



## Ancient prints found in Nullabor

What are thought to be only the second set of prehistoric footprints in the world of *Homo sapiens sapiens* (modern man), have been discovered by a team of ANU archaeologists in the south-west corner of South Australia.

The three prints, set in lithofied stone (mud which has become stone), are estimated to be around six thousand years old and are located in an area of the Nullabor Plain previously unsurveyed by archaeologists. Alongside the human footprints are several animal prints, including the giant emu, *Genyornis newtoni*, which until now was thought to have become extinct at least twenty-six thousand years ago. The team leader, Dr Scott Cane, has described the region as 'incredibly rich in Aboriginal sites'.

The human prints are the first found in Australia and are believed to be the only ones ever discovered in surface rock. The only other known prints are in southern France. They were uncovered after deep excavation in the clay base of a cave. The French prints, at Le Tuc d'Audoubert, are estimated to be ten thousand years old and are preserved in a crystalline layer of lime.

Dr Cane is principal archaeologist with ANUTECH, the marketing company of ANU. His team included fellow archaeologists, Ms

Marina Walkington, Mr Alan Lance and Mr Tom Gara, all from ANUTECH, and Mr Robert Paton, a Master of Arts student from the Department of Prehistory and Anthropology in The Faculties. They made their discovery in April, while carrying out preliminary research for a heritage study commissioned by the South Australian Department of Environment and Planning. The three year project is aimed at finding and recording sites of Aboriginal and archaeological significance in the South Australian section of the Nullabor Plain.

Dr Cane says although he had suspected the area was interesting archaeologically, he and his team were amazed by the wealth of their discoveries. 'The Nullabor Plain is the biggest stretch of limestone deposit anywhere in the world, and limestone, because of its high alkaline content, preserves things very well. Consequently, the area is likely to contain the oldest and best preserved Aboriginal sites in Australia.' Much of the research involved climbing through narrow entrances into giant limestone caves which spread below the coastal section of the Nullabor Plain. Many of them contained evidence of Aboriginal habitation, such as cave paintings, stone tools, old camp fires and food remains. The caves also contained old fire sticks, presumably left by Aboriginal people exploring the caves in the past.

Another important site found near Wilson's Bluff is a large flint quarry. 'We believe this site is the only quarry within a one hundred thousand square kilometre area,' Dr Cane told *ANU Reporter*. 'From it, we hope to get an insight into Aboriginal technology and trade routes in the area'.

### SECRET

The whereabouts of the footprints are being kept secret until further examinations are carried out next summer. The stretch of coastline in which they are located is unusual, in that the desert goes right down to the water's edge. 'The prints are on the floor of an old salt lake. They must have formed as people walked around the lake to get food and water while the lake bed was still soft. Very dry environmental conditions must have followed straight afterwards to ensure the prints were not obliterated,' said Dr Cane. 'The first print we found [Ed: pictured] is thought to be that of a young man. It is about a size nine . . . too long for a woman's foot and the clear arch indicates that it belonged to a young person. The second print is a broad, short foot, probably an older woman's. Mud pushed up around the heel suggests that the person slipped slightly as s/he walked. We are not yet sure about the third print, which has partly worn away.'

The nearby animal prints include those of kangaroos, wallabies and emus. Dr Cane says

the presence of the 30 centimetre long giant emu prints is particularly significant. 'This larger, more robust version of the present day emu was thought to have been wiped out by hunters between twenty-six and thirty thousand years ago. Discovering prints only six thousand years old means the creature survived a lot longer and existed alongside the modern emu. Until now, we had thought the modern variety was a descendant of the giant emu. This also casts doubt on our theories about the impact Aboriginal hunting had on the megafauna, which were widespread between 20 and 30 thousand years ago.'

### NYEERINA JINNA

The existence of footprints in the Nullabor had been described by the famous Australian adventurer, Daisy Bates, who lived with the Aborigines of the area around the turn of the century. In her book, *The Passing of the Aborigines*, she wrote:

. . . on the limestone slabs that have formed, and that now lie exposed in some of these depressions near the coast, are numbers of footprints, called by the natives *nyeerina jinna*, of humans, animals and birds which walked over the soft mud of long ago to get the oysters, mussels and other shell-fish whose fossils line the shallow banks girding them.

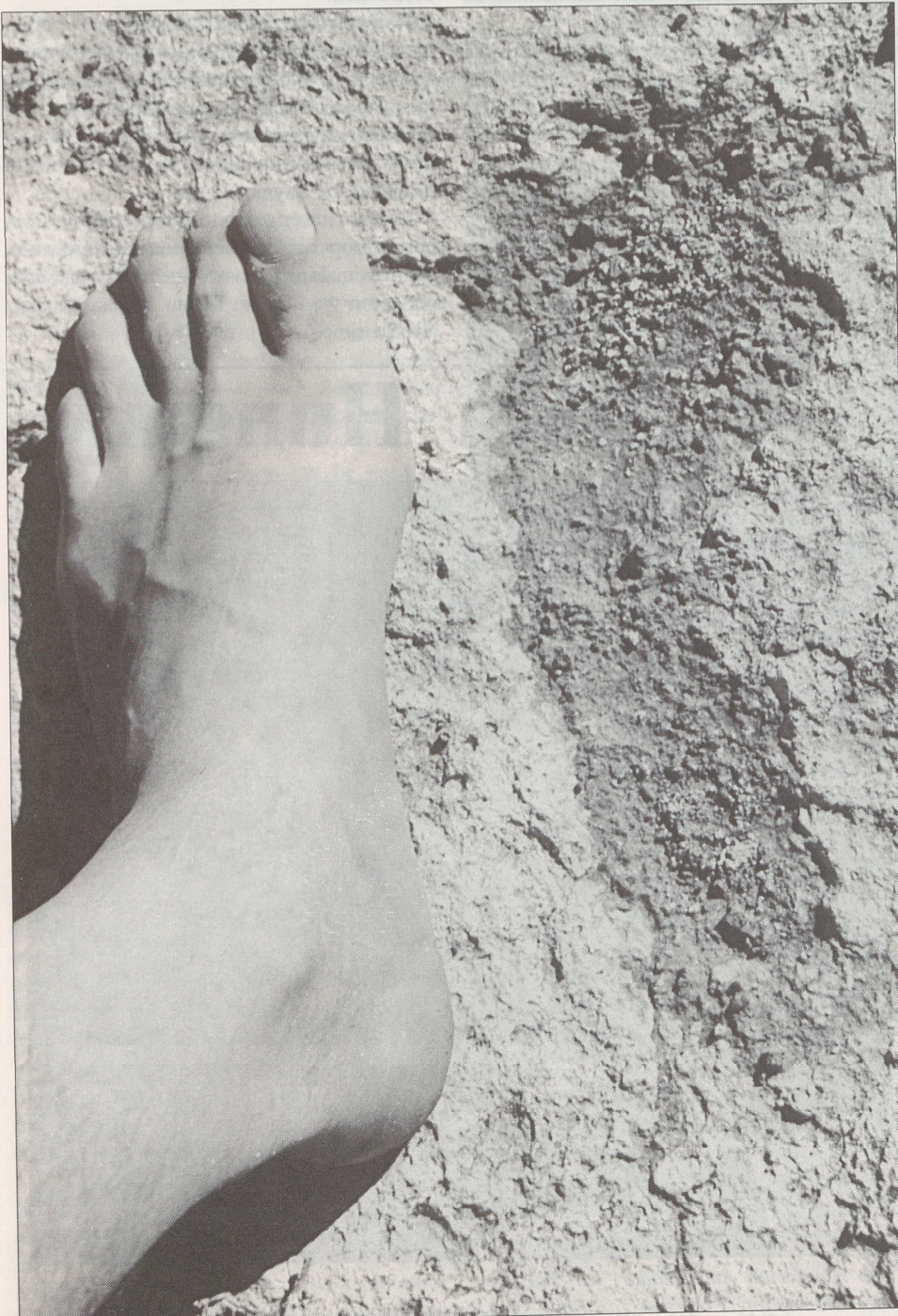
Apparently no-one took her reference seriously and it was never checked by experts. It is not known if the prints she describes are the same as those discovered by Dr Cane's team.

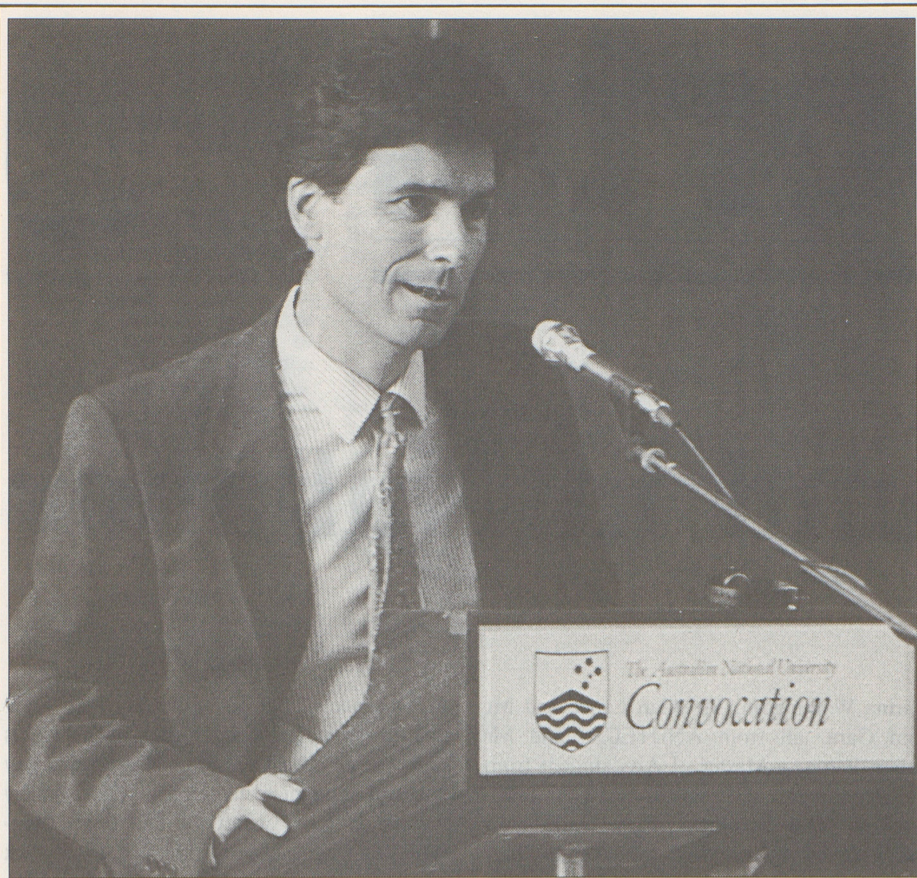
The next stage of the research is a one month field trip during the summer break. 'The discovery of the animal and human prints provides us with a window into life in the area at the time. They could reveal all sorts of information about the early part of the Holocene period. We are making up a joint inter-departmental team from the department of Prehistory in the Research School of Pacific Studies and the Prehistory and Anthropology Department in the Faculty of Arts. It is a great opportunity for a multi-disciplinary approach. Some people will work on the caves, others at the flint quarry. A third group will examine the footprints and search for others. It should be a real seedbed for ideas', Dr Cane said. Groups of prehistory undergraduate students will be invited to assist in the field research.

