

Dr. P. J. Claringbold of the Division of Animal Genetics, **Mr. M. Kovarik** of the Division of Mechanical Engineering, and **Dr. G. N. Lance** and **Mr. T. Pearcey** of the Division of Computing Research have been elected Fellows of the Australian Computer Society.

Visiting Professor

Professor C. F. Cullis, professor of physical chemistry at the City University, London, is spending three months as a Visiting Scientist at the Sydney laboratory of the Division of Mineral Chemistry.

Professor Cullis is well known internationally for his work in combustion kinetics and other areas of combustion research of industrial importance.

He is a consultant to a number of British industrial firms, Assistant Scientific Editor of the International Union of Pure and Applied Chemistry, and British Secretary of the Combustion Institute.

Death of Dr. Kelley

Dr. R. B. Kelley, widely known for his many contributions to the study and practice of animal breeding, died in Brisbane on February 13 at the age of 79.

Dr. Kelley was born in Melbourne in 1890. After graduating in veterinary science from the University of Melbourne in 1914 he served for 4½ years in the A.I.F. and then held a number of veterinary appointments before joining the CSIR Division of Animal Health in 1931 as Animal Geneticist.

One of his responsibilities in this appointment was to investigate the idea proposed by the then Chief of the Division, Dr. J. A. Gilruth, of producing an improved breed of cattle for northern Australia by appropriate cross-breeding with Zebu strains.

In 1933 Dr. Kelley selected in the U.S.A. and brought to Australia for a syndicate of Queensland pastoralists the first 19 head of Zebu cattle to be imported.

He observed and recorded their performance and that of their progeny over the next 15 years. The promising results obtained led him to recommend in the early 1950s that more Zebus be imported.

Dr. Kelley was associated with the selection in the U.S.A. of many of these cattle, notably the foundation stock—Brahman and Africander—for the National Cattle Breeding Station, Belmont, Rockhampton.

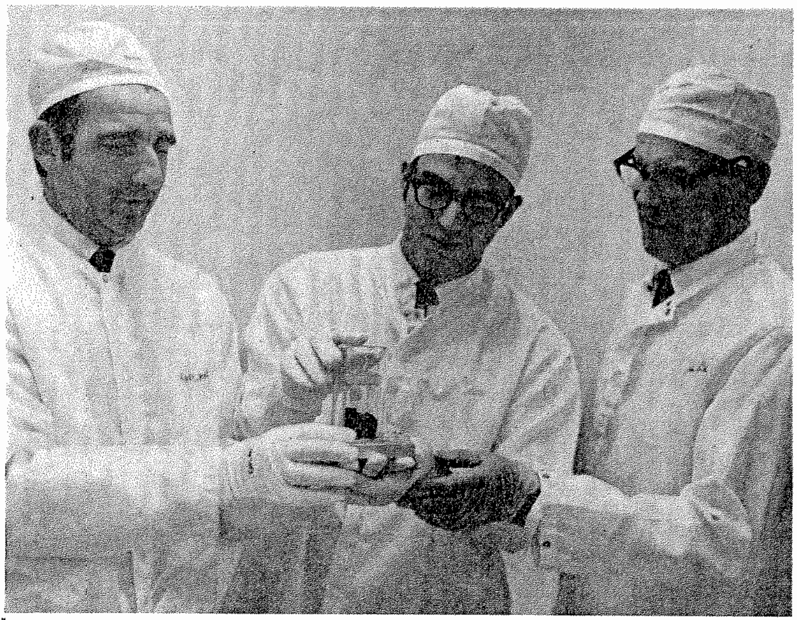
Dr. Kelley was also concerned with the selection and importation by CSIRO in the early 1950s of Sindhi and Sahiwal cattle from Pakistan.

For most of his CSIRO career Dr. Kelley was Officer-in-Charge of the McMaster Field Station, Badgery's Creek, N.S.W.

This station was the centre for his work on sheep breeding and for the highly successful breeding and training of sheep dogs which he undertook as a personal interest.

He retired from CSIRO in 1954 and then held a number of overseas appointments, in Singapore, Malaya and the Middle East. In recent years, while living in retirement at Nambour, Queensland, he was still available for consultation on cattle breeding programmes.

Dr. Kelley wrote many scientific papers and three books dealing with his specialities.



Mr. J. W. Smith of the Sydney laboratory of the Division of Mineral Chemistry returned to Australia recently after spending a year at the University of California's Institute of Geophysics and Planetary Physics working with Professor I. R. Kaplan. At the invitation of the NASA Research Center, Moffett Field, California, the two men participated in a search for organic compounds in samples of lunar dust. Our photo shows, from left, Professor Kaplan, Assistant Professor J. W. Schopf, and Mr. Smith handling a sample of lunar rock.

Honour for Dr. Walsh

Dr. Alan Walsh, Assistant Chief of the Division of Chemical Physics, has been elected a Foreign Member of the Royal Academy of Sciences, Stockholm, Sweden.

The only other Australian to have been elected to the Swedish Academy is Sir Macfarlane Burnet.

Dr. Walsh has a world-wide reputation for his development of the atomic absorption method of chemical analysis.

More than 10,000 atomic absorption spectrophotometers are now in use around the world.

Dr. Walsh was elected a Fellow of the Royal Society, London, last year.

He was elected to the Australian Academy of Science in 1958 and is immediate Past-President of the Australian Institute of Physics.

He won the Britannica Australia award for science in 1966.

Dr. WALSH

10 Hours equals 1 Day

We've got metric money and we're getting metric measures, so why not metric time? asks an Australian businessman, Mr. William Bell.

He says a distinct parallel exists between Australia's metric currency and the metric time proposal.

"The currency unit has been changed from 240 old pence to 100 new cents. The time unit will be changed from 24 old hours to 10 new hours or 1000 new minutes."

Mr. Bell's proposal is reported in "The Australasian Manufacturer".

He says the same consideration that was given to the adoption of the metric system for currency and weights and measures should be given to time measurement.

His proposed time scale is:

100 new seconds (n/s) = 1 new minute (n/m).
100 new minutes (n/m) = 1 new hour (n/h).
10 new hours (n/h) = 1 new (or old) day.

The conversion table is:

1 n/s = 0.864 old seconds (o/s).
1 n/m = 86.4 o/s = 1.44 old minutes (o/m) = 100 n/s.
1 n/h = 8640 o/s = 144 o/m = 2.40 old hours (o/h) = 100 n/m.
1 new/old day = 86400 o/s = 1440 o/m = 24 o/h = 10 n/h.

More News in Brief

Open Day

More than 30 tanners from all mainland States except Queensland attended the annual open day of the Leather Industry Research Association conducted by the Leather Research Section of the Division of Protein Chemistry at the Division's Parkville Laboratory on February 26.

They heard short talks on the progress of research by each member of the Section's research staff.

Great interest was shown in the potentialities of freezing hides, both as a cheaper alternative to the more usual method of salting for hide preservation and as an aid to hide unhairing.

Visitor

Professor G. H. Bolt, professor of soils and fertilizers at the Agricultural University of Wageningen in the Netherlands, is spending six months at the Division of Plant Industry.

He is doing research in the Pye Laboratory with Dr. J. R. Philip.

Reunion

The girls employed during the years 1926 to 1935 in Head Office and the Division of Forest Products (then also in East Melbourne) became very attached to one another and arranged to meet every few years.

The latest of these gatherings was held shortly before Christmas.

Some of the girls are now grandmothers, and they proudly displayed photographs of children and grandchildren.

Radiation

The International Commission on Radiation Units and Measurements is seeking nominations for the second award of its Gray Medal which is given in recognition of outstanding contributions in the scientific fields of interest to the I.C.R.U.

Dr. Huelin Retires

Dr. F. E. Huelin retired from the Division of Food Preservation last month after nearly 40 years with CSIR and CSIRO.

His research gained him an international reputation in the fields of post-harvest physiology and the chemistry of fruits and vegetables.

He was one of a small band of pioneers whose work on preventing wastage in stored fruit and extending storage life conferred great economic benefits on Australia.

Dr. Huelin joined CSIR in 1928 to study the ripening of bananas, and his work contributed to the development of highly successful ripening methods.

In 1930 he was awarded a CSIR overseas studentship to Cambridge University where he studied the biochemical effects of ethylene on potato tubers and, in 1932, was awarded his Ph.D.

On returning to Australia in 1932 he joined Dr. S. A. Trout and Mr. G. Tindale in an attack on storage disorders in pome, stone and citrus fruits. The collaboration of these three men over the next few years was highly productive.

In 1941 Dr. Huelin joined the Division of Food Preservation's studies of war-time food technological problems in supplying food to the armed services. He produced a large number of scientific papers on various aspects of food chemistry as a result of his investigations.

Afterwards he made many notable contributions, with other scientists, to knowledge of the chemical constitution of the oily or waxy coatings of fruit and the volatile substances given off by apples after picking.

Dr. Huelin has been concerned with the problem of superficial scald, a serious disorder in several varieties of apples and pears, particularly Granny Smith apples. In recent years he has taken part in research which has identified almost certainly the substances responsible for this disorder.

SAFETY NOTES *goes lyrical . . .*

She's yours, son.

If you can make the vilest stinks invented
And work in them from morn till late at night,
And without proper care can be contented
To fool around with stuff like dynamite;

If you can fill the lab. with toxic vapours
And never think to use the proper hood,
Or heed a timely warning re your capers
Although deep down you know you really should;

If you can still remain quite calm and placid
When those around you effervesce and fret
Each time you have to test a fuming acid
You suck it up a one c.c. pipette;

If you can start an acid distillation
And wait until it bumps, it's really hot,
Then show you really lack anticipation
By dropping in a piece of porous pot;

If you persist in dumping glass that's broken
In the nearest bin that's meant for paper waste,
And leave in glassware to be washed a token
Such as sodium or Raney nickel paste;

If you can force a piece of thin glass tubing
Without protection through an ill-bored bung,
And when one day it's through your hand protruding
Don't be surprised your praises go unsung;

If you can smoke or light a bunsen burner
Where there's ether, now that really packs a punch,
And having slopped 'round toxics like a learner
Think the bench is just the place to have your lunch;

If you can give your every working minute
Setting dangerous traps around for everyone,
Then yours is the lab., and everything that's in it,
And what is more, you're welcome to it, son.

J. W. Hallam, Safety Officer.

Coresearch was there when Forest Products won the Muncey Shield at the 1970 CSIRO Swimming Sports at the Melbourne City Baths. So were, from left, Jeanette McGeoch (Animal Health), Alan Stott and his sousaphone (Chemical Research Laboratories), Irene Duffy (Head Office), Sylvia Woitowitz (Chemical Physics), Susan Dennis (Animal Health), Karin Taylor (Head Office), and John Sheldon and trombone (C.R.L.).

Credit Go-Ahead

Approval has been given for deductions to be made from salaries for payment to Credit Unions as money on deposit.

The CSIRO Co-operative Credit Society, Melbourne, and the Laboratories Credit Union Co-operative, Sydney, have decided to accept deposits made in this way, subject to any limitations each may have to impose from time to time on the amounts of deposits accepted.

At present the Laboratories Co-operative Limited, Canberra, is not in a position to extend the facility to its members.

The Melbourne society is able to accept money on deposit from CSIRO staff who are not shareholders in it. Because of different statutory requirements in N.S.W., the Sydney union may only accept deposits from its members.

In both cases, interest at the rate of 6 per cent per annum will be paid on moneys deposited.

In the case of the Melbourne society the rate of 6 per cent reflects an increase recently decided on by the directors in the rate paid for amounts deposited for periods of less than 12 months.

Staff requiring regular deductions from salary for both loan repayments and deposits will combine the two amounts on one authority form and the total amount will be paid to the Credit Society or Credit Union as a single deduction.

Any variation to either the loan repayment or the deposit will require a fresh authorization.

Both credit bodies envisage that individual authorizations to deduct money as deposits will remain unchanged for at least 13 pay periods.

Authority forms may be obtained from the offices of the Melbourne society or the Sydney union, to which they must be returned after completion.

If the society or union is able to accept the deposit it will pass the authority form on to the appropriate CSIRO pay office, which will commence the deductions as soon as the variations can be fitted into the normal pay system.

A separate form, also available from the society or union, is necessary to cease deductions for deposits.

Further information may be obtained from Mr. J. Belkin, Manager, CSIRO Co-operative Credit Society Limited, 314 Albert Street, East Melbourne, or Mrs. J. Ryan, Secretary, Laboratories Credit Union Co-operative Limited, CSIRO, Grace Bros. Building, 213-223 Broadway, Sydney.

"How singular! You mean to say we're all on sabbaticals?"

"Saturday Review"

New Appointees

Mr. C. S. Allison has joined the Division of Computing Research to investigate new techniques for using the Division's computing equipment and assist computer users in the Sydney area with their programming problems. Mr. Allison graduated B.Sc. with honours from the University of Sydney in 1969.

Dr. D. L. T. Anderson has been appointed to a research fellowship in dynamical meteorology with the Division of Meteorological Physics. He will work at the Commonwealth Meteorology Research Centre. Dr. Anderson graduated B.Sc. with honours from the University of St. Andrew's in 1966 and recently obtained his Ph.D. from the same university.

Mr. J. F. Archibald has joined the Division of Plant Industry to work at the Tobacco Research Institute at Mareeba, Queensland. Mr. Archibald graduated B.Sc. from the University of Reading in 1949 and M.Sc. from the same university in 1953. He has worked as a senior agronomist with the Queensland Department of Primary Industries at Mareeba.

Mr. B. M. Bindon has joined the Division of Animal Genetics to undertake research on endocrinological aspects of growth and reproduction with special reference to increasing the efficiency of sheep production by genetic means. Mr. Bindon graduated M.Sc. from the University of New England in 1967 and since then has been studying for his Ph.D. at the University of Sydney. Mr. Bindon worked at the Division of Animal Physiology between 1963 and 1966.

Mr. N. C. Bulleid has joined the Division of Fisheries and Oceanography to work on the collection of field data as part of the Division's northern prawn programme. Mr. Bulleid graduated B.Sc. with honours from the University College of South Wales and Monmouthshire in 1968 and M.Sc. from the University of Southhampton in 1969.

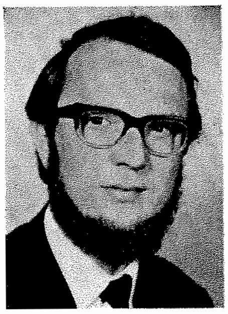
Dr. J. L. Caswell has been appointed to a postdoctoral fellowship in radioastronomy with the Division of Radiophysics. Dr. Caswell graduated B.A. with honours from the University of Cambridge in 1962 and Ph.D. from the same university in 1966. Since 1967 he has been a postdoctoral fellow at the Dominion Radio Astrophysical Observatory, Canada.

Mr. W. S. Hearn has joined the Division of Fisheries and Oceanography to work on the compilation and analysis of several types of data but principally those referring to population studies. Mr. Hearn graduated B.Sc. from the University of Western Australia in 1964. Since then he has been a tutor in the Department of Mathematics at the University of Western Australia and has been studying for his M.Sc.

Mrs. Colleen Kirkman has been appointed to the Division of Mathematical Statistics to work on statistical aspects of the research programme of the Division of Tropical Pastures. Mrs. Kirkman graduated B.Sc. from the University of Queensland in 1968 and since then has worked as a research statistician with the Planning and Traffic Section of the Brisbane City Council.

Mr. M. R. Kuss has joined the Division of Computing Research to investigate new techniques for using the Division's computing equipment and assist computer users in the Adelaide area with their programming. Mr. Kuss graduated B.Sc. from the University of Adelaide in 1963. Since then he has worked as a programmer with G.M.H., the P.M.G., and the South Australian Department of Agriculture.

Dr. R. M. Gifford has been appointed to the Division of Plant Industry to study photosynthesis as affected by environment and genotype, and its relation to crop productivity.



Dr. GIFFORD

Dr. Gifford graduated B.Sc. with honours from the University of Nottingham in 1965 and recently gained his Ph.D. from Cornell University.

Mr. R. J. Love has joined the McMaster Laboratory of the Division of Animal Health to work on immunological problems relating to infections in sheep. Mr. Love graduated B.V.Sc. with honours from the University of Sydney in 1969 and has spent the past 12 months as a veterinary inspector with the Pastures Protection Board at Condobolin.

Mr. P. C. Nancarrow has been appointed to the Division of Mineral Chemistry at North Ryde to study ferrous metal dissolution in relation to mineral beneficiation. Mr. Nancarrow graduated B.Sc. from the University of N.S.W. in 1962 and M.Sc. from the same university recently. Since 1955 he has been employed by Australian Iron and Steel Pty. Ltd.

Dr. G. H. L. Rothschild has joined the Division of Entomology to study insect pheromones and their possible use in control of light brown apple moth. Dr. Rothschild graduated B.Sc. with honours from the University of Nottingham in 1959 and Ph.D. from the University of London in 1962. From 1962 he spent six years as an entomologist in the research division of the Malaysian Department of Agriculture in Sarawak where he worked on the ecology of rice pests in South-East Asia. Since then he has been working at the Commonwealth Institute of Entomology in Britain.

Mr. T. D. Sowerbutts has joined the Division of Mathematical Statistics to help scientists in the Canberra Divisions with statistical aspects of their research programmes. Mr. Sowerbutts graduated B.Sc. from the Australian National University in 1969.

Dr. M. D. Hatch has joined the Division of Plant Industry to study intermediary carbon metabolism in plants, particularly the path of carbon in photosynthesis with special reference to tropical plants. Dr. Hatch graduated B.Sc. with honours from the University of

Dr. HATCH

Sydney in 1954 and Ph.D. from the same university in 1958. From 1959 to 1961 he was a postdoctoral fellow at the University of California. Since then, except for twelve months in 1967 as Reader in Plant Biochemistry at the University of Queensland, he has been with the David North Plant Research Centre of C.S.R. Co. Ltd. in Queensland, where he was head of the Biochemistry Section.

Dr. R. M. M. Traynier has joined the Division of Entomology to carry out research on host-relations of plant-feeding insects and on behavioral problems associated with the practical use of pheromones. Dr. Traynier graduated B.A. with

Dr. TRAYNIER

honours from the University of Cambridge in 1962 and Ph.D. from the University of Birmingham in 1965. Since then he has been working as a postdoctoral fellow with the British Columbia Research Council, Vancouver.

Mr. R. K. Tume has been appointed to the Division of Food Preservation to investigate biochemical mechanisms in the metabolism of muscle and the properties of muscle enzymes and sub-cellular structures. Mr. Tume graduated B.Sc. with honours from the University of Adelaide in 1964 and since then has been studying for his Ph.D. at the Universities of Adelaide and Melbourne.

DEADLINE

Contributions to the May issue of Coresearch should reach the Editor at 314 Albert Street, East Melbourne, by Thursday, April 16.

Printed by CSIRO, Melbourne

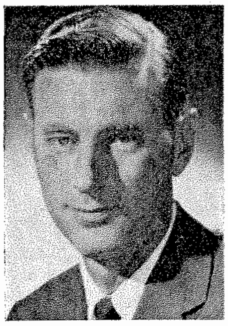
CORESEARCH

FOR CIRCULATION AMONG MEMBERS OF CSIRO STAFF — NUMBER 134, MELBOURNE, MAY 1970

Scientists Honoured

Dr. J. P. Wild of the Division of Radiophysics and Professor E. J. Underwood, a part-time member of the Executive, were among the four Australians elected Fellows of the Royal Society last March.

The other two Australians were Professor J. C. Jaeger, Professor of Geophysics at the Australian National University, and Dr. J. F. A. P. Miller, Head of the Experimental Pathology Unit of the Walter and Eliza Hall Institute of Medical Research.



Dr. WILD

Dr. Wild, who is Director of the Solar Radio Observatory at Culgoora, is one of a small group of scientists who brought Australia into world prominence in radioastronomy in the years immediately after the war.

He played a major role in the design and development of the radioheliograph, a unique instrument for obtaining continuous 'radio' pictures of the Sun.

One of Dr. Wild's most important discoveries was that the Sun intermittently ejects streams of electrons travelling at speeds approaching that of light.

He found that large disturbances of this kind give rise to shock waves which travel through the Sun's atmosphere and in space around the Sun at speeds of about 1,000 miles a second.

Dr. Wild identified these shock waves as the agent which caused magnetic storms and auroras in the earth's atmosphere.

Professor Underwood, who is Professor of Agriculture and Director of the Institute of Agriculture at the University of Western Australia joined the Executive in 1966.

Professor UNDERWOOD

He is a pioneer of trace element research and one of the original discoverers of the significance of cobalt in the nutrition of sheep and cattle.

He has also worked on botulism and pregnancy toxaemia in sheep, fat lamb production, and sheep infertility on clover pastures.

MORE MONEY WANTED

Unlike banks and many other lending institutions, the CSIRO Co-operative Credit Society has not increased its interest rates on loans.

Because of this there has been a greatly increased demand for loans from the Society.

The Directors would therefore like to see more CSIRO people and their relatives and friends investing in the Society so that loan applications can be dealt with as quickly as possible.

The Society represents a sound and secure investment prospect. An interest rate of 6% a year will be paid on all money deposited.

Repayment of deposits is virtually on demand, although some notice is required if large amounts are to be withdrawn.

Staff members who are unable to deposit large sums may be interested in a scheme introduced recently.

Under this scheme depositors can arrange to have sums of money deducted automatically from their salaries each pay day.

Interest rate is, of course, still at the attractive rate of 6% a year.

"Authority for deduction" forms can be obtained from the Manager of the Credit Society, Mr. J. Belkin, at 314 Albert Street, East Melbourne.

POSITIONS VACANT

The following vacancies for professional appointments are current:

STATISTICIANS (EO 1/2) — Division of Mathematical Statistics — 440/227 (1/5/70).

SOIL CHEMIST (RS/SRS) — Division of Soils — 283/3 (1/5/70).

DINGO ECOLOGIST (RS/SRS) — Division of Wildlife Research — 560/273 (1/5/70).

RESEARCH SCIENTIST (ROCK MECHANICS) (SRS/PRS) — Division of Soil Mechanics — 920/105 (1/5/70).

MATHEMATICIAN (SPRS) — Division of Plant Industry — 130/1061 (1/5/70).

EDITOR (SSO 1/2) — Division of Fisheries and Oceanography — 320/429 (8/5/70).

EXTENSION OFFICER (SSO 2/3) — Meat Research Laboratory, Division of Food Preservation — 300/513 (8/5/70).

EXPERIMENTAL OFFICER (EO 2/3) — Division of Applied Physics — 750/459 (8/5/70).

EXPERIMENTAL OFFICERS (EO 1/2) — Division of Computing Research — 900/153 (8/5/70).

EXPERIMENTAL OFFICER (EO 2/3) — Division of Physics — 770/399 (8/5/70).

RESEARCH SCIENTIST (EXTRACTIVE METALLURGY) (RS/SRS) — Division of Mineral Chemistry — 601/114 (8/5/70).

CHEMICAL ENGINEER OR EXTRACTION METALLURGIST (RS) — Division of Chemical Engineering — 608/115 (1/5/70).

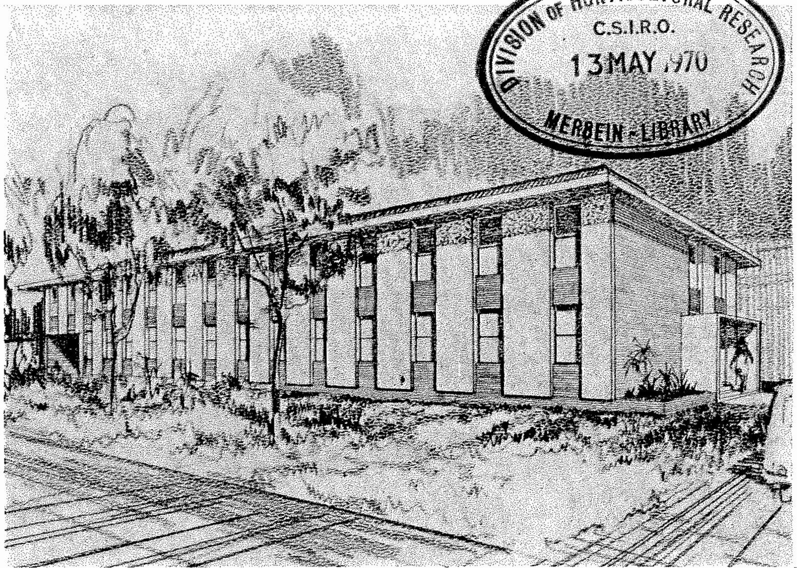
EXPERIMENTAL OFFICER (EO 1/2) — Division of Animal Physiology — 245/485 (15/5/70).

POSTGRADUATE STUDENTSHIP (EO 1) — Division of Textile Physics — 465/324 (15/5/70).

RESEARCH SCIENTIST (BIOLOGICAL CONTROL) (RS/SRS) — Division of Entomology — 180/538 (15/5/70).

RESEARCH ENGINEER/SCIENTIST (AERODYNAMIC INVESTIGATIONS) (RS/SRS) — Division of Mechanical Engineering — 430/283 (15/5/70).

MICROBIAL PHYSIOLOGIST (RS/SRS) — Division of Food Preservation — 305/156 (29/5/70).



Above is an architect's drawing of a proposed stored grain research laboratory for the Division of Entomology. The laboratory will be used for research into the control of insect pests in stored grain. The work will fall into three main categories: chemical control, physical control, and biological studies.

Funds to build the laboratory, which will cost between $200,000 and $300,000, will be provided by the Australian Wheat Board. Operating costs will be shared equally between the Board and CSIRO.

The two-storey building will be about 140 feet long and 40 feet wide and will provide about 11,000 square feet of space. Plans are expected to be ready for tendering by the end of this year and the building should be complete by the end of 1971.

Mr. S. W. Bailey of the Division of Entomology will head the stored grain research programme. It is planned to build up a research team of ten research scientists and supporting staff over the next few years.

PARKES IN APOLLO 13 DRAMA

The 210 foot radiotelescope at Parkes played an important part in the emergency arrangements to help the Apollo 13 astronauts return to earth last month following the explosion in the service section of the space craft.

On the afternoon of Tuesday, 14th April, CSIRO received an urgent request from the National Aeronautics and Space Administration for support from Parkes.

Within 4½ hours the radio telescope had been converted to receive voice communications and telemetry transmissions from Apollo 13.

The space craft was transmitting at the lowest possible signal level and this was one of the main reasons for enlisting the aid of the Parkes antenna.

Mr. J. G. Bolton, Director of the Parkes Observatory, said that the signals were only a thousandth of the strength of those normally received from astronauts on the moon.

A few days after the successful splashdown, Dr. E. G. Bowen, Chief of the Division of Radiophysics, received the following telegram from Dr. O. M. Covington, Director of Manned Flight Support, NASA:

"I would like to express my personal thanks along with the appreciation of everyone involved in the Apollo 13 mission for the outstanding support provided by Honeysuckle, Carnarvon and Parkes.

"This support contributed significantly in the safe return of the Apollo 13 crew.

"I would especially like to single out those responsible for bringing up the Parkes antenna and associated systems in record time.

"This response was so impressive that special mention of it was made to President Nixon during his visit to the Goddard Space Flight Centre last Tuesday."

Cause For Confusion

"It is a strange and confusing circumstance of this case," said the learned judge, "that the principal antagonists, the plaintiff and the third defendant, are called by the same name.

"The plaintiff is, or claims to be, a corporate body recognised and governed by the law in force in the Eastern Zone of Germany; the third defendant is, or claims to be, a corporate body recognised and governed by the law of the Federal German Republic.

"Sacrificing accuracy somewhat recklessly for the sake of brevity, I am tempted to say that the object of the action is to determine which of these two bodies, if either, is the other, and, if not, whether either, and if so which, is another corporate body of the same name, or, if not in fact such third body, is identical with it.

"If this is not a wholly accurate way of stating the case (and in seriousness I would say that it is not) it will appear that the issues which are involved are scarcely less complicated and metaphysical than they would be if it were."

— from Reports of Patent, Design and Trade Mark Cases, No. 7, 1969, London.

NEW IDEAS ON DESALINATION

The number one pollutant of Australian water supplies is not the filthy organic matter which is found in many rivers overseas, but ordinary common salt.

The problem of removing it is still unsolved. A number of proven processes for desalination exist, but none can provide water at the low costs we are accustomed to.

To be useful, water has to be very cheap. City dwellers expect to, and do, receive regularly this chemical substance, water, delivered to their homes for only 5 to 7 cents per ton, and with quite extraordinary purity of about 99.95 per cent.

No other large-scale chemical commodity approaches these levels of cost and purity, or the scale on which it is handled.

Simply moving the stuff involves major engineering structures and costs, without subjecting it to a highly sophisticated operation such as desalination.

Yet calculations show that the theoretical energy requirements for desalination are almost trivial — science tells us this quite definitely. The process should not therefore be expensive.

What's more, we know it can be done using little energy. Nature found the secret millions of years ago.

When life was evolving in the sea, primeval organisms devised desalination processes to eliminate salt from crucial parts of their cells. Biological desalination continues to be fundamental to life processes.

I have no doubt that the high cost of desalination today is the consequence of a "sledge-hammer" aproach — our chemistry and engineering are simply not subtle enough.

Fortunately, designers of the new generation of desalination processes are beginning to show the requisite subtlety and they're beginning to learn from nature.

It is highly significant that, like biological systems, most of these new processes involve polymers — a vast class of chemical substances including plastics, fibres, rubber, protein, and wood.

Modern research on desalination represents an intriguing pot-pourri of chemistry, biology, engineering and economics. With this perhaps we should include a dash of politics.

Nature's way of desalination is the successful product of millions of years of evolution.

The crocodiles of saline lakes weep truly salty tears, as do marine birds, reptiles and some species of tamarisk. The tears are in fact salty effluents from biological salt pumps.

Many other biological systems possess salt pumps — our kidneys for example.

A salt pump transfers salt from one side of a biological membrane to another so that the membrane separates fresh from salty water. These membranes are made of water repellent fatty substances and protein polymers.

Two simple but very important principles can be learnt from these biological systems.

Desalination requires energy. Nature uses chemical energy in a mysterious process to pump salt through membranes — the salty fluid gets saltier and the less salty fluid continues to get less salty.

This transfer consumes amazingly small amounts of energy. But how? Unfortunately we don't know.

In part, the answer is the consequence of a simple geometric fact — as you continue to subdivide a material the area of its surface increases rapidly.

Nature has evolved membranes on an incredibly small, microscopic scale, with the result that the total surface area spread out between the membranes and the water — the interfacial area — is tremendously large.

Now salt will flow faster across the membrane when the force driving it increases. It follows that when the area of the membrane becomes larger a much smaller driving force can move a given amount of salt in a given time.

This article is based on a talk given recently by Dr. D. E. Weiss, Leader of the Water Purification Section of the Division of Applied Chemistry, on the ABC radio science programme, "Insight".

As the membrane area increases, the amount of energy consumed diminishes and eventually approaches an absolute lower limit — a theoretical minimum.

Furthermore, in many cases nature has chosen to move the minority component, the salt, rather than the majority component, the water. By so reducing the actual flow of material to a minimum she exploits the full potential of her membranes.

The small amount of energy required to perform biological desalination is therefore a direct result of the enormous membrane area she employs, and of the efficient way it is utilised.

The key clue to ultimate, cheap, man-made desalination, then, is to find ways of using small driving forces which can be compensated for by large interfacial-areas — but these must be cheap since they represent a major cost in desalination plant.

It is also clear that these expensive interfaces should be efficiently utilised — this necessitates taking salt from the water, not water from the salt — and avoiding unessential flows of mass or energy.

In man's desalination technology, membranes and interfaces take many forms.

In some processes, water is taken from the salt — the most familiar example is distillation, where brine is boiled to form steam and when the steam passes through cooler tubes it condenses to fresh water.

Another example is reverse osmosis, where water is forced through plastic membranes leaving the salt behind on the other side. Once again it is the great mass of water that is moved, not the salt.

But other processes take salt from the water, as in nature. In electrodialysis, for example, electricity causes salt to flow through plastic membranes leaving the water behind.

In all these processes salt or energy flows across tubes or plate-like membranes. These tubes or membranes are major items of cost, and it is necessary to strike a compromise for optimum performance — a larger energy cost is tolerated in order to reduce the cost of the expensive tubes or membranes.

But in distillation processes the energy consumption is exceptionally high, because very large amounts of heat are released when steam condenses.

It is essential to recover much of this heat for re-use. This requires huge surface areas for heat transfer, and this involves pipes. You can get some idea of the magnitude of piping requirements from the fact that a sea-water distillation plant producing 100 million gallons per day of fresh water requires 10,000 miles of three-quarter to one-inch tubing. It would take the largest tube mill in the U.S.A. 18 months to produce this.

The high capital and energy costs of sea-water distillation plants are therefore a direct result of the large flows of energy recycling within the process. Whenever you use a distillation process you cannot dodge this fundamental limitation.

But this large recycling of energy is not a fundamental necessity for desalination as can be seen from the very low energy requirements of reverse osmosis and biological desalination.

In order to obtain a cheaper source of energy, there have been a number of proposals recently to combine sea-water distillation with a nuclear power station on a massive scale.

But the nuclear power station is no more than a source of heat with the important gimmick that the sale of electricity can subsidise the cost of the heat.

Because the energy requirements for some other desalination processes are so much smaller, and do not therefore require a subsidy, it is my firm conviction that nuclear-powered desalination of sea-water will not stand the test of time, even though much research must be done before alternative processes can replace it.

Returning to interfaces and surface areas, the heart of the desalination problem — a particularly expensive form of surface is obtained from large pipes or flat plates.

As we have seen, it is necessary to subdivide material to microscopic dimensions to obtain large surface areas from small amounts of material.

This is achieved in a recent process for reverse osmosis by fabricating its membranes as minute tubes — each with the thickness of a human hair. You can fit miles of such tubing into a very small space and it uses little material.

Even larger surfaces can be obtained if particles are finely subdivided as granules, but if these are too fine they cannot be separated easily from a salt solution.

