

THE
AUSTRALIAN NATIONAL UNIVERSITY

1972

REPORT



The Australian National University

**REPORT OF THE COUNCIL FOR THE PERIOD
1 JANUARY 1972 TO 31 DECEMBER 1972**

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THE AUSTRALIAN NATIONAL UNIVERSITY

**REPORT OF THE COUNCIL FOR THE PERIOD
I JANUARY 1972 TO 31 DECEMBER 1972**

To His Excellency the Right Honourable Sir Paul Hasluck, GCMG, GCVO, KStJ, Governor-General and Commander-in-Chief in and over the Commonwealth of Australia.

MAY IT PLEASE YOUR EXCELLENCY :

I have the honour to transmit to Your Excellency the Report of the Council of The Australian National University for the period from 1 January 1972 to 31 December 1972 furnished in compliance with Section 33 of the *Australian National University Act 1946-1971*.

H. C. COOMBS

Chancellor

The Council

The Council met six times during the year in March, May, July, September, October and November.

The Chancellor presided over meetings in March, July, September, October and November; the Pro-Chancellor presided over the meeting in May.

MEMBERS OF THE COUNCIL AS AT 31 DECEMBER 1972

MEMBERS EX OFFICIO

Herbert Cole Coombs, MA *WAust.*, PhD *Lond.*, HonDLitt *WAust.*, HonLLD *Melb., Syd. and ANU*, FAHA, FASSA, FAA—*Chancellor.*

The Honourable Sir Anthony (Frank) Mason, KBE, BA LLB *Syd.*—*Pro-Chancellor.*

Emeritus Professor Sir John (Grenfell) Crawford, CBE, MEc *Syd.*, HonDSc *N'cle (NSW)*, HonDEc *NE*, HonLLD *Tas.*, HonDSc(Econ) *Syd.*, FAIAS, FASSA—*Vice-Chancellor.*

David Noel Ferguson Dunbar, MSc *NZ*, PhD *Melb.*—*Deputy Vice-Chancellor.*

Frederick Colin Courtice, MA DPhil *Oxon.*, DSc *Syd.*, MRCS, FRACP, Hon FRACS, FAA—*Deputy Chairman of the Board of the Institute of Advanced Studies.*

Arthur Neville Hambly, MSc DipEd *Melb.*, FRACI—*Deputy Chairman of the Board of the School of General Studies.*

Richard Christopher Refshauge—*President of the Australian National University Students' Association.*

MEMBERS ELECTED BY THE SENATE

Lionel Keith Murphy, QC, BSc LLB *Syd.*
To resign 13 March 1973.

Peter Elliot Rae, BA LLB *Tas.*
Present tenure expires 30 June 1974.

MEMBERS ELECTED BY THE HOUSE OF REPRESENTATIVES

Kim Edward Beazley, BA *WAust.*, MA.
Resigned 22 December 1972.

Michael John Randal MacKellar, BScAgr *Syd.*, BA *Oxon.*
Present tenure expires 18 August 1973.

MEMBERS APPOINTED BY THE GOVERNOR-GENERAL

George Austin Colman.

Present tenure expires 29 September 1975.

Sir Norman (Lethbridge) Cowper, CBE, BA LLB *Syd.*

Present tenure expires 29 September 1974.

John Qualtrough Ewens, CMG, CBE, LLB *Adel.*

Present tenure expires 29 September 1975.

Sir Warwick (Oswald) Fairfax, MA *Oxon.*

Present tenure expires 29 September 1974.

Sir Brian (William) Hone, OBE, BA *Adel.*, MA *Oxon.*

Present tenure expires 29 September 1975.

Peter James Lawler, OBE, BEc *Syd.*

Present tenure expires 29 September 1975.

Thomas Fulton Coleman Lawrence, BSc BE *Syd.*, FRAeS.

Present tenure expires 29 September 1975.

Geoffrey Lance McDonald, BA MB BS *Syd.*, FRACP, MRCP.

Present tenure expires 29 September 1974.

John Colinton Moore, BCom *Qld.*, AAUQ.

Present tenure expires 29 September 1974.

Sir (Horace) Frank Richardson.

Present tenure expires 29 September 1973.

Sir Frederick (William George) White, KBE, MSc *NZ.*, PhD *Cantab.*, HonDSc
Monash, ANU and P&NG, FAA, FRS.

Present tenure expires 29 September 1974.

Arthur John Russel Yencken, MA *Cantab.*

Present tenure expires 29 September 1975.

MEMBERS CHOSEN BY HEADS OF THE RESEARCH SCHOOLS IN THE INSTITUTE OF
ADVANCED STUDIES

Wilfred David Borrie, OBE, MA *NZ.*, FASSA.

Present tenure expires 29 September 1973.

Sir Ernest (William) Titterton, CMG, MSc PhD DipEd *Birm.*, FRSA, FAA.

Present tenure expires 29 September 1973.

MEMBERS CHOSEN FROM AMONG THE DEANS OF THE FACULTIES IN THE SCHOOL OF
GENERAL STUDIES

Eric Charles Fry, BA BEd DipEd *Syd.*, PhD.
Present tenure expires 29 September 1975.

Ian Gordon Ross, MSc *Syd.*, PhD *Lond.*, FRACI.
Present tenure expires 29 September 1973.

MEMBER ELECTED BY THE PROFESSORS IN THE INSTITUTE OF
ADVANCED STUDIES

Patrick Alfred Pierce Moran, MA ScD *Cantab.*, MA *Oxon.*, DSc *Syd.*, FAA.
Present tenure expires 29 September 1974.

MEMBER ELECTED BY THE PROFESSORS IN THE SCHOOL OF
GENERAL STUDIES

Liu Ts'un-Yan, BA *Peking*, BA PhD DLit *Lond.*, DipEd *HK*, HonDLitt
Yeung-Nam, FAHA.
Present tenure expires 29 September 1974.

MEMBERS ELECTED BY THE NON-PROFESSORIAL ACADEMIC STAFF
IN THE INSTITUTE OF ADVANCED STUDIES

James Maurice Bowler, MSc *Melb.*, PhD.
Present tenure expires 29 September 1974.

Stuart Ross Taylor, MA *Oxon.*, MSc *NZ*, PhD *Indiana*.
Present tenure expires 29 September 1975.

MEMBERS ELECTED BY THE NON-PROFESSORIAL ACADEMIC STAFF
IN THE SCHOOL OF GENERAL STUDIES

Donald William Archdall Baker, MA *Melb.*
Present tenure expires 29 September 1975.

Peter Edwin Miles Standish, BA BEd *Syd.*
Present tenure expires 29 September 1974.

MEMBER ELECTED BY THE RESEARCH STUDENTS

Robert Parry Monckton, BSc *Flin. and ANU.*
Present tenure expires 29 September 1973.

MEMBER ELECTED BY THE UNDERGRADUATE STUDENTS

Michael Grahame Wright.
Present tenure expires 29 September 1973.

MEMBERS ELECTED BY CONVOCATION

Ruth Emma Auguste Arndt, BSc(Econ) *Lond.*
Present tenure expires 29 September 1975.

The Honourable John Johnstone Dedman, BA HonLLD.
Present tenure expires 29 September 1975.

The Honourable Thomas Eyre Forrest Hughes, QC, LLB *Syd.*
Present tenure expires 29 September 1975.

Germaine Anne Joplin, BA DSc *Syd.*, PhD *Cantab.*
Present tenure expires 29 September 1975.

MEMBERS APPOINTED BY THE COUNCIL

John Darling.
Present tenure expires 11 March 1973.

Roy Douglas Wright, MB MS DSc *Melb.*, DSc, FRACP.
Present tenure expires 9 November 1974.

SECRETARY TO THE COUNCIL

The Registrar.

THE VICE-CHANCELLOR'S REPORT

A report presented by Emeritus Professor Sir John Crawford, CBE, to his last meeting of the University Council on 9 March 1973.

I wish to use this opportunity to review what I regard as the most significant developments in the University during my term as Vice-Chancellor. I rather want to review what I have regarded as the key issues and what has emerged in the last five years. I will do this by discussing in turn the executive role of the Vice-Chancellor; the protection of the University as a place in which the right of dissent is upheld for all its members; the development of the University both physically and academically; the Council; and the future of the Australian National University.

The Vice-Chancellor, under the Council, is the executive of the University. He is responsible for carrying out Council's wishes. In this regard his guiding principle must be to provide and support the best possible conditions for the pursuit of the academic purposes of the University, namely, teaching and research. This primary purpose of the University administration is, I believe, better appreciated than it was.

No Vice-Chancellor can ever claim 100% success in this endeavour and I am conscious of some failures on my part. I do wish, however, to make one unequivocal claim—the major administrative structure approved by Council at the outset of my office has stood up to a gruelling test. It has shown its effectiveness in supporting the vast complex of budgeting and accounts, academic boards and committees, student admissions and examinations, physical planning and development, our external relations—to mention only some of the more obvious areas of executive responsibility. All this has been achieved in cost terms which compare more than favourably with other universities. Despite the vicissitudes of dealing with unpredictable cost increases, especially non-academic salaries, the University has remained solvent without serious impairment of its principal academic goals.

In a sense the other responsibilities to which I wish to refer are also executive in nature, but they are also wider in the sense that they reflect policy judgments both by the Council and the Vice-Chancellor. The first of these matters is one to which I gave very high priority when I took office in January 1968. This was the need to protect the existence of a university, particularly this University, as a place of intellectual freedom for all. Dissent is, to me, the life blood of a good university, but when it carries the threat of violence and intimidation on the part of some, no Vice-Chancellor can be a passive spectator.

A policy had to be developed and expressed and I am glad to report my gratitude to the staff and the ANU student body for the support given me. The policy was simply that communication within the University should be widened as much as possible, that the remoteness of the Vice-Chancellor and senior officials, academic and non-academic alike, should be greatly lessened by this and that device of opening doors and in other ways improving access for those with either grievance, positive ideas or simply seeking advice as many do. I like to think that student participation was increased because the case for it was overwhelming. Certainly, well before 1968, I had felt this need in the ANU and was strongly

supported in the School of General Studies even if with trepidation on the part of some. As might have been expected the results of providing for more scope for participation have been uneven, but in net very good indeed. Generally the opportunities are greater than present demand—despite this I believe there is room for further improvement.

However, the process of protecting the University required more than wider communication—it also called for acceptance by all of the principle that the right of dissent was the right of all; that none had the right to impose views by force or intimidation; and that when decisions had to be made they were made after proper consultation and in terms that could be explained and justified in relation to the welfare of the University and its members. It is the wide acceptance of this view that has given me most pleasure and a confidence that the University could proceed, without disruption, to develop further its high place in academic work in Australia and beyond. I hope the development of the University Forum will provide further scope for staff and student influence on the future course of the ANU.

In the background of all academic developments there has again been a widespread staff (but rather less student) involvement in academic planning. Perhaps one of the most encouraging things to me personally was the response to invitations issued by me for ideas for the 1973–75 triennium. The outcome has been a tribute to that effort.

The Act requires the research schools of the Institute of Advanced Studies 'to encourage and provide facilities for postgraduate research and study, both generally and in relation to subjects of national importance'. I believe they are meeting this test and, judging by the way all are respected and called on for academic and public help, have become a major factor in national life and often internationally as well. We have consolidated the work of the longer established Research Schools, Chemistry and Biological Sciences are well forward, and Earth Sciences, after a somewhat difficult birth, faces a promising future. In the process of argument and discussion among ourselves, with the Australian Universities Commission (AUC) and with the Government, we have developed a framework for future growth of the Institute and related activities. I think the principles developed there and broadly accepted in its fifth report by the AUC can be sustained in the future.

In the School of General Studies, although we have not found a more satisfactory name for it—a fact I much regret—we have widened the academic options open to students. Prehistory, sociology and the grouping of old and some new courses in science and arts appropriate to what I call the 'Study of Man', promise well. So, too, do the various other combinations of economics, arts, science and law. The Legal Workshop is clearly a successful innovation as is the degree of master by course work in economics. To get under way shortly is the Office for Research in Academic Methods which hopefully will, among other objectives, make teaching more effective throughout the University. The School has been hard pressed to reduce costs per student, but here also a not unsatisfactory course of action has been evolved. Part-timers have presented something of an academic problem, but Council has approved steps which should raise the effectiveness of their participation in our academic life. The School has developed well, not least

because from the beginning in 1960 the Council enabled it, in practical ways, to attract high quality students and to develop its own postgraduate activities.

We are about to launch two major centres of considerable excitement in their own right and likely to make an important contribution to the intellectual unity of the University—itself a major aim I have nourished in my term as Vice-Chancellor. I refer to the Humanities Research Centre and the Centre for Resources and Environmental Studies. These Centres have the great advantages of being of interest to many in both the Institute of Advanced Studies and the School of General Studies and being designed to support work in both. In fact their interests and programs will in practice be so integrated with School and Institute that I have no fear of a 'third world' developing. They will be bridges of great importance to the unity of the ANU. They have the further advantage of forging stronger links with the academies, other universities, the CSIRO and, in the case of the Centre for Resource and Environmental Studies, of being of vital concern to Federal and State Governments alike.

A most important factor in this development of a greater sense of unity in the University has been the establishment of the Graduate Degrees Committee. This now unifies the administration and development of policies in the postgraduate field.

It is gratifying to observe the University's standing in the academic world. I offer no quantitative data on this, although some is available to researchers, I can only judge by the growing attractiveness of the ANU as a place to work both to visitors and recruited staff; its success in reversing the post-war brain drain; its clear standing in the publication of scholarly work in and outside Australia; and the growing respect for its members as effective contributors to many public authorities—again both here and abroad. Not least (and this can be quantified) is its great success in competition with other universities in attracting graduate scholars. The ANU is an exciting place in which to work and it is important to keep it this way.

This remark bears on the important problem of relations with external bodies capable of influencing the future of the ANU. Thus, relations with the Australian Vice-Chancellors' Committee (AVCC) will continue to be important for the University. The Committee has grown into a much more effective reflection of concerns and objectives of Australian universities than it was. Certainly this University has benefited considerably from the regular exchange of views and experiences. From the nature of universities, the AVCC cannot always speak with unanimity—but it does now submit well considered views, especially to governments and to their own councils.

I have frequently spoken of the AUC, sometimes critically but also with considerable respect. It is charged with advising Federal and State Governments on the 'balanced development' of universities. This it has done with growing efficiency but also under increasing financial constraints largely imposed by the extreme pressure on limited State resources of other educational needs. This, of course, has been a difficulty for the ANU which sought to be treated on the merits of its proposals not merely as some sort of average of the total university system. In its last report the AUC has recognised the complexity and uniqueness of the ANU and has sought to establish principles appropriate to it and especially the Institute.

The very fact that a statutory authority like the AUC does have considerable power (for its *advice* is very authoritative) over the 'balanced development' of universities inevitably presents a threat to university autonomy. This is a matter calling for constant vigilance. It is good to record that the AUC recognises this danger and has been keen to evolve general principles of development which serve the interests of universities with minimum impairment of the authority of their governing bodies. This is important in a situation in which universities clearly cannot be allowed to 'write their own tickets'.

The ANU policy has been clear and, given the constraints on the AUC, not unsuccessful. This policy is to argue our case openly and within reason. I have often used the term 'comparative advantage' and believe that we will always get a hearing if we concentrate on the things the ANU can do best because of its location, equipment and high quality of staff and students. We have not opposed the rights of others to seek national centres; but we do not have to abandon the right to new developments such as the Research School of Earth Sciences and the two newest centres.

One other external relationship calls for mention. I refer to relations with the Canberra College of Advanced Education. These have been good and it is fair to record that their success in achieving rapid progress from the beginning was, in important measure, due to the full support cordially given by the ANU. The College was able to blueprint many of its administrative operations by drawing directly on ANU experience and legislation. In academic terms the relationship could, I believe, be rather closer yet in some areas—but I expect further progress.

I have every reason to be grateful to the Council for the support its members, collectively and severally, have given me. Because of our claims to be a national university, the membership is geographically wide, and, by some standards, large. But it has functioned well, even if mild protests have been my lot as this or that member has been 'invited' to serve on Committees of the Council.

Perhaps the most important thing to be said about the Council is the consensus nature of its work. It is important to stress this for, contrary to opinion sometimes ventured by students and others, the Council is not dominated by any group such as Government appointed members. It does not hesitate to proceed to a formal vote if the occasion requires it, but even then the striking thing is that the voting is not by 'interest' groups. It is a deliberative body in which members try to reach a conclusion best likely to serve the University.

The Council is an independent body. It has acted with a full sense of responsibility to the community. It will not be misunderstood, I hope, if I record a special thank-you to the present Chancellor and the two Pro-Chancellors of my time.

I have already implied a good deal about the future of the ANU in my earlier remarks but a few more things need to be said. Most of them rest on the promise that has strongly guided my own thinking and actions. This is a national university, by intent of law and by Council policy in its direction of University development. It must continue to be a University of high quality in teaching and research; it does not need to be a colossus in numbers and should resist any pressure to become big for the sake of bigness. But there are accompanying responsibilities and obligations which must be recognised.

Among these I include the following :

- (a) We are well endowed, especially in the established research schools. I believe these should consolidate over the next few years, allowing the new centres and the Research School of Earth Sciences to develop within a moderate rate of growth for the University as a whole. The School of General Studies faces a tighter but not ungenerous future—it will, like the established research schools, have to accept the fact that some new ventures within the School may be possible only by reducing resources available to established activities no longer so much in demand.
- (b) Being well endowed we should strive even harder to provide opportunities for Australian academics as well as those from overseas to work with us. A welcome to colleagues from other universities has always been a declared purpose of the University and I am pleased to report a more active use of the University's facilities in this way.

Perhaps my final remarks on the future of the ANU reflect not only my view of the national purpose of this University but my experience in government in the nineteen-fifties. We made too little use of universities then and while the situation improved in the sixties the universities have remained relatively isolated from public affairs except through student and staff demonstrations on Vietnam, or Aboriginal affairs and like issues. There have been important exceptions for this University. First there has been the growing use of ANU personnel in support of Federal Senate Committees and as expert witnesses. Lately, I have had no cause to complain judging by the increasing calls by the new Government on our economists, lawyers, political scientists and foresters for services in one form or another. We have played a large part in policy development in Indonesia and elsewhere and have been for some time, and not less so currently, a major force in the development of Papua New Guinea. Our scientists, both directly and through the Academy of Sciences where ANU membership is very strong, have played a role in assisting governments and I expect this role to increase significantly.

In general terms we cannot divorce our accumulating knowledge from action in the world outside. This has come to be accepted both outside and within universities. At least I can predict that the Australian National University will be invited to take an increasing part both at home and abroad. I hope it responds to that challenge, for it is better prepared than any other university to do so. I believe it can respond without loss of its autonomy and rather with further gain to its intellectual liveliness and high academic standards.

PUBLICATIONS

CRAWFORD, J. G.

'The agricultural crisis.' In *The Australian Economy: A Second Volume of Readings* (eds H. W. Arndt & A. H. Boxer), 85-91, Cheshire.

CRAWFORD, J. G. & BOARD, G. H.*

'Japan's trade policy and trade in temperate zone agricultural products.' In *Obstacles to Trade in the Pacific Area* (eds H. E. English & K. A. J. Hay), 15-65, School of International Affairs, Carleton Univ.

* Based on work done while a member of the Vice-Chancellor's staff.

Developments of 1972 in Summary

THE INSTITUTE OF ADVANCED STUDIES

REPORT OF THE DEPUTY CHAIRMAN OF THE BOARD

Professor F. C. Courtice, FAA

The most important new development in the Institute of Advanced Studies in 1972 was the decision to establish the Research School of Earth Sciences, making the seventh research school. The Department of Geophysics and Geochemistry in the Research School of Physical Sciences will form the basis of the new school in the coming triennium, and diversification into other disciplines will be made in succeeding triennia. An appointment to the Headship of the Research School of Earth Sciences is expected early in 1973. In addition to this new school, steps were taken towards the establishment of two centres, one for resource and environmental studies, and one for the humanities, and of the North Australia Research Unit; all these were foreshadowed in the submission for the 1973-75 triennium. The aim of these organisations is to encourage and facilitate multi-disciplinary research in the fields concerned, involving not only the Institute of Advanced Studies but the whole University. Similarly, two new departments will shortly be established—the Department of Pharmacology in the John Curtin School of Medical Research, and the Department of Politics and Sociology in the Research School of Pacific Studies.

During the year, the last year of the triennium, several major buildings were completed. The first stage of the permanent building of the Research School of Biological Sciences was opened on 10 November by the Governor-General, His Excellency the Right Honourable Sir Paul Hasluck, GCMG, GCVO, KStJ; a small part of the building was then occupied, the main move from temporary premises being planned for early 1973. In the Research School of Physical Sciences, extensions to the mathematical sciences block and to the Cockcroft Laboratory complex were completed and occupied and the tower for the 14 UD accelerator was near to finality. In the John Curtin School of Medical Research the specific-pathogen-free animal house was completed and will be operating early in 1973.

In December the academic staff numbered 437 and there were 120 research officers and research assistants. This is an increase of forty-seven over the previous year when financial stringencies necessitated a reduction in academic numbers. Included in this number are forty-three postdoctoral fellows. Of the students proceeding to the degree of Doctor of Philosophy, ninety-three successfully completed their course in 1972, an increase of ten on the previous year. There were, however, only 249 students enrolled for the degree of Doctor of Philosophy in December compared with 311 at the same time in 1971 and 329 in 1970. This probably reflects the lower numbers of applications from students

of high quality in recent years. The Board of the Institute is at present considering the broad question of graduate training at the pre-doctoral and postdoctoral level. Among the senior appointments during the year was that of Professor D. A. Low who succeeded Professor O. H. K. Spate as Head of the Research School of Pacific Studies, of Professor F. L. Jones to the Chair of Sociology, of Professor O. MacDonagh to the second Chair of History and Professor J. D. Freeman to the Chair of Anthropology. Professor D. G. Catcheside, FAA, FRS, Professor A. Albert, FAA, and Professor J. C. Jaeger, FAA, FRS, retired, and Professor A. L. Epstein resigned to take a position in England.

The Institute of Advanced Studies has continued to attract large numbers of visiting scholars, not only from overseas but also from other parts of Australia. The interaction between members of the Institute of Advanced Studies and distinguished visitors helps to ensure that a high standard of research is maintained. Another important feature of academic life is the number of conferences and congresses held in Canberra in which members of the University play a leading role. One such conference was the United States-Australian Symposium on Vision organised by the Department of Physiology of the John Curtin School of Medical Research under the auspices of the United States National Science Foundation and the Commonwealth Department of Education and Science. This very successful Symposium was held under the terms of the United States-Australian Bilateral Agreement for Co-operation in Science.

The quality of research publications and books continues at a high level, and lists of publications are given elsewhere in the Report. Many scholars have been honoured for their work.

THE SCHOOL OF GENERAL STUDIES

REPORT OF THE DEPUTY CHAIRMAN OF THE BOARD

Professor A. N. Hambly

The year 1972 was one of adjustment for the School of General Studies. There was a general reduction in the financial provision for academic development, due to increases in non-academic salaries that were unforeseen at the beginning of the triennium. This was a preparation for the 1973-75 triennium in which the recommendations in the fifth report of the AUC assume a substantial reduction in the cost per student in the operation of the School. A different pattern of student interest in the various faculties became manifest. The rapid growth of undergraduate enrolments in the Faculty of Arts was checked, but growth in the postgraduate enrolments more than compensated for this. The reverse effect was noted in the Faculty of Science where a slow, steady growth in undergraduate enrolments continued but the decline in postgraduate enrolments also continued.

The enrolments in the School as a whole increased, not by a significant increase in the numbers of entrants, but because the retention of students into later years of their courses increased considerably. This was particularly evident in the Faculty of Law, which had limited its intake of new students but nevertheless showed the greatest percentage growth in enrolments; a clear indication of the

success of their methods of selection for entry to the course. The School supervised the training of all the undergraduates and 60% of the postgraduate students of the University.

Despite the financial restrictions, the output of scholarly work by the staff was represented by twenty-five books and 456 articles in learned journals, while the number of degrees of bachelor conferred increased by 23% to 609.

Student participation in departmental and faculty education committees, and in the Liaison Committee of the Board of the School, is now well established though there is some variation in effectiveness in the different faculties. At a time when a decreasing fraction of students opts to study modern languages it is pleasing to note their initiative in the Departments of Germanic Languages, Russian and Chinese where students have organised several week-end excursions on which only German or Russian were spoken, or weekly luncheon sessions where conversation was in the Chinese idiom. While the Board has been discussing student evaluation of curricula and the effectiveness of teaching, students in the Departments of French and Pure Mathematics have carried out such assessments and produced very useful results.

A major development for the School was the establishment of the Human Sciences Program. The central core of the program consists of three units, Human Biology, Human Ecology and Human Adaptability. The sequence has been accepted as part of a course for a degree in either arts or science. There has been a warm response to the new course from students. The class in Human Biology has increased by over 50% to ninety-four while that in Human Ecology, which has been limited to forty by the available facilities, was heavily over-subscribed.

Human Biology deals not only with the structure and functions of the human body but also with man's behaviour, his emotions and higher mental processes. Human Ecology discusses man's natural environment, his interpretation and modification of it. Human Adaptability, which will be presented for the first time in 1974, is concerned with the physical and mental changes in man as he responds to his environment.

Although the remainder of the degree course can be made up of traditional studies such as history, philosophy, zoology, psychology or statistics, many departments have been developing, independently, new courses which have a close relationship to the core sequence. For example the Department of Zoology will have courses in human growth and populations, animal ecology and ethology, the Department of Statistics is introducing demography while the Faculty of Law is teaching the subject Environmental Resources Law.

The program is the outcome of a suggestion made some time ago by Dr S. V. Boyden, FAA, and Professor F. J. Fenner, MBE, FAA, FRS, has provided considerable assistance to the School in the development of the course. The Board of the School is treating the first triennium of the program as an experiment in interdisciplinary studies. Assistance is being provided by the Tertiary Education Research Centre of the University of New South Wales in assessing the success of the program.

The changes in the staffing structure of the School, made necessary by the AUC

requirement that the cost per student be reduced, were discussed by Professor C. A. Gibb, OBE in his Annual Report for 1971. The Board of the School has specified the extent to which part-time instructors must be substituted for full-time staff in medium-sized and large departments. The turnover of lecturing staff in the School is well below the average for Australian universities so that adjustment of staff, when student interest in a particular subject varies rapidly, is difficult to bring about. The new category of lecturing fellows, appointed for three years in the first instance and for not more than five years in all, was added to the academic staff during the year to increase flexibility of staffing. The quality of the first appointments to this classification has been very high.

The Board of the School is grateful to Professor Sir Rutherford Robertson, CMG, FAA, FRS for carrying out, single-handed, an investigation of work loads in all departments in order to test the validity of the existing formulae used in the distribution of new appointments. Although no specific change in the formulae was suggested, the recommendation that there should be a better exchange of information between departments and faculties, so that they might better understand each other's teaching and research problems, is proving useful in some facilities. As a consequence of the growth of the School some liberalisation of the staffing for the larger non-science departments appears to be possible in 1973 and later years. At the same time the disestablishment of positions in departments in which student interest has decreased has progressed steadily. Since it was first instituted in 1970 some nine teaching positions have been deleted from the staff in the Faculties of Arts (2), Asian Studies (1) and Science (6). These have been mainly in the tutor and demonstrator grades.

The conditions of appointment in the tutor and demonstrator classifications were reviewed in response to a submission from representatives of these grades. Some improvements in provision for study leave, and in salary range, were recommended to Council.

The first year of operation of the Legal Workshop (virtually an extension of the law course by a year of practical training) was a great success. The demand for the limited number of places in the course was sufficient to warrant the duplication of the course in 1973. Council agreed to the provision of a four-year course for the degree of Bachelor of Science (in addition to the standard three-year course) for students specialising in geology. A recommendation for a four-year course in accounting is at present under discussion by the Education Committee of Council.

The Board of the School recorded its appreciation of the work of the Librarian, Mr J. J. Graneek, and Professor H. Whitmore of the Faculty of Law who resigned their offices in 1972. Professor S. J. Turnovsky took up his appointment to the newly-created third chair in the Department of Economics, which is the largest department, in terms of student numbers, in the University. In August, Professor J. P. Hardy of the University of New England came to the Chair of English, made vacant by the resignation of Professor G. H. Russell. Dr N. Trudinger, Reader in Mathematics at the University of Queensland, accepted an appointment to the Chair of Pure Mathematics but will not take up duty until late in 1973.

SITE AND BUILDINGS

A list of buildings completed or under construction during the year is included in the building program summary which appears later in this Report. Practically all the buildings included in the capital works program for the 1970-72 triennium will be completed by the end of the triennium.

The University's capital works submission for the 1973-75 triennium has been approved in substance by the Commonwealth Government following the recommendations of the AUC although the grants requested have been reduced in most cases. Preliminary planning of the University's two highest priority buildings in the 1973-75 triennium, ie, the Law/Asian Studies link and the Life Sciences Library, has started to enable tenders for these buildings to be invited at the beginning of the triennium.

The University's submission for funds to commence building for a medical school in the 1973-75 triennium is under consideration by a committee appointed by the Minister for Education and Science which is operating as a committee of the AUC; the committee is investigating the future needs for medical schools. This committee is expected to visit the University in May 1973 and its recommendations will be made known later in the year.

The extensive review of the site plan in 1971 culminated in the acceptance by Council in December 1971 of a plan developed after considerable discussion and revision during the year. Acceptance of this plan has enabled the University to proceed with more detailed planning of specific areas of the site, including improvements to the landscaping and hydraulics of Sullivans Creek.

During the year a section of the basement of the R. G. Menzies Building was fitted out to accommodate the UNIVAC 1108 computer and support staff from the University Computer Centre.

The basement of Melville Hall has been completed and temporarily occupied by a computer belonging to the Department of Customs and Excise. This area will revert to University use, with all improvements, at the end of 1973.

A building to house banks, a post office, a pharmacy, the University Co-operative Credit Union and the Co-operative Bookshop has been completed. The roof of the building will form an elevated broad walk connecting the podium of J. B. Chifley Building to the new Students' Union.

Discussions have continued between the University and Canberra authorities, including the NCDC, on the integration of the campus with city development, particularly in the University Avenue area.

NOTES ON OTHER DEVELOPMENTS

The Governor-General, Sir Paul Hasluck, opened the building for the Research School of Biological Sciences on Friday, 10 November 1972.

The new building focuses on the three-storey high, glass-roofed central court, on either side of which are three-storey laboratory wings. Also off the court are

*Opening of
Research
School of
Biological
Sciences*

shared facilities such as the computer terminal, photographic suite, administrative offices, workshops, stores, animal house, controlled environment area and an ecology service area.

*Multichannel
Scanner for
Mount Stromlo
Telescope*

The Mount Stromlo and Siding Spring Observatories have developed a multichannel spectrophotometer for use on the 74-inch telescope at Mount Stromlo. The instrument, developed by Dr A. W. Rodgers, Mr R. Roberts and Mr E. Stapinski, simultaneously measures in thirty-three different wavelength bands the light of stars covering the spectrum from the ultra-violet to the infra-red. The scanner is the first of its kind in the southern hemisphere and the first in the world to operate under interactive computer control. The massive data output is handled by the same real time computer as controls the instrument.

The light detectors used in the multichannel scanner are cooled to -60°C to reduce unwanted background noise; the scanner uses a unique cooling system which has greater stability and is more economical of the dry ice-alcohol coolant consumed than any previous system.

The scanner weighs 850 lbs, took four years to develop and cost \$186,000.

The sensitivity of the instrument is such that the 74-inch telescope can detect, in a narrow wavelength band, light from stars which are less than one hundred-thousandth of the brightness of the faintest naked eye stars.

The multichannel scanner, which has been designed to be compatible with the Anglo-Australian 150-inch telescope at Siding Spring Mountain, has been used to measure the temperatures and pressures at the surfaces of faint hot stars in the halo of our galaxy and, from measures of the colours of external galaxies, to determine the proportions of stars of various ages in these galaxies.

*Tandem
Tower*

Erection of the huge pressure vessel for the new tandem accelerator was completed just before Easter. With a vertical length of seventy-two feet and eighteen feet in diameter, the pressure vessel weighs ninety-five tons; it is housed in a tower which rises 112 feet above ground level, dominating the Physical Sciences area of the site.

The pressure vessel, when the tandem accelerator is in operation, will hold an insulating gas which will allow a high voltage terminal to go to very high levels. The tandem accelerator is used in nuclear physics research.

*The
Cyclotron*

An injector cyclotron which will greatly expand the research capacity of the Department of Nuclear Physics arrived on 11 February 1972.

The machine was transported in four 1,272 cubic foot containers with a total weight of 100,000 pounds and was manufactured for the University by the Cyclotron Corporation in Berkeley, California. It will be used as a fixed energy injector into the type-EN tandem accelerator which has been in operation at the University for twelve years. It will allow the proton and deuteron energies of the EN accelerator to be raised from the present twelve million volts to maxima of thirty-eight million volts and twenty-seven million volts respectively by using the combination of the cyclotron and the accelerator.

A multi-media concert of light and sound, entitled 'Synchronos 72', was held in September 1972 and was the most ambitious of its kind to have been staged in Australia. *Concert of Light and Sound*

The initiative for the concert was taken by artist Stan Ostoja-Kotkowski and composer Don Banks who met while on Creative Arts Fellowships at the University. Together the artists conceived the idea of an audio-visual concert. Since arriving at the University, Don Banks had spent much time composing and furthering his research into the use of electronic music. Stan Ostoja had done much research into the linking of sound and colour, and during his Creative Arts Fellowship he experimented with a number of techniques in which art and electronics came together.

Throughout the ninety-minute performance there was instrumental and vocal music, taped and live electronic music, all integrated with visual images projected on a total of six screens with a total width of forty-five feet. Some of the images came from two laser chromasonic units designed by Stan Ostoja.

The University held a public exhibition of Oriental scrolls, porcelain and bronzes from the collection given to the University last year by Mrs K. Lyttelton-Taylor. Most of the forty scrolls were Chinese and included examples dating from AD 1200 to work by contemporary artists of mainland China. There were also Japanese scrolls and a number of Tibetan temple hangings. *Exhibition of Oriental Pieces*

Among the pieces of Chinese porcelain were examples from the Ming period (fourteenth to the seventeenth century) and the bronzes included Buddhas from a number of South-East Asian countries. Additional character was lent to the exhibition by a number of pieces of Oriental furniture.

The Indian High Commissioner, Mr S. Krishnamurti, presented a collection of thirty volumes of the works of the Indian philosopher, Sri Aurobindo, to the University on Friday, 24 November. The presentation marked the centenary of Aurobindo's birth in Calcutta on 15 August 1872. *Presentation of Indian Books*

At an informal function held in the R. G. Menzies Building of the University Library the Vice-Chancellor, Emeritus Professor Sir John Crawford, received the books on behalf of the University. Among those present were members of the University staff with an interest in India and Indian affairs and members of staff born in India.

The mural commissioned by the University for the main end wall of the University House dining hall was erected in October. The mural, by Leonard French, is called 'Regeneration'. In abstract, in brilliant enamel colour, it represents a man emerging from the earth and sea, reaching up to the sun like a Prometheus figure, releasing life forms—fish, reptiles and birds—which descend into his body and into the sea and onto the land. It has eighteen six-foot panels and is attached to the wall by specially made steel mountings. The cost was met by a number of donors. *Leonard French Mural*

A teak elephant, which now stands in the foyer of the Forestry Building, was received by the University as a gift from the Director of the Royal Laos Forest *Teak Elephant*

and Water Department in recognition of assistance given to Laos by members of the Department of Forestry.

The Laos-Australian Reafforestation Project, established by the Department of Foreign Affairs, followed a request from the Royal Laos Government.

*Opening of
ANU Boatshed*

His Excellency, Mr Moshe Erell, Israeli Ambassador to Australia, officially opened the new thirty-berth boatshed on Saturday, 18 March. Mr Erell is an honorary member of the ANU Boat Club and a keen oarsman.

The boatshed has been built at a cost of \$33,000 with funds provided jointly by the University and the University Sports Union. Besides accommodating up to thirty boats in racks, the new boatshed has a maintenance workshop, showers and toilets and space to meet future expansion.

Building the boatshed with its ideal situation at the mouth of Sullivans Creek has led to an upsurge of active student membership of the ANU Boat Club.

Exhibitions

The following exhibitions were held during the year in the R. G. Menzies Building of the University Library except where otherwise shown:

28 February to 6 March—Display of work by Creative Arts Fellows (arranged by the Orientation Week Committee) (J. B. Chifley Building of the University Library); 30 March to 12 May—African arts (UNESCO Travelling Exhibition); 6 to 21 April—Portraits of Australian writers by Louis Kahan (in co-operation with the National Library and the owner of the portraits, Meanjin Quarterly, Melbourne) (J. B. Chifley Building of the University Library); 15 May to 15 June—Photographic display (Canadian High Commission); 10 to 14 July—Exhibition of photographs and posters illustrating aspects of Aboriginal life (arranged by Abschol) (J. B. Chifley Building of the University Library); 14 to 20 August—Hu Te Hsin-Batik paintings (arranged by Mr D. Yen Ho Wu, Department of Anthropology and Sociology); 4 to 11 September—Australian National University Photographic Society's Competition (J. B. Chifley Building of the University Library); 12 to 17 September—Seventh Annual Union Art Exhibition (Melville Hall); 18 to 29 September—Photographic exhibition (arranged by the Embassy of the Philippines); 30 September to 9 October—Annual International Art Competition (to aid the socially, physically and mentally handicapped; arranged by the Robin Hood Committee); 11 to 18 December—Paintings by David Lu.