### In this issue

Environmental ethics . . . . .	2
Crossword puzzle solution . . . . .	2
Cost-savings from equation in pipeline . . . . .	3
Comet and Supernova together . . . . .	3
Artificial intelligence feature . . . . .	4/5
Curtain up on ANU drama . . . . .	6
V-C launches Crawford essay book . . . . .	6
Classified/briefly etc. . . . .	7/8

Six thousand year old footprint pictured alongside a modern size nine. Photo: Scott Cane, ANUTECH.





## Cambridge and the KGB

Dr Christopher Andrew, until recently a Visiting Fellow in the Department of International Relations, Research School of Pacific Studies, delivered a highly amusing address at a Convocation Luncheon at University House last month. Dr Andrew discussed the training of a number of KGB agents at Cambridge University and dismissed the thesis that the British Secret Service had a continuing tradition of moles. Dr Andrew is a Fellow and Senior Tutor at Corpus Christi College, Cambridge, and author of a most entertaining history of British espionage, *Secret Service*. Photo: Bob Cooper.

## Russian Studies student wins essay prize



Ros Ransome

An ANU student in the new first year Russian Studies unit *Russia and its Writers*, Robert Piper, has just been awarded the 1986 annual prize awarded by the Australian and New Zealand Slavists' Association. The competition, which began five years ago, is for the best essay submitted as part of normal course requirements by any student of the nine Slavonic and Russian departments at Australian universities. The topic is not restricted, but length is limited to 3,000 words. One entry from each department may be submitted anonymously and without identifying the university, to an independent judge, normally overseas. Four of the five competitions have been won by students of the Russian Section of the Department of Modern European Languages at ANU.

## J.G. Crawford Award

The J.G. Crawford award of \$2,000 is being offered to the author of a research paper which is seen by the selection panel as making a substantial and original contribution towards understanding between Australia and Japan. To be eligible for consideration, the paper should address some aspect of the Japanese economy or economic policy, or Japan's international relations or relations with Australia, or the political environment affecting these affairs. Where possible, the winning entry will be published by the Australia-Japan Research Centre, as part of its Pacific Economic Papers (PEP) series. Applications should be received by 30 November 1987. For further information, contact John McBride, Executive Officer, Australia-Japan Research Centre, (062) 473877.

## English in the workplace

The popular *English in the Workplace* course is again being offered by the Staff Training and Development Unit at ANU, in conjunction with the Reid TAFE College. Staff and students attend sessions for two hours per week, to help improve their written and oral English. For further information, please call x4304/4338.

**Cryptic Crossword No 1: Solution**

1	S	T	A	F	F	C	E	N	T	R	E	A
2	Y	N	E						E	R	C	
3	N	O	N	R					P	L	I	A
4	T	O	M	A	C	E						
5	H	O	U	R	I				I	N	C	A
6	E	N							R	O	A	A
7	T	A	C	I	T	C			M	O	N	E
8	I	E	O	L					E	U		
9	C	A							A	C	R	E
10									T	O	W	E
11									C		S	T
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												
31												
32												
33												
34												
35												
36												
37												
38												
39												
40												
41												
42												
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												
61												
62												
63												
64												
65												
66												
67												
68												
69												
70												
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												
81												
82												
83												
84												
85												
86												
87												
88												
89												
90												
91												
92												
93												
94												
95												
96												
97												
98												
99												
100												

# ANU leads the way in environmental ethics

A Canadian philosopher who is visiting ANU said recently that Australia had a number of the world's leading thinkers on environmental ethics.

Professor Michael Allen Fox from Queen's University in Kingston, Ontario, has been teaching environmental philosophy in the Department of Philosophy, Faculty of Arts. He said a number of ANU philosophers had done important work on environmental ethics, including Emeritus Professor John Passmore, presently a Visiting Fellow in the History of Ideas Unit in the Research School of Social Sciences (RSSS), Dr Richard Sylvan, a Senior Fellow in the Department of Philosophy, RSSS, Mr David Dumaresq, a lecturer in Human Sciences, Faculty of Arts, and a former PhD student, Dr David Bennett. Another internationally known Australian environmental philosopher is the animal liberationist, Professor Peter Singer from Monash University in Melbourne.

Professor Fox said that the field of environmental ethics had been burgeoning over the last 15 years, in parallel with increased popular and political interest in animal welfare and the conservation of natural areas.

While at ANU Professor Fox is completing a book on the conceptual foundations of environmental ethics. He is looking at the fundamental problems of ethics such as the nature of rights and what kinds of things have rights. He sees rights as a buffer against the unjust use of power. But although he believes the concept of rights cannot be extended to the non-human sphere, he affirms that humans do have obligations to nature.

In one chapter Professor Fox examines the value of non-human species. He divides nature's value into intrinsic or inherent values, those independent of humans, and instrumental or use values, those which serve humans. Instrumental values of nature include the economic, recreational, aesthetic and symbolic value of plants and animals for humans.

Whether or not non-human species have intrinsic value is more controversial. Many would-be exploiters of nature say plants and

animals only have value if they serve humans. Others, including some animal rights advocates, say that a limited number of animal species have value in themselves. Professor Fox finds the moral dividing line that separates say, fish from cats, arbitrary. He says that all living things have intrinsic value.

This position creates problems in ordering interests, for instance, deciding which species to kill to feed humans. Professor Fox is still not clear on the best way to establish such priorities. He is not a vegetarian.

His position is shifting. In 1986 he published a book called *The Case for Animal Experimentation*. He now sees this case as arrogant and arbitrary and says animal experiments cannot be justified. The human-measured benefits of animal experiments in no way compensate the animals or their species for the costs (pain and death) they have borne.

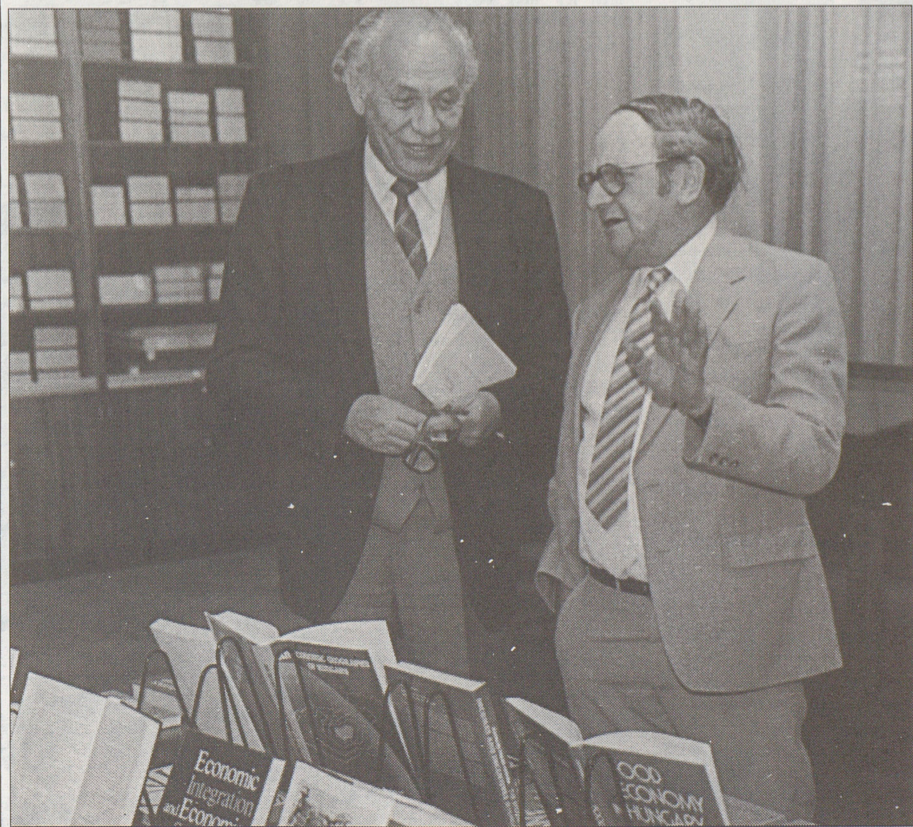
Professor Fox says philosophy has a role to play in political action. Environmental ethics ideas may trickle through society and place further pressure on governments, courts and exploiters of plants and animals.

He also believes that those concerned about the moral status of nature should be ready to aid those, whether the poor people who chop down tropical rainforests or Canadian seal-hunters who depend on seals for their livelihood, whose economies depend on nature's destruction.

However, he thinks that ultimately arguments about the treatment of the non-human sphere may evolve similarly to those about race and sex discrimination. Moral ideas may eventually overcome economic arguments. 'In a few decades ours may be seen as a period of ferment,' he says.

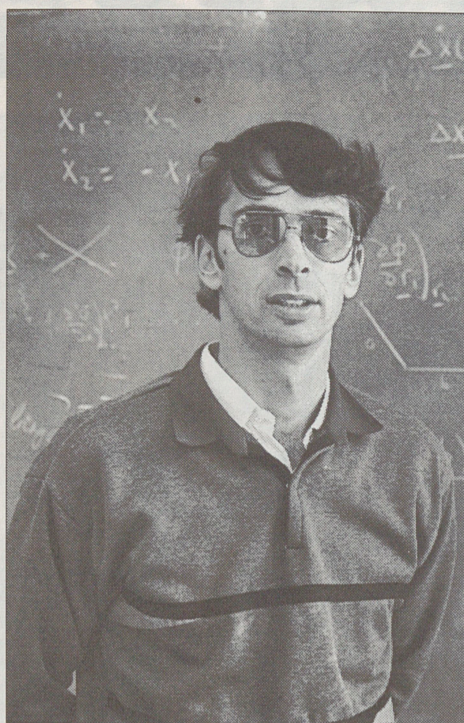
'We are never going to escape entirely from our anthropocentric orientation, because we're the ones making the assessment. But that does not mean we have to favour human interests all the time.'

## Gift from Hungary



The Hungarian Ambassador, Mr Pal Ipper, is pictured (left) chatting with the Deputy Vice-Chancellor, Professor Ian Ross, at a recent function in the McDonald Room of the Menzies Library, at which a presentation was made to the ANU Library of a collection of Hungarian books written in English. Photo: Stuart Hay.