However, by putting tiny magnets within such particles, we have recently demonstrated at the Division of Applied Chemistry in collaboration with a local chemical firm that even particles of the size of bacteria can be handled easily.

The magnetic particles readily coalesce into large flocs; these settle rapidly but they can be easily broken into fine particles again.

This provides an ideal method for obtaining a very large surface area at low cost — but how can it be used for desalting?

There is one desalination process in wide use for producing ultra-pure water for boilers — the so-called ion-exchange process where salt is absorbed by resin beads about one-tenth of an inch in diameter.

This approach is most attractive because salt is taken from the water and the surface area is relatively cheap — if the particles were magnetic we could use much smaller particles with even larger surfaces.

Unfortunately the process has to recover the resin in a purified form for continual use. To remove the salt from the resins chemical energy is required and this form of energy is very expensive so the whole process is costly.

In collaboration with local industry and the Australian Mineral Development Laboratories, we have made considerable progress towards cheapening the process of ion-exchange by inventing some new resins; these avoid the need for chemical energy in purifying the resins.

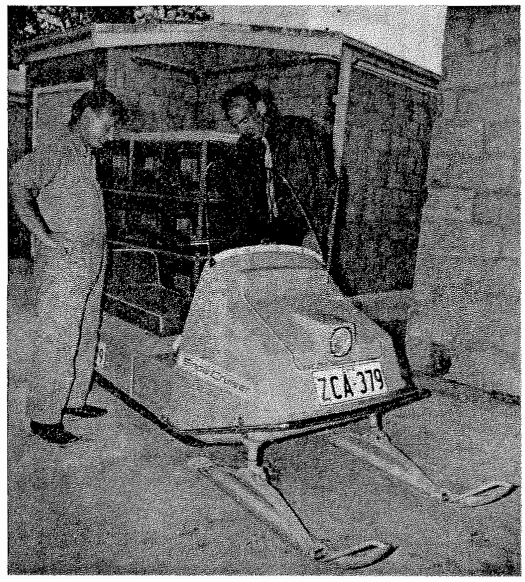
After our resins have absorbed salt from cold brackish water, the salt is removed by simply washing the resins with hot water.

This approach has some fundamental advantages — it takes salt from the water, as in nature, across an extensive but cheap interface, and uses the cheapest form of energy — low-grade heat.

But it is limited to the treatment of brackish water. Although our research is encouraging, there is still much to be done to convert it into a practical commercial process.

As they absorb salt, these so-called Sirotherm resins stretch, but when they are heated they contract. Expansion and contraction processes are also key factors in biological membranes.

(Continued on page 4.)



The latest acquisition of the Division of Wildlife Research transport fleet is this Snow Cruiser. It will be used during the coming winter for fauna surveys in the Kosciusko National Park. Admiring the Cruiser are Hans Dimpel (left) and Kent Keith.

SAFETY NOTES

A trap for young players

A warning on the dangers of using sodium metal to dry solvents has been issued by a major chemical supplier.

The warning draws attention to the serious risks of returning bottles with residues of sodium in them, in view of the large number of bottles which pass through modern bottle-washing plants, added to the difficulty of detecting residues in amber, or opaque bottles.

If metallic sodium is used to dry a solvent in its container, any residual metal must be destroyed by reaction with anhydrous isopropyl alcohol and the bottle rinsed out with water before return.

Leaving metallic sodium in large winchester bottles could cause accidents in the laboratory itself. Sodium lead alloy is a suitable drying agent, which decomposes safely under water and is thus a suitable alternative.

Silver that isn't!

Practically all silver solders contain cadmium and the most common type in use for more than 20 years contains about 20 per cent cadmium. The term "silver solder" is a misnomer and often leads to confusion.

It is actually a brazing alloy which melts and flows at a lower temperature than standard brazing alloys. It is usually used for joining copper, brass or bronze materials, although it may be used for other materials.

Cadmium is a highly toxic element, particularly as a freshly formed fume generated by a flame from a torch. In addition to silver soldering it may be formed when welding or brazing is done on a cadmium plated object or when cadmium plated objects are heat-treated.

Cadmium plated utensils must be kept from contact with food, since food acids dissolve small quantities of this material, producing violent gastrointestinal disorders.

At least three deaths have been recorded because of inhalation of fumes from silver solder.

Various methods are suggested for prevention of accidents of such a nature:

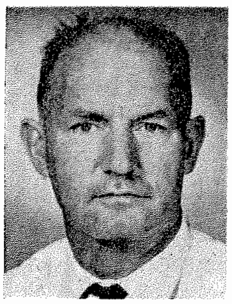
- A satisfactory method of control is adequate exhaust ventilation.
- Silver soldering should not be done more than 2 ft from an exhaust hood.
- For short term jobs, where ventilation is completely impracticable, respirators with filters designed specifically for this material should be worn.

J. W. Hallam, Safety Officer.

News In Brief

Institute Medal

Dr. F. H. W. Morley, Assistant Chief of the Division of Plant Industry, has been awarded the medal of the Australian Institute of Agricultural Science for his "outstanding contribution to agricultural and pastoral science in Australia".



Dr. MORLEY

Dr. Morley's work has included research on sheep genetics and physiology; the cytogenetic, morphological, biochemical and physiological properties of pasture legumes, particularly subterranean clover; and plant-animal interactions and pasture utilisation.

Doctorates

Miss Helen Newton Turner of the Division of Animal Genetics was awarded the degree of Doctor of Science by the University of Sydney last month for her published work.

Mr. K. J. Hutchinson of the Division of Animal Physiology has been awarded the degree of Doctor of Philosophy by the University of New England for his work on fodder conservation and energy flow.

Mr. A. D. Worth of the Division of Food Preservation has been awarded the degree of Doctor of Philosophy by the University of Wisconsin for his work on bacterial spores.

Masters

Mr. G. M. Adam of the Division of Computing Research has been awarded the degree of M.(Eng.)Sc. by the University of Western Australia.

Mr. N. W. Bainbridge of the Division of Textile Physics has been awarded the degree of M.Eng.Sc. by the University of New South Wales.

Mr. L. E. Brownlie of the Division of Food Preservation has been awarded the degree of M.Sc.Agr. by the University of Sydney.

Award

Mr. C. A. Gladman of the Division of Applied Physics has been awarded the Jack Finlay National Award by the Institution of Production Engineers.

Wine Research

Dr. W. W. Forrest of the Division of Nutritional Biochemistry has been appointed Director of the Australian Wine Research Institute. He took up his new post late last March.

Crown of Thorns

Mr. D. J. Tranter of the Division of Fisheries and Oceanography has been appointed to a joint committee set up by the Commonwealth and Queensland governments to investigate the crown of thorns starfish.

Science Writer

Mr. R. Lehane of Head Office has been appointed science writer for "The Australian".

For the last few months Mr. Lehane has been Editor of Coresearch.

Assistant Registrar

Mr. A. I. Dunlop of Head Office has been appointed an Assistant Registrar at Monash University.

Assistant Chief

Dr. T. H. Blakeley has been appointed Assistant Chief of the Division of Chemical Engineering.

Before joining CSIRO last year Dr. Blakeley was a Director of Morganite Research and Development Ltd., a company set up by the Morgan group of companies to operate the research department which he had previously initiated.

Dr. BLAKELEY

His interests there included the technology of speciality graphites and ceramics, and the cost effectiveness of research planning.

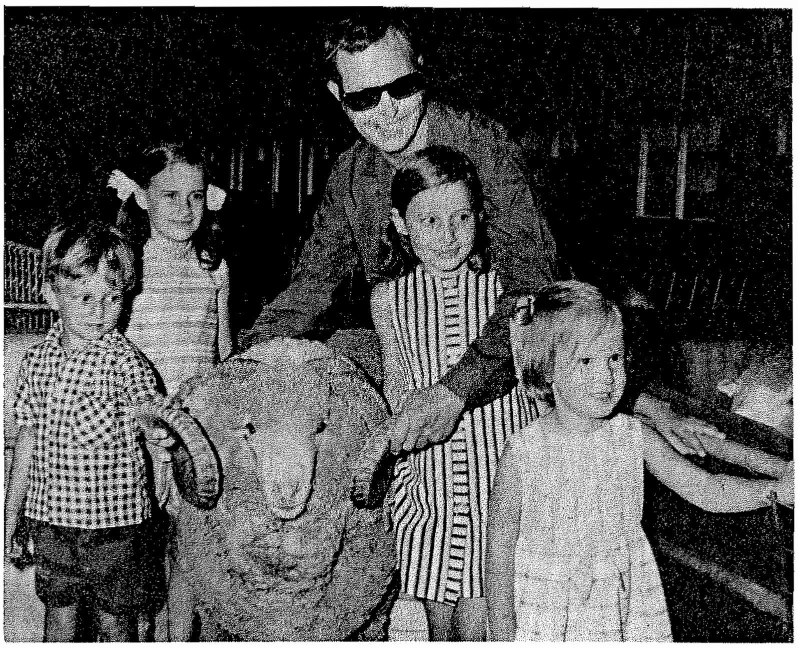
Ski Club Notes

The CSIR Ski Club will hold its annual beginners' night on Thursday, 21st May, at the Division of Protein Chemistry, 343 Royal Parade, at 7.45 p.m.

A panel of the Club's expert skiers will discuss skis, boots and equipment, skiing and the Club's lodges.

Used equipment will be offered for sale to members at this meeting.

The 1970 Skivoo will be held on Friday, 29th May, at Stoke House, Marine Parade, St. Kilda. Entree's at 8 p.m. begin the Club's final pre-skiing social activity. Casual dress, Smorgasbord dinner, BYO; booking through Divisional Representatives or Mrs. Wailes (92 8937). Tickets at $3.50 each.



The ram's name is George and he is a male model. As a change from parading with mannequins at Sydney Sheep Show fashion parades, George is now living it up in the Australian Pavilion at Expo 70. Before he left Australia he spent a holiday at the Ian Clunies Ross Animal Research Laboratory of the Division of Animal Physiology at Prospect. Bidding him a last fond farewell before his overseas voyage are Glen Collins, Alexandra Dagg, Ross Edols, Angela Dagg and Meredith Edols.

Community Aid Abroad

The Community Aid Abroad group in the Division of Textile Industry at Geelong has raised $925 towards the $3,500 target for the current project of the CAA groups in Head Office and the Divisions of Forest Products, Chemical Physics, and Textile Industry.

A total of $2,410 has so far been raised for the project—to help the Kubang Sepat Farmers' Association in Kelantan, Malaysia, establish a credit co-operative for farmers.

The Division of Textile Industry group has contributed $2,745 to Community Aid Abroad since the group was formed in 1965.

Yak-Yak

"Chauries have originated from Yaks (female is known as Nak) and Khirkoo and Jolung bulls on lower hill Zebu cattle. The female of Yak, which is commonly known as Nak, produces chauries when crossed with a bull locally known as Khirkoo and Jolung. Chauries are further subdivided into two types depending on different combinations of parents. Chauries obtained by crossing Nak (mother) with Jolung or Khirkoo bulls (father) is called as DIMJU and is supposed to be of a better quality than the one called URUNG which is obtained by crossing lower hill cows (Zebu cattle) with Yaks."

Zootecnica e Veterinaria (11-12, 281; 1969).

Deadline

Contributions to the June issue of Coresearch should reach the Editor at 314 Albert Street, East Melbourne, by Friday, 15th May.

NUPELA SIAMAN LONG CSIRO

"Wanpela lain man namba bilong ol i winim ol arapela lain i mekim dispela wok long saiens, ol i kolim CSIRO, longpela nem em i Kominwel Saientifik na Indastriel Risers Oganaisesin. Em bai i gat nupela siaman long mun Me 1970, nem bilong en, Dokta J. R. Price.

"Bajet bilong olgeta yia bilong CSIRO em i $49,000,000.

"Gavman bilong Australia i bin kirapim dispela wok bambai save na stadi bilong ol i ken helpim ol indastri long Australia.

"Ol indastri i tupela kain. Praimeri indastri em i olsem ol as bilong ol wok o bisnis. Ol man bilong planinm na kisim kain kain kaikai o prut samting, no ol man i painim gol o ain samting insait long graun, no ol man i katim ol diwai na i bringim long somil, of dispela kain wok bilong ol, ol i kolim praimeri indastri.

"Na kain namba tu ol i kolim sekondari indastri, em i olsem ol arapela wok ol i mekim bihain long namba wan wok, olsem wok bilong ol somil bilong katim ol plang.

"Ol man bilong planim na lukautim ol lain kokonas ol i wok long praimeri indastri, tasol ol husat i kisim wel long kopra, ol i wok long sekondari indastri."

That's how "Nius", a quarterly newsheet published in pidgin by the Department of External Territories for the people of Papua and New Guinea described the appointment of Dr. Price as Chairman of CSIRO.

Freely translated the item reads:

"CSIRO, the Commonwealth Scientific and Industrial Research Organization, is the foremost scientific research organization (in Australia).

"In May 1970 it will have a new Chairman, Dr. J. R. Price.

"CSIRO's annual budget is 49 million dollars, 49,000,000.

"The Australian Government has instituted this work to understand and study how it can help Australian industry.

"There are two kinds of industry. Primary industry is the basic industry. The production of fruit and other kinds of food, the mining of gold, iron and other minerals, the felling of trees and their transport to the mill are all examples of primary industry.

"The other kind, called secondary industry, follows in the wake of primary industry, for instance, the manufacture of products at the sawmill from forest timber.

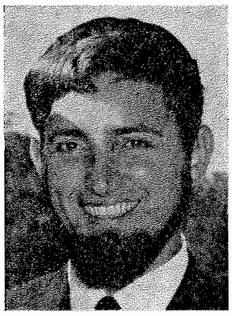
"The management and operation of coconut plantations is primary industry; the production of oil from copra is secondary industry."

Reprinted by courtesy of the Melbourne Sun.

New Appointees

Dr. D. E. Ayres has been appointed to the geochemistry section of the Division of Mineral Chemistry where he will carry out research on the mineralogy and petrology of ore-bearing and associated rocks. Dr. Ayres graduated M.Sc. from the University of Queensland in 1963. From 1961 to 1965 he worked as a mineralogist with the Australian Mineral Development Laboratories and since then he has been studying at the University of Wisconsin where he recently obtained his Ph.D.

Mr. W. C. Curnow has been appointed to the Building Section of Head Office to administer the Organization's building programme in Queensland, northern New South Wales and the Northern Territory. He will be stationed at the Brisbane Regional Administrative Office. Mr. Curnow graduated in architecture from the University of Queensland in 1966.



Mr. CURNOW

For the last eleven years he has been with the Commonwealth Department of Works in Queensland.

Dr. G. R. Cresswell has been appointed to the Division of Fisheries and Oceanography to carry out research in the field of physical oceanography. Dr. Cresswell graduated B.Sc. with honours from the University of Western Australia in 1958 and Ph.D. from the University of Alaska in 1968. From 1959 to 1962 he worked with the Australian Antarctic Division in Melbourne and Antarctica and from 1962 to 1968 at the University of Alaska. Since mid-1968 he has been an assistant professor at the University of Calgary, Canada.

Mr. P. S. Gee has joined the Division of Protein Chemistry to study the breakdown of proteins by oxidising agents and irradiation. Since graduating B.Sc. with honours from Monash University in 1966 Mr. Gee has been studying for his Ph.D. at that University.

Dr. P. H. Groenvelt has been appointed to the Division of Plant Industry to carry out research on the mechanics of swelling systems. Dr. Groenvelt graduated M.Sc. from the University of Wageningen, Holland, in 1963 and Ph.D. from the same university in 1969. Since 1966 he has been lecturing at Wageningen in soil physics.

Miss Christine Haseldine has joined the Division of Nutritional Biochemistry where she will study the functional role of selenium and certain vitamins in plant and animal tissues. Miss Haseldine graduated B.Sc. recently from the University of Adelaide.

Miss Nicola Horsfall has joined the microbiology unit of the Division of Animal Health and will work at the Long Pocket Laboratories, Brisbane. She will be responsible for the unit's routine virology, bacteriology, and serology. Since graduating B.Sc. from the University of Queensland in 1966, Miss Horsfall has been a microbiologist in the pathology department of the Prince of Wales Hospital, Randwick, New South Wales.

Mrs. Barbara Howlett has been appointed to the Division of Animal Health where she will carry out research in the fields of parasitology and immunology. Miss Howlett graduated B.Sc. with honours recently from the University of Melbourne.

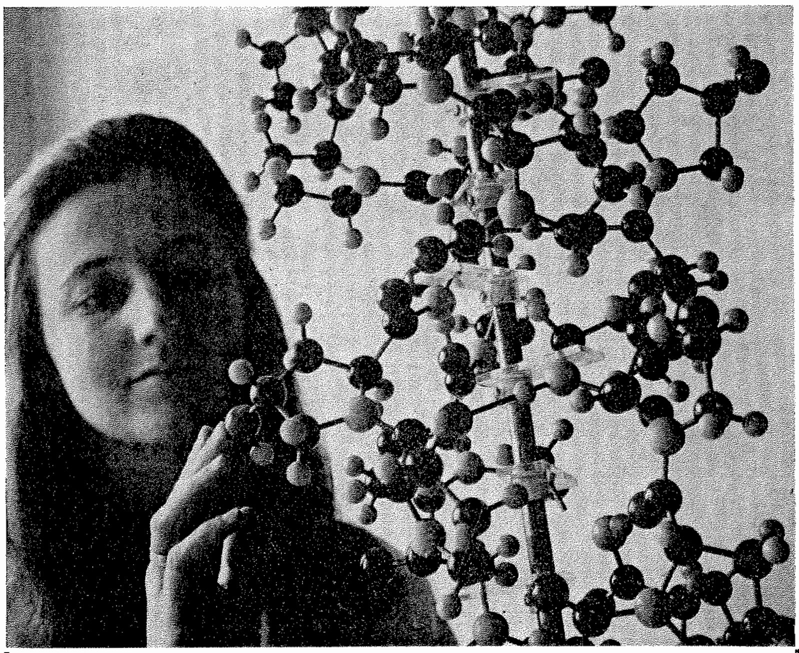
Mr. M. P. T. Linzey has joined the Division of Building Research to work on the development of computer programmes and techniques of systems analysis. Since graduating B.E. from Canterbury University in 1968, Mr. Linzey has been studying for his M.E. at Auckland University.

Dr. A. McKenzie has been appointed to the fuel chemistry section of the Division of Mineral Chemistry to study the reaction kinetics of gaseous hydroxyl radicals. Dr. McKenzie graduated M.Sc. from the University of Melbourne in 1965 and Ph.D. from the University of Cambridge in 1967. For the last two years he has been working at the National Centre for Atmospheric Research at Colorado.

Mr. T. J. Plowright has been appointed to the Division of Irrigation Research to study the movement of water through plants. Mr. Plowright graduated M.Sc. from the University of Adelaide last year.

Mrs. Anne Spinkston has joined the Division of Tropical Pastures to carry out research on the agronomy and breeding of legumes of the genus *Stylosanthes*. Mrs. Spinkston graduated B.Sc. from the University of Adelaide recently.

Mr. L. J. Wardle has been appointed to the Division of Soil Mechanics to develop computer programmes for predicting the behaviour of soil and rock masses. Mr. Wardle graduated B.Sc. with honours recently from Monash University.



Mention the word hair to the average young Australian female and she's likely to start humming "Age of Aquarius". But to Margaret Davis of the Division of Protein Chemistry the word has more cerebral connotations, which explains why you see her here lost in mute communion with a molecular model of keratin. Keratin, as everyone knows, is the protein out of which wool and hair are made.

New Ideas On Desalination

(Continued from page 2.)

In some ways, I suspect, these processes are related to what goes on in the polymer chains of rubber when the rubber is stretched and when it is heated. Heating stretched rubber develops a tension which causes it to contract.

There is much more to it than this, of course, but I hope I have given some idea of the basic principles involved. It is a thrilling adventure to be finding common ground between such seemingly diverse subjects as ion-exchange polymers, rubbers and biological membranes.

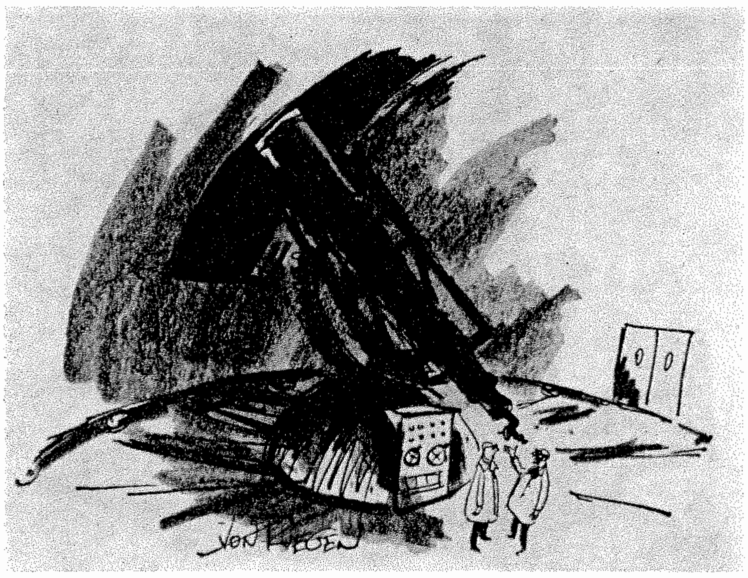
We are steadily moving in our technological desalination research in a direction which is becoming increasingly intermingled with biochemical thinking. In following this fascinating path of research the chemist, biochemist, and engineer work at exciting frontiers of knowledge — academic and applied investigations become inextricably intertwined.

But research knowledge alone is not enough.

It requires a team effort between management, engineers and scientists to translate laboratory data into national wealth.

For this, Australia needs to place greater emphasis on the difficult task of training scientists, engineers and management in the ways of applied research.

Above all, we need dedicated professionals eager to apply science and technology for the good of the nation and of mankind.



"Once I walk out of that door, I leave the universe behind me."

Courtesy "Saturday Review".

Form A Line

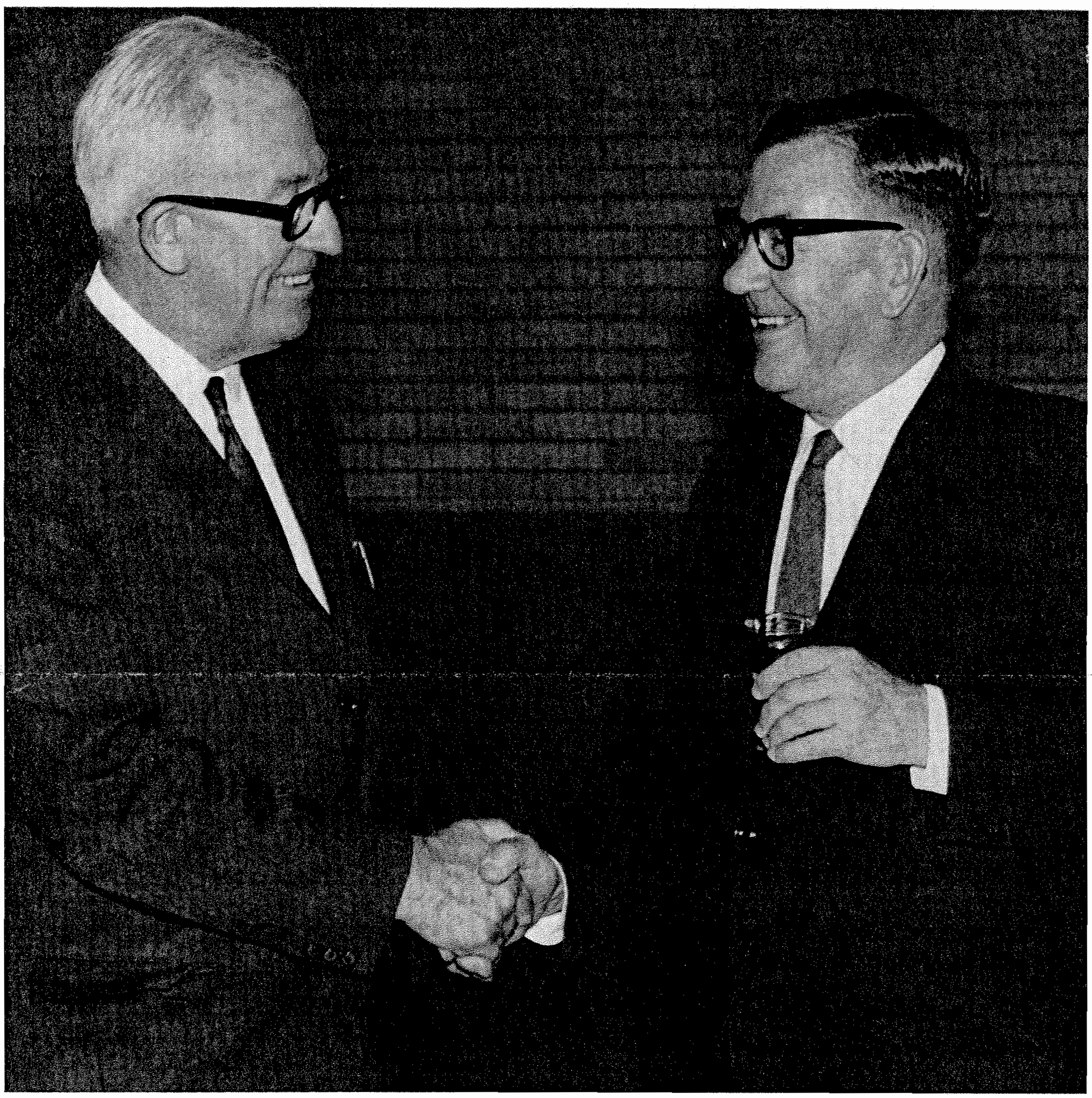
A poem penned by a member of the crew of H.M.A.S. Diamantina following a recent oceanographic cruise during which the Division of Fisheries and Oceanography studied the larval distribution of the Western Australian rock lobster.

I watched them cast their nets down aft,
And grinned a lecher's grin.
As I drank the last of Ginger-Beer,
And tossed away the tin.
I'd checked the wind and wave before,
And watched the tidal run
That took my can into the net
Like a bullet from a gun.
It mingled with the other stuff,
The bottles and the gash;
With salps and crays and mantis-shrimps,
The bangers and the mash.
The bridled tow was straining hard
The tow wire was bar taut.
Said Dave, "We've got a haul tonight,
I wonder what we've caught".
"Prob'ly only sailors' junk,"
Said Cliff with knowing leer.
"I've seen them do this many times,
Every flamin' year."
And when the nets were on the deck,
The garbage scattered wide,
Cliff picked among the refuse heaps
To see where crays might hide.
Euphausids, salps, brown-mullet too,
Were in the catch that night
But mixed with bottles, spuds and stew
They make a frightful sight.
So even science can be fun
And keep us young in heart.
Like when they signal, "CAST YOUR NETS".
The garbage ditching starts.

Mulga Blue.

CORESEARCH

FOR CIRCULATION AMONG MEMBERS OF CSIRO STAFF — NUMBER 135, MELBOURNE, JUNE 1970



SIR FREDERICK SAYS GOODBYE

In August, 1959, Coresearch Number 5, carried the news of the appointment of Sir Frederick White as Chairman of CSIRO. Now, nearly 11 years later, we carry the story of his retirement and of the appointment of his successor, Dr. J. R. Price.

Last month Sir Frederick left for overseas where he will lead the Australian delegation to the Commonwealth Agricultural Bureaux Review Conference. Before he went he gave the following message to Coresearch for all members of staff.

"I retire from CSIRO with a profound admiration for our institution in which so many of our fellow-Australians seem to place so much confidence. CSIRO is respected in the world of science for its contributions to knowledge; it is highly regarded by the Australian community for its part in setting the scene for industrial and agricultural progress.

"There is much evidence to support this statement. The achievements of our scientific and technical colleagues have frequently received the accolade of an award of merit from universities and academies in Australia and overseas. The attention paid to our research results that promote the development of this country is clear and obvious.

"I have spoken of our scientific work first for the reason that this is the prime purpose of our activity. However, the credit for the achievements in the scientific realm can certainly be shared by every member of the staff. It has always been encouraging to see how all of those whose work supports the research programme share the satisfaction when success comes the way of their Division and of the Organization generally.

"Everyone's contribution is important. This, I believe, has led to the shaping of all the complex processes of support and administration to a common objective: the success of CSIRO research.

"Each and every group in our organization has achieved a high standard of skill and integrity and each in its own field has been adventurous and forward-looking in its achievements. Our administration in particular has retained that remarkable flexibility so necessary to the success of a scientific institution.

"I don't believe that I exaggerate when I say that one has the feeling of belonging to an organization that is vital in its outlook and dynamic in its activities.

"Despite the size of CSIRO, informality has been a characteristic which has made for effective achievement and a pleasant working environment. Many visitors to Australia and other observers have commented favourably from time to time upon the friendliness they have experienced amongst the scientific and supporting staff. This is no small achievement in an institution that is one of the large research organizations of the world.

"All of these attributes have arisen from the friendly and skilled co-operation that is the hallmark of the staff of CSIRO. I thank each of you for your part in this."

Sir Frederick Retires

Sir Frederick White, K.B.E., Ph.D., F.A.A., F.R.S., retired from CSIRO on 25th May after nearly eleven years as its Chairman. During the last few weeks, Sir Frederick has been farewelled at a number of informal functions by his friends and colleagues throughout the Organization. Among the mementoes he was given were an album of photographs, culled from throughout CSIRO and put together by Mr. Eric Smith of the Division of Animal Health, and an album of autographs of CSIRO staff.

Sir Frederick was born on May 16th, 1905, in New Zealand, and was educated at the Victoria University College, Wellington. He graduated B.Sc. 1927, and M.Sc. (with first class honours) in 1928. In 1929 he won a postgraduate scholarship which took him to St. John's College at Cambridge. He worked in the Cavendish Laboratory under the late Lord Rutherford, and was awarded his doctorate in 1932.

From Cambridge, Sir Frederick went to Kings College, London, where he served as a lecturer in physics in Sir Edward Appleton's Department. During this period he carried on research in various aspects of radio propagation, and published a text book on Electromagnetic Waves.

In 1937 he was appointed Professor of Physics at Canterbury University College in New Zealand. In New Zealand he took a leading part in the establishment of the Research Laboratory of the British Empire Cancer Campaign Society.

In 1941 Sir Frederick was given leave by his University to assist C.S.I.R. in the organization of its Radiophysics Laboratory in Sydney, and in 1942 he was appointed Chief of the Division of Radiophysics. In 1945 Sir Frederick resigned his professorship and joined the Head Office staff of C.S.I.R. as Assistant Executive Officer. He was appointed a member of the Executive Committee of the Council in 1946.

When the Council was reconstituted as CSIRO in 1949 he was made a Member of the Executive and in 1957 he became Deputy Chairman. He was appointed Chairman of CSIRO in 1959 following the death of Sir Ian Clunies Ross.

Sir Frederick has been the recipient of many high honours. He was elected a Fellow of the Australian Academy of Science in 1960 and of the Royal Society in 1966. In 1962 he was created a Knight Commander of the Order of the British Empire. Last year he received the honorary degree of Doctor of Science from the Australian National University and Monash University and was elected to the newly created position of Chairman of ANZAAS.

The following tribute to Sir Frederick by one of his colleagues expresses the feelings which Sir Frederick's many friends throughout CSIRO hold for him.

"When the time comes for the history of Australian science in the 1960's to be documented, the names of CSIRO and Sir Frederick White will be linked in honourable mention. But there is another story to be told. A story just as important, but less likely to be featured by the official historian. This is Sir Frederick as a man, the sum total of his natural ability, his human emotions and his social motivation.

"It was the good fortune of a few of us to be close to the scene and to see the interplay between the official and the personal: the Chairman of CSIRO and Fred White, the man. The manner in which these qualities are balanced in a man is perhaps a true measure of his real stature.

"I am sure that his many CSIRO friends would like the opportunity to express their personal thanks for the way in which this balance was kept. We should like to say thanks for not blowing up when a good intention foundered on a rock of petty stature. Thanks for the leaven of human kindness when having to make an unpopular decision. Thanks for keeping quiet at those times when to speak would have been unkind. Thanks for seeking out the best side in a man first. Thanks for being cheery in the face of circumstances which turned others to pessimism. Thanks for not being a prima donna. Thanks, Sir Frederick, for being Fred White."

At its meeting in Canberra last month the Advisory Council recorded its appreciation of Sir Frederick in the following words:

"This Advisory Council records its deep appreciation of the excellent work of the Chairman Sir Frederick White both as a scientist and as an administrator. It recognises and records with pride that by his ability and his outstanding personal qualities of courage, patience and humility he not only has gained an international reputation supported by high awards but has been responsible in no small measure for the steady development of CSIRO and the high regard in which CSIRO is held by the Government, by Industry and by the Public in general. It now wishes him a long, happy and fruitful retirement."

Dr Price Takes Over

Dr. J. R. Price became Chairman of CSIRO last month following the retirement of Sir Frederick White. Dr. Price, whose appointment as successor to Sir Frederick was announced last July, has been a Member of the Executive since 1966.

He graduated B.Sc. with honours from the University of Adelaide in 1933 and M.Sc. from the same university in 1935. He then left for Britain where he worked at Oxford University under Professor Sir Robert Robertson. After graduating D.Phil. he became Head of the Chemistry Section at the John Innes Horticultural Institution in 1937. When war broke out he transferred to the Ministry of Supply and worked on propellants and explosives.

In 1945 he returned to Australia and joined the C.S.I.R. Division of Industrial Chemistry. He was appointed Officer-in-Charge of the Organic Chemistry Section in 1960 and in 1961 the Section became a Division with Dr. Price as its Chief.

Dr. Price was awarded the degree of Doctor of Science by the University of Adelaide in 1954, the H. G. Smith Memorial Medal of the Royal Australian Chemical Institute in 1956, and the Leighton Memorial Medal in 1969. He was elected a Fellow of the Australian Academy of Science in 1959.