*Public
Lectures*

The following public lectures were given in the University during 1972:

The University lectures, a series of five lectures in March/April on the theme, 'Science 72—insights into some of the advancing areas of science'—Professor A. R. Sandage: 'Did the World begin? The structure and evolution of the Universe'; Professor B. Morris: 'Cancer, auto-immune disease and organ transplantation—the contributions of immunology to contemporary medicine'; Professor I. G. Ross: 'The Chemist—molecular psychologist and resolute polluter'; Professor A. E. Ringwood: 'Continental drift and the Earth's interior—revolution in the earth sciences'; Professor R. Street: 'Applications and innovation in physics'.

A series of six lectures in May/June on the theme, 'Environment and society'—Professor F. J. Fenner: 'Is there an environmental crisis?'; Professor W. D.

Borrie: 'Controlling human numbers: the prospects of human growth'; Professor H. R. Vallentine: 'Technology and environment'; Dr G. M. Neutze: 'Economics of environmental control'; Professor H. W. Arndt: 'Development and environment: the problem for the less developed countries'; Professor N. G. Butlin (chairman) and speaker in the series: 'Environment and society: a review'.

A series of five lectures on the theme, 'Nationalism—yesterday and today'—Dr E. Kamenka: 'Political nationalism: the evolution of an idea'; Professor J. Plamenatz: 'Two types of nationalism'; Professor G. Mosse: 'Mass politics and the political liturgy of nationalism'; Professor Wang Gungwu: 'Nationalism in Asia'; Professor S. Avineri: 'Israeli and Arab nationalism: a comparison of political and social aspects'.

The Morrison Lecture was given on 6 September by Dr Kamenka on 'Marx, Marxism and China'.

The John Curtin Memorial Lecture was given on 20 October by The Honourable Donald Dunstan on 'Curtin, Australia and now'.

The Charles Strong Memorial Lecture was given on 25 July by Professor R. J. Zwi Werblowsky on 'Jerusalem—Holy City of three religions'.

The Arthur F. Yencken Lectures were given on 3 and 4 July by Dr Coral Bell on 'The problem of crisis diplomacy' and 'Asian crises and Australia'.

Other public lectures arranged were as follows: 4 April—Professor M. Euwe: 'Computer chess'; 27 June—Professor G. Bowersock: 'The artist as monarch—Nero and Hadrian'; 6 July—Professor A. L. Burns: 'Peace kept by terror—world politics and nuclear weapons'; 11 July—Professor Ho Peng-yoke: 'The search for perpetual youth in China, with special reference to Chinese alchemy'; 1 August—Professor H. Kahn: 'The future of mankind'; 11 October—Professor Chiang Yee: 'The principle and technique of Chinese painting and calligraphy'.

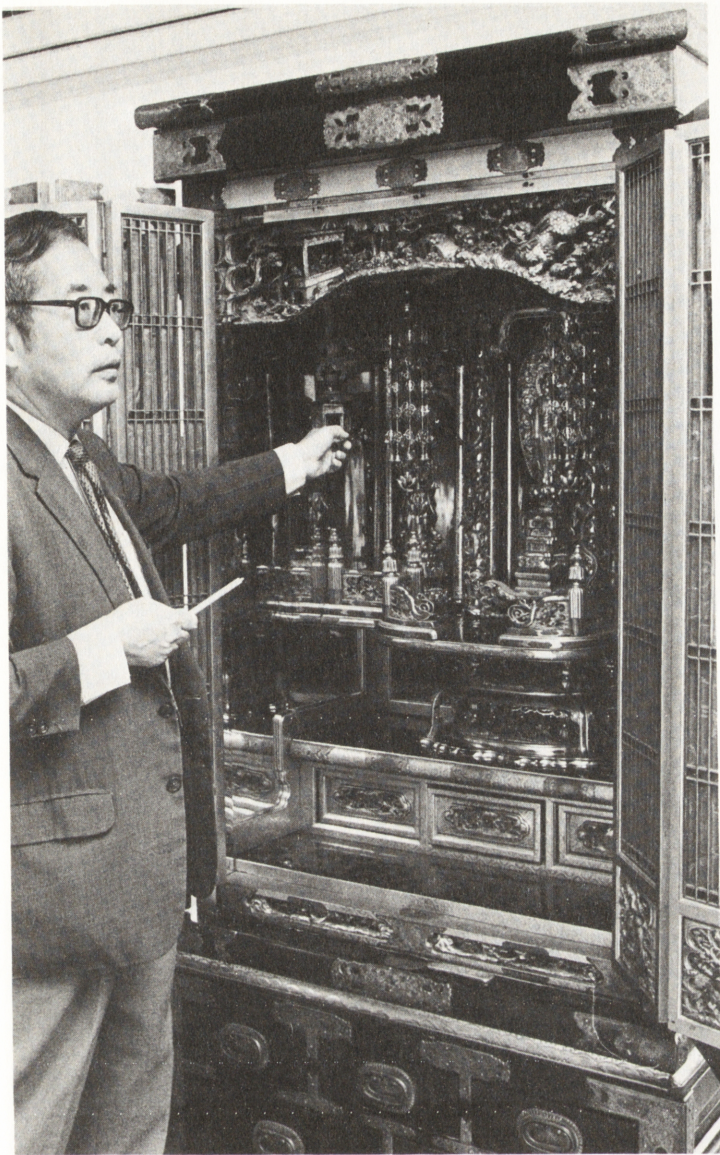
The total full-time staff (excluding research scholars) increased from 2,804 at 30 April 1971 to 2,975 at 30 April 1972, an increase of 171 (or 6%). Of this increase eighty-nine were teaching and research staff (including research only and central academic) and eighty-two were other staff.

Teaching and research staff increased by 10% from 899 in 1971 to 988 in 1972 and other staff increased by 4% from 1,905 to 1,987.

*Summary of
Staff Numbers*

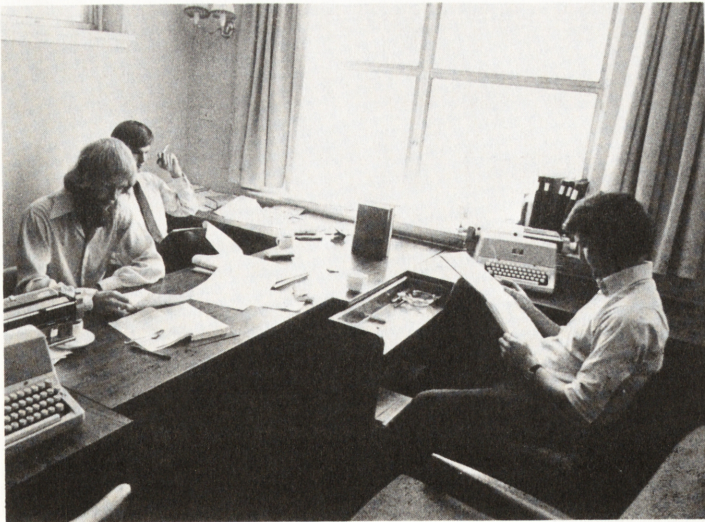
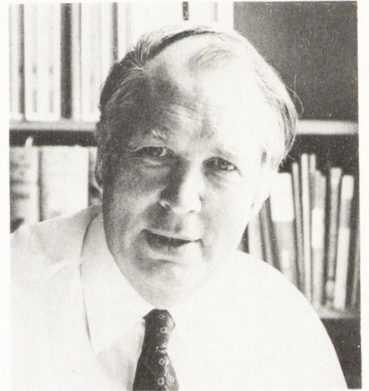
ENROLMENTS

One hundred and thirty-two new research students enrolled for the degree of Doctor of Philosophy in the University during 1971–72, of whom eighty-two enrolled in the Institute of Advanced Studies, forty-eight in the School of General Studies and two in the Computer Centre. They comprise seventy-seven Australians, eighteen students from Britain, ten from Asian countries, three from Canada, five from New Zealand, twelve from the United States of America and seven from other countries.



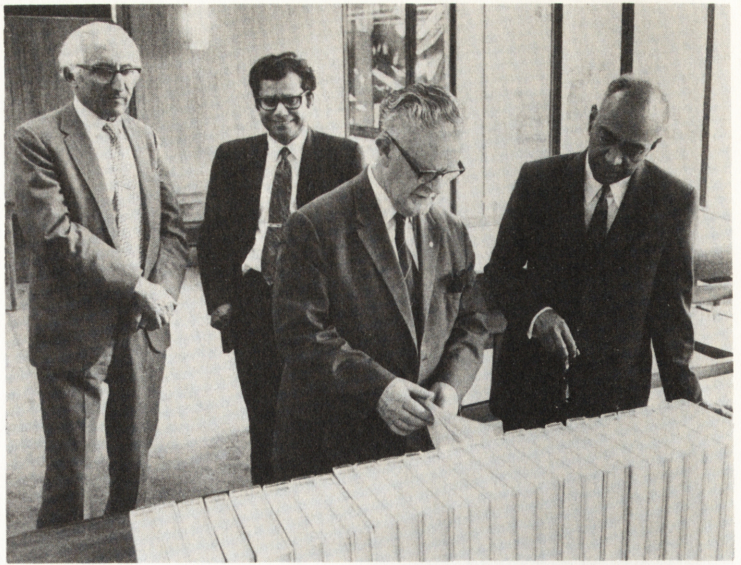
A number of pieces from the Lyttelton-Taylor Oriental collection, given to the University by Mrs K. Lyttelton-Taylor of Tamworth, have been mounted for display in the University. The Dean of the Faculty of Asian Studies, Professor Liu Ts'un-yan (*pictured*) advised on the gift and selected a number of pieces, including this Buddhist shrine, for permanent display in the foyer of the Asian Studies building.

Professor D. A. Low was appointed to succeed Professor O. H. K. Spate as Director of the Research School of Pacific Studies. Professor Low, who took up his appointment early in 1973, was formerly Professor of History and Dean of the School of African and Asian Studies, University of Sussex. From 1959-64 he was successively Fellow and Senior Fellow in the Department of History, Research School of Social Sciences, ANU. (*Photo by G. Carpay*)

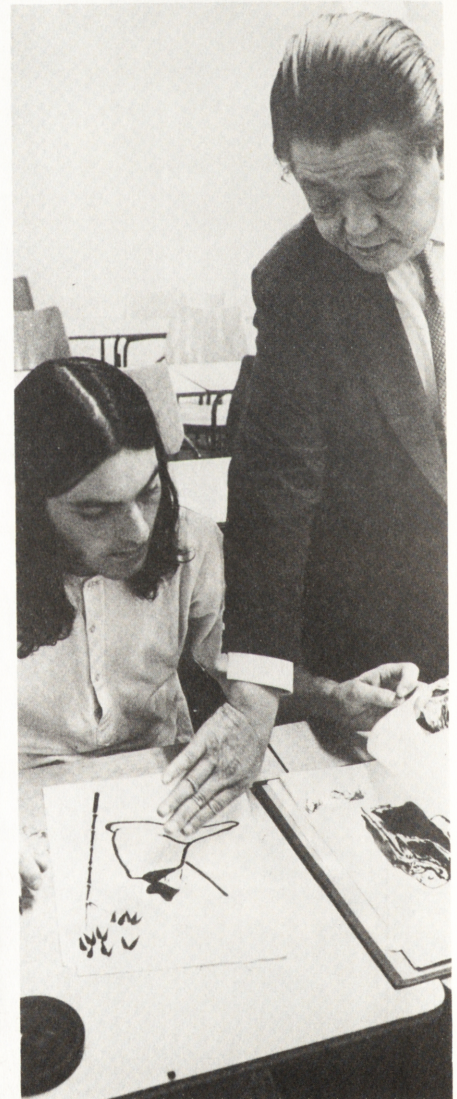


Students of the first Legal Workshop of the Faculty of Law were grouped into simulated 'legal firms' to work on 'cases' set up like real life situations. The Legal Workshop course, which because of demand is being held twice in 1973, is a six-month full-time course providing an alternative to traditional articles-of-clerkship introduction to legal practice for law graduates.

The Vice-Chancellor, Sir John Crawford, examines one of the thirty volumes of the work of the Indian philosopher, Sri Aurobindo, presented to the University by the Indian High Commissioner, His Excellency Mr S. Krishnamurti (right), to mark the centenary of the philosopher's birth. Aurobindo, who died in 1950, was active in the Indian Nationalist Movement until 1910 and spent the last years of his life meditating, teaching and writing. At left is Mr J. J. Graneeck, who retired as University Librarian at the end of 1972. (Photo by G. Carpay)



Professor Chiang Yee, Professor Emeritus of Chinese at Columbia University, who received an Honorary Doctorate of Letters from the University at the September 1972 Conferring. This year, in addition to other duties, Professor Chiang is teaching the first course on Chinese calligraphy in the University. Professor Chiang, artist and authority on calligraphy, has illustrated his own 'Silent Traveller' series of travel books and has held a number of exhibitions of his Chinese paintings and calligraphy. (Photo by C. M. Dickins)



Professor D. H. Pike, general editor of the fourth volume of the *Australian Dictionary of Biography*, already is at work on the fifth volume due to be printed this year. Volume four, published last year, is part of a proposed series of twelve. It covers the D-J biographies of Australians in the period 1851-1890. Professor Pike received a Britannica Award for his work on the Dictionary which, when complete, will be divided into historical periods, with alphabetical classifications in each. (Photo by G. Carpay)



Sydney jazz musician Don Burrows at Synchronos '72, a concert of light and sound held in the University in August 1972. The concert was devised by composer Don Banks and artist Stanislaw Ostoja-Kotkowski, both of whom have held Creative Arts Fellowships in the University. (Photo by G. Carpay)



'Regeneration' is the title of the Leonard French mural which covers the end wall of the dining hall of University House and was presented by a number of donors. The eighteen six-foot panels which comprise the work were mounted in the hall in October 1972—six months after the work was commissioned. In brilliant enamels, the mural shows man emerging from the earth and the sea, reaching up to the sun like a Prometheus figure, releasing life forms—fish, reptiles, birds—which descend into his body and into the sea and onto the land. (Photo by G. Carpay)



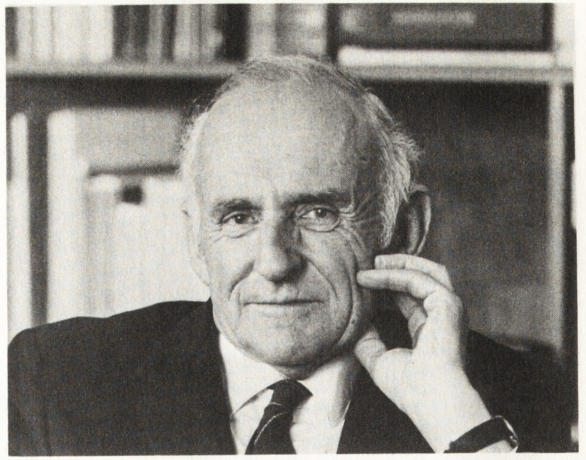
Mr Justice A. F. Mason, of the NSW Court of Appeal (now Sir Anthony Mason, a member of the High Court of Australia), was appointed Pro-Chancellor to succeed Sir Richard Eggleston, who had held the position since 1968. (Photo by Australian Information Service)



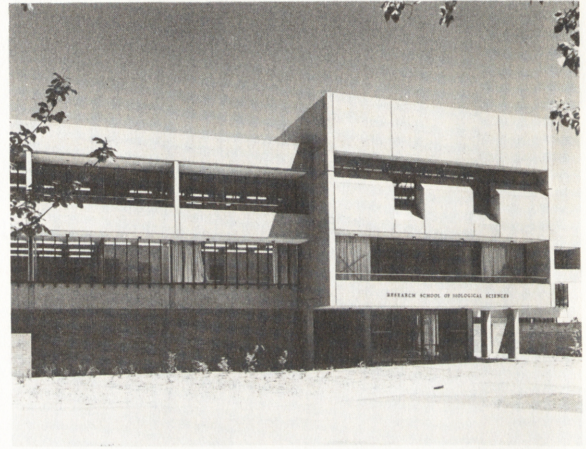
The opening of the Research School of Biological Sciences building also marked the retirement of Professor D. G. Catcheside (left), the Research School's foundation Director. After the official opening by the Governor-General, Sir Paul Hasluck, Professor Catcheside showed Sir Paul, the retiring Vice-Chancellor, Sir John Crawford (right), and the Chancellor, Dr H. C. Coombs (foreground), over the \$3 million complex. (Photo by B. Parr)



Professor Sir Rutherford Robertson was appointed to succeed Professor D. G. Catcheside as Director of the Research School of Biological Sciences. Sir Rutherford, President of the Australian Academy of Science, was formerly Master of University House. *(Photo by G. Carpay)*



The Research School of Biological Sciences building was officially opened by His Excellency the Governor-General, Sir Paul Hasluck, on 10 November 1972. The \$3 million building has a three-storey glass-roofed central court, on either side of which are laboratory wings. Also off the court are computer, photographic and electron microscopy facilities, and offices, workshops, stores, animal houses, controlled environment area and ecology services area. *(Photo by B. Parr)*



To isolate influenza virus, Dr W. G. Laver (*left*), Senior Fellow in the Department of Microbiology, swabs the throat of a duck held by Dr R. G. Webster, Visiting Fellow and formerly Senior Fellow in the Department. They were among a group of fifteen Australian doctors invited by the China Medical Association to make a study tour of the People's Republic in 1972. The two scientists have studied the origins of influenza virus for several years and are particularly interested in the Asian and Hong Kong flu epidemics which are both thought to have originated in China. *(Photo by S. Butterworth)*



The total number of students enrolled in the Institute of Advanced Studies was 351, of whom three were students for the degree of master, two were enrolled for masters qualifying and seven were not proceeding to a degree.

In the School of General Studies the total number of enrolled students increased by 266 (or 6%) from 4,447 in 1971 to 4,713 in 1972. The number of new students was 1,466 of whom forty-eight were students for the degree of Doctor of Philosophy. Of the total students 2,697 were full-time and 2,016 were part-time; the proportion of full-time students increased from 56% in 1971 to 57% in 1972. The number of students enrolled for the degree of bachelor was 3,975 (3,859 in 1971), for the degree of master 202 (180 in 1971), for masters qualifying 119 (81 in 1971), for Legal Workshop twenty-six and for miscellaneous units not towards a degree 201 (143 in 1971). There were 188 (182 in 1971) students enrolled in the School of General Studies for the degree of Doctor of Philosophy and two students enrolled for courses of research not leading to a degree.

The total number of students enrolled in the Computer Centre was eight, of whom six were students for the degree of Doctor of Philosophy and two for the degree of master.

DEGREES AWARDED

The degree of **Bachelor of Arts** was conferred on: M. J. Abbott, M. Agostino, A. P. Armstrong, Robin E. Asman, W. J. Atkinson, A. G. Auzins, Nola A. Bacon, Robin M. Barker, N. R. Barling, Diana P. Beams, Lisbeth D. Bennett, D. J. W. Bentley, H. D. S. Berents, Joan M. Berry, B. E. Blink, I. D. Bollen, Margaret E. Bond, J. R. Bower, Elizabeth M. Bradford, Joan Bradley, D. J. Breiner, B. C. Brett, Marilyn J. Bridge, R. A. Brown, Sally K. Brumley, Annette Buchtmann, I. Burke, Kay E. Bussell, L. Buszynski, A. P. Camilleri (awarded posthumously), R. J. Carruthers, Mary C. Carse, Pamela J. Christian, Dinah M. R. Clark, T. G. R. Clark, W. G. Coffey, M. D. G. Coley, Christine M. Colwell, D. P. Connors, P. R. Cornhill, N. G. Cree, M. E. Cunliffe, Marjorie A. C. Dalgarno, P. N. Dalkin, H. S. Davies, L. W. Davies, P. M. Daw, Anne P. Dewhurst, D. W. Edgerley, Wendy P. Edwards, N. R. Ellis, R. N. Ellis, R. M. Esquerria, Margaret M. Evans, W. J. Evans, P. B. Eyles, Margaret R. Fagan, Margaret C. Falkingham, Edith Felton, Ceilidh M. Fenton, M. M. H. Fetter, K. R. Fielder, Helen Fisk, P. A. Fitzgerald, Helen C. Fraser, I. A. Fraser, C. C. Gallagher, Eileen M. Gallagher, Elizabeth M. Garvin, Hester L. Gascoigne, D. R. Gassner, J. Gluszyk, L. R. Goldie, J. C. N. Gooch, Mary E. Gosling, Margaret A. E. Gray, M. P. Green, J. K. Grigg, Lynne F. Gulson, R. R. Gunaratna, Deborah H. Gyffyn, Margot C. Hamilton, R. J. B. Hamilton, J. M. Hardin, Nancy L. Harding, A. C. Harris, Alison B. Hart, V. H. Hawley, C. H. Hayman, Jennifer Hayward, Mary J. Healy, J. H. Hemphill, M. Hess, P. F. Heweston, D. A. Hickling, Sigrid I. Hill, Louise A. M. Hingee, L. C. Hoffman, P. E. Hohnen, P. L. Holmes, Yvonne F. Holt, Kathrine A. Houghton, J. A. Howlett, C. R. Hull, N. Imashev, Angela L. James, Jennifer F. James, E. C. Jobsz, Elizabeth P. Johnson, Anne E. Jones, T. J. Jones, T. M. Jones, Ilse M. Juhasz, L. Katz, H. E. Keen, W. Keice, W. R. Kelly, Deborah D. Kennedy, I. L. Kerr, D. J. King, K. W. Lampert, M. P.

Larobina, J. S. Latham, Mary D. Lawler, C. S. Leahy, D. J. Lean, Lynne A. M. T. Lenox, M. K. L. Light, K. K. G. Lisners, Jann E. Little, L. E. Lobelson, Lynette C. Lovell, Heather M. Lovie, Helen Low, Karin A.-M. Ludwig, Nora Lukstins, Elizabeth J. McAlpin, D. I. McCallum, J. McErlean, Joanne C. McGlynn, C. J. McGuigan, C. J. Mackay, M. F. McKay, E. A. Mann, O. J. F. Mann, Elizabeth A. Markham, Irene E. Mather, Carolyn M. Meadley, W. P. Meadley, Catherine A. Metcalfe, J. S. Metcalfe, G. B. Meyer, Cherylle M. Miller, Helen S. Mills, M. Momcilovic, M. Montefiore, Patricia M. Morgan, K. F. Morrissey, Jennifer C. Moseley, Fiona L. Moyes, J. C. Nicol, M. G. O'Brien, G. A. O'Meara, B. L. O'Neil, R. J. O'Neill, J. C. Oostermeyer, R. I. Ordish, R. D. O'Sullivan, S. H. Oza, R. V. Parliament, A. W. Patterson, W. S. Patterson, J. D. Peak, C. R. Perez del Castillo, I. L. Potas, A. T. Potter, I. S. Powell, Lyndall J. Price, J. F. Quinn, Patricia A. Read, T. J. Read, Catherine Redei, J. C. Reid, J. R. Reid, J. J. Rheinberger, Alison C. Richards, Genevieve M. Riley, Elizabeth J. Roarty, H. Rosen, G. P. Russell, J. J. P. Ryan, P. M. Ryan, D. J. Schlemaker, Sandra L. Schodde, Janette E. Scott, Susan M. Seddon, L. S. Shea, J. H. Sim, A. D. Skelton, P. D. Slocum, G. Smith, Marilyn R. Smith, M. B. Smith, R. G. Smith, R. A. A. Spain, M. P. Stackpool, H. Stefanik, M. J. C. Stephens, Rosemary A. Stephens, K. N. Stevens, J. W. J. Stevenson, Denise Stojanovic, Jennifer D. Stokes, Janette A. Storr, P. A. E. Sutherland, Maria-Nijole Svedas, D. T. Swieringa, Catherine F. Tarlington, R. K. Thomas, A. G. Thompson, D. D. Thompson, G. G. Thompson, J. J. L. Thomson, J. H. Tseng, D. M. Tumilty, Joan S. Tweedie, Erin A. Twigg, Janet E. Vickers, R. S. Vickery, Rosina Wainwright, Julie M. Walding, Penelope A. Walford, T. R. B. Walker, Yvonne A. Walker, F. P. Watson, D. Weissman, G. M. Wellsmore, Deanne M. Whittleston, B. T. Widdop, Jenny M. Williams, Marcelle L. Williams, C. A. J. Willoughby, Anthea O. Wilson, Susan P. Wilson, Beverley L. Wilton, P. M. Winch, R. A. Wise, Mary L. Wright, Elizabeth V. Youngman.

The degree of **Bachelor of Arts with Honours** was conferred on: D. A. Affleck, W. R. Androni, Rosemary K. Auchmuty, A. A. Bain, Annaliese J. Baker, Susan A. Baldwin, Margaret M. Batch, J. C. Bishop, I. M. Britain, Penelope A. Chapman, J. A. C. Conybeare, J. J. Cox, R. J. Davies, J. M. Douglas, G. I. Feletti, Barbara A. Flett, A. J. Francis, Elsie M. E. Gillies, A. D. Gould, Pamela A. Heydon, S. J. Hogan, S. J. Holt, P. Jablon, Kathryn M. Kang, T. M. P. McEwen, M. M. McKernan, J. Magdulski, Ilma E. M. O'Brien, T. D. Polleycutt, R. C. Refshauge, J. C. Schooneveldt, P. A. Selth, Marion Shnukal, M. J. Thawley, A. H. Turtle, Helen E. Watson, R. B. Whitelaw, G. C. Windsor, Robyn G. Withers, G. Witynski, T. Zivkovic.

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Dr G. C. L. Hazlehurst, Fellow in History, formerly Fellow of Queen's College, Oxford.

Dr G. A. R. Johnston, Senior Fellow in Physiology, formerly Fellow.

Professor F. L. Jones, Professor and Head of Department of Sociology, formerly Senior Fellow.

Mr J. T. G. Jukes, Senior Fellow in International Relations, formerly Fellow.

Dr A. Kalnajs, Senior Research Fellow in Astronomy, formerly Senior Research Fellow, Royal Greenwich Observatory.

Dr W. Kasper, Senior Research Fellow in Economics, Research School of Social Sciences, formerly Adviser to Economic Division of Malaysian Treasury, (appointed by Development Advisory Service of Harvard University).

Dr C. C. Kissling, Fellow in Human Geography, formerly Lecturer in Geography, University of Canterbury.

- Dr J. H. Lister, Senior Research Fellow in Medical Chemistry, formerly Senior Lecturer in Organic Chemistry, Chester Beatty Research Institute, Royal Cancer Hospital, London.
- Professor D. A. Low, Director, Research School of Pacific Studies, formerly Professor of History and Dean of the School of African and Asian Studies, University of Sussex.
- Dr O. MacDonagh, second Chair of History, formerly Professor of Modern History, University College, Cork.
- Dr T. G. McGee, Senior Fellow in Human Geography, formerly Senior Lecturer in Geography and Geology, University of Hong Kong.
- Dr I. D. G. Macleod, Fellow in Engineering Physics, formerly Research Fellow.
- Dr R. J. May, Field Director, New Guinea Research Unit, formerly Senior Economist, Papua New Guinea Department, Reserve Bank of Australia.
- Dr R. E. Miles, Senior Fellow in Statistics, formerly Fellow.
- Dr K. J. Muirhead, Fellow in Geophysics and Geochemistry, formerly Research Fellow, Engineering Physics.
- Dr K. M. Rangaswamy, Senior Research Fellow in Mathematics, formerly Senior Reader, Madurai University.
- Professor Sir Rutherford Robertson, Director of Research School of Biological Sciences, formerly Master, University House, ANU.
- Dr A. W. Rodgers, Professorial Fellow in Astronomy, formerly Senior Fellow.
- Mr R. L. Tweedie, Postdoctoral Fellow in Statistics, formerly ANU Travelling Scholar at Cambridge.
- Dr C. E. West, Senior Research Fellow in Experimental Pathology, formerly Research Fellow.

THE SCHOOL OF GENERAL STUDIES

- Mrs J. Miriam Benn, Senior Lecturer in English, formerly Lecturer.
- Dr R. J. Campbell, Senior Lecturer in Philosophy, formerly Lecturer.
- Dr C. Christensen, Senior Lecturer in Pure Mathematics, formerly Lecturer.
- Dr C. E. B. Conybeare, Reader in Geology, formerly Senior Lecturer.
- Dr K. H. J. Gardiner, Senior Lecturer in Asian Civilizations, formerly Lecturer.
- Professor J. P. Hardy, Professor of English, formerly Professor of English, University of New England.
- Dr J. Y. Henderson, Senior Lecturer in Accounting and Public Finance, formerly Lecturer.
- Dr T. R. Mautner, Senior Lecturer in Philosophy, formerly Lecturer.
- Dr D. B. Melrose, Reader in Theoretical Physics, formerly Senior Lecturer.
- Dr J. R. Niland, Senior Lecturer in Economics, formerly Assistant Professor of Economics, Cornell University.
- Dr M. Rasmussen, Senior Lecturer in Chemistry, formerly Lecturer.
- Dr N. F. Smythe, Senior Lecturer in Pure Mathematics, formerly Visiting Associate Professor, Dartmouth College, USA.
- Mr P. E. M. Standish, Reader in Accounting and Public Finance, formerly Senior Lecturer.

Dr J. A. A. Stockwin, Reader in Political Science, formerly Senior Lecturer.
Dr S. Supomo, Senior Lecturer in Indonesian Languages and Literatures, formerly Lecturer.
Dr S. J. Turnovsky, Professor of Economics, Research School of Social Sciences, formerly Senior Fellow in Economics.

THE INSTITUTE OF ADVANCED STUDIES

Senior Staff Resignations

Dr D. J. Anderson, Senior Fellow in Environmental Biology.
Dr R. Dingle, Senior Fellow in Solid State Physics.
Professor A. L. Epstein, Professor in Anthropology and Sociology.
Dr T. Scarlett Epstein, Senior Fellow in Economics.
Dr B. E. Hobbs, Fellow in Geophysics and Geochemistry.
Dr A. J. Strathern, Fellow in Anthropology and Sociology.
Dr B. Walcott, Research Fellow in Neurobiology.
Dr Marion W. Ward, Field Director, New Guinea Research Unit.

THE SCHOOL OF GENERAL STUDIES

Mr H. Mukai, Senior Lecturer in Japanese, to return to Tokyo.
Dr D. W. Stammer, Senior Lecturer in Economics to Reserve Bank of Australia.
Dr C. A. Tisdell, Reader in Economics to Chair of Economics, University of Newcastle, NSW.
Professor H. Whitmore, Professor of Law to Chair of Law, University of New South Wales.

THE INSTITUTE OF ADVANCED STUDIES

Senior Staff Retirements

Professor A. Albert, Professor in Medical Chemistry.
Professor D. G. Catcheside, Director, Research School of Biological Sciences.
Professor J. C. Jaeger, Professor in Geophysics and Geochemistry.

THE SCHOOL OF GENERAL STUDIES

Mrs Myra M. Graneek, Lecturer in Germanic Languages.

THE LIBRARY

Mr J. J. Graneek, Librarian.

Obituary

Dr T. J. Batterham, Senior Fellow in Medical Chemistry, John Curtin School of Medical Research, died 6 November 1972.
Dr R. Ho, Senior Fellow in Human Geography, Research School of Pacific Studies, died 16 January 1972.

Dr A. Adams, *University of Maryland*; Dr R. F. Agarwala, *Bhabha Atomic Research Centre*; Professor D. B. Allbrook, *University of Western Australia*; Professor M. F. Atiyah, *Institute for Advanced Study, Princeton*; Professor H. D. Attwood, *University of Melbourne*; Professor S. Avineri, *The Hebrew University of Jerusalem*; Mr J. Banno, *Chiba University*; Professor G. Birkhoff, *Harvard University*; Associate Professor T. Bisalputra, *University of British Columbia*; Dr O. E. Björkman, *Carnegie Institute of Washington*; Professor I. Brecher, *McGill University*; Dr D. M. Brink, *University of Oxford*; Professor W. A. Brock, *University of Chicago*; Dr M. Burrows, *University of Oxford*; Dr D. E. Butler, *Nuffield College, Oxford*; Professor K. R. Carroll, *University of Western Ontario*; Dr S. T. Chang, *Chinese University of Hong Kong*; Dr R. A. Cooper, *New Zealand Geological Survey, Wellington*; Captain C. H. Cotter, *University of Wales*; Professor A. D. Couper, *University of Wales*; Dr J. de Laeter, *Western Australian Institute of Technology*; Dr D. W. Dockrill, *University of Newcastle (NSW)*; Professor T. W. Donnelly, *State University of New York*; Dr N. Drozdov, *Moscow State University*; Professor V. V. Drushchits, *Moscow State University*; Professor E. Eguchi, *Yokohama City University*; Professor D. Elliott, *University of Tasmania*; Dr A. Ewart, *University of Queensland*; Dr E. Farrar, *Queens University, Ontario*; Dr J. Ferguson, *University of the Witwatersrand*; Mrs Rosemary Firth, *University of London*; Professor R. W. Firth, *University of London*; Dr K. Fredricksson, *Smithsonian Institution, Washington DC*; Professor J. M. Gani, *University of Sheffield*; Mr W. J. Gardner, *University of Canterbury*; Dr N. C. Gay, *University of the Witwatersrand*; Professor G. H. Golub, *Stanford University*; Professor J. L. Gowans, *University of Oxford*; Professor M. N. Greenball, *Ohio State University*; Professor E. Gross, *University of Washington*; Mr B. V. Hamon, *Commonwealth Scientific and Industrial Research Organization, Sydney*; Dr L. F. Henderson, *University of Sydney*; Professor R. J. Hensley, *University of Miami*; Dr Polly Hill-Humphreys, *University of Cambridge*; Mr J. H. Hills, *Macquarie University*; Professor Ho Peng-yoke, *University of Malaya*; Professor R. M. Hochstrasser, *University of Pennsylvania*; Professor C. Howard, *University of Melbourne*; Dr C. J. Hughes, *Memorial University, Newfoundland*; Professor J. A. Hunt, *University of Hawaii*; Professor J. D. Hunter, *University of Otago*; Professor E. P. Hutchinson, *University of Pennsylvania*; Associate Professor T. Ishikawa, *Chiba University*; Associate Professor G. D. Johnson, *Kansas State University*; Professor O. Kahn-Freund, *University of Oxford*; Professor W. E. Kalbach, *University of Toronto*; Associate Professor H. Kaneda, *University of California (Davis)*; Professor W. M. Kaula, *University of California*; Dr K. G. Koehler, *Institute for Economic and Social Research, Djakarta*; Dr D. Langbein, *Battelle Institute, Germany*; Professor A. K. Lascelles, *University of Sydney*; Professor A. Lijphart, *State University of Leyden*; Professor J. A. Mabbutt, *University of New South Wales*; Dr D. Maelzer, *University of Adelaide*; Dr W. G. Malcolm, *Victoria University of Wellington*; Professor R. M. Martin, *La Trobe University*; Professor Ethel W. Maw, *Bryn Mawr College, Pennsylvania*; Professor W. H. Maw, *University of Delaware*; Dr M. J. Mays, *University of Cambridge*; Emeritus Professor D. P. Mellor, *University of New South Wales*; Professor G. W. Miller, *University of London*; Professor W. H. Miller, *Yale University*; Dr P. B. Moore, *University of Chicago*; Professor G. L. Mosse, *University of Wisconsin*; Professor H. V. Muhsam, *The Hebrew University of Jerusalem*; Professor S. Otsuka, *Osaka Uni-*

*Visiting
Research
Workers*

versity; Dr V. A. Parsegian, *National Institutes of Health, USA*; Associate Professor J. D. Paxton, *University of Illinois*; Dr H. W. Peter, *State University of New York*; Mr R. Petridis, *University of Western Australia*; Professor J. P. Plamenatz, *University of Oxford*; Mr R. C. Price, *University of Otago*; Dr O. S. C. Queiroz, *Centre National de Recherche Scientifique, France*; Miss J. Radford, *University of Melbourne*; Dr Heather Radi, *University of Sydney*; Professor M. S. Rajan, *Jawaharlal Nehru University*; Dr J. A. Rees, *University of Liverpool*; Associate Professor B. J. Rigsby, *University of New Mexico*; Professor A. J. Robinson, *York University*; Dr W. T. Robinson, *University of Canterbury*; Professor K. A. Ross, *University of Oregon*; Mr D. Ruyooka, *Ministry of Agriculture, Uganda*; Dr A. R. Sandage, *Hale Observatories, Pasadena, California*; Dr J. H. Sass, *Geological Survey, Menlo Park, California*; Dr C. B. Schedvin, *University of Sydney*; Professor L. Schwartz, *Ecole Polytechnique, Paris*; Professor Marie-Hélène Schwartz, *University of Lille I*; Professor M. Silverstein, *Chicago University*; Associate Professor J. J. Sims, *University of California (Riverside)*; Dr J. J. Skehel, *National Institute for Medical Research, London*; Dr N. V. Sobolev, *Academy of Sciences, USSR*; Professor P. Sonnenfeld, *University of Windsor, Ontario*; Dr G. S. R. Subba Rao, *Indian Institute of Science, Bangalore*; Dr I. P. Ting, *University of California (Riverside)*; Professor T. Totoki, *Keio University*; Professor R. H. Turner, *University of California*; Dr G. P. Vinson, *St. Bartholomew's Medical College, London*; Professor A. A. Ware, *University of Texas*; Associate Professor D. W. Watts, *University of Western Australia*; Dr R. G. Webster, *St. Jude's Hospital, Memphis*; Dr Elizabeth Whitcombe, *University of Sussex*; Dr P. J. Wilenski, *Commonwealth Treasury*; Dr R. M. Wing, *University of California (Riverside)*; Dr S. B. Yue, *University of Hong Kong*.