# Cost-savings from equation are in pipeline



Dr Denis Evans

Two centuries ago Newton defined the viscosity of a fluid. The viscosity is the resistance to flow. He imagined that the viscosity of a fluid should only be a function of the temperature and density of the fluid. Such fluids are called Newtonian. At the present time there is no simple — analytic — theory capable of correctly predicting the viscosity of even the simplest Newtonian liquid at high density.

Non-Newtonian fluids get thicker or thinner with stirring or with the passage of time. Their viscosity is not simply dependent on temperature or pressure. Examples are crude oil, molten plastics, paint, blood, very thin air in the upper atmosphere, plasmas and 'silly putty'. Understanding these fluids is thus very important for commerce, transport, including space travel, medicine and energy production.

An important class of nonequilibrium systems are called nonequilibrium steady states. Although not at equilibrium, because of the application of external forces, these systems are time independent — steady. Although water may flow steadily through a pipeline, it is not at equilibrium. Molecules at the centre of the pipe stream past those at the boundaries.

All this brings us to Dr Evans' field — nonequilibrium statistical mechanics. It is a field where Gibbs' equations do not apply; where stirred fluids climb up the stirring rod, where liquids swell when they emerge from a tap and siphon themselves from one container to another. Where Gibbs' equations describe the behaviour of systems at equilibrium, the equations derived by Dr Evans and his colleagues describe all types of nonequilibrium

fluids — Newtonian or non-Newtonian. These new equations, like Gibbs', are very general, but very difficult to solve. They give exact expressions for the time-dependent many-particle distribution function. Once this distribution is known all mechanical properties of the system can be calculated.

## COLLABORATION

Dr Evans built on work in the field done in Japan in the late 1960s. He collaborated with researchers in the USA and in RSC. These collaborators were Professor William G. Hoover of Lawrence Livermore Laboratory, Dr Brad Holian of Los Alamos National Laboratory, Professor Howard Hanley of the US National Bureau of Standards and Dr Gary Morriss, a Research Fellow in RSC.

Though the breakthrough came three years ago, Dr Evans told *ANU Reporter*, 'At the time we didn't realise how important it would be.' About a year after the initial work, further properties and formulations were worked out and computer simulations were used to test the validity of the theory.

The importance of understanding the transport properties of fluids and fluid mixtures was evident in Australia a couple of years ago, when an oil pipeline carrying a very waxy crude oil seized up in winter. In theory, but not yet in practice, when combined with computer simulations, Dr Evans' equations should be able to predict phase transitions, from liquid to solid, in non-equilibrium, non-Newtonian fluids. The effects of varying the flow rate and adding 'anti-freeze' chemicals could be predicted.

The first application of early versions of the theory of nonequilibrium steady states was the development of a computer program which predicted the transport properties of mixtures from an experimental knowledge of the properties their individual components. This program is being used by large American oil and chemical companies to help design petrochemical plants. Improvements in the prediction of thermophysical properties can substantially reduce the cost of plants which presently are overdesigned to compensate for inadequate data.

However, there is still a great deal of theoretical work to be done. Much of this will be done using computer models to test the statistical mechanical theory. The University's new supercomputer will be particularly well-suited to these simulations, which require considerable computing power. Dr Evans said the supercomputer would be a relatively cheap and highly convenient laboratory in which to explore the theory. Nearly all of the presently used algorithms for simulating nonequilibrium flows at a molecular level were derived by Dr Evans' group in RSC.

Dr Evans said it was still too early to know the ultimate applications of the theory of nonequilibrium systems. He mentioned very dilute fluids, such as the upper atmosphere, where the conventional hydrodynamics for flows around re-entry vehicles breaks down. The flows of plasmas must also be understood to allow the controlled use of fusion energy. Like other work in fluid mechanics, the RSC research might still arouse interest in one or two centuries.

ANU chemists have worked out new statistical mechanical equations which help explain the properties of some very unusual fluids. An earlier version of the theory has already assisted in the design of chemical plants in the USA.

The research group led by Dr Denis Evans, a Senior Fellow in the Research School of Chemistry (RSC), is now trying to extract useful results from the theory to apply to the design of pipelines, among other things.

An understanding of the mechanics of fluids is important for the design of objects that move through fluids, such as boats, aeroplanes and space vehicles, and the design of things which transport fluids, such as pipes and chemical plant machinery. Fluid mechanics also helps the manufacture of polymers, such as paints and plastics, and has medical applications which include the study of the movement of blood through arteries, veins and capillaries.

Various levels of theory can be used to model the behaviour of fluids. Physicists could look at the elementary particles that make up the fluid and use mechanical theories — classical, after Newton, or quantum, after Schrodinger and Heisenberg — to predict the behaviour of the fluid from the dynamics of its constituent particles. In practice, there are too many particles and equations of motion for this approach to work.

Late last century, physicists worked out statistical methods to explain the behaviour of bulk matter such as fluids, in terms of the interactions of its constituent molecules. Statistical mechanics as it is called, has enabled the calculation of equilibrium properties such as the melting and boiling points of fluids in terms of molecular parameters. An equilibrium system is one which has been allowed, in the absence of external influences, to come to a state of quiescence. An American physicist, J. Willard Gibbs, worked out the basic equations of equilibrium statistical mechanics at the turn of the century. These equations still form the basis of the subject.

But Gibbs' equations only work for equilibrium systems. Until 1985, no equivalent set of equations was known for steady state systems away from equilibrium. One of the main achievements of the liquid state group in RSC, has been the derivation of a nonequilibrium analogue of Gibbs' equations for equilibrium fluids.

## Comet and Supernova together



This photograph of Comet Wilson (the blur on the left) and Supernova 1987A (bright spot right) in the Large Magellanic Cloud (fuzzy area around Supernova) was taken recently with the Oddie Telescope at Mount Stromlo by graduate students in astronomy, Mr Chris Flynn and Mr George Paltaglou. The length of Comet Wilson is due to the movement of the comet across the sky during exposure. Comet Wilson has now passed its closest approach to earth and is becoming fainter. Astronomers at the Mount Stromlo and Siding Spring Observatories are now analysing spectral data collected with the University's telescopes. Dr Bruce Peterson, who is working with astronomers from Arizona State University, said they were comparing the carbon-isotope ratios of Comet Halley and Comet Wilson. Comet Halley, an old comet, has been around the sun many times, while Comet Wilson is the same age as Comet Halley and whether it was part of the early solar system. Dr Peterson said that Comet Wilson had not been 'cooked' by the sun as much as Comet Halley, so its carbon-isotope ratio should not be as distorted.

A Reader in the Department of Mathematics, Faculty of Science, Dr Dayal Wickramasinghe, is examining observations made of Comet Wilson at Siding Spring, to see whether they support the theory that comets contaminated the earth with organic matter, perhaps even life.

Dr Peterson and other astronomers at Mount Stromlo are also watching the Supernova, waiting for the hot, dense debris around the exploded star to cool. At that stage, the cloud of gas and debris will become semi-transparent, allowing optical observations of the conditions inside the clouds. Pulses of light may reveal the presence of an extremely dense neutron star in the centre of the Supernova. Dr Peterson expects observations of the Supernova to continue for several years, checking theories of neutron stars and their gas envelopes.

## University innovation in new field

Innovative research in the area broadly known as artificial intelligence (AI) is taking place in a number of research schools and departments at ANU. The work is keeping pace with the leading edge of international developments.

Around the world scientists are pursuing the challenge of automating tasks usually performed by humans. In the USA and Europe many research teams are attacking the fundamental and applied problems of artificial intelligence. In Japan, the massive Fifth Generation Computer project is aimed at giving the country greater industrial power. In Australia, the Department of Science has identified AI as a new area of national priority.

The definition of artificial intelligence has evolved along with the computers that are expected to display intelligence. In the 1950s the aim was to build robots with human capabilities. AI researchers tried to make machines that could see, hear, learn, talk and think as well as humans. Contests between researchers and their subjects, such as chess-playing, were popular.

Such literal imitation of human behaviour is no longer the touchstone of AI. The trend now is to build useful machines that have some particular skill, that can collaborate with humans to some social benefit. Such computers, and their programs, are often called expert or knowledge-based systems. These systems may help in education, management, economics, research, manufacturing, defence and even reasoning in general (see adjacent stories). Almost any human endeavour may be affected by AI.

The Head of the Department of Computer Science, Faculty of Science, Professor Robin Stanton, said recently that AI was one of the most exciting intellectual areas, one that could contribute to a fundamental understanding of humans. He compared the last 20 years of AI to the Industrial Revolution, producing economic benefits but at the risk of social dislocation. Academically, AI was 'an infiltration of intellectual structures across many disciplines'.

Many disciplines contribute to AI research. Psychologists and linguists help with perception and the analysis of language. Computer scientists and engineers build the machines and write their programs. Others with expertise in biology, medicine, physics, philosophy or economics try to program their methods into the machines.

The new Centre for Information Science Research, established in December, 1986, will be a multi-disciplinary centre with links around the University. Its management committee includes representatives of physics, biology, the social sciences and medical research. The committee recently sought research proposals from groups around the campus, and individuals who might be interested in collaborating with the centre. Though the Centre has a wide ambit, artificial intelligence could be one focus for its research. The planned appointment of a part-time co-ordinator could soon narrow the focus.

ANU has a number of research projects relevant to AI, though the researchers themselves may not always describe their work that way. The Commonwealth Department of Science, in a handbook that details AI researchers in Australia, lists a number of researchers at ANU. In the Department of Computer Science,

Faculty of Science, there are Mr Robert Edmondson, Dr Malcolm Newey, Mr Graham Williams and Professor Robin Stanton. Professor Stanton's work on the management of the Great Barrier Reef Marine Park is described on this page.

In the Department of Engineering Physics, Research School of Physical Sciences, there are Dr Iain Macleod, Dr Bruce Millar, the Head of the Department, Professor Stephen Kaneff and PhD students, Mr Paul Mackerras and Mr Frantz Clermont.

In the Research School of Biological Sciences, the handbook lists the leader of the Ecosystems Dynamics Group, Dr Ian Noble (see article). In the Research School of Social Sciences the AI activity is among the philosophers, Dr Richard Sylvan, Dr Robert Meyer and Dr Michael McRobbie. Dr Meyer and Dr McRobbie lead the Automated Reasoning Project, described right.

The computer simulation of human behaviour is quite dependent on the study of cognition and perception. Necessary groundwork in these areas is being laid by the Head of the Department of Psychology, Faculty of Science, Dr Michael Cook, a lecturer in the Department of Prehistory and Anthropology, Dr Margaret Lyon, and a psychologist in the Office for Research in Academic Methods, Dr Judith Slee. The new Centre for Visual Sciences, directed by Professor Adrian Horridge, is doing research on animal vision that may help produce machine vision (see *ANU Reporter*, 24 April, 1987).