Dr. Price has been extremely active in the affairs of the Royal Australian Chemical Institute. He was President of the Victorian Branch in 1959 and Federal President from 1962 to 1964. Last year he served as Chairman of the Organizing Committee for the XXIInd Congress of IUPAC which was held in Sydney.

New Executive Member

Mr. V. D. Burgmann has been appointed to the Executive. He has been an Associate Member since March, 1969.

A graduate in science and electrical engineering from the University of Sydney, Mr. Burgmann joined the Division of Radiophysics in 1939 to work on radar. During the war he spent some time as liaison officer in London and Washington, where he was responsible for collecting information for Australia on developments in radar research. He also spent a period at the Radiation Laboratory of the Massachusetts Institute of Technology.

After the war Mr. Burgmann led a research team which developed navigation aids for civil aviation. The team's main achievement was Distance Measuring Equipment, which is now a standard installation on all domestic airlines. Mr. Burgmann shared the 1951 Bronze Medal of the Institute of Navigation in Britain for a paper entitled "An Investigation into Air Traffic Control by a Simulation Method".

In 1949 he became Officer-in-Charge of the Physics and Engineering Unit of the newly formed Wool Textile Research Laboratories. The Unit became the Division of Textile Physics in 1958 with Mr. Burgmann as its Chief.

ACADEMY FELLOWS

Mr. W. C. Swinbank of the Division of Meteorological Physics and Dr. G. K. White of the Division of Physics have been elected Fellows of the Australian Academy of Science.

Mr. Swinbank's research has led to a deeper understanding of the development of turbulence in the lower layers of the atmosphere and of the transfer of heat, water vapour and momentum between the earth and the atmosphere.

Mr SWINBANK

His work has also contributed to fundamental knowledge of such phenomena as fog formation and evaporation from natural surfaces.

Dr. White has made important experimental contributions to knowledge of the transport properties, thermal capacities and thermal expansion of solids.

Dr WHITE

His monograph on experimental techniques in low temperature physics is the standard reference work in this field.

His work has also contributed significantly to fundamental knowledge of superconduction, paramagnetism, and free electron contribution to thermal expansion.

President

Mr. E. E. Bond, Director of the Bread Research Institute and Officer-in-Charge of the Wheat Research Unit, has been elected the first Australian President of the International Association for Cereal Chemistry.

Mr. Bond was installed as President at the 5th World Cereal and Bread Congress in Dresden, East Germany, last month.

Mr BOND

The International Association for Cereal Chemistry comprises representatives of professional organizations, associations, and institutions throughout the world.

It is concerned with various aspects of cereal research, particularly methods used for the evaluation of cereals and cereal products.

SAFETY NOTES

A popular myth-conception

When visiting laboratories a topic that is frequently raised is accident proneness. There appears to be a widespread belief that certain personality types are, through no apparent fault of their own, predisposed towards having repeated accidents.

In any particular year there will always be a small number of people who have an above average number of accidents.

If these people were in fact accident prone one would expect their high accident rate to continue in following years. Removal of these people from the work force should, therefore, lead to a subsequent overall decrease in accident rates in the rest of the population.

Research overseas has shown that this is not so.

In South Africa, for example, one research worker studied accidents to railway shunters over a three year period. In the first year he removed the 10 percent with the highest accident rate and considered the other 90 percent over the three year period. He found that the accident rate in this group went up instead of down as would have been expected from removing the "accident prone" 10 percent.

Then again an American doctor studied 35,000 accident cases during his lifetime and found that there was no instance in which a person repeatedly had accidents over the years. In short periods of time some people did have more accidents than might be expected but in the long term they had no more accidents than "normal" people

There are many other examples which could be quoted to show that there is no single type of safe or unsafe individual. Rather, each individual has a range of behaviour, any part of which may be safe or unsafe depending on the hazards to which he is exposed.

The concept of accident proneness serves only to obscure the fact that every accident has a precise cause although the cause may not always be easy to discover.

For example there are many cases where the cause of repeated accidents has been traced to the onset of deafness resulting from exposure to high noise levels.

So let's forget about "accident proneness" and concentrate on finding out the real causes of accidents and doing something about them.

L. C. R. Thompson, Safety Officer.

News In Brief

Doctorate

Dr. A. Walsh, Assistant Chief of the Division of Chemical Physics, has been awarded the honorary degree of Doctor of Science by the University of Melbourne.

Assistant Chief

Dr. E. F. Henzell has been appointed Assistant Chief of the Division of Tropical Pastures.

Masters

Mr. R. S. P. Coutts of the Division of Applied Chemistry has been awarded the degree of Master of Science by La Trobe University.

Mr. J. M. George of the Division of Animal Physiology has been awarded the degree of Master of Rural Science by the University of New England.

ECAFE Assignment

Dr. H. G. Higgins, Officer-in-Charge of the Paper Science Section of the Division of Forest Products, left recently for a two months tour of South-East Asia as Regional Co-ordinator for Research in Pulp, Paper and Cellulose Products for ECAFE.

His task is to review the scope for possible co-operation between member countries of ECAFE in research on the production of pulp, paper and other cellulose products from forest products, and if appropriate to set up a regional project or projects in this field.

Flume Inaugurated

One of the last official functions performed by **Sir Frederick White** as Chairman of CSIRO was the inauguration of a flume at the Australian National University's Department of Geology last April.

The flume was constructed for the Division of Soils and the Geology Department of the Australian National University for both research and teaching.

The tiltable glass-walled flume is 30 feet long, 3 feet deep and 3 feet wide, and will be used mainly to investigate erosion and formation of sediments by currents at discharges up to 6 cusecs.

This structure is mounted over a large trough which runs almost the entire length of the flume laboratory. The trough, when the flume is in use, serves as a sediment trap, and also allows the measurement of discharge over a v-notch weir.

The flume can also be moved aside and the trough then becomes available on its own for investigating problems such as erosion on slopes, the combined effects of waves and currents, and the development of river meanders.

The recirculating water supply is drawn from a large balance tank located underground and outside the building. From here water is pumped to the head tank of the flume. The flow discharged from the flume passes back along the trough over the v-notch weir and from there runs gravitationally back into the balance tank.

One of the first things to be studied closely with the flume will be the transportation of detritus by very shallow flows.

CSIR Ski Club Notes

At both the Club's ski lodges, at Mt. Buller 145 miles from Melbourne and at Falls Creek, 250 miles, all is ready for the 1970 skiing season to begin. The official opening of the season is the Queen's Birthday week-end and both lodges are heavily booked.

Two beginners' week-ends will be held at Mt. Buller, 20th and 21st June and 27th and 28th June, and skiing instruction will be given by the Club's experts.

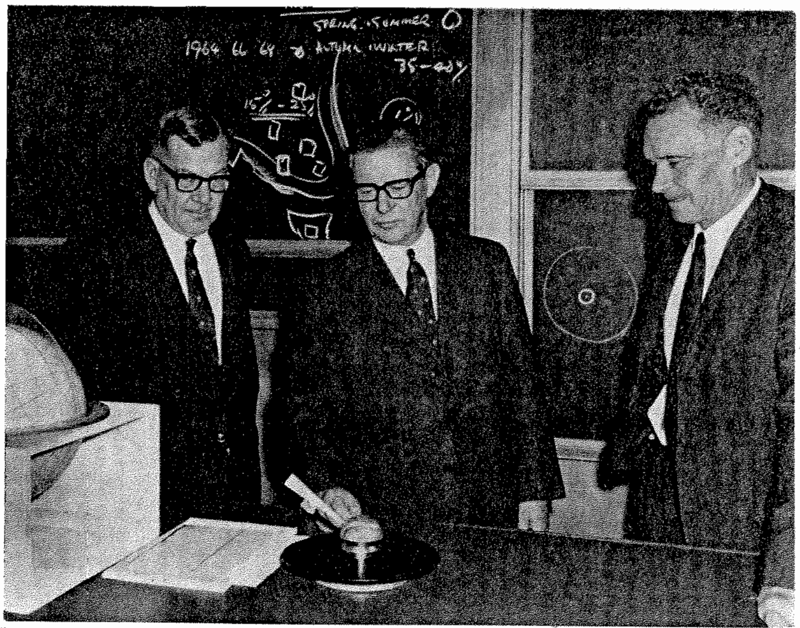
Mr. Bob Hughan has resigned and the new secretary is **Mr. Alan Dann,** 120 Gilbert Road, Preston, 3072 (phone 480-2135).

Surplus Talent

When listing Public Service promotions the Commonwealth Gazette includes the qualifications required of the successful appointee in his new post.

According to the Gazette of 30th April, among the qualifications required of one recently elevated officer was *"excessive ability of a high order"*.

The first annual conference of the International Solar Energy Society to be held outside the United States was held in Melbourne last March. Dr. R. N. Morse, Chief of the Division of Mechanical Engineering, is President of the Society. Half of the 150 people who attended were from overseas and some 25 countries were represented. After the conference delegates took part in an extensive programme of tours, visits, and discussions. Our picture shows a group of delegates inspecting a solar still at the Division of Mechanical Engineering.



The Minister for Education and Science, Mr. Nigel Bowen, visited the Division of Radiophysics last April to see something of the Division's research activities. The Chief of the Division, Dr. E. G. Bowen (right), is seen here explaining to the Minister and Dr. J. R. Price how a pulsar emits radio waves in a cone-shaped beam as it rotates.

Quotes for the Month

"Half the modern drugs could well be thrown out the window, except that birds might eat them."

Martin Henry Fischer.

"The Socratic manner is not a game at which two can play."

Hilaire Belloc.

"Never lend books for no one ever returns them; the only books I have in my library are books that other people have lent me."

Anatole France.

Deadline

Contributions to the July issue of Coresearch should reach the Editor at 314 Albert Street, East Melbourne, by Monday, 15th June.

POSITIONS VACANT

The following vacancies for professional appointments are current:

PROGRAMMER (SSO 2/3)—Division of Radiophysics—790/40 (5/6/70).

PARASITOLOGIST (ECTOPARASITES) (EO 1/2)—Division of Animal Health—202/354 (5/6/70).

BIOCHEMIST (EO 1/2)—Division of Food Preservation—308/14 (5/6/70).

ECOLOGIST (REGROWTH INVESTIGATIONS) (RS/SRS)—Division of Plant Industry—132/186 (5/6/70).

PASTURE ECOLOGIST (RS/SRS)—Division of Tropical Pastures—850/349 (5/6/70).

LEADER, PHYSICS AND ENGINEERING SECTION (SRS/PRS)—Division of Food Preservation—300/512 (5/6/70).

SYSTEMS ENGINEER (EO 1/2)—Division of Building Research—390/431 (12/6/70).

SCIENTIFIC SERVICES OFFICER (SSO 1/2)—Commonwealth Meteorology Research Centre—424/7 (12/6/70).

LIBRARIAN (LIBRARIAN 1/2)—Division of Animal Health—201/363 (19/6/70).

CHEMIST (EO 1/2)—Division of Mineral Chemistry—601/120 (19/6/70).

MINERALOGIST (EO 1/2)—Division of Mineral Chemistry—601/121 (19/6/70).

ANALYTICAL CHEMIST (EO 1/2)—Division of Mineral Chemistry—601/122 (19/6/70).

EXPERIMENTAL PATHOLOGIST OR BACTERIOLOGIST (RS/SRS)—Division of Animal Health—202/340 (3/7/70).

REPRODUCTIVE PHYSIOLOGIST (RS/SRS)—Division of Animal Physiology—245/472 (3/7/70).

"He was expelled from a think tank for guessing."

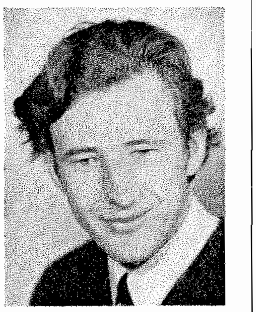
Courtesy "Saturday Review".

APPOINTMENTS TO STAFF

Mr. R. J. Akhurst has been appointed to the Division of Entomology to carry out research on nematodes associated with the Sirex wasp and its parasites. Mr. Akhurst graduated B.Sc. with honours from the University of Sydney last year.

Mr. D. J. Best has joined the Division of Mathematical Statistics to assist with statistical aspects of the research programme at the Division of Food Preservation. Since graduating B.Sc. with honours from the University of Sydney in 1967 Mr. Best has been with the Commonwealth Bureau of Meteorology.

Mr. D. F. Callen has joined the Division of Plant Industry and will study the role of induced mutations in plant im-



Mr. CALLEN

provement. Mr. Callen graduated B.Sc. with honours from the University of Adelaide in 1968 and since then has been a programmer with the Commonwealth Treasury.

Dr. R. J. Blagrove has been appointed to the Division of Protein Chemistry to work on the mechanism of recently developed wool dyeing processes. Dr. Blagrove graduated B.Sc. with honours from the University of Adelaide in 1965 and Ph.D. from the same university in 1968. Since then he has been carrying out research at the Radcliffe Infirmary, Oxford, on a CSIRO studentship.

Dr. P. Detchon has joined the Division of Horticultural Research to investigate nucleic acid metabolism in fruit. Dr. Detchon graduated B.Sc. from

Dr. DETCHON

the University of London in 1966 and Ph.D. recently from Sheffield University.

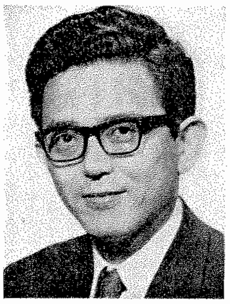
Mr. I. A. Campbell has been appointed to the Upper Atmosphere Section to undertake laboratory studies of collisions between charged and neutral particles in the gas phase. Mr. Campbell obtained his Diploma of Aeronautical Engineering from the Royal Melbourne Institute of Technology in 1967. Since 1962 he has been with the Aeronautical Research Laboratories of the Department of Supply.

Dr. B. F. Green has been appointed to the Division of Wildlife Research to carry out physiological research in dingoes with particular emphasis on water metabolism, reproduction, and the role of smell in dingo behaviour. Dr. Green graduated B.Sc. with honours from the University of London in 1963 and Ph.D. from the University of Adelaide in 1969.

Mr. J. P. McNamara has joined the Division of Food Preservation to study the application of direct gas heating to food processing operations. Mr. McNamara graduated B.Sc. with honours from the University of New South Wales in 1962 and has worked as a chemical engineer in Britain, Canada, and Australia, mainly in the paper and oil industries.

Mr. W. J. Muller has been appointed to the Division of Mathematical Statistics and will take part in the Division's research programme. Mr. Muller graduated B.Sc. with honours last year from the University of Sydney.

Dr. H. Sasaki has been appointed to the Division of Forest Products to undertake a study of stress distribution in glue lines in laminated wood construction. Dr. Sasaki graduated Bachelor of Agriculture at Kyoto University in 1955

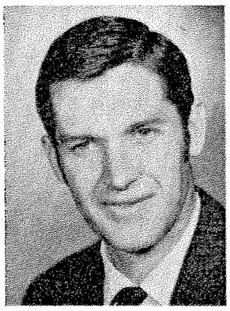


Dr. SASAKI

and Doctor of Agriculture at the same University in 1966. Since 1955 Dr. Sasaki has been working at the university's Wood Research Institute where he holds the position of Associate Professor in the Division of Composite Wood.

Dr. I. M. Russell has joined the Division of Textile Industry to investigate the synthesis of compounds capable of reacting with wool for improved effects on the fibre. Dr. Russell graduated B.Sc. with honours from the University of Melbourne in 1965 and recently obtained his Ph.D. from the same university.

Dr. R. C. Shearer has joined the Division of Plant Industry to study the physics of water movement and solute transfer processes in saturated and unsaturated porous media and soils. Dr. Shearer graduated B.Ag.Sc. from the University of Adelaide in 1958, M.Ag.Sc. in



Dr. SHEARER

1964 and Ph.D. in 1968. From 1959 to 1962 Dr. Shearer worked as a soil conservation officer in the South Australian Department of Agriculture and since 1968 he has been a postdoctoral fellow in the Department of Soils and Plant Nutrition at the University of California.

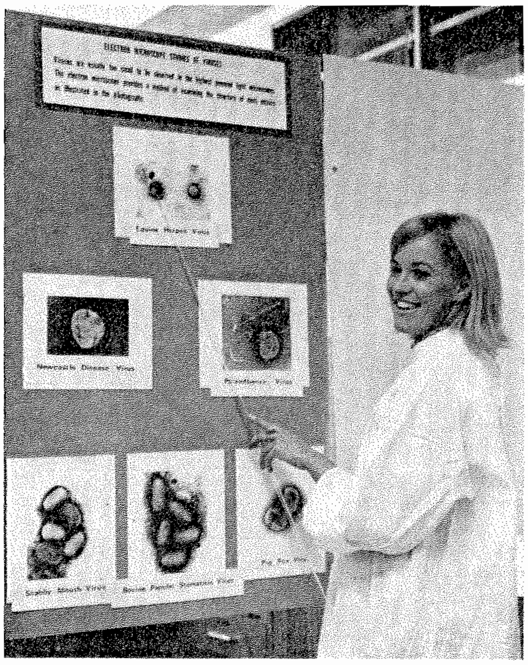
Mr. G. T. Smith has been appointed to the Division of Wildlife Research to study vocalization in birds. Mr. Smith graduated B.Sc. with honours from the Australian National University in 1964. Since 1965 he has been a biologist with the Antarctic Division of the Department of External Affairs and has been working for his Ph.D. at the Australian National University.

Miss Carolyn Symmons has been appointed to the Division of Food Preservation to investigate taint in mullet. Miss Symmons graduated B.Sc. from the University of London in 1967. Before coming to Australia last November she worked at Westminster Hospital and in the Nutrition Department of Ranks, Hovis, McDougall Ltd.

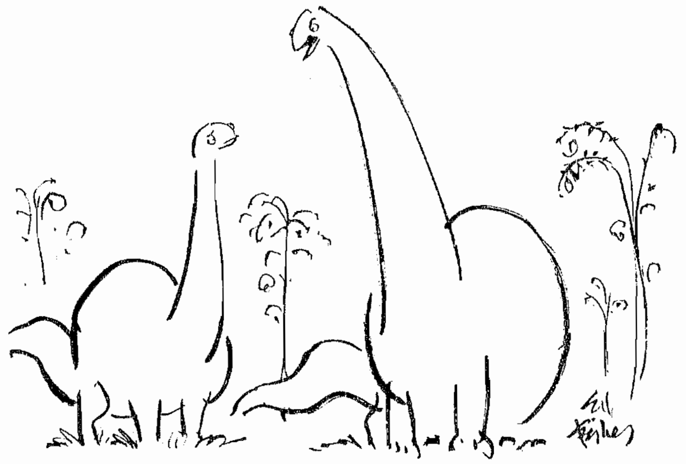
Mr. G. J. Thornton has been appointed to the Division of Chemical Engineering where he will be responsible for the day to day running of the Division's simulation laboratory. Since obtaining his Diploma of Electronics Engineering from the Royal Melbourne Institute of Technology in 1964, Mr. Thornton has been with the Government Aircraft Factories and the Aeronautical Research Laboratories of the Department of Supply.

Dr. M. Wong has been appointed to the Division of Animal Physiology to investigate the metabolism of oestrogens and phyto-oestrogens. Dr. Wong graduated B.Sc. with honours from the University of New South Wales in 1966 and Ph.D. from the same university in 1969.

Miss Penny Woollard has joined the Division of Wildlife Research to study the biology of game animals and animals exploited by man. Miss Woollard graduated B.Sc. from the Australian National University last year.



If you have ever had trouble telling the difference between scabby mouth virus and pig pox virus, then Jill Parkin at the Long Pocket Laboratories of the Division of Animal Health is just the girl to set you right.



"Look kid, we're aware of the problems besetting our society. We're working on them."

Courtesy "Saturday Review".

Amateurs Build Satellite

Australian amateur radio enthusiasts are designing and building part of a communications satellite expected to be launched by an American rocket about the middle of next year.

Thousands of amateur radio operators around the world are expected to use the satellite to talk to one another over distances up to 4000 miles.

Amateurs in Australia and West Germany are building separate electronics systems for the satellite, and American amateurs will package and power it.

The Australian group will provide all the command and telemetry electronics. These consist of a 35 channel digital command system and a 60 channel telemetry facility.

The telemetry information will be transmitted as a 45.5 baud teletype signal providing direct read-out of data by ground stations.

Australian participation follows the successful launching and tracking early this year of the all-Australian amateur satellite Australis-Oscar 5.

The manager of the Australian section of the new project, Mr. G. L. Jenkins of the Division of Mechanical Engineering, said the new satellite would be much more advanced than Australis-Oscar 5.

In many respects it is more complex than Telstar, the first American communications satellite.

He said the Australian section was expected to cost about $5000 and would be ready by Christmas.

The satellite's two electronics packages, which would operate separately, would be able to pick up and retransmit signals from low-powered amateur transmitters.

Directional and steerable aerials would be needed to receive transmissions, but hundreds of enthusiasts in Australia and thousands around the world would have this equipment and be able to use the satellite.

Printed by CSIRO, Melbourne

136##1970

CORESEARCH

FOR CIRCULATION AMONG MEMBERS OF CSIRO STAFF — NUMBER 136, MELBOURNE, JULY 1970

Credit Society Offers Investors New Deal

In a move to stimulate further investment in the CSIRO Co-operative Credit Society, its Directors have decided to raise the rate of interest on money deposited with the Society.

However, the interest rate on loans from the Society remains unchanged.

The new interest rates, which came into operation on 1st June, are as follows:

- For amounts deposited by fortnightly deductions from salary — 6%.
- For fixed amounts deposited for 12 months or less — 6%.
- For fixed amounts deposited for more than 12 months — 6½%.
- For fixed amounts deposited for more than 5 years — 7%.

Thus, the interest rate for money deposited for more than 12 months is increased to 6½% p.a. Money in this category already on deposit with the Society will automatically qualify for the increased rate.

In addition, money may now be placed on deposit for more than 5 years and earn interest at the rate of 7% p.a.

However, the Directors would like to point out that those current depositors who wish to have their money placed in this latter category must elect to do so in writing, as interest at the higher rate only applies from the date of election.

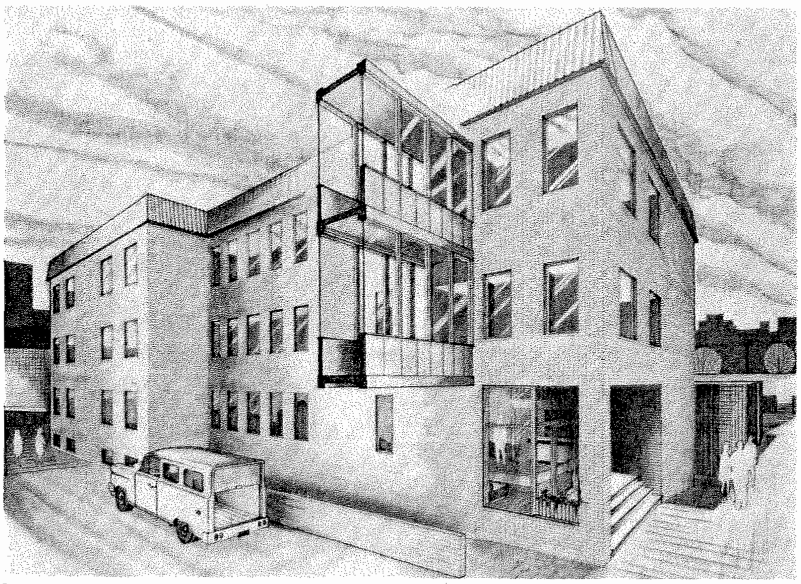
For amounts which are placed on deposit for periods of 12 months or less the interest rate is 6% p.a.

It should be noted that for those who are now having regular amounts deducted from their fortnightly salary for deposit with the Society, the interest rate of 6% p.a. is paid from the date of the first deduction.

However, after such deductions from the salary have been made for a period of 6 months, the accumulated amount, or portion thereof, may be placed on deposit for a longer period.

The depositor must complete a "Request for Acceptance of Deposit" form to effect this transfer, and interest at the rate of 6½% or 7% p.a., according to the term of the deposit, will be paid from the date the money is transferred.

These forms are available from the Manager, CSIRO Co-operative Credit Society, 314 Albert Street, East Melbourne, or from the Divisional Administrative Officers throughout the Organization.



Work will begin shortly at Parkville, Melbourne, on a new building to provide office and laboratory accommodation for the Division of Animal Health and to house the Division's library and canteen. This will enable the existing building to be used wholly for laboratory accommodation. The new building will be a composite structure of load-bearing brickwork and steel frame. It was designed by the Victorian Office of the Commonwealth Department of Works and is expected to cost about $470,000. The two upper floors will be linked by a bridge to the existing building.

POSITIONS VACANT

The following vacancies for professional appointments are current:

EXPERIMENTAL OFFICER (EO1/2) — Division of Applied Physics — 750/465 (10/7/70).

EXPERIMENTAL OFFICER (EO1/2) — Division of Computing Research — 900/158 (10/7/70).

EXPERIMENTAL OFFICER (EO1/2) — Division of Entomology — 186/3 (17/7/70).

POSTDOCTORAL FELLOWSHIP IN FLUID STATE PHYSICS — Division of Physics — 770/407 (31/7/70).

RESEARCH SCIENTIST (COTTON RESEARCH) (RS) — Division of Textile Industry — 464/485 (31/7/70).

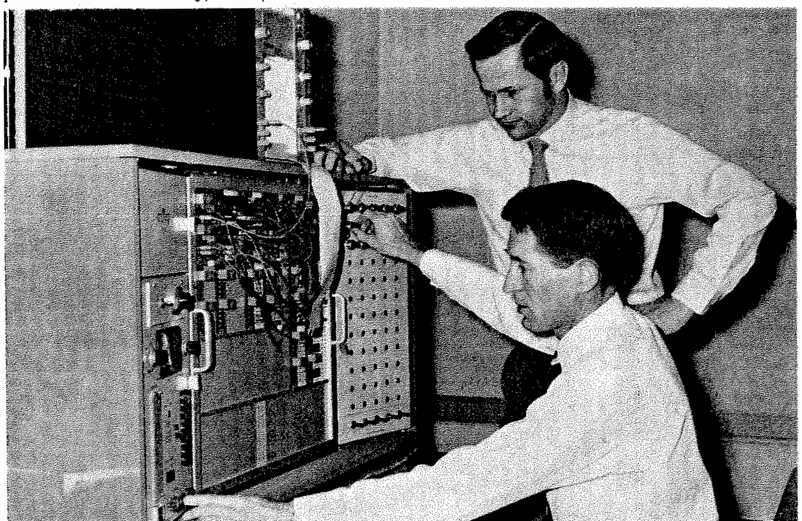
PLANT GENETICIST (RS) — Division of Tropical Pastures — — 850/345 (31/7/70).

RESEARCH ENGINEER (PRS) — Division of Mechanical Engineering — 430/288 (31/7/70).

POSTDOCTORAL RESEARCH FELLOW (RS/SRS) — Division of Chemical Engineering — 608/120 (7/8/70).

MOLECULAR BIOLOGIST (RS/SRS/PRS) — Division of Animal Health — 201/361 (7/8/70).

POLYMER CHEMIST (RS/SRS) — Division of Applied Chemistry — 586/95 (14/8/70).



Professor G. M. Van Dyne (standing) watches Mr. Peter Benyon of the Division of Computing Research operating an analogue computer during an intensive three week course on biological systems analysis and simulation at the Division of Computing Research last May. Professor Van Dyne, who is Professor of Biology at the Colorado State University and Director of the United States IBP Grasslands Biome Program, conducted the course which was arranged by the Divisions of Land Research and Plant Industry and the Rangelands Research Unit. The course was attended by 30 scientists from nine CSIRO Divisions as well as by representatives from universities and from several Commonwealth and State Government Departments.

UNIVERSITY APPOINTMENT

Dr. J. B. Langridge, Assistant Chief of the Division of Plant Industry, has been appointed Professor and Head of the Department of Genetics in the Research School of Biological Sciences at the Australian National University.

Under special arrangements between the two institutions, Professor Langridge will continue to be a staff member of CSIRO, dividing his time so that he develop his present work in genetics at the University while continuing his research interests in CSIRO.

Dr LANGRIDGE

Professor D. G. Catcheside, who established the Department in 1967, will continue his work there but, as Director of the Research School, he has found it difficult to give the necessary time to the wider interests of the Department.

Commenting on Professor Langridge's appointment, he said "The cooperation rendered possible between University and CSIRO interests in genetics should be extremely fruitful.

"Professor Langridge is distinguished for his contribution to the knowledge of the biochemical genetics of bacteria and flowering plants. His research has been characterized by an ingenious combination of genetics with biochemical techniques."

Research Award

Dr. T. G. Wood of the Division of Soils has been awarded a grant by the Royal Society of South Australia to enable him to study type specimens of raphignathoid mites in the Berlese collection in Florence.

SAFETY NOTES

Disposal Sale — Damaged Goods

1. One right eye — damaged by splash of hot solder.
2. One right eye — damaged by corundum chip from grinding wheel.
3. Two eyes — matched pair — damaged by welding flash.
4. One left eye — damaged by acid splash.
5. Two eyes — matched pair — damaged by chemical explosion.
6. One pair safety spectacles — one lens shattered by exploding glass apparatus.
7. One pair safety spectacles — one lens shattered by broken drill bit.
8. Two factured toes — damaged by falling tow-bar.
9. Crushed foot — damaged by falling object.
10. Two pairs safety boots — as new except for damaged leather toe caps caused by falling objects.
11. Two vehicles — badly damaged in accidents.
12. Two safety belts — successfully used in above vehicles.

Into which disposal category do you fall? The choice is yours — make it an intelligent one.

J. W. Hallam, Safety Officer.

5(COR)

THE MYTHOLOGY OF SCIENCE

If there be some special heaven reserved for historians, or even perhaps some deliciously appropriate hell, I suppose it would be a place full of broken idols. It would be a place where material evidence would be readily available to prove beyond all reasonable doubt that every popular story was false. Paul Revere did not ride at midnight, Washington had no cherry tree and Hannibal no elephants, Nero never fiddled, and the stories you are liable to read in the Bible would all be necessarily false.

by Professor Derek J. de SOLLA PRICE

Professor Price is Avalon Professor of the History of Science at Yale University. He is well known for his books "Science Since Babylon", "Little Science, Big Science" and "Science of Science". This article is based on an address given by Professor Price while in Australia last year.

Now you all know that when the whole world heard how Galileo performed his famous and daring experiment from the Tower of Pisa it became dramatically clear that scientific method could refute the assertions of Aristotle and the philosophers.

Here had been a dogma unchallenged since the days of ancient Greece, but overthrown by this masterstroke; the event may be said to usher in the modern age of rational, objective and experimental science.

It may be said, but it would be indeed very wrong. The world heard about the experiment, but Galileo almost certainly never made it.

Although several other people, in different places and at various times, before and since, performed such an experiment, they seem to have gotten results that supported several different views.

Galileo does not make the claim, nor indeed did he need to, in support of the incorrect theory he first proposed, or for the correct one which he eventually formulated by mathematical reasoning and appeal to imaginary thought-experiments.

At first sight one would suppose that if an error has been made here it is a comparatively trivial and common example of historical inaccuracy.

It must, of course, be corrected by these historical iconoclasts, and it will be a pity to lose a rather good and graphic piece of folklore from the story books.

I hope to show that much more is at stake. We are, I feel, being victimized by a whole mythology of science, current among both laymen and the scientists themselves.

This mythology, in part a well-intentioned and deliberate late-nineteenth century Victorian invention by moral philosophers, purports to show the way that science should work — logically, methodically, objectively — with constant recourse to the twin tribunals of reason and experimental proof.

From this dangerous world of fairy tales that show what science would be like if it were really perfect, there leads a very slippery path.

In such ways one gets to that sterile scientific prose which pretends to be perfect because the personal pronoun and the active voice of verbs are avoided as if they are obscene.

There is a lot to the dictum that if there is no felicitous prose, then there can be no felicitous thought or discovery.

It is very possible that the conventional effort to make scientific reports read blandly and impersonally has done damage to the healthy growth without providing real safeguards for impartiality and other good attributes.

Moreover, by the same route we are led to a public image of the scientist as some sort of impersonal, relentless man-in-a-white-coat in a tiled laboratory, oblivious of the world in his hard pursuit of truth even if it leads him to danger.

More than this, we are led to the scientist's image of himself and the way in which he sees not only his administration and interpretation of his own professional life, but also his relations to society.

The public attitude to science is still dominated by Hollywood images of Pasteur and Edison and thoughts about atom bombs and napalm. And the self image of the scientist is often just as stereotyped and unrealistic.

In the world today there is no public doubt that science is the delicate and active growing-tip of our civilization.

Already in the days of Galileo and Copernicus it was recognized (sometimes with violent opposition) that science was to change the whole intellectual patterns of Man, removing whole areas from the provinces of philosophy and theology, while enriching them with problems that were deeper and more complex than ever before.

Now, we must also admit that science and its technologies holds the purse-strings of nations, controlling their political and economic strengths, and affecting the destinies of continents that have hardly been touched by the great historical movements associated with even such powerful forces as Christianity, democratic institutions, and the mercantile age.

In these circumstances it is a truism to say that science is of vital importance to every person alive today.

Because of this importance it is a matter of life and death, or at least one of incalculable harm or good, if we believe things that are false about science and the way in which it works.

Since deepest antiquity it has been the function of scholars and scholarly institutions to think as deeply as men can, and to teach about those things that are important to mankind.

Such is the tradition which we have proudly inherited from Plato and Aristotle, from the Medieval universities, and from the growth of modern learning.

The universities and colleges, however, out of the same tradition, have had to undertake another task, that of training professionals for the law, for medicine, for teaching and, more recently, for the sciences.

Unfortunately, though so many of our university specialties exist for the scholarly discussion of several other facets of man's existence, humanists have derelicted their duty, and we have tended to leave the examination of science to the scientist himself.

Thus, we find it very worthwhile to have professors of economics and political science, even though they are not primarily successful businessmen or active politicians, or even directly involved with educating the young for such future activities.