VISITORS

During the year the University was honoured by the visit of—

His Excellency The Right Honourable Sir Paul Hasluck, GCMG, GCVO, KStJ, Governor-General of Australia, on the occasion of the opening of the Research School of Biological Sciences, Friday, 10 November 1972.

Among overseas visitors to the University during the year were: Dr R. G. Albertson, *University of Puget Sound*; Mr C. Alpert, *Israel Institute of Technology*; The Right Honourable Dr O. Arikpo, *Federal Commissioner for External Affairs, Nigeria*; Dr Baraka, *University of al-Azhar*; Professor K. Boulding, *University of Colorado*; Senator D. Ching, *Hawaii*; Sir Robert Blackwood and Board of Trustees, *Asian Institute of Technology*; Professor G. W. Bowersock, *Harvard University*; Professor Bystrom, *University of Hawaii*; Dr Chi-peng Chieh, *Director of the Institute of Nuclear Energy, Atomic Energy Council, Republic of China*; Sir Eric Drake, CBE, *Chairman of British Petroleum Company*; Professor M. Euwe, *President, World Chess Federation*; Professor M. G. Fontana, *Columbus, Ohio*; Mr P. Garnham, MBE, *Assistant Registrar, University of Oxford*; Mr J. W. Hayward, *Registrar, University of Otago*; Mr H. Kahn,

USA; Mr A. Kershaw, MC, MP, *British Parliamentary Under-Secretary of State for Foreign and Commonwealth Affairs*; Professor M. Kotani, *President, Science University of Tokyo*; Mr J. McGargow, *Deputy Registrar, University of Glasgow*; The Honourable J. McNie, *Minister of Colleges and Universities, Ontario*; Dr F. Matsuda, *Director, Department of Transport, Hawaii*; Professor A. A. Mazrui, *University of Uganda*; Mr P. Msekwa, *Vice-Chancellor, University of Dar-es-Salaam*; Professor Nashar, *University of Alexandria*; Mr Ngiam Tong Dow, *Ministry of Communications, Singapore*; Professor Goesti Ngoerah, *Rector of Udayana State University, Indonesia*; Dr Ir. Noelyadi, *Rector, Brawidjaja University, Indonesia*; Dr S. Nilsson, *Nobel Foundation, Sweden*; Mr M. Okuyama, *Ottemon Gakuin University*; Professor A. R. Omar, *Veterinary Research Institute, Ipoh*; Mr T. Onishi, *Registrar, Daito Bunka University*; Mr D. B. Peskin, *Director, Fairchild Camera & Instrument Corporation, California*; Dr M. Rashdan, *Vice-Chancellor, University of Agriculture, Malaysia*; Mrs W. P. Rogers, *New York*; Professor A. Sauvy, *College de France*; Mr J. Scott, *Assistant Registrar (Academic) Lincoln College, New Zealand*; Mr Um Sim, *Foreign Ministry of the Government of the Khmer Republic*; Mr Yue Soong, *Atomic Energy Council, Republic of China*; Mr R. Stead, *BBC Controller and BBC Representative in Australia*; Mr Suzuki, *former Japanese Ambassador to Australia*; The Right Honourable Mrs Margaret Thatcher, MP, *Secretary of State for Education & Science, UK*; Professor H. A. Thompson and Dr Dorothy B. Thompson, *Institute for Advanced Study, Princeton*; Dr Toh Chin Chye, *Vice-Chancellor, University of Singapore, Minister for Science & Technology, Singapore*; Professor M. W. R. Wade, *University of Oxford*; Dr Mou-tai Wu, *Deputy Director of Institute of Nuclear Energy, Atomic Energy Council, Republic of China*.

PRINCIPAL BENEFACTIONS

Special Purpose Grants and Bequests to the University during 1972 were as follows :

<i>Donor</i>	<i>Amount</i>	<i>Purpose</i>
	\$	
Anonymous	31,111	For fellowship—Department of Economics, Research School of Pacific Studies
	2,200	For research—Department of Economic History, Institute of Advanced Studies
	7,000	For research—Department of Economics, Research School of Pacific Studies
	3,510	For research—Department of Economics, School of General Studies
APM Forests Pty Ltd	100	For research—Department of Botany
Associated Pulp and Paper Mills Ltd	1,500	For research—Department of Forestry
Attorney-General's Department	1,500	For research—Department of Engineering Physics
Australian Academy of Science	500	For research—Department of Economics, School of General Studies
	6,268	For research—Department of Clinical Science
Australian Dairy Produce Board	750	For research—Department of Physical Biochemistry
Australian Institute of Aboriginal Studies	1,390	For research—Department of Linguistics, School of General Studies
	3,320	For research—Department of Linguistics, Institute of Advanced Studies
	3,000	For research—Department of Sociology, Institute of Advanced Studies
	2,610	For research—Department of Biogeography and Geomorphology
	8,083	For research—Department of Sociology, School of General Studies
	6,697	For research—Department of Prehistory, Institute of Advanced Studies
Australian Institute of International Affairs	1,000	Study group—Professor F. J. Fenner
	500	Study group—Dr J. D. B. Millar
Australian Institute of Nuclear Science and Engineering	2,400	For research—Department of Engineering Physics
	8,298	For research—Department of Nuclear Physics
	4,323	For fellowship—Department of Nuclear Physics
Australian Institute of Urban Affairs	21,887	For research—Urban Research Unit
Australian Kidney Foundation	3,000	For research—Department of Immunology
Australian Meat Board	26,639	For research—Department of Zoology
Australian Newsprint Mills Ltd	3,000	For research—Department of Forestry
Australian Research Grants Committee	6,244	For research—Department of English
	2,014	For research—Department of History
	6,262	For research—Department of Germanic Languages
	2,670	For research—Department of Linguistics, School of General Studies
	872	For research—Department of Prehistory, School of General Studies
	4,374	For research—Faculty of Economics
	334	For research—Faculty of Law
	1,971	For research—Department of Chinese
	7,714	For research—Department of Asian Civilizations
	8,212	For research—Faculty of Science
	42,842	For research—Department of Chemistry
	6,409	For research—Department of Physics
	10,961	For research—Department of Theoretical Physics, School of General Studies
	20,891	For research—Department of Forestry
	29,410	For research—Department of Biochemistry, School of General Studies
Australian Wool Board	10,100	For research—Department of Chemistry
	8,571	For fellowship—School of General Studies
Bank of Montreal	1,050	For travel assistance—Department of Clinical Science

<i>Donor</i>	<i>Amount</i>	<i>Purpose</i>
	\$	
Bank of New South Wales	1,000	Gift for Fossil Appeal Research—Vertebrate Palaeontology Unit
Bougainville Copper Pty Limited	4,778	For research—Research School of Pacific Studies
British Tobacco Company (Australia) Limited	1,000	For publication of the Australian Economic Review
The Broken Hill Proprietary Company Limited	202	For research—Department of Botany
Bryant & May Pty Ltd	500	For research—Department of Botany
Carnegie Institute of Washington	3,333	For research—Dr J. Robertson
Mr B. W. Chappell	438	For research—Department of Geology
Commonwealth Advisory Committee on Advanced Education	4,961	For research—Education Research Unit
Commonwealth Banking Corporation	1,000	For Ditchley Foundation Conference
Copper Refineries Pty Ltd	38,286	Copper Refining Project
Council of Aboriginal Affairs	2,500	For research—Department of Anthropology and Sociology
CSIRO	3,656	For research—Department of Economics, School of General Studies
	3,400	For research—Department of Zoology
	3,500	For research—Department of Prehistory, Institute of Advanced Studies
	350	Scholarship—John Curtin School of Medical Research
	525	Scholarship—Research School of Biological Sciences
	1,050	Scholarship—School of General Studies
Dalgety Agri-Lines Ltd	2,280	For research—Department of Clinical Science
Mrs E. N. Darling	300	For the Arthur F. Yencken Memorial Lecture
Department of Education and Science	350	For research—Education Research Unit
	3,600	US-Australian Symposium on Vision
	13,120	For research—Department of Psychology
Department of Environment, Aborigines and Arts	1,374	Seminars—Centre for Continuing Education
	7,850	Audio Visual Seminar
Department of Foreign Affairs	8,201	For research—Department of Forestry
	14,638	For Masters Degree Course in Agricultural Development Economics
	10,000	For research—Education Research Unit
Department of Forestry, Queensland	1,000	For research—Department of Forestry
Department of Health	18,100	For research—Department of Sociology, School of General Studies
Department of Immigration	40,600	For research—Department of Demography
Department of Supply	14,000	For research—Department of Statistics, Institute of Advanced Studies
Drapers Company	2,105	For scholarship—Department of Economics, School of General Studies
Elder Smith Goldsbrough Mort Ltd	500	For publication of the Australian Economic Review
Esso Australia Ltd	500	For research—Department of Geology
Professor F. J. Fenner	2,000	For Leonard French mural
FM Forests Pty Ltd	750	For research—Department of Botany
Food and Agricultural Organisation	839	For priorities in agricultural research
Ford Foundation Grant	69,418	For research—Research Schools of Social Sciences and Pacific Studies
Forestry Commission of New South Wales	2,500	For research—Department of Forestry
Forestry Commission of Tasmania	500	For research—Department of Forestry
General Motors-Holden's Pty Ltd	3,462	For fellowship—Department of Mathematics, Institute of Advanced Studies
Imperial Chemical Industries of Australia and New Zealand Ltd	3,250	For fellowship—School of General Studies
International Bank for Reconstruction and Development	7,501	For research—Department of Economics, Research School of Pacific Studies
International Development Research Centre	3,831	For research—Department of Far Eastern History
Dr Germaine A. Joplin	250	For Leonard French mural
James N. Kirby Foundation	15,000	For the publication of the Australian Economic Review

<i>Donor</i>	<i>Amount</i>	<i>Purpose</i>
	\$	
T. C. K. & D. Le	500	For the John Curtin Memorial Lectures
Leukaemia Society of America	19,963	For fellowship—Department of Immunology
Leverhulme Trust	6,320	For visiting fellowships
Lowell Observatory	2,729	For research—Department of Astronomy
Medical Research Council—Canada	422	For research—Department of Medical Chemistry
Sir Leslie Melville	10,000	For Leonard French mural
Professor W. Milgate	1,000	For Leonard French mural
The Myer Foundation	662	For research—Department of Geography
	818	For research—School of General Studies
National Heart Foundation of Australia	6,996	For research—Department of Clinical Science
	448	For fellowship—John Curtin School of Medical Research
News Ltd	1,000	For Ditchley Foundation Conference
Northern Territory Administration	9,558	For research—Department of Psychology
	1,000	For research—Department of Forestry
Office of Aboriginal Affairs	83,000	For research—Dr H. R. Bustard
	5,900	For research—Department of Psychology
	7,000	For research—Department of Economics, Research School of Pacific Studies
Paramount Nurseries	500	For research—Department of Botany
Professor P. H. Partridge	1,358	For Leonard French mural
Lady Pilditch	1,000	For Arthur F. Yencken Memorial Lecture Fund
Ian Potter Foundation	2,000	For Ditchley Foundation Conference
Queen Elizabeth II Fellowship Committee	16,081	For fellowship—Department of Environmental Biology
	14,423	For fellowship—Department of Genetics
	34,701	For fellowship—Department of Applied Mathematics, Institute of Advanced Studies
Reserve Bank of Australia—Rural Credits Development Fund	18,028	For research—Department of Forestry
	3,078	For research—Department of Zoology
	8,066	For research—Department of Human Geography
	18,759	For research—New Guinea Research Unit
	2,350	For research—Department of Economics, Research School of Pacific Studies
Roche Products Pty Ltd	200	For ACT Postgraduate Committee in Medicine
Rockefeller Foundation	11,957	For research—Department of Genetics
Rothmans University Endowment Fund	6,250	For fellowship—Research School of Physical Sciences
Sandoz Australia Pty Ltd	1,500	For travel assistance—Department of Clinical Science
Servier Laboratories Pty Ltd	1,200	For travel assistance—Department of Clinical Science
Dr C. A. Tisdell	500	For Leonard French mural
Torrens Industries Limited	500	For research—Department of Geology
Professor A. D. Trendall	1,175	For Leonard French mural
University of Otago	810	For research—Department of Geology
Upjohn Pty Ltd	1,000	For travel assistance—Department of Clinical Science
Western Australia Department of Forests	2,000	For research—Department of Forestry
Western Mining Corporation Limited	700	For research—Department of Geology
Wood & Forests Department of South Australia	1,000	For research—Department of Forestry
World Health Organisation	2,135	For research—Department of Microbiology
World Wild Life Foundation	4,370	For research—Dr H. R. Bustard
Mr A. J. R. Yencken	400	For the Arthur F. Yencken Memorial Lecture Fund
Mr D. W. Yencken	300	For the Arthur F. Yencken Memorial Lecture Fund

Acknowledgment must also be made here of the many gifts in kind received by the University.

Accompanying Reports and Statements

THE INSTITUTE OF ADVANCED STUDIES

THE JOHN CURTIN SCHOOL OF MEDICAL RESEARCH

REPORT OF THE DIRECTOR

Professor F. J. Fenner, MBE, FAA, FRS

As in 1971, the current year has been characterised by difficulty in financial planning due to the effects of substantial increases in non-academic salaries. The cuts that were necessary to finance these salary increases were made in the equipment and supplies vote, in order that staff recruiting was not inhibited. The result was an increase in total academic staff from seventy-nine to eighty-seven (forty permanent, thirty-two short tenure and fifteen postdoctoral fellows). Further recruiting in the two new departments was prevented by the continued failure to appoint a Head of the Department of Human Biology and by lack of space available for the Department of Immunology until members of the Research School of Biological Sciences move to their new building early in 1973.

Buildings planned for the 1970-72 triennium were completed and the library is now fully furnished. Books and journals have been relabelled according to the United States Library of Congress scheme. The specific-pathogen-free animal house is completed but not yet commissioned because of difficulties with the mechanical services. There continues to be increased pressure on the animal breeding facilities but the appointment of Dr J. B. Smith to supervise animal production and care has strengthened this aspect of School services. During the year the operation of the stores and supplies section was also strengthened by the appointment of Miss W. Trevella, as Assistant to the Business Manager (Laboratory Services).

Scientific activity continued at a high level; detailed accounts of the work in the various departments will be found in the pages that follow. Exclusive of abstracts and brief notes, 187 articles were published in scientific journals, fourteen chapters were contributed to a wide variety of books, and two books were published. Due in large part to the initiative of Dr S. V. Boyden, FAA, of the Department of Human Biology, a three year major in Human Sciences has been launched in the School of General Studies. For the first three years of its operation as an experimental interdisciplinary course it will be largely guided and in part taught by Dr Boyden.

This year marks the end of the tenure of Professor A. Albert, FAA, as Head of the Department of Medical Chemistry, which began in 1949. He will continue to work in the University as a Visiting Fellow in the Research School of Chemistry,

jointly supported by this School and the Research School of Chemistry. The Department will be contracted to a Medical Chemistry Group and the space and staff positions thus made available will be used to establish a Department of Pharmacology early in 1973.

Senior members of the School were involved in a variety of international scientific activities. No major international congresses of interest to the School were held in 1972, but members of appropriate departments attended a variety of smaller international congresses as well as the conferences held by national scientific bodies. Professor P. O. Bishop, FAA, served as a member of the Council of the International Union of Physiological Sciences, Professor G. L. Ada, FAA, as a member of Council of the International Agency for Research in Cancer, Professor Albert as a Titular Member of the Medicinal Chemistry Section of the International Union of Pure and Applied Chemistry, Dr D. D. Perrin as Australian delegate to the Council of the International Union of Pure and Applied Chemistry, Dr Boyden on the Governing Board of the Commonwealth Human Ecology Council, and I served as President of the International Committee on Nomenclature of Viruses, and a member of the Scientific Committee on Problems of the Environment. A notable international event held in the School was the United States–Australian Symposium on Vision, organised jointly by the United States National Eye Institute and the Department of Physiology. Over twenty of the leaders in this field of research in the USA participated in this small specialist symposium.

We regret to have to record that Dr T. J. Batterham, Senior Fellow in the Department of Medical Chemistry and Dr K. F. Carroll, a research student in the Department of Clinical Science, died during the year.

Research Activities

The work of the *Department of Biochemistry* has continued to be oriented towards the study of fundamental biochemical processes within the cell. As previously, the bacterium *Escherichia coli* has played a large part as a source of experimental material, because with this organism it is possible to solve problems by the combined biochemical and genetic approach which has proven so fruitful in recent years. Experience has shown that conclusions reached following studies with bacterial cells are either applicable directly to the cells of higher organisms or point the way for further experimentation with higher organisms. A wide variety of problems is under investigation, including the pathway of synthesis of the vitamin-like compound ubiquinone; the study of reactions by which such cells oxidise foodstuffs and obtain energy; studies on the details of enzyme reactions, including participation of metals and the functioning of enzymes vital for control of pathways of metabolism within the cell; the way in which water soluble compounds such as metal ions, phosphate and other compounds are transported across the fatty membranes surrounding cells; the biochemical basis for certain abnormalities of skin pigmentation in man, and studies on the structure of proteins.

The *Department of Clinical Science* is wholly set up within the Canberra Hospital where it provides a clinical service, by referral, for both ambulatory patients and in-patients and conducts a program of clinical and laboratory research orien-

tated towards problems associated with coronary heart disease. The work is also particularly relevant to patients with disordered blood fats, diabetes, obesity and early hypertension.

Work done during the year has included investigations into the manner in which blood fats are derived and disposed of in animals and in humans, both normal and with various diseases; the blood fat level in newborn infants and its response to different forms of feeding; the efficacy of drugs and of specially prepared polyunsaturated milk and meat products in lowering blood cholesterol levels; blood clotting and thrombus formation; the nervous component of causes of high blood pressure; and the effect of diet during pregnancy on the growth and bodily functions of rats.

The *Department of Experimental Pathology* is engaged on research into the fundamental mechanisms concerned in disease processes.

One field of research concerns the effects of injury and of toxic substances such as alcohol and lead on the minute organelles of cells. These experiments have been carried out on cultured cells and studied by the electron microscope. In other experiments the effects of injury and of ischaemia on the behaviour of some of the cell enzymes have been studied in order to elucidate the mechanisms concerned in traumatic shock, a common clinical condition following severe injury in man.

Another field of research concerns organ grafting and the mechanisms involved in the rejection of tissue from another animal. Small pieces of kidney are grafted into a special chamber in a rabbit's ear, and the graft is then studied by microscope until the grafted tissue is rejected. These studies are of importance in relation to organ grafts in man.

Studies of cholesterol and fat metabolism in relation to disease of arteries have continued together with studies of ageing of arteries. All of these experiments are directly related to the origin of atherosclerosis, the disease of arteries underlying coronary heart disease.

Investigations have also been made on the development of certain processes and functions in the foetal lamb. These studies are related to disease in the human foetus. Other studies concern the development and function of the lymphatic system and the transport and metabolism of the hormone, thyroxine, which is produced by the thyroid gland.

The *Department of Human Biology* is concerned with the population biology of man. One group of workers is concerned with the impact of the processes of civilization on the biology of the human organism, largely by integrating relevant information on the biology of man in his changing environment from a number of different disciplines. In order to test some of the hypotheses generated by this approach, field studies have commenced in Hong Kong. This city has many characteristics which make it ideal for a comprehensive study of the interaction between the environment and the complex biological systems which make up a modern urban community.

The other major activity in the Department is the study of the genetic diversity of human populations, particularly in India, South-East Asia and Australia.

Modern biochemical techniques make it possible to recognise inherited differences in a large number of protein and enzyme systems present in samples of blood and other tissues. Some of these differences are due to specific mutant genes which have a restricted distribution in certain populations. Such mutant genes are valuable markers for studying human migrations in preliterate societies. In addition, it is possible to use the data on the variation at all the gene loci studied to estimate the evolutionary divergence between populations, and the group has been involved in studies of this kind with respect to the relationship between tribes of Aborigines in Australia as well as for the highly structured caste groups in India. Finally, the data is being analysed to provide information on the amount of genetic diversity which is maintained in normal human populations, and in an attempt to determine what factors might be important in determining the extent of this variability.

Considerable attention has been given to problems of practical interest including investigation of the distribution of abnormal haemoglobins and other haematological deficiencies in India, as well as studies of association between common genetic markers and nasopharyngeal carcinoma in Singapore, and with oesophageal carcinoma in Iran. Also, preliminary investigation of the interaction between genetic and environmental factors influencing birth weights and growth patterns in Aboriginal infants is being carried out.

The work of the *Department of Immunology* is directed towards studying the way in which cellular systems develop in the animal to preserve its individuality. The uniqueness of an individual is determined by genetic material donated to the embryo from its two parents. From the moment of conception this special individuality is preserved by complex mechanisms which are directed towards discriminating between the individual's own 'self' materials and foreign 'non-self' substances.

The protective function of 'self/non-self' discrimination is seen most obviously in the reactions that occur in the body in response to diseases caused by viruses and bacteria. These protective reactions have been exploited in medicine by adapting vaccination procedures to induce immunity against a variety of infectious diseases. There are, however, several fundamental biological questions which are related to the immune reactions that occur against foreign substances. For example, there are naturally occurring conditions where certain tissues grow without regard to any of the laws which normally constrain cell growth in the body. A malignant tumour will destroy its host and yet the body's immune defence system seems not to be aroused. The foetus inside the womb is essentially a foreign body, tolerated by the mother until the birth processes expel it. How does the body discriminate so effectively against the foreign bacterium and virus and yet fail to react against the foetus or the malignant tumour? What is the nature of the 'tolerant' state that exists in these situations?

The development of discriminatory systems of the body is being studied in the foetus and in primitive organisms in an attempt to uncover and manipulate the developmental events which are involved in detecting 'foreignness'. These studies in sheep have involved the development of surgical techniques which enable major surgical operations to be carried out on the foetus at an early stage of its development with impunity. In addition, the use of the foetal animal offers a

unique experimental situation for challenging an animal's immune system with foreign materials before it is exposed to the environment in which it will subsequently live.

The physiological regulation of the immune response is also being studied. The ultimate aim of this work is to try and manipulate immune reactions so that they can be turned on and off at will. If this can be done, it should then be possible to manage the problems of graft rejection that are presently such a bane in the treatment of kidney disease by renal transplantation. Much emphasis is also being placed on research into establishing and analysing states in which animals are tolerant of foreign tissues. The main purposes of this work are to devise ways of subverting the tolerant state that exists between a host and a malignant tumour and to create a specifically tolerant state in an individual who is to receive a foreign tissue or organ graft.

Research is also being done into the specific mechanisms involved in the rejection of grafted tissues. The principal cell concerned in these reactions is the lymphocyte, a cell which has the capacity to react violently when it comes into contact with cells of a similar type derived from another individual. Specific reactions of this type occur in transplanted organs and are highly destructive. It now seems in addition that these cellular reactions may be important in enhancing other potentially destructive immune phenomena. Experimental model systems have been devised to study these mixed lymphocyte reactions *in vivo* in the chick embryo and in sheep carrying kidney transplants and *in vitro* in the test tube with the 'cultured cell' systems.

The major activity of the *Department of Medical Chemistry* is the study of heterocycles related to the naturally-occurring purines and pyrimidines. Heterocycles are defined as substances whose molecules consist of rings containing, in addition to the usual carbon atoms, one (or more) foreign atom, usually nitrogen. Such substances usually have a relatively longer residence time in the body and hence can exhibit high biological activity in small doses.

Under the pressure of natural selection, nature has chosen heterocycles to perform some of the most vitally important tasks in the living cell. Thus two pyrimidine and two purine bases are used as durable repositories of the cell's genetic information and one of them, in combination with phosphorus and oxygen, acts as the energy-bank of all living cells. The principal aim of this Department's work is to correlate physical properties with chemical structure in these series as an aid to the discovery of more selective medicaments. In addition, new syntheses are sought to provide hitherto inaccessible material for these purposes. Another important interest of the Department is the study of the equilibria that control the disposition of minute, but essential, traces of heavy metals in the human body. In the year under review, a most interesting general reaction has been found in which the ring-shaped molecules of pyrimidines and fused pyrimidines (which include purines and the pteridines responsible for the biosynthesis of both purines and pyrimidines) are split open. This takes place on prolonged contact with nucleophiles, a class of substance widely present in all living cells. After a further lapse of time, the molecular rings are formed again, but lose an atom of nitrogen in the process.

Three new reactions have been discovered for making azapurines, which are the only naturally-occurring substances with three consecutive nitrogen atoms in one molecule, and which are used in experimental anti-cancer research.

Medical use of the antibiotic phleomycin requires a purine to be administered at the same time, to boost its action. A physical property has now been discovered which sorts synergistic (ie, helping) purines from non-synergistic ones. This property is the ability to pass from solution in water to that in lipids (ie, fatty material). This has been quantified, and it was found that synergism occurs only within a narrow range of lipid/water partition values. With this advance, the selection of purines for further biological tests has lost its previous random character.

Tetraethyl orthocarbonate, a reagent never previously used to synthesise molecular rings, has been explored during the year and found to introduce methoxyl-groups in difficult positions of the molecule. A particularly successful use of this reagent was made in the azapteridines, a class of substances occurring in micro-organisms and possessed of potent biological activity.

Previous reports have described quantitative investigations of the relative affinities of amino acids (the building blocks of proteins) for the cations of heavy metals. By devising new and more complicated computer programs, these studies have now been extended to di- and tri-peptides, which are intermediates in the biosynthesis of proteins from amino acids. A whole class of metal-binding substances, which inhibit the development of influenza virus, has been discovered. The chemical nature of these inhibitors suggests that copper (at an unusual level of oxidation) is essential for the activity of this virus and this knowledge may possibly lead to useful drugs.

All aspects of this Department's work have greatly benefited from physico-chemical research in progress, much of it depending on delicate and costly instruments in need of regular maintenance and replacement.

Work in the *Department of Microbiology* is concerned with the study of viruses and cells and with the way in which the body can recognise and react against both these and much simpler substances. Most of the work carried out is on a long term basis but every now and then findings are made which have a more immediate interest.

Influenza remains a public health problem of world-wide importance. This is mainly because, unlike most other viral diseases, the influenza virus changes its properties every few years. Once we are vaccinated against, for example, poliomyelitis, the protection lasts for many years. This is not true for influenza virus infections. The study of influenza virus particles has been a major concern of this Department since its inception. In the last few years a senior investigator, Dr W. G. Laver, has been able to disrupt the viral particles and to isolate their several components. By careful and meticulous work, he has been able to examine some of the components using a technique called peptide mapping which enables the investigator to pick out very important but small differences in proteins which, by other criteria, appear to be similar. Using this approach, Dr Laver has shown a correlation between the structure of at least one viral component and the serological properties of the virus—that is the properties which

determine whether it will cause disease in man. The evidence suggests further that the sudden changes in properties which occur can be explained if human influenza virus strains and animal or avian influenza virus strains infect the same cell and progeny are produced with properties derived from *both* parent strains. Major recent influenza outbreaks seem to have originated from China (Asian Flu, Hong Kong Flu) and this is an area of the world where there may be close contact between humans and domestic animals. It is appropriate that Dr Laver was able to visit China this year and make contact with prominent Chinese virologists.

Many workers in the Department are now concerned with a class of lymphocytes in the body called T lymphocytes because they are derived from the thymus. Evidence is growing that this class of cell plays a regulatory role in the control of the immune response. It has been known for several years that this cell may help in the production of antibody though it does not itself seem to make such antibody. Workers in this Department have recently shown that cells of this nature are particularly important in the control of some viral infections; may well be concerned in the control of multiplication of some cancer cells; and in a state where animals are tolerant of a particular protein, ie, they do not make antibody against it, these cells have a specific *suppressor* activity.

In general terms, the work of the *Department of Physical Biochemistry* involves the investigation of the physical and chemical properties of biological materials (mainly proteins and enzymes) and the elucidation of systems and processes of biochemical and medical interest. The approach frequently requires the development of new experimental procedures and the application of fundamental principles of physical chemistry and mathematics in formulating new theories.

A group, headed by Professor L. W. Nichol, has examined the effects on haemoglobin of small molecules which occur in the mature red blood cell and which function by aiding the release of oxygen bound to haemoglobin into living tissue. Methods have also been developed to study interactions between dissimilar large molecules and are being applied to investigate the combination of proteins and polysaccharides to lipoproteins isolated from human serum. The group has commenced studies on consecutive enzymic reactions, wherein a starting compound is transformed to a final product in a series of steps such as are encountered in metabolic pathways operating in the living cell. Dr P. D. Jeffrey is collaborating with the group in the latter project and has also continued his work on determining the size of the physiologically active unit of insulin and on developing theories pertaining to the ultracentrifuge.

Dr H. A. McKenzie and his group have extended their comparative studies on milk and blood proteins with the aim of relating their structure to their biological function. The work is particularly relevant to an understanding of the chemical evolution of proteins, of the mechanisms of their denaturation and of the role water plays in determining the properties of proteins and enzymes. The studies also involve investigations, in collaboration with certain paediatricians, of the allergenic activity of selected, purified milk proteins.

The group led by Dr A. B. Roy has found strong evidence that the physiological function of the enzyme, sulphatase A, is to hydrolyse cerebroside sulphate, a reaction of importance in the metabolism of nervous tissue. Experiments utilising

a modified form of sulphatase A, stripped of a carbohydrate component, have led to findings which bear on studies of the congenital condition metachromatic leucodystrophy in which the metabolism of cerebroside sulphate is disturbed.

Other projects included model studies on the mammalian kidney and molecular orbital calculations relating to small biologically active molecules such as convulsant and anticonvulsant drugs.

In most of the projects close collaboration is maintained with scientists in other departments of the University, in the Commonwealth and overseas, for indeed, it is a general aim of the Department to foster interest in the physico-chemical formulation and solution of biological problems.

The work of the *Department of Physiology* is mainly concentrated along three separate lines—the nature of the chemical substances used to transmit information between nerve cells; the way muscle nerves influence and determine the properties of the muscles to which they are connected; and the nervous mechanisms in the eye and the brain that enable us to see and recognise the objects in the world about us.

Studies of chemical transmitter substances operating at synapses within the mammalian brain and spinal chord have continued using microtechniques, chemical and biochemical procedures developed in past years. Using strychnine and bicuculline as specific antagonists, further evidence has been obtained of the vital roles of glycine and gamma-aminobutyric acid as an inhibitory transmitter in the central nervous system, roles relevant to the neurological problems of epilepsy and Parkinson's disease. More antagonists of the excitation of neurones by glutamic and aspartic acids have been found which may prove useful in assessing the function of these amino acids as excitatory transmitters. Investigations have continued of the factors involved in the synthesis, storage and inactivation of transmitters and the manner in which these substances excite or inhibit nerve cells.

Further work has been carried out on the dynamic properties of mammalian muscles. It has now been established that the relation between the duration of active state and the intrinsic speed of sliding of actin and myosin filaments is not the same in extraocular muscles and limb muscles. These differences between heterologous muscles afford opportunities for investigating the roles of various structures that are involved in activation and contraction of individual fibres and the neural influences that determine these characteristic properties.

The neurophysiological study of the visual system is becoming a rapidly advancing field in the quest for understanding the functional organisation of the brain. Various lines of investigation continue to be developed within the Department. The detailed properties of individual neurons in the visual cortex have been studied with respect to the specificity of their responses to the orientation and direction of movement of visual stimuli. Such information provides the basis for proposing models of the neural interconnections underlying visual pattern recognition. Work continues on the groups of neurons connecting the retinas to the visual cortex. Significant refinements have been discovered in the visual classification of these nerve cells as well as in the regional distribution of their axons within the brain. The important principles governing the deployment of different numbers of neurons to serve various parts of the visual field are the goal of a

comparative study of retinal ganglion cell topography in Australian marsupials and native placental mammals. An experimentally accessible output of visual processing is the control of eye movements; a start has been made in the instrumental monitoring of eye position. This is a key step towards the challenging task of studying the performance of visual neurons in the conscious behaving animal.

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*** Based on work done while a Visiting Research Worker.

** Based on work done prior to joining this University.

‡ Not a member of this University.

* Based on work done while a member of the Department.

THESES

Thesis titles of work successfully submitted by research students in the John Curtin School of Medical Research on whom degrees were conferred in 1972:

Doctor of
Philosophy

- BARTER, P. J.
'Studies in the metabolism of plasma triglycerides and *free fatty acids*.' *Department of Clinical Science*.
- BEART, P. M.
'The neurochemistry of amino acid transmitters.' *Department of Physiology*.
- BIGUM, C. J.
'Synthesis and nuclear magnetic resonance studies of isotopically labelled heterocycles.' *Department of Medical Chemistry*.
- COOPER, M. G.
'Antigen-binding cells in tolerance and immunity.' *Department of Microbiology*.
- HOSKINS, J. A.
'Studies on pyrimidinesulphonic acids and related compounds: Syntheses and metatheses.' *Department of Medical Chemistry*.
- LIEW, F. Y.
'Studies on cytophilic antibodies.' *Department of Microbiology*.
- MEDVECZKY, N. E.
'Phosphate transport in *Escherichia coli*.' *Department of Biochemistry*.
- NEWTON, NORMA A.
'The function of ubiquinone and menaquinone (vitamin K₂) in *Escherichia coli*.' *Department of Biochemistry*.
- PEDERSEN, N. C.
'Studies in transplantation immunity.' *Department of Immunology*.
- SCOLLAY, R. G.
'Allogeneic interactions *in vitro* and *in vivo*.' *Department of Immunology*.
- WALKER, KAREN Z.
'Pathogenesis of the graft-versus-host reaction in chick embryos.' *Department of Experimental Pathology*.
- WATT, ANN E.
'Multiple equilibria in assemblages of various metal ions and complexing species: Models for biological systems.' *Department of Medical Chemistry*.
- WELLS, J. D.
'Physical chemistry of polymer interactions: A study of simple model systems for connective tissue.' *Department of Physical Biochemistry*.

THE RESEARCH SCHOOL OF PHYSICAL SCIENCES

REPORT OF THE DIRECTOR

Professor Sir Ernest Titterton, CMG, FAA

The output of research from the School during 1972 increased in a most gratifying manner. There was a total of 355 publications, 326 of these being papers in international and local scientific journals; ten were books, chapters of books or encyclopaedia entries, while nineteen were research reports. This is a new record for the School, exceeding the one established last year. In addition, twenty-nine theses went forward for examination, one of which was for a degree of master, the others for the degree of Doctor of Philosophy. This also represents a record for the School.

Considerable progress in building operations was made during the year. Extensions to the mathematical sciences block and to the Cockcroft Laboratory complex were completed and occupied. The tower for the 14UD accelerator was near to finality and foundations for the target and control areas had been excavated and partially laid by the end of the year. The program of 'cosmetics' to improve the appearance of the original buildings on the peninsula was well under way. The Oliphant Building was painted early in the year and elimination of the red brick produced a great improvement in appearance. By the end of the year most of the Cockcroft Laboratory complex had been painted and fascias were being fitted to the smaller of the two towers to hide the sloping roof. Funds available in the 1973-75 triennium should allow this program to be completed and with the erection, during the new triennium, of the planned Applied Mathematics, Solid State Physics, Statistics and School Services building across the end of the peninsula, the upgrading program will be completed.

Viewed from the lake and from Black Mountain, the general appearance of the buildings has been vastly improved and completion and painting of the 14UD tower will make this a landmark and provide a focal point for the physics group of buildings.

The year saw staff members of the School honoured in a number of ways. For the second consecutive time the Pawsey Medal of the Academy of Science was awarded to a staff member of the School—in this instance to Dr K. C. Freeman of the Department of Astronomy. Professor K. Mahler, FAA, FRS, received the DeMorgan Medal of the London Mathematical Society and Dr M. S. Paterson was elected to a Fellowship of the Australian Academy of Science. Professor A. E. Ringwood, FAA was elected a Fellow of the Royal Society of London and was awarded the Werner Medaille of the German Mineralogical Society on the occasion of its 50th Anniversary Meeting. I was elected President of the Australian Institute of Nuclear Science and Engineering and was appointed a Fellow of the Australian Academy of Forensic Sciences.

Professor J. C. Jaeger, FAA, FRS, retired at the end of the year after twenty years service with the University, nineteen of them as Head of the Department of Geophysics and Geochemistry, during two of which he was Dean of the School. The School was delighted that Council has agreed the present Geophysics and Geochemistry laboratories should be named the 'Jaeger Building'. This is a fitting commemoration of the vital contributions Professor Jaeger made in estab-

lishing the Department and bringing it to its present important position in the international scientific community.

The steady flow of Queen Elizabeth II fellows to work in the various departments continues. During the year, Dr M. N. Barber arrived from Cornell to join Applied Mathematics and Dr J. D. Love of the University of Toronto was awarded a fellowship also to be held in the Department of Applied Mathematics. Dr D. T. Wickramasinghe from the University of Arizona is expected to join Astronomy early in 1973. This will bring the total of Queen Elizabeth II fellows in that Department to five—an all-time Australian record.

A further Australian Institute of Nuclear Science and Engineering Fellowship was obtained—Dr K. H. Bray returned from the University of Alberta to take up a second position in the Department of Nuclear Physics. He joins Dr L. E. Carlson who already has held an AINSE Fellowship for two years.