The University also has a critic of the enterprises of artificial intelligence and expert systems listed in the handbook of AI researchers. The Reader in Information Systems in the Department of Commerce, Faculty of Economics and Commerce, Mr Roger Clarke, said recently that the fundamental conception of AI was 'off the beam', since the need was not to supplement the billions of naturally intelligent humans, but to complement them.

There were already signs of a backlash against the notion of genuinely 'expert' systems which take decision-making out of the hands of humans. The field as a whole was being re-defined as 'knowledge-based systems', and the emphasis was quickly changing to 'advisor' systems which support human decision-making rather than replacing or automating it. Another weakness was that many expert systems were merely a refinement of well-established decision-table and decision-tree techniques.

But his more important criticism was that many researchers were 'beating up' expert systems technology, and making expensive claims for applications of little real economic value. Mr Clarke is developing a framework for evaluating proposals for knowledge-based systems, to ensure that large sums are not spent on applications which offer little or no prospect of payback.

Mr Clarke said that in a world of over four billion people, many of whom would be enduring enforced leisure, there would be no shortage of human intelligence. 'The last thing we need is more things that act like people — with imagination, creativity, personality, inaccuracy, imprecision and unreliability.'



The Co-ordinator of the Automated Reasoning Project, RSSS, Dr Robert Meyer, left, and the Deputy Co-ordinator, Dr Michael McRobbie. Photo: Marlee Maxwell.

## Automated reasoning could provide electronic assistants

Members of the Automated Reasoning Project in the Research School of Social Sciences (RSSS) are seeking ways to use computers to prove old and famous mathematical theorems.

The Co-ordinator of the Project, Dr Robert Meyer, said recently that most people supposed mathematics to be a matter of high intelligence. But, he said, 'in some areas of mathematics the best reasoners we have now are machines'. Computers could reduce half a day's thought to a few seconds.

Dr Meyer, a logician, has been in the Department of Philosophy in RSSS since 1974. He estimates that a reasoning computer could have saved him one year in 10 of his professional life. He has been working with computers since 1976.

Dr Meyer's first PhD student at ANU was an honours graduate in logic from the University of Queensland, Michael McRobbie. Dr McRobbie is now Deputy Co-ordinator of the Automated Reasoning Project.

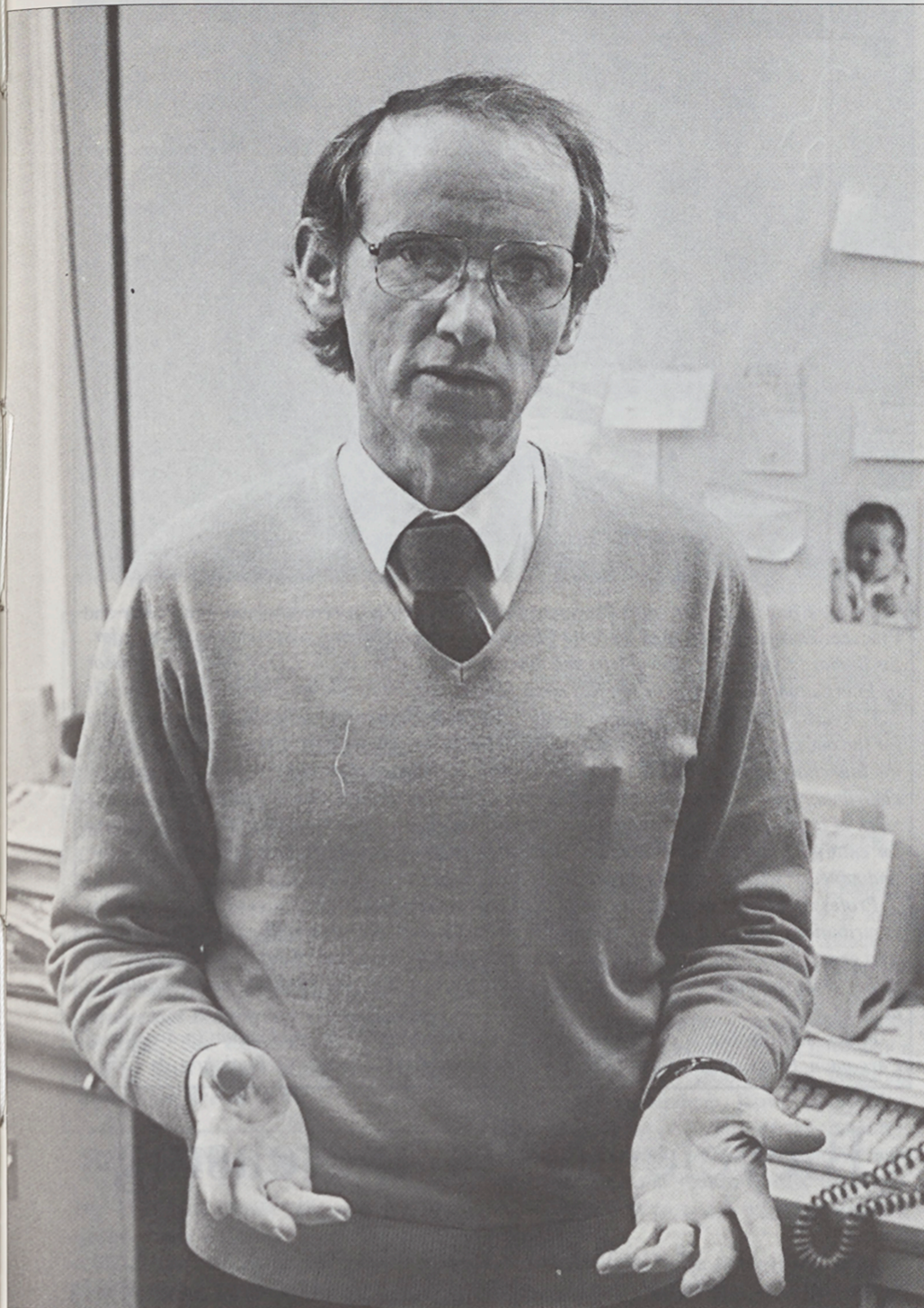
Automated reasoning or deduction is one of the main areas of artificial intelligence research. Other international centres of automated reasoning are in the USA, West Germany, Britain and France, and the Project has very close links with a number of these.

Mathematical and formal reasoning ultimately

proceeds from axioms through rules to a proof. In automated reasoning, a proof of a mathematical statement is searched for by trying to get the computer to perform these operations backwards. By cutting down the number of rules, the possible proofs are kept to a minimum.

Dr Meyer and Dr McRobbie are working on propositions in arithmetic known as number theory. They believe that, in conjunction with international researchers, modest but significant advances are being made. Many mathematical problems have been first solved by machines but so far the computers have not solved any truly difficult problem alone.

Dr McRobbie was responsible for establishing the Automated Reasoning Project during 1986 and it has recently moved into refurbished rooms in I-Block. The 15 staff, including PhD students, are working on the latest computer workstations from California, made by Sun Microsystems. These terminals have a high-resolution screen, a lot of power, high speed and sophisticated graphics. Staff are presently transferring work from the old



The Head of the Department of Computer Science, Faculty of Science, Professor Robin Stanton. Photo: Roger Green.

DEC-10 computer in the Coombs Building and testing the capabilities of their new machines.

Dr Meyer hopes to make progress on the major problems with which the Project is concerned by 1990. He said there were still considerable difficulties, such as the huge number of possible solutions to a problem that arose from lots of rules. Rather than using computers as coolie labour to sort through vast numbers of possibilities by trial and error, he said that programs had to be tailored to the particular problem. The computers needed some human direction — intelligence.

Once the automation of reasoning was further improved, Dr Meyer foresaw many possible applications. Expert computers would be able to solve many of the problems that now required sustained and complex reasoning. In 20 years, he said, mathematicians and natural scientists could have mechanical reasoning assistants, used just as electronic calculators were used now.

Dr McRobbie said that the search for artificial intelligence had given a big boost to philosophy. The demands for technical logic in the natural sciences and the rapidly increasing capabilities of computer hardware meant that the arcane science of logic was now in considerable demand. Logicians

have suddenly become highly employable, especially in the computer-related areas.

Another incentive for up-and-coming logicians might be the \$100,000 offered by an American organisation to those who first design a computer system that solves a genuinely difficult mathematical problem.

The Automated Reasoning Project is a multi-disciplinary group that hopes to attract good computer scientists, as well as logicians. Dr Meyer hopes to build on the close links already established with the Department of Computer Science in the Faculty of Science, sharing seminars and students, and possibly running joint courses on artificial intelligence. The Project is also affiliated with the new Centre for Information Sciences. With the new groups and links across campus, ANU could become an internationally recognised centre for research in artificial intelligence. Dr Meyer hopes this may also help retain some of the best brains in Australia.

On the more human potential of automated reasoning he said: 'It may not be so long before you will be able to sit down with your PC and tell it your problems and it will say: "Let me give you a hand".'

## Expert systems help manage parks and forests

Two ANU research teams are refining computer programs that will help the managers of natural lands resolve conflicts and predict the effects of decisions.

One team, under the Head of the Department of Computer Science, Faculty of Science, Professor Robin Stanton, is working on the Great Barrier Reef Marine Park. The other, in the Research School of Biological Sciences (RSBS), led by Dr Ian Noble, is looking at the dynamics of ecosystems, with particular reference to national parks and state forests.

Both computer programs are expert systems, where the computer is programmed with the knowledge and logical steps used by experts. Expert systems which can be applied to practical problems are a rapidly growing part of artificial intelligence research. Expert systems in land management — whether in agriculture or the evacuation of disaster-struck cities — are becoming popular around the world. UNESCO is particularly keen to use such systems, as a way to transfer expertise to countries with few highly trained technicians.

The Great Barrier Reef project in the Department of Computer Science is being undertaken with the CSIRO Division of Information Technology, particularly Dr John Smith. Mr Hugh Mackenzie and Mr Scott Milton from CSIRO are visiting ANU for the research and Professor Stanton is also working with a masters-degree student, Mr Greg Toomey. The research uses the automated reasoning techniques arising from the study of computational logic; so there is a bridge between the Department of Computer Science and the Automated Reasoning Project.

The first stage of the project was to make a digital map of the 1,000-plus reefs of the Great Barrier Reef, so that it could be manipulated by computer. Each reef and the surrounding waters were given a list of natural attributes of importance to park management, such as the presence of rare fish or dugong breeding grounds or tourist resorts.

The next step was to derive a number of different usage classes or zones, which covered a range of human uses. Some zones allowed commercial shipping or scientific research, while others excluded almost all human activity.