We teach English literature and art history, and indeed general history itself, not in order to make students into novelists and poets, painters and generals, but because all these things are important in our world, and we must needs understand in order to live fully and use our intelligences and abilities as best we can.

It is in this spirit that I claim the modern world demands that one not merely teach the art of being a scientist, but that one should somehow teach scientist and citizen alike about science and its relations with society.

Scientists are temperamentally uncharitable animals — especially towards their colleagues in other disciplines — and often presume that no non-scientific subject can be truly hard work; these humanities must be much more like reading a novel.

All the more so, they might say, goes for the business of talking about science, which must be so much easier and softer than doing it.

Just as economics, political science, art history, English and history are valid subjects in their own right, not to be compared with the occupations of businessmen, senators, painters, poets and other practitioners, so we too try to have an honorable and hard-working scholarship of analysis and criticism of science.

We attempt to do for science what economists do for business.

This scholarship comprises the fields of history of science, including that of medicine and of technology, the philosophy of science, the sociology and psychology of scientists, and the social and political relations of science and its institutions.

Over the last few decades these sub-disciplines have been attracting an increasing body of people with competence to some degree in both the sciences and the humanities, and they have begun to coalesce into an independent body of knowledge.

There are now about twenty major universities including Yale with full Ph.D. programs in one or more of these sub-disciplines, and at some 30-40 more institutions there exists some special teaching appointment in the field, at undergraduate and perhaps at graduate level.

Now, back to Galileo. Rather than talk at greater length about humanistic discussion about science, I would rather attempt my task by an effort to exemplify one such mode of scholarship, and show how the mythologies give us not merely the wrong facts but also a very misguided interpretation of the work of the scientist.

The principal trouble with the story of the Tower of Pisa, or rather with its moral, is that it is based upon hopelessly wrong views of Medieval science and of the relations between scientific theory and experiment.

The Middle Ages used to be seen as a long interval of stagnation intervening between the Greek Miracle and the Renaissance.

In this stagnation the only achievement was the eventual transmission of the flame of learning from the ancient world to the modern, and even this was diluted in its utility by blind subservience to the authorities, microscopic disputation of scholasticism, and the dangerously false pseudo-sciences of superstitious astrology and fraudulent alchemy.

It is difficult even for the most devoted iconoclast to know where to begin in correcting this story.

Greek science was not merely transmitted to the 16th century by passive copyists and translators, teachers and printers.

Before it came to us it had gone through Byzantium and Islam, India and China, back again to Islam and thence via Sicily and Spain to the universities of England, France and Italy, at each phase going through several languages and cultural philosophies. Each stage contributed, some of them decisively, to the progress of the sciences.

In science, the men of the Renaissance did not need to reach back, through the darkness of time, to retrieve the wisdom and culture of the ancients as they had to reach back for the art. That is why much of modern science comes first from the German Reformation rather than the Italian Renaissance.

The astronomy that was learnt by Copernicus came to him in a continuous tradition that comprised not merely the Almagest of Ptolemy, whose form he copies in his own book, but also the significant improvements and technical devices which came from the Spanish Alfonsine astronomers and from such Islamic workers as Ibn As-Shatir who provided most of his mathematical innovations.

The mechanics and theory of falling bodies that came to Galileo were not only those of Aristotle or of the churchmen ignorant of the science of their own day. They comprised also the work of the masters of Merton College, Oxford, that of Nicole Oresme and other Parisian researchers, all of the 13th and 14th centuries.

These mechanicians had successfully transformed Aristotelianism by means of a new theory of impetus and an approach that used something very like the later graphical and geometrical methods used by Galileo to derive his laws of falling bodies.

Galileo was trying to add to living science not combat anti-scientific dogma.

Now let us look deeper at this misunderstood and maligned Medieval science.

Astrology and alchemy were, in their day, far from the non-sensical and anti-scientific malpractices that romantic stories would have us believe.

Though modern 20/20 hindsight shows us they were both false, even Medieval scholars were not simple-minded, and the truly sympathetic historian can readily see how eminently believable and scientifically useful these false sciences were.

Just as the science of 1650 dissolved into that of 1950, so will that of today pass into the future.

We cannot be so simple-mindedly conceited as to believe that all our modern science is eternally valid in its present form. Some of it is inevitably more valid than other parts, but some of it may be as wrong as alchemy.

After all, it was unreasonable before Lavoisier to presume that chemistry would entail anything quite so absurd as the notion that compounds had none of the properties of their elements.

Who could assert without a mysticism bordering on insanity that common salt was composed of a yellow poison gas and a soft silvery metal that burst into flames when cast on water?

Yet, take the obvious view of the relation between compounds and the elements that should compose them to give them salinity, crystallinity, solubility, etc., and you have the Aristotelian theory of elements (more or less) and a fine basis for a science of alchemy, and an art whereby all useful chemical transformations can be ordered and rationally understood.

In the Medieval craft tradition where so much new technical and industrial chemistry was arising quite rapidly, alchemy was indeed a useful, though admittedly imperfect science, and the famous matters of gold-making and eternal life were only the most lurid and popular perversions that appealed to a public that could not understand the technicalities.

It is in the same spirit that one often hears the Theory of Relativity explained as if it springs from the sudden

(Continued on next page)

News In Brief

Queen's Birthday Honours

Mr. D. E. Henshaw of the Division of Textile Industry has been created a Member of the Order of the British Empire.

Mr HENSHAW

Mr. Henshaw originated the concept of self-twist spinning and built the first self-twist spinning machine.

Mr. R. R. Rochford of the Division of Plant Industry has been awarded the British Empire Medal.

Mr ROCHFORD

Mr. Rochford has been active in Canberra community affairs for many years. He is Past President and Honorary Life Member of the Canberra Horticultural Society and Vice-President and Honorary Life Member of the National Agricultural Society.

President

Mr. M. V. Tracey, Chief of the Division of Food Preservation, has been elected President of the Australian Biochemical Society for a two year period commencing July, 1970.

Visitor

Dr. F. G. Shuman, Director of the National Meteorological Centre of the United States Weather Bureau, is spending three weeks at the Commonwealth Meteorology Research Centre, Melbourne. During his stay he will present two series of lectures on "Operations and research at the National Meteorological Centre" and "Some properties of finite difference systems".

Dr. Shuman will also have discussions with members of the Division of Meteorological Physics, the Commonwealth Bureau of Meteorology, and Melbourne and Monash Universities.

Rivett Medal

Dr. A. Reid of the Division of Mineral Chemistry has been awarded the David Rivett Memorial Medal for 1970 by the CSIRO Officers' Association. The award was made in recognition of his outstanding contributions to the work of the Organization, particularly in the field of solid state chemistry.

Dr REID

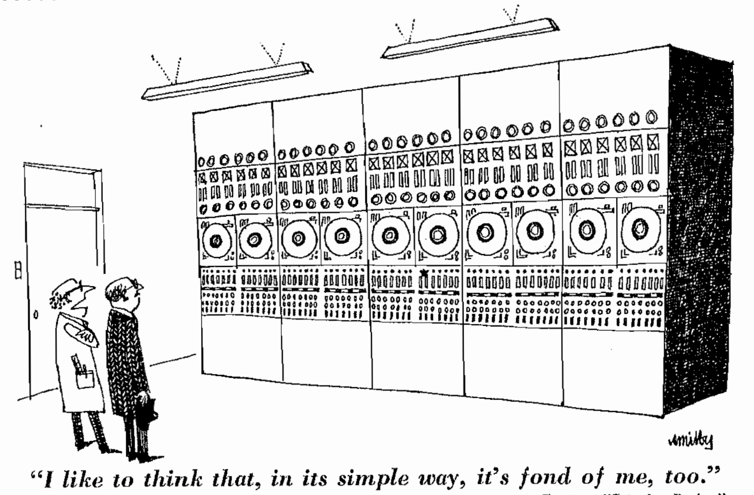
Termite Conference

Last month the Division of Forest Products organized and hosted a Termite Conference and Instruction Course for members of the Pest Control Industry in Victoria.

Shortly after our Coresearch cameraman took this picture at the recent International Grassland Congress, the irate owner of a nearby shop retrieved his waffle board and bore it off in high dudgeon.

The Conference marked one of the last official appearances of **Mr. F. Gay** of the Division of Entomology. Mr. Gay, a leading authority on termites, retires next month after 38 years with the Organization.

Our picture shows Mr. Gay (centre) with (from left to right) Mr. N. Tamblyn, Mr. J. Beesley and Mr. C. D. Howick of the Division of Forest Products, and Mr. K. L. Biggs of the Division of Building Research.



"I like to think that, in its simple way, it's fond of me, too."

Courtesy "Saturday Review"

The Mythology of Science

(Continued from page 2)

momentous discovery by Einstein who is presumed to have sat like a yogi and pronounced that "everything is relative".

If only it were so. Navel contemplation is much less expensive than accelerators and rocketry, and tensor calculus requires much hard-won manipulative skill.

So it is with alchemy; in its day it was hard, technical, tough science.

The mythological dependence of science upon experiment involves something more than mistaken historical facts or their appraisal as part of the history of man. At stake here is the whole popular feeling of scientists and laymen alike that there exists a "scientific method".

At its crudest this takes the form of a recipe for error-free thinking or even for a prescription for scientific discovery.

Nobody would deny the existence of logic or the desirability that all thinking men, and in particular, all scientists should be aware of common pitfalls in logic and of the nature of concepts, theories and hypotheses.

It must, however, be pointed out that when one passes this elementary level, the deeper questions of the philosophy of science are very deep indeed.

If one "unpacks" the idea of a theory, a model, an hypothesis, one finds a great deal to discuss and no ready answers on which all philosophers of science agree.

Of such a nature is the question of how it is that light appears to be both a wave and a particle, and how its wave-mechanical explication involves a principle of uncertainty.

Other discussions may involve such controversies as that surrounding the sense in which a mechanical brain may be said to "think", and the nature of a crucial experiment which claims to be able to decide between rival theories.

If it had actually taken place as described, Galileo's experiment might well be discussed as a crucial experiment.

I can assure you it would give no open-and-shut case. As a matter of fact if one goes through the history of science, ancient and modern, looking for crucial experiments, one soon realizes that here is another area where things are not quite what they seem.

It is very difficult to find an unexceptional example.

If they exist at all, they are far from typical of the way in which experiment actually becomes involved with the construction and reconstruction of scientific theories.

In order to discuss what actually has happened in the relation between experiment and theory, it does little good to consider what would happen if scientists did all the right things in the right order and in exactly the right way.

If they did, there would be some interesting sort of an exact one-to-one correlation between the logical priority of theories and their historical sequence.

In fact, as is obvious, when we learn a modern science we can well omit all the wrong turnings and displace an original and roundabout way of doing things, putting in instead a recent way that is more simple, more elegant, or more capable of leading us to new places.

It is, by the way, the lack of such a one-to-one correspondence that makes nonsense of pious ideas that one might do two jobs at the same time and add human interest by teaching science itself on some sort of historical principles.

Since scientists are not perfect, not even today as is so well illustrated by Watson's book "The Double Helix", it makes a great deal of sense to look historically at exactly these differences between logical development and what in fact took place.

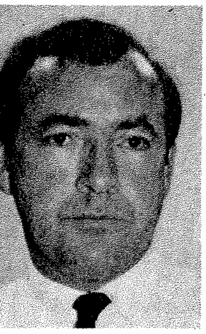
A very important development now taking place in the historiography of science is concerned with just such problems of discovering how it is that science seems to make sudden advances that hinge upon one man or one revolution in experiment or theory.

We are discovering that pieces of false science and of false history are often peculiarly revealing, and more importantly, we discover that although science seems empty of crucial experiments it appears to be full of scientific revolutions and abrupt changes of paradigm.

(Continued on page 4)

APPOINTMENTS TO STAFF

Dr. J. B. Allen has been appointed to Head Office as an Assistant Secretary (Industrial and Physical Sciences). Dr. Allen will take part in the formulation, development and implementation of policy associated with CSIRO's research in the physical and industrial sciences. He will also be concerned with liaison between CSIRO and Australian research associations, and with other bodies receiving grants from CSIRO. After graduating B.Sc. with honours from the University of London in 1950 and Ph.D. from the University of Cambridge in 1953, Dr. Allen joined the Mineral Resources Division of the Overseas Geological Surveys in London. In 1967 he became a mineral economist with the Bureau of Mineral Resources in Canberra and in 1968 an executive assistant in the Mineral and Petroleum Industries Section, Northern Territory Division, Department of the Interior.



Mr BURGESS

Mr. D. Burgess has joined the Industrial and Physical Sciences Branch in Head Office where he will take part in the Branch's work in patents and licensing. Mr. Burgess graduated B.Sc. with honours from the University of Liverpool in 1956. After working in process control and operational research in the chemical and steel industries he came to Australia in 1967 and since then has been a Patents Examiner with the Commonwealth Patents Office.

Mr. F. H. J. Crome has been appointed to the Division of Wildlife Research to study the ecology of native pigeons and mound building birds. Mr. Crome graduated B.Sc. with honours from Monash University in 1969.

Mr. N. J. Dallwitz has joined the Division of Entomology where he will act as a mathematical and statistical consultant to other research workers in the Division. He will also work on the analysis of biological systems and the construction of mathematical models. Mr. Dallwitz graduated from the Australian National University obtaining his B.A. (Hons.) in 1964, B.Sc. (Hons.) in 1965, and Ph.D. in 1970.

Mr. R. Evans has been appointed to the Division of Animal Genetics to advise on statistical techniques for analysing data from experiments on sheep genetics. Mr. Evans graduated B.Sc. from the University of New South Wales in 1966. Since obtaining his Diploma of Education in 1967 he has been an instructor in physics and mathematics with the Australian Army.

Mr. T. J. Healy has joined the Industrial and Physical Sciences Branch at Head Office to take part in the Branch's work in patents and licensing. Since graduating B.Sc. from the University of Melbourne in 1962 Mr. Healy has been an Examiner of Patents with the Commonwealth Patents Office.

Dr. D. G. Hess has been appointed to the Division of Meteorological Physics to study the dynamics of the atmospheric boundary layer. Dr. Hess graduated M.Sc. from Pennsylvania State University in 1964 and Ph.D. from the University of Washington in 1968. Since then he has been a research meteorologist with the Geophysical Fluid Dynamics Laboratory at Princeton University.

Mr. J. A. Hope has joined the Division of Building Research where he will work on the conduct and management of building operations. Mr. Hope worked with the Australian Atomic Energy Commission from 1958 to 1967 and graduated B.A. from the University of New England in 1966. Since 1968 he has been lecturing in mathematics at the Queensland Institute of Technology at Toowoomba.

Mr. J. M. Kerrisk has been appointed to the Division of Fisheries and Oceanography to work on the collection, compilation and publication of tuna catch and effort data and on the infra-red measurement of sea surface temperatures. Since graduating B.Sc. with honours from the University of Adelaide in 1964 Mr. Kerrisk has been carrying out research at Flinders University on the mathematics of diffusion in fluids.

Dr. G. J. Leach has joined the Division of Tropical Pastures where he will work on the agronomy and ecology of pasture systems in the brigalow region of Queensland. Dr. Leach graduated B.Sc. with honours at the University of Reading in 1958 and Ph.D. from the same University in 1961. Since 1962 he has been a lecturer in agronomy at the Waite Agricultural Research Institute, Adelaide.

Mr. A. V. Ramamurthy has been appointed to the Division of Chemical Engineering to carry out research on rheology and mixing. Mr. Ramamurthy graduated in chemical engineering from Nagpur University, India, in 1962 and obtained his M.E. from the Indian Institute of Science at Bangalore in 1965. Since then he has been studying for his Ph.D. at Monash University.

Mr. D. T. Roth has joined the Division of Plant Industry and will work at the Tobacco Research Institute, Mareeba, on the analysis of plant and soil material. Mr. Roth graduated B.Sc. with honours last year from the University of Tasmania.

Mr. J. Skicko has been appointed to the Division of Forest Products to study the chemistry and biosynthesis of lignin in eucalypts and its relation to wood properties. Since graduating B.Sc. from the University of Melbourne in 1967 Mr. Skicko has been a chemist with the Department of Customs and Excise.

Dr. G. W. Skyring has joined the Division of Plant Industry and will work at the Baas-Becking Laboratory on the physiology and biochemistry of sulphate-reducing and sulphate-oxidising bacteria. Dr. Skyring graduated B.Sc. with honours from the University of Queensland in 1956 and Ph.D. from the same university in 1962. From 1961 to 1964 he was a Lecturer in Microbiology at the University of Queensland and since 1965 he has been working at the Cell Biology Research Institute of the Canadian Department of Agriculture.

Dr SKYRING

Dr. F. W. N. Smith has been appointed to the Division of Tropical Pastures where he will study the nutrition of tropical grasses. Dr. Smith graduated M.Sc.Agr. from the University of Sydney in 1964 and Ph.D. from Cornell University in 1969.

Dr. M. J. Trinick has joined the Division of Plant Industry to carry out research on legume microbiology. Dr. Trinick worked as a research scientist with the Department of Agriculture in New Guinea from 1959 to 1966. He graduated B.Sc. from the University of Sydney in 1958 and M.Sc. from the same University in 1965. He recently obtained his Ph.D. from the University of Western Australia.

Mr. D. Wells has been appointed to the Division of Applied Chemistry to work on the development of new synthetic procedures and on the elucidation of structure of organic compounds. Mr. Wells graduated B.Sc. with honours from the University of Western Australia in 1969.

Mr. M. C. Welsh has joined the Division of Mechanical Engineering where he will carry out research on axial flow fans and on the design and development of wind tunnels. Mr. Welsh graduated B.E. from the University of Sydney in 1965. As a member of the R.A.A.F. for the last five years he has worked with the Aircraft Research and Development Unit at Laverton and with the Maintenance Squadron at East Sale.

Dr. P. C. Young has been appointed to the Division of Fisheries and Oceanography to carry out research on the ecology of prawns. Dr. Young graduated B.Sc. with honours from the University of London in 1962 and Ph.D. from the University of Queensland in 1965. Since 1966 he has been working at the Fisheries Helminthology Unit in Britain.

Aid for India

In November, 1968, Mr. J. F. Horwood of the Division of Dairy Research began raising a fund to send high-protein milk biscuits to India through the Aid India Campaign.

The biscuits were developed by the Division as a means of supplementing the diet of people in communities where nutrition is poor.

By August last year some $465 had been contributed by the staff of the Divisions of Dairy Research, Building Research and Mechanical Engineering and this together with a matching grant from Arnott-Brockhoff - Guest Pty. Ltd., manufacturers of the biscuit, was sufficient to send one ton of biscuits to India.

Recent reports indicate that the biscuits have been well received there and are being used to improve the diet of children in a number of districts.

The Mythology of Science

(Continued from page 3)

Next, as a good example of the role of false science, we might take the case of phlogiston, the principal of combustion that entered into chemical reactions and gave many beautiful insights into physical chemistry before it was found to be utterly false as a theory.

The exciting thing here is that this particular theory was never rejected as false, it just evolved piecemeal into a more and more complicated theory in which phlogiston had to be given so many special *ad hoc* properties that explaining everything, it explained nothing, and could be dispensed with as soon as the identification of the gas, oxygen, made alternative schemes available.

As has been pointed out recently by Cyril Smith of M.I.T., the nature of phlogiston corresponds almost exactly to the electron gas, rather than to elementary oxygen — so they were righter than they thought.

As an example of false history, we may take the extraordinary popular notion that somehow Columbus and the other navigators wrought a great revolution by proving that the earth was not flat.

I do not doubt the bravery of the seamen nor the excellence of the discoveries they made, but it is quite clear that centuries before the time of Christ and at all times since it was clear that the Earth was approximately spherical.

It was known in admirable detail to most scientists and figures in most popular books of antiquity, the Middle Ages and the Renaissance.

There was, it is true, an early Christian heresy which maintained on a literalist interpretation that it was flat, and (with not much less force) there is still a British society devoutly addicted to this view.

It is true also that Columbus, as others, made a fundamental error in getting the size of the globe right, but believing the land mass of Europe and Asia to be so great there was only room for a rather small Pacific and not for anything but small islands in between.

Just how the rumour started that they thought the earth was flat is very difficult to ascertain, but now it is virtually canonized along with the Tower of Pisa by elementary school books and even by encyclopedias.

What is also particularly interesting about ancient knowledge of the earth is that the Greeks who found the size of the globe so accurately did so by a process of excellent guesswork rather than any actual measurement.

Some of them say that they measured and described the process, but it is clear on critical examination that the account cannot be taken at face value.

It just happens that the facts of nature are such that if one makes the right sort of completely qualitative observations in astronomy, one can manipulate them mathematically and derive what seem to be quite accurate quantitative data.

These data can then be improved by further qualitative observation and manipulation.

With some luck and a great deal of cunning judgment, one can then get astronomical theory and measures of the size of the earth and the distances and sizes of the sun and moon with a most impressive accuracy.

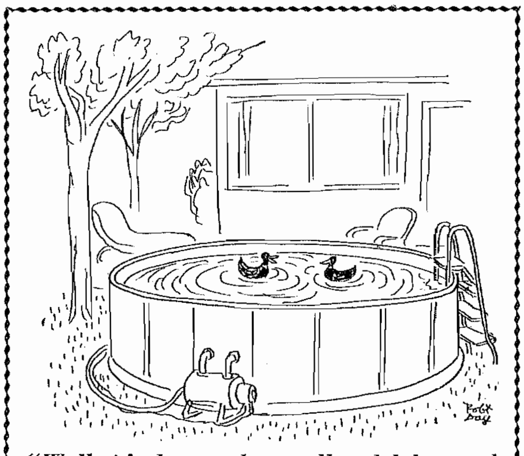
For example, if we know that in going 3,000 miles from California to New York one goes through 3 time zones, then the earth must be 24,000 miles round and its radius is therefore 4,000 miles. If we know the moon is $\frac{1}{4}$ as big as the earth, its $\frac{1}{2}$ degree size tells us it must be 240,000 miles away.

Almost all ancient and Medieval mathematical astronomy takes this turn, and almost never can one find certain evidence that the marvellously correct results were derived from actual measurements by instruments.

Only in the seventeenth century did men learn how not to fudge experiments.

Here is a perfect instance of the relation between observation and theory being rather different from what one might expect.

(To be continued)



"Well, it's better than polluted lakes and rivers if you can stand the chlorine and the fluoride."

Book Entry

Mr. W. H. Taylor of the Division of Building Research has been nominated for inclusion in The Dictionary of International Biography, The Directory of British and American Writers, and The Blue Book: Leaders of the English-speaking World (St. James Press, Chicago and London). Mr. Taylor is author of Concrete Technology and Practice.

DEADLINE

Contributions to the August issue of Coresearch should reach the Editor at 314 Albert Street, East Melbourne, by Wednesday, 15th July.

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CORESEARCH

FOR CIRCULATION AMONG MEMBERS OF CSIRO STAFF — NUMBER 137, MELBOURNE, AUGUST 1970

New Appointees

Mr. I. H. Eberhard has joined the Division of Wildlife Research to study the biology and ecology of the dingo in the eastern highlands of Australia. Mr. Eberhard graduated B.Sc. from the University of Adelaide in 1964 and recently completed his studies for his Ph.D. at the same university.

Mr. F. B. Griffiths has been appointed Zooplankton Curator at the Division of Fisheries and Oceanography where he will assist in the care of the zooplankton collection and in the collecting programme. Mr. Griffiths graduated B.Sc. with honours from the University of British Columbia in 1966. Since coming to Australia in 1967 he has been employed at the Garvan Institute of Medical Research at St. Vincent's Hospital, Sydney.

Mr HARVEY

Mr. I. L. Harvey has been appointed Staff Training Officer at Head Office. He will be responsible for the training of administrative and clerical staff. Mr. Harvey graduated B.A. from the University of Sydney in 1957 and B.Sc. from the University of New South Wales in 1963. After a short period with the Department of Labour and National Service he spent from 1959 to 1960 as a teacher, and from 1961 to 1962 as a psychologist with the New South Wales Vocational Guidance Bureau. Since 1963 he has been a psychologist and research staff officer with the Australian Army Psychology Corps.

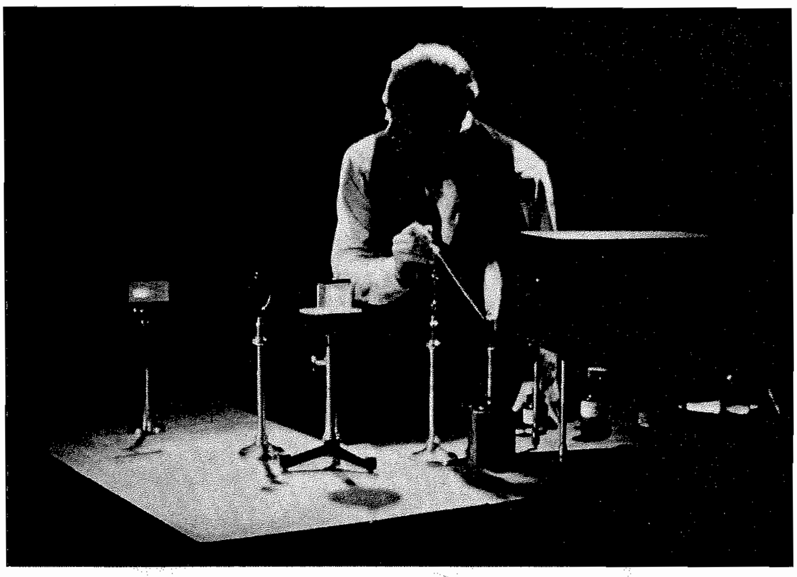
Mr. B. W. Horwood has joined the Division of Animal Physiology where he will be concerned with the flow of information between research staff and those involved with the Division's findings. Since graduating M.Ag.Sc. from the University of Adelaide in 1966 he has been studying philosophy at the same university.

Mr. P. Y. Lee has been appointed to the Division of Radiophysics to work on the design and programming of real-time data collection systems and data processing systems for the National Radio Astronomy Observatory at Parkes. Mr. Lee graduated B.Sc. with honours from the University of Western Australia in 1968 and obtained his Diploma of Numerical Analysis and Automatic Computing from the University of Sydney in 1969. Since then he has been working with Programmers Ltd., Sydney.

Mr. R. R. Merrit has joined the Division of Mineral Chemistry to study reactions of sulphides in molten salt systems. Since graduating B.Sc. with honours from the University of Western Australia in 1965 Mr. Merrit has been studying for his Ph.D. at the same university.

Mr. A. C. Monticone has been appointed to the Division of Radiophysics where he will carry out micro-wave and wave guide research associated with the Parkes radio-telescope. Mr. Monticone graduated B.Sc. from the University of Sydney in 1967 and B.E. from the same university in 1969.

Mr. J. R. Zdysiewicz has been appointed to the Division of Protein Chemistry to work on the characterization of fibrous proteins such as keratin and collagen and to study the influence of chemical treatments on conformational and other changes in the pattern of the wool fibre. Since graduating B.Sc. with honours from the University of Adelaide in 1964 Mr. Zdysiewicz has been studying for his Ph.D. at the same university.



A LONG SHOT THAT PAID OFF

Two hundred scientists and industrial leaders attended the premiere in Melbourne last June of "A Long Shot That Paid Off", the Film Unit's latest production.

Shot in colour, this 33 minute film tells of the development of atomic absorption spectroscopy by Dr. Alan Walsh of the Division of Chemical Physics.

Dr. Walsh appears in a number of sequences throughout the film.

There are also interviews with various scientists who have employed atomic absorption spectroscopy in their laboratories.

Another section describes some of the experiments of Bunsen and Kirchhoff last century.

Speaking at the premiere, the Chairman, Dr. J. R. Price, said that the development of atomic absorption spectroscopy had been an outstanding example of the manner in which basic research uncommitted to an immediate economic objective could bring great benefit to the national economy.

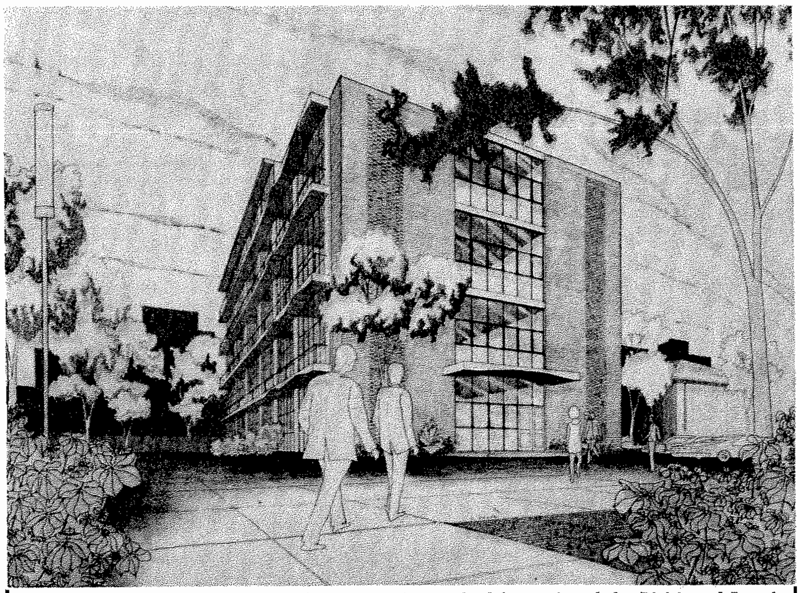
Our picture above is from a "flashback" sequence in the film in which Robert Bunsen (played by Dr. J. B. Willis of the Division of Chemical Physics) is greatly mystified by the phenomenon of atomic absorption.

Senate Election

Dr. B. L. Sheldon of the Division of Animal Genetics is standing as a candidate in the election later this month for the University of Sydney Senate.

Dr. Sheldon, who was President of the CSIRO Officers' Association from 1967 to 1970, believes that the representation of graduates on the Senate should be broader than it is at present.

He said that he would have a special interest in the Science Faculty and other related faculties; their structure and relationship to the rest of the University; facilities for postgraduate training; the funding of University research; student problems; and increased cooperation between the University and CSIRO.



Above is an architect's impression of new extension to the laboratories of the Division of Protein Chemistry at Parkville, Melbourne. The extension is now under construction and should be finished by early next year. It is expected to cost about $380,000.

SAFETY NOTES

Battery flattery

The dictionary defines a battery as a division of artillery (meant to explode often) or an electric cell which stores electricity (not meant to explode at all but will occasionally). Some batteries just blow their tops but others go off with shattering results.

A fully charged battery or one being charged generates hydrogen and as little as 4 per cent of hydrogen mixed with air can be exploded by some bright spark when:

- switches are left on
- cables are crossed during installation
- a warm battery is filled with water
- poor connections are made
- tools accidentally contact battery, starter or generator terminals
- those working on batteries try to smoke at the same time.

The danger is greatest in an unventilated garage or workshop. Battery work should always be carried out in a well ventilated area to prevent accumulation of hydrogen.

Quotes for the month

"It takes less time to do your thing safely than it does to explain why you did it unsafely." **Longfellow (approx.)**

"Many accidents are caused by drivers hugging the wrong curves." **Anon.**

Hygiene standard

The National Health and Medical Research Council have just issued a booklet of standard threshold values for contaminants in the air of workplaces. This is an invaluable guide and can be obtained free of charge from The Secretary, NHMRC, P.O. Box 100, Curtin, Canberra, 2605.

L. C. R. Thompson, Safety Officer.

THE MYTHOLOGY OF SCIENCE

Let us now take an important case in which the historical facts are unassailable and the scientific position quite clear as progress from a false theory to a true one.

The case is that most famous contribution of Copernicus, and we shall now show that the customary evaluation is not merely a piece of mythology, but one which obscures from us an important attribute of science.

What did Copernicus achieve in substituting his new heliostatic model of the planetary system for the geostatic one of Ptolemy and nearly all preceding astronomers?

Copernicus certainly made a few observations of his own, but these are not particularly good, even for the low ebb of his time, and they certainly play no important role in his new theory.

We have then a theoretical advance to consider, and one which repute would have us believe to be of the greatest importance to the breaking of the old Aristotelian physics and everything that went with it in theology as much as in astronomy.

In the conventional evaluations two facts stand out; the new system was more accurate and more simple than the old Ptolemaic astronomy.

That it was more accurate seems reasonable enough; we know it was incorrect to suppose that the earth stood still and was the centre of the system of the universe. Naturally an approach to the modern theory would more accurately agree with the facts of observation.

That it was more simple was evident because all the annual motions of celestial bodies could suddenly be attributable to a single annual motion, that of the earth around the sun.

The improvement of simplicity was indeed so great that it has become in this case the *locus classicus* for indicating that we should always prefer a simple theory to a more complex one, all other things being equal.

Strange as it may seem, if one goes through the arduous process of computing a planetary appearance, using first one system, then the other, so as to get a result to compare with observation, it comes out roughly the same either way.

In spite of the tradition that the number of circles has been drastically reduced by Copernicus, one goes through as many steps in the calculation; as a matter of fact, because of some rather irrelevant epicycles introduced by Copernicus to make his system even more perfect, the arithmetic becomes a little more tedious than it might.

In spite of the fact that the old theory is wrong by modern standards it gives the same answer; again, as a matter of fact, because Copernicus uses constants that are not very precisely determined or well chosen, the calculation from his system will not give results quite so accurate as those that would have been derived from Ptolemaic theory brought up to date in its basic parameters.

The reason for this state of affairs is elementary. For all the observations then available one had only evidence of the relative motion between the earth and one of the planets. With no fixed landmarks in space there was no hope of telling which was moving and which standing still.

Astronomy had to wait until long after the invention of the telescope before one could detect the tiny annual motion that showed the earth to be moving slightly in comparison with the enormously distant fixed stars.

But by that time Kepler had shown on quite different mathematical grounds that the system must be heliocentric, and Galileo's telescope had found the clinching proofs of the phases of Venus and the miniature solar system of satellites around Jupiter.

In these circumstances it is no longer a surprise that the Copernican doctrine found only a gradual acceptance.