The Laboratory received its usual quota of distinguished visitors from overseas. Notable amongst them were—Mrs Margaret Thatcher, Secretary of State for Education and Science, UK; Professor Sir Harrie Massey, London; Dr M. Wood, Oxford; Dr Margaret Burbidge, Herstmonceaux; Professor Sir Fred Hoyle, Cambridge; Dr G. Isaac, Birmingham; Dr D. M. Brink, Oxford; Professor I. Harpaz, Israel; Professor M. Baranger, MIT; Professor A. Ware, Texas; Dr V. A. Parsegian, Bethesda; Professor W. H. Miller, Yale; Professor M. Kotani, Tokyo; Professor D. Langbein, Frankfurt; Professor M. F. Atiyah, Princeton; Professor G. Burkoff, Harvard; Professor J. Diendonno, Nice; Dr A. R. Sandage, Hale Observatories; and Professor L. Schwartz, Paris.

On the departmental fronts two major matters were decided during the year. First, the long drawn-out discussion on the future of the Department of Geophysics and Geochemistry was settled when Council, acting on the recommendation of the Board of the Institute following the Courtice Committee Report, decided to establish a Research School of Earth Sciences. The present Department, which will form the nucleus of the new School currently planned at a total of eighty academics, will separate from this School during 1973. Agreement on the division of staff and resources was reached during the year and an Electoral Committee of Council was reviewing applicants for the Directorship of the new School by the end of the year. The second matter affecting the School was the decision of the Anglo-Australian Telescope Board to advertise for a Director for the 150" telescope project. The Director and his senior scientific and technical staff will be employees of the Board of which he will be Chief Executive. After his appointment the Board proposes that arrangements be made for close co-operation with the University and for use, as far as is practicable, of the supporting facilities and services of the University. These two decisions remove uncertainties which had been disturbing the School for a considerable time.

Elsewhere, in other departments, progress has been good. Applied Mathematics developed its staff establishment to five members, together with four Queen Elizabeth II fellows, a postdoctoral fellow and five students. The group received visits from three distinguished overseas visitors for various periods during the year and the research program benefited enormously.

The program outlined in last year's report, to increase the research output in the Department of Engineering Physics by improving the interdisciplinary balance has been implemented through new appointments. The standing of the Department in the world of science has been increasing rapidly, thus four members (including one scholar) were invited directly to deliver papers at overseas conferences. The Department ran a conference in Canberra on Plasma Physics. Held during the month of March, the meeting was attended by all Australian and New Zealand groups working in the field and proceedings of the conference were published late in the year. The difficulties in staging this meeting emphasised again the School's urgent need for a lecture theatre of its own. ABC television, in its 'Science Australia' series, included a forty-five-minute program under the title of 'HPG Superpower'. The program dealt mainly with the homopolar generator itself, but gave some coverage of the laser research and to the macroparticle accelerator studies.

The Department of Mathematics began its organisational work for the Second International Conference on the Theory of Groups to be held in the University in August next year.

Work in the Department of Nuclear Physics has been interrupted somewhat by the various building operations. However, the negative ion injector cyclotron arrived in March and was installed in record time, passing its acceptance tests in June. The guaranteed performance was exceeded in all respects and, apart from a number of minor teething troubles to be expected in a new installation, subsequent operation has been very successful. Commissioning of the beam transport system went to plan and virtually all the beam can be transmitted through the EN tandem without loss. The two-machine-system, called a Cyclo-Graaff, is already in use for experimental work.

The major project of the Department, the 14UD tandem, has progressed well and construction is holding to the original timetable. Some delays occurred along the way, mainly in the commencement and construction times of the main pressure vessel. However, there was sufficient planned flexibility that, with good co-operation from the builders, the tower (which houses the pressure vessel and the accelerator) was completed in time. Many different organisations were involved in this project, each with a major role—tank manufacturer, builders, accelerator manufacturer, Department and School. The latter two have been responsible for the main pressure vessel support structure, gas handling equipment and general services. The 14UD tandem requires new target areas and a control room for its operation. For this purpose \$200,000 was provided by the AUC and construction commenced in early December with completion expected in about six months time. Accelerator components arrived in mid-December and the main stack was being installed at the end of the year. Acceptance tests are expected to take place around April 1973.

The new Department of Solid State Physics brought its staff up to the planned establishment level during the year and was underway with its research program, including experiments using the homopolar generator as a magnet power source.

The Faculty and Faculty Board of the School met on four and thirteen occasions respectively. Each considered a wide range of matters affecting the opera-

tions of the School. The former body agreed to a final version of Faculty and Faculty Board rules and these were sent forward to the Board of the Institute after endorsement by the Faculty Board.

In addition to the routine work of Faculty Board there were a number of important special items. Amongst these were recommendations for the division of staff, fiscal and other resources between the School and the Research School of Earth Sciences when this group splits off in 1974; a stores reorganisation leading to a limited self-service style operation; a review of the implications of the 5th report of the AUC as this relates to School operations in 1973-75; and preparation of plans for the School's submission for the 1976-78 triennium.

The AUC recommendations for 1973-75 will allow only partial implementation of the proposals put forward from the School during the triennium. On the building front the School was well treated, being given \$80,000 for the Mount Stromlo Workshop extension, \$200,000 for target area, control room and supporting services block for the 14UD accelerator and \$620,000 for the building across the end of the peninsula planned to house the Department of Applied Mathematics, some School Services, the Department of Solid State Physics, the Department of Statistics of the Research School of Social Sciences and a School lecture theatre and common-room.

Unfortunately, the sum of \$620,000 (cut from the requested \$750,000) had not been intended by the AUC to cover inclusion of the lecture theatre and common-room which the School regards as of very high priority. A careful review of the building design, both within the University and by consultants outside, suggested that the lecture theatre and common-room might be attained within the available funds although the operation would be tight but it certainly appeared possible to erect the building with these features included if they were shelled and left for completion with additional funds to be sought in the next triennium. The matter was still under discussion at the end of the year but a decision will be made early in 1973.

In other decisions the Commission—(a) referred the request for funds for the Department of Astronomy to build a 60" photometric telescope for a recommendation by the Government's Advisory Committee on Science and Technology. This group will consider the proposal in relation to other high cost scientific projects currently before it; (b) commented on the decision to set up a Research School of Earth Sciences.

Recurrent expenditure funds available to the School, although not at the level requested, will make it possible to complete the planned development of the new Departments of Applied Mathematics and Solid State Physics and allow a little expansion in other areas towards the end of the triennium. In 1973, however, it will only be possible to maintain operations at about the level which had been achieved by the end of 1972.

Two other decisions of the Commission raise problems for the School. In the first, separate funds were not made available for computers which now have to be funded from research equipment grants. With the present 360/50 computer approaching obsolescence as a physics research machine, a proposal had

been made for \$750,000 for a new computer. Means of funding this project were under consideration at the end of the year. In the second, the Commission suggests that the possible ultimate size of the academic establishment of the School should be 120. In considering proposals for the 1976–78 triennium at the last two meetings of the year, Faculty Board approved academic staffing levels which already reached this limit. Indeed, considerable pruning was needed to stay within the limit, and strong cases for additional staff had to be rejected. Heads of departments felt that the figure of 120 may require review. Planning for the 1976–78 triennium will continue in the early months of 1973.

Purchases of books for the Joseph Needham collection were made during the year and these have been housed in a special cabinet in the Physics Library. This collection was made possible by a donation from Professor K. Mahler, who asked that a collection of Chinese mathematical books be purchased to honour Joseph Needham, a distinguished China scholar.

The School is also fortunate to have on loan fifteen paintings and a suit of armour from the Lyttelton-Taylor collection of art works donated to the University. The works are on display in the library and Mathematical Sciences Building.

The record research output of 1972 represents the combined effort of the whole School. A great deal of credit must go to the technical and workshop staffs for the excellence of their supporting work, and to School Services for providing maintenance, servicing and general housekeeping for the School at a very high level.

All concerned will be striving for an even better performance in 1973.

Principal activities in the *Department of Applied Mathematics* are in two main areas. These are vision research and colloid science, particularly as applied to biophysical problems. Both have direct relevance to practical problems—the first to optical communications, and the second to a wide range of industries. Work also goes on in certain areas of chemical and molecular physics.

*Research
Activities*

The objectives of the vision research program are to provide an understanding of the observed shapes, sizes, refractive indices and arrangement of the various photoreceptor organelles in the eyes of both vertebrates (rods and cones) and invertebrates; and to predict causes and effects on the visual response due to photomechanical movement of photoreceptors and surrounding media.

In both areas major advances have been made. The influence of the known physical properties of a photoreceptor on its absolute, angular, spectral and polarisation sensitivity has been elucidated. A few special applications of the mathematical methods developed include the explanation of fly colour vision, frog colour vision, the navigation and polarisation detection and fish polarisation detection mechanisms. In vertebrate vision the major advance has been the explanation of the famous Stiles-Crawford effect, a classical problem of thirty years standing.

The last provides the first psychophysical evidence for dielectric wave guide modes in human photoreceptors. Vision research has been carried out in close

collaboration with experimentalists in the Departments of Neurophysiology and Physiology in other Research Schools of the University and with Professor Miller from Yale, whose visit resulted in an important contribution dealing with the optical function of human receptors.

In the areas of optical communications the production of low loss glass fibres by the CSIRO has made communication via optical fibres a reality. Collaboration has been established between the Department and the Australian Post Office Communications Group to study the transmission of information via such fibre systems and has resulted in the award of a substantial contract from the Post Office.

Colloid science can be described as a grey area of physics and chemistry lying somewhere between the atomic and macroscopic domains and where the intuition regarding particle interactions is still to be developed in full. In particular it includes electrolyte theory and surface chemistry. While the ultimate thrust of the work is directed towards understanding the specificity of biological macromolecules and the energetics of cell adhesion and specificity, applications to various industries ranging over plastics, detergents, glue, paper and mineral flotation are important and perhaps more immediate. The Department has a very strong theoretical group at work in these areas and has received considerable stimulation through the visits of Professor Langbein, Dr Parsegian and through close links built up with a number of active experimental groups in the UK and Netherlands following overseas visits by two staff members. Professor B. W. Ninham was invited to give the opening address, detailing the Department's work in colloid science, to a special international conference of the Chemical Society—Faraday Division held in Bristol on 'Dispersion Forces in Thin Films'.

The colloid research program involves three main lines. The first relates to studies of the influence of geometry, structure and size on the magnitude and specificity of forces which act in biological systems using a generalisation of the continuum theory of molecular forces.

In the second, comparisons are made of theoretical predictions and measured forces for a variety of clean experimental systems. For experiments performed so far agreement is excellent. Perhaps the most pleasing result was a quantitative explanation of the delicate phenomenon of spreading of oil films on water.

The third program has been related to the extension and generalisation of the modern theory of colloid stability to include the effects of conduction processes and electrolytes. In the case of electrolytes a previously unrecognised coupling between double layer (electrostatic) and electromagnetic fluctuation forces has been discovered and in general the effects of spatially dependent dielectric susceptibilities has led to prediction of a plethora of new and previously unsuspected physical effects. Especially worth noting are force laws quite radically different from those at the basis of the older theories.

This work shows great promise and may well explain a number of puzzling experimental anomalies and possibly lead to a theory of surface energies. The new theories have been applied to a variety of systems of biophysical interest.

Other researches, peripheral to the two main lines, have been carried out and include investigations of the possible roles of physical mechanisms in insect olfaction; the interactions between optically active molecules; nucleation theory and a theory of fibrous bed filters; particular problems in surface chemistry; non-simple liquid theory; and certain problems in statistical mechanics.

Work in the *Department of Astronomy* continued with telescopes at Mount Stromlo and Siding Spring Observatories. The dominating building developments at the Siding Spring Observatory were the 150" Anglo-Australian telescope and the UK Science Research Council's 48" Schmidt telescope. The dome for the former was completed during the year and is now a landmark for miles around the site. The 48" telescope was nearing completion by the end of the year and will be used for detailed sky-mapping after it is commissioned.

The fundamental problem of astrophysics is the origin and evolution of the universe and the most exciting result of recent years has been the discovery that the three independent 'clocks' by which evolution is measured—the ages of the stars, the ages of chemical elements and the time scale of expansion of the universe—all show that a major discontinuity took place some 10^{10} years ago. Staff of the Mount Stromlo and Siding Spring Observatories have been pioneers in both the concept and the use of the 'stellar clock' and this work continues in the form of age-dating of a large number of stars and the investigation of their kinematics in the galaxy. The Observatory has become a major contributor to the observational data needed to rate the 'expansion clock' of the universe through co-operation with Dr Sandage of the Hale Observatories. From red-shifts in the spectra of galaxies observed with the 200" reflector in California and our 74" reflector, the local anisotropy of the general expansion of the universe has been mapped. Observations of southern galaxies were crucial for finding the anisotropic shear field of the local Hubble flow before the zeropoint of the 'expansion clock' could be determined. The Observatory's contribution to this problem also involves extensive studies of radio galaxies and Quasars, and the almost unique access to the nearest galaxies—the Magellanic Clouds—has been fully exploited.

Research in the *Diffusion Research Unit* is concerned with the physical properties of liquids and is centred on one important property of liquids, namely self-diffusion. An integrated program has been set up in which one theoretical and two independent experiment methods of determining self-diffusion coefficients have been developed.

The most important liquid to study is water, yet for the last twenty years, and despite numerous appeals in the literature, no one has been able to produce an accurate set of measurements for the self-diffusion process in this liquid. However, this year, data of the required accuracy has been obtained in the Unit. Apart from the intrinsic value of this data in many fields of science two new research areas have been opened up. Thus, it has been possible to study the isotopic effect in self-diffusion which, although well-specified in gases and solids, has not been studied in liquids. Secondly, the NMR equipment can now be calibrated so as to obtain an accuracy in order of magnitude better than that of data previously reported by this method. Complementary work on high pressure diffusion in water has been started.

As in 1971, the main emphasis of the work in the *Electron and Ion Diffusion Unit* was on measurement of electron and ion transport coefficients rather than the analysis of these data to give collision cross-sections or interaction potentials. Progress has been made towards solving two outstanding problems; the correct interpretation of electron diffusion and drift experiments allowing for spatial dependence of the electron energy distribution function, and the dependence of measured ion mobilities on gas pressure. Both are studied, not only for their intrinsic interest, but also because they stand in the way of the satisfactory interpretation of transport data at the microscopic level. Two definitive experimental projects in connection with these problems were completed this year, namely the measurement of the lateral diffusion of electrons in argon using an apparatus of variable length, and the measurement of electron and ion drift velocities in a drift tube, an order of magnitude longer (50 cm) than those commonly used.

Experimental studies of electron drift and attachment in oxygen are of technological as well as scientific interest. The use of the long drift tube enabled the range of reliable measurement of electron mobilities to be extended considerably. This data, in conjunction with complementary data from the Cavalleri diffusion experiment, will greatly improve the understanding of low energy collision processes in oxygen. An extensive set of measurements of the mobilities of the negative ions formed by attachment has resolved most of the problems posed by conflicting data from other laboratories.

Experiments to examine positive ion clustering have centered on high pressure measurements without mass identification. These experiments have shown that the commonly used techniques employing mass identification may give misleading results because of changes in the relative abundance of the reactants in the transition region between the drift tube and mass analyser.

Theoretical work, carried out partially in collaboration with the Department of Theoretical Physics and with the Physics Department of the University of New England, has centered on the theory of the dispersal of travelling electron groups, the diffusion of electrons from a wide aperture source, and the interpretation of ion mobility data in terms of ion-neutral interaction potentials.

Substantial changes have been made in the program of the *Department of Engineering Physics*. Seismic research has been closed down and operation of the Tennant Creek Seismic Array has been transferred wholly to the Department of Geophysics and Geochemistry. Because of the success of the LT series of plasma experiments, it has been decided to couple the HPG System into the LT4 plasma machine to provide a much greater longitudinal magnetic field than has been used previously, thereby providing interesting new regions of operation from which it is hoped to gain further understanding of plasma behaviour. It is relevant to note that increased world-wide interest in toroidal plasma machines has been generated, partly by the results achieved by this laboratory's LT experiments in providing appropriate descriptions of plasma instabilities.

The laser group has achieved amplification from the two-inch disk high power laser system and is currently working to optimize the system to obtain extremely high peak optical powers. The earlier stages of the high power laser system are

already being used in experiments to assess the reflection and absorption of laser light in high temperature, high density plasmas, and an apparently successful method for solving the laser beam back-reflection problem has been produced. Experiments have commenced on multiphoton ionization and cascade processes, electron-ion separation in laser produced plasmas, and on the spectroscopy of highly stripped ions in laser produced plasmas. Complementary studies on laser produced breakdown in matter (using a medium powered laser) have resulted in new infra-red recording techniques which provide information on temperature as a function of time and position, enabling a testing of different theories on the breakdown and expansion mechanism of laser produced plasmas to be carried out. These studies have been facilitated by using novel picture processing techniques and special computer programs developed by the Information Science Group.

The high field magnet laboratory gained further recognition through being consulted by the Clarendon Laboratory, University of Oxford, and the Max-Planck-Institut für Festkörperforschung, Stuttgart, on the generation of high magnetic fields. It appears that the principles developed in the Department for the production of such fields have achieved general acceptance and have no other contenders. A film, 'Building the 300 Kilogauss Magnet at the Australian National University' was completed with assistance from the CSIRO Film Unit and has been shown at magnet conferences in Europe. The magnet laboratory provided high magnetic fields for experiments for the Department of Solid State Physics during the year.

Apart from work on LT4, the plasma group was able to evaluate the effect of trimming magnetic fields on the plasma geometry of LT3, and a start was made on the experimental investigation of magnetic surfaces in LT3. In this latter respect, preliminary results, the first of their kind for a tokamak, indicate general agreement between experimental observations and theoretical prediction.

Understanding of the contact behaviour of the macroparticle (rail gun) accelerator for accelerating gram sized particles to hypervelocities has progressed towards realisation of reliability and repeatability of performance, after some sixty pulses to the experiment. Velocities of over two km/s have been obtained using laminated copper projectiles weighing two grams in a one-metre-long gun; it is planned eventually to use a ten-metre gun.

Effective experimental time from the HPG System has been greater than in any earlier year; the System itself has seen a year of consolidation and an enhancement of facilities designed to assist experimenters in monitoring their experimental parameters—for this purpose, an on-line link with the Department's computer has been made to perform certain computations while experiments are in progress.

Work of the Information Science Group has continued to assist in the expansion of experimental capabilities, as well as in studying more fundamental problems in artificial intelligence. Some aspects of studies important to man-machine interaction were reported at an international conference in Holland. The Group's assistance has been sought and given to the Division of National Mapping,

Department of National Development, in feasibility investigations on computer assistance with census and other problems, by other Government departments, universities and other organisations. New developments have resulted in the University filing provisional patents on two devices for man-machine interaction.

Within the *Department of Geophysics and Geochemistry* research work continued on a wide range of problems related to the structure, composition, history and evolution of the earth and moon.

Studies on lunar samples are now concentrated on the highlands material returned by Apollo 15 and 16 missions. Detailed investigations of age and composition revealed that this material represents an ancient crust, older than 4,000 million years, composed mainly of feldspathic material. The moon was extensively melted and differentiated very early in its history. Lunar studies in the Department are providing a window on the early stages of planetary evolution, now erased by later geological processes on the earth.

Investigations of the temperature-dependence of electrical conductivity of lunar materials have provided strong evidence that the deep interior of the moon is much hotter than previously believed and is probably close to the melting point.

Work on geochronology and isotope geochemistry using rubidium-strontium, potassium-argon and lead-uranium methods has concentrated on two broad problems—the evolution of the ancient Precambrian Shield in the nickel-belt of southwest Australia, and the geological development of young island arc provinces, particularly in New Guinea, Indonesia and the southwest Pacific. These are both long-term projects, but already significant progress has been made. For example, the ages of mineralization of the large porphyry copper deposits in New Guinea and Bougainville have turned out to be extraordinarily young, indeed, it is probable that related deposits are being formed at the present time. These studies are being completed by a wide range of trace-element investigations.

Interesting results continue to be produced from the large-scale magnetic array studies. A large 'hot-spot' in the lower crust or upper mantle beneath western Victoria has been discovered. This is thought to be related to the geologically recent basaltic volcanism in that region. The uppermost mantle beneath the ocean just off the southern NSW coast has also been found to be abnormally hot. This may be a relic of a former sea-floor spreading episode connected with the formation of the Tasman Sea.

Archeomagnetic investigations have been carried out on fifteen Aboriginal fire-places some 25,000 to 35,000 years old as determined in the Department's radio-carbon laboratory. These measurements have provided much new information about variations in the intensity and orientation of the earth's magnetic field during this period.

This has a bearing on the nature of fluid motions in the earth's core—the source of the magnetic field and also upon the interaction between magnetic field intensity and the cosmic ray flux at the earth's surface. Other investigations in palaeomagnetism have concentrated upon the continental drift of Australia relative to other continents during the Precambrian.

Because of its locations with respect to earthquake source regions north of Australia, the Warramunga seismic array at Tennant Creek is in an ideal position to investigate the complex structure of the mantle at depths of 300 to 1,000 kilometres. Work carried out during the year produced the highest resolution 'map' of the seismic velocity distribution around depths of 600-700 km yet obtained anywhere in the world. This region contains a major seismic discontinuity which is generally believed to be caused by a high pressure phase transformation also discovered in the Department.

Using apparatus and techniques recently developed here, large samples of high pressure mineral phases were successfully fabricated and detailed studies of their elastic properties were carried out. These studies have a direct application to the understanding of seismic discontinuities in the earth's mantle. Elsewhere in the high pressure field, studies were directed towards the effect of water upon melting relationships of mantle materials and upon the fractionation of magmas in the mantle. These investigations have particular relevance to the origin of volcanism in island arc regions where water is carried deep into the mantle by sinking lithosphere plates. They are experimentally difficult, but nevertheless an understanding of the physical chemistry of magma generation in this environment is emerging.

The *Department of Mathematics* continued its research activities in pure mathematics, principally in algebra and analysis; again substantial use was made of the computing equipment of the University for a study of a narrow range of algebraic problems and a comparison of different computer methods to attack them. The flow of research students continued and former scholars of the Department obtained academic appointments in many parts of the world. The ancillary activities of members of the Department such as refereeing, reviewing, examining, advising and editing continued undiminished. Several members travelled overseas for conferences, consultation and study, and the Department again played its part in bringing distinguished mathematicians as visitors to Australia and visitors from other parts of Australia to Canberra.

In the *Department of Nuclear Physics* the year was dominated by machine building operations already mentioned. However, research in the heavy-ion field has expanded, being helped by substantial improvements in the transmission of heavy ions through the EN tandem, achieved by better beam optics. This improvement in beam intensity allowed the investigations of quasi-molecular states and inelastic scattering to proceed more effectively. Studies of neutron transfer reactions induced by ^{13}C ions have been undertaken with the aim of understanding the reaction mechanism and of finding whether they will be useful for determining spectroscopic factors. Work in the important heavy-ion field will be greatly facilitated when the 14UD accelerator comes into operation, as this machine will provide much higher energies and a vastly wider range of heavy ion beams.

A subject on which investigation has begun and which has considerable interest both in nuclear and atomic physics is that of the magnetic field at the nucleus in partially stripped heavy ions. This field, which can be of the order of 100 MG for an ion with a single 1s electron, interacts with the nuclear magnetic moment, causing precession of the nucleus. Significant rotation can occur even in times of the order of 1 picosecond. This study may help to throw light on the

mechanism of stripping and subsequent decay of the excited ion and it may well lead to a method of measuring magnetic moments of short-lived nuclear states.

Research programs in the longer established areas of Departmental interest, have continued successfully. In the reaction field investigations of two-step reactions and of (d,p) induced fission have been made. The latter is important because it may provide information on nuclear potentials which have two minima as a function of deformation. Some work on isobaric analogue states has continued and a variety of experiments directed towards the study of energy states in light and medium weight nuclei have been completed. Experiments with the polarised ion source have begun only recently, after a long period of commissioning troubles with it. Quite a number of manufacturer's faults had to be corrected and pumps replaced in order to obtain usable polarised ion beams through the accelerator.

Studies in beam-foil spectroscopy have increased in sophistication and have proceeded effectively. Investigations have been made of the Stark effect in hydrogen-like ions from beam-foil sources and on the effect of channelling on the optical excitation of the ions. Radiation damage in alkali halides has also been studied through the channelling effect.

The *Department of Solid State Physics* carries out research in a few selected areas of the discipline and, in particular, makes use of the high field magnet laboratory in the Department of Engineering Physics. Initially, the high magnetic field program involved studies of certain magnetic oxides, but equipment was added during the year to enable optical experiments to be done and successful Zeeman effect work on heat-treated zircons in fields of 200 kG was completed. The splittings found will be of assistance in understanding the optical spectrum of uranium in zircon.

A research program using the technique of magnetic circular dichroism has been started for investigating the defect centres and impurity ions in alkaline earth oxides, and work on $\text{MgO}:\text{Cr}^{3+}$ is nearing completion.

Studies have been made on certain features of impurity ions and colour centres in CaO and SrO. These include absorption and fluorescence lines associated with the F centres luminescence of CaO and the thermoluminescent properties of the centres.

Investigation of the near-infra-red spectrum of $\text{MgO}:\text{Fe}^{2+}(3d)^6$ has led to the observation of ${}^5\text{T}_2-{}^3\text{T}_1$ spin-forbidden transitions. Identification of spin-orbit split components of the above states made a detailed theoretical calculation possible and substantial lowering of the spin-orbit parameter (215 cm^{-1}) from its free ion value (400 cm^{-1}) was observed. This is consistent with the results of Mössbauer and far-infra-red spectroscopy on this material. Preliminary results of uniaxial stress experiments confirmed the above assignments as clear intensity variations were observed. The Mössbauer spectrometer has been used also for investigations of a variety of iron compounds at room temperature. Studies of ferrous ferric ratios in MgO as well as site occupancies in olivines and pyroxenes have been completed.

Measurements of the reflectance, absorption, and luminescence in the region of the low-temperature, free-exciton energy in GaAs, GaP and Pb₁₂ have been initiated. Results for all three compounds have been obtained at low temperatures and in the absence of external perturbations. Some data in DC magnetic fields up to eighty kilogauss has been obtained for GaAs and an analysis in terms of linear and quadratic Zeeman terms has been conducted.

Measurements of the Stark effect using alternating fields can provide information on the type of symmetry present at defect sites in crystals. In the first instance, this method can determine whether or not inversion is possible in the point group symmetry of the optical site. The electronic equipment required for applying fields up to forty kV/cm has been built and initial tests have been carried out along known axes of diamond crystals.

In the *Department of Theoretical Physics* there was a gradual increase of staff numbers and the Department now has a specialist in solid state theory.

Work continued on theoretical aspects of nuclear physics, statistical mechanics, field theory and high energy physics. In nuclear astrophysics an outstanding problem is the unexpectedly low emission of neutrinos from the sun. One of the possible explanations, the presence of a narrow 0⁺ level in Be⁶ just above the He³ + He³ threshold, has been shown to be untenable. However, a recalculation of the Be⁷ (p γ)Be⁸ cross-section at low energies suggests a partial explanation of the observations. Work on the eight vertex model in lattice statistical mechanics continues to excite interest and has attracted a senior Fulbright visitor, Professor F. Y. Wu, to join us in 1973.

In solid state physics the possible role of random impurities in trapping of excitons has been studied, while, in high energy physics, a phenomenological investigation of the S-region anomaly (\sim 1930 MeV) has been undertaken. This seeks to assess evidence for the formation of the S-meson in the elastic scattering and two-meson annihilation channels in $\bar{p}p$ and $\bar{p}n$ (through $\bar{p}d$) interactions.

Four staff members went overseas on study leave or to give invited lectures.

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THESES

Thesis titles of work successfully submitted by research students in the Research School of Physical Sciences on whom degrees were conferred in 1972:

*Doctor of
Philosophy*

- BARBER, J. P.
 'The acceleration of macroparticles and a hypervelocity electromagnetic accelerator.' *Department of Engineering Physics*.
- CAELLI, W. J.
 'Studies of high isospin states in light even-even nuclei and of low-lying collective states in medium weight odd-mass nuclei.' *Department of Nuclear Physics*.
- CARRIVEAU, G. W.
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- CHADWICK, J. J. M.
 'Bases of projections in Banach spaces with an appendix on non-standard analysis.' *Department of Mathematics*.
- ETHERIDGE, M. A.
 'Experimental investigations of the mechanisms of mica preferred orientation in foliated rocks.' *Department of Geophysics and Geochemistry*.

¶ Member of the Department of Applied Mathematics, Institute of Advanced Studies.

* Based on work done while a member of the Department.

‡ Not a member of this University.

- FISHER, R. A.
 'The statistical mechanics of argon.' *Diffusion Research Unit.*
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 'The analytic properties of the triangle and box diagram amplitudes.' *Department of Theoretical Physics.*
- GILL, J. B.
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- MAXWELL, P. C.
 'Machine perception and description of line drawings.' *Department of Engineering Physics.*
- O'BRIEN, G. C.
 'Almost periodic and quasi-periodic solutions of differential equations.' *Department of Mathematics.*
- REEVES-SAUNDERS, R.
 'The evolution of high current D.C. arcs on rotating anodes.' *Department of Engineering Physics.*
- ROBERTSON, J. W.
 'The evolution of massive stars.' *Department of Astronomy.*
- ROBERTSON, W. I.
 'Wave packet scattering and time delay.' *Department of Theoretical Physics.*
- ROBSON, R. E.
 'Transport phenomena in neutral and ionized gases.' *Department of Theoretical Physics.*
- SRINIVASACHARYA, K. G.
 'Spectroscopic investigations of a plasma.' *Department of Engineering Physics.*
- VAN MEGEN, W. J. J.
 'Study of nuclear reaction theories.' *Department of Theoretical Physics.*

VEIZER, J.

'Chemical and strontium isotopic evolution of sedimentary carbonate rocks in geologic history.' *Department of Geophysics and Geochemistry.*

WATSON, R. B.

'Radiative capture studies in the giant resonance region.' *Department of Nuclear Physics.*

WELLMAN, P.

'The age and palaeomagnetism of the Australian cenozoic volcanic rocks.' *Department of Geophysics and Geochemistry.*

*Master of
Science*

KAC, M.

'Weak decays of strange particles.' *Department of Theoretical Physics.*

STOKES, N. R.

'The variability of M-stars.' *Department of Astronomy.*

THE RESEARCH SCHOOL OF SOCIAL SCIENCES

REPORT OF THE DIRECTOR

Professor W. D. Borrie, OBE

Two aspects of the School's research in 1972 might be emphasised—the diversity of the work, spread over the nine departments and three units, in which projects in almost every social science discipline were to be found; and the increasing requests to individuals and research groups to examine matters of public interest in order to assist the formulation of policies in the fields of economics, administration and social organisation. Examples of both these aspects are apparent in the summaries of the work of the separate departments and units which follow in this report.

Diversity is apparent in the range of research from eighteenth and nineteenth century political and social thought in the History of Ideas Unit, to the study of the making of the Australian constitution in the Department of History, and the economic history of Australia since World War II in the Department of Economic History; and from the analysis of social mobility and stratification in the Department of Sociology, or from the research into the factors determining the processes of family formation and family size in contemporary Australia in the Department of Demography, to the analysis in the Department of Philosophy of the ethical and political aspects of the ecological controversy, or to the examination in the Department of Political Science of the problems arising from the processes of decolonisation in Papua New Guinea.

Much of this type of work is based upon individual research designed to examine particular issues in depth—an approach which is still regarded as fundamental to the maintenance of the scholarly standards of the School—but a tendency towards scholarly insularity which could follow from such an approach continued to be tempered by the continuous opportunities for cross-disciplinary discussion provided in the program of seminars which were pursued in 1972 throughout the School with even more vigour than in previous years. These seminars also served to integrate the contributions of an unusually talented stream of distinguished visitors with the work of the various components of the School.

Examples of the 'public interest' aspects of the School's research are seen in the following: the continuation of the National Population Enquiry under the control of the Director; three new projects begun at the request and with the support of Commonwealth Government departments in the fields of secondary and tertiary education (the study of foreign students in Australia, an analysis of special problems associated with the development of regional colleges of advanced education, and the attitudes of senior secondary students to the restructuring of higher secondary education in the ACT); the completion of a three-year project examining the processes of urban development in Melbourne carried out by the Urban Research Unit in association with a Committee of the Victorian Division of the Australian Institute of Urban Studies; the continuation of the direction by Dr C. A. Price, of the cultural and social aspects of a major project of the Academy of the Social Sciences in Australia which is examining the impact of post-war immigration on Australian life and society; and the initiation of a further major project of the Academy under the guidance of Professor N. G. Butlin, designed

as an interdisciplinary study involving scholars of several universities to examine the ecological and environmental processes associated with the development of the Botany Bay region; the studies of clear and atmospheric turbulence pursued into 1972 in the Department of Statistics; and the studies developed by the Department of Demography, with assistance from overseas funds, in the fields of family planning and population policies in 'developing' countries.

Many of these activities increasingly involved quantitative research techniques and the marshalling of small research groups to carry through work to meet specific targets. Such work involved greater use of temporary academic staff, particularly at the levels of research and postdoctoral fellows, and increased staff eg, research assistants. It was also associated on occasions with the generation of massive data through field surveys, increasing use of the computer and further expansion of trained computer programming staff. One major social survey was carried out by the Department of Demography and another similar survey was planned for 1973 by the Department of Sociology. These activities emphasise the increasing cost and complexity of social science research, and during the year attention was given to methods of funding such activities on a School basis. The installation of the University's new UNIVAC computer during the year also brought relief to a problem area that had reached crisis proportions in 1971, but before 1972 was over it was apparent that there would soon be an urgent need to supplement these new facilities to meet the School's computer requirements and it was clearly indicated that 'number crunching' of massive proportions is now an essential element of social science research.

Recognition of the School's work at the international level was apparent in a number of ways. Professor J. C. Caldwell, Department of Demography was appointed Social Science Adviser to the World Health Organisation. Dr. G. M. Neutze, Urban Research Unit, was appointed a member of a UN Advisory Group on the Nagoya Centre for training in regional development. Professor F. L. Jones, Department of Sociology, was invited to accept membership of the Research Committee on Social Stratification of the International Sociological Association and attended a meeting in Rome in December. Dr E. Kamenka, after accepting an invitation to deliver a paper to the American Society for Political and Legal Philosophy in New York, was invited to lecture in January and February in seventeen American and Canadian universities. In September Professor W. D. Borrie, OBE, delivered the Robb Lectures at the Auckland University, New Zealand, and was Chairman of the Preparatory Committee for the Second Asian Population Conference held by the Economic Commission for Asia and the Far East in Tokyo in November.

On the national front, Professor T. W. Swan, Department of Economics, delivered the Giblin Lecture at the Sydney Conference of the Australian and New Zealand Association for the Advancement of Science. In September, Professor J. A. Passmore delivered the second Oscar Mendelsohn Lecture at Monash University. Mr P. F. Harrison, Urban Research Unit, was awarded the Sidney Luker Memorial Medal for distinguished services to town and regional planning in Australia. During the year Professors L. Broom, A. L. Burns and J. C. Caldwell were elected Fellows of the Academy of Social Sciences in Australia.

The impetus of the staff recruitment drive launched in 1971 was sustained through 1972 and the School ended the triennium with funds for staffing at the

1970-72 triennium level fully committed. During the year twenty-four new academic appointments were made and accepted, against eight resignations. The Chair of Sociology was filled by the appointment in July of Dr F. L. Jones, previously a Senior Fellow in the Department. In December, Professor F. H. G. Gruen, took up the second chair in the Department of Economics and Professor O. MacDonagh of University College, Cork, was invited to accept the second chair in the Department of History. New posts advertised included a second chair in the Department of Law and professorial fellowships in the Urban Research Unit and the History of Ideas Unit.

With regard to students, the position through 1972 was—

Enrolled January 1972	—	60
Appointed during 1972	—	15
		—
		75
Students successfully completing PhD course during 1972	—	27
		—
Enrolled at December 1972	—	48

Thus an unusually heavy crop of graduands had temporarily depleted the student body, but in the December round of applications Faculty Board had recommended a further fifteen new scholarships, thus restoring expected enrolments by early 1973 to approximately sixty once more.

During the year, Faculty gave attention to important aspects of the School's academic organisation in the form of reaching agreement on a revision of the rules of Faculty and Faculty Board and in the recommendation to the Graduate Degrees Committee that a degree of Master of Philosophy should be introduced in addition to the present degree of Doctor of Philosophy. It is hoped that this proposal will be approved and integrated into the School system in the forthcoming triennium.

Long-term visitors from both Australian and overseas universities again played a significant role in the School's research activities. Fifteen visiting fellows supported from School funds and seven honorary fellows were present in the School for periods of three months or longer.

In October 1972 the School's third John Curtin Memorial Lecture was given. The speaker on this occasion was The Honourable D. A. Dunstan, QC, MP, and his topic was 'Curtin, Australia and Now'.

Success in recruitment and the supplementary staff required for research sponsored by outside funds again exerted pressure on room space. Some temporary relief was found by the acquisition of rooms in other buildings and further relief is being found on a joint School basis by the conversion into seventeen studies and a seminar room of the unfinished ground floor of the Research School of Social Sciences hexagon which was vacated when Archives moved to their new quarters in 1971. It was fairly clear by the end of 1972 that in the light of plans for the 1973-75 triennium, room space will continue to be critical until a substantial new addition to the H. C. Coombs Building can be provided, hopefully in the 1976-78 triennium.