The management plan for the Great Barrier Reef has 55 policies covering shipping, research, fishing, tourism, commerce and conservation. The ANU programmers turned some of these policies into logical rules encoded so that the computer could make deductions. The rules, applied to the physical attributes of the reefs, produced a brightly coloured zoning map.

The map, so far covering the reefs north of Cairns, showed which reef areas could be definitely zoned in one category or another, which reefs had a choice of zones, which reefs had policy conflicts and which reefs had insufficient information on them to be resolved. The number of unresolved areas showed the completeness or otherwise of the policy rules and the conflict areas showed the consistency of the rules (for example, applied to one reef, the policies may have indicated that one reef had to be both highly protected for dugong breeding and also open to commercial fishing).

The program helps park managers to refine their policies to make them as complete and consistent as possible.

The Great Barrier Reef Marine Park Authority has shown interest in the expert

system while reserving its judgment on whether there are some non-computable aspects of park planning. The use of rules to deduce maps has also interested the army, which could use the program for battlefield command. The system could show conflicting orders at different levels and reduce the chance of self-attack.

Some members of the Ecosystem Dynamics Group in RSBS are seeking to understand and predict the changes in vegetation that occur after dramatic change — fire, grazing or logging. Their expert system has built on experience in Kakadu National Park and South West Tasmania, but could be applied to other national parks, grazing and forestry operations in Australia and even in China. The research team is Dr Ian Noble and two PhD students, Mr Mike Strasser and Mr Andrew Moore.

Dr Noble began modelling forest succession and regeneration in the late 1970s with Professor Ralph Slatyer, now Director of RSBS. Up to that time, computer models of vegetation change started with details of growth and nutrient cycles and followed a very complex set of processes. The initial data required time-consuming field studies, the processing used up much expensive computing time.

In 1980, Dr Noble and Professor Slatyer produced a 'vital attributes' model of vegetation change which incorporated only that information needed to predict the presence or absence of species during successional changes. This information is readily available knowledge from local experts. The model can logically be extended to predict changes in more detail but it becomes very difficult for managers to use. Expert systems are a means to overcome this problem. Empirical knowledge can be combined with ecological theory in a computer program which will advise what to do and not to do to make a forest or farm flourish. The quality of the computer's advice, of course, reflects the quality of the expertise fed into the program.

The vital attributes model is now in the text books. Since 1980 Dr Noble has been refining the program to incorporate the best of new automated deduction programs. This allows the input of more disturbances, such as cyclones, and the more detailed prediction of the vegetation changes that will occur, particularly the composition and structure of the ensuing forest or grassland. The output can be graphically displayed in space and time. Long-term trends and the susceptibility of vegetation to human impact can be shown.

Dr Noble's model has already been applied to the regeneration of eucalypt forest in bauxite mining areas in Western Australia, the recolonisation of plants after fire in the temperate rainforest in Tasmania and to advise foresters in China. Current projects concern fire management in the woodlands of Kakadu National Park (research in conjunction with CSIRO for the Australian National Parks and Wildlife Service), grazing in the arid lands of central Australia and the management of forests and water catchments in other areas.

The CSIRO program on fire in Kakadu was originally written by a PhD student in the Department of Computer Science, Mr Graham Williams. His expert system won an award at an international conference in France.

# Curtain up on ANU Drama

The newly appointed Drama lecturer at ANU, Mr David Williams, says record numbers of students have enrolled in this year's inter-disciplinary drama field program, proving that the study of drama on campus is more popular than ever. And he says the recent allocation of the ANU Arts Centre dance studio for use by students is evidence that the University recognizes drama as an important academic pursuit.

Mr Williams is the first drama lecturer at ANU. He has completed a Master of Arts at the University of Kent, specialising in the work of the internationally acclaimed director, Peter Brook. Mr Williams has also worked as an actor, mostly with fringe theatre companies in London.

'When I arrived at ANU I was very concerned to learn that there was no work-space available for everyday student use. Having been granted use of the dance studio now provides a focus for studying drama, a performance base.'

'Until now, drama at ANU has been studied largely as a literary artifact rather than in terms of practical performance. Why a person wrote a play and not a novel or poem can only be understood through active exploration.'

## FIELD PROGRAM

One of the reasons Mr Williams was brought to ANU was to consolidate the Drama Field Program, which involves students and lecturers from the departments of English, Modern European Languages, Classics, Asian Studies and Philosophy.

'I am very impressed with the degree of enthusiasm for the Drama Field Program. There is a wealth of energy and ideas from the students.'

'The interest in drama here can be witnessed by the recent appointment of a theatre company in residence: Interact. Its potential input

into practical theatre work on campus is enormous.'

Mr Williams is teaching three new drama units at ANU. He says all have a heavy emphasis on performance and students will be assessed in part on their participation. 'Practical drama is often thought to be problematic to assess, but it can be done. By awarding marks not for acting ability, but for each student's commitment, understanding of technique, stage management, lighting and so on.

## MAHABHARATA

He hopes to take a group of students to the Adelaide Arts Festival next year to witness a performance of Peter Brook's production of *The Mahabharata*. The 12-hour Sanskrit epic is to be shown over three nights and will be performed in a quarry outside the city. The production involves performers from 16 countries. *The Mahabharata* is one of the most exciting theatre productions ever attempted. The stories in it are still vitally alive in India today. Its theatrical techniques come from many traditions and the spectator is fully engaged throughout.'

Mr Williams' appointment to ANU is for three years. 'By the time I leave, I hope there will be a strong caucus of individuals actively involved in staging productions on campus. It is only through direct experience of the grimy, sweaty conditions that characterise the creative process that participants will become fully embroiled, and reap the benefits.



The University's first ever drama lecturer, David Williams, is pictured striking a theatrical pose with a Balinese puppet. Photo: Stuart Hay.

# Vice-Chancellor launches Crawford essay book



The Vice-Chancellor, Emeritus Professor Peter Karmel (left), recently launched *Policy and Practice: Essays in Honour of Sir John Crawford*. Among those present were the Chancellor, Sir Richard Blackburn (second left) and the two editors of the book, J.D.B. Miller, Professor of International Relations in the Research School of Pacific Studies (second right) and Dr L.T. Evans, Chief Research Scientist with CSIRO. Professor Karmel read from a letter sent for the occasion by the Prime Minister, Mr Bob Hawke, who said he was delighted to hear of the launching of the book. 'It comes as no great surprise that such a group of distinguished contributors felt it important to put together this series of essays to pay tribute to the life's work of a truly great Australian,' said Mr Hawke. 'Each contributor is to be congratulated for enlarging our understanding and knowledge in a manner which their subject would have undoubtedly wholeheartedly approved.'

Professor Karmel said that the authors of the essays all underlined that in the range of his contributions to public policy, both within Australia and internationally, Sir John stood out as a great figure. 'This influence sprang neither from a grand stature nor a silver tongue, but rather from the intellectual grip he had on his goals and a single-minded determination to achieve them.'

*Policy and Practice* is an Australian National University Press publication (a division of Pergamon Press, Australia). It is available from the Co-operative Bookshop at \$35.

# Bicycle thefts increasing

by Marko Pekkarinen\*

Bicycle thieves are having a field day in the ACT. In the past 12 months, well over a thousand bicycles have been stolen, a number from ANU, and most of them unlocked.

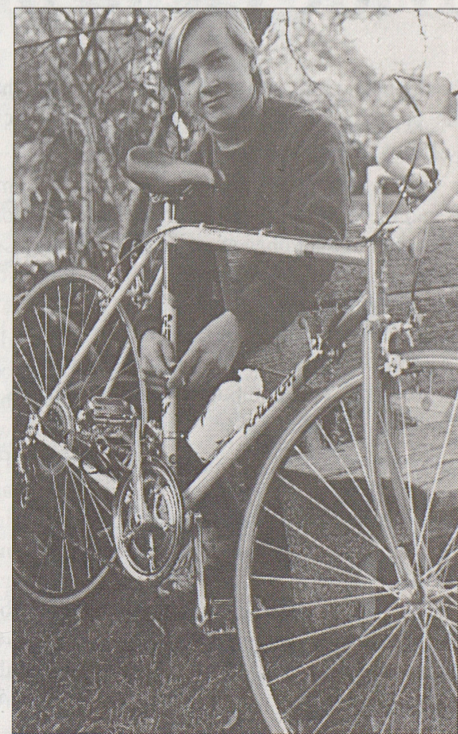
'The theft of bicycles at the University appears to be on the increase,' said Mr Ken Harrison, Head of Buildings and Grounds at ANU.

Approximately 110 bicycles a month have been stolen in the ACT so far this year, compared with 95 a month at the end of last year. The total value of bikes stolen this year amounts to \$111,400. No-one has been caught in the last twelve months.

Though there are cages and bike racks around the campus, some are little used by students, especially if they are placed away from class areas. Apart from the University, bikes are often stolen from schools, shopping malls and even front yards.

'About 99 per cent of bikes stolen are unlocked,' said Sgt Alex Fyfe of the Police Community Relations Unit. 'A thief really will not bother trying to steal a locked bike if he does not have to.' Police believe that a number of stolen bicycles leave Canberra to be sold in New South Wales. An identification number should be put on bicycles to help police identify them if they are stolen. But the safest way to keep your bike secure is to chain

it to a tree or post, or a bike rack with a good lock.



\* Marko Pekkarinen, on a week's work experience for ANU Reporter, is a Year 10 pupil at Weston Creek High School.

Marko Pekkarinen illustrates the importance of securing bicycles on campus. Photo: Roger Green.

## Credit where it's due . . .

The University Credit Union has announced a new service for members which it believes is a first among Canberra financial institutions.

It is an overdraft limit on savings accounts up to double the amount of salary deposits credited to the account. Members can access their overdraft by cheque or cash withdrawal, or through the Australia-wide Rediteller or Flexiteller systems. The only charge to members is when the account is overdrawn; when this occurs, the amount concerned is automatically covered by free loan protection insurance.

The Credit Union's General Manager, Mr Barry Murphy, told *ANU Reporter* that the offsetting effect of salary credits and surplus funds in the accounts would make this probably the cheapest form of consumer finance available in the ACT. The fact that any surplus funds were used to reduce loan interest rather than earn taxable deposit interest was an added feature. Mr Murphy said he hoped that the overdraft facility would be linked to a charge-free cheque account later this year.

## History of Ideas Unit — two public lectures

Two public lectures by distinguished visitors to the History of Ideas Unit in the Research School of Social Sciences will be held over the next two months. On 28 July, Professor Alan Ryan (New College, Oxford, and Princeton University, New Jersey) will lecture on: *Bertrand Russell and the Irresponsibility of Intellectuals*. On 4 August, Professor W.W. Bartley III (the Hoover Institution, Stanford), will speak on: *Sir Karl Popper: Toward an Intellectual Biography*. All interested are welcome. The lectures, which are free, will be held at 8pm in the Haydon-Allen lecture theatre at ANU.