What else could a competent astronomer do when he was faced with two systems that seemed to provide an equally valid set of explanations and computations with only a dubious gain in simplicity in one place and a loss of it in another?

by Professor
D. J. de SOLLA PRICE

The first part of this article appeared in last month's Coresearch.

The answer lies in going outside the astronomy and into questions of the physics of the process. Here, Copernicus gave no proofs, mathematical or otherwise, but he suggested, mostly by implication, that there was a whole new way of looking at the situation and seeing a single great pattern.

However, contrary to the old mechanics, the new system appeared also to be a valid alternative.

In the words of Herbert Butterfield, men had to put on a new thinking cap. In the historiography of Tom Kuhn, the old paradigm within which men had made all their conjectures lay broken.

The old theory had not been disproved or even replaced. It had merely been shown that there was a promising new way of looking at things.

As yet many of the answers seemed equivalent, more correspondences were to follow, but eventually means would be found of generating new ideas along the quite different path that had been taken, and eventually the new ideas would lead to as well-integrated a world outlook of mechanics and astronomy as that which seemed then to have been set aside for no good reason and perhaps with great danger to all rational thought.

Seen with sympathy in this light there is no doubt that Copernicus is still a great figure in the history of astronomy.

It also makes more sense to discover here the tremendous innate conservatism with which the scientist guards his paradigms.

It is better than thinking that there is some ideal scheme in which theory is the result of a tissue of hypotheses created and sifted by experimental and observational tests.

Again and again we can show that science must be seen as a creative and inspired activity, strangely irrational in its human process and far from the methodical and objective search for truth which may have seemed such a noble ideal.

You may be wondering why it is that historians of science seem so preoccupied by the distant past of science when surely it is this modern scientific world that concerns us so seriously.

Galileo, Newton and Copernicus were masterminds and made some of the most fundamental and basic contributions, but surely the greater part of our historical discussion should be occupied with the greater part of science since 90 per cent of all the scientists that have ever been are alive now and 90 per cent of all the scientific advance that has been made has happened within living memory.

Should we not therefore devote more time to telling of relativity and quantum mechanics, of nuclear energy and molecular biology?

Before I say "no" and proceed to sidestep the issue, let me point out that we are even more derelict in our apparent duty than I have indicated.

Some historians of science are quite frequently occupied not merely with the distant past, but with that which is very distant and remote from our culture.

Some study ancient technical works in Arabic, Hindu, Sanskrit, Hebrew and Chinese sources as well as Greek and Latin; others research on Babylonian mathematics and astronomy that may be 1000 years earlier than the Greek and much more sophisticatedly complicated.

Indeed the popularity and progress of such studies is now beginning to prove quite a strong influence on traditional historians who find the internationalism of the history of science and technology and its cross-cultural influences an important corrective to their long blindness in this direction.

I might mention here that the study of the tremendously exciting ancient Babylonian material has demolished the idea of the Greek Miracle that we once understood so well as the fountainhead of our culture.

Instead of that simple beginning we have a much older and more complex story that goes back to pre-history.

At the other end of the timescale our revaluations of the technical content of the Industrial Revolution is changing some of the prior interpretations of social and economic historians.

This is particularly evident in new studies of the relationship between science and technology.

Now we know that one should never see technology as a sort of "application" of science. For the most part all new science grows out of old science and new technology derives from old technology.

The only direct and strong transfer is from technology into science by way of that special field of scientific instrumentation. Science is transformed into technology only by the relatively weak process familiarly known as technical education.

To return to our tendency to harp on the distant past, we may claim that it is there we find in the most pure and simple form all the basic issues affecting the life of science and its practitioners as well as the relations to society, to economic change, political pressure and the ambient philosophies.

In perspective, it is much easier to examine the trial of Galileo and dissect out its issues, than it would be to do the same for Oppenheimer.

With old examples that have been trampled and re-trampled by persistent scholarship we may now analyse many of the important and eternal questions about such things as the relation between science and mathematics, or between pure science and technology about which the mythology is rampant and dangerous.

We may determine with some accuracy the effects of war upon science and of science upon war — neither relation being particularly obvious.

As a last specific example we may examine the secret world of the emotions and motivations that make a man become a scientist and do the things he does.

What sort of men are these? On the whole they are very interestingly different now to what they were up to about a generation ago.

For example many of the great scientists of the past whose names are household words (Newton, Galileo, Boyle, Pasteur, Mme Curie, Priestley, Lavoisier, Tycho Brahe) lost a parent at a tender age or were otherwise exposed to emotional traumata that caused them perhaps to have difficulty in relating to people.

Relating instead to things and ideas they became the typical lonely child curled with a book, and the man so deeply entangled with the emotion of learning that he would fight tooth and nail for the intellectual property that would be symbolized by his being Boyle of the Law or Pasteur of the vaccine.

The priority struggles of the scientific past do not spring from any impersonal and cold objectivity but from a set of highly personal emotions of rather abnormal creative people suffering from maladjustments they turned to productive ends.

It has now been shown several times over that scientists, far from being unemotional and impersonal have a very high emotional investment in their career and personality patterns that are quite special — for example they have a very high rate of rare responses in word association and other such tests.

After Watson's book on the DNA research I do not need to digress further on such themes as the jealousy, sexuality and competitiveness of scientists.

It is important to understand such things in a world where scientists are beginning to inherit the power and directing force once held at various stages of society by the rich businessmen, the generals, or the lawyers.

It is worth remarking in closing that so many scientists will give lip service to the history of science and seem to want it for what must be the wrong reasons.

Because of this tremendous urge to secure intellectual property and acknowledgment, they all want to publish their work, though, of course, very few actually want to read, and then only to see if somebody else has got there first.

Because of the resultant uncertainty they have often wished for a history of science that would record all contributions that were worthy, and sift competing claims with some miraculous objectivity.

"Honor the past, that I in turn shall be suitably appreciated" they seem to say.

Others claim, for example, medicine is so difficult that they often do not know what to do, so it is nice to know what Osler would have done.

Others again say that science is so impersonal and dull that we need to inspire the young with brave stories of Edison and Dr. Salk.

I hope I have been able to show that it should be much more important to analyse the motivations of such requests than satisfy them.

I hope too that these few iconoclastic examples will serve to illustrate that these subjects can substitute vital illumination for the mythology and superstition with which we still tend to regard man's boldest ventures in science and technology.

News In Brief

Doctorate

Dr. A. F. Reid of the Division of Mineral Chemistry has been awarded the degree of Doctor of Science by the Australian National University on the basis of his published work on solid state chemistry.

Farrer Medal

Dr. J. Melville, a member of the Advisory Council and a former member of the Executive, has been awarded the 1970 Farrer Medal for distinguished service to Australian agricultural science.

Executive Officer

Mr. A. F. A. Harper of the Division of Physics has been appointed full-time executive officer of the recently formed Metric Conversion Board.

Visitor

Professor K. Tamaru, Professor of Chemistry at Tokyo University, will spend four months with the Division of Tribophysics as a Leverhulme Trust Visiting Fellow.

Professor Tamaru is an authority on catalysis and has made important contributions to catalytic processes for the synthesis of ammonia.

Moving Affair

The 24th Annual Ball of Melbourne Divisions and Sections next month will be a sentimental occasion that will bring a lump to the throat of even the most hard bitten.

For many from Head Office this will be their last CSIRO ball in Melbourne before they leave for Canberra.

The venue for this heart-rending scene: the Royal Ballroom — the date: Thursday, 10th September — the price: a modest $8.50 a double. Contact your social club representative now.

Annual Tussle

Forty stalwarts from Sydney braved the Canberra cold last July for the annual rugby and basketball battles between the Sydney and Canberra Regional Administrative Offices.

The Canberra girls proved far too strong on the basketball court and outclassed their opponents 32 to 15.

In rugby, however, Sydney came from behind to scrape home a 6 to 5 win.

Quotes for the Month

". . . suddenly everybody has become seriously concerned to protect the natural environment. . . . It seems to me more than a coincidence that this awareness should have happened at exactly the moment man took his first step into space."

Fred Hoyle

"If I had to judge the existence of the moon on the plausibility of any of the theories, I'd claim it wasn't there."

Anonymous scientist

Deadline

Contributions to the September issue of Coresearch should reach the Editor at 314 Albert Street, East Melbourne, by Friday, 14th August.

Printed by CSIRO, Melbourne

CORESEARCH

FOR CIRCULATION AMONG MEMBERS OF CSIRO STAFF — NUMBER 138, MELBOURNE, SEPTEMBER 1970

CSIRO's Budget Passes $62,000,000

CSIRO will have a total Budget for 1970-71 of $62,530,100 for capital and non-capital expenditure, of which $50,859,300 will be provided directly by the Government, $9,648,200 by the Agricultural Industry Committees, and $2,022,600 by various other contributions.

Treasury Funds

Of the amount of $50,859,300 provided by Treasury appropriation, $43,742,000 is for salaries and general running expenses, $6,597,300 for capital expenditure, and $520,000 for repairs to buildings.

The allocation for salaries and running expenses represents an increase of $4,204,525 over the actual expenditure for 1969-70. This will cater for the following requirements:

- Increments, reclassifications, additional provision for lump sum payments in lieu of furlough and arbitration adjustments to salaries will absorb $2,641,000.
- The planned development of projects initiated in earlier years with Ministerial support will absorb $126,000. The most important activities in this category are wildlife research in northern Australia, problems concerned with the storage of grain, and investigations relating to the processing of sulphide ores.
- Three new projects which will require $83,000 in the first year will be commenced. These are rock mechanics, mineral physics, and the effects of 1080 poison on wildlife.
- An amount of $118,000 has been set aside for increased grants to such bodies as the Standards Association of Australia and the National Association of Testing Authorities.
- For general expansion in many Divisions and Sections the Executive has provided 121 new positions, $91,000 to cover additional casual labour and overtime, and $783,000 to increase travelling maintenance and equipment provisions.

The capital allocation from Treasury sources is divided into two categories — those items under the control of CSIRO and those handled by the Department of Works and the Department of the Interior.

The first group of items will total $1,724,000. This will be spent on developmental work at field stations ($428,000), the purchase of major items of laboratory equipment ($623,000), the acquisition of additional scientific computing equipment ($530,000), the development of the new area of the Ginninderra Field Station ($94,000), and the continued development of the new cattle station established near Mundubbera, Queensland, in 1966, for the Division of Tropical Pastures ($49,000).

Of the $4,500,000 provided for building projects under the control of the Department of Works, $3,950,000 will be needed for buildings under construction at the end of 1969-70 while the remainder will cover works to be commenced in the current financial year.

The major items in the current year's new works programme are: site works at Bradfield Park, Sydney, for the National Standards Laboratories ($500,000), a herbarium at Black Mountain, Canberra, for the Division of Plant Industry ($485,000), a rock mechanics' laboratory at Syndal, Melbourne, for the Division of Applied Geomechanics ($163,000), a laboratory and workshop building at Parkes for the Division of Radiophysics ($150,000), a workshop at Cronulla, Sydney, for the Division of Fisheries and Oceanography ($125,000), and a development laboratory at Garden City, Port Melbourne, for the Division of Mineral Chemistry ($113,000).

Summary of Estimates of Expenditure for 1970-71

	Estimates 1970-71 $	Expenditure 1969-70 $	Increase or Decrease $
Under CSIRO control			
Salaries and general running expenses	43,742,000	39,537,475	4,204,525
Buildings, works, plant and development items	1,724,000	1,659,549	64,451
Total under direct control of CSIRO	45,466,000	41,197,024	4,268,976
Under Department of Interior control			
Acquisition of sites and buildings	43,300	100,638	—57,338
Under Department of Works control			
Furniture and fittings	330,000	138,244	191,756
Repairs and maintenance of buildings	520,000	434,502	85,498
Buildings, works	4,500,000	2,669,684	1,830,316
Total CSIRO — Treasury Funds	50,859,300	44,540,092	6,319,208
Contributory Funds			
Salaries and general running expenses	11,041,900	9,954,747	1,087,153
Buildings, works, plant and developmental items	628,900	613,356	15,544
Total funds CSIRO — all sources	62,530,100	55,108,195	7,421,905

Other Funds

The joint Commonwealth industry research funds provide most of the finance available to CSIRO from non-Treasury sources.

The Australian Wool Board has allocated $7,474,000, comprising $4,035,000 for wool production research and $3,439,000 for wool textile research.

The wool production research figure includes $3,886,000 for salaries and general running expenses and $149,000 for capital items while the corresponding amounts for wool textile research are $3,189,000 and $250,000.

The main capital projects included in the approved programme are: refurbishing of surgery and climate control building for the Division of Animal Physiology ($45,000), woolshed at "Longford", Armidale, for the Division of Animal Genetics ($13,000), cottage at "Longford" for the Division of Animal Genetics ($15,000), textile processing plant for the Division of Textile Industry ($73,000), steam generator for the Division of Textile Industry ($15,000), a textile processing plant for the Division of Textile Physics ($61,000), data logging equipment for the Division of Protein Chemistry ($44,000), and a pilot-scale controlled-environment oven for the Division of Textile Industry ($15,000).

The Australian Meat Research Committee has agreed to provide a total sum of $1,352,787, comprising $1,270,287 for salaries and general running expenses and $82,500 for capital purposes.

The main capital project is a tuberculosis isolation unit to be erected at Maribyrnong for the Division of Animal Health at a cost of $75,000.

The funds provided by the Wheat Research Council for 1970-71 total $233,109. This is a reduction of $53,491 compared with the allocation for the previous year. The reason for this is the termination of projects dealing with soil tillage, the disc plough, and wheat physiology and also a reduction in the work being carried out in Europe on the biological control of skeleton weed.

The Dairy and Tobacco Research Committees have provided $323,900 and $264,400, respectively, for research for their particular industries.

In each instance the allocations represent small increases on the approved figures for 1969-70.

Provision has been included in the 1970-71 Estimates for the expenditure of $2,022,604 from miscellaneous grants and donations. The actual expenditure under the same heading for last financial year was $1,817,421.

MINERAL PHYSICS RESEARCH

Dr. K. G. McCracken has been appointed to CSIRO to lead research on mineral physics.

He will be located initially in the Division of Mineral Chemistry and, after examining current developments in the application of physics to the problems of the mineral industry, will advise the Executive on an appropriate programme on research for CSIRO in this field.

Dr. McCracken graduated B.Sc. with honours from the University of Adelaide in 1956 and Ph.D. from the same university in 1959. After two years as a postdoctoral fellow at the Massachusetts Institute of Technology he became an Assistant Professor in the Institute's Department of Physics.

From 1962 to 1966 he was Professor of Space Sciences at the South-West Centre for Advanced Studies, Dallas, Texas, and from 1966 to 1969 Professor of Physics at the University of Adelaide.

Since then he has been a visiting professor at the Physical Research Laboratory, Ahmedabad, India.

Dr. McCracken was awarded the Pawsey Medal of the Australian Academy of Science last year for his work on X-ray astronomy.

Last July a ballot was held among members of Head Office staff transferring to Canberra early next year to determine their priorities for selection of government accommodation in Canberra. Our picture shows Dr. Price about to draw the first marble from the box while Mr. Les Graham (centre) and Mr. G. D. McLennan prepare to record the results.

LABORATORY OPENINGS

Chemical Engineering

A $1.4 million laboratory complex for the Division of Chemical Engineering at Bayview Avenue, Clayton, Melbourne, will be officially opened by the Minister for Education and Science, Mr. Nigel Bowen, on Monday, 14th September.

The laboratories will be opened for public inspection between 10 a.m. and 4 p.m. on Tuesday and Wednesday, 15th and 16th September.

A booklet on the open day exhibits and a brochure on the Division's activities are available from the Division.

Dairy Research

The Minister for Customs and Excise, Mr. D. L. Chipp, will officially open an extension to the laboratories of the Division of Dairy Research at Highett, Melbourne, on Monday, 28th September.

Jubilee Award

Dr. M. Lipson, Chief of the Division of Textile Industry, will receive the Jubilee Award of the Textile Institute on behalf of his Division in Manchester later this month.

PRESERVING AUSTRALIA'S RAIN FORESTS

Rain forests, for the first time ever, are just beginning to creep into the news. Everybody is getting interested — and not before time — in conservation; that is to say, in preserving the most valuable bits of our natural environment before they disappear altogether. We've all heard the discussions about the Barrier Reef, the mineral sands, and the red kangaroos; and now we're beginning to hear arguments about rain forests.

Yet I suspect that if you went up to a bloke at random in the street and asked him to define a rain forest, he'd find it difficult; and you couldn't blame him, because it is difficult.

It's easiest if you think about it on a world scale. The forests of the world can be roughly divided into four great groups.

First, there are the conifer forests of the northern hemisphere, that cover thousands of square miles of Canada and northern Europe. Apart from a few plantations and a bit of Hoop Pine we don't have these; our climate isn't cold enough.

Then there are what we call the sclerophyll forests: the word "sclerophyll" simply means "hard leaves", and these forests are rather open, grassy, evergreen forests of arid lands, with narrow, tough, leathery leaves.

This is our native bush, our forests of gums and wattles, of *Eucalyptus* and *Acacia*; you get something like this in parts of South Africa and around the Mediterranean, but there is no doubt that we in Australia have the finest and most extensive sclerophyll forests in the world.

Thirdly, there are the summer-green, broad-leaved deciduous forests of the temperate regions — the typical forest of England.

Lastly, there are the broad-leaved evergreen forests; these are the rain forests. Rain forests are at their best in the humid tropics; but they do stretch — with the tree-species changing all the time of course — right down into the temperate regions.

We have these in Australia, but we don't have much of them; they're virtually confined to a quite narrow strip all down our eastern seaboard.

Do we need to worry about our rain forests? Are they in any danger? Well, yes, they are.

Rain forest develops at its best in areas with good rainfall and good soil; so perhaps it's hardly surprising that the early settlers tended to clear them on sight for pasture.

They were often rather silly about this, sometimes clearing forests on slopes too steep to cultivate properly, where all that happened was that most of the soil washed down the hill in the first heavy rain.

But even if mistakes like this are avoided, there are still those who can't look at a rain forest without wanting to replace it by pasture or a Hoop Pine plantation.

So they're in danger from man; but they're in danger, too, from their age-old enemy the sclerophyll forest.

Gums and wattles can't survive in the deep shade under the rain-forest canopy; but should the rain forest be destroyed by fire, the situation changes overnight.

As Dr. Len Webb, of the Division of Plant Industry's Rain Forest Ecology Section, once put it, the sclerophyll forest is never far away; its gums and wattles will be on a neighbouring hilltop, poised ready to spring and to take over if they get the chance. The rain forest will usually come back, but it will take a long, long time.

But does it matter? There's a lot of rain forest around in the tropics — do we really need to bother about our little bits of it?

I think we do; and I'm going to give three reasons why I think we should try to hang on to every fragment that still remains.

The first reason has to do with the plants themselves. The tropical rain forest is the richest and most complex plant community in the world; in only 18 little quarter-acre plots in North Queensland my colleagues collected no less than 818 different species of trees.

There are the great trees, the plant buttresses, the robust woody climbers we call lianes, the strangler figs; no botanist can view these without getting excited.

Old Humboldt the plant geographer, writing a century ago, described it breathlessly as "forest piled on forest".

This article is based on a talk given on the ABC radio programme "Insight" earlier this year by Dr. W. T. Williams of the Division of Tropical Pastures.

It's not that you can't see these things elsewhere, because you can; but there's nowhere else in the world that you can see them so easily, for the great glory of the Australian flora is its accessibility.

You can see the rain forest without months of preparation, without privation, without fear of attack from man, animals or disease; there is good subtropical rain forest within an hour's drive of Brisbane, and you can pop out and have a look at it in an afternoon if you feel inclined.

For those whose work will ultimately take them into the vast tropical forests there is no better initial training-ground than eastern Australia.

But there is more to these trees than this: they are more than something to be admired, somewhere to train foresters.

Not only do some of them produce our most highly-prized timbers; some of them look as though they are going to provide drugs that man desperately needs.

In our northern coastal rain forest there is a not very common liane called *Tylophora*, and from it comes the new drug *Tylocrebrine*. This has proved extremely effective against lymphoid leukaemia, and is now undergoing its final trials at the United States National Cancer Institute.

In these forests, too, are members of the *Apocynaceae* (the Frangipani family) and the *Rutaceae* (the Citrus family); and several of these produce drugs with anti-tumour activity which are reaching the hospital-trial stage.

Others produce drugs which are showing great promise in dealing with hypertensive conditions associated with some forms of heart disease.

We need all these badly; but if we are to have them we must safeguard the sources of supply. It takes a long time to bring a new drug into general use; the whole process, from first collection of a promising plant, through extraction, purification, tests on animals and on man, clinical trials and the rest, all takes about 20 years.

As things are going now, it could easily have happened that, by the time we discovered the power of Tylocrebine, the forests containing *Tylophora* might have been cleared and the plant extinct.

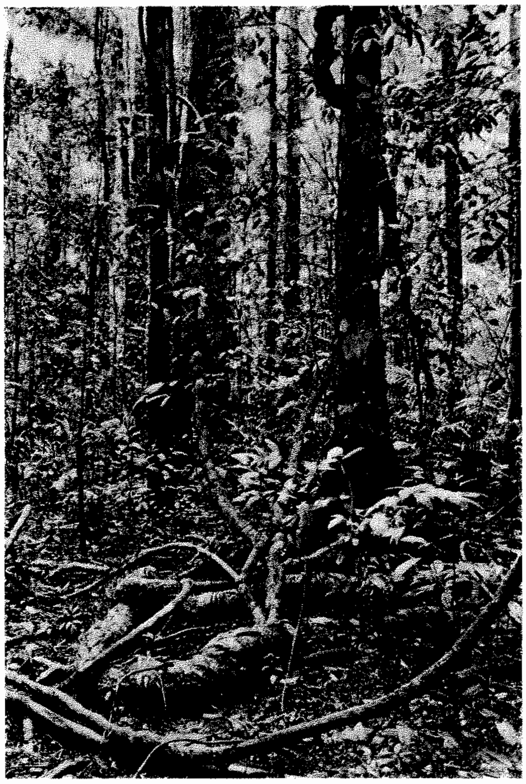
Nor do we know what there may be yet to find, because so few of our rain forest plants have yet been studied.

My colleagues and I were recently working in a one-acre plot at Davies Creek, on the Lamb Range south-west of Cairns. We confined our attention to the 25 commonest tree-species on the plot; and no less than three of those had no names — they have never been described. We dare not lose them until we know more about them.

But a rain forest contains more than plants; it contains animals, and these are my second reason for wanting to keep our forests.

As a habitat, it produces a variety of succulent fruits, and peculiar formations of leaf litter on the forest floor.

It is a world of its own, cut off from the severity of the outside world by the dense canopy.



A typical scene in climax rain forest. Woody vines like those in the foreground are characteristic of rain forest. The picture is from the recently published book "Tropical Queensland" by Stanley and Kay Breeden.

Dr. Jiro Kikkawa of Queensland University, who is an expert on Australian bird behaviour and distribution, has pointed out that many mammals and birds lead an extraordinarily secluded life in the dark forest; they may even remain high up in the canopy, just as if they were trapped and kept in a natural zoo.

On the ground are many birds: there may be log-runners (which, incidentally don't run on logs but stick to the ground); there may be ship-birds, scrub-wrens and brush-turkeys; there may be pittas, the brightly-coloured birds sometimes known as "painted thrushes", one of which gained local fame by insisting on cracking open snail-shells on a conveniently-abandoned beer bottle; there may be cassowaries.

Among the mammals are pademelons, or scrub-wallabies, and the little musky rat-kangaroo measuring only 18 inches from nose to tail.

Up in the trees you may find rifle-birds, king parrots, cat-birds, rain forest possums and tree-kangaroos.

As you go north the variety increases; in southern Queensland there are about 100 species of birds in the rain forest; in north Queensland there are 200.

Many of these animals are very restricted in their distribution: the cuscus, for example, largest of all the possums, and the magnificent palm cockatoo, largest of all the black cockatoos, these are confined to the forests of Cape York Peninsula.

The habitats of most of these beasts and birds are so specialized that they can't survive in the hard world outside; disturb the habitat and you destroy the beast.

They can no more live outside their natural zoos than could the denizens of a metropolitan zoo if you were to open all the cages and let them loose in the streets of the city.

Every Australian is at heart a bushman; these animals and birds are part of his life, and I don't think he would want to lose them. But he will, if he lets the rain forests go.

However, I mentioned three reasons for wanting to keep the forests; and the third and last of these, which is the one that concerns me personally most closely, may at first sight seem the strangest: I want them as a world model.

Bear with me a little while I explain what I mean by this. Rain forest reaches its highest development in the equatorial belt, the home of most of the underprivileged, developing, or emergent people of the world, for whom the gulf between food production and population is increasing all too rapidly.

Some of this forest must undoubtedly be exploited in the interests of man; but how?

As I said earlier, clearing doesn't always work; how are we to decide, for any given area of forest, whether it should be cleared for agriculture, replaced by an artificial single-species forest, logged for timber, or conserved in its natural state?

To do this we must be able to define particular forest types, types to which we can give names, and which can be described in such a way that they can easily be recognised, and their properties studied.

(Continued on page 4)

Recent Retirements

Three officers with, between them, some 90 years of service with CSIRO retired from the Organization recently.

They are Mr. C. A. Gladman of the Division of Applied Physics, and Dr. C. G. Greenham and Mr. R. R. Rochford of the Division of Plant Industry.

Mr. Gladman began his career as an apprentice at the Royal Naval Torpedo Factory in Greenock, Scotland.

He graduated B.Sc.(Eng.) with honours from the University of London in 1939 and in 1947 came to Australia to

Mr GLADMAN

take up the position of Lecturer-in-Charge of Production Engineering at Sydney Technical College.

In 1950 he joined the staff of the Metrology Division of the National Standards Laboratory as head of the Applied Mechanics Section, a post which he held till his retirement.

Mr. Gladman earned an international reputation for his work on many aspects of production engineering research and was elected President of the International Institution for Production Engineering Research in 1966.

Mr. Greenham joined the Division of Plant Industry in 1932 as a plant physiologist after graduating B.Sc. from the University of Queensland.

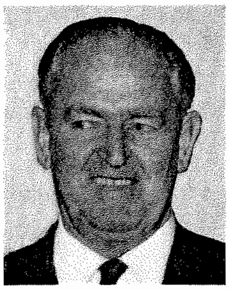
Mr GREENHAM

He later gained his M.Sc. in 1934 and his D.Sc. in 1967 from the same university.

During the war Mr. Greenham was seconded to the National Standards Laboratory where he worked on the production of slip gauges.

Since then he has achieved a considerable reputation for his work on the application of physiology and biochemistry to the control of weeds, particularly skeleton weed and mistletoe.

Mr. Rochford joined the Division of Plant Industry in 1939 as a member of the Genetics Section.



Mr. ROCHFORD

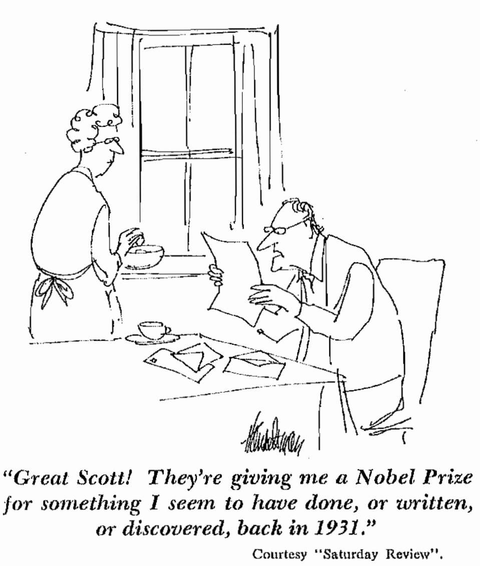
During the war he played an important role in research work associated with vegetable seed production, a project at that time of importance to the war effort.

He continued with the vegetable section until 1952 when he became Officer-in-Charge of the Division's glasshouses and glasshouse services. He returned to the Genetics Section in 1957.

Mr. Rochford has been active in Canberra community affairs for many years. He is Past President and Honorary Life Member of the Canberra Horticultural Society and Vice-President and Honorary Life Member of the National Agricultural Society. He was recently awarded the British Empire Medal.

The appointment of Mr. A. F. Harper of the Division of Physics as Executive Officer of the Metric Conversion Board was announced in last month's Coresearch. Mr. Harper (left) is seen here being farewelled by the Chief of the Division, Dr. R. G. Giovanelli.

The first annual championships conducted by the Table Tennis Committee of CSIRO (Canberra) Sports Association reached their conclusion last July. Our picture shows Dr. J. R. Price presenting the ladies' "A" Grade singles table tennis perpetual trophy to Mrs. Audrey Kovalskis of the Division of Plant Industry.



"Great Scott! They're giving me a Nobel Prize for something I seem to have done, or written, or discovered, back in 1931."

Courtesy "Saturday Review".

Football

A return football match between the Melbourne Regional Administrative Office and Head Office was held at Darley Park, Bacchus Marsh on Sunday, 26th July.

The game turned out to be a real thriller with the R.A.O. once again being the victors.

Final scores were R.A.O. 9-13 (68 points), Head Office 4-13 (37 points).

Best players for R.A.O. were Phil Tyler, Clyde Smith, Ken Parker, John Walton, Greg Thill and Daryl Eaton, and for Head Office John Dodds, Martin Smith, Bob McCulloch, Ian McAlpine and Neil Barnes.

The game was played in excellent "spirit" and the day was thoroughly enjoyed by players and spectators alike.

Safety Abstract

Hazards to go-go dancers from exposures to "black" light from fluorescent bulbs.

Schall, E. L., et al. "American Industrial Hygiene Association Journal", Detroit, Michigan, U.S.A., July-August 1969, Vol. 30, No. 4, pp. 413-416, 14 bibl. refs.

Report on an investigation carried out in the United States in 1967 on possible skin and eye hazards of nightclub workers exposed to fluorescent "black light" bulbs. 20 clubs were visited and UV light energy was measured at various distances from the bulbs with a foot-candle meter, a black-ray UV meter with sensing filter and an IL-600 research photometer with sensing filters. The maximum energy densities of the bulbs (20-210 uW/cm^2) were recorded at about 365 nm. Skin and eye inspections were carried out on go-go dancers and hostesses, some of whom complained of a tiredness or a burning sensation when looking at the bulbs. No significant clinical evidence of eye or skin damage was discovered. Noise intensity measurements showed high levels (30-107 dBA).

SAFETY NOTES

Instant Manicure

On the first warm Saturday in spring, hospital emergency room crews expect a parade of patients holding a bloody towel around a lacerated or amputated hand or foot.

On opening day of the grass-grooming season, the rotary power mower begins its work of trimming lawns, fingers and toes.

About 70% of the injuries from power mowers are lacerations, amputations, and fractures that result from the cutting and crushing action of the fast whirling blade.

In addition, there are high-velocity ejections of wire, glass, stones and debris that can puncture vital body parts.

Most injuries associated with the rotating cutter occur when the operator reaches under the housing, pulls the machine over a foot, or picks at grass clogging the discharge opening.

Missiles thrown by the rotary blades strike bystanders as well as operators, and are like shrapnel up to 50 feet or more.

Working up or down a slope can cause loss of control and part of a foot. Mow at right angles to the slope.

Horrifying, isn't it? And all caused by a mower in perfect condition.

What about the mower in poor condition, with open discharge chute, worn blade bolts, and cracked or badly worn blades?

I am sure your mower is in good condition — or is it?

And that you handle it carefully — or do you?

And for those who will insist on mowing in bare feet, sandals, or thongs, etc.:

"Spring is here, the grass it grows
Whatever happened to my toes?"

The rhyme is corn, don't use a mower to remove yours.

J. W. Hallam, Safety Officer.

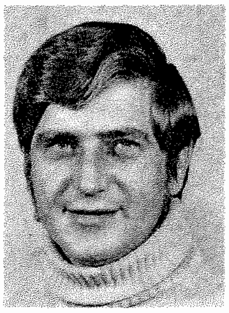
APPOINTMENTS TO STAFF

Dr. D. G. Cran has joined the Division of Horticultural Research to work on ultrastructural aspects of chloroplast development in higher plants.

Dr. CRAN

Dr. Cran graduated B.Sc. from the University of Edinburgh in 1966 and recently completed his studies for his Ph.D. at the same university.

Mr. W. J. Davidson has joined the Division of Entom-



Mr. DAVIDSON

ology to work on the preparation of biological materials and to study enzyme activity. Mr. Davidson graduated B.Sc. from the Australian National University in 1965 and after a short period at the University of Sydney returned to the A.N.U. in 1967 where he has been studying for his M.Sc.

Mr. I. E. Pollard has joined the Division of Computing Research where he will investigate new techniques for using the Division's computing equipment, develop suitable software, and act as a computing consultant for CSIRO research staff in the Melbourne area. Since graduating B.Sc. with honours from the University of Melbourne in 1965 Mr. Pollard has been studying at the same university for his Ph.D.

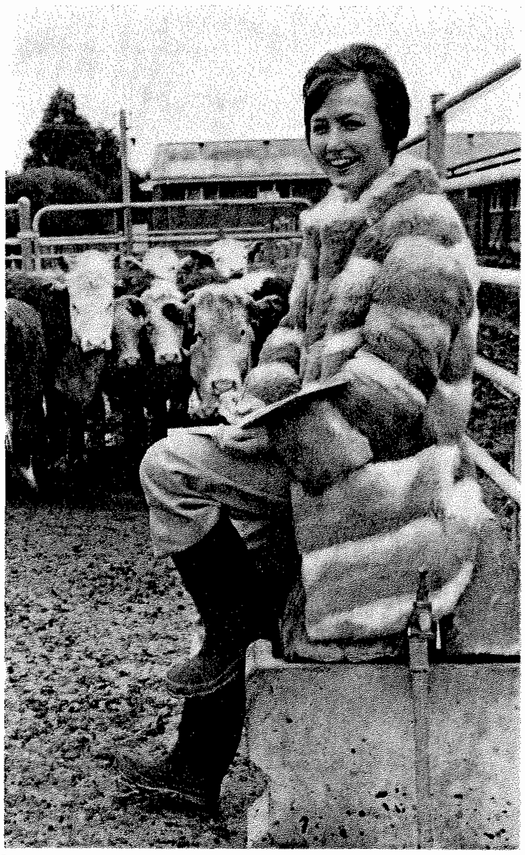
Mr. J. L. Smith has been appointed to the Division of Food Preservation to work on problems associated with the processing and preservation of fish, arthropods, and molluscs. Since graduating B.Sc. from the University of Sydney in 1968 Mr. Smith has worked as a school teacher and as a demonstrator at the same university.