In the Archives Section, six new business deposits and fourteen trade union deposits totalling approximately 320 linear feet of records were added to the collection in 1972. Steps were initiated to provide additional space by compacting the second half of the storage area in the 'new hemihexagon' of the H. C. Coombs Building. The collection continued to serve a wide range of users. During 1972, 133 persons made use of the Archives, a total of 902 visits to consult business and trade union records being recorded. Of these users, fifty-seven were from within the University and seventy-six from outside the University.

Mr M. Saclier took up the position of Archives Officer at the end of July following Mr R. C. Sharman's resignation.

The major event of the year for the Programming Section was the installation of a new computer, the U1108. This has involved the Section in conversion of both programs and data files being used on the 360/50 for use on the new machine. During the transition to the U1108, the Computer Centre lost some of its programming staff and the members of the Section acted for a period as part-time consultant programmers for the Computer Centre.

There has been a steady increase in the use of computers and the services of the Programming Section throughout the year. There has also been a pleasing increase in the number of people who are able to use the computer independently, only requiring to consult the Section on difficult problems.

One of the programmers left the Section in 1972 and joined the Department of Economic History. While this is a loss to the Section, the School has not lost his skills.

Under the Director's Section and with outside funds, work continued on the National Population Enquiry, which is due to report to Government by June 1974. The staff employed by the Enquiry consisted of one research fellow, one postdoctoral fellow, three research assistants and a secretary. In addition to the working papers prepared by the research staff, eighteen papers were commissioned covering statistical, social and economic aspects of the Enquiry.

Finally, on behalf of all those concerned with academic research in the School, I wish to pay tribute to the quality and devotion of the service of the academic and business administrative staff, the research assistants and programmers, the secretaries and typists, those who operate the printing pool, and those who run the stores and other services. Many of these officers have carried heavy work loads through 1972 from such factors as the recruitment of new staff, the organisation of major new research projects, the preparation of seminar papers, and the output of manuscripts of books and articles which continued at the high levels noted in 1970 and 1971.

Research Activities

The remainder of this report summarises the work in 1972 of each Department and Unit.

Again much of the work of the *Department of Demography* went into the Australian Family Formation Project; the material collected during a survey of 2,500 families in Melbourne has been partly analysed and several preliminary reports published or prepared for publication. Other studies on family formation and planning—in Indonesia, West Africa, and the Philippines—are continuing or nearing completion.

In migration, work was completed on Scandinavians and continued on refugees, southern Europeans, the volume of settler arrivals and departures, and on Australian and other immigration policies. Work was also begun on internal migration in Victoria and Indonesia, with special emphasis on movement from rural areas to metropolitan and other urban areas.

Other staff and student research was concerned with Australian life tables, mortality and marriage patterns, and with the implications of international population trends in developed and developing countries.

During the year members of staff also collaborated with the Departments of Statistics and Sociology in the School of General Studies in the preparation of semester courses for undergraduates in the fields of formal and historical demography. These courses will be serviced by the Department's staff in 1973.

Members of the *Department of Economic History* were responsible for a course on economists' history in the degree of Master of Economics program. Professor S. J. Butlin was engaged on his official economic history of World War II and on his study of nineteenth century banking. Prior to his transfer to the Department of Economics, Mr B. D. Haig continued his work on women in the workforce and on projections of the Australian economy. Dr N. G. Cain carried forward his study of Australian economic policy between the two world wars and Dr A. Barnard continued his study of Goldsbrough Mort and the dairying industry. Dr K. A. Tucker worked on retail services in the United Kingdom, Australia and New Zealand and Dr J. J. Pincus extended his prior study of American tariff formation. Professor N. G. Butlin was engaged with his survey of Australian graduate careers and with the trade cycle between the two world wars. He was also engaged with the planning of a multidisciplinary project of the three Academies to examine Australian environmental problems and policy possibilities.

Dr Barnard undertook considerable administrative responsibilities as Chairman of the Archives Committee and Chairman of the ANU Press Advisory Committee.

The *Department of Economics* continued work in the applied field with particular reference to the Australian economy. Again under Dr R. G. Gregory's guidance, the Department played a major role in the master's degree course in economics. A substantial task was the replacement of the staff so depleted by a series of tragic circumstances in 1970 and 1971. Four new appointments were offered, but at the end of the year it seemed that two would probably not be taken up. However, the Department hopes to return to full strength in 1973.

In the *Education Research Unit*, Dr D. S. Anderson continued his major study of professional socialisation based on a sample of about 3,000 students who embarked on courses in engineering and law in 1965 or medicine and teaching in 1967, in six Australian universities. These students have been followed as they proceeded through their faculties to see how they adapted to university education and came to acquire the characteristics of their profession. A similar study by Dr D. G. Beswick is examining the intrinsic motivation of students during the last years of secondary school and the first year of university or college experience. Dr G. S. Harman continued his major project on pressure groups and

education policy and administration, and his bibliography on the politics of education was completed. Dr C. Selby Smith's study of costs and benefits in Australian higher education continued, the major work in 1972 being of course costs in universities and teachers colleges, on the relationship between unit costs and enrolments, age earnings profiles in major courses and private costs.

The Unit's interdisciplinary approach was seen in the studies of the politics of education. A book of selected readings was completed for publication in 1973 and a series of seminars was run on 'Designing an Education Authority'.

Requests from the Commonwealth Government for major projects at both the secondary and tertiary level were a notable feature of 1972. The Australian Commission on Advanced Education funded a major study of regional colleges in relation to their environments which will continue in 1973 and 1974. At the request of the Department of Education and Science, the Unit examined a sample of the attitudes of secondary students to the proposal to establish fifth and sixth form colleges in the ACT. Late in 1971 the Australian Commission on Advanced Education also requested an urgent report on the cost implications of lengthening three-year diploma courses in engineering to four years which was completed by the end of January 1972. A study of overseas students in Australia is being conducted as part of an international study by the UN.

The *Department of History* continued its studies of Australian social, political and intellectual history, with similar aspects of British history in the nineteenth and twentieth centuries; and with relevant comparative studies, especially those arising from British 'imperial' developments. Emphases change from time to time according to the availability of materials for advanced research and the special interests of members of staff. As a Department in a 'national' university, the Department has also been deliberately concerned to encourage mature research in Australia by making available several posts on its establishment to historians from other universities for periods of up to two years, so that work already well advanced may be completed.

A notable event during 1972 was the publication by the ANU Press in October of the major bibliographical volume edited by Miss P. Mander-Jones, *Manuscripts in the British Isles Relating to Australia, New Zealand and the Pacific*. This project was begun in 1963 as a collaborative venture between the ANU, represented by the Department of History, Research School of Social Sciences, and the National Library of Australia, with Miss Mander-Jones as Director. The volume of some 700 pages will remain an indispensable aid to scholars for many years.

Making of the Australian Constitution, a book by Professor J. A. La Nauze, was published in February, and Mr L. F. Fitzhardinge's biography of W. M. Hughes was completed with the despatch of the second volume to the publisher towards the end of the year.

The advertisement of a second chair in the Department of History attracted a strong field, and resulted in an invitation to Oliver MacDonagh, Professor of History at the University College, Cork, formerly Professor of History at Flinders University and Fellow of St. Catharine's College, Cambridge, to accept the appointment. His arrival in 1973 will further strengthen the work of the Department in the fields of modern British history and 'imperial' history.

Under the leadership of Professor D. H. Pike, the School continued to provide the central organisation of the *Australian Dictionary of Biography*, which is steadily proceeding according to the original plan of producing some twelve volumes covering 1788–1939. Volume 4 (D–J) was published in August. Work on Volume 5 (K–P) progressed steadily and publication is expected in 1973. Volume 6 (Q–Z), expected in 1974, will complete the second chronological section, 1851–1890. The State and the Armed Services Working Parties are drafting the lists for Section 3 (1891–1939). Professor G. C. Bolton, Mr N. B. Nairn, Dr R. J. O'Neill and Professor J. Poynter have been appointed as Section Editors. Biographical Registers for the Queensland Parliament 1860–1929, and the Victorian Legislature 1851–1900 were published in September.

The *History of Ideas Unit* continued to serve as a focus for discussion and research into the development of ideas about man and society, with particular reference to the eighteenth, nineteenth and twentieth centuries. Work included modern social and political thought, both Marxism and liberalism; philosophies and macro-sociologies of law, Freudianism, Russian and Soviet philosophy and social thought; the history and significance of ideas about the Christian church and its early forms or organisation and radical religious and anti-religious views in the contemporary period. In these activities visitors from overseas and from other universities, as well as colleagues from other departments and disciplines within the University again played a significant role. All three visiting fellows—Professor S. Avineri, Professor G. L. Mosse and Professor J. P. Plamenatz—took part in the public lectures on nationalism and together with Professor G. Rudé and Mr R. Conquest, they presented a series of papers in an extremely successful weekend seminar in July on the theme 'History and Consciousness'.

Much of the Unit's research during the year has again been directed towards the production of books. These included the ANU Public Lecture Series of 1971 on the Paris Commune. The series on nationalism presented in 1972 is now in the press. Studies on Descartes and on Jesus and the Law in the Synoptic Tradition have also been sent off to the publishers.

The main work of the *Department of Law* continued to be in the fields of federal constitutional law, common and private law, international law, Papua New Guinea law and general legal theory. In June, Professor G. Sawyer went to England on study leave while Mr J. G. Starke, QC, returned in October from a five months' visit to various European centres of international law, including some three months at the Max-Planck Institute at Heidelberg and a month at the Conference Centre at Bellagio. Dr S. J. Stoljar completed a history of contract at common law and Dr P. G. Sack completed his book of New Guinea law for publication. Mr G. E. Parker pursued his work in criminology and Australian legal history. The Department was enriched by the presence of various visiting fellows—Mr T. R. Bredmeyer on leave from the Papua New Guinea Administration, Professor C. Howard of the University of Melbourne and Dr Alice E.-S. Tray from the Faculty of Law.

The work of the *Department of Philosophy* was unusually unorthodox in 1972 by the conventional standards of a department of philosophy. Essays were written—sometimes for circulation rather than publication—on such topics as afforestation, stagflation, the patronage of the arts; and a book was brought near to completion on the ethical, political and metaphysical aspects of the ecological

controversy. At the more conventional level, work was completed on a large book on meaning, and another on problems arising out of the teaching of logic in secondary schools. Other aspects of education were also investigated—articles were published, or prepared for publication, on the nature of an educated community, on carefulness and devotion in education and on the contemporary revolt against science.

The Department is greatly interested in the philosophy of the social sciences. A book in the form of a series of essays on rationality in the social sciences was almost completed; another has been accepted for publication on laws and rules in sociology; a third is under way on rationality and psychosis, especially schizophrenia. For the rest, work continued in the traditional fields of moral and political philosophy and on the history of philosophy, especially in the germinal seventeenth century.

In the *Department of Political Science* two new projects were begun—on the political and administrative problems of decolonisation in Papua New Guinea, and the editing of the Minutes of the Federal Parliamentary Labor Party, 1901 to 1946, which the Department was authorised to publish in full by resolution of the Parliamentary Party in 1971. Work completed included two contributions to a book on the political problems of planning in Sydney, a statistical handbook on *Australian General Elections*, a complete revision of the Department's handbook of *Australian Trade Unions and Employees' Associations*, and a study of 'scientific and strategic-political theories of international politics'. Other publications, in the form of journal articles, ranged from an analysis of voting at the Australian federal convention, through studies of the electoral system, to historical accounts of the origins and more recent development of the USSR government elite and a survey of Papua New Guinea politics on the eve of self-government.

An historical dimension was relatively prominent in 1972. There were projects in co-operation with colleagues in other universities on the origins of the Australian party system (1890–1910), on the formation of the NSW Labor Party (1890–1920), and on political and economic change in Papua New Guinea (1966–1970). Theses completed included an analysis of the origins of the non-Labor Parties in NSW and Tasmania (1894–1912), and the development of air power in Australian defence (1923–1954).

At the same time, quantitative analysis and survey interview material remained important in ongoing research on the political significance of Australian trade unionism, and on political and voting behaviour in both Australian elections and in the Papua New Guinea House of Assembly (1964–1971). Structural and institutional analysis was focused mainly on the politics of the European community, and on the distribution of power in the Soviet bureaucracy and political system. A special study was also made of the implications of the May-June Moscow agreements between the USA and the USSR.

In the *Department of Sociology* research was concentrated in two general areas—social differentiation, stratification and mobility; and organisations and systems analysis. The emphasis in the former area was on occupational and educational change in contemporary Australia; and in the latter on the role of workers in decision-making and communication processes in major organisations.

Two new staff arrived in mid-year to collaborate on a new study of occupational change. With these appointments, the Department approached its formal establishment of seven academic staff. In July, Professor Jones (then Senior Fellow) was appointed Head of the Department. A vacant research officer post was re-advertised in the second half of the year, and the post left vacant as a result of Professor Jones' appointment to the Chair will be advertised early in 1973.

The Department had six graduate students, four of whom were working in fields associated with occupational, social and cultural change, and two on Aboriginal studies.

In the *Department of Statistics* research continued on statistical and probability theory, and their applications. Dr R. C. Boston left the Department for another position and pending his replacement, work on clear air atmospheric turbulence has lapsed for the moment. Mr B. V. Hamon of the CSIRO spent three months in the Department working on the spectral theory of ocean waves with Professor E. J. Hannan, FAA. Much attention was devoted during the year to estimation problems in stationary processes, the theory of point processes, geometrical probability and its applications, problems of selection, statistical inference, and the estimation of genetical characters such as intelligence in groups and individuals. Seminars were run throughout the year and four members of staff gave honours courses in the School of General Studies. Consulting was done for other departments of the University.

During 1972 the *Urban Research Unit* brought close to completion its first major research projects on the process of urban development. Although a number of detailed monographs are still in preparation and a book will be written later, the body of the work is now completed. It has added to understanding of government and private roles in urban development and of the high degree of inertia in the form and structure of cities.

Building on this research, the future work of the Unit will focus on the changing functions of central business districts, the urban land market, the use of the housing stock, and a comparative study of metropolitan planning in mainland Australia. Theses are being written in areas close to the Unit's own program including local government politics, a history of planning ideas and the provision of local services within a metropolitan area.

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- SCHOEFL, GUTTA I.¶¶ & MILES, R. E.
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- JONES, M. A.*
Housing and Poverty in Australia. Melbourne UP, xiii + 239.
- NEUTZE, G. M.
 'The government and administration of metropolitan development.' *Economic Papers*, **36**, 38-49. Also in *The Australian Economy: A Second Volume of Readings* (eds H. W. Arndt & A. H. Boxer), 513-26, Cheshire, F. W.
 'Economics of the environment.' In *Australia as Human Setting* (ed. A. Rappoport), 239-50, Angus.
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The Politics of Urban Growth. ANU Press, ix + 160.

¶ Member of the Department of Statistics, School of General Studies.

¶¶ Member of the Department of Experimental Pathology

* Based on work done while a member of the Unit.

¶¶¶ Member of the Department of Political Science, Institute of Advanced Studies.

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Environmental Quality in Four Melbourne Suburbs. Urban Research Unit, xii + 167.

VANDERMARK, E. H.

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THESES

Thesis titles of work successfully submitted by research students in the Research School of Social Sciences on whom degrees were conferred in 1972:

AMBANNAVAR, J. P.

'Employment pattern in India since 1911.' *Department of Demography.*

*Doctor of
Philosophy*

DENHOLM, D. D.

'Some aspects of squatting in New South Wales and Queensland 1847-1864.' *Department of History.*

HARVEY, V. A.

'The theory and practice of electricity pricing policy—alternatives for the State Electricity Commission of Victoria.' *Department of Economics.*

JAIN, S. K.

'Cohort nuptiality in New Zealand.' *Department of Demography.*

KEEVES, J. P.

'The home, the school and educational achievement: A study of change in performance in mathematics and science during the first year at secondary school.' *Department of Sociology.*

KOIVUKANGAS, E. O.

'Scandinavian immigration and settlement in Australia before World War II.' *Department of Demography.*

MCCARTHY, J. M.

'Air power and Australian defence: A study in imperial relations 1923-1954.' *Department of Political Science.*

MCLEAN, I. W.

'Rural output, inputs and mechanisation in Victoria 1870-1910.' *Department of Economic History.*

PAGAN, A. R.

'A study of estimation procedures for time series models in economics.' *Department of Economics.*

PRESTON, A. J.

'Controllability and optimality in economic stabilisation theory.' *Department of Economics.*

QUINE, M. P.

'Multitype Galton-Watson processes.' *Department of Statistics.*

RAO, G. L.

'Internal migration and political change in India: A case study of a new industrial town.' *Department of Political Science.*

SHULTZ, R. J.

'The assisted immigrants, 1837-1850.' *Department of History.*

SNOOKS, G. D.

'Hume enterprises in Australia, 1910-1940: A study of micro-economic growth.' *Department of Economic History.*

STANLEY, O. G. P.

'Ownership and control and the financing and investment policies of the firm.'
Department of Economics.

THOMSON, P. J.

'Phase measurements and narrow spectral band inference.'
Department of Statistics.

WATT, A. J.

'Objectivity and moral judgments.'
Department of Philosophy.

WELLER, P. M.

'Non-labor parties, 1894-1912: The development of their parliamentary and electoral organization in New South Wales and Tasmania.'
Department of Political Science.

WHEWELL, D. A.

'Transcendental arguments and the concept of self-refutation.'
Department of Philosophy.

YAMAGUCHI, J. T.

'Postwar demographic transition and labour development in Japan.'
Department of Demography.

*Master of
Arts*

EADE, SUSAN M.

'A study of Catherine Helen Spence, 1825-1910.'
Department of History.

HOOPER, BEVERLEY J.

'Australian reactions to German persecution of the Jews and refugee immigration, 1933-1947.'
Department of History.

THE RESEARCH SCHOOL OF PACIFIC STUDIES

REPORT OF THE ACTING DIRECTOR

Professor Wang Gungwu

Professor O. H. K. Spate retired from the Directorship at the end of October. He stayed to see many projects begun during his tenure come to fruition and left satisfied that others which he had helped to initiate will be continued with vigour. He is not lost to the School and will return from his leave, not to his old Department of Human Geography, but will continue his research writings in the Department of Pacific History. The School's new Director, Professor D. A. Low, formerly Professor of History and Dean of the School of African and Asian Studies at the University of Sussex, was appointed in the middle of the year and is expected to arrive early in February 1973. Professor Wang Gungwu was appointed Acting Director for the intervening three months and Professor H. N. Bull was Acting Director during Professor Wang's brief absence in Indonesia.

The School welcomed its new Professor of Anthropology, Dr J. D. Freeman, formerly Professorial Fellow in the Department, who was on hand to take over his new responsibilities immediately after appointment. He succeeded Professor A. L. Epstein who left to take the Chair of Social Anthropology at the University of Sussex. At the same time, the School also lost Dr T. Scarlett Epstein of the Department of Economics, who resigned to accompany her husband to Sussex and was appointed to a chair in the Institute of Development Studies. The School, fortunately, did not lose Dr Marion W. Ward when she resigned as Field Director of the New Guinea Research Unit to follow her husband, Professor R. G. Ward, to Canberra, and it is hoped that she will continue to be closely associated with the School's work. Her successor, Dr R. J. May, took over as Field Director from March. Two fellows of the School left for senior appointments elsewhere—Dr A. J. Strathern of the Department of Anthropology and Sociology was appointed to the Chair of Anthropology at the University of Papua and New Guinea, and Dr S. A. FitzGerald of the Department of Far Eastern History took three years' leave to serve as the first Australian Ambassador to the People's Republic of China. At the beginning of the year, the School was saddened by the death of Mr R. Ho, Senior Fellow in the Department of Human Geography.

During the year, Professor Spate steered the School through the difficult but necessary adjustments in response to the Australian Universities Commission's report on the new triennium of 1973-75. Among the most significant developments agreed to in the report were the new Department of Politics and Sociology which the School hopes will come into being during 1973, and the support given to the young Departments of Linguistics and Prehistory. With the inclusion of Sociology in the new department, the Department of Anthropology and Sociology will drop Sociology from its name. There were eighty students enrolled for the degree of Doctor of Philosophy at the beginning of the year and sixty-seven at the end of the year; twenty-five degrees of Doctor of Philosophy were awarded or recommended in 1972.

There were many notable publications by members of the School during the year. A collaborative work in which were many specially written contributions

by members of the School (especially in the Departments of Economics, Pacific History, Anthropology and Sociology, Linguistics and the New Guinea Research Unit) was the *Encyclopaedia of Papua and New Guinea*. The new series of *Contemporary China Papers* produced by members of the Contemporary China Centre has attracted wide attention.

It was not a year of conference and seminar activities for the School, although internal and quasi-internal seminars were organised by most departments. The New Guinea Research Unit as usual helped to organise the 6th Waigani Seminar and contributions came from several departments in the School. Also, several departments were active at the 44th ANZAAS Congress, especially the Departments of Anthropology and Sociology and Human Geography. Emeritus Professor W. E. H. Stanner, CMG was President of Section 25 (Anthropology) and Professor J. D. Freeman organised a symposium on 'Ethology and the Study of Human Behaviour'. Professor Ward was President of Section 21 (Geographical Sciences). Two seminars organised by the Strategic and Defence Studies Centre were also noteworthy—the first was on 'The Options for Australia's Defence Policy in the 1970s' and the other was on 'The Changing Pattern of Great Power Interaction'.

As in 1971, members of the School were in great demand as outside lecturers, whether to other parts of the University, other universities at home and abroad, or various societies and agencies. Amongst these may be mentioned Emeritus Professor Stanner's Charles Mackay Lecture; Professor Spate's lecture, 'Anomalies of Authorship', in the Symposium on Neglected Masterpieces of the Australian Academy of the Humanities; Dr E. Kamenka's Morrison Oration, 'Marx, Marxism and China'; and Professor Wang's Keynote Lecture to the Symposium on Higher Education in Singapore and his lecture on 'Nationalism in Asia' in the ANU Lecture Series on Nationalism.

Members of the School continue to provide advisory services to national and international academic agencies. Notable additions to the services provided in 1971 were as follows: Professor H. W. Arndt in the Department of Economics served as Deputy Director of the Country Studies Division of the Organisation for Economic Co-operation and Development in Paris and Mr D. M. B. Butt also in the Department of Economics was appointed to the Taxation Review Committee of the Commonwealth Government. Professor Bull of the Department of International Relations was Research Chairman of the Australian Institute of International Affairs. Professor J. W. Davidson of the Department of Pacific History was appointed Permanent Consultant to the Constitutional Planning Committee for Papua New Guinea. Dr FitzGerald in the Department of Far Eastern History was adviser on China to the Leader of the Opposition before the December elections and was then appointed Ambassador to China. Professor J. Golson in the Department of Prehistory was a member of the Australian National Advisory Committee for UNESCO's Working Party on the Conservation of the Indigenous Cultural Heritage of the South Pacific. Dr R. M. Sundrum served on the Committee for Asian Manpower Studies, Professor Wang on the Council of the Australian Academy of the Humanities, and Dr F. J. West was appointed British Academy Fellow at Christ Church, Oxford University. Mention should also be made of the Cilento Medal for outstanding achievement in Aboriginal welfare presented to Emeritus Professor Stanner.

The school was again honoured by many distinguished visitors, a list of whom may be found under the sections 'Visiting Research Workers' or 'Visitors'.

Professor Spate would wish me to record his thanks to the Graduate Assistant, Mr G. L. Hutchens, the Business Manager, Mr P. J. Grimshaw and their staff and to the staff both academic and non-academic, of all departments in the School. On behalf of the academic staff, I wish to add my thanks to Mr Hutchens, Mr Grimshaw, their assistants, and to all other non-academic staff, in each department. For myself, I wish also to thank the Director's secretary, Mrs M. E. Carron, for making it possible for me to act as Director at all.

I think my colleagues who have shared the whole, or part, of the years with Professor Spate as the School's Director would wish me to place on record an appreciation of his work for the School and for all of us. Indeed he has left his manifold administrative duties for higher things, and we welcome him back as a colleague—but not before saying that his scholarly and intellectual leadership will not be forgotten. My colleagues and I, noting that we have not lost Professor Spate, have been awaiting with keen anticipation the arrival of our new Director, Professor Low.

The concerns of the *Department of Anthropology and Sociology* remain the study of human behaviour, culture and society in the Pacific with particular reference to Aboriginal Australia, Papua New Guinea and Melanesia, the Malayo-Polynesian region and certain parts of South-East Asia. During the year Emeritus Professor Stanner, who is an Honorary Fellow in the Department, has made notable contributions to Aboriginal Affairs. There have been two major publications on parts of Papua New Guinea and Melanesia—Dr Strathern's *One Father, One Blood: Descent and Group Structure among the Melpa People*, and Dr E. Ogan's *Business and Cargo: Socio-Economic Change among the Masi oi of Bougainville*. Dr Diane Barwick completed a book on Aboriginal reactions to nineteenth century Victorian government policy. Five students of the Department were awarded the degree of Doctor of Philosophy in anthropology. Three of these dissertations referred to parts of Papua New Guinea, one to the northern Lau islands of Fiji and one to a village in India. In Papua New Guinea, research is in progress on political change in the Western Highlands, the dual organisation of the Arapesh, chieftainship and political organisation of the Mekeo, the economic anthropology of Rossel Island and the Chinese community of New Britain. Elsewhere research is being undertaken on the economics of seine fishing in southern Ceylon, the *adat* law of the Iban of Sarawak, the human population ecology of Western Samoa and on the relation between religion and ecology among the Walbiri of central Australia.

*Research
Activities*

Additions to equipment and assistant staff have substantially improved the capacity of the *Department of Biogeography and Geomorphology*, to employ the talents of its academics to their full potential. There has been a noticeable quickening in the tempo of research, the degree of co-operation with other departments and non-University bodies and an encouraging increase in the frequency with which members of the Department are able to contribute to the solution of problems of conservation and environmental management.

The processes affecting the development and breakdown of landforms and their vegetation cover at the present day are being investigated on the east coast of Australia, in the mountains of New South Wales and in the Kimberleys of Western Australia. The invasion of Australia and parts of the Papua New Guinea mountains by alien plants is now being documented and the process of integration with the indigenous biota and its environment investigated. Ecological work on Mt Wilhelm, Papua New Guinea, which has contributed much to the understanding of the natural history of equatorial high mountains is being phased out.

In the field of Quaternary research, the combined indications of vegetation histories, glaciation histories and the stratigraphy of lakes and associated landforms are beginning to build a framework of climatic change over the past thirty-thousand years, from Papua New Guinea to southern Australia. Already, the onset of aridity sixteen-thousand years ago has been shown to extend across the south of the continent and other wide-reaching hypotheses based on data accumulated during the past few years are now ripe for testing.

The same sources and techniques provide valuable insights into the nature of man's environment during his occupation of Papua New Guinea and the Australian continent. This is nowhere better demonstrated than at the discovery site of Australia's oldest human skeleton (Mungo, NSW) and in the Wahgi Valley of Papua New Guinea where the extensive horticultural occupation, until less than five hundred years ago, of what are now enormous swamps, demands an understanding of environmental change for the explanation of human behaviour. A major investigation of relative changes in land and sea levels during the recent Quaternary past has been launched, the results of which will have world-wide implications.

The main regional emphasis of research in the *Department of Economics* continued to be on Indonesia and Papua New Guinea, with increasing attention also to China and the Pacific Islands and continuing work on South-East Asian countries. Among the more important publications were the *Encyclopaedia of Papua and New Guinea*, the economic section of which was edited and in considerable part written in the Department; two books by former scholars, based on their theses for the degree of Doctor of Philosophy; three issues of the *Bulletin of Indonesian Economic Studies*, largely written by members of the Department; a volume of essays on Australia and Asia by Professor Arndt; and a series of studies of planning techniques by Dr Sundrum. The course for the degree of Master of Agricultural Development Economics was successfully initiated with nineteen students from seven Asian countries. Mr Butt was appointed a member of the Taxation Review Committee set up by the Commonwealth Government.

The *Department of Far Eastern History* concerns itself with the history of China and Japan. During the past year its research has continued to concentrate on the science and civilization of pre-modern China, including China's contacts with its neighbours and with the West; aspects of biography and historiography in China; the politics and society of modern China and the Chinese overseas; and the political history of modern Japan. The range of work may appear relatively limited but we feel that a small department like ours should not try to cover all

aspects of the long and distinctive histories of two major civilizations. For the past four years the Department has concentrated on extending its work on modern China. This is because Australian universities have been particularly weak in modern Chinese history. The Department hopes to extend this work a little further and at the same time expand its interest in modern Japanese history and strengthen our links with other Australian universities with similar interests.

The year saw a number of long-standing projects coming to fruition. Particularly noteworthy was the extensive work on the Ch'u Silk Manuscript and the metallurgical remains of ancient China, the Index to the *Secret History of the Mongols*, the essays on Meiji politics in Tokushima prefecture, the study of Sino-Soviet diplomacy during the years 1917-1924 and the Department's collaborative volume of essays, *Sources on Chinese History*. Also near completion are two volumes of G. E. Morrison's correspondence, a reference work on Chinese cabinets in 1912-1949, and contributions to the chemistry volumes of Joseph Needham and Wang Ling's *Science and Civilisation in China*.

The Department is proud to have one of its fellows, Dr FitzGerald designated the first Australian Ambassador to the People's Republic of China. He will be hard to replace even though he is only expected to be away for three years. The Department postponed recruiting a professorial fellow in modern Japanese history and a research fellow in modern Chinese history to bring out respectively Mr J. Banno of Chiba University and Mr P. Clarke of Monash University. The Department was also part-host to the University's Asian Fellow, Professor Ho Peng-yoke from the University of Malaya.

Three candidates submitted successful theses for the degree of Doctor of Philosophy and another seven students are making good progress in their research with all but one working on modern Chinese history.

The Department produced the two issues of its biannual journal, *Papers on Far Eastern History*, and is in the final stages of publishing four more volumes in its Monograph Series.

Work in the *Department of Human Geography* has been concentrated in two main fields of interest. The first concerns location problems in Australia and the second concerns the spatial aspects of modernisation in the Pacific and South-East Asia. In Australia, staff and research scholars were engaged in studies in the location of manufacturing, mineral processing, and the effects of a recession on the agricultural machinery distribution system. A further project involved land requirements and other aspects of the demand for second homes along the south coast of New South Wales. In Papua New Guinea, members of the Department were engaged in studies of changing systems of agriculture, the introduction and spread of new agricultural enterprises, and internal migration and urbanisation. A study of transport costs in the Fiji/Tonga area is in its later stages.

Early in the year the Department suffered a severe loss with the sudden death of Mr R. Ho, a Senior Fellow, who formerly had been Professor of Geography in the University of Malaya. The vacancy created by his death is to be filled by the appointment of Professor T. G. McGee of the University of Hong Kong.

Late in 1972, Mr H. C. Weinand took up a research fellowship. Dr G. J. R. Linge, Professorial Fellow, was engaged in preparation of Volume I of a trilogy on the 'Industrial Geography of Australia'. Dr P. J. Rimmer, Senior Fellow, was on study leave in Europe throughout the year and was able to visit leading centres for geographical research in the UK, Netherlands, and Sweden. Dr W. C. Clarke, Senior Research Fellow, continued his work in Papua New Guinea and prepared for future field work in Indonesia. Dr Diana R. Howlett, Research Fellow, completely revised a book on Papua New Guinea which will appear shortly under the title of *Papua New Guinea: Geography and Change*. She has begun a study on urbanisation and national development in Papua New Guinea and South-East Asia. A total of five candidates for the degree of Doctor of Philosophy were in residence for part or all of the year, and three degrees were awarded during the year, for theses submitted in late 1971.

The cartographic office of the Department continued to provide a service not only to the Department of Human Geography but also to members of the Research School of Pacific Studies, the Research School of Social Sciences and the ANU Press.

The work in the *Department of International Relations* continued to focus upon three principal areas—the international political system as a whole, the international politics of the Asian and Pacific region, and Australia's foreign and defence policies.

Major research in progress during 1972 included Professor J. D. B. Miller's *Survey of Commonwealth Affairs 1953–1969*, which was completed during the year; Professor Bull's study of the conditions of world order; Dr R. J. O'Neill's work on the Australian official history of the Korean War; Mr J. T. G. Jukes' study of *The Soviet Union in Asia*, finished during the year; Mr D. C. S. Sissons' study of the history of Australian-Japanese relations; Mr J. L. S. Girling's writing of *Insurgency and Intervention*, finished during the year; Mr W. A. C. Adie's work on two books on China's foreign policy; Mr G. Warner's work on a diplomatic history of the Vietnam War; and Dr C. Holbraad's study of the role of middle powers. Sir Alan Watt published his memoirs during the year.

Eight students in the Department gained their degree of Doctor of Philosophy during the year and in all but one case, went on to take up appointments in Australian or overseas universities. Two members of the Department were on leave for part of the year assisting Parliamentary Committees in foreign affairs—Mr Sissons in relation to Japan and Mrs Nancy Viviani in relation to foreign aid. Dr T. B. Millar continued as Director of the Australian Institute of International Affairs. Members of the Department carried a heavy burden of lecturing to outside bodies in Australia and overseas.

The Department had three visitors during the year who were also connected with the Contemporary China Centre. Professor Bull succeeded Professor Miller as Head of the Department in October.

The year proved to be very successful in the *Department of Linguistics* with the achievement of new important results in one of the long-term projects carried out by the Department with regard to the language situation, language classification and the question of linguistic prehistory in the New Guinea area. Work

carried out by Dr C. L. Voorhoeve, Dr T. E. Dutton, Dr D. C. Laycock and Professor S. A. Wurm, demonstrated that all the Papuan languages of the area can be grouped into five major and five minor unrelated groups of languages which within each of these groups are comparatively closely interrelated. In addition, around twenty or so isolated Papuan languages are left which, partly because of lack of pertinent information, cannot at this stage be included into one of these groups as yet, or related to each other though it seems quite unlikely that all of them are in fact isolated languages. A comparatively small part of the New Guinea mainland, located in northern West Irian, is still linguistically unknown, but because of the very low density of population in that area, it seems unlikely that more than twenty to fifty hitherto unknown languages exist in that area. The total number of Papuan languages in the New Guinea area is estimated to be around seven hundred of which at this stage of our knowledge 670 languages have been identified. The ten groups referred to above are very uneven in size, the largest group which covers more than three quarters of the New Guinea mainland, containing 422 languages and the other four major groups ninety-one, forty-seven, thirty-five and thirty-two languages, with the five minor groups accounting for a total of twenty-six languages. Adding the isolates to this, the figure of around 670 is reached.

Another major project concerned with the languages of the south-western Pacific in which Dr D. T. Tryon's work had produced results of very great importance during 1971 in demonstrating that the languages of the New Hebrides were members of a single large language family and quite similar to each other, had unfortunately come to an abrupt halt early in 1972 because of the resignation of Dr Tryon who had been offered a senior lectureship in the James Cook University of North Queensland. Steps to fill the vacant position have been taken and an appointment is expected to be made in 1973.

The Department's work in Australian linguistics and linguistics of South-East Asia has been continuing with further good results.

The research teams in the Department of Linguistics are becoming increasingly engaged in international co-operation in major international linguistic research projects involving the preparation of large-scale publications in Pacific linguistics. A very important publication of this kind is a large volume on languages of the New Guinea area which is to be published as volume one of a new international series entitled 'Current Trends in Language Sciences'. All members of the Department of Linguistics will co-operate in producing this volume in collaboration with a number of overseas scholars, but the major responsibility for its production will be taken by members of this Department and by a few other Australian scholars.

The publication activity of the Department has continued strongly and seven monographs, occasional papers and books have been published.

The *New Guinea Research Unit* continued its research activities in the fields of rural and urban resettlement, economic development and political change. Towards the end of the year a joint committee of Unit and University of Papua and New Guinea researchers was established to organise a major study of rural-urban migration in Papua New Guinea. The Unit's research program in 1972

was assisted by grants from the Rural Credits Development Fund of the Reserve Bank.

During the year members of the Unit participated in several study groups set up by the new Papua New Guinea government to consider certain aspects of economic and financial policy and a member of the Unit was appointed as a permanent consultant to the Constitutional Planning Committee created by the government.

A member of the Unit acted as co-ordinator of a joint ANU and University of Papua and New Guinea study of the 1972 national general election in Papua New Guinea, to be published in 1973.

The 6th Waigani Seminar, jointly sponsored by the Unit, the University of Papua and New Guinea, the Administrative College, the Council on New Guinea Affairs and the Papua New Guinea Society, was held in April-May, on the topic 'Priorities in Melanesian Development'. The collected papers from this seminar will be published in 1973.

Five issues of the *New Guinea Research Bulletin* and seven issues of *Luksave*—three in simple English and four in Pidgin, were published during the year.

The *Department of Pacific History* maintained the broad program of research in the history and politics of the Pacific Islands and South-East Asia upon which its members have been engaged for some years. Professor Spate took up his appointment as Professor in Pacific History in November, after relinquishing the Directorship of the Research School of Pacific Studies. Mr H. E. Maude, OBE, began his term as an Honorary Fellow in March. One Research Fellow, Dr L. Castles, joined the Department, and three visiting fellows were attached to it during the year. The number of research students increased to nine and two former students received the degree of Doctor of Philosophy. Another submitted a thesis which was under examination at the end of the year.