## Bistro offers winter special

The University House Bistro is offering a special winter set lunch, competitively priced at \$12.50 per head, for groups between 10 and 25 in number. The price includes main course with salad, gateau and coffee. Bookings should be made with Mrs Lyn North on 7-271, (062) 49 5271 for outside calls.

## Staff Centre has new management

The Staff Centre has new managers — University House. The move follows a difficult year of trading. In agreeing to the new arrangements, the Finance Committee has provided for an immediate cash grant and loan to enable major refurbishments to go ahead at the Staff Centre's lakeside premises. It is understood that consultations have been taking place with the six Centre staff, to safeguard their future.

The Staff Centre will continue to offer a club-style atmosphere, open free to all staff and with outside membership still available. It will be known as the Staff Centre at Old Canberra House. University House intends to open the premises for lunch Monday to Friday, and on Friday nights for dinner.

Meanwhile, University House reminds clients that it is pleased to cater for University social functions, seminars and meetings. For functions in the House or the Staff Centre, please call the Functions Manager, Mrs Lyn North, on 7-271 from within the University, or 495-271 from outside.

For sandwiches for fewer than 50 people, as well as bottle-shop supplies, please call the Bottle-shop/Buttery Manager, Mrs Jan Branstom, on 7-288 (internal) or 495-288 (external).

## Understanding software

A course called *Writing Better Computer Software Documentation For Users* is to be run by the Centre for Continuing Education (CCE) from 29 June to 1 July. The course will be of interest to programmers, systems analysts, technical writers and documentation specialists, as well as managers of information services who are responsible for preparing documentation standards. It aims to provide a systematic approach to documentation writers, thereby improving customer satisfaction with the software, and reducing calls from end-users who require clarification of operating procedures.

The fee is \$470. For those unable to attend the first course, it will be offered again on July 2, 3 and 6. For further information, contact ANU, GPO Box 4, Canberra, 2601. (062) 49 4580 or 49 3858.

## International Conference on Thai Studies

An International Conference on Thai Studies will be held next month at ANU. The conference will emphasise aspects of economics and development, as well as all fields of the humanities and social sciences. The conference is divided into ten themes: economics, language and literature, history, minorities and politics, politics and international politics, prehistory and archaeology, change in rural Thailand, modern Laos, urban and regional development, and religion and belief systems. The opening, on 3 July, and all sessions held in the Coombs Lecture Theatre, will be open to the public at no charge. Registration is \$60, which includes two volumes of Conference Proceedings, and loose copies of all papers distributed.

The ANU Library and the National Library have arranged an exhibition in the MacDonald Room of the Menzies Library, with rare, early items as well as informative material on the development of publications in and about Thailand. Further information can be found by contacting the Convenor of the organising committee, Dr Gehan Wijeyewardene, in the Department of Anthropology, RSPacS (x3273/2162).

## Special research centres — new proposals sought

Proposals are being sought from suitably qualified researchers under the Commonwealth Special Research Centres Program, for the period 1988-90. The Program which was set up in 1982, supports a limited number of special units within higher education institutions, where research of outstanding quality and likely to lead to a significant development of knowledge, may be pursued within an international context. Excellence is the primary criterion of the Selection Committee. Priority is given to proposals which can contribute to Australia's economic development and international trade. The Committee is also receptive to innovative arrangements between institutions and co-operative developments with industry and commerce. Potential applicants, whom their institutions fully support, should contact the Registrar, Dr Rosalind Dubs (x2621/2) for proposal forms. The Institute of Advanced Studies at ANU is specifically excluded from the program.

## Public lecture

Professor H.A. Buchdahl, a Fellow of the University, will give a public lecture entitled *Second Culture Second Law* on 17 June in the Huxley Lecture Theatre, Mills Road, at 8pm.

The lecture will attempt to present a generally intelligible description of the Second Law of Thermodynamics. The inability of C.P. Snow's literary colleagues to describe this law on the one hand and, on the other, the alleged failure of scientists to communicate, share a common basis. An examination of this leads to the conclusion that the widespread criticism of scientists in this regard is unjustified, according to Professor Buchdahl.

The lecture is free and interested members of the public are invited to attend.

## Mirages and Challenges

*China in the Eyes of French Intellectuals: Mirages and Challenges* is the title of the forthcoming 1987 Morrison Lecture. This year's guest lecturer is the distinguished French academic, Emeritus Professor Jean Chesneau, Professor of Contemporary Far Eastern History at the Sorbonne. Professor Chesneau will deal with four main themes: French philosophers' encounter with China in the 18th century; the century of neglect dominated by adventurers and others; Maoist mirage in the French intellectual scene; and the relevance of China to the French intellectual crisis in the 1980s. The lecture will be held at 8.15pm on Wednesday 24 June 1987 in the Coombs Lecture Theatre at ANU; it is free and open to all who are interested.

## Workshop for women

A two day workshop is being held in the University Counselling Centre on 29 and 30 June for women of any age who are interested in gaining a greater understanding of themselves. They may be facing a decision concerning their careers, relationships or families. They may be dissatisfied with their present situation, but unsure how to change it. There will be opportunities for self-exploration, discussion and sharing experiences with other women. There will also be an opportunity to acquire assertion skills. The registration fee is \$2 and staff and students are welcome; the workshop will be run by Leila Bailey and Margaret Evans. Further information is available from Jill Hardy at the Counselling Centre (x2442). Registration closes on 22 June.

Continued from page 8

*International Relations, RSPac sem.* Ms Adriana Novelo — Nationalism and international solidarity: Vietnam, in the socialist world, 11am, sem rm B, Coombs.

*Centre for Mathematical Analysis Colloquia*, Dr L. Koch — Cartan's chains and Lorentz geometry, 4pm, sem rm, Hanna Neumann bldg.

## Arts and Entertainment

Entries for the next issue close at 5pm on Wednesday 17 June and will be for the period Monday 29 June to Friday 17 July inclusive. Each notice should be typed on a separate piece of paper. Publication is restricted to events on campus only.

Tuesday 16 June

*Canberra School of Music*, Cushion concert, ANU Drill Hall, Kingsley Street, 12.40pm, a varied program presented by student musicians. Bring your lunch.

Wednesday 17 June

*Canberra School of Art Forum Lecture*, Tracey Moffatt, Sydney based film-maker, CSALT, 1pm, Admission free.

*Canberra School of Music*, Jazz at Manuka, lively jazz at lunchtime at the original School of Music, Manuka Circle, 12.30pm, light lunch available.

Thursday 18 June

*The University Toastmasters Club*, weekly meeting, 12.30-1.30pm, IRU sem rm, Chifley bldg.

Wednesday 24 June

*Canberra School of Music*, Anniversary Series I, presented by the Friends of the Canberra School of Music. Geoffrey Tozer celebrates twenty-five years as a concert pianist. Works by Bach, Haydn, Bartok, Schubert and Beethoven. Admission \$6, \$4, Bookings open 9 June, from 10am-3pm.

Thursday 25 June

*The University Toastmasters Club*, weekly meeting, 12.30-1.30pm, IRU sem rm, Chifley bldg.

## Awards

*CSIRO 1987, Postdoctoral Awards*, Closing date 30 June 1987. Contact: J. Bergin x4206.

*Australian Academy of the Humanities Travel Grants*, Closing date 30 September 1986, Contact: The Executive Secretary, Australian Academy of the Humanities, GPO Box 93, Canberra, ACT 2601, (062) 487744, Mrs Sally Janeczko.

*Japanese Government (Monbusho) Scholarships 1988*, Closing date 17 July 1987, Contact: The Secretary, Department of Education (Japanese Government Monbusho Scholarships) PO Box 826, Woden, ACT 2606.

*NT Literary Awards*, Closing date 4 August 1987, Contact: Chairperson, NT Literary Awards Committee, C/- Box 1701, GPO, Darwin NT 5794.

*Canadian Studies Faculty Enrichment Program, Australia and New Zealand*, Closing date 15 July 1987, Contact: Canadian High Commission, Commonwealth Avenue, Canberra, ACT 2600.

Details on the following scholarships may be obtained from the

*Graduate Students Section* located on the lower ground floor of the Chancery Annex.

*Rotary Foundation International Peace Scholarships*. Tenable at University of Bradford School of Peace Studies, Bradford, West Yorkshire, England. Application forms are available from local Rotary Clubs. International closing date 15 July 1987.

*Australian Meat and Livestock Research and Development Corporation 1988 Postgraduate Study Awards*. Tenable at Australian or overseas universities for postgraduate study. Closing date 31 July 1987.

*Australian Graduate School of Management Travel Scholarships* for Fifth Australian Student Workshop in Management Research 24-26 July. Closing date 1 June 1987.

*Philips International Institute of Technological Studies Postgraduate Scholarships 1988*. For BSc holders who wish to study postgraduate Electrical Engineering. Enquiries close 17 July. Applications close 31 July. Application forms and information available from Mr I.K. Anstey, Philips Industries Holdings Limited, P.O. Box 1138, North Sydney, NSW 2060.

*Harkness Fellowships 1988 Awards*. For postgraduate study and travel in U.S.A. Application forms available until 17 August 1987 for closing date of 31 August 1987.

*Wenkart Foundation Postgraduate Scholarships*. Closing date 31 August 1987. For medical sciences and related areas.

*National Health and Medical Research Council Postgraduate Research Scholarships*. Closing date 30 June 1987.

Information and application forms for the following Scholarships are available from the Department of Education, P.O. Box 826, Woden ACT 2606 (telephone 837777).

*French Government Postgraduate Scholarships 1988/9*. In literature, linguistics and education. Closing date 31 August 1987.

*French Government Awards for French Teachers*. Closing date 31 August 1987.

*French Government Scientific Fellowships*. For 3-6 months for postgraduates. Closing date 12 June 1987.

*Federal Republic of Germany Scholarships 1988/89*. For twelve months. Applicants must have a Bachelor degree and good knowledge of German. Closing date 19 June 1987.

## Meetings

*Security and arms control in the North Pacific, A Major International Conference*, 12-14 August 1987. For further details and a registration form contact: Pauline Kerr, Peace Research Centre, Research School of Pacific Studies, Australian National University, GPO Box 4, Canberra, ACT 2601.

## Call for papers

*Australian & New Zealand Association of Management Educators*, 'Building Bridges', 4-6 November 1987, University of Sydney. Contact: ANZAME Conference and Exhibition, Kaye Paterson, P.O. Box 468, Paddington, NSW 2021. (02) 3324622.