Mr. H. A. Standfast has joined the Division of Animal Health to organize and extend serological techniques being used in the Division's Microbiology Section at the Long Pocket Laboratories, Brisbane. He will also carry out research on ephemeral fever and other arbovirus infections of domestic animals. Mr. Standfast graduated B.Sc. from the University of Queensland in 1954. From 1951 to 1956 he worked as a scientific officer in the Laboratory of Microbiology and Pathology of the Queensland Department of Health and from 1956 to 1961 as a malariaologist with the Public Health Department of Papua and New Guinea. Since then he has been a research entomologist with the Queensland Institute of Medical Research.

Mr. S. L. Lattimore has been appointed an Assistant Secretary in the Industrial and Physical Sciences Branch at Head Office where he will take part in the formulation development and implementation of policy associated with research in the Industrial and Physical Sciences. He will also be concerned with maintaining and fostering liaison between CSIRO and Australian research associations and with other bodies receiving grants from

Mr. LATTIMORE

CSIRO. Mr. Lattimore graduated B.Sc. with honours from the University of London in 1957. After studying cosmic ray, he joined B.T.H. Co. Ltd. where he worked on mechanical engineering research. He came to Australia in 1956 and after working as a physicist with ICIANZ and Kodak (A/asia) Pty. Ltd., joined the D.S.I.R., New Zealand, in 1961 where he was attached to the Physics and Engineering Laboratory. In 1967 he returned to Australia to take up a position with Plessey Pacific Pty. Ltd.



Petite sparkling-eyed bovine-tuberculosis researcher Teresa Switkowski of the Division of Animal Health, posing obligingly on a Maribyrnong Field Station drinking trough, quipped wittily to Coresearch camera-man Eric Smith, "You can bounce blizzards in this outfit, baby".

Preserving Our Rain Forests

(Continued from page 2)

The rain forests in a word, must be classified. The material to be handled is so complex that only a computer can cope with it; and only the last 5 or 10 years have there come into use computers large enough and powerful enough to tackle the job.

But we can't take a big computer into the equatorial forest with us; we've got to find some sort of model system closer to hand.

If we are ever to solve this problem there are five things we must have.

There must be rain forests of wide variety and easy access; there must be botanists — more precisely, ecologists—who have enough experience of rain forests to define the problems for study and to assess the meaning of the numerical results that are obtained; there must be numerical workers with sufficient understanding of both ecology and numerical analysis to advise on the computer programs to be used or, if necessary, written; there must be a battery of programs for the classification of large-scale data of a variety of types; and there must be a computer large enough and fast enough to carry out the necessary computation in a reasonable time.

At this moment there is only one region of the world where all five requirements exist simultaneously: that is, in eastern Australia.

If we in Australia are not prepared to carry out this work on behalf of the world, then it won't be carried out at all; because nobody else is in a position to do it.

And which of our five requirements matters most?

Well, a computer can be replaced and new programs can be written; men, too, can be replaced — their training may take a few years, but the rain forest will wait; but if the rain forests are destroyed they cannot be replaced in a human lifetime. We would be well advised to keep them.

"As far as I'm concerned, all this damn flapdoodle about the environment is just a trick to take our minds off the Commies."

Courtesy "New Yorker".

Algorithmic Theatre

In Paris another experimental play has bit the dust. L'Augmentation ("The Rise") by George Perec came off after only a four-week late afternoon run at the Theatre de la Gaiete at Montparnasse.

Perec won one of the coveted literary awards (the Prix Renaudot) in 1964 with his novel, Les Choses.

Since then he has turned increasingly to literary experiment and last year startled the Paris literary academicians with a novel called La Disparition, in which the letter e (18 per cent frequency rate in French) was conspicuous by its absence.

L'Augmentation started life as an attempt to translate a computer flow chart into ordinary language. But it was more than just a herculean literary exercise.

The editor of Enseignement Programme, in which it first appeared, wished to underline the limits of computer teaching with a binary decision tree model (a progression in which every decision point has two mutually exclusive alternatives).

Perec chose as his theme an underling's request for a rise in salary in a large corporation, worked out his own flow chart and then translated it into 30 pages of unpunctuated text ("you knock on your superior's door either he says come in or he doesn't if he doesn't you either . . . or . . . if he does say come in either . . . or . . ." and so on ad infinitum et ad absurdum).

From "New Society".

DEADLINE

Contributions to the October issue of Coresearch should reach the Editor at 314 Albert Street, East Melbourne, by Monday, 14th September.

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CORESEARCH

FOR CIRCULATION AMONG MEMBERS OF CSIRO STAFF — NUMBER 139 MELBOURNE, OCTOBER 1970

CHEMICAL ENGINEERING LABORATORY OPENED

A new laboratory complex for the Division of Chemical Engineering was opened at Clayton last month by the Minister for Education and Science, Mr. Nigel Bowen.

Located adjacent to Monash University, the laboratories cover a total area of 61,000 square feet and cost approximately $1.5 million.

The Division of Chemical Engineering is the second division to transfer to Clayton.

The first building on the site was the David Rivett Laboratory of the Division of Chemical Physics.

Commenting on the choice of site for the new laboratory, Mr. Bowen explained that its proximity to the university was no accident. He said it had always been a policy of the Executive to locate CSIRO laboratories, wherever possible, close to university campuses in order to stimulate and facilitate increased cooperation and collaboration between the Organization and universities.

"This proximity of the two institutions provides greatly improved opportunities both for mutual stimulus and the interchange of ideas and for the sharing of expensive equipment and facilities," he said.

"It also enables CSIRO and university scientists to gain a deeper understanding of one another's problems. All these interactions are desirable and are to be welcomed."

Speaking at the opening, the Chairman, Dr. J. R. Price, said that plans were now being made for the eventual transfer of the Division of Applied Chemistry to Clayton.

Because of the Division's special laboratory requirements, he said, this would be quite an expensive operation. Nevertheless, it was hoped that the transfer would take place in the mid 1970's.

The new laboratory complex is the first in Australia to be designed and built specifically for chemical engineering research and development.

The main unit contains laboratories, a library, an administration section, and conference and meeting rooms.

Other units include the light technical laboratory and two heavy technical laboratories, one of which is provided with a wide range of process equipment, as well as a workshop and store, a mechanical plant room and an electrical substation.

Functionally, the laboratories are designed for carrying projects through to the specification of criteria on which a full-scale plant may be designed.

In terms of scale of operations, the progression might be described as "beaker to bucket to tank".

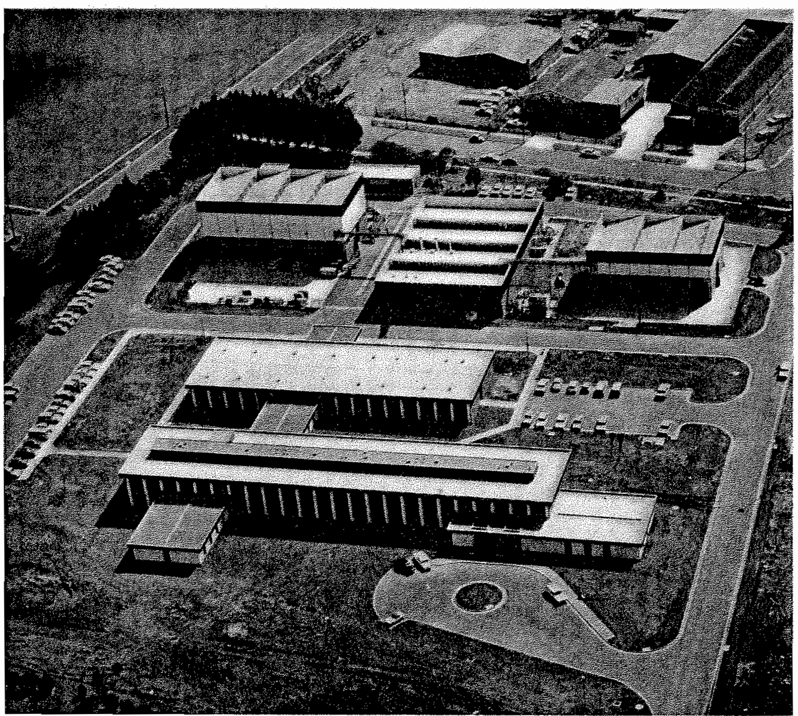
Thus an investigation may start in the scientific laboratories, leading to exploratory work on a larger scale in the light technical laboratory.

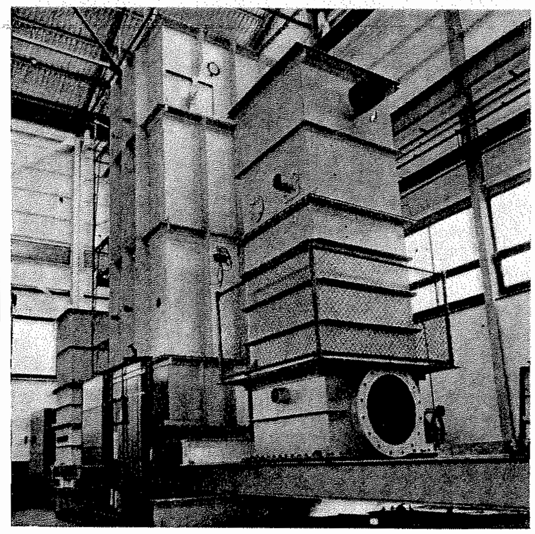
Experience in the latter could then call for pilot plant work in one or other of the heavy technical laboratories, where some indication could be obtained of yields, product quality, heat and mass balances, costs, and scale-up factors, thus providing data for full design.

Two important facilities have been incorporated into the new laboratories. One is a hybrid analogue/digital computer, by far the most powerful of its type in the country, which is finding application in the solution of a wide range of practical processing problems.

The other facility is a wide range of chemical engineering equipment, valued at about $200,000, which firms can operate, using their own staff if they wish, to try out modified or new industrial processes on a technical scale.

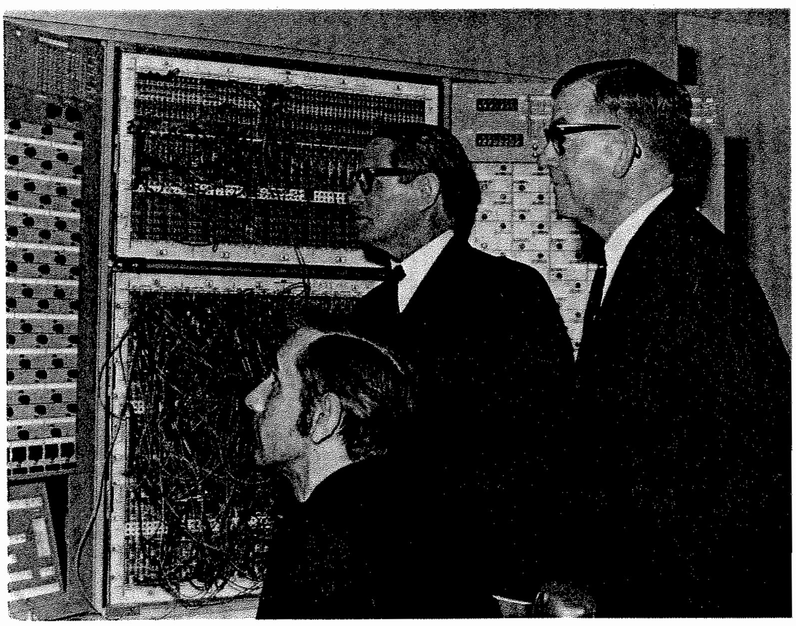
In the past this equipment has been used by industry for trying out such diverse processes as the purification of beeswax for the production of cosmetics, the concentration of beef broth, and the drying of wet hair removed from hides in fellmongering.





The new laboratory complex, above, of the Division of Chemical Engineering provides a wide range of equipment which industry can use to try out industrial processes on a technical scale. The full-scale fluidised bed, right, is used for both fundamental research and industrial trials. Applications of fluidised beds in Australian industry include the roasting of pyrites, zinc sulphide oxidation, foundry sand drying and cooling, salt drying, pea freezing, and plastic coating.

The Minister for Education and Science, Mr. Nigel Bowen, and Dr. J. R. Price, are seen below discussing the Division's analogue/digital computer, the most powerful of its kind in Australia, with Mr. P. Molloy of the Division.



POSITIONS VACANT

The following vacancies for professional appointments are current:

EXPERIMENTAL OFFICER (EO 1/2) — Division of Computing Research — 900/163 (8/10/70).

EXPERIMENTAL OFFICER (EO 1/2) — Division of Animal Genetics — 675/287 (9/10/70).

EXPERIMENTAL OFFICER (EO 1/2) — Division of Applied Physics — 750/469 (9/10/70).

MICROBIOLOGIST (EO 1/2) — Division of Fisheries and Oceanography — 320/438 (9/10/70).

PHYSICIST (EO 1/2) — Rangelands Research Unit — 951/16 (9/10/70).

MOLECULAR BIOLOGIST (RS) — Division of Plant Industry — 130/1094 (9/10/70).

AGRICULTURAL METEOROLOGIST (RS/SRS) — Division of Meteorological Physics — 420/253 (9/10/70).

HYDROLOGIST/ENGINEER (SSO 1/2) — Agricultural and Biological Sciences Branch, Head Office — 117/125 (16/10/70).

POSTDOCTORAL FELLOWSHIP IN PLANT BIOCHEMISTRY — Division of Plant Industry — 130/1090 (16/10/70).

EXPERIMENTAL OFFICER (EO 1/2) — Division of Plant Industry — 130/1049 (23/10/70).

CROP PHYSIOLOGIST — AGRONOMIST (RS/SRS) — Tobacco Research Institute, Division of Plant Industry 815/82 (23/10/70).

SOIL CHEMIST (RS/SRS) — Tobacco Research Institute, Division of Plant Industry — 815/83 (23/10/70).

PASTURE ECOLOGIST (RS/SRS) — Division of Tropical Pastures — 854/13 (23/10/70).

RESEARCH PHYSICIST IN FLUID MECHANICS (RS/SRS) — Division of Plant Industry — 130/1096 (30/10/70).

PROTEIN CHEMIST (PRS/SPRS) — Division of Protein Chemistry — 675/290 (30/10/70).

An Information Service for Australian Science

The CSIRO library, the State Libraries in each of the capital cities, the National Library in Canberra, together with numerous libraries in State and Commonwealth government departments, universities, colleges of advanced education, industrial firms, and scientific, technological and professional societies, formed a great resource of bibliographical material which could be made accessible to users of scientific and technical information, the Chairman, Dr. J. R. Price, told an audience in Canberra last August.

Dr. Price was delivering the Leighton Award Address at the Fourth National Convention of the Royal Australian Chemical Institute.

The theme of the convention was communication in chemistry and Dr. Price spoke on the communication of scientific knowledge for useful application.

He said that the enormous resource of bibliographic material which the various scientific and technical library holdings constituted was a total resource to be built on and exploited.

The proper exploitation and development of this total resource was receiving increasing attention, not only from those using it and those who wanted better access to it, but from those who had the responsibility for it.

The matter had been discussed recently by the Council of the National Library, the Standing Committee of the Australian Advisory Council for Bibliographical Services, and the Executive.

Opinion appeared to be healthily divided on the matter of exploitation and development of information resources, but proposals for action would probably emerge soon.

Although there was an urgency about this, there should not be unconsidered haste, Dr. Price cautioned.

Opinion differed in most countries on how the organization of information services on a national basis should be approached.

In Australia there was a lack of knowledge about the real needs (not the wants) of users of scientific and technical information.

Even with all the information currently available, the selection of a road to follow had to be a matter of judgement.

The situation in Australia was changing rapidly and it would be as well to avoid becoming irrevocably committed to only one of possibly a number of options.

Rather we should adopt an experimental evolutionary approach.

Because of the combined factors of tradition, geographical size and lack of density of our population, a good deal of the experience available from other countries was of only limited relevance to Australia.

Japan and Canada, however, provided two examples of some interest to Australia — the Japan Information Centre of Science and Technology, and the National Science Library of Canada.

The former was established in 1957 as a non-profit institution to act as the central organization of science information activities servicing the advancement of science and technology in Japan.

Its purpose and activities were:

- to collect world-wide science information comprehensively and to process it systematically.
- to disseminate information rapidly and appropriately to organizations and individuals regularly or upon request.
- to encourage science information activities in individual organizations and to assist them in the solution of problems they were unable to tackle themselves.

The Centre was financed through Government funds and subscription and service fees.

The National Science Library of Canada was a major agency responsible for the dissemination of scientific and technical information in that country.

It was complemented by a Technical Information Service within the National Research Council.

The National Science Library and the Technical Information Service constituted an information transferral agency, the resources and services of which were designed to ensure that Canada's scientists, engineers and industrialists had direct and immediate access to publications and information required in their day-to-day work.

The resources of the National Science Library of Canada now totalled some 725,000 volumes and had been built up in close cooperation with other federal libraries.

The function of the library, with its collection and services, was to reinforce and supplement local information services.

It served as the focal point of a national scientific and technical information network, and could be a particularly helpful guide since the Canadian situation closely paralleled our own in terms of history, economic, social and industrial growth, population and geography.

Dr. Price stressed, however, that Australia must develop its own system to meet its own particular needs and requirements, and must do this by the most efficient and economic means.

A national system should make the maximum use of existing resources. Ideally, in the Australian context, it should be developed by planned voluntary cooperation.

He suggested that the objectives of an information service for Australian science and technology could be:

- the provision of a national service, relevant to the present needs, and capable of development to meet the future needs, of the generators, processors, disseminators and users of information
- the optimum utilization of existing information services and systems and the development of new ones
- the promotion of national and international cooperation and liaison for the exchange of information
- the support and active encouragement of the development of facilities for education and training in information science and technology, to provide the qualified manpower which will render possible the implementation of a national information policy
- the support of, and active participation in, research, development and innovation in information science and technology to increase both the efficiency of information services and the quality of the information which these services provide.

There were two possible ways in which such a service might be established: a centralized system operated by a single authority, which would provide all services to all users, or a decentralized system with its components operating under a variety of ownerships and jurisdictions, but collaborating under the guidance of some coordinating body to constitute a network of services.

In the Australian situation, the second alternative appeared preferable for the following reasons:

- the users of information were themselves widely dispersed geographically, and widely divergent in disciplines, interests and objectives. To meet the needs of this varied clientele an information system must be diverse and flexible
- both the size of Australia and its distribution of population discouraged centralization
- Australia's present information services and libraries were operated by Federal and State Governments, by universities, private companies, industrial associations, and by professional societies. Each of these bodies was autonomous. This militated against their being superseded by a centralized system, with all the concomitant jurisdictional problems
- maximum use should be made of sources of information already available in the country. Even if it were possible to duplicate the collections of scientific and technical information already held in order to collect these at one central point, such duplication simply to achieve this end would be exceedingly expensive and wasteful of existing resources. This was not to say that some duplication was not necessary and desirable to meet known needs.

A National Information Service for Science and Technology could act most effectively and appropriately as the coordinating body and as the referral centre — a clearing house for existing scientific and technical information services in Australia.

In so doing it could identify needs and meet them either from its own resources or by arrangement with an appropriate centre.

It could also maintain effective liaison and participation at the international level.

But its main role as a national information service for science and technology would be to complement the resources and services already provided by the scientific and technical centres of Australia.

Its own resources and services should be designed to reinforce and supplement those services already existing rather than to supplant or replace them.

However, Dr. Price pointed out, even if Australia was successful in formulating and developing a proposal for the proper use and exploitation of its information resources, it would still be only the beginning of an experiment.

We still had to educate subject information specialists in the new tools (of which those produced by the American Chemical Society were but an advance guard); librarians had to be introduced to the new technology; computer specialists had to be enlisted to solve our problems; administrators had to be convinced of needs; and, above all, users had to be educated.

The total education problem associated with this whole subject was scarcely realized in Australia.

Scientists spoke glibly of the information explosion, but many of them had been surprised to learn that 85% of chemical abstracts were derived from only 2,000 titles, out of a total of 12,000. Were the other 10,000 titles of no great importance, Dr. Price asked.

How many scientists were prepared to cut down on the published word by agreeing to the publication of refereed abstracts?

Could the present generation of scientists and technologists adapt their working methods to depending on regular computer print-outs based on profile searches?

Were organizations, particularly the smaller industrial firms, willing to meet the bill for personalized E.D.P. current awareness searches?

What was being done to educate the next generation of information users? How many universities gave more than a passing thought to inducting students in the proper use of information sources? What thought had been given to education at the secondary level? Was this needed?

Were chemists and others prepared to let the librarian, and his colleague — the "information scientist" — help them? In other countries they were — what of Australia?

How many scientists really knew what present tools were available? Should they distinguish between wants and needs?

You need the help of the librarian and the information scientists, Dr. Price told his audience, but you should not attempt their job.

"Direct your energies to answering some of the questions I have just posed — these can be answered only by you. The answers are needed now."

"It can print information at the rate of 5,600 words a minute. Run a help wanted ad for someone who can read 5,600 words a minute". Courtesy "Saturday Review".

News In Brief

Sir Frederick Honoured

The honorary degree of Doctor of Science was conferred on **Sir Frederick White** last August by the University of Papua and New Guinea on the occasion of its first graduation ceremony.

Honorary Fellows

Sir Frederick White and **Emeritus Professor H. C. Webster,** Scientific Counsellor to the Australian Embassy, Washington, have been elected Fellows of the Australian Institute of Physics.

Doctorate

Mr. M. G. Ridpath of the Division of Wildlife Research has been awarded the degree of Doctor of Philosophy by the University of London for his work on the ecology and behaviour of the Tasmanian native hen.

Visitor

Professor P. J. van Demark of the Microbiology Department of Cornell University is spending twelve months at the Division of Animal Health, Melbourne, working with Dr. A. W. Rodwell on the metabolism of Mycoplasmas.

Below: Our picture shows Professor van Demark (left) and Dr. Rodwell discussing the structure of Mycoplasma mycoides (the organism which causes bovine pleuropneumonia) as revealed by the electron microscope.

Executive Member

Mr. J. L. Farrant of the Division of Chemical Physics was elected to the Executive of the International Federation of Electron Microscope Societies at its VIIth Congress in Grenoble, France, last month.

Mr FARRANT

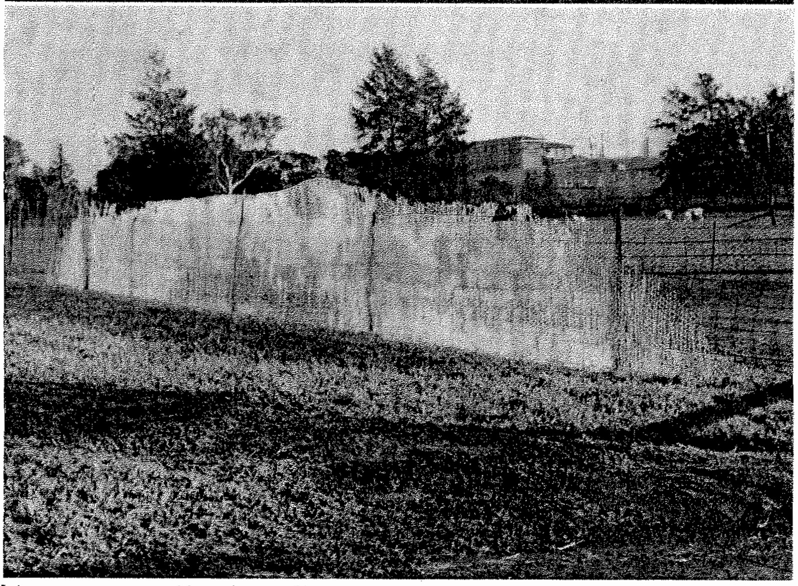
The Federation has accepted an invitation to hold its next Congress in Canberra in August 1974, and Mr. Farrant has been appointed Chairman of the Organizing Committee for the Congress.

Mr. Farrant is also Chairman of the National Committee for Electron Microscopy, Australian Academy of Science.

President

Dr. I. G. Jarrett of the Division of Nutritional Biochemistry has been elected President of the Endocrine Society of Australia and will hold office for two years.

BLEAK PROSPECT



It can get pretty cold at the Ian Clunies Ross Animal Research Laboratory at Prospect as this picture taken on the morning of a severe frost shows. This unusual effect was produced when a rotary water sprinkler was left operating at night.

Deadline

Contributions to the November issue of Coresearch should reach the Editor at 314 Albert Street, East Melbourne, by Thursday, 15th October.

Fund Contributors Meet

The Second Annual Meeting of Contributors to the CSIRO Benevolent Fund will be held in the Conference Room on the Third Floor, Head Office, at 9.30 a.m. on Tuesday, 10th November. (See story on back page.)

Training Course

At the end of last August a three day training course was held in Canberra for junior clerical staff from Canberra divisions and from the Regional Administrative Office.

During the course the trainees visited the Division of Entomology's laboratories at Black Mountain to gain a better appreciation of scientific research and the way it is carried out.

Below: Our picture shows Dr. R. J. Bartell of the Division of Entomology explaining his work to the trainees.

Retirement

Mr. W. R. Ferguson retired from CSIRO last month.

A graduate in architectural engineering from the University of Adelaide, he was awarded a CSIR studentship in 1933 and spent one year in the United States at the Forest Products Laboratory, Madison, and one year in Britain at the DSIR Forest Products Laboratory.

He joined the Division of Forest Products in 1935 as a research officer in the Timber Utilisation Section and three years later transferred to Head Office as Principal Architect.

Mr. Ferguson played a major role in the development of CSIRO's laboratories. The principles of laboratory design which he laid down are widely accepted in Australia and in many countries overseas.

As a consultant on laboratory design he has assisted research organizations in a number of countries including Indonesia, Ceylon, Thailand, and Uruguay.

London Appointments

Mr. R. F. Turnbull, Chief Scientific Liaison Officer in London, will return to Australia next month.

He will be replaced by **Dr. E. G. Hallsworth,** Chief of the Division of Soils. Dr. Hallsworth will take up his appointment, which will be for twelve months, next January.

Mr. D. B. Thomas, who has been Scientific Liaison Officer in the London Office since June last year will retain his current responsibilities.

In addition, a second Scientific Liaison Officer has been appointed to the London Office. He is **Mr. R. D. Croll,** Assistant Secretary (Agricultural and Biological Sciences).

Mr. Croll will take up duty early this month and will be responsible primarily for maintaining liaison with British research institutes and universities.

SAFETY NOTES

Bower Birds and the Call of Spring

Spring, when a young man's fancy turns to thoughts of love, and a housewife's turns to spring cleaning.

But what about the bower-birds? Not the feathered variety, but that large group of scientists, storemen and others who just can't bear to throw anything out.

How about it, you people who are always short of space. Do you really need to keep that old piece of equipment or apparatus, last used 10 years ago, but which "could be handy someday"?

And all those bottles of odd chemicals cluttering up the place and collecting dust. The ones that were required for that job that finished about 1961, and the ones obtained especially for Dr. Whosit — he left the Organization in 1953, didn't he?

Apart from the fact that they are no longer required, how safe are they? Have they deteriorated? Has the picric acid dried out?

You probably stopped using benzidine because of its carcinogenic properties, but what happened to the unused stock?

How much hazardous or unwanted stock has been cleaned out of the labs and sent back to the store? Very convenient for the labs but a nuisance, to say the least, for the storeman.

Why not arrange for one of your senior chemists to go through the chemical store, checking for deterioration, labels fallen off, chemicals obviously unwanted, and hazardous materials.

You may be really surprised at how much "junk" you have in the lab and store, and how much more spacious and safer it is without it.

Come on — bower-birds — try your wings. You may even find that missing item for which you have been searching.

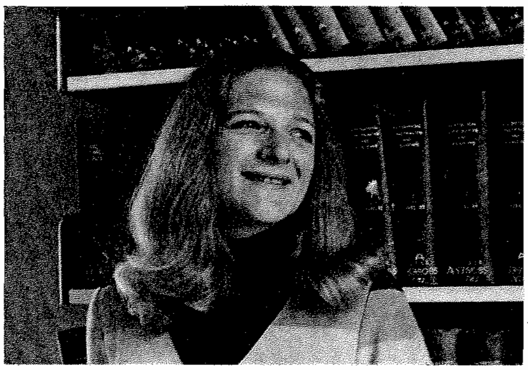
J. W. Hallam, Safety Officer.

APPOINTMENTS TO STAFF

Mr. P. A. Ahern has been appointed to the Division of Building Research where he will work on the development of computer programs and other techniques of the systems approach and their application to urban and other planning problems. Since graduating in civil engineering with honours from the University of Melbourne in 1969, Mr. Ahern has been working as a structural engineer with the firm of Crooks, Michell, Peacock and Stewart.

Mr. A. K. Chin has joined the Division of Mathematical Statistics to prepare compatible programs for statistical computations, data processing, and numerical analysis. Mr. Chin obtained his Diploma in Mathematics from the South China Teachers' Training College in 1959 and his Associate Diploma in Mathematics from the Royal Melbourne Institute of Technology in 1967. Since 1968 he has been working with Electrical Control and Engineering Ltd., Sydney.

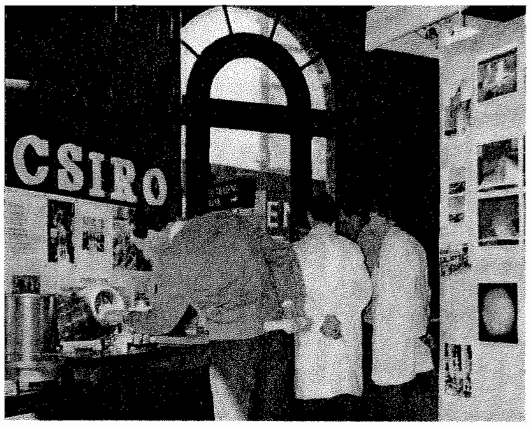
Miss Jay James has been appointed Librarian to the Animal Health Research Laboratory, Parkville. Miss James graduated B.A. from the University of Melbourne in 1965 and obtained her Diploma of Librarianship from the Royal Melbourne Institute of Technology in 1967. For the last two years she has been teaching in the Department of Librarianship at R.M.I.T.



Miss Jay JAMES

Dr. J. A. Frew has been appointed to the Division of Chemical Engineering to assist in the development of mathematical models of mineral processing and related plants with a view to optimizing performance and the introduction of automatic control. Dr. Frew graduated B.Eng. (Chemical) from the University of Melbourne in 1962 and M.Eng.Sc. from the same university in 1966. He recently obtained his Ph.D. at Northwestern University, Illinois.

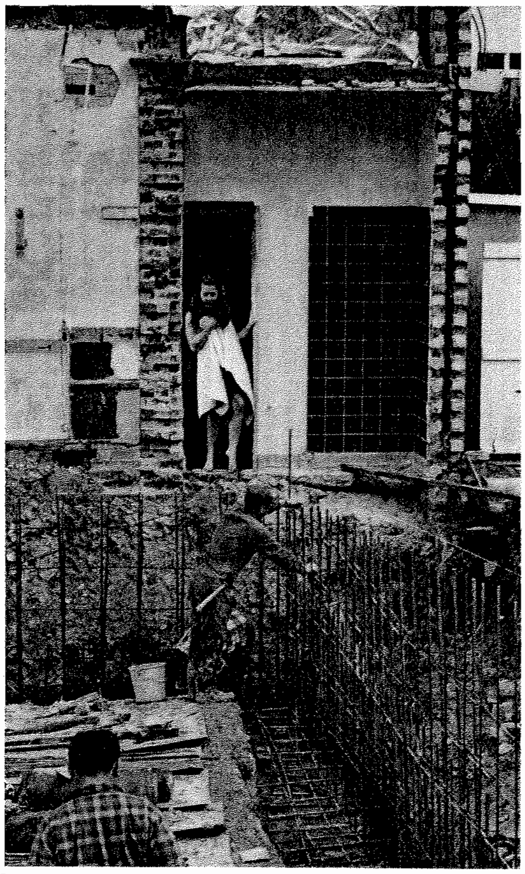
Dr. I. E. Grey has joined the Division of Mineral Chemistry to initiate research into the application of solid state chemistry to selected aspects of mineral processing, with emphasis on the identification of individual phases and on the conditions which govern their formation. Dr. Grey graduated B.Sc. with honours from the University of Tasmania in 1966 and Ph.D. from the same university in 1969. Before his appointment Dr. Grey was a Postdoctoral Fellow at the University of Texas.



With the assistance of Mr. J. Coles of the Division of Applied Physics, five apprentices from the National Standards Laboratory arranged the above display at the Commonwealth Bank, Sydney, for Apprenticeship Week. A number of other Commonwealth Departments also exhibited and an instrument constructed by Mr. A. Rawlinson of the Division of Plant Industry was on display.

Mr. G. J. Hansen has been appointed to the Division of Building Research where he will work on the conduct and management of building operations and related problems. Mr. Hansen graduated B.Sc. from Monash University in 1968 and began studying for his M.Sc. at the same university last year. Since early this year he has been carrying out operations research for Australian Consolidated Industries.