Members of the Department participated in teaching and training courses at institutions outside the University. Dr A. J. S. Reid lectured at two Indonesian universities and also read a paper to a seminar on Australia and the Indonesian Revolution conducted by the Monash University South-East Asian Centre. Dr J. M. R. Owens addressed the History Section of the 44th ANZAAS Congress in Sydney. Professor Davidson accepted appointment as a Permanent Consultant to the Constitutional Planning Committee to Papua New Guinea. He and Dr P. R. Corris attended the 6th Waigani Seminar at Port Moresby.

The fourth volume in the Pacific History Series, *A Residence of Eleven Years in New Holland and the Caroline Islands* by James F. O'Connell, edited by Dr S. H. Riesenberg, a 1971 Visiting Fellow in the Department, appeared during the year, as did Volume VII of *The Journal of Pacific History*. Dr Reid acted as guest editor of the April issue of *Indonesia*. Professor Davidson and Dr D. A. Scarr prepared a paperback edition of *Pacific Islands Portraits* and began planning a companion volume to this work.

The Pacific Manuscripts Bureau, which is supported jointly by the University and a group of research libraries, continued to collect and microfilm records relating to the history of the Pacific area. During the year some five thousand

feet of microfilm of unpublished material relating to Fiji were acquired by the Bureau's Executive Officer, Mr Langdon.

For the *Department of Prehistory* the year has been marked by a heavy program of field research, both continuing projects begun in previous years and initiating important new projects. Volume II of the departmental monograph series *Terra Australis* has been published. Entitled '*Ol Tumbuna, Archaeological Excavations in the Eastern Central Highlands, Papua New Guinea*', by Dr J. P. White, it is the revised version of the doctoral thesis produced by Dr White as a graduate student in this Department. Members of the Department have participated in several international conferences—Mr H. A. Polach in New Zealand, and Dr R. M. Jones in the Philippines. In addition, a number of members in the Department have given lectures outside this University.

In Papua New Guinea, Professor J. Golson has begun a large-scale excavation in the Upper Wahgi Valley swamps, where extensive remains of intensive agricultural activities involving complex water control ditches had been previously noted. This work is a large-scale expansion of work previously carried out by members of this Department in the same general area, and at various stages during the year Professor Golson has been assisted by five other members of this Department. Investigation of rock shelter living sites nearby, initiated by Mr O. A. Christensen, is expected to add a further dimension to this study. On the southern Papuan coast, the Department's previous interest in this area has been expanded eastwards to Amazon Bay where a community of pottery manufacturers is still living in a traditional manner, offering unique possibilities for ethnographic research as well as extending our historical perspective of the region by means of archaeology.

A second large-scale project involving two members of the Department has also begun in the southern New Hebrides where Mr L. M. Groube and Dr N. R. McArthur have produced important new data for archaeological and demographic studies in the region. Mr Groube has also extended his work to the northern New Hebrides where a preliminary survey has been carried out.

In Australia, the work previously reported on human fossil material from Kow Swamp has continued and Mr A. G. Thorne has visited Indonesia to examine comparative human fossil remains from that area. The Kow Swamp material continues to be of vital importance in understanding the prehistory of Australia and has aroused international interest. The Department's interest in the Northern Territory has been reactivated by Dr Jones who has taken advantage of the unique opportunity of living with a group of Aborigines who have returned to living off the land, and studying their exploitation techniques, settlement patterns and seasonal movements, as well as excavating prehistoric sites in the area. New research has also been initiated in the south-eastern part of South Australia, and several projects in New South Wales have either reached completion or are nearing completion.

The Department has achieved two notable scientific advances. In the Radiocarbon Laboratory, Mr Polach's work on the use of sugar as an alternative dating standard has recently been adopted at the 8th International Conference on Radiocarbon Dating held in New Zealand. Mr W. R. Ambrose's work on

the use of freeze-drying for the preservation of organic artifacts recovered from excavations is now being employed in several laboratories in Europe where its success has been warmly acclaimed.

During the year reference facilities of the *Strategic and Defence Studies Centre* have been in heavy demand by scholars both within the ANU and from other tertiary institutions, visitors from overseas, government officials and service officers and the media. These facilities have been maintained and expanded, particularly with regard to the press clippings service. Two series of seminars were held during the year, the first on 'The Options for Australia's Defence Policy in the 1970s' and the second on 'The Changing Pattern of Great Power Interaction'. These seminars were well attended by a wide variety of interested persons. Two Canberra Papers on Strategy and Defence have been published, No. 13, *Chinese Strategic Thinking Under Mao Tse-tung* by Mr W. A. C. Adie and No. 14, *The Development of Soviet Strategic Thinking Since 1945* by Mr J. T. G. Jukes. A survey, *Australia's Defence Capacity* is in production.

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THESES

Thesis titles of work successfully submitted by research students in the Research School of Pacific Studies on whom degrees were conferred in 1972:

ABELL, ROBYN J.

'Philippine policy towards regional co-operation in Southeast Asia, 1961-1969.' *Department of International Relations.*

*Doctor of
Philosophy*

BEDFORD, R. D.

'Mobility in transition: An analysis of population movement in the New Hebrides.' *Department of Human Geography.*

CHOW, J.

'The history of Chinese diplomatic missions in Japan 1877-1911.' *Department of Far Eastern History.*

EGLOFF, B. J.

'Collingwood Bay and the Trobriand Islands in recent prehistory: Settlement and interaction in coastal and island Papua.' *Department of Prehistory.*

FRANK, R. M.

'Sedimentological and morphological study of selected cave systems in eastern New South Wales, Australia.' *Department of Biogeography and Geomorphology.*

FUNG, E. S. K.

'The Hupeh revolutionary movement 1900-1912: A study of the role of the new-style army.' *Department of Far Eastern History.*

HOPE, E. R.

'The deep syntax of Iisu sentences: A transformational case grammar.' *Department of Linguistics.*

HUGHES, I. M.

'Recent neolithic trade in New Guinea. The ecological basis of traffic in goods among stone-age subsistence farmers.' *Department of Human Geography.*

LANG, ADRIANNE

'Nouns and classificatory verbs in Enga (New Guinea): A semantic study.' *Department of Linguistics.*

LAU TEIK SOON

'Malaysia-Singapore foreign policies in Southeast Asia, 1965-1970.' *Department of International Relations.*

LIM TECK GHEE

'Peasant agriculture in colonial Malaya: Its development in Perak, Selangor, Negri Sembilan and Pahang, 1874-1941.' *Department of Pacific History.*

MCCAWLEY, P. T.

'The Indonesian electric supply industry.' *Department of Economics.*

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'Caste and economic development in a Haryana village.' *Department of Anthropology and Sociology.*

RIMOLDI, M. R.

'The Hahalis welfare society of Buka.' *Department of Anthropology and Sociology.*

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'Neighbours and killers: Residence and dominance among the Hewa of New Guinea.' *Department of Anthropology and Sociology.*

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'The principle of non-intervention in international order.' *Department of International Relations.*

WALMSLEY, D. J.

'A systems approach to consumer spatial behaviour.' *Department of Human Geography.*

WALTER, M. A. H. B.

'Changing principles of social organisation in the exploring islands of northern Lau, Fiji.' *Department of Anthropology and Sociology.*

WELFIELD, J. B.

'Japanese Defence Policy, 1945-1970.' *Department of International Relations.*

WRIGHT, A. G. P.

'The immediate origins, conduct and diplomacy of the Indo-Pakistani War, 1965.' *Department of International Relations.*

YEO KIM WAH

'British policy towards the Malays in the Federated Malay States, 1920-40.' *Department of Pacific History.*

THE RESEARCH SCHOOL OF CHEMISTRY

REPORT OF THE DEAN

Professor D. P. Craig, FAA, FRS

The Research School of Chemistry during its fifth year may be said to have reached the end of the first phase of its development. Professor R. L. Martin, FAA, joined the School to occupy the third of the three chairs which had been foreseen in the early planning of the School as forming its principal academic and administrative core. The main conventional divisions of the subject of chemistry, inorganic, organic, and physical and theoretical, are each now strongly represented in a non-departmental structure within which research projects that bring together viewpoints and skills from different disciplines are encouraged, side-by-side with the usual specialist studies.

Activities that can be broadly described as educational were greatly developed during 1972. The School is committed to the view that series of lectures, literature review groups, formal and informal seminars and other modes of sharing knowledge, especially to bring in scholars and other younger research workers, are of central importance as a source of research stimulus as well as of information. Attendance at lecture courses by members of the University coming from outside the Research School suggest that the effort now being put towards such educational purposes is serving a wider University interest.

At the end of September there were fifty-two academic staff and twenty-six students.

The School shared the honour of two of its members by the award to them of distinguished medals of learned societies. Professor A. J. Birch, FAA, FRS, received the Matthew Flinders Medal of the Australian Academy of Science, the Flintoff Medal of the Chemical Society, and the Davy Medal of the Royal Society. Dr D. A. Buckingham was awarded the Corday-Morgan Medal of the Chemical Society.

Staff Activities

Professor Birch gave plenary lectures in Poona and Lucknow on the occasion of the Symposium on Synthesis organised by the International Union of Pure and Applied Chemistry, and at the Vancouver meeting of the Canadian Institute of Chemistry. He also gave the Flintoff Lecture to a joint Symposium of the Chemical Society and the Biochemical Society in London. Professor Craig was a visiting professor at University College, London, and gave a plenary lecture at the International Symposium on the Organic Solid State, in Glasgow. Dr A. J. Parker lectured at the Reaction Mechanisms Conference in Burlington, USA, and at the Gordon Conference on Hydrocarbons in Andover, USA. Dr A. M. Sargeson gave a plenary lecture at the International Conference on Co-ordination Chemistry in Toronto, Canada. Dr Buckingham gave invited lectures at the American Chemical Society Summer Symposium in Buffalo, USA, at the International Conference on Co-ordination Chemistry in Toronto and at the Gordon Research Conference on Enzymes, Coenzymes and Metabolism in New Hampshire, USA. Members of the School gave lectures at the Australian Electrochemistry Conference at Terrigal, NSW, at the Organic Chemistry Sym-

posium in Adelaide, at the Co-ordination and Metal-Organic Conference at Camden, NSW, and at the ANZAAS meeting in Sydney.

Lectures
and
Seminars

The School has been able to invite a number of Australian and overseas chemists to participate in its research projects and to give lecture courses and seminars.

PUBLICATIONS

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* Based on work done while a member of the Department.

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*** Based on work done while a Visiting Research Worker.

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 'Studies of some biologically active compounds.'
- CORRIE, J. E. T.
 'Synthesis and structure of selected terpenoids.'
- DEKKERS, J.
 'Cobalt (III) promoted synthesis of peptides.'

*Doctor of
 Philosophy*

¶ Member of the Department of Developmental Biology.

‡ Not a member of this University.

* Based on work done while a member of the Department.

** Based on work done prior to joining this University.

¶¶ Member of the Diffusion Research Unit.

LLOYD, D. J.

'Transition state character in E_2 reactions.'

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SCHIPPER, P. E.

'Interactions of Chiral molecules.'

TURNER, T. W.

'Fluorophosphine complexes of rhodium.'

*Master of
Science*

HOSKINS, KATHLEEN

'Reactions with electrophiles of complexes containing olefinic ligands.'

THE RESEARCH SCHOOL OF BIOLOGICAL SCIENCES

REPORT OF THE DIRECTOR-ELECT

Professor Sir Rutherford Robertson, CMG, FAA, FRS

The major event of the year was the opening on 10 November, of the first stage of the permanent building for the School, by His Excellency the Governor-General. While the building was not ready for occupation by the research scientists, it was possible to appreciate the way in which it will be used and the extent to which common facilities are a prominent feature in the School. These range from the workshops, photographic suite and administrative offices to special laboratories for controlled environment chambers and ecological experiments, and to animal accommodation and facilities for growing plants. During 1973, the various departments and units of the School which have grown up in relative isolation, will be brought together for the first time and the parts should begin to weld together and stimulate one another in a way not previously possible.

The foundation Director of the School, Professor D. G. Catcheside, FAA, FRS, retired on 31 December 1972. His work and planning for the School have been responsible for its successful development to this stage. The School is grateful for what he has done. He will remain as a Visiting Fellow in the Department of Genetics.

Professor B. John, the foundation Professor of the Department of Population Biology, joined the School at the beginning of September and commenced work in temporary quarters. In his first season, grasshoppers, one of the insect populations in which he is interested, reached plague proportions.

At the end of the year the academic staff numbered forty-two, comprising six professors, one professorial fellow, seven senior fellows, four fellows, one senior research fellow, twenty-two research fellows and six postdoctoral fellows. Twelve visiting fellows and nine honorary fellows have worked in the school for one to many months during the year, many others having come for shorter visits.

There were thirty-three research students in the School during the year and eight gained the degree of Doctor of Philosophy.

The major change in the work of the *Department of Developmental Biology* resulted from the appointment of Dr A. J. Gibbs, who works with viruses of plants and lower animals. He was able to show that a number of plant viruses not previously known to occur in Australia are to be found here. His interests range widely from ecological studies to the development and molecular biology of viruses.

*Research
Activities*

The other lines of research in the Department continued. One area of study concerns cellular development in micro-organisms. The components of cells in yeast, for example, were part of a developmental study and detailed new information

on the membranes within the cell was obtained. The sites of synthesis of proteins in the membranes were investigated and how these developed were investigated by the techniques of nuclear magnetic resonance, which provides information on changes within the lipid layers in the membranes, and of electron microscopy for examining the ultrastructure.

Micro-organisms were also used to study the small circular cytoplasmic DNA forms (which are responsible for carrying the information about how a cell will develop). These may be universal as they occur in yeasts and some water moulds, and in certain forms of human leukemia.

Another area of study concerns the hormones of plants. The mechanism of action of the cell division hormone, zeatin, was investigated and some aspects, such as its immediate metabolic fate, were elucidated. Further work on the mode of action of gibberellins led to the discovery that within one hour of application of this hormone, an 'early protein' is formed which appears essential for the later synthesis of hydrolytic enzymes. Ferrous ions are needed in this system and possibly more generally in plant protein synthesis. Comparisons between this system in barley and that in which nitrate induces the formation of nitrate reductase in mung bean roots were begun.

Descriptive studies using light and electron microscopy have been carried out on a number of marine algae collected by Professor T. Bisalputra, in northern Queensland. Work on ultrastructure of the ciliate *Paramecium* was completed and published. Work began on the structure and development of the cuticle of the eucalyptus leaf and scanning electron microscopy was used successfully in work in the biology and taxonomy of *Eucalyptus* species. The hypothesis of relationships postulating two large groups of species first put forward in 1959 was confirmed by use of the method in studies of flower development.

The research work of the *Department of Environmental Biology* is concerned with the manner in which biological and environmental factors interact to produce and maintain ecological systems with various structural and functional characteristics.

There are three main areas of activity, all of which are closely interconnected. These areas concern the study of key environmental processes associated with the movement of energy and matter in the biosphere, processes by which the environment is coupled to the biota and with structure-function relationships within biological systems.

In the first area, attention is being given primarily to micrometeorological processes associated with the exchange of energy, momentum, water and carbon in biological microenvironments, and with nutrient cycling in specific ecosystems. In the second area, primary consideration is devoted to research on photosynthesis ranging from specific studies of photosynthetic processes to general consideration of energy capture and primary productivity. Another major area of research concerns the physiological and ecological aspects of stomatal function. In the third area, ecosystem structure and function is being studied on a wide front.

The research ranges from whole system studies involving general phenomena such as system response to perturbation, environment-diversity relationships, succession, competition and dispersal, to studies of specific interactions between species and between trophic levels. Plant-herbivore and prey-predator interactions are of particular interest, as are decomposition processes.

The research program utilises natural and modified, aquatic and terrestrial ecosystems in the field and in laboratory-created ecological units. There is considerable interest in the theoretical basis of the processes under study. The implications of the work to broaden areas of biology, such as biogeography, and to questions of ecosystem management and conservation are also under active consideration.

The main interest of the *Department of Genetics* is in attempting to use the techniques of genetics and molecular biology to understand the mechanism underlying adaptation and evolution. With the addition to the Department this year of three further scientists, a strong team has been gathered for such evolutionary studies. There are now three scientists working on adaptive and evolutionary problems with higher eukaryotes (marsupials, monotremes, fish and plants), one with the lower eukaryotes (*Neurospora*), three with prokaryotes (bacteria and viruses) and one with prebiological molecular order. The experimental techniques vary greatly, especially as between haploid micro-organisms and diploid higher organisms, but they have the common aim of interpreting evolutionary progress in terms of molecular change.

A novel approach that has developed this year is the study in cells of higher organisms of the expression of genes obtained from bacterial cells. Techniques have been perfected for introducing bacterial genes into the cells of flowering plants, insects and mammals. In addition to providing new means of examining genetic relatedness, these techniques have potential use in selectively modifying domestic animals and plants.

Considerable progress has been made in establishing a method for selecting plants with an amino acid composition more suitable for human nutrition. In the coming year, the methods that have been developed with bacteria will be applied to barley and perhaps rice.

The activities of the *Molecular Biology Unit* this year have ranged from studies on protein synthesis to the purification and characterisation of ribonucleic acid. Problems relating to the role of protein synthesis in cell differentiation and carcinogenesis are being actively pursued.

The initiation of protein synthesis is a complex process, consisting of several discrete biochemical steps. The first event in protein synthesis is the recognition of a specific species of message (messenger ribonucleic acid) by ribosomes. Evidence has been found that such a specific recognition is involved in the regulatory mechanism of gene expression. Significant progress has been made in understanding the mechanisms by which ribosomes recognise specific messages and initiation of protein synthesis is controlled.

Techniques have been developed for purification and characterisation of particular species of cellular ribonucleic acid, since this field of investigation is of considerable importance for a clear understanding of the regulatory mechanism which underlies cell differentiation and carcinogenesis.

The interest in the *Department of Neurobiology* remains centered on the correlated structure and function of the nervous system and research is aimed at several levels ranging from the primary receptors to motor neurons. At the receptor level, the analysis of various types of insect visual systems has been in progress for some time. Although there is an apparently endless diversity of insect types, we have reached the stage where the most important types are now known in outline and a comprehensive review is in preparation. Over the past year, most of the effort of Professor G. A. Horridge, FAA, FRS, has been upon mechanisms in eyes which make use of special adaptations to increase sensitivity. Collection and analysis of visual information in photoreceptors and the underlying neuropile in insects, especially the large ones found in Australia, provide a model for integration in a sensory system. Such a description depends on the combination of morphological, ultrastructural and electrophysiological techniques. This has been studied at the level of the retina. The first steps in integration during the neural processing of information in the first optic ganglion have also been investigated. How parameters like motion detection results from interaction of information in parallel channels deeper in the optic neuropile is being analysed. The tendency is to move toward an investigation of the central mechanisms.

Research is taken deeper into the brain in studies of the crab eye movements, induced by angular accelerations, and is aimed at analysing the brain mechanisms for producing co-ordinated motor patterns generated by specific sensory inputs. The physiology of the sensory input and motor output in this system is now well enough known to enable an attempt on the interneurons to be made. The dynamics of the crab statocyst which is sensitive to angular acceleration, is the interest of a research scholar. The lack of precise anatomical information about crustacean brain remains a problem but studies on crab and crayfish brain using light and electron microscopy are producing information about central nervous synapses and pathways.

Analysis of patterned motor neuron discharges is also part of research into the development of specific connections of flight motor neurons in locusts. Here too, the lack of precise knowledge of anatomical details of identified neurons has resulted in a concentrated effort to gain a clearer picture of neuron morphology. Visiting Fellow, Dr M. Burrows, provided a great impetus to the study of the electrophysiology and anatomy of identified locust motor neurons.

The establishment of connections between specific neurons in the central nervous system and between motor nerves and muscles is a research theme which has been gaining more and more attention in the laboratory. The problem is being approached by studies of regeneration of appendages in cockroaches and crayfish and by culturing insects and observing the structure and function of known sense organs at different stages in the animal's life.

Some biochemical aspects of neurospecificity are being studied by Dr J. L. Denburg whose time is divided between the culture of insect ganglion cells and setting up procedures for enzyme analysis of identified crustacean neurons.

The *Department of Population Biology* which came into existence on 1 September will focus its attention on biological problems associated with the structure, dynamics and evolution of natural populations of Australian animals and plants. Initially the Department will concern itself with insects endemic to Australia which are not only abundant but also economically important. As the group develops during the coming triennium it will extend its scope to cover plant and mammal populations also.

The *Taxonomy Unit* is concerned with setting up systems of names intended to reflect useful and hypothesis-generating classifications of organisms and with providing convenient identificatory facilities to enable people to capitalise on the classifications by arriving at names applicable to their material. This Unit aims to train students and to develop research into modern classificatory and identificatory methods, to make detailed studies of selected groups of plants relevant in an Australian context, and to pursue the application of taxonomic ideas to problems of social, economic and general biological interest. Work at present under way includes anatomical and taxonomic studies of the plant families Dilleniaceae, Actinidiaceae, Saxifragaceae, Cunoniaceae, Leguminosae and Gramineae; the development of new and more efficient identificatory techniques, of general application, but at present with special reference to grasses; and efforts to employ taxonomic notions to gain new insights into problems associated with human allergies, plant diseases and legume seed-protein content.

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*Developmental
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** Based on work done prior to joining this University.

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* Based on work done while a member of the Department.

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*Environmental
Biology*

¶ Member of the Research School of Chemistry.

* Based on work done while a member of the Department.

‡ Not a member of this University.

¶¶ Member of the Department of Botany.

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Genetics

Molecular Biology Unit

‡ Not a member of this University.

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† Visiting Research Worker.

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¶ Member of the Department of Chemistry.

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‡ Not a member of this University.

¶ Member of Department of Applied Mathematics, Institute of Advanced Studies.

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STANGE, G.

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WATSON, L., AL-RAIS, A. H.‡ & MYERS, A.‡

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THESES

Thesis titles of work successfully submitted by research students in the Research School of Biological Sciences on whom degrees were conferred in 1972:

ANGEL, TERESA G.

- 'Genetic control of recombination in the histidine-3 region of *Neurospora crassa*.' *Department of Genetics*.

BUTLER, R. G.

- 'Studies on the compound eye of the cockroach, *Periplaneta americana*.' *Department of Neurobiology*.

Taxonomy

*Doctor of
Philosophy*

‡ Not a member of this University.

§ Member of the Department of Applied Mathematics, Institute of Advanced Studies.

GORDON, P. A.

'The relationship of lipid and protein synthesis to mitochondriogenesis in yeast.'
Department of Developmental Biology.

GRAETZ, R. D.

'A micrometeorological study of the contributions of the individual elements of a community of plants to the momentum heat and vapour fluxes from that community as a whole.'
Department of Environmental Biology.

MENHENETT, R.

'Hormonal and phytochrome-induced unrolling of barley leaves.'
Department of Developmental Biology.

SHELTON, P. M. J.

'Studies on the lateral line system of the African clawed toad at larval and adult stages of development.'
Department of Neurobiology.

YU, R. S. T.

'A comparative study of mitochondrial differentiation in candida parapsilosis and saccharomyces cerevisiae.'
Department of Developmental Biology.

*Master of
Science*

DOWNTON, JOY

'Some aspects of photosynthesis in higher plants.'
Department of Environmental Biology.

THE SCHOOL OF GENERAL STUDIES

THE FACULTY OF ARTS

REPORT OF THE DEAN

Dr E. C. Fry

The Faculty of Arts offers a broad range of studies in the humanities and social sciences, from which any subjects may be chosen towards the degree of Bachelor of Arts, so long as at least two disciplines are pursued to third-year level. The areas covered by the Faculty have been extended in the social sciences, where some departments are new, and in the humanities Music and Fine Arts are proposed for the future. The shape of the Faculty within which growth will take place is now fairly definitely settled.

In the past, growth has often been hectic, so the pause last year had advantages. In 1972 the number of undergraduates enrolled in the Faculty (including Arts/Law) was 1,906 compared to 1,900 in 1971, the total number of undergraduates standing still because the first-year intake fell. This decline in new applicants occurred in most universities and faculties, for reasons which are open to conjecture. In the Faculty of Arts the trend had been reversed at the beginning of 1973 when a marked rise in new entrants was apparent.

Stability in undergraduate numbers permitted consolidation of teaching, inauguration of new courses and development of graduate studies. One important gauge of teaching is the success rate of students. Most first-year examination pass rates were above 85%; taking into account wastage as well as examination failure, success rates were usually over 75%. Success rates in later years are of course better than this, so the results are a cause for satisfaction, without complacency.

New units were offered in the Departments of Sociology, Linguistics and History, whilst other departments made adjustments within existing units to introduce new subject matter or widen students' options. New knowledge and interpretations must constantly be incorporated into the teaching of humanities as well as social sciences if the subjects are to live. Sociology, now several years old, is the most rapidly growing department within the University, the great demand for places in it showing the need which it fills. Linguistics, another recent department grows on a smaller scale. During 1972, Prehistory was separated from the Department of History with a first-year enrolment of over one hundred. As a joint Department of Prehistory and Anthropology, concentrating on the Australian and Pacific area, it will complete the range of social sciences planned for the Faculty.

The flourishing of the social sciences reflects community and student interests in Australia today. Also typical of contemporary Australia is the neglect of European languages which have lost their traditional place in school curricula and are not widely seen as part of the nation's cultural heritage. The language departments of the Faculty have begun a serious examination of the sources of their students, the content of their teaching and their place in a liberal education.

Since students are partners with staff in the process of teaching and learning, their active participation in planning is very helpful. This has gone ahead usefully at all levels—Faculty meetings, the Faculty Education Committee, Departmental Liaison Committees, and informally. Participation has fluctuated with need and during 1972 no crises affecting students arose. Some matters of importance to students are the need for a rational annual calendar, for comparable work loads in units and settled methods of assessment. Students will take part with staff in seeking solutions to these problems during 1973.

Both staff and students were adequately housed when the last of the Faculty's teaching staff were able to move from the Childers Street buildings. Space will be short during 1973 and more so during 1974 until the new Arts V building is available. The danger of the Arts area becoming over-congested to the detriment of those who work there is a continuing concern. The consequences which flow from the decision to site the new Union so close to the Arts buildings will unfold for many years and will have to be scrutinised at each step to avoid overcrowding.

Whilst undergraduate enrolments remained stationary, graduate students increased from 160 in the previous year to 194. This figure was made up of forty-seven candidates for the degree of Doctor of Philosophy, 104 candidates for the degree of Master of Arts, and forty-three candidates in the Master of Arts qualifying course. The increase has been made possible by the initiative of departments in deploying their resources to meet the demand for higher degrees from graduates who seek an academic career or wish to use a higher degree in other ways. Whilst the doctorate is by thesis only, the degree of Master of Arts may be awarded by course work, providing a bridge between a general first degree and advanced professional qualifications. Both graduate enrolments and the variety of graduate education should continue to increase.

Teaching, which is the first purpose of the Faculty, merges into research with graduate studies. In their own research, members of the Faculty, who mostly have heavy teaching duties, published nine books and ninety-two articles or chapters of books during the year, a considerable achievement of scholarship.

PUBLICATIONS

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'Some effects of partial recrystallisation on C¹⁴ dating late Pleistocene corals and molluscs.' *Quaternary Res.*, 2, 4, 244-51.

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JOHNSON, B. L. C. & REICHL, PHYLLIS†

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'Population growth and town location in an agricultural economy: Iowa, 1840-1960.' *Geogr. Anal.*, 4, 2, 134-55.

BURGSTALLER, E.

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Germanic Languages

¶ Member of the Department of Prehistory.

† Not a member of this University.

KUHN, H.

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PENNY, BARBARA R.

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Linguistics

DIXON, R. M. W.

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HAIMAN, J. M.

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RENSCH, K. H. M.

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DAVIES, B.

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DAVIES, B. & NINHAM, B. W.¶

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DRUMMOND, J. E.

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PETERSONS, H. F.

'Computation of the lunar daily variation and error analysis.' *J. geophys. Res.*, **77**, 16, 2948-56.

RICHMOND, P.¶, DAVIES, B. & NINHAM, B. W.¶

'Van der Waals attraction between conducting molecules.' *Physics Lett.*, **39A**, 301-2.

BRYCE, R. A.

'Projective groups in varieties.' *Bull. Aust. math. Soc.*, **6**, 169-75.

BRYCE, R. A. & COSSEY, P. J.

'Fitting formations of finite soluble groups.' *Math. Z.*, **127**, 217-23.

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COSSEY, P. J.

'On non-Cross varieties of A-groups.' *J. Aust. math. Soc.*, **13**, 159-66.

FRICK, MARIETJIE* & NEWMAN, M. F.¶¶

'Soluble linear groups.' *Bull. Aust. math. Soc.*, **6**, 31-44.

LOY, R. J. & MILLER, J. B.‡

'Tight Riesz groups.' *J. Aust. math. Soc.*, **13**, 224-40.

MCDUGALL, D.

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SHIELD, D. B.

'Bounds on the Engel class of some group extensions.' *Proc. Camb. phil. Soc., math. phys. Sci.*, **71**, 179-88.

WARD, M. A.

'Bases for polynilpotent groups.' *Proc. Lond. math. Soc.*, **3S**, **24**, 409-31.

¶ Member of the Department of Applied Mathematics, Institute of Advanced Studies.

* Based on work done while a member of the Department.

¶¶ Member of the Department of Mathematics.

‡ Not a member of this University.

*Applied
Mathematics*

*Pure
Mathematics*

Philosophy

- CAMPBELL, R. J.
'Did Meinong plant a jungle?' *Philosophical Papers*, I, 89-102.
Review of *Kerygma and Myth* (ed. H. Bartsch). *Reformed Theological Review*, XXXI, 3, 97.
- GIBSON, Q. B.
Review of *Explanation in the Behavioural Sciences* (eds R. Borger & F. Cioffi). *Australasian Journal of Philosophy*, 50, 92-4.
- MAUTNER, T.
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Political Science

- BENNETT, S. C. (ed.)
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- CONNELL, R. W.‡ & GOOT, E. M.
'Science and ideology in American "political socialization" research.' *Berkeley Journal of Sociology*, XVII, 165-93.
- CRISP, L. F.
Peter Richard Heydon 1913-1971. Griffin, 55.
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- GOOT, E. M.
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- GOOT, E. M. & CONNELL, R. W.‡
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- HUNTER, THELMA A. C.
'Indian communism and the Kerala experience of coalition government 1967-69.' *J. Commonw. polit. Stud.*, X, 1, 45-70.
- McFARLANE, B. J.
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- REID, G. S.
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- STOCKWIN, J. A. A. (ed.)
Japan and Australia in the Seventies. Angus, xiv + 223.
- STOCKWIN, J. A. A.
'The ultra-right wing in Japanese politics.' *World Review (Aust.)*, II, 2, 41-54.
- WEST, KATHARINE O.
'Stratification and ethnicity in "plural" new states.' *Race*, XIII, 4, 487-95.

‡ Not a member of this University.

DE BRAY, R. G. A.

Review of *Melbourne Slavonic Studies*, 5 & 6. *AUMLA*, 38, 56-7.

Russian

BROOM, L.¶** & SAHA, L. J.

'Negro academics and professional societies.' *Am. Sociol.*, 7, 9-11.

Sociology

BARNES, K. R.‡, BISHOP, W. J.‡, CRAIGIE, D. J.‡, CUSHING, R. G., GOULSTON, K. J.‡ & WHYTE, H. M.¶¶

'Doctors' opinions on general practice and health centres in the Australian Capital Territory.' *Med. J. Aust.*, 1, 1302-8.

CUSHING, R. G. & BEAN, F.‡

'On the utility of residual plots.' *Social Science Quarterly*, 52, 999-1000.

CUSHING, R. G. & HUNT, L.‡

'Status discrepancy, interpersonal attachment and right-wing extremism.' In *Political Attitudes & Public Opinion* (eds D. D. Nimmo & C. M. Bonjean), 324-38, McKay.

CUSHING, R. G., ZURCHER, L.‡, KIRKPATRICK, G.‡ & BOWMAN, C. K.‡

'The anti-pornography campaign: a symbolic crusade.' *Social Problems*, 19, 217-38, 1971.

GLASNER, P. E.

'Secularization: its limitations and usefulness in sociology.' In *The Social Sciences and the Churches* (ed. C. L. Mitton), 246-57, Clark, T.

IRWIN, R. P., SANDON, J.‡, ANG, J.‡, MATAIRA, R. K.‡ & MEYER, R.‡

'Curriculum development in physical education.' *N.Z. J. Health, phys. Educ. & Recreat.*, 5, 2, 57-71.

THESES

Thesis titles of work successfully submitted by research students in the Faculty of Arts on whom degrees were conferred in 1972:

HAEBICH, W.

'The multiplier of various products of groups.' *Department of Pure Mathematics.*

Doctor of
Philosophy

LI YEUNG LIN-NEI

'An instrumental study of Mandarin and Cantonese tones.' *Department of Linguistics.*

MURRAY, W. J.

'The right-wing press in the French Revolution (1789-1792).' *Department of History.*

TISDELL, MARIE-ELIZABETH

'Studien zur erzählweise einiger mittelhoch-deutscher dichtungen.' *Department of Germanic Languages.*

WALSH, K. J.

'Appeals to antiquity in the making of the Elizabethan Settlement.' *Department of History.*

BROPHY, GILLIAN M.

'African socialism: The theory and practice of Kwame Nkrumah.' *Department of History.*

Master of
Arts

COOPER, R. F.

'"And the villain still pursued her" origins of film in Australia, 1896-1913.' *Department of History.*

¶ Member of the Department of Sociology, Institute of Advanced Studies.

** Based on work done prior to joining this University.

‡ Not a member of this University.

¶¶ Member of the Department of Clinical Science.

- DAW, E. D.
 'A constitutional study of the Church of England in Australia, 1847-1872.' *Department of History*.
- GILL, CATHARINE A. C.
 'A critical study of selected fiction by John Updike.' *Department of English*.
- GODFREY-SMITH, W. L.
 'Metaphor.' *Department of Philosophy*.
- GUY, D. J. R.
 'Max Frisch: The search for a workable human relationship.' *Department of Germanic Languages*.
- HERBERT, G.
 'Social geography of voting behaviour in Sydney and Melbourne.' *Department of Geography*.
- HICKS, CYNTHIA A.
 'The impossible alliance: Australia, the United States and the post-war settlement of 1919.' *Department of History*.
- HUNT, CAROL F.
 'A historical survey of the criticism of the work of William Collins, 1765-1967.' *Department of English*.
- MULCAHY, J. S.
 'L'oeuvre romanesque de François Mauriac: Themes et art.' *Department of French*.
- WHITROD, R. W.
 'Assessment of the seriousness of offences by selected groups in Australia and New Guinea.' *Department of Sociology*.

*Master of
 Science*

- DOWNES, GAYE L.
 'Slow viscous flow over rectangular cavities.' *Department of Applied Mathematics*.
- FRICK, MARIETJIE
 'The nilpotent length of finite soluble groups.' *Department of Pure Mathematics*.
- WILSON, W. H.
 'Primitive irreducible linear groups.' *Department of Pure Mathematics*.

THE FACULTY OF ASIAN STUDIES

REPORT OF THE DEAN

Professor E. S. Crawcour

The Faculty offers courses in the languages and literatures of China, Japan, India, Indonesia and Malaysia, and a training in the discipline of history which, together with further studies of religion and philosophy, is offered by the Department of Asian Civilizations. Faculty also sustains a considerable program of research.

Despite the fact that 1972 was a year in which the total of new undergraduate enrolments in the University decreased, I am pleased to report that the Faculty of Asian Studies maintained its growth rate with an increase of 22% in new undergraduate enrolments. There was a shift in the pattern of this increase between departments from the previous even distribution in that this year undergraduate enrolments in the Departments of Chinese and South Asian and Buddhist Studies increased whilst undergraduate enrolments in the other departments decreased. This pattern repeated itself in postgraduate enrolments with the exception that the Department of Asian Civilizations postgraduate enrolments also increased.

Undergraduate unit enrolments totalled 750 (Asian Civilizations 422; Chinese eighty-nine; Indonesian Languages and Literatures 133; Japanese seventy-one; and South Asian and Buddhist Studies thirty-five). The overall enrolment in the course for the degree of Bachelor of Arts (Asian Studies) was 247. Thirty-seven students completed the bachelor course, twenty-one at pass level and sixteen at honours level. Mr C. A. Modini was the first student in the Faculty to attempt and complete two full honours years in the one year. He gained first class honours in both Classical Chinese and Modern Chinese and was awarded a University Medal for Modern Chinese. Mr. T. J. Moy, who obtained first class honours in Asian Civilizations was awarded the Tillyard Prize.

Eighteen full-time and four staff candidates were enrolled for the degree of Doctor of Philosophy. Twenty-one students were enrolled for the degree of Master of Arts (Asian Studies) and eleven students for master's qualifying courses. Four candidates obtained their doctorates and two their degree of master.

Student participation in Faculty affairs, both at Faculty and departmental level, continued. At Faculty level, the Faculty Education Committee continued to meet regularly and discuss such topics as receipts for essays, promotion of staff-student contact, roll of student representatives to students, Asian restaurant on campus, suggestions for 1973 reorientation week, correlation between Asian Civilization and texts used in Asian languages, effects of conversion to a semester system, examinations in Asian language units, extra credit for Japanese major, University Co-operative Bookshop, and publication of examination results. Some of these topics were raised through the Faculty suggestion box which the Committee had requested to be installed in the Faculty of Asian Studies building so that students could raise, anonymously if they wished, matters which they might not otherwise have raised. Another of the Committee's suggestions resulted in

students organising a most successful student/staff 'get together' at the University Union. At the request of the Board of the School, Faculty reviewed its practice of inviting student members of the Faculty Education Committee who are not members of the Faculty to attend Faculty meetings. It was unanimously agreed that the attendance of the student members at Faculty was beneficial and that the practice should be continued. At departmental level, all departments maintained the principle that students should participate in the formulation of the education policies and structure of courses in departments.