## Visitors

Professor Peter T. Cummings, University of Virginia, Visiting Fellow, Research School of Chemistry, 25 May — 3 July 1987, interests: Statistical mechanics, chemical process design, x4028.

# Classified

Advertisements are restricted to staff and students of the University and members of Convocation, and to 20 words each. Normally, only one advertisement per person can be accepted for each issue. Typed advertisements should be sent or delivered to ANU Reporter, University Information. The envelope should be marked 'Advertisement'. No advertisements can be accepted over the telephone. The closing date for next issue is 5 pm Wednesday, 17 June, Inquiries, x2229.

## For Sale

**Toyota Crown**, 1970, auto, ACT rego, reas condition, best offer over \$900; 484002 (bh), 476516 (ah).

**Volvo**, S/W, 145, auto, very gd cond, recond engine with 12 months warranty, long rego, \$4500 ono; 726227.

**Datsun**, 1971, good condition, \$750 ono; x2562/542981 (ah).

**Holden VC Commodore**, L 1980, 6 cyl, 4 speed, rad/cass, new tyres, 6 mths rego, \$6,200 ono; 493803 (bh), 921777 (ah).

**FX Holden**, worked 138 Grey motor, triple SU's, silver mink duco, wide wheels, red velour interior, \$4950; x4314.

**Binoculars**, pair, small, high quality, 8 x 24 \$150; 7 x 20 \$100 ono; Vivitar 80-200mm macro zoom lens, Olympus mount with polaroid & skylight filters, offers over \$500; ideal for travel, bush-walking, mint cond, original receipts; 492465/824005.

**Carpet square**, wool, pale grey, with underlay, 11 1/2' x 10 1/2', very gd cond, \$1,209/951495 (ah).

**Mattress**, inner spring, dble bed, as new, \$100; Wooden base, \$30; Cappuccino machine, \$60; 479702 (ah).

**Rocking chair**, Ercol, old English double bow, \$468; (40% current retail price) ono; x2908/572184 (ah).

**TV**, Sony, 34cm, colour, VHF/UHF, exc cond, \$260; Mexican glass shade, \$75; Wooden base for dble bed, \$20; x3177.

**Camphor chests**, by Shanghai craftsman, \$550; x3270/889115 (ah).

**Knitting machine**, Empisal, with lacemaker attachment, \$90; Kenwood Chef with some attachments, \$150; x2809/582583 (ah).

**Windows**, aluminium sliding Stegbar, approx 6' x 4', two at \$50 ea; Screen door, \$10; 492771/474335 (ah).

**Diving weights**, 1.50 ea; Rhee Tae Kwan Do suit, approx size 18, \$20; x3421.

**Holden HQ**, 1971, rego March 1988, mech sound cond, \$950; Typewriter, manual, Hermes Ambassador, wide carriage, very gd cond, \$80; 544641.

**Ski Boots**, Nordica, mens, size 7 1/2, good cond, \$70; Paul x4737.

**Lens**, Zoom 28 to 80mm Hanimex Macro, 55mm bayonet mounts \$210; Rogerson, Burton Hall, x3083.

**Sailboat**, Fireball, 16' and trailer with spare spinnakers & jib, good cond, \$1,000 ono; 823692.

**Suzuki 125**, GP road bike, almost brand new, 1300 kms, \$600; x2506.

**Bike**, man's Free Spirit, 10 speed, \$80; Andras x3546.

**Pram**, Steelcraft 3 in 1, as new, \$70; Cot, white Queen Anne, new mattress, \$150; 959218.

**Dining chairs**, (4), green upholstery, fretwork centre of high back, \$240 ono; Standard lamp, cane and wood, \$40; 477301.

**House**, Ainslie, completely renovated, 2 br, open plan with

rear deck, large well established garden, good sized garage, \$126,000; 822300.

**Garage sale**, moving interstate, furniture & fittings, incl sofa bed and table, Sunday 7 June, 51 Macleay St, Turner, 11am-4pm; x4703/487685.

**Golf clubs**, ladies, right-handed, basic set and bag, \$85 ono; 824843 (ah).

**Movie camera**, Canon 514 XLS, Elmo projector both Super 8 and sound in exc cond, \$400; 632014 (bh), 887550 (ah).

**Router**, Makita 3601B, brand new, never been plugged in, \$250 ono; x4292/959218 (ah).

**Old cameras**, (3) Circa 1936 + 1936 projector, make an offer; x4292/959218 (ah).

**Computer**, Commodore 64, with cassette, joystick, programmer and user manuals, virtually never used, \$295; 493134/513684 (ah).

**Computer**, Kaypro 4 plus printer, Admate DP80 and extra software, \$850; x2193/824539.

**Recording tapes**, 1/4" x 600' on 5" reel, used once only, \$3 each; 582626.

**IBM convertible PC**, 256K Ram, dual 3.5" 720KB floppy diskette, weight 6kg, never used, \$2600; Hercules graphics adapter for IBM PC/compatible, support monochrome monitor to display graphs, with printer cable, never used, \$200; Y.S. Chen, x2828.

**Brief case**, needs repairing, \$10; x2433/542688 (ah).

**Camera**, Konica SLR, \$200; Olympus compact camera, \$100; Enlarger \$60; Pentax lens \$100; Nikon lens \$140; some other lenses; Chris 465452.

**Heater**, oil filled, column style, in working order, reasonable price; x3890.

**Bedhead**, Q.A. mahog, \$60; 3 ven blinds, exc cond, grey all 150cm drop, 2 @ 179cms width, 1 @ 236cms width, \$70 the lot; Cane stools 2, blk seat, \$10 pr; 2' x 1' fish tank & stand + access, \$40; Mattress 3', gd cond, \$25; Curtain, cont, cream lace, 6 mtrs, \$25; x4166/318815.

**Honda Acty Van**, 1985, 27,000 kms, 11 months rego, as new, camper option, \$5,500; 381389.

**Mazda 929**, wagon, 1977, manual, very gd cond, one owner, new clutch & brakes, \$3,500; 486083, x3872.

**Renault 16TS**, new tyres, good cond, rego February 1988, \$1000 ono; 474603 after 4pm.

**Honda CX500**, 1981, exc cond, mech A1, 38,000 kms, \$1500; Honda 125 Road, goes well, \$210; 516156.

**Helmet**, and leather jacket for motorbike, as new, plus gloves, boots, all-weather pants, sell separately or the lot, \$250; 516156.

**Mountain bike**, 15 speed, 22 1/2", exc cond, all Japanese frame and components, mudguards, \$750; x3197.

**Ski Parka**, down-filled, detachable sleeves, blue, ladies size, large \$95; Ladies ski vest, size 14, \$25; Ladies moon boots, size 9, \$25; Tina 492888/493856.

**Dimplex**, 10-column oil-filled radiator, \$39; x2908.

**Fireplace**, black hood style, old but useable, complete with flue, grate etc, \$100, or swap for something I need; Towing mirrors, as new, \$25; Dusseal sealing paint for gyprock walls, 4 litres, \$25; 494614 (bh), 544274.

**Cassette recorder**, player, Sharp portable, power or batteries, condensed mike, 1 mth old, \$40 ono; x3415.

**Nissan 720**, diesel dual cab 4 x 4, 11/84 model a/c, CB radio, luggage rack, exc cond, \$14,750; Sonya x4161/540975 (ah).

**New mountain jacket**, navy blue nylon, fully insulated with 600g pure superdown, size L, ideal for snowcampers and ski-tourers, \$125; 816080.

**Computer**, Apple II Europlus, with 80 column Z80, parallel cards etc, monitor & disc drive; Typewriter, IBM electric; Record player cabinet, old; Chest of drawers, old, offers; 582531 (after 7pm).

**Windsurfer**, w/sail cover, \$525; Roof rack, \$50; x3197.

**Waterbed**, Kingsize, Pine side tables, Bedhead, Caps & Skirt, olive green, Sheep-skin underlay, very good condition, \$500; x2566/581504 (ah).

**Carpet**, 3.2 x 3.6m, wool berber, bound edges, as new, \$90; Rad/cass, AM/FM, mains battery player, Phillips \$25; Radar detector, Autex super III, new \$150; Green vinyl bean bag, gd cond, \$20; 496830 (ah).

**Datsun 180B**, 1976, rego February 1988, 3 yr warranty, \$2500; Frank x3286/3226.

**Cabinets**, (2) matching 28 x 91 x 100cms; 1 Bureau, 1 Cocktail bar, \$200 ea; Full set wool/blend beige seat covers for Nissan Bluebird 1984 onwards, 2 front floor mats & rear spoiler, \$120 the lot; 544873 (ah).

**Ford Escort 1300**, 1975, rego 10/87, good cond, white, economical, radio, \$1900; x4758/475214 (ah).

**Macintosh software**, UCSD pascal compiler from softech, mac-pascal interpreter, microsoft basic interpreter, \$175 the lot; Macintosh discs, single sided discs, 22 for \$75; Ken x4472.

**Camera**, Pentax MG with Takumar 28-80mm zoom lens, gd cond, \$250; Printer, Brother HR5, Thermal dot matrix ribbon or thermal paper; battery operated with AC adaptor; Centronics parallel interface, \$200; Ski boots x country, size 9/10, \$20; x3128/487240.

**House**, Lyneham, solid brick, 3 br, A1 condition, large est garden, close Civic, quiet street, extension potential, \$89,500; x4720/485849 (ah).

**Falcon XE**, wagon, 1984, 4.1 with tow bar and roof rack, 23,000 kms, \$12,000; Baby buggy, Maclarin lie-back, exc cond, \$65; x3632/816641.

**Mazda 323**, s/w, 1978, good cond, rego 3/88, \$3,500 ono; Heater, Dimplex, \$20; Aluminium caravan annex, new canvas roof, gd cond, \$800; Sally 497577 (bh), 546212 (ah).

**Kayaks**, (2), paddles (2), splash covers (2), buoyancy vest (2), & 1 dble decker portable kayak carrier; free with sale (2) wet suit shorts, (1) wet suit vest, and (1) head protector, all for \$800; J. Kelly 497475 (ah).

**Lounge chairs**, pair \$50 ea; Couch \$50; Children's bunk beds, w/mattresses, \$125; Bikes suit 6-10 yrs, \$30 ea; 494321/511120.

**Renault TS20**, auto, 5 dr hatch, equipped with all options, 12 mths rego, \$10,900; x3719/511306.

## Accommodation Available

**House**, 3 br, f/f, available mid-August — 2 January 1988, \$150 p.w. 632014 (bh), 887550 (ah).

**House**, Hughes, needs a third person to share till August, quiet, non-smoker, \$45 p.w. 813760.

**House**, O'Connor, 2 br, f/f close Uni & bus stops, avail from 15 July — 15 October 1987, no groups, non-smoker pref, \$100 p.w. H. Mann x2268.