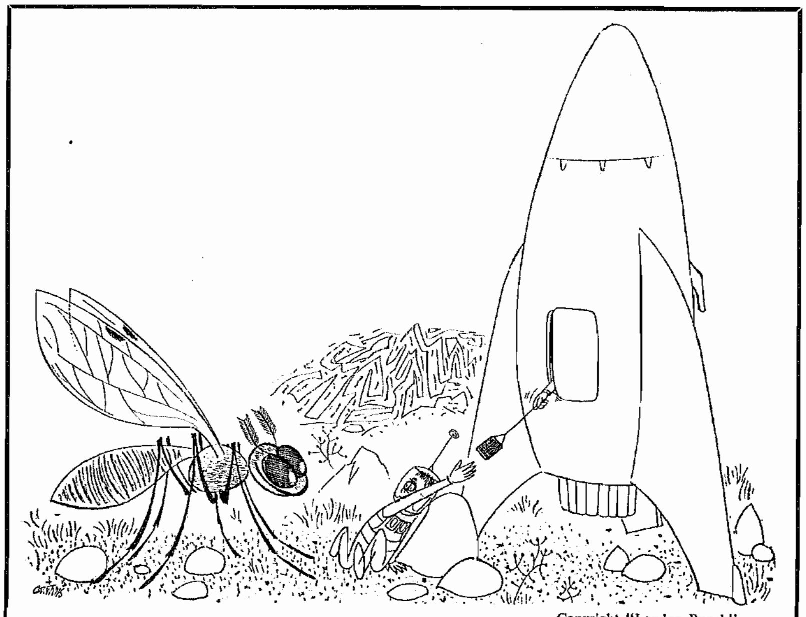
Mr. R. J. Illman has been appointed to the organic chemistry section of the Division of Nutritional Biochemistry where he will work on chemical synthesis and the development of methods of separation analysis based on chromatography and paper electrophoresis. Since graduating B.Sc. from the University of Adelaide in 1968 Mr. Illman has been working in the University's Organic Chemistry Department.



Shower rooms should be kept well ventilated to prevent mould growing on the paintwork, according to the experts at the Division of Building Research. The girls at the Division of Animal Health, Parkville, feel, however, that this sort of thing can be carried just a little too far.

Mr. K. A. Johnston has joined the Division of Applied Mineralogy to work on a system, based on the use of zirconium oxide solid electrolytes, for continuously measuring oxygen concentration in molten copper. Mr. Johnston graduated B.Sc. with honours from the University of New South Wales in 1961 and worked as a metallurgist with Australian Iron and Steel at Port Kembla until mid 1966. Since then he has been studying for his Ph.D. at the University of New South Wales.

Mr. I. W. Robertson has been appointed to the Division of Radiophysics where he will write scientific and data processing programs for the Cloud Physics Research Group. He will also assist in the analysis of the results of cloud seeding and other experiments. Mr. Robertson graduated B.Sc. with honours from the University of Sydney in 1963 and M.Sc. from the University of New South Wales in 1967. Before joining CSIRO he was studying for his Ph.D. at the Australian National University.



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CSIRO Benevolent Fund

Two years ago, with the encouragement of the Executive, the CSIRO Benevolent Fund was launched to help alleviate misfortunes suffered by members of the staff and their families.

To date, forty-eight grants totalling some $3,500 have been made.

The Fund is financed by voluntary contributions of 10 cents a fortnight from members of the staff located in Western Australia, South Australia, Tasmania and Victoria. The main aim of the fund is to provide advice and financial assistance to staff and their families.

The Benevolent Fund is administered by a General Committee comprising representatives of the Divisions and Sections. The General Committee elects annually from its members a Management Committee.

The Management Committee which meets regularly in Melbourne considers the cases which are brought to its attention. Information passed on to the Committee is handled in strict confidence.

Because of the frequent need for speedy action, the Committee has established procedures to cope with such cases, particularly those requests for assistance coming from areas outside Melbourne.

Membership represents participation by some 64% of staff in the area and the Management Committee feels that the work being done warrants better support.

If you are not already a member would you care to help? It only costs 5 cents a week and this can be deducted from your salary each fortnight.

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CORESEARCH

FOR CIRCULATION AMONG MEMBERS OF CSIRO STAFF ONLY — NUMBER 140 MELBOURNE, NOVEMBER 1970

NEW LABORATORY FOR DAIRY RESEARCH

A new laboratory wing for the Division of Dairy Research was opened last month at Highett by Mr. D. L. Chipp, Minister for Customs and Excise and Member of Parliament for the district.

The building, covering 15,000 square feet, cost about $350,000, which was contributed in roughly equal parts by the Commonwealth Government and a number of individual dairy companies.

Mr CHIPP

The new laboratory is intended to expand the Division's facilities for research on protein chemistry, recombined dairy products, milk protein products, and the chemistry of cheese manufacture.

A special laboratory and preparation room will be used for investigations into the development of new foods from milk.

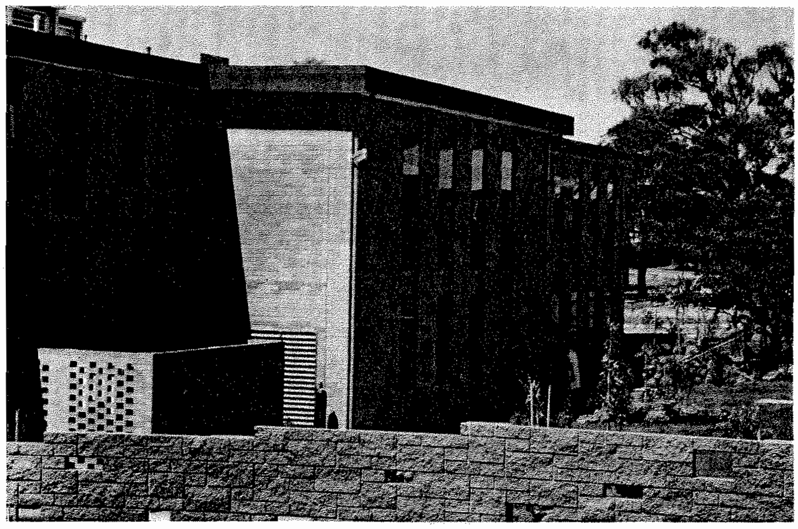
Speaking at the opening, Mr. Chipp commented on the recent achievement of the dairy industry in raising productivity. For example, milk production last year reached a record level of 1,665 million gallons, an increase of 9 per cent over the previous year.

He went on to say that the Division of Dairy Research had always played a large part in assisting the industry and he was confident that the new laboratories would continue to do so at this time when less accessible markets were becoming of major importance.

"In Indonesia alone," he continued, "there are some 120 million people, most of whom never consume dairy products."

Capturing these markets will not be easy, he said, and pointed out that butter from the Common Market countries can be delivered in Hong Kong at 20 cents a pound while the producer gets 70 cents a pound.

"Nevertheless the challenge is there. To meet it calls for a sensible approach to change, the acceptance of rationalization and a realization that the old ways and the old times are gone.



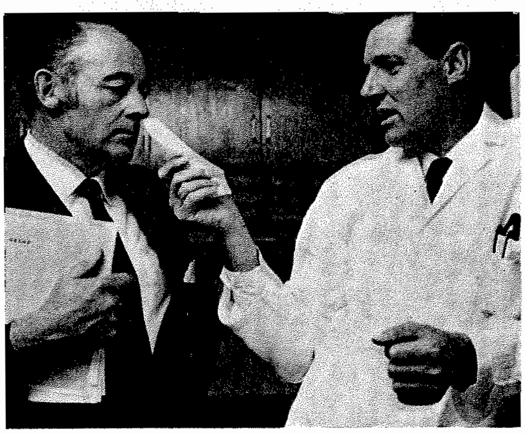
"This is not the time to encourage more people to turn to dairy farming. The call must be for research, technical innovation and vigorous marketing."

Introducing the Minister, the Chairman of the Executive paid tribute to the Chief of the Division, Mr. Loftus Hills, who will retire next year.

Mr. Loftus Hills has been with the Organization since 1940, when CSIR had a small dairy research section located at the Department of Agriculture's School of Dairy Technology at Werribee.

Under his direction the Dairy Research Section and the Division of Dairy Research have pioneered work in a number of new dairy products; among them are butter powder, butter fat shortening, special milk powder for bread and more recently, the high protein milk biscuit.

In the new laboratory wing (above) of the Division of Dairy Research Miss Barbara Keogh is seen showing Mr. W. F. L. Reese and Mr. E. B. Gilbert of the Australian Dairy Produce Board the action of bacteriophage on a cheese starter culture (immediately below). In the bottom photograph Mr. W. Stark discusses flavour chemistry with Mr. J. Bourne of the Regional Administrative Office, Melbourne.



Credit Society Raises Loan Maximum

Mr. R. W. Muncey, Chairman of the CSIRO Co-operative Credit Society, announced last month that the Society will now lend up to $8,000 to individuals for housing finance.

Mr. Muncey was speaking at the Thirteenth Annual General Meeting of the Society at Head Office on Thursday, 29th October.

Although it was agreed at a special general meeting of shareholders last March to amend the Rules of the Society to enable the maximum individual loan made or guaranteed by the Society to be increased to $8,000, there was some delay while approval to this amendment was obtained from the Registrar of Co-operative Credit Societies.

Mr. Muncey said that membership of the Society had increased during the financial year 1969/70 by 469, bringing the total membership to 2,840.

This compares with a net increase in membership in the previous year of 232.

The net increase in capital of the Society for the year was approximately $284,300. At the end of the financial year the total capital (money on deposit plus share capital) stood at nearly $1,879,000.

Loans totalling more than $820,875 were made to 497 members during the year. The total amount of loans outstanding at the end of the financial year was slightly more than $1,863,000.

Mr. Muncey drew attention to a provision of $2,500 for income tax for 1969/70 as compared with $75 for the previous year.

This was because of a recent decision by the Taxation Board of Review that net profit earned by credit societies was assessable as income for taxation purposes. The Society must now pay tax at the company rate.

Mr. Muncey reported that the new increased interest rates introduced last June for money on deposit with the Society had proved popular with investors.

This was a good indication that rates of investment in the Society compared favourably with outside investment rates, he said.

He pointed out, however, that the Directors of the Society were reluctant to make any moves at the present time to increase the present borrowing rate of $7\frac{1}{2}\%$ p.a. on the quarterly balance. This rate had remained unchanged since the formation of the Society.

In the same period bank overdraft rates had increased from 6% to $8\frac{1}{4}\%$.

There was little doubt, Mr. Muncey said, that the present rate offered to borrowers was highly satisfactory when compared with outside borrowing rates, especially when the death indemnity and disability insurance cover, which cost was carried by the Society, was taken into account.

POSITIONS VACANT

The following vacancies for professional appointments are current:

POSTDOCTORAL FELLOWSHIP (PLANT BIOCHEMISTRY OR PHYSIOLOGY) (RS/SRS) — Division of Food Preservation — 300/527 (13/11/70).

RESEARCH SCIENTIST (RS/SRS) — Division of Mechanical Engineering — 430/292 (6/11/70).

SOIL PHYSICIST (RS/SRS) — Division of Soils — 270/396 (6/11/70).

SCIENTIFIC SERVICES OFFICER (MEAT FLAVOUR AND TEXTURE EVALUATION) (SSO 1/2) — Division of Food Preservation — 300/530 (13/11/70).

SCIENTIFIC FILM OFFICER — Head Office — 113/36 (13/11/70).

EXPERIMENTAL OFFICER (AERODYNAMIC INVESTIGATIONS) (EO 1/2) — Division of Mechanical Engineering — 430/293 (13/11/70).

SCIENTIFIC ASSISTANT (SSO 1) — Division of Land Research — 618/294 (20/11/70).

EDITOR-IN-CHIEF (SPRS/CRS) — Editorial and Publications Section (30/11/70).

RESEARCH SCIENTIST (BOVINE INFERTILITY) (RS/SRS) — Division of Animal Health — 201/371 (11/12/70).

Interdisciplinary Communications

Communication requires three components: the originator, the channel, and the receptor. Such a three link chain may be very simple: two individuals, one of whom is talking to the other. It may become increasingly complex, and employ fantastically sophisticated electronic equipment as the channel.

The example of Nixon speaking to Armstrong over a distance of nearly a quarter of a million miles is still vivid in our memories.

A further elaboration, of great concern to scientists, is that the act of communication need not be instantaneous in time. An idea, a diagram, a piece of data may be recorded, and brought into contact with the receptor days or years later.

In this sense the originator may have absolutely no idea who his receptor may be or where he may be located.

The two ends of the chain may be separated by time, distance, language and philosophy. Little wonder then that communication may be difficult.

Communication also requires two other features. There must be an individual who wishes to distribute certain knowledge or material or who at the very least possesses it.

There must also be an individual who desires to be informed.

The qualification of the first individual is necessary because communication may be involuntary in certain circumstances, for example in areas of espionage.

In the areas of science and engineering one view is that there exists a random pattern. There are many thousands of originators. They have no idea who their receptors may be, and they cast their bread of information upon the waters of the scientific literature.

At the other end of our chain exist a multitude of receptors who, if I may be permitted a change in metaphor, have their personal radar periodically active to receive any intelligence which may strike it.

It is also evident that any individual may function both as an originator and as a receptor.

Traditionally, the scientist has paid no attention to his medium of communication. For the most part, he has taken the trouble to see that the results of his work have been recorded.

He has cared little for the clarity or ease of understanding of this record. If he has published it in the literature of science with which we are all familiar, he has generally tried to make the work appear as important and as impressive as possible.

Since we tend to be impressed by what we cannot readily understand, he has not infrequently made use of elaborate and complicated records. Thus an unnecessary complication enters the communicator process.

If he has not recorded his work somewhat permanently, he may have discussed it with colleagues, or presented a paper at a conference, meeting or symposium.

Here the scientist has acted directly as the originator, and used speech as the channel.

Of the many media available, these are the only two that have been used in any major way by the scientist and technologist.

In recent years a start has been made in utilizing the electronic media, but only in a secondary way.

What chemist has arranged to video tape all his experiments? What chemist has taped his descriptions and observations of experiments as he goes along?

The halting steps that we have taken into the electronic media have been for the purpose of storage and recovery, after the initial entry into the channel of communication has been made.

Let us consider briefly the classical method employed by the chemist/communicator in dealing with his results.

In response to one or more of several pressures, he writes a paper, which is submitted for publication in one of the 20,000 or so journals devoted to publishing the results of chemical research.

In last month's Coresearch we published part of an address given by the Chairman, Dr. J. R. Price, in Canberra last August at the Fourth National Convention of the Royal Australian Chemical Institute. The theme of the Convention was communication in chemistry.

The article on this page is based on an address given at that Convention by Mr. T. H. G. Michael, General Manager and Secretary of the Chemical Institue of Canada since 1958.

If found worthy it is duly printed. At this stage, it may be read by no one, or at best by very few. The cost to get it to this stage has been very high. The chemist's time and effort to do the writing; the time and effort of the reviewers; and the mechanical costs of publishing and distributing the journal.

The rapidly rising costs of this sort of procedure, and the even more rapidly rising volume of this sort of medium will make it necessary to re-examine this system of commencing communication very critically.

What are the motives which have caused the scientist to publish his research results in the form of a scientific paper?

The most probable reasons are:

- the hope of obtaining academic credit, either in the form of a degree or of promotion,
- the self-esteem engendered by seeing one's name in print,
- the desire to make new scientific knowledge available.

While all these motives imply a desire to communicate, the desired receptors in each case are different, and the techniques used by the scientist might well be different.

An aspect of this traditional part of the communications channel is of interest.

The recent institution of the page charge has had one interesting effect. It finally brought granting agencies which support research to realize that such research and its results was valueless until an attempt was made to communicate it. "To publish" was, in their framework, synonymous with "to communicate".

Up to the present, the scientist has found it necessary to use words in order to communicate and each discipline has evolved a more or less distinctive set of words, a jargon. The meaning of these phrases is known only to the elect.

At first, as the scientific disciplines took form out of the broad field of natural philosophy, no real problems arose.

For a long time chemists and physicists were cognizant of each others' fields. In fact, a lot of the early chemical work in the field of combustion and the identification of the components of air was done by physicists.

Each field grew, and as it grew it developed its own language. Then the fields began to develop sub-specialties.

The details of phraseology used by a biochemist are very different from those used by a theoretical inorganic chemist, and yet they are both chemists.

Differences in jargon between disciplines represent a major barrier to effective communication. The situation presents a real challenge to scientists to overcome, and to express themselves when they communicate in such a way that they can be understood by all potential receptors.

It is impossible to discuss the subject of communications today without referring to Marshall McLuhan, who has been termed the "high priest" of the new communications. He is best known for the phrase "the medium is the message".

The fact that such a statement can be made and accepted by many makes it necessary to consider it seriously.

Each medium is in its own way an extension of the self, of consciousness. Thus media may be thought of as extensions of the body, of the writing ability, of the voice.

McLuhan considers the medium based on electric technology to be in effect an extension of the brain, of the complete individual.

The medium exists, and has substance and meaning, regardless of what if any message may be transmitted by it. A medium has an impact on society through its own existence, and regardless of the use made of it. T.V., for example, has altered the social patterns of a generation, and has done this without any reference to the type of material or education or entertainment transmitted by it.

While in this sense the medium may indeed be the message, the scientist is concerned with his message, and with the selection of the best media for his communication needs.

In the special case of interdisciplinary communication in which the scientist seeks to communicate with the general public, it is necessary for him to choose media, or channels of communication, which will come to the attention of the public.

In the same way when he seeks to establish rapport with a specialized public such as members of government, he must choose the media most likely to be noted by the public in question.

When the desired receptor is known, his habits and preferences are the deciding influence in the choice of the way in which he is aproached.

In the common example of attempting to influence a governing political party, there is little use in employing as a medium the organ of a different party.

The electric medium, so-called, is finding its current use in connection with the storage and retrieval of information. This activity is part of the channel of communication. It is perhaps a holding tank in the system.

It seems probable that future developments will be in the direction of facilitating the direct input from the communicator to such data banks in the communications channel.

In his essay "Problems of Communicating with People through Media" Barrington Nevitt says:

"Although the content of any human communication may aim at expressing the subjective intent of the human transmitter, the actual message is the total effect produced on its human recipient — the result of the multi-level interplay of sensory responses, created in him with his own personal biases, by the combination of both content and media operating in, and interacting with, his total environment, physical, psychological, and social. The recipient actively participates in making his message from all the components that enter into his sensory life rather than passively matching it to what the transmitter intended."

Does any scientist interested in communicating have this type of reaction in mind?

If his prime audience or target is his own particular discipline, the problem may be somewhat less serious than if different disciplines are involved.

It may be that that natural products chemists, for example, tend to have the same sort of psychological make-up. They may tend to react in similar manner to a given stimulus.

One such chemist may therefore be in a position to synthesize from the communication generally what the originator intended.

Suppose, however, that the recipient, instead of being a natural products chemist in the same laboratory, is an engineering physical in another country, speaking a different language.

He may be oriented toward the application of knowledge rather than its generation. All the factors mentioned by Nevitt come into play. It would not be surprising if the result of the communication were different from the intention.

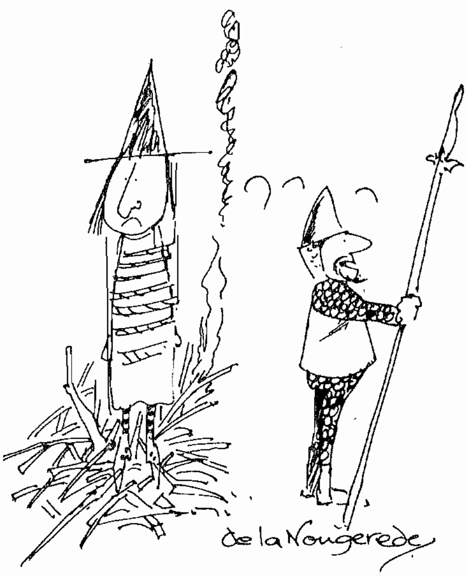
We have all at some time or other used a phrase such as "he took what he wanted from it".

If we consciously realize that this can be a part of the communications process in everyday life, we should not think that it cannot be also operative in the case of communicating in the field of science. The communicator must be aware of the conscious or unconscious bias in the recipient.

The report of the President's Science Advisory Committee in 1963 said "We do not understand the communication process well enough to know how our natural language can be made into an instrument for the most effective presentation of scientific and technical information".

This statement is still true today. It emphasizes the point that the communicator must take all the precautions within his power to make the material which he communicates simple, straightforward and easy to understand.

Every discipline evolves its own jargon . . .



"We have ignition."

DEADLINE

Contributions to the December issue of Coresearch should reach the Editor at 314 Albert Street, East Melbourne, by Friday, 13th November.

The News In Brief

Founding Member

Mr. J. F. Kefford, Assistant Chief of the Division of Food Preservation, has been elected to the Executive Committee of the newly formed International Union of Food Science and Technology. He has also been appointed Chairman of the Union's Education and Training Committee.

Golden Fleece

Dr. H. McL. Gordon of the Division of Animal Health, has been admitted as a Member of the Order of the Golden Fleece of the Californian Wool Growers in recognition of his research on sheep parasitology and his service to the sheep industry.

Memorial Lecture

The Food Technology Association of Tasmania has instituted a Myles Sykes Memorial Lecture to honour the memory of **S. M. Sykes** of the Division of Food Preservation who died on November 17, 1969.

Myles Sykes was Leader of the Food Research Unit at the Tasmanian Regional Laboratory in Hobart.

The first Myles Sykes Memorial Lecture was delivered in Hobart last month by **Mr. J. F. Kefford**, Assistant Chief of the Division of Food Preservation, who spoke on the subject "Food Science Serves the Food Industry".

Science Broadcasts

The A.B.C. science programme "Insight" will now be broadcast in Canberra over radio station 2CN at 9.30 a.m. every Sunday. "Insight" was previously broadcast over station 2CY.

Broadcast times for "Insight" over other A.B.C. stations remain unchanged at:

10.45 a.m. (Eastern time) — Sydney (2FC), Melbourne (3AR), Brisbane (4QG), Hobart (7ZL).

10.15 a.m. (Central time) — Adelaide (5CL).

10.40 a.m. (Western time) — Perth (6WN).

9.15 p.m. (Eastern and Western time)—Regional transmitters in country areas of N.S.W., Qld., Vic., Tas., W.A.

8.45 p.m. (Central time) — Regional transmitters in country areas of S.A.

Ski Club Notes

The CSIR Ski Club will hold its Annual General Meeting on Thursday, 12th November, at 8.00 p.m. at the Division of Protein Chemistry. Business will be to receive the Annual Report and the Audited Balance Sheet, both to be issued to all attending; to receive the Sub-Committee reports for Mt. Buller, Falls Creek, Mt. Hotham, Racing, V.S.A., and Social; and finally, to carry out the important task of election of the new office-bearers for 1971.

The Annual Dinner Dance will be held at the Rembrandt on Saturday, 28th November; tickets from Divisional Representatives and Mrs. M. Wailes (telephone 92 8937).

Housing Scheme

Since the A.M.P. Society's housing scheme for CSIRO officers commenced fourteen years ago 123 members of the Organization's staff have received housing finance totalling $1,049,260.

Most of this money was made available before 1967 when housing finance was fairly difficult to obtain.

However, the recent restrictions on housing loans imposed by the Banks during the latter part of 1969 again focussed attention on the A.M.P. scheme.

Although some officers were anxious to obtain finance from the Society they were not policy-holders (of two years' standing) and consequently were rejected.

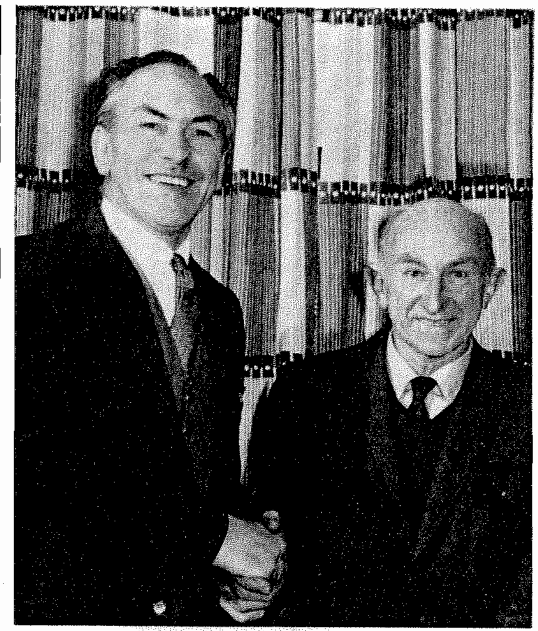
Others were deterred by the interest rates, which currently stand at 7½% per annum for loans up to $8,000 and 8% per annum for loans over $8,000 and not exceeding $12,000.

Notwithstanding this the A.M.P. housing finance plan is still attractive to a limited number of CSIRO officers (provided they are A.M.P. policy-holders) because the Society is prepared to advance up to 80% of the valuation of the property offered as security.

Although the Society has a formal limit of $12,000 on the amount of a housing loan this can be extended in special circumstances.

There have been several instances where CSIRO personnel have been advanced more than $15,000 by the Society whereas most Savings Banks will usually not provide more than $8,000.

All enquiries are kept strictly confidential. They should be directed to Mr. R. W. Viney, Finance Manager, Head Office, 314 Albert Street, East Melbourne.



Mr. N. B. Lynch retired from the Division of Forest Products last September after almost 26 years service with the Division. Mr. Lynch is an outstanding craftsman and an expert on wood finishing problems. Among the jobs with which he has been associated as a cabinetmaker are an inlaid table presented by the Commonwealth Government to the United States of America for inclusion in the Roosevelt Memorial, and a table with an inlaid map of New Guinea containing 19 native timbers which, together with a presentation box for a pictorial album, were presented to the Queen by the New Guinea Administration. Mr. Lynch was also associated with the basic cutting and machining of the plywood pieces forming the Clunies Ross Memorial Mural at the National Science Centre, Melbourne. He is seen here with the Chief of the Division, Mr. R. W. Muncey.

SAFETY NOTES

Who's at Fault?

Your 10 year old son is busy in the workshop with saw, hammer and nails. He asks you if he can use a chisel.

Is your answer typically "Yes, but be careful", or do you show him how to use it properly, and consequently safely? Whose fault is it when he gashes a hand?

In the lab, do you give your assistant a "standard method" and let him go ahead on his own, saying that it is quite straightforward if the instructions are followed carefully?

If so, I assume you will give your son or daughter, who has reached driving age, a book on how to drive a car and let them loose with the family vehicle.

When something goes wrong, whose fault is it, really?

Free Literature

The following publications are available free on request from the National Health and Medical Research Council, Canberra —

Code of Practice for the Safe Use of X-Ray Analysis Equipment, 1969.

Revised Radiation Protection Standards for Individuals Exposed to Ionizing Radiation, 1967.

Dose Equivalents, Maximum Permissible Doses and Dose Limits of Ionizing Radiation, 1969.

Atmospheric Contaminants, 1970.

It is strongly recommended that Divisions and Sections get copies of relevant booklets. The revised "Atmospheric Contaminants" should be in every establishment.

J. W. Hallam, Safety Officer.

Quotes for the Month

In the eyes of every author, I fancy, his own past work falls into four classes. First, the pure rubbish which he regrets ever having conceived; second — for him the most painful — the good ideas which his incompetence or impatience prevented from coming to much; third, the pieces he has nothing against except their lack of importance; these must inevitably form the bulk of any collection since, were he to limit it to the fourth class alone, to those poems for which he is honestly grateful, his volume would be too depressingly slim.

W. H. Auden — Preface to Collected Shorter Poems 1930-1944.

A friend who at a pinch cannot remember a thing or two that never happened is just as bad as one who does not know how to forget.

Samuel Butler.

Wool Research Committee

The Executive has appointed a special committee to advise it on the Organization's wool production and wool textile research programmes.

Mr. L. W. Weickhardt, Chairman of the Australian Innovation Corporation, will be Chairman of the new committee.

The other members of the committee are **Professor C. W. Emmens**, Professor of Veterinary Physiology, University of Sydney, **Professor F. Jarrett**, Dean, Faculty of Economics, University of Adelaide, **Mr. D. D. von Bibra**, Australian Wool Board, **Dr. R. B. Dun**, Executive Officer, Australian Meat Research Committee, and **Mr. W. J. Vines** and **Mr. W. Grant Davies** of Dalgety Australia Limited.

The committee will be assisted by **Dr. D. B. Williams** who will be returning to CSIRO from the University of Melbourne to act as secretary.

The committee will undertake a review of the Organization's current wool production and wool textile research.

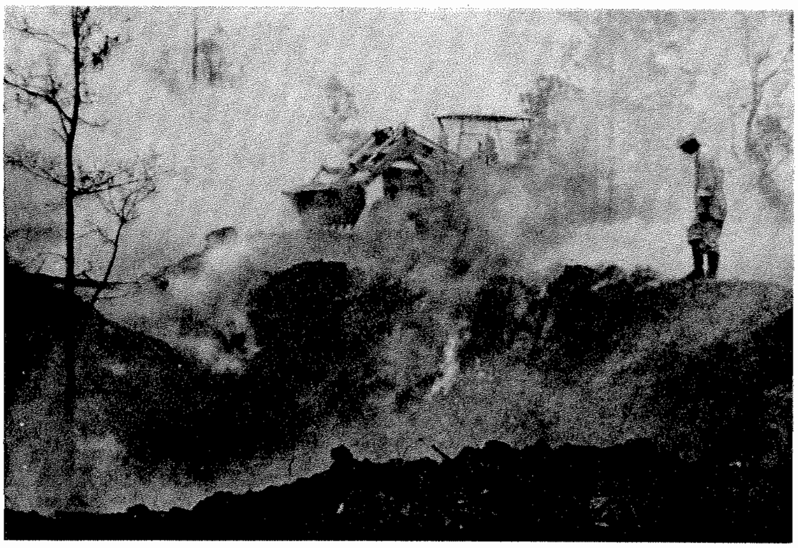
Projects financed from both Treasury funds and the Wool Research Trust Fund will be covered in the review.

An assessment will be made of the relationship between the needs of the wool industry, the ways in which resources for the research are apportioned, and the balance between short and long term projects.

The adequacy of facilities available for research will also be assessed.

The committee will bring to the notice of the Executive any changes in research programmes it believes desirable as well as any measures necessary to improve the presentation of research findings.

Low-grade coal waste products from coal mining operations are known to accumulate in large heaps where bushfires and long periods of high temperatures can cause them to catch fire and smoulder for many years. The problem has been investigated by the Division of Mineral Chemistry and is the subject of a new 24-minute colour film made by the Film Unit. The film was screened recently at the Annual Conference of the Australasian Institute of Mining and Metallurgy and shows how fires in coal waste dumps can be prevented and controlled by proper construction and chemical treatment.



BUZ-WORD GENERATOR
Second Generation

The following technical writing kit was prepared by Honeywell's E.D.P. Division. It is based on the Simplified Integrated Modular Prose (SIMP) writing system. Using this kit, anyone who can count to 10 can write up to 40,000 discrete, well-balanced grammatically correct sentences packed with state of the art terminology.

To put SIMP to work, arrange the modules in A-B-C-D order. Take any four-digit number, 8751 for example, and read Phrase 8 off Module A, Phrase 7 off Module B, etc. The result is a SIMP sentence. Add a few more four-digit numbers to make a SIMP paragraph.

After you have mastered the basic technique, you can realize the full potential of SIMP by arranging the modules in D-A-C-B order, B-A-C-D order, or A-D-C-B order. In these advanced configurations, some additional commas may be required.

SIMP TABLE A

1. In particular,
2. On the other hand,
3. However,
4. Similarly,
5. As a resultant implication,
6. In this regard,
7. Based on integral subsystem considerations,
8. For example,
9. Thus,
0. In respect to specific goals.

SIMP TABLE B

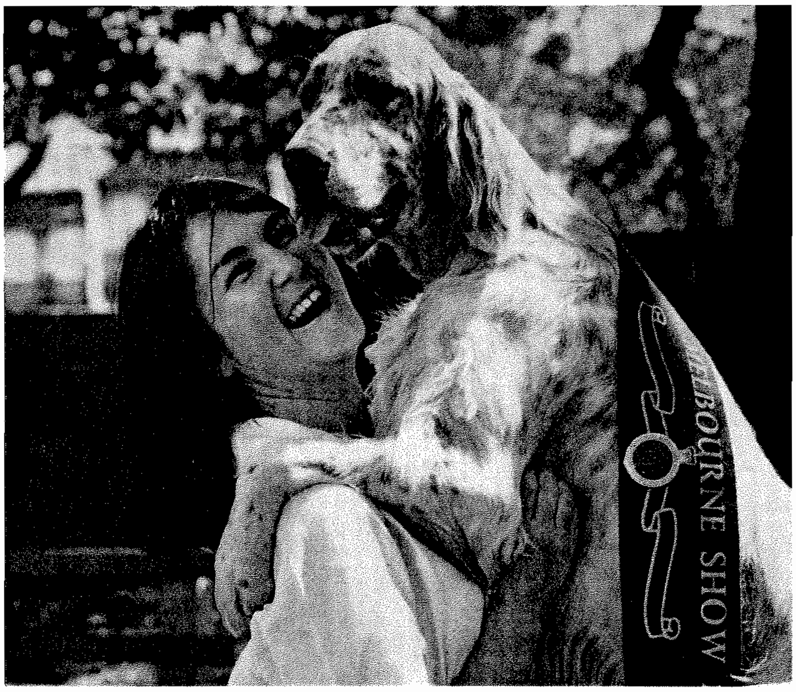
1. a large portion of the interface co-ordination communication,
2. a constant flow of effective information,
3. the characterization of specific criteria,
4. initiation of critical subsystem development,
5. the fully integrated test program,
6. the product configuration baseline,
7. any associated supporting element,
8. the incorporation of additional mission constraints,
9. the independent functional principle,
0. a primary interrelationship between system and/or subsystem technologies.