During the year Mr H. Mukai, Senior Lecturer, resigned to return to Japan after ten years with the Department of Japanese and Mrs Elly H. Soebardi, Tutor, Department of Indonesian Languages and Literatures, resigned to accompany her husband overseas on his study leave. New appointments were Dr Julia C.-Y. Ching, Lecturer, Department of Asian Civilizations, Mr I. M. Proudfoot, Senior Tutor, Department of Asian Civilizations, Mr R. S. Pulvers, Lecturer, Department of Japanese and Dr R. K. Marz, Lecturer in Hindi, Department of South Asian and Buddhist Studies. Miss I. Kōnō of the Diatō Bunka University spent the year teaching in the Department of Japanese under the auspices of the Japanese Ministry of Foreign Affairs. Special leave was granted to Dr J. D. Frodsham, Reader, Department of Chinese, to teach at the University of Dar es Salaam, Tanzania, and to Dr P. Ryckmans, Senior Lecturer, Department of Chinese, to serve as Adviser on Chinese Affairs at the Belgian Embassy in Peking. Dr J. G. Caiger, Dr K. H. J. Gardiner, Department of Asian Civilizations and Dr S. Supomo, Department of Indonesian Languages and Literatures were promoted to Senior Lecturers and Mrs Luise A. Hercus, Department of South Asian and Buddhist Studies and Dr J. T. F. Jordens, Department of Asian Civilizations were promoted to Readers.

Visitors to the Faculty during the year included Professor Ho Peng-yoke, Professor of Chinese Studies at the University of Malaya and 1972 Asian Fellow. Professor Chiang Yee, Professor Emeritus of Chinese, Columbia University, arrived in September to assist with teaching in the Department of Chinese and during the first two terms the students and staff of the Department of South Asian and Buddhist Studies benefited from the presence of Professor M. Hara, Faculty of Letters, University of Tokyo, a well-known specialist in classical Sanskrit literature. Once again the Faculty was indebted to Dr C. P. Mackerras, Research Fellow, Department of Far Eastern History, who was seconded to the Department of Chinese during Dr Ryckman's absence in Peking. The Faculty also benefited from special lectures and seminars given by distinguished academics who visited the various departments in the Faculty for shorter periods.

Professor A. L. Basham completed his editing of the new edition of the *Legacy of India* for the Clarendon Press. He also edited *Civilizations of Monsoon Asia* to be published early in 1973 by Angus and Robertson, Sydney. Drs S. A. A. Rizvi, H. H. E. Loofs, K. H. J. Gardiner and Ann L. Kumar have all contributed chapters to this publication. Dr Rizvi, in collaboration with one of his research students, Mr V. J. A. Flynn, has produced a monograph on the historic city of Fathpur Sikri which celebrated its 400th Anniversary this year. Dr Ching has written sixteen biographies of Ming thinkers for the Ming Biographical Project, Columbia University, and was co-author of fourteen others. Research con-

tinued in the following projects: Muslim religious movements from the eighteenth to the twentieth century, and aspects of Islamic modernism in India and Iran (Dr Rizvi); study of the finds from the Thai-British Archaeological Expedition (Dr Loofs); translation of the *Samguk-sagi* and a study of Korean legends (Dr Gardiner); annotated translations of poems by the monk Saigyō appearing in the medieval Japanese anthology, *Shinkokinshū* (Dr R. H. P. Mason); characteristics of modern written Japanese, an analysis of those grammatical structures which survive practically only in the written language (Dr A. A. Alfonso); and a study of the Arabana-Wanganuru language group (Mrs Hercus). The English-Malay Dictionary Project completed a further satisfactory year. New projects commenced were on Traditional Islamic Schools in West Java, with special reference to organisation and curriculum, by Dr Soebardi supported by a grant from the Australian Research Grants Committee; the preparation of a textbook for spoken and written Hindi for university students (Dr Barz); a study of the secret ritual language of the Timugon Murut *babalian* (female shamans) including the transcription and translation of a large number of religious chants (Dr D. J. Prentice).

At the request of the Government of India, Dr Rizvi made a detailed survey of the medieval monuments of Agra and Fathpur Sikri. Also at the invitation of the Indian Government, Dr Rizvi visited Fathpur Sikri for the city's 400th Anniversary celebrations. The Government of the Khmer Republic (Cambodia) invited Dr Loofs as the consultant from Australia to attend the preparatory conference on the restoration and animation of historical sites for the purpose of establishing the Applied Research Centre for Archaeology and Fine Arts. Professor Crawcour, Dr Caiger and Dr Mason gave evidence in connection with the enquiry into Japan conducted by the Senate Committee on Foreign Affairs and Defence. Professor Crawcour visited New Zealand in May at the invitation of the Wellington Polytechnic and the Waikato University Conference on Chinese Studies. During his visit he had consultations with New Zealand authorities on the development of Japanese language teaching in New Zealand. In November he attended the Japan PEN Club International Conference of Japanese Studies in Kyoto, Japan. Professor A. H. Johns was appointed external examiner to the Universiti Sains Malaysia, Penang, and Professor Liu Ts'un-yan was invited by the Government of Hong Kong to serve as an adjudicator for the Chinese speech program of its musical festival. Among matters of personal interest, Professor Liu Ts'un-yan was awarded an Honorary Doctor of Literature by the Yueng-Nam University in Daegu, Korea. A University Medal was presented to him by the College of Liberal Arts and Science, Seoul National University.

In the course of the year members of Faculty again participated in lectures, seminars, colloquia, congresses, conferences and continuing education courses at this University and at other universities, institutions and associations in Canberra and elsewhere in Australia and overseas. Close co-operation was again maintained with the Canberra College of Advanced Education with an interchange of lecturers and tutors to the mutual advantage of both institutions.

The Faculty of Asian Studies Publications Committee had a very active year, publishing two monographs in the Oriental Monographs Series, two in the Asian Publication Series and three Occasional Papers. One previous Occasional Paper

was reprinted. Occasional Paper No. 12, *Australian Theses on Asia*, compiled by Miss E. Bishop, was so much in demand that a supplementary printing was required.

Intensive courses in Chinese, in collaboration with the Canberra College of Advanced Education, and Japanese were offered in January and again both proved very popular and highly successful.

Continuing its policy of creating a broader interest in things Asian among school children, the Faculty again organised a program of lectures for schools within reach of Canberra. In August an Open Day was held for secondary school students from two Sydney schools.

A second edition of the Faculty booklet *The Faculty of Asian Studies: A Brief Guide* was printed.

During the year the Faculty was able to augment its displays in the foyer of the Asian Studies building with items from the Lyttelton-Taylor collection of oriental pieces. The displays have proved to be popular with visitors to the Asian Studies building. A sitar on display led to a public concert being organised by the Faculty of Asian Studies in June when Mrs Prabha Agarwala, an accomplished sitar player from India, gave a recital on the Faculty sitar to aid the World University Service Appeal for Bangladesh. Some items of the Lyttelton-Taylor collection were used as props by the students of the Department of Chinese in their successful performance of two one-act plays in Chinese.

Although it was a year of consolidation, growth and some progress, the Faculty still faces difficulties in its efforts to develop a centre for Asian studies of the scope and standard that I believe The Australian National University is entitled to expect. The increase in unit enrolments in the Faculty was well above the average for the School of General Studies and under the direction of Dr Barz, Hindi already shows every indication of becoming a viable course. Deferment of the introduction of a mainland South-East Asian language beyond the 1973-75 triennium was a great disappointment to the Faculty.

A continuing factor inhibiting development of the work of the Faculty is a general lack of public interest reflected in reluctance of some state departments of education to develop Asian studies at the secondary level. While I appreciate that the Faculty is treated not ungenerously in the overall application of the student/staff ratio, operating within the context of the restriction means in effect that development of the Faculty must follow the growth of public interest, rather than giving a lead in broadening the scope and raising the level of Asian studies throughout the country. One particular factor said to be inhibiting the growth of Asian studies in the Australian education system is a shortage of appropriate teaching materials. Members of the Faculty are contributing to overcome this lack by preparing textbooks for secondary and tertiary use and this work should be encouraged in a material way. Another is a shortage of qualified teachers of Asian subjects, and here again the Faculty is doing more than any other single institution to help fill this gap.

I believe that the Faculty has now reached a level of maturity at which, given the co-operation of educational authorities and hopefully of Asian governments,

it can play an increasing role in promoting awareness and understanding of Asia in Australia.

PUBLICATIONS

DOBBINS, K. W.

'The commerce of Kapisene and Gandhāra after the fall of Indo-Greek rule.' *Journal of the Economic and Social History of the Orient*, XIV, III, 286-302, 1971.

*Asian
Civilizations*

GARDINER, K. H. J.

'The Kung-Sun warlords of Liao-tung (189-238), Part I.' *Pap. Far E. Hist.*, 5, 59-107.

'The Kung-Sun warlords of Liao-tung (189-238), Part II.' *Pap. Far E. Hist.*, 6, 141-201.

'Taoism.' *Essays on Religious Traditions of the World*. The Helen Vale Foundation of Australia, 66-73.

KUMAR, ANN L.

'Dipnagara (1787?-1855).' *Indonesia*, 13, 69-118.

LOOFS, H. H. E.

'Ein neuer Typ des randbeschlagenen Spatens aus Sachsen.' *Tools & Tillage*, I, 4, 237-40, 1971.

'Découverte d'une sidérurgie ancienne à U-Thông, Thaïlande centrale.' *Archeol. Rozhl.*, XXIII, 3, 337, 1971.

'Funanese cultural elements in the Lower Menam Basin.' *J. orient. Soc. Aust.*, 8, 1 & 2, 5-8, 1971.

MASON, R. H. P. & CAIGER, J. G.

A History of Japan. Cassell, 334.

RIZVI, S. A. A.

Fatehpur Sikri. Archaeological Survey of India, 97.

CHING, JULIA C.-Y.

The Philosophical Letters of Wang Yang-ming (1472-1529). ANU Press, 142.

Chinese

LIU TS'UN-YAN

'A comparative study of the three imperial commentaries on the Lao-tzū, Pt. I.' *Journal of the Institute of Chinese Studies*, IV, 2, 287-342.

'On Jaroslav Prusek's Chinese history and literature: Collection of studies.' *J. orient. Soc. Aust.*, 8, 1 & 2, 113-28, 1971.

'The Taoists' knowledge of tuberculosis in the twelfth century.' *T'oung Pao*, LVII, 19-20.

JOHNS, A. H.

Review of *The Admonitions of Seh Bari* (ed. & trans. by G. W. J. Drewes). *J. SE. Asian Stud.*, III, 2, 341-4.

*Indonesian
Languages
and
Literatures*

PRENTICE, D. J.

Review of *Sentence Analysis in Modern Malay* (by M. Blanche Lewis). *Asia Major*, XV, 2, 257-60, 1970.

SOEBARDI

'Prince Mangku Nagara IV: A ruler and a poet of 19th century Java.' *J. orient. Soc. Aust.*, 8, 1 & 2, 28-58, 1971.

SOEWITO-SANTOSO

'The word *taji* in the Rāmāyana kakawin.' *Studies in Indo-Asian Art and Culture*, I, 243-52.

'The Islamization of Indonesian/Malay literature in its earlier period.' *J. orient. Soc. Aust.*, 8, 1 & 2, 9-27, 1971.

'The legend of Djaka Bandung.' *Kunthi*, 2, III, 19-20.

SUPOMO, S.

'On the date of the old Javanese Wirātaparwa.' *Studies in Indo-Asian Art and Culture*, **1**, 261-6.

'The dating of the old Javanese Uttarakāṇḍa.' *J. orient. Soc. Aust.*, **8**, 1 & 2, 59-67, 1971.

'"Lord of the mountains" in the fourteenth century Kakawin.' *Bjidragen tot de Taal-, Land- en Volkenkunde*, **128**, 2 & 3, 281-97.

Japanese

PULVERS, R. S. (trans.)

The Swordsmen's Dance (by K. Miyazawa). *Meanjin Quarterly*, **31**, 4, 479.

PULVERS, R. S.

'Miyazawa Kenji isn't here now . . . you see he's gone to fetch the black thorns from the sun.' *Mainichi Daily News*, 11 July, 6000 words, p. 13.

'Kangaroo.' *Mainichi Daily News*, 28 August, 1000 words, p. 2.

'Spring and pandemonium.' *Meanjin Quarterly*, **31**, 4, 478.

South Asian and Buddhist Studies

DE JONG, J. W.

'A brief survey of Chinese Buddhist historiography.' *Studies in Indo-Asian Art and Culture*, **1**, 101-8.

'Notes à propos des colophons du Kanjur.' *Zentralasiatische Studien*, **6**, 505-59.

Review of *The Elders' Verses, I: Theragāthā* (trans. K. R. Norman). *Indo-Iranian Journal*, **XIII**, 297-301.

Review of *Karunāpundarīka* (ed. I. Yamada). *Indo-Iranian Journal*, **XIII**, 301-14.

Review of *Lives of Eminent Korean Monks. The Haedong Kosūng Chōn* (trans. P. H. Lee). *Indo-Iranian Journal*, **XIII**, 315-17.

Review of *Paläographisches zu den Sanskrithandschriften der Berliner Turfan-sammlung* (by Lore Sander). *Indo-Iranian Journal*, **XIII**, 317-19.

Review of *The Buddhist Nirvāṇa and its Western Interpreters* (by G. R. Welbon). *Journal of Indian Philosophy*, **1**, 396-403.

HERCUS, LUISE A.

'Eaglehawk and crow: A Madimadi version.' *Mankind*, **8**, 137-40, 1971.

'Arabana and Wanganuru traditions, Pt. 1: The Warana of Lake Eyre.' *Oceania*, **2**, 2, 94-109, 1971.

'Some unusual sound changes in Prakrit.' *J. Am. orient. Soc.*, **92**, 1, 100-4.

Review of *The Origin and Development of the Bengali Language* (by S. K. Chatterji). *AUMLA*, **1**, 276-7, 1971.

Review of *Linguistic Trends in Australia* (ed. D. C. Laycock). *Lingua*, **29**, 1, 91-4.

YUYAMA, A.

'"Jūni Innenju" Oboegaki.' *Indogaku Bukkyōgaku Kenkyū*, **XX**, 1, 448-4.

'A bibliographical guide to the study of Buddhist Sanskrit texts.' *Bulletin of the Bibliographical Society of Australia and New Zealand*, **4**, 77-81.

'Hokekyō Bonpon Shūi (1).' *Hokke Bunka*, **19**, 7-5.

'Hokekyō Bonpon Shūi (2).' *Hokke Bunka*, **22**, 7-6.

'Bibliographical activities by orientologists in Canberra.' *Aust. Acad. & Res. Libr.*, **III**, 2, 81-6.

THESES

Thesis titles of work successfully submitted by research students in the Faculty of Asian Studies on whom degrees were conferred in 1972:

Doctor of Philosophy

CHING, JULIA C.-Y.

'To acquire wisdom: The "way" of Wang Yang-ming (1472-1529).' *Departments of Chinese and Asian Civilizations*.

RULE, P. A.

'K'ung-tzu or Confucius? The Jesuit interpretation of Confucianism.' *Department of Asian Civilizations*.

TERWIEL, B.-J.

'Religion in rural central Thailand: An analysis of some rituals and beliefs.'
Department of Asian Civilizations.

TIWARI, J. N.

'Studies in Goddess cults in northern India, with special reference to the first seven centuries A.D.'
Department of Asian Civilizations.

DZULKIFLI SALLEH

'Modern Indonesian literature—the earliest years.'
Department of Indonesian Languages and Literatures.

Master of Arts (Asian Studies)

LEGG, ELIZABETH S.

'An outline of clause and phrase structure in Bahasa Indonesia.'
Department of Indonesian Languages and Literatures.

THE FACULTY OF ECONOMICS

REPORT OF THE DEAN

Professor C. R. Heathcote

Degree Structure

The structure of courses offered by departments in the Faculty remained substantially unaltered, exceptions being the introduction of teaching at third-year level in computer science and the conversion to semester units in statistics. The Department of Statistics took advantage of the change to semester organisation to adjust course content with the major aim of co-ordinating teaching in mathematical statistics and econometrics. New units introduced included Accounting Control (Department of Accounting and Public Finance) and Resources Policy (Department of Economics). The Master of Economics course work program, taught jointly by members of the Faculty and the Institute of Advanced Studies, continued to attract students of good quality and is now well established. A second course work program at postgraduate level leading to the degree of Master of Agricultural Development Economics was introduced. Whilst formally attached to the Faculty the program is administered and taught mainly by members of the Research School of Pacific Studies.

Enrolments

Total undergraduate enrolments in the four Departments of Accounting and Public Finance, Economic History, Economics and Statistics remained in round figures at 2,150, the same as in 1971, thus terminating the rapid growth experienced in the immediately preceding years. Enrolments in first-year courses, as at 30 April, declined from 1,233 in 1971 to 1,077 in 1972. The overall stability of undergraduate numbers was maintained by a larger number of students than previously proceeding to second and third-year courses. Nineteen students were enrolled for the degree of Master of Economics by course work and twelve for the Master of Agricultural Development Economics. Postgraduate students proceeding to a degree by thesis numbered thirteen for the degree of master and sixteen for the degree of Doctor of Philosophy.

Student Performance

Failure rates in first-year units continue to be much higher than in later-year units. The following table exhibits the success rate in the first-year courses offered by departments in the Faculty.

Success Rate (Passed/Enrolled) in First-Year Units.

	1971	1972
Accounting	53%	53%
Economic History	67%	74%
Economics	54%	53%
Statistics	64%	74%

The 74% success rate for statistics is an overall figure obtained by pooling the results of all first-year semester units in that subject. Thus it includes those students who passed the semester unit in introductory statistics at their second attempt after failing in the first semester examination. The statistics success rate at the end of first semester 1972 was 68%, which is more directly comparable with the 1971 figure.

Research conducted by members of the Faculty has included work on public expenditure theory; resource allocation in the public sector; cost-benefit analysis applied to roads; road finance; planning, programming, budgeting systems; defence economics; economics of education; taxation theory and policy; inter-governmental fiscal relations; national accounting systems; income measurement theory; accounting control systems; behavioural aspects of accounting; methodology in accounting theory; company finance; the British economy in the 1840's; economic stagnation in India, 1890-1940, with special reference to agriculture and population growth; Australian fertility trends in the late nineteenth century; Australian agricultural commodity policy 1929-1968, with special reference to wool and wheat; the application of economic theory and econometrics to historical problems; English intercounty fertility differentials in the nineteenth century; the question of the authorship of an anonymous nineteenth-century economic tract; Australian economic policy; population, pollution, and optimal growth and planning; microeconomic decision-making under uncertainty; foreign investment; trade and development in South-East Asia and the Pacific area; manpower programs; taxation and the rural sector; resource use; pure and applied probability theory; multivariate analysis; econometric time series; picture processing and pattern recognition; adaptive control; numerical methods and interactive systems.

Research

A major development was the acceptance of a proposal to establish the Centre for Research on Federal Financial Relations. The work of the Centre will be financed by the Commonwealth Government but it will operate as an integral part of the University and will be directed by Professor R. L. Mathews of the Department of Accounting and Public Finance.

*Federal
Financial
Relations*

Staff-student relations are cordial although the extent of student participation in departmental affairs is variable. The Faculty Education Committee met on several occasions during the year and in particular contributed usefully to the debate on the proposed structure of the University.

*Student
Participation*

Staff movements included the arrival of Professor S. Turnovsky to take up the third Chair in the Department of Economics. The resignation of a staff member of long standing occurred when Dr D. W. Stammer left the University to take up a post in the Reserve Bank of Australia.

Staff

The assistance of the Academic Registrar, the Business Manager and their staffs are gratefully acknowledged. The Faculty is also in debt to the Faculty Secretary and Sub-Dean for their efficient and effective work throughout the year.

Acknowledgments

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*Accounting
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'Methodology in accounting theory.' In *Accounting Concepts: Readings* (eds C. J. Gibson, G. G. Meredith & R. Peterson), 68-79, Cassell.

MATHEWS, R. L. & JAY, W. R. C.

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TILLEY, I. G.

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History*

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ARNDT, H. W.¶ & STAMMER, D. W.

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DRYSDALE, P. D. (ed.)

Direct Foreign Investment in Asia and the Pacific. ANU Press, 360.

*** Based on work done while a Visiting Research Worker.

† Not a member of this University.

¶ Member of the Department of Economics, Research School of Pacific Studies.

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GREGORY, R. G.¶ & JAMES, D. W.

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TURNOVSKY, S. J. & WACHTER, M. L.‡

'A test of the expectations hypothesis using directly observed wage and price expectations.' *Review of Economics and Statistics*, 54, 47-54.

¶ Member of the Department of Economics, Research School of Social Sciences.

‡ Not a member of this University.

WALSH, C.

'On internalising externalities.' *Economic Record*, **48**, 122, 254-9.

Statistics

ANDERSSSEN, R. S.¶ & SENETA, E.

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'An inequality for characteristic functions.' *Bull. Aust. math. Soc.*, **6**, 1, 1-10.

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JOHN, S.

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SCOTT, D. J.*

'An invariance principle for reserved metric spaces.' *Z. Wahrscheinlichkeitstheorie Verwandte Gebiete*, **20**, 117-28, 1971.

SENETA, E.

'Population projection variances and path analysis.' *J. Am. statist. Ass.*, **67**, 617-19.

¶ Member of the Computer Centre.

¶¶ Member of the Department of Statistics, Institute of Advanced Studies.

* Based on work done while a member of the Department.

THESES

Thesis titles of work successfully submitted by research students in the Faculty of Economics on whom degrees were conferred in 1972:

DUNCAN, R. C.

'The gains from pasture research in Australia: An economic analysis of research in the CSIRO Division of Plant Industry.' *Department of Economics.*

*Doctor of
Philosophy*

GARNAUT, R. G.

'Australian trade with Southeast Asia: A study of resistances to bilateral trade flows.' *Department of Economics.*

NICHOLLS, D. F.

'Inference problems for vector linear time series models.' *Department of Statistics.*

SCOTT, D. J.

'Functional limit results in probability theory.' *Department of Statistics.*

TOFT, H. I.

'The economic feasibility of a national drought reserve of grain.' *Department of Statistics.*

FORD, G. C.

'The development and extent of the Australian tariff on cloth and yarn.' *Department of Economics.*

*Master of
Economics*

LEWCHALERMWONG, A.

'Taxation and tax reform in Thailand.' *Department of Accounting and Public Finance.*

MINCHIN, A. St J.

'Investment allowances for Australian manufacturers.' *Department of Accounting and Public Finance.*

CURRIE, ALISON M.

'Some limit results in queueing theory.' *Department of Statistics.*

*Master of
Science*

McRAE, I. S.

'Ladder indices and other topics in random walk.' *Department of Statistics.*

THE FACULTY OF LAW

REPORT OF THE DEAN

Professor P. S. Atiyah

The year has been one of consolidation for the Faculty of Law, which has reached its maximum size in undergraduate enrolments.

Degree Courses

Council agreed in principle during the year to the introduction of a degree of Master of Laws by course work and research paper. This course will be established as soon as staff resources permit.

During the year the Faculty reviewed its method of assessing the award of the degree of Bachelor of Laws with honours, and revised the rules to reduce by one law subject the workload of students in the second year of the course for the pass degree or third year of combined courses. The Faculty has considered for some time that students in these years have been subject to an undue burden and is grateful to the Faculties of Arts, Asian Studies and Economics for their agreement to the course changes.

Legal Workshop

The first Legal Workshop course was held in the first half of the year and was an outstanding success.

The rationale behind the establishment of the Legal Workshop involves the recognition of two premises—that education for the practice of law calls for training at two levels, the academic and the professional; and that the professional part of the education of prospective lawyers is itself best provided in two stages, the first being a period of organised vocational training in an institutional setting, and the second a period of practical experience in a professional setting under supervision, or as it is sometimes called, a period of intraining in practice.

In this context, then, the role of the Legal Workshop is to provide the first of the two stages of the professional education of lawyers, that is, organised vocational training in an institutional setting. As such, the course is designed, in the first place, to introduce the student to the practice of law, to give him an understanding of the nature and role of the legal profession and to develop in him a sense of professional responsibility. In the second place, it is designed to develop further the academic resources and intellectual skills acquired by the student during his undergraduate training, and to teach him to adapt and apply them to the analysis and resolution of practical legal problems.

The course does not, and could not, aim to produce a fully equipped practitioner. It sets out to do no more than to provide the student with such basic training as will equip him for a further period of professional training in actual practice. It is a course which is complementary to intraining and intended to supplement and strengthen it.

The Legal Workshop provides a common course of training for both branches of the profession. Admission to the course is open to all graduates in law of any Australian university and enrolments for each course are restricted to thirty students.

Upon satisfactory completion of the course the student is then qualified to be admitted to practice in the Australian Capital Territory. Full reciprocal rights of admission have now been arranged with both New South Wales and Victoria, so that after admission in the Australian Capital Territory, a student may then, without further qualification, be admitted to practice in each of those States.

Being a course which was breaking new ground, it attracted considerable attention in legal, professional and educational circles and numerous requests for further information about the course were received from individuals and educational bodies throughout Australia and from abroad, as well as being the subject of favourable comment in legal literature.

Because of the number of applications received for admission to the Workshop, it has been found necessary to offer two courses in 1973. Each course will have a full enrolment and the severe demands such a program will impose on the space, staff and instructional resources of the Workshop are obvious. Without the help of many distinguished practitioners from New South Wales, Victoria and the Australian Capital Territory who have given instruction to Legal Workshop students, the demands would have been even more burdensome.

Almost 600 students including eleven postgraduate students were enrolled for law courses.

*Enrolments
and
Examination
Results*

Approximately 530 applications were received for entry and 160 new students were enrolled within the quota at the beginning of the academic year. The entry level rose slightly above the 1971 level but remained a little below the minimum aggregate for the award of a Commonwealth Scholarship. The percentage of part-time students enrolled declined by 6% from 32% to 26%.

With the exception of Criminal Law and Procedure failure rates in first-year subjects continued to decline slightly. The failure rate in the compulsory second-year subject of Commercial Law declined significantly from 26% to 13%. It remained stationary in Property I and Torts and rose in Administrative Law from 17% to 25%. Of these subjects Commercial Law was the only one in which a tutorial program was offered. This may have contributed to the improved results. The Faculty is anxious to provide tutorial teaching in Property I in which the high failure rate continues to be disturbing. Unfortunately the staffing position makes this impossible at the present time.

It is pleasing that the number of students excluded from further enrolment in law courses by the Faculty's Academic Progress Committee dropped from forty-four in 1971 to twenty-one in 1972.

Some difficulties in recruitment have been experienced. The fifth chair in the Faculty of Law remains vacant and two other vacancies have resulted from the loss of staff to the University of New South Wales. With the rapid expansion of posts at the Law Schools of the Universities of Sydney and New South Wales and Monash University, and the establishment of a new Law School at Macquarie University, it is expected that problems in filling vacancies will increase.

Staff

Professor H. Whitmore and Mr D. E. Harding resigned at the end of the year to accept chairs in the University of New South Wales.

Professor Atiyah succeeded Professor Whitmore as Dean of the Faculty in September.

*Research
and
Other
Activities*

Research was carried out on Contracts of Guarantee for the International Encyclopaedia of Comparative Law; law in developing countries; law of international trade; statutory interpretation in Australia; and the philosophy and sociology of law and on comparative law, especially the law of communist countries.

Whilst on study leave overseas, several members of the Faculty visited various universities and legal institutions. Members of the Faculty were actively engaged in the preparation of submissions and papers to various authorities and many contributions and articles were published.

Considerable correspondence has been conducted by the Legal Workshop with educational bodies throughout Australia and abroad who are concerned with the establishment and promotion of courses of professional legal education.

Members continued to serve on committees, commissions, at conferences and presented lectures on a wide variety of topics.

Professor Zines served as Dean of Students from September 1971 until his departure on sabbatical leave in May.

*ANU
Law Society*

The ANU Law Society has initiated the establishment of a Legal Referral Service manned by law students with the aim of helping less privileged citizens of Canberra to discover whether they have a legal problem and to tell them where to obtain legal advice.

PUBLICATIONS

ATIYAH, P. S.

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DAVIES, G. J. & HARRISON, R. J.‡

'Torrens Land System—Prior Certificate of Title.' *Alberta Law Review*, X, 344-7.

DAVIS, J. L. R.

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GEDDES, R. S.

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GOLDRING, J. L.

'Bankruptcy—preferences and running accounts.' *Aust. curr. Law Digest*, 27-30.

‡ Not a member of this University.

HAMBLY, A. D.

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HOLDER, W. E.

'1971 Advisory opinion of the International Court of Justice on Namibia (South West Africa).' *Fedl Law Rev.*, V, 115-24.

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KELLY, G. J.*

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RICHARDSON, J. E.

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TAY, ALICE E.-S.

'Gemeinschaft, gesellschaft, mobilisation and administration: The future of law in Communist China.' *Asia Q.*, 1, 257-303.

'The status of women in the Soviet Union.' *American Journal of Comparative Law*, XX, 662-92.

TEARLE, W. J.

'Oil pollution from shipping.' *University of Queensland Law Journal*, VII, 303-10.

'Some aspects of punishment in New South Wales.' In *Australian Criminal Justice System* (eds D. Chappell & P. Wilson), 557-70, Butterworth.

TURNER, C.

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'Common Law implied terms of fitness in contracts of simple hire and hire-purchase: An analysis.' *Australian Law Journal*, 46, 560-72.

WHITMORE, H.

'Administrative Law in the Commonwealth: Some proposals for reform.' *Fedl Law Rev.*, V, 7-30.

THESES

Thesis title of work successfully submitted by a research student in the Faculty of Law on whom a degree was conferred in 1972:

GEDDES, R. S.

'Custody of children in Australia.'

*Master of
Laws*

‡ Not a member of this University.

* Based on work done while a member of the Department.

THE FACULTY OF SCIENCE

REPORT OF THE DEAN

Professor I. G. Ross

It is likely that for some years the Dean of the Faculty of Science will find himself reporting adversities. These are not easy times. As reported in 1971, staffing entitlements have been redetermined in a way which declares that several departments of the Faculty are now overstaffed. Positions casually vacated are thus being disestablished, notwithstanding a steady increase in student numbers. Inevitably, the positions vacated tend not to be those which departments would chose to have lost if they had control of such matters. Additionally, the fifth report of the Australian Universities Commission has introduced a new figure of merit into University planning—the cost per student. The Faculty's costs are high and must, it seems, be reduced. The most acceptable plan to this end seems to be to work for growth which earns an entitlement for new staff and to take up much of this entitlement by the appointment of short term, junior or part-time staff.

Permanent staff establishments will remain fixed for many years and staff mobility in science departments is not great. Until a few years ago, all departments of the Faculty envisaged considerable future expansion—few of them have attained their intended complement in terms of spread of interest and back-up strength in key areas. It is now appreciated that the plans of the mid-sixties will not be realised.

The challenge to the Faculty is considerable and has been acknowledged in a logistic study carried through by a Planning Committee chaired by Professor J. D. Ovington. The Faculty sees growth of student numbers as the way out of its problems but believes that the structure given it in its salad days cannot be re-constituted unless eventual growth exceeds the notional bounds set by current estimates of the final size of the University. Briefly, the Faculty sees that it may need to increase enrolments by 70% or more, whereas the currently planned upper limit allows for only 50%. However, a 70% increase in student numbers would see only a 25% increase in permanent staff positions—some to allow for new developments and some to round off the complements of existing departments.

The Planning Committee's study has implications for the other Faculties as well, for while some of the Faculty's problems are of intramural origin, others represent the inevitable consequences of passing from youth through adolescence towards a steady, mature state.

Courses

The courses offered in the Faculty remained substantially unaltered but certain imperfections of teaching by semesters are now acknowledged and planning has begun for a probable major reconstruction of courses in 1974.

There have been two major developments. Microbiology, for some years envisaged as a future new department, has been introduced in a much scaled-down form with the establishment of posts of senior lecturer and demonstrator within the Department of Biochemistry and a board of studies to organise collaborative

programs with other biology departments. This device, namely the extension of the scope of existing departments rather than the establishment of new ones, will almost certainly be the pattern for such new developments as the future permits. Teaching in microbiology will commence in 1973.

A course in Human Sciences will also be offered within the Faculty on an experimental basis. It is hoped this interdisciplinary course will break much new ground, not only in its content but in the difficult matter of transcending boundaries between Faculties.

A new course structure has been approved leading to a four-year pass degree in specified circumstances. This course is now available in geology. The intention is to permit pass-level students to acquire a broader course of training rather than a more advanced one. There are well articulated economic reasons for not encouraging a proliferation of four-year pass degree courses—students who are enrolled for such courses will still have the option of taking a three-year degree. At the same time it is recognised that some students, particularly those who plan to practice their discipline in the field, may well be better served by four years of course work than by the conventional honours year which is taken in any event by 60% of graduates for the degree of Bachelor of Science.

Dr P. R. Stewart has been appointed Senior Lecturer in Biochemistry (Microbiology). *Staff*

The growing research productivity of the Faculty was summarised in the 1971 report. In 1972, publications totalled 233 (222 in 1971), degrees of Doctor of Philosophy awarded numbered thirty-two (the previous highest figure having been eighteen in 1970), and the degree of Master of Science by thesis was awarded to seven candidates (reflecting a decline from eighteen in 1968). It is unlikely that the number of degrees of Doctor of Philosophy awarded will continue at the high level of 1972—many graduates are thinking twice about entering a course of training heading towards well advertised difficulties of employment. For all that, the fall in enrolments in the physical sciences especially is so marked (and is general) that it is possible to contemplate a situation in five years' time in which young graduates of the degree of Doctor of Philosophy may again be in short supply. *Research*

As in previous years no attempt is made to summarise the highly diverse research activities of the Faculty. Instead there follows a selection of topics of research in different departments. The senior staff members responsible are named but it will be appreciated that research students and technical staff have in most cases been co-workers in these projects.

Biochemistry: Metamorphosis of the blowfly. Because of the speed with which blowflies undergo the striking transformation from maggot to fly, they are particularly suitable insects with which to study the biochemical changes occurring during development, especially as such changes appear to be basically similar throughout the whole animal kingdom.

The Department has devised a procedure for breeding the Australian sheep blowfly *Lucilia* under completely sterile conditions, for injecting various radio-

active materials into the developing adult, and for isolating specific cellular structures (eg, mitochondria, muscle fibres) and proteins from the mature insect. With these techniques, we have been able to provide a comprehensive and quantitatively precise description of the storage of protein ingested by the maggots (which feed on decaying flesh and wool) and its reutilisation during the formation of the adult fly. (Professor L. M. Birt with support from the Australian Research Grants Committee and assistance from the Division of Entomology, CSIRO.)

Botany: Beneficial microbes in native forests. Many forest trees are host to symbiotic fungi which promote the growth of individual trees by enhancing the uptake of nutrients through the roots. It also appears that parasitic microbes may play a constructive role, by contributing to the system of checks and balances which maintains the equilibrium of the forest community as a whole. A long-term objective is to assess the overall positive contribution of these various microbes. For this, a sound knowledge of host-microbe specificity will be needed, which in turn requires reliable identification of the organisms involved. Recent work has demonstrated the value of several chemical 'fingerprinting' techniques for identifying microbes and tree roots taken from natural habitats. (Dr G. A. Chilvers and Dr R. J. Seviour, with the co-operation of Associate Professor W. D. Crow of the Chemistry Department.)

Chemistry. Trees belonging to the genus *Eucalyptus* include a large number of valuable timber species which are extensively used in forest planting. However, since cuttings of these species do not strike roots, afforestation must rely on propagation by seed. A collaborative research effort between the Departments of Botany and Chemistry has shown that these species contain natural inhibitors of the root-striking process, and several of them have been isolated and synthesised. These inhibitors belong to a class of cyclic peroxide not so far encountered in plant chemistry and the origin of the peroxide linkage may well have physiological significance. The long-range objective of the research is to establish how these compounds are made in the tree and how they exert their effect.

Ability to block either of these pathways might open the way to substantial improvements in forest economy. The project is part of a wider interest in control of biological populations by natural chemical means—an attempt to avoid 'synthetic evolution' brought about by the indiscriminate use of man-made control agents. (Associate Professor W. D. Crow, in collaboration with Dr D. M. Paton, Department of Botany.)

Forestry: Forest land use on the south coast. In the past, forestry has been traditionally relegated to land considered unsuitable for agriculture. Currently, new demands, eg, for recreation, tourism and conservation, are being exerted on the existing forest areas. Because of these pressures, there is a need to review the traditional role of forests, particularly in very sensitive areas. The Department of Forestry has commenced a study of the potential for forestry development in the south coast region of New South Wales. The major objective is to ascertain the most efficient way in which the expanding demand for wood products can be met from the region while concurrently taking into consideration any factors which may influence forest management practices. Special attention is being

given to the classification of land for forest production and to the comparative economics of these forest land classes, of marginal farming areas, of regional development and of the placement of suitable forest industries.

The south coast region lends itself well to this type of study. Most of the area is covered by indigenous hardwood forests while much of the remaining un-forested land has been developed for dairying. The region is popular for recreation and consequently there is pressure on the forest authority to modify forest management practices to meet tourist needs. Excellent markets for wood products are available, particularly sawlogs, mining timber and pulpwood. (The study requires liaison with several authorities and scientific organisations; it also involves several staff members working as a team and covering a range of disciplines. The project is supported by a grant from the Rural Credits Development Fund, Reserve Bank of Australia.)