**Flat**, central London, well furnished, spacious, 1 br, living room with sofa-bed, adj London University, avail November 1987, £120 p.w. x4357.

**Room**, Page, in new 3 br townhouse, comfortable furnished in pleasant surroundings, share with 2 others, \$45 p.w. + expenses; 549247.

**House**, Narrabundah, sunny, cosy home, seeks non-smoking female graduate, \$55 p.w., avail mid-late May 1987; 951562.

**House**, Cook, 3 br, available early August — mid October 1987, fully equipped, \$100 p.w. x4037/x4681/514950.

**House**, Adamnaby — skiing, to rent, sleeps 5/8, 30 mins Mt Selwyn, Kiandra, \$250 p.w./\$40 per night; x4528/475306.

**House**, Cook, quiet street, 3 br, extended living area, u/f, close shops, bus, bikepath, avail mid July 1987 — end April 1988, \$140 p.w.; 514357.

**Flat**, O'Connor, Dryandra Street, near ANU, CSIRO, sunny SC 1 br with views & carport, avail soon, \$90 p.w.; 884097 (ah).

**House**, Page, furnished, avail end June — mid September 1987, 2 br, \$100 p.w. 548466 (ah).

**House**, Lyons, 4 br, 2 bathrooms, close all amenities, car available, 12 mins drive ANU, avail July-August 1987, \$150 p.w. neg; x3887/824354 (ah).

**House**, Hughes, 3 br, u/f, lock-up garage, easy care garden, long lease, \$140 p.w.; sorry, no groups or pets; x3004/883540 (ah).

**House**, Scullin, 3 br, dble garage, furnished, avail late July — March 1988, no smokers or pets, \$140 p.w.; 541015 (ah).

**House**, Deakin, attractive, spacious, views, centrally heated, garage avail, person to share with owner, \$82 p.w.; 821108 before 10.30am/after 6pm.

**Turner**, person to share comfortable 2 br house, \$65 p.w.; 644603 (bh), 573524 (ah).

**Room**, Ainslie, in comfortable house, share with one female, \$50 p.w. + bills, male/female, 28+ pref; Deborah 478269 (bh).

**Cottage**, 25 mins ANU, \$70 p.w. available July-August 1987, cat lover only; 302348/582589.

**Room**, Kaleen, for mature person, furnished, well equipped household, \$51 p.w.; x4226/x3583 (bh), 416460 (ah).

**Unit**, Kingston, person to share sunny 2 br unit, large room, all mod cons, views, \$82.50 p.w. 462415 (bh), 957376 (ah).

**House**, Lyneham, two friendly people sought for mature group household, large sunny home, wood stove, near bike path, non-smokers, pref women, child considered; Bill 726407 (bh), 488259 (ah).

## Accommodation Wanted

**House/Flat**, furnished, wanted for academic couple, willing to care for pets and plants, recommendations available; x2395.

**Share/House sit**, responsible second degree student needs accommodation for rest of academic year; Maggie x4015.

**Share**, friendly, non-smoker, Chinese social sciences postgrad student, would like shared accommodation with Australian group, moderate cost, close Uni, from early July; 475981 (ah).

**Board**, breakfast & evening meal, will help with chores, mow lawns, baby sit, inner suburbs only; Stuart 492523 (bh).

## Secretarial

**Typing**, wordprocessing, assignments, theses, job applications, job resumes, ANU graduate with secretarial experience, \$2 A4 double spaced page; 275509.

**Wordprocessing**, assignments, theses etc, final copies off daisy-wheel printer, reasonable rates, will pick-up from campus; 882038.

**Proof Reading**, and/or editorial assistance provided by a qualified experienced Editor, theses a speciality, \$15 p.h.; Liz 412113 (ah).

**Typist**, extraordinaire, no job too small, exc rates, pick-up/deliver on campus; Dawn x4566/412253.

## Wanted

**Bird cage**, Sleeping bag, Student desk, Camping table; x3887/813545 (ah).

**Lounge suite**, 1 x 2, 2 x 1, pref linen winged or high back, also Queen Anne or similar bookcase; 959218 (ah).

**Hot rollers**, in working order; x3890.

## Miscellaneous

**General Handyman available**, postgrad, good with hands, experienced, cheap, most home maintenance/improvement and garden jobs considered; Paul 493253/571831 (h).

# Academic Diary

**Diary entries for the next issue close at 5pm on Wednesday 17 June and will be for the period Monday 29 June to Friday 17 July inclusive. Please assist us by submitting ALL diary entries on forms available from University Information, x2229.**

## Monday 15 June

**Philosophy/Political Science/Sociology (Joint)/Arts**, Special seminar series I, Professor B. Ollman — Marx's dialectical method, 10am, sem rm 2097, Haydon-Allen.

## Tuesday 16 June

**Far Eastern History**, RSPacS sem, Ms P. Keating — Peasant revolution in China: A review of the recent literature, 11am, sem rm E, Coombs.

**Humanities Research Centre/Faculties sem**, Dr Peter Kornicki — Mass-production printing for non-existent readers: printing and Buddhism in early Japan, 4pm, HRC reading rm, A.D. Hope.

**Demography**, RSSS sem, Professor H. Muhsam — Pre-selection of the sex of children, 3.30pm, sem rm A, Coombs.

**UNMRC Centre/RSC, Discussion Group**, Ms L. Harland — Practicalities of quantitative NMR, 11am, sem rm 134, RSC.

## Wednesday 17 June

**Philosophy/Political Science/Sociology (Joint)/Arts**, Special seminar series 2, Professor B. Ollman — Marx's dialectical method, 10am, sem rm 2097, Haydon-Allen.

**RSC/Inorganic Chemistry sem**, Dr Wasantha Wickramasinghe — Neutron diffraction studies of some transition metal hydride complexes, 11am, sem rm 134, RSC.

**Human Geography**, RSPacS sem, Mr R.M. Bourke — Variation over time in crop yield and area planned in Papua New Guinea highlands subsistence agriculture system, 2pm, sem rm C, Coombs.

**Pacific & Southeast Asian History**, RSPacS sem, Ms Birgit Scheps — Miklouho-Maklay and his work in New Guinea and Australia, 2pm, sem rm D, Coombs.

**Public Lecture**, Professor H.A. Buchdahl — Second Culture, Second Law, 8pm, Huxley L.T.

## Thursday 18 June

**History**, RSSS sem, Dr Avner Offer — Did Germany really starve in the first world war? 10.45am, sem rm D, Coombs.

**Sociology**, RSSS sem, Mariah Evans & Jonathan Kelley — The legitimation of inequality, 4pm, sem rm E, Coombs.

**International Relations**, RSPacS sem, Dr Richard Higgott — The state and the international politics of structural adjustment: A theoretical introduction with Australian examples, 11am, sem rm B, Coombs.

**RSC/Organic Chemistry sem**, Dr Richard Hooley — Gibberellin derivatives as molecular probes for receptors in the wild oat aleurone, 11am, sem rm 134, RSC.

## Friday 19 June

**Philosophy/Political Science/Sociology (Joint)/Arts**, Special seminar series 3, Professor B. Ollman — Marx's dialectical method, 10am, sem rm 2097, Haydon-Allen.

**Economic History/The Faculties/RSSS/The Faculties (Joint sem program)**, Dr Bob Jackson — Industrialisation and the structure of pay: was there a Kuznets curve in nineteenth century Britain?, 11am, sem rm E, Coombs.

## Tuesday 23 June

**Peace Research Centre, RSPacS sem**, Professor Jean Chesneaux — Modern war and military technology as a paradigm of modernity, 11am, sem rm A, Coombs.

**Humanities Research Centre/Faculties sem**, Dr C.A. Gerstle — A Japanese *Phaedra*: The Bunraku play *Sesshu Gappo ga Tsuji*, 4pm, HRC reading room, A.D. Hope.

**Far Eastern History**, RSPacS sem, Professor H. Bolitho — The road goes ever on and on, 11am, sem rm E, Coombs.

## Wednesday 24 June

**Linguistics/Arts sem**, Professor Jacob Mey — Whose language? (A presentation of Prof. Mey's recent book under the same title, John Benjamins 1986), 4pm, sem rm 2135, Dedman.

**Far Eastern History & Pacific & Southeast Asian History**, RSPacS joint sem, Dr E. Ungar — Notions of leadership and power in 15th century Vietnam, 2pm, sem rm D, Coombs.

**Morrison Lecture**, Emeritus Professor Jean Chesneaux — "China in the eyes of French Intellectuals — Mirages and Challenges", 8.15pm, Coombs L.T.

## Thursday 25 June

**History**, RSSS sem, Dr Chris Cunneen — The commemorative Business' Revisited", 10.45am, sem rm D, Coombs.

**CRES sem**, Bruce Mitchell — Integrated land and water management, 12.30-2pm, sem rm CRES, 5th fl, Hancock bldg.

**International Relations**, RSPacS sem, Dr Derek da Cunha — The rationale for the build-up of Soviet naval power in the Pacific, 11am, sem rm B, Coombs.

**Centre for Mathematical Analysis Colloquia**, Professor W. Moran — Kirillov theory for divisible nilpotent groups, 4pm, sem rm, Hanna Neumann bldg.

**Sociology**, RSSS sem, Krzyztof Zagorski — (Re?) Birth of inequality: Post war changes in socio-economic achievement in Poland, 4pm, sem rm E, Coombs.

**RSC/Organic Chemistry sem**, Dr John Huppertz — The changing face of herbicide research, 11am, sem rm 134, RSC.

**Demography**, RSSS sem, Mr Abbas Bhuiya — Factors affecting child survival in Matlab, Bangladesh, 12.30pm, sem rm D, Coombs.

## Friday 26 June

**Economics**, RSSS sem, Peter A. Goringe — Hostages, measurement costs, specific human capital and labour market contractual relationships, 2pm, sem rm D, Coombs.

## Tuesday 30 June

**Humanities Research Centre/Faculties sem**, Professor Andrew Parkin — Yeats and Meyerhold: the symbolist theatre, 4pm, HRC reading rm, A.D. Hope.

**Demography**, RSSS sem, Dr C. Young — Young people leaving home in Australia: the trend towards independence, 3.30pm, sem rm A, Coombs.

## Thursday 2 July

**History**, RSSS sem, Dr John McQuilton — The home front in a local government area: The case of Yackandandah 1914-18, 10.45pm, sem rm D, Coombs.

## Continued on page 7

ANU Reporter is published by University Information, 28 Balmain Crescent, Canberra 2601, on the second and fourth Friday of each month. Telephone: 494170/1 (editorial), 492229 (classified). Printed by Canberra Publishing and Printing Co., Fyshwick.