SIMP TABLE C

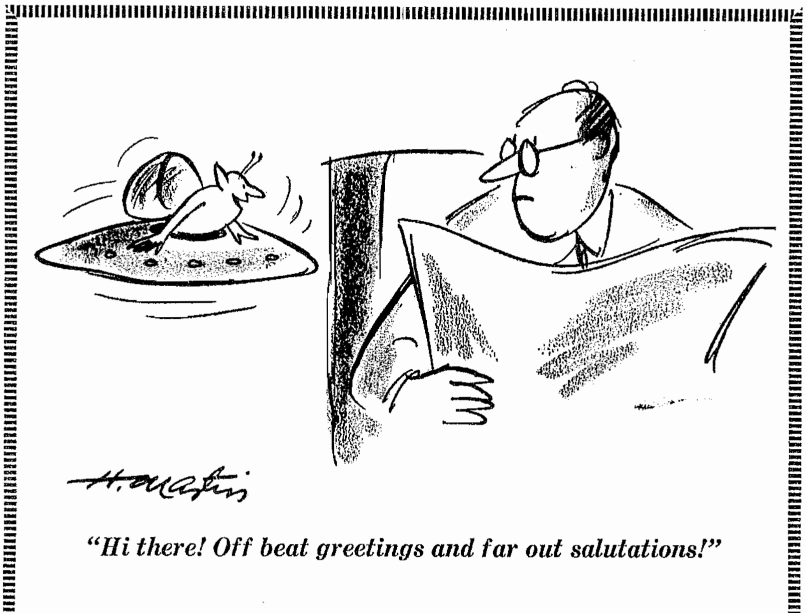
1. must utilize and be functionally interwoven with,
2. maximizes the probability of project success and minimizes the cost and time required for,
3. adds explicit performance limits to,
4. necessitates that urgent consideration be applied to,
5. requires considerable systems analysis and trade-off studies to arrive at,
6. is further compounded, when taking into account,
7. presents extremely interesting challenges to,
8. recognizes the importance of other systems and the necessity for,
9. effects a significant implementation,
0. adds overriding performance constraints to.

SIMP TABLE D

1. the sophisticated hardware,
2. the anticipated fourth generation equipment,
3. the subsystem compatibility testing,
4. the structural design, based on system engineering concepts,
5. the preliminary qualification limit,
6. the evolution of specifications over a given time period,
7. the philosophy of commonality and standardization,
8. the greater fight-worthiness concept,
9. any discrete configuration made,
0. the total system rationale.



About a year ago, Beverley Watt of the Division of Animal Health, Parkville, was featured on this page, tending an alleged geep, which proved to be a rather disappointing animal. But there is nothing disappointing about Lisa (Ch. Wenella Shaudelle), Beverley's English Setter, who was awarded a blue ribbon at the Royal Melbourne Show.



"Hi there! Off beat greetings and far out salutations!"

APPOINTMENTS TO STAFF

Miss Annette Angyal has been appointed to the Division of Animal Genetics to carry out research on basic genetic processes. Since graduating B.Sc. from the University of Sydney in 1965 Miss Angyal has worked with the Sydney Blood Transfusion Service, the Biochemistry Department of the University of California, Hammersmith Hospital, London, and the Royal Melbourne Hospital.

Mrs. Ditta Bartels has joined the Division of Animal Genetics where she will study basic genetic processes including mutation and chromosome breakage. Mrs. Bartels graduated B.Sc. from the University of Sydney in 1968 and Dip.Ed. from Sydney Teachers' College in 1969.

Mrs. Merilyn Edwards has been appointed to the Division of Animal Genetics where she will carry out research on basic genetic processes. Mrs. Edwards graduated B.Sc. with honours from the University of Sydney in 1968 and since then has been a research assistant at Riker Laboratories, Thornleigh, New South Wales.

Mr. J. R. Gardner has been appointed to the Division of Mineral Chemistry where he will study the surface properties of mineral oxides in relation to the development of separation methods of flotation. He graduated B.Sc. with honours from the University of Melbourne early this year.

Mr. A. B. Hearn has joined the Division of Land Research and will work at the Kimberley Research Station, Kununurra, on the agronomy of irrigated cotton. Mr. Hearn graduated B.Sc. at the University of Reading in 1954 and obtained his Diploma in Tropical Agriculture from the Imperial College of Tropical Agriculture, Trinidad, in 1956. From 1956 to 1961 he was with the Agricultural Department of Nyasaland. Since then he has worked with the Cotton Research Corporation in Southern Arabia and in Uganda.

Dr. M. M. Ludlow has joined the Division of Plant Industry where he will carry out research on the physiology of pasture legumes and grasses. At the University of Queensland Dr. Ludlow graduated B.Agr.Sc. with honours in 1964 and Ph.D. in 1969. Until his appointment he was Senior Visiting Research Fellow at the Department of Botany, University of Aberdeen.

Mr. G. B. Marshall has joined the Division of Building Research where he will carry out research on the conduct and management of building operations and related problems. Before his appointment Mr. Marshall was a Staff Officer in the Division of Weapons Engineering of the Royal Australian Air Force. He graduated B.Sc. from the University of Queensland in 1959.

Dr. D. A. Ratkowsky has joined the Division of Mathematical Statistics and will undertake research at the Tasmanian Regional Laboratory on statistical aspects of the Laboratory's research programmes. Dr. Ratkowsky graduated B.Ch.E. from City College, New York, in 1956 and Ph.D. from the University in Washington in 1962. From 1961 to 1962 he held a NATO Fellowship at the University of Cambridge at the University of Queensland. Between 1964 and 1968 he was Assistant Professor in the Department of Chemical Engineering at the University of British Columbia and since 1968 he has been Officer-in-Charge of the Biometry Section at the Waite Agricultural Research Institute.

Mr. A. Souprounovich has been appointed to the Division of Building Research where he will study the durability of organic building materials. Since graduating B.Sc. from the University of Queensland in 1967 Mr. Souprounovich has been working as a chemist at the Government Chemical Laboratories, Brisbane.

Mr. R. J. Steele has joined the Division of Mineral Chemistry to work on methods of extracting metals from their ores, with particular emphasis on systems involving halogens in molten salts and vapour transport reactions. Since graduating B.Sc. with honours from the University of New South Wales in 1966 Mr. Steele has been studying for his Ph.D. at the same university.

Mr. G. Worotnicki has been appointed to the Division of Applied Geomechanics to carry out research on methods of rock stabilization in surface and subsurface constructions. Mr. Worotnicki obtained his Diploma of Mechanical Engineering from the Institute of Mechanical Engineering, Kharov, Ukraine, in 1940 and his Diploma in Secondary Metallurgy from Sydney Technical College in 1952. Since then he has worked as an engineer with the Snowy Mountains Hydro-electric Authority.

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CORESEARCH

FOR CIRCULATION AMONG MEMBERS OF CSIRO STAFF — NUMBER 141 MELBOURNE, DECEMBER 1970

DEATH OF DR JOHN FALK

Dr. J. E. Falk, Chief of the Division of Plant Industry, died at Canberra Hospital on the morning of 25th October after a prolonged illness.

The following appreciation of Dr. Falk was written by several of his colleagues.

John Falk will be remembered for his notable contributions in many areas, both in the sciences and the arts.

He was a recognized world authority in an important area of biochemical research. His book, "Porphyrins and Metalloporphyrins", which he was revising at the time of his death, was awarded the Archibald Olle Prize of the Royal Australian Chemical Institute.

He was the first President of the A.C.T. Branch of the R.A.C.I., a former President of the Australian Biochemical Society, and a former President of the Botany Section of A.N.Z.A.A.S.

John Falk placed heavy stress upon the necessity for close liaison between the scientist and the community to ensure that the fruits of research were exploited profitably. He broadcast frequently, wrote prolifically for the Press and "general" journals, gave many lectures and addresses. He played a very active part in current discussions on defining a government science policy, and in developments in the social role of science.

Agricultural research and agricultural practice owe much to John Falk. He succeeded Sir Otto Frankel, an eminent geneticist and plant-breeder, as Chief of the largest division of CSIRO and among the largest agricultural research institutions in the world. He devoted his efforts to building bridges between the research of his Division, and the worlds of the farmer, the economist, and the extension worker, as well as maintaining the scientific excellence of the institution.

The relationships between scientific research, economics, and agriculture also attracted his interest. He saw clearly the dilemma posed by the great need for maintaining quality in scientific research, and investigating the immediate problems of industry.

With single-minded determination he set about strengthening the links between his Division and State Departments of Agriculture. He succeeded so remarkably in this objective that today some nine officers of Departments of Agriculture are housed in the Division.

He enjoyed nothing more than to share his love of music with his family and friends. He had been President of the Canberra Orchestral Society at a significant time in the fostering of musical activities in a fast-growing city in the late 1950's. An outstanding organizer with a rare breadth of vision, John Falk guided the Society in its efforts to establish the Canberra School of Music.

John Falk's many achievements in forging links between different scientific disciplines, between scientists and others in the community, between the arts and the sciences, owed much to his aptitude to get on with diverse groups of people. The man will be remembered as much as the distinguished scientist.

Dr. Falk was born in Cessnock, New South Wales. He received much of his formal education and began his scientific career in Sydney graduating in science from the University of Sydney in 1942. In 1949 he was awarded a Nuffield Fellowship which enabled him to work at University College Hospital Medical School, London. He obtained his Ph.D. from the University of London in 1951 and in 1953 was awarded the Foulerton Research Fellowship of the Royal Society.

Dr. Falk joined CSIRO in 1955 to lead the Biochemistry Section of the Division of Plant Industry, and became Chief of the Division in 1963. He was a Fellow of the Australian Academy of Science, Fellow of the Royal Australian Chemical Institute, and held many distinguished offices in professional societies.

As Chairman of the A.C.T. Committee of the Freedom from Hunger Campaign in 1967 and 1968, and member of the Projects Committee of the National Freedom from Hunger Campaign, he did much to show the scientific effort involved in technical aid programmes.

He was a distinguished flautist, having played for many orchestras, including the Sydney Symphony Orchestra. Dr. Falk did much to encourage musical activities in Canberra, and was President of the former Canberra Orchestral Society in the late 1950's.

Rainmaking School

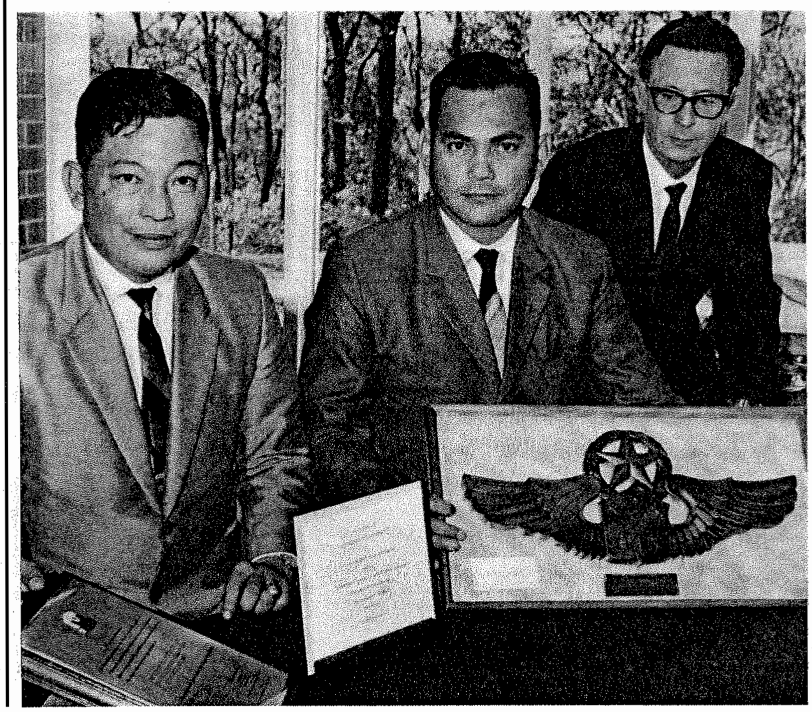
The Division of Radiophysics recently held its fifth course of instruction in cloud seeding techniques to stimulate rainfall. It was attended by delegates from the Philippines, Peru, Korea, the United States of America and New Zealand, and from Australian State Government Departments.

After the course a plaque was presented to the Chief of the Division, Dr. E. G. Bowen, on behalf of the Vice-President of the Philippines, His Excellency Fernando Lopez.

The inscription on the plaque expresses appreciation for the aid and assistance the Division has given over the years to the Republic of the Philippines in developing its own cloud seeding program, which is part of an overall campaign to stimulate the country's agricultural productivity.

Dr. Bowen also received a carved mahogany replica of the Philippines Air Force emblem, presented on behalf of the Commanding Officer of the Air Force, Brigadier-General Singson, in gratitude for the training program in cloud seeding operations arranged for pilots from the Philippines.

Below: Lt.-Colonel Macabuhay and Major Paiso of the Philippines Air Force, with Divisional Secretary Noel Seddon, arranging the plaque and the emblem into a display in the foyer of the Division's laboratories at Epping.



PLANNER

Dr. D. F. Waterhouse, Chief of the Division of Entomology, has been appointed to a committee drawn from scientists from a number of countries to help plan an International Centre of Insect Physiology and Ecology.

The Centre will be established at Nairobi in Kenya and hopes to receive financial support from the United Nations Development Fund and private foundations.

It will carry out research aimed at controlling insect pests and will train research entomologists from Kenya and other east African countries.

RETIREMENT

Mr. W. A. Holt of the Regional Administrative Office, Sydney, retired last month and was awarded the Imperial Service Medal in recognition of his services to the Organization.

Mr. Holt joined the clerical staff of the National Standards Laboratory in 1941.

Since 1950 he has been responsible for customs, shipping and travel arrangements for officers in the New South Wales region.

He has also assisted visiting scientists and new appointees from overseas with their travel arrangements.

Pawsey Medal

Nominations Invited

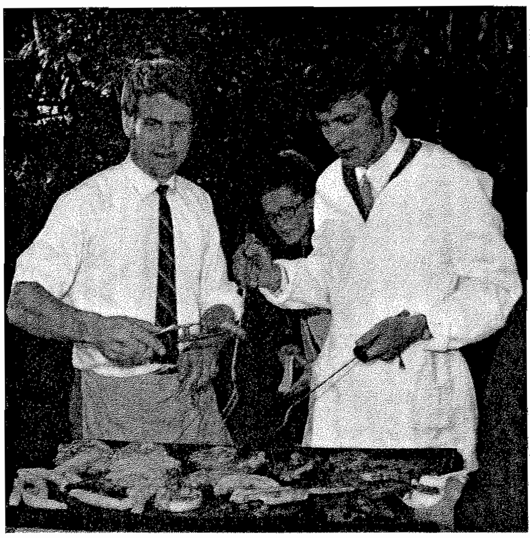
The Pawsey Medal has been endowed to commemorate the unique contributions to science in Australia by the late Dr. J. L. Pawsey, a former Assistant Chief of the Division of Radiophysics.

The Medal was first awarded in 1966 and its purpose is to recognise outstanding research in physics by younger scientists. Candidates must be under the age of 36 years at the closing date for nominations, and their research must have been carried out mainly in Australia.

Nomination of candidates has been invited by the Australian Academy of Science. All nominations are strictly confidential, and should be addressed to: The Executive Secretary, Australian Academy of Science, Gordon Street, Canberra City, A.C.T. 2601.

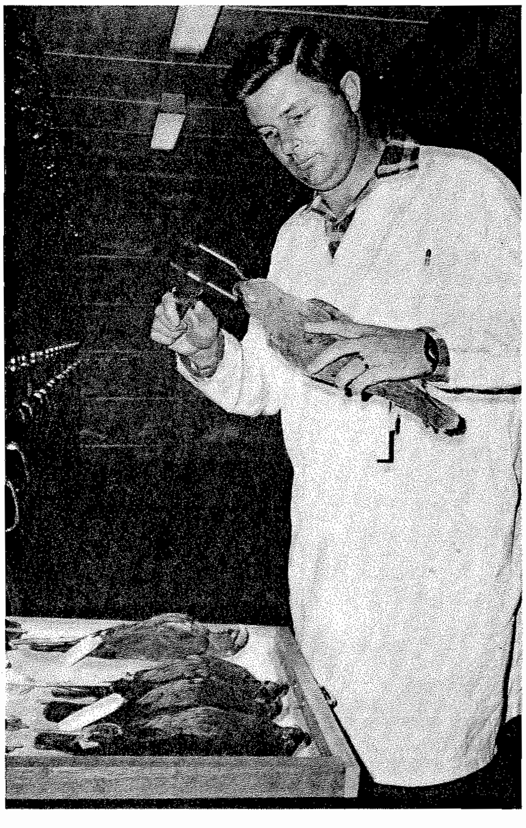
Included with the candidate's name should be his date of birth, postal address, and sufficiently full details of the research he has performed to allow an accurate assessment by the selection committee appointed by the Council of the Academy.

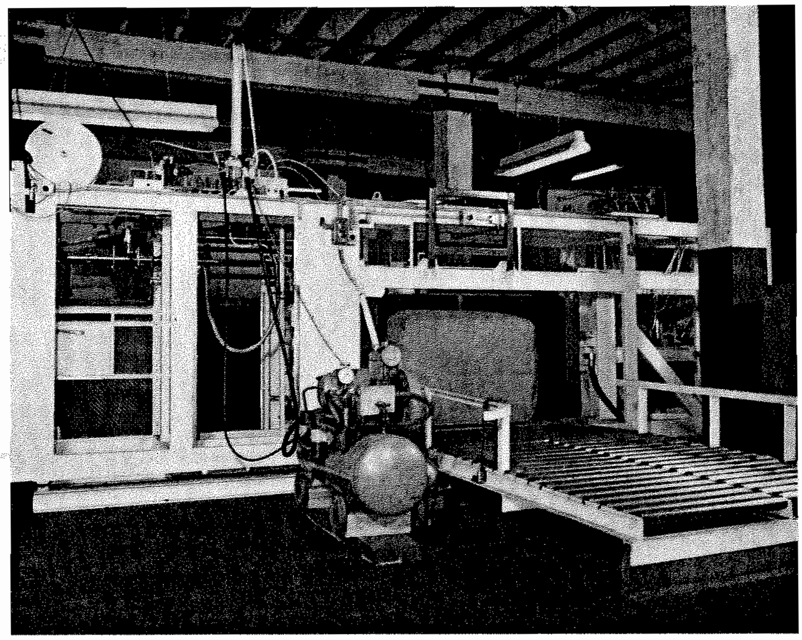
Nominations close on 31st December.



More than 50 members of the Division of Soils attended a Social Club barbecue at the Edinburgh Hotel, Adelaide, last October. Above: Miss Prue Ringwood waits hungrily in the background while Bryan Smith (left) and John Dighton manipulate the meat. Below: John Pickering and Rachel Baker munch approvingly on their T-bones.

Mr. J. M. Forshaw of the Division of Wildlife Research has been awarded a Winston Churchill Fellowship to enable him to gather information and material in Europe, Asia, North and South America, and the Pacific for a book, "Parrots of the World". Mr. Forshaw is seen below examining museum specimens of Australian parrots.





Measuring Wool Objectively

There was an urgent need to achieve maximum efficiency and economy in wool marketing operations and this seemed certain to accentuate the trend towards objective measurement for the Australian wool clip, Mr. J. G. Downes, Chief of the Division of Textile Physics, said last month.

Mr. Downes, who was speaking at an Advisory Council meeting in Sydney, said that the demand for a range of efficient instruments to carry out objective measurement of the clip would become even more intense if the industry eventually adopted the practice of testing wool before sale.

He told the Council that the Division of Textile Physics had begun its research on wool sampling and measurement ten years ago in anticipation of the present trend.

About forty per cent. of the research effort of the Division was now directed towards new or improved techniques for wool measurement and to the development of wool testing equipment.

Test equipment currently undergoing trials or at various stages of development would make possible the automatic sampling and measurement of such important characteristics as "yield", fineness, vegetable matter content and staple length.

Mr. Downes pointed out that over the past ten years, objective measurement of the yield (content of clean fibre) had increased to the stage where nearly forty per cent. of the annual clip was tested, but this testing only occurred after sale.

The most expensive part of this testing was not the cost of the test itself but the cost associated with getting access to and sampling the wool.

Sampling wool bales after sale involved a good deal of handling and this was costly.

The stage had now been reached where it was almost certainly more economical to sample all wool bales when they were weighed as they entered the wool store.

An automatic coring machine had been developed by the Division to sample bales at this stage and was able to handle up to 120 bales an hour.

Mr. Downes said that there was now a strong case, not only for sampling all bales before sale, but also for testing samples before sale.

The information obtainable from these tests should be useful to the wool-selling broker and to the woolgrower as well as to the buyer.

The broker might be able to make substantial economies in handling and marketing practices and the grower could obtain essential information on which to base his classing, culling and breeding operations.

An even more radical development would be to offer wool on the sale floor on the basis of representative samples tagged with the principal characteristics as measured during pre-sale testing, Mr. Downes said.

It would be a distinct advantage if wool, like its synthetic fibre competitors, was offered for sale in this fashion on the basis of specified characteristics such as diameter, length, and colour of the fibre.

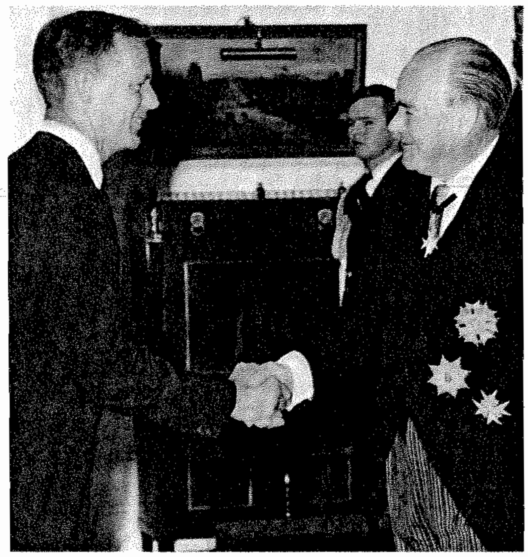
The present practice of physically handling and displaying very large numbers of bales (about fifty per cent. of the Australian clip) for subjective appraisal on the show floor would then gradually disappear.

If even a small fraction of wool handling costs were saved in this way, the total over the whole industry could be substantial.

Additional savings might accrue indirectly from changes in packaging and shipping procedures made possible by pre-sale sampling and testing.

Mr. Downes said that if pre-sale testing of wool did become standard practice, the total number of tests required for the clip would be very much greater than at present.

The picture above shows the automatic coring machine developed by the Division of Textile Physics for sampling wool bales.



Press Officer, Mr. H. P. Black, of Head Office, was awarded the Polar Medal last October for his work with A.N.A.R.E. Mr. Black led the 1957 expedition to Macquarie Island and the 1960 expedition to Wilkes Base. He is seen here receiving the award from the Governor-General, Sir Paul Hasluck.

News In Brief

Visitor

Dr. J. H. Hart, Associate Professor of the Department of Botany and Plant Pathology at Michigan State University, is spending ten months as a visiting guest worker with the Division of Forest Products.

Dr HART

Dr. Hart is interested in the response of sapwood to injury and is studying the changes in extractives which occur under different conditions.

Quotes for the Month

Australia has two scientific spies overseas. They are in Washington and London. They are termed scientific liaison officers.

Canberra News, 5th November 1970.

Independent observers say CSIRO is the most efficient research organization in the world — low administrative costs, high productivity, promotion by merit rather than by seniority, and brand new laboratories without any accumulated deadwood of non-productive staffs.

Eric Burgess in The Christian Science Monitor, 11th August, 1970.

Correction

In last month's issue of Coresearch, **Mr. R. J. Steele** was incorrectly reported as having been appointed to the Division of Mineral Chemistry.

Mr. Steele has, in fact, been appointed to the Division of Food Preservation where he is working on the applications of physical chemistry and electrochemistry to problems encountered in the processing and preservation of foods.

President

Mr. W. B. Kennedy of the Division of Building Research has been elected President of the Operational Research Society of Victoria.

Advisory Council Meeting

The Advisory Council met in Sydney on Tuesday 10th and Wednesday 11th November.

On Tuesday morning, **Dr. A. E. Pierce,** Chief, and **Mr. J. R. Egerton** of the Division of Animal Health addressed the Council on the development of a vaccine for use against footrot in sheep, and **Mr. J. G. Downes,** Chief of the Division of Textile Physics, spoke on the objective measurement of wool.

In the afternoon the Council inspected the laboratories of the Division of Mineral Chemistry. **Mr. I. E. Newnham,** Chief of the Division, gave a short review of the work of his Division, **Dr. L. A. Baker** spoke on iron ore pellet spalling, and **Dr. G. H. Taylor** described recent work on the origin of oil and natural gas in Bass Strait.

The following morning **Dr. E. G. Bowen,** Chief of the Division of Radiophysics, spoke to the Council about the future needs of radio astronomy and **Dr. F. J. Lehany,** Chief of the Division of Applied Physics, gave a short talk on the proposed re-establishment of the National Standards Laboratory at Bradfield Park. This was followed by a visit to the Bradfield Park Site.

In the afternoon the Council inspected the laboratories of the Division of Food Preservation. The Chief of the Division, **Mr. M. V. Tracey,** gave a brief review of his Division's work and **Mr. J. Middlehurst** spoke on freeze drying.

Below: The Chairman, Dr. J. R. Price, Mr. D. R. S. Craik of the Department of Treasury, Mr. F. J. Lehany, Chief of the Division of Applied Physics, and Sir Henry Somerset, Part-time Member of the Executive, discuss a model of the proposed complex which will house the National Standards Laboratory at Bradfield Park near Sydney. The seventy-five acre site will be familiar to many ex-RAAF types as the old No. 2 Personnel Depot which was later converted to a migrant holding centre.

BISCUIT PLANT FOR ZAMBIA

The Minister for Foreign Affairs, Mr. McMahon, announced last month that a $32,000 biscuit-making plant was being sent by ship to Zambia.

It will be used to make milk biscuits of the type developed by the Division of Dairy Research in collaboration with Arnott-Brockhoff-Guest Pty. Ltd.

The plant is a gift from the Australian Government to the Government of Zambia under the Special Commonwealth African Assistance Plan (SCAAP).

The biscuits have been specially formulated to overcome two major problems.

Firstly, climatic conditions in many developing countries often do not allow the development of a dairy industry capable of supporting widespread distribution of fresh milk.

Secondly, the biscuits are designed to eliminate certain digestive problems encountered among people in developing countries. This is because milk is not generally a regular part of their diet.

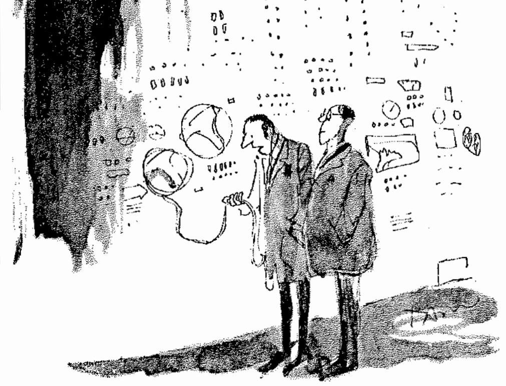
Zambian authorities are conducting a campaign against malnutrition and the milk biscuit plant will greatly assist in this.

The milk biscuit is an ideal food for young children in areas where the supply of fresh milk is not practical because of lack of refrigerated storage and transport. Eight milk biscuits are equal in food value to a pint of milk.

The gift of a milk biscuit plant under Australia's aid programme was proposed following a visit by officials of the Zambian Dairy Produce Board to Australia.

Since the decision was made to provide the plant, Dr. R. A. Buchanan of the Division of Dairy Research has visited Zambia under the sponsorship of the Australian Dairy Produce Board. A further visit will be made by an Australian biscuit-making expert during installation of the plant.

The Australian Dairy Produce Board hopes that growing interest in the milk biscuit will lead to increased exports of Australian co-precipitates and anhydrous milk fat.



"You can fool some of the digital components some of the time, but you can't fool all of the digital components all of the time."

Courtesy "Saturday Review".

"Help ban chlorinated hydrocarbons."

Courtesy "Saturday Review".

SAFETY NOTES

Dead or Alive

Many of us these days prefer the metallic Christmas tree to the old dead branch of a pine. But be wary of coloured lights on the metallic trees, many types are dangerous.
It is better to have a dead tree and you alive than vice versa.

Pop Goes the . . .

Sparkling wines are becoming more popular each year, particularly for celebrating or mourning the latest wage decision. Take care when opening them — plastic stoppers or corks can be ejected at a high velocity.
Better to repair a hole in the ceiling than a hole in the head.

Bang Goes the . . .

Shaving cream, suntan lotion, deodorant, insect spray or repellent, duco — you name it — if it isn't already available in an aerosol can, it soon will be.
But keep the can out of direct sunlight — do not lean it on the shelf near the rear window of the car where the sun can overheat it. You may be preparing your own private bomb.

A Happy Christmas and a Safe One

We've said it before but it's worth repeating, "The taxi fare home from that 'smashing' party is probably about 5% of your no-claim bonus".

J. W. Hallam, Safety Officer.

Music may or may not have charms to soothe the savage beast but it works wonders with Cheeky Charlie. For Charlie, who lives at the Parkville laboratories of the Division of Animal Health, the high spot of the day is lunch-time when Judy Yelland escapes from the madding crowd and seeks the seclusion of the sheep pen to practise for her music exams.

APPOINTMENTS TO STAFF

Mr. J. H. Canterford has been appointed to the Division of Mineral Chemistry and will work on the hydro-metallurgical treatment of Australian ores of economic importance. Dr. Canterford has been a senior demonstrator in the Department of Organic Chemistry at the University of Melbourne since 1966. He gained his B.Sc. with honours at that university in 1962 and his Ph.D. in 1967.

Dr. J. M. Cullen has joined the Division of Entomology to work on the biological control of weeds and insect pests. He graduated B.A. with honours from the University of Cambridge in 1963 and Ph.D. from the University of Adelaide in 1969. Since then he has been a research fellow at the Waite Agricultural Research Institute.

Mr. R. I. Forrester has been appointed to the Division of Mathematical Statistics to assist research staff in Adelaide Divisions with statistical aspects of their research programmes. Mr. Forrester graduated B.Sc. from the University of New England in 1966 and obtained his Diploma of Education there in 1967. The following two years were spent in National Service with the Army and since then Mr. Forrester has been teaching at a Canberra high school.

Dr. C. A. Olmsted has joined the Division of Nutritional Biochemistry to study fat metabolism in the ruminant animal and the role of lipids in membrane permeability. Since 1965 Dr. Olmsted has been Associate Professor in the Department of Biological Sciences at Louisiana State University. He obtained his Ph.D. from the University of California in 1966 and before taking up his last post held research positions at Long Island University, the Universities of California and Wisconsin, and the Battelle Institute.

Dr. A. W. L. Veen has joined the Division of Soils as an X-ray spectrographer. He will study the chemistry and mineralogy of Queensland soils. Dr. Veen graduated B.Sc. from the University of Amsterdam in 1964 and recently obtained his Ph.D. from the same university.

Mr. I. G. Wright has been appointed to the Division of Animal Health to study the epidemiology of bovine babesiosis. Mr. Wright graduated B.V.Sc. from the University of Queensland in 1965 and since 1967 has been studying for his Ph.D. at the same university.

Dr. B. Rosenberg has been appointed to the Division of Computing Research to carry out research on the development of techniques for the interpretation for the computer of pictorial and graphical data. Dr. Rosenberg graduated B.Sc. from the University of Bristol in 1965 and recently obtained his Ph.D. from the University of Southampton.

DEADLINE

Contributions to the January issue of Coresearch should reach the Editor at 314 Albert Street, East Melbourne, by Friday, 11th December.

POSITIONS VACANT

The following vacancies for professional appointments are current:

EXPERIMENTAL OFFICER (EO 1/2) — Division of Building Research — 390/436 (4/12/70).

EXPERIMENTAL OFFICER (EO 1) — Division of Protein Chemistry — 462/355 (4/12/70).

ENGINEER (Engineer 1/2) — Division of Tribophysics — 370/212 (4/12/70).

RESEARCH MINERALOGIST (SRS/PRS) — Division of Mineral Chemistry — 601/132 (4/12/70).

STATISTICIANS (EO 1/2) — Division of Mathematical Statistics — 440/238 (11/12/70).

SPECTROSCOPIST (DATA ANALYST) (EO 1/2) — Division of Mineral Chemistry — 601/136 (11/12/70).

RESEARCH SCIENTIST (BOVINE INFERTILITY) (RS/SRS) — Division of Animal Health — 201/371 (11/12/70).

RESEARCH SCIENTIST (RS/SRS) — Division of Building Research — 390/437 (11/12/70).

SOIL SCIENTIST/ECOLOGIST (RS/SRS) — Division of Plant Industry — 132/192 (11/12/70).

RESEARCH GEOLOGIST (RS/SRS) — Division of Applied — 604/82 (18/12/70).

LIBRARIAN (Librarian 1/2) — Central Library — 118/220 (11/12/70).

EXPERIMENTAL OFFICER (EO 1/2) — Division of Protein Chemistry — 462/356 (11/12/70).

PHYSICIST, PHYSICAL CHEMIST OR PHYSICAL BIOCHEMIST (EO 1/2) — Division of Animal Genetics — 675/296 (18/12/70).

CHEMIST (EO 2/3) — Division of Applied Chemistry — 586/92 (18/12/70).

BIOLOGIST (ECTOPARASITES) (EO 1/2) — Division of Animal Health — 202/354 (15/1/71).

A CSIRO team has taken the 1970 Katherine cricket premiership. Most of the team work at the Research Station run by the Division of Land Research at Katherine in the Northern Territory. This is the second premiership won by the team, the first being in 1967 when the team was formed. The cricket team is part of the Station's Social Club which also has a baseball team (premiers in 1969 and 1970) and a basketball team.

Our picture shows from left to right — Back Row: Ian Neale (Education Dept.), John Ive (CSIRO), Ted Morris (CSIRO), John Donellan (ex. CSIRO), Peter Kelsch (ES&A Bank), Peter Short (Dept. of Health). Front Row: Peter Lewis (Education Dept.), Mike Mansfield (Commonwealth Bank), Bob Myers (CSIRO, Captain), Des Baccini (CSIRO), Mike Spillman (CSIRO).