Geology. A highly successful attempt has been made to compile a geotectonic globe of 'Pangaea', the pre-drift assemblage of the world's continents. As a basis for this reassembly, a computer program for plotting and rotating continents into any desired position and on various projections has been developed.

With this material as a basis, studies were made of various aspects of Continental Displacement and Plate Tectonics and the data transferred, along with illustrations of models and diagrams, to a twenty-minute colour film with sound commentary. Valuable guidance was provided by Mr D. Fetherston of Visual Aids. The entire project represents a very substantial synthesis of global tectonics. (Dr M. J. Rickard.)

Physics: Hypervelocity aerodynamics. Economical space flight depends upon controlled recovery of spacecraft and their launching vehicles. Exploration of other planets also requires controlled entry into their atmospheres. Both applications demand a thorough understanding of the aerodynamics of flight at spacecraft re-entry speeds. To allow experiments at such speeds in the laboratory it has been necessary to develop a new type of pulsed wind tunnel. Following several years of design, development, construction and proving, this wind tunnel has recently become available as a research facility. Up to the present it has been used in studies of flow problems associated with the type of re-entry spacecraft, exemplified by the American 'Space Shuttle'. Thus the flow over blunt leading edges has been investigated, as well as the flow produced by a deflected control surface, and the flow over delta wings. More basic experiments have also been used to reveal gaps in present knowledge of chemical reactions in air at high temperature. (Dr R. J. Stalker and Dr H. Hornung, supported by the Australian Research Grants Committee.)

Psychology: The Hermannsburg Project. An Education Research Grant, supplemented by capital grants from the Office of Aboriginal Affairs and the Department of the Interior, has enabled Associate Professor G. N. Seagrim to set up a longitudinal study of the cognitive development of Aboriginal children in the Alice Springs area. The study is conducted mainly at Hermannsburg Lutheran Mission with comparison groups drawn from other centres of population. The performance of a large group of children on a battery of tests devised for this purpose will be followed for at least three years. It is hoped that something will thus be learned about the factors which handicap

these children and which do not appear to affect similar children raised, for example, in European families. Preliminary data appear to show, for instance, that many children regress rather than progress with age and that nutritional factors are unlikely to play a major part in the general retardation that is observed.

Theoretical Physics: The theory of optical systems. The theory of the defects of the imagery of optical systems has been vigorously pursued in two directions. In particular, the foundations have been laid for dealing with general (symmetry-free) systems, part of the work being devoted to the development of an appropriate mathematical formalism. Texas Instruments Incorporated has, as a token of their interest, borne the considerable costs of the page charges incurred in the publication of relevant papers in the *Journal of the Optical Society of America*, normal company policy notwithstanding. The propagation of light through insect eyes of certain types has been studied in collaboration with the Departments of Neurobiology and Applied Mathematics (Institute of Advanced Studies). (Professor H. A. Buchdahl and Dr P. J. Sands, with Australian Research Grants Committee support.)

Zoology: Reproduction of marsupials. When a female of the kangaroo family has an infant in the pouch, a very early embryo is also present in the uterus, but is inactive. The uterus too is inactive. The presence of the pouch young has now been found to act on the pituitary gland and through the pituitary on the ovary; by this route, inhibition of both embryo and uterus is maintained. If the young leaves or is removed from the pouch the inhibitory effect ceases and both the embryo and uterus become active. The same effect has been produced experimentally by removing the pituitary. The resumption of development by the embryo depends on secretions of the uterus; these have been analysed in detail. Detailed analyses have also been made to show what substances cross the placental barrier between mother and fetus and to what extent the fetus is biochemically independent of the mother. The only protein so far found to cross the placenta is albumin. The developing fetus is probably independent of the mother in most of its protein components and possibly also of some hormones, notably of the adrenal cortex. (Dr C. H. Tyndale-Biscoe, with CSIRO support.)

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* Based on work done while a member of the Department.

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* Based on work done while a member of the Department.

¶ Member of the Department of Geophysics and Geochemistry.

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THESES

Thesis titles of work successfully submitted by research students in the Faculty of Science on whom degrees were conferred in 1972:

Doctor of Philosophy

- ALLEN, G. H.
 'High speed plasma flow about probes.' *Department of Physics*.
- BODEN, R. W.
 'Changing land use in the Canberra region.' *Department of Forestry*.
- BRAITHWAITE, L. W.
 'Daylength, gonad cycle and flightless moult in black duck, *Anas superciliosa* and grey teal, *Anas gibberifrons*.' *Department of Zoology*.
- BUZZELL, G. R.
 'Studies on the miracidium and sporocyst of *Fasciola hepatica*.' *Department of Zoology*.
- CHAPMAN, B. E.
 'Studies of proteins by nuclear magnetic resonance spectroscopy.' *Department of Chemistry*.
- DAVIDSON, J.
 'Variation, association and inheritance of morphological and wood characters in an improvement programme for *Eucalyptus deglupta* Blume.' *Department of Forestry*.

* Based on work done while a member of the Department.

‡ Not a member of this University.

*** Based on work done while a Visiting Research Worker.

- DENNIS, E.
'Energy distributions of sputtered particles.' *Department of Physics.*
- FORD, G. E.
'The relationship between a nematode parasite *Trichostrongylus retortaeformis* and its host or environment.' *Department of Zoology.*
- HOUSE, P. D. R.
'Rat liver plasma membranes: Isolation: Enzymatic functions: And interaction with insulin.' *Department of Biochemistry.*
- JENSEN, A. R.
'Permo-triassic stratigraphy and sedimentation in the Bowen Basin, Queensland.' *Department of Geology.*
- KNIGHT, A. E. W.
'The decay of molecular luminescence.' *Department of Chemistry.*
- LAMB, D.
'Litter decomposition and nutrient release in *Pinus radiata* plantations.' *Department of Forestry.*
- MCCAY, I. W.
'The preparation and reactions of three bicyclo (4.2.0) octa-2,4,7-trienes.' *Department of Chemistry.*
- MCINTOSH, M. K.
'Non-equilibrium effects in shock tunnels.' *Department of Physics.*
- NUNN, E. E.
'The 1,2-photoaromatization reaction: A versatile route to highly strained ring systems.' *Department of Chemistry.*
- PETERS, D. E.
'Correlation of the chemistry and fine structure of wool.' *Department of Chemistry.*
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'Embryo-maternal relationships in the tammar wallaby *Macropus eugenii* (Desmarest 1817).' *Department of Zoology.*
- SANDS, R.
'Uptake of picloram by eucalypt leaf discs.' *Department of Forestry.*
- SHINEBERG, J. B.
'Lactose repressor mutants of *Escherichia coli* K₁₂ which are partially defective in their repression of β -galactosidase synthesis.' *Department of Botany.*
- SHORTHOUSE, D. J.
'Studies on the biology and energetics of the scorpion *Urodacus yaschenkoi* (Birula, 1904).' *Department of Zoology.*
- SPAIN, A. V.
'A study of aspects of the nutrient cycle in a New South Wales conifer forest.' *Department of Forestry.*
- WILSON, W. S.
'(4+2) π -Cycloaddition reactions. Their application to the synthesis of azocines and diazocines.' *Department of Chemistry.*
- ZIOLKOWSKI, F.
'The kinetics and mechanisms of the thermal decompositions of carbamates in the gas-phase.' *Department of Chemistry.*
- CHAN, J. H.-T.
'Alkylation of adenine derivatives.' *Department of Chemistry.*
- DUNSTONE, R. L.
'Some physiological aspects of evolution in wheat.' *Department of Botany.*

Master of
Science

- FOSTER, H. R.
'Near-surface diffusion anomalies in solids.' *Department of Physics.*
- FURRER, B. J.
'Management and silviculture in the spotted gum forests on the south coast of NSW.' *Department of Forestry.*
- HAYDEN, ELIZABETH J.
'Natural plant communities of New South Wales.' *Department of Botany.*
- LEY, K. F.
'Chemical studies of some histological components of wool.' *Department of Chemistry.*
- O'LEARY, A. T.
'The theory and design of zoom lenses.' *Department of Theoretical Physics.*
- PHILLIPS, PAMELA J.
'Adaptation of plants to contrasting temperature environments: A biochemical basis for the photosynthetic response.' *Department of Botany.*
- SOLAGA, C.
'The diffusion of scandium in magnesium oxide.' *Department of Physics.*
- STEELE, L. P.
'The kinetics and mechanism of the hydrogen chloride catalysed decomposition of t-butyl isopropyl ether.' *Department of Chemistry.*
- WILSON, D. T.
'Synthetic and mechanistic studies of ruthenium (III) complexes.' *Department of Chemistry.*

*Master of
Arts*

- CUNLIFFE, PENELOPE J.
'The role of training in the development of paw preference in the rat.' *Department of Psychology.*

THE UNIVERSITY LIBRARY

REPORT OF THE UNIVERSITY LIBRARIAN

Mr J. J. Graneeck

The new pattern of administrative organisation introduced at the beginning of the year worked smoothly and efficiently. The four subject librarians (Science, Social Sciences, Humanities and Law) made a considerable contribution, in co-operation with the academic staff, to a balanced development of the collections and also participated in reference work, bibliographic projects and reader education. A new post of Official Documents Librarian was created. Mr P. Clayton was appointed in March and had some success, through systematic checking of duplicates lists, scanning of catalogues and bibliographic aids and personal visit and contact, in obtaining valuable sets which were either new to the Library or which filled gaps in existing runs. A phased program of rebinding and repair of damaged volumes was initiated.

The Library Committee met twice and among other matters discussed ways and means of making provision for growth of the Library in the next ten years.

The University Librarian retired at the end of the year, and Miss J. M. Waller was appointed Acting Librarian until such time as a new appointment is made.

Professor A. D. Hope, OBE, completed his tenure of office as Library Fellow. The record of his achievement in the five years since his election provides ample justification for what has proved to be a highly successful innovation. Approval was given to the establishment of a new category of Library Visitor which, it is hoped, will enable selected individuals in the Public Service, the professions, industry and commerce to spend periods of study leave reading in the Library.

The work of the newly appointed Social Sciences Librarian, Mr D. McGrath, and the Official Documents Librarian was mainly directed to collection building and reader service in the R. G. Menzies Building which houses research collections in the social sciences. A special effort was made to develop holdings of materials in nineteenth and twentieth century British history. Arrangements for undergraduate use of the research collections continued to operate satisfactorily; undergraduate loans from the R. G. Menzies Building increased by almost 50% since 1970 without creating any insurmountable difficulties. There was a significant increase in the use made of ANU doctoral theses deposited in the R. G. Menzies Building. The number of loans of duplicate copies and photocopies to other libraries increased from 290 in 1971 to 434 in 1972. A spot check on the number of books reshelfed by library attendants in August and October provided a positive indication of more active exploitation of the available resources.

The reference department produced the first of what it is hoped will be a series of annotated guides to the research collections, entitled *Bibliographic Aids to Research in History and Politics, especially on Australian Topics*.

Reclassification of the monographs in the J. B. Chifley Building was completed and the collection is now more readily accessible to undergraduates than at any time since 1966 when the task was begun. There was a marked increase in the use of the open-shelf book stock with the result that the problem of maintaining accurate shelf order became acute. A number of undergraduates were recruited

to assist on a part-time basis in checking shelves and the situation was thereby brought under control. Many more personal and telephone enquiries were handled at the reference desk undoubtedly generated by the expanded Readers' Advice program and new developments in teaching methods. The pattern of reader education established in recent years was maintained and extended to new subject areas, including Australian and American history, American literature and South-East Asian civilization. Appointment of a second readers' adviser made it possible to provide a continuous service of individual guidance and assistance. A comprehensive *Guide to Reference Materials in Asian Civilizations* was compiled and will be available for distribution to students early in the new year. Select lists in English literature and political science were also compiled and distributed.

The Reserve Desk had a difficult year aggravated by an exceptional number of staff changes, delays in the production of the computerised catalogue and an outbreak of petty pilfering. Following discussions with academic staff, new streamlined procedures were introduced designed to reduce pressures and improve service.

As a result of the appointment of Miss K. Britcliffe as Humanities Librarian, it was possible to make some progress with the development of a research collection in the J. B. Chifley Building in support of studies in European language and literature.

Appointment of Mr Y. S. Chan as Senior Librarian responsible for contemporary China studies resulted in an overall strengthening of the Chinese language book stock, particularly in the fields of contemporary government and politics, economics and literature. A revised list of Chinese periodicals held by ANU and including the holdings of Melbourne and Sydney University libraries, has been prepared and will be distributed early in 1973. A first list of Japanese periodicals was also compiled and made available to interested users.

The Library has been fortunate to secure the services of Mr C. Hobbs, formerly Head of the Southern Asian Section, Orientalia Division of the Library of Congress, Washington, DC, as Visiting Senior Librarian for a period of six months from 1 October. Mr Hobbs is advising the Library on collection development of South-East Asian materials.

Miss R. O'Shea was appointed Law Librarian in succession to Mr P. Biskup. The Library was used intensively and there was a sharp increase in reserve desk loans from 29,000 in 1971 to 38,000 in 1972. A list of holdings of French legal materials was compiled and distributed to the French Embassy and other Australian law libraries. The outstanding feature of the acquisition program was the near completion of our holdings of Irish and Scottish Statutes and Reports.

The extensions to the Physical Sciences branch library were completed providing improved layout of the stack and staff quarters and a new store-room and microfilm room. The Life Sciences library acquired several complete sets of journals and a number of basic multi-volume works which have been extremely scarce for many years and very difficult to obtain. The program of acquisition in the earth sciences was accelerated and special attention was given to rationalisation of holdings in the relevant sections of the library.

Limited use was made of the Medlars service provided by the National Library. Despite this discouraging experience, steps were taken to gauge user reaction to a number of other computerised services available overseas.

A notable contribution to the services rendered to readers was the long awaited publication, after many vexatious delays beyond the Library's control, of the first, preliminary edition of the computerised list of current serials received in the Library. This will be updated at regular intervals and should prove an invaluable guide to the Library's resources.

Apart from some temporary accumulations in areas of unusually active acquisition there are no back logs of cataloguing of Western language materials. In Asian languages there is a more difficult situation, particularly in respect of South Asian materials. There is some prospect of a solution to the problem if the attempts which are being made to recruit an Indian librarian prove to be successful.

The reclassification unit made considerable progress during the year. In the six years since its inception, over 60,000 titles (comprising 125,000 volumes) have been processed. In addition to the monographs in the J. B. Chifley Building, the Medical Sciences branch library has been completely reclassified. It is expected that the sub-unit which was set up to expedite the work in Physical Sciences will complete its task early in 1973.

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CENTRE FOR CONTINUING EDUCATION

REPORT OF THE DIRECTOR

Dr C. Duke

During the year the Centre for Continuing Education further clarified its special role and responsibility as a part of the ANU. It has come to know what educational situations best bring people and ideas together in the special environment of the University, to facilitate the clarification of important national concerns among those particularly able to influence or change them. At the same time, by arranging seminars and search conferences in a diversity of significant areas, the Centre has acquired greater expertise in the design and evaluation of learning situations. It is now widely recognised and frequently approached for assistance in the planning of courses and conferences by a variety of institutions and associations.

The Centre thus became an adviser or consultant to a number of other educational agencies, and to some non-educational agencies attempting educational provision. The philosophy of the Centre has been clarified in the direction of seeking to foster a more educative, or learning, environment in the various leisure and particularly work contexts which determine the quality of life of different groups in the community. Success in a number of projects is to be determined by the way organisations modify their structures, task, roles, and climate, to enhance training and learning (as in the training division of Public Service or industry) or teaching (as with trainee nurses and doctors in a hospital) and to enrich the jobs of their employees generally. The Centre's special national conferences and seminars are mostly courses in management to enhance competence in managing material and human resources. As experience has been gained in discriminating between potentially fruitful and relatively ineffectual projects and in learning to assess or evaluate the longer term consequences of such work, the Centre has slightly reduced the number of such courses compared with 1971. Those offered have generally been better designed to meet the providers' and the clients' educational objectives, acquiring greater effectiveness by involving participants over a much longer span of time than the conference itself.

This has assisted in clarification of the tasks and identity of academic members of the Centre. Criteria for promotion have been clearly defined. Although Centre staff do very little conventional teaching by way of weekly lectures, much of their work in conducting seminars and exploratory meetings, often away from Canberra, which feed into national conferences, is itself teaching. Beyond this, teaching takes the form of devising and sustaining effective learning environments in residential courses by chairing sessions, moderating syndicates, etc. Thus, while 120 people took part in a national conference entitled 'Graduates for What?', arranged in Canberra on behalf of the Graduate Careers Council of Australia and the Australian Vice-Chancellors' Committee, a much larger total number took part in preparatory half-day regional meetings in each capital city under the guidance of Centre staff and of colleagues working with them on this project. Some will be involved in follow-up seminars in 1973. Subsequently, a research assistant involved in the exercise was engaged for four months to follow up the conference and evaluate its effectiveness. This material is now being

used by an academic member of staff concerned with processes of social change and the diffusion of information. Academic studies in the Centre are thus often concerned with action and feedback into the particular community involved with a project. At the same time it has become clear that more effort must be devoted to conceptualising and reporting such action and research. Some of the Centre's resources are being shifted in this direction. The Centre thus now sees itself as an applied social and behavioural science unit with a particular responsibility for studying the change processes triggered off by its own operations.

Within this central area of national conferences, some deserve special mention. Several were concerned with educational institutions and processes themselves, conformably with the belief that continuing education is about the whole spectrum of formal and informal educational provision from pre-school to retirement, not just leisure-time classes for adults. These included the conference 'Graduates for What?' involving all parties responsible for the production and employment of graduates and a narrower exercise which examined the burgeoning of sociology and the different perceptions among employers and academics as to its meaning. This was arranged at the request of the Sociological Association of Australia and New Zealand which contributed to the cost. Another co-operative venture on an aspect of education was a search conference on adult education for Aborigines funded by the Office of Aboriginal Affairs and conducted in co-operation with the Australian Association of Adult Education. In May a week-long national workshop on specific learning disabilities was arranged in co-operation with the national and State Specific Learning Disabilities Associations as an in-service course for teachers and others. After an initial refusal, this project was assisted by Commonwealth Education and Science funds as well as by SPELD contributions. Two other search conferences, one in May for doctors and the other in December for nurses, examined the teaching and learning which takes place in hospitals. Both took the Canberra Hospital as a case study and attracted high-level interstate participation. Both of these conferences, like several others during the year, were followed by proceedings intended to foster thought along the lines of discussion and recommendations at the conference among others not able to take part in the conference itself.

Two national courses have emerged as central to the Centre's philosophy and interests. The intensive ten-day seminar on 'The Development of Human Resources' was held for the third time in April, attracting managers from industry and commerce, the Public Service and other non-profit-making organisations. A training course on Small Group Learning Methods in May, attracted teaching and training personnel from a variety of settings ranging from colleges of education and advanced education to industrial training and agricultural extension. Both courses will be offered again in 1973 with modifications derived from the 1972 course. They provide a laboratory for the Centre to develop its ideas and experience of social and organisational change through group methods and to experiment with the small autonomous group which is a powerful learning device. The benefits of this experience show themselves in other kinds of courses, particularly the search conferences. A second Human Resources course was arranged for one nominating organisation from the main course, providing the

Centre with experience in the dissemination and diffusion of ideas for organisational change in a particular setting. Earlier in the year a special Small Group Training course was offered to the main tertiary institutions in Canberra: although the College of Advanced Education was willing to nominate a suitable contingent of participants the University did not reciprocate and the course was therefore cancelled.

A number of other special conferences and seminars were arranged. Probably the most demanding and significant drew together government and private participants from both sides of the Tasman to examine present and future trade and other relations between Australia and New Zealand. Although deferred because of an airline strike, this venture which was arranged in conjunction with the Victoria University of Wellington, proved stimulating and fruitful of ideas and it is likely that a second conference will be held there in 1973.

Other conferences included an examination of Restrictive Trade Practices legislation and needs, a study of the Australian minerals industry drawn together and directed by Dr Susan Bambrick, and annual summer schools on aspects of religion and journalism. The latter is the last of the series in its original form because both the Centre and the Canberra branch of the Australian Journalists' Association feel some dissatisfaction with the design and educational efficacy of such a School in relation to the needs of the profession. It is hoped that a search conference will be held instead of a summer school some time in 1973. The Centre's senior administrator also organised a seminar in August on the 'Departure of Migrants' for the Department of Immigration.

Several other significant projects, some of which took considerable academic and administrative time, were deferred either because still more time was needed or because some political factor (especially the imminence of the Federal Elections) intervened. Prominent among these was a proposed seminar with parliamentarians, senior parliamentary officers and Public Servants on the 'Future of Parliament'. Other projects included search conferences on the shape of education in the ACT, on Aboriginal affairs and on industrial relations. A pilot course to examine industrial relations at the shop-floor level within the Australian Post Office was eventually abandoned after nearly two years of discussions. Although there was no tangible outcome the exploratory work was not without value both to the Post Office and Union personnel and to the Centre staff concerned.

While seminars and search conferences have taken much time and attention, refresher and other longer training courses have shown less progress. Highly successful courses of a month's duration continue to be offered in Japanese and spoken Mandarin, the latter jointly with the Canberra College of Advanced Education. These provide a model for such work with internal departments, but it is unlikely that they will multiply until internal University staff can receive more significant compensation for the time involved which is more likely to be attractive as relief from other duties during the year than in terms of higher fees. Progress will be slow until such courses attract AUC funds and so provide additional resources to internal departments.

A second course in mathematics for social scientists was arranged on behalf of the Academy of Social Sciences. Although this course was made available for

participants from outside tertiary institutions it attracted only three non-academic participants, all from the Public Service. It seems probable that after perhaps one more year this course will have done its work in each university and major college of such teaching. The course is providing the Centre with a protected opportunity for offering another course to the Public Service and business community; the slight response may be attributable to the fact that most Australians are not yet prepared for the idea of month-long periods of study leave except for a very few well recognised courses and purposes.

The only longer training course offered during the year was the thirteen weeks part-time local Health and Welfare course which has been significantly modified and developed since the Centre first offered it in 1970. Although probably at a sub-university level it was taken on for a limited term for the Centre to experiment with and improve course design before transferring it to some other institution. This year the course evolved around a sociological framework for the first time and discussions with the Canberra Technical College should lead to that institution offering it as a regular feature. This illustrates the experimental role in continuing education which the Centre has set itself and the need to remain a flexible and small unit.

Attempts to establish term-long refresher courses for high school teachers from all parts of the Commonwealth have been virtually shelved, following discouraging responses from the State Directors-General. An alternative proposal for such courses for inspectors was developed by exchange of letters but then referred to the Canberra College of Advanced Education School of Teacher Education which may soon be able to offer postgraduate external courses to meet this need. Further planning has gone into a system of education for union leadership and it is hoped that this may bear fruit in 1973.

A new approach to refresher education was launched late in the year. Following discussions with the Librarian and in the Library Committee, a scheme known as the Library Visitors Scheme was established, whereby small numbers of relatively senior persons from business, the professions and the Public Service might engage in self-directed study on campus for four weeks or more. First indications are that this will attract a small but steady stream of suitable people who might benefit the academic community while pursuing their own interests through the work of the University.

The University, through the Centre, continues to provide an increasingly stimulating and diverse program of mostly evening classes in the natural and social sciences and the humanities. Particularly interesting is the success with which some natural science departments have successfully devised and taught courses which convey something of the structure and approach of their discipline to the layman. While the behavioural science area continues to expand, it has yet remained possible to sustain a good balance between the main subject areas represented within the University. One pleasing feature of this year's Class Program has been the greater involvement of some departments. While wastage, particularly in the winter term, remains an endemic problem, few classes could be described as failures. The most successful appear to have been several in which a strong cohesive spirit developed through a seminar approach and some others where a particularly stimulating and imaginative lecturer was able to hold

his class together despite the lack of individual tuition. The Centre regrets that pressure on its academic resources has so far prevented it from offering adequate induction to tutors at the beginning of the year. In all 1,866 students attended the classes in 1972. Follow-up work has continued by means of a further questionnaire to the 1970 survey of students attending classes in an attempt to develop an explanatory model as to the reason why they attend and what effect participation may have on them.

An increasing proportion of the time of academic staff of the Centre has been taken up in advising other agencies making educational provision. The Director and Dr A. T. Davies stayed at the Australian Administrative Staff College on three occasions during the year to observe and comment on the educational processes and purposes of the College, especially the operation of the syndicates. Dr Davies will visit the Henley Staff College in 1973 for comparative purposes. Other bodies advised included the Pharmaceutical Society of Victoria, the Royal College of Physicians, the Administrative and Clerical Officers' Association, the Commonwealth Office of Aboriginal Affairs, the Darling Downs College of Advanced Education, the Foundation for Youth (Canberra Lottery) and the Sisters of Charity. Consultation with other agencies has been a characteristic of many of the Centre's national projects, some of which are sponsored jointly with other organisations. This process, especially since such conferences have increasingly come to be held in University House, has helped to build bridges between different parts of the University and the community.

Much of the Centre's research effort continues to be applied to evaluation in a broad sense. Apart from projects on the Class Program and the conferences on graduate employment and sociology, studies are in progress or have been completed of the 1971 National Fisheries Seminar for the Department of Primary Industry, of a reading dynamics course offered on campus for the Students' Representative Council in conjunction with the lecturer in efficient reading, and of learning group processes in a number of different courses. The Centre would like to undertake systematic follow-up and evaluation of several earlier projects, particularly the 1971 Science and Industry Encounter and early Human Resources Seminars, but resources do not yet allow this. A joint survey with PA Management Consultants on employer attitudes to human resource management was being processed for publication at the end of the year. Other academic time has been devoted to editing and publishing papers produced through the conferences of the Centre; the Director remains editor to the International Congress of University Adult Education and was elected Chairman of the Australian Association of Adult Education. Dr Davies retired from the Executive of this Association in anticipation of study leave which is to be devoted to studying the diffusion and application of social science findings in organisations.

Weekly seminars on aspects of continuing education continue to attract a diverse group including Canberra College of Advanced Education and Canberra Hospital personnel, medical practitioners and clergymen, as well as colleagues from the University and the Public Service. A first series of papers from these seminars has been edited by Dr N. F. Haines and published and others will follow. The seminar series has become a form of professional development and a channel for professional exchange for local and interstate continuing educators and others.

Dr Haines visited Britain to present a paper on education and the management of resources to the Second International Conference on Higher Education. He also spoke on continuing education and small group methods to the Women's University, Bombay. The Director took part in a workshop on the training of adult educators in Delhi and has been invited, if time and resources can be made available, to set up a course for the training of key university adult education personnel in India. Members of the Centre have addressed national and state associations of tutors, training personnel and adult educators on aspects of continuing education. It is hoped as the Centre's academic strength increases in the coming triennium that the experience gained in 1971 and 1972 will provide a base for more systematic training and research in continuing education through higher degree study and special workshops in Australia and Asia.

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‡ Not a member of this University,

§ Member of the Research School of Chemistry.

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AUSTRALIAN NATIONAL UNIVERSITY PRESS

REPORT OF THE DIRECTOR

Mr W. A. Wood

The Press is the publishing department of the University. General responsibility for and control of the Press are vested in the Vice-Chancellor. An Editorial Committee, consisting largely of members of the academic staff, supervises editorial policy, specifically authorises publication of scholarly works not expected to recover their costs, and advises the Press on matters of broad consequence.

During the year, thirty-five new books and one journal were published. The first volumes in a new series, *Immigrants in Australia*, sponsored by the Academy of the Social Sciences, were issued. Another series, *Asian Publications*, sponsored by the Faculty of Asian Studies and the Department of Far Eastern History, also commenced during the year. Three public lectures given at the University were published and eight publications issued by other departments were taken on for commercial distribution.

Perhaps the most notable publication of the year, and certainly the largest yet undertaken by the Press, was *Manuscripts in the British Isles Relating to Australia, New Zealand and the Pacific*, edited by Miss P. Mander-Jones, OBE, the former Mitchell Librarian. This reference work was sponsored by the University and the National Library of Australia and its publication was the culmination of nine years of preparation.

Ninety-four manuscripts were submitted to the Press, of which thirty-eight were accepted for publication. These figures are very similar to those of 1971 but show an increase of approximately 50% on earlier years.

The interests of the Press in publishing works on Polynesia and Melanesia were underlined by the Editor's trip to New Zealand and Fiji and by the appointment of an academic editorial adviser in Papua New Guinea.

Wider distribution of publications was given particular emphasis with the appointment of sales representatives for all Australian states. Overseas, Angus and Robertson (UK) Ltd in London, was appointed the Press' stockholding agent for Europe, Africa, and the Middle East, thus finally giving the Press representation in all major overseas markets. Overseas distribution and co-publishing were the primary reasons for a two-month trip to Europe, North America and East and South-East Asia undertaken by the Director in spring.

PUBLICATIONS BY THE PRESS

ADIE, W. A. C.

Chinese Strategic Thinking under Mao Tse-tung

AITKIN, D.

The Country Party in New South Wales: A Study of Organisation and Survival

ARNDT, H. W.

Australia and Asia: Economic Essays (clothbnd & paperbnd edns)

BEAZLEY, K. E.

John Curtin: An Atypical Labor Leader

- BIRD, E. C. F.
Coasts (paperbnd repr.)
- BOLTON, G. C.
A Thousand Miles Away: A History of North Queensland to 1920 (paperbnd)
- CHING, JULIA C.-Y.
The Philosophical Letters of Wang Yang-ming
- DAVIES, J. L.
Landforms of Cold Climates (paperbnd)
- DE RACHEWILTZ, I.
Prester John and Europe's Discovery of East Asia
- DONNITHORNE, AUDREY G.
The Budget and the Plan in China: Central-Local Economic Relations
- DOW, F. D. M.
An Outline of Mandarin Phonetics (2nd edn)
- DRYSDALE, P. D. (ed.)
Direct Foreign Investment in Asia and the Pacific
- FITZGERALD, C. P.
The Southern Expansion of the Chinese People: 'Southern Fields and Southern Ocean'
- FITZGERALD, S. A.
Talking with China: The Australian Labor Party Visit and Peking's Foreign Policy
- HARRIS, S.
This Our Land (clothbnd & paperbnd edns)
- JOHNSTON, RUTH
Future Australians: Immigrant Children in Perth, Western Australia
- JUKES, J. T. G.
The Development of Soviet Strategic Thinking Since 1945
- KAMENKA, E. (ed.)
Paradigm for Revolution? The Paris Commune 1871-1971
- KING, P.
The Strategy of Total Withholding
- LEWIS, D.
We, the Navigators: The Ancient Art of Landfinding in the Pacific
- MACKERRAS, C. P.
The Uighur Empire According to the T'ang Dynastic Histories: A Study in Sino-Uighur Relations 744-840
- MANDER-JONES, PHYLLIS (ed.)
Manuscripts in the British Isles Relating to Australia, New Zealand, and the Pacific
- MARTIN, JEAN
Community and Identity: Refugee Groups in Adelaide
- MASTERMAN, J. C.
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- O'CONNELL, J. F.
A Residence of Eleven Years in New Holland and the Caroline Islands (ed. S. H. Riesenbergl)
- PARKER, R. S. & TROY, P. N. (eds)
The Politics of Urban Growth (clothbnd & paperbnd edns)
- STRATHERN, A. J.
One Father: One Blood: Descent and Group Structure among the Melpa People

THOMSON, KATHLEEN & SERLE, G.

A Biographical Register of the Victorian Legislature 1851-1900

TURNER, NAOMI

Sinews of Sectarian Warfare? State Aid in New South Wales 1836-1862

WATERMAN, A. M. C.

Economic Fluctuations in Australia, 1948 to 1964

WATERSON, D. B.

A Biographical Register of the Queensland Parliament 1860-1929

WEBBER, M. J.

Impact of Uncertainty on Location

DEPARTMENT OF SOCIOLOGY, INSTITUTE OF ADVANCED STUDIES

The Australian and New Zealand Journal of Sociology (3 issues)

COMPUTER CENTRE

REPORT OF THE HEAD OF CENTRE

Dr M. R. Osborne

The close of 1971 saw two major decisions taken in relation to computing in the University. A U1108 computer with a computing capacity of about seven times that of the heavily overloaded IBM 360/50 was ordered and a committee was set up to advise on computing developments in the ANU. Unfortunately this committee has not reported and this has created an atmosphere of uncertainty during a period of major expansion of the computing facilities.

The first part of the year was dominated by the requirement to prepare the site for and plan the operation of the U1108. The new machine became operational in May and quickly took over the main computing burden. It is now heavily used and the availability of remote consoles has been a major factor in achieving this utilisation. To provide operators it was necessary to reduce the number of Centre operators on the IBM 360/50 and the Data Processing Unit has provided invaluable assistance in operating this machine. Operators will be available in 1973 to satisfactorily staff the three-shift operation of the U1108. Throughput of the U1108 is at present limited by the restricted backing store available, but it is hoped that this can be expanded in 1973.

The basement area in the R. G. Menzies Building had to be readied very quickly and trouble with the machine room acoustics and air-conditioning was encountered. It is hoped that remedial action has removed these problems.

The separation of the programming and operations staff in the R. G. Menzies Building and the academic staff in the Cockcroft Building has led to a number of problems in operation and direction of the computing service, including major inefficiencies in the Centre's consulting work.

Systems development work has proceeded fairly smoothly with the U1108, and UNIVAC provided considerable initial help in getting the machine operational. A number of seminars and lecture courses were held in addition to the usual programming courses to provide instruction for users on the new equipment. A programmer has been designated system librarian with special responsibility for the subroutine library. This has been a great help in establishing a common subroutine library on the campus computers.

Work on computer systems has continued despite some key resignations during the year. The IBM 36/50 console system now offers a BASIC interpreter. A general purpose link for sixteen-bit computers has been designed and is being used to connect the NOVA and PDP-11. It is intended that it will be adopted as a standard for linking mini computers on campus. A high-speed link between the U1108 and the PDP-11 has been designed and construction commenced.

Significant contributions in numerical analysis made during the year include a convergence result for the numerical solution of a first kind Fredholm integral equation, an algorithm for the stable differentiation of functional data contaminated with error, an algorithm for solving a generalised eigenvalue problem, an efficient method for unconstrained optimisation using derivatives, a least

squares procedure for improperly posed problems, economical (and machine independent) procedures for generating random numbers, and computational procedures for nonlinear experimental design problems.

Members of the staff participated in the fifth Australian Computer Conference, at several other conferences, and in a number of colloquia and seminars. The annual One-day Seminar was held on 6 December. About two hundred participants attended. This year's theme was 'Error, Accuracy, and Approximation'.

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* Based on work done while a member of the Department.

¶ Member of the Department of Geophysics and Geochemistry.

THESES

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'Transformation methods in nonlinear programming.'

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'The development of interactive facilities for the DDP-516 digital computer.'

*Master of
Science*

UNIVERSITY HOUSE

REPORT OF THE MASTER

Professor Emeritus Sir Rutherford Robertson, CMG, FAA, FRS

Governing Body

At the end of 1972 the composition of the Governing Body was as follows:

Master: Professor Emeritus Sir Rutherford Robertson.

Fellows: *Retiring 15 August 1973*: Dr P. A. Arriens, Mr I. C. Maclean, Mr R. M. McCulloch, Dr A. B. Roy, Mr P. E. M. Standish.

Retiring 15 August 1974: Dr A. R. Crawford, Dr C. Duke, Dr F. E. M. Lilley.

The Master was in residence throughout the year except for a short period in hospital in January. During the year, he continued collaborative work in biochemistry with Dr D. Weiss, FAA, of the CSIRO and Dr F. L. Bygrave of the Department of Biochemistry, School of General Studies, but at a somewhat reduced rate due to other activities. Sir Rutherford was re-elected President of the Australian Academy of Science and Chairman of the Consultative Committee of the three Australian academies. He continued as Chairman of Committee for the Queen's Fellowship in Marine Science and was appointed to the Commonwealth's Advisory Committee on Science and Technology. Considerable work was involved in the survey of times given to teaching and allied duties in the School of General Studies. This survey was undertaken at the request of the Vice-Chancellor.

The Chancellor

The Chancellor, Dr H. C. Coombs, FAA, has frequently been in the House, staying in the Chancellor's flat during the year.

Members and Residents

At the end of the year total membership stood at about 757 with eighty-seven invited members. Despite considerable publicity for the House in the ANU Reporter and individual invitations to all new staff members, the total membership has not increased during the year. Members of the University are now finding various alternatives for their social and club life.

Though the membership of the House has not increased during the year, the occupancy has been consistently higher than that of 1971. The improvement in occupancy has been due to a deliberate effort to induce academic visitors to Canberra, particularly those attending conferences, to stay at the House. The arrangement with the Centre for Continuing Education has been very satisfactory to both the House and the Centre. The House has also accepted some permanent residents who are associated with institutions other than the ANU, eg, CSIRO. The number of postgraduate students in residence reached a maximum of seventy-five in April and decreased steadily during the year to about forty-five in December. The House continues to provide a friendly and sociable atmosphere for academics and is greatly appreciated by visitors to the University.

Increases in tariffs for both casual and permanent residents have been necessary to keep pace with the increasing costs. The introduction of a bed and breakfast rate for casual visitors was a success and the Governing Body decided to introduce the alternatives of bed and breakfast rates or full board for all residents in 1973.

Tariff

During the year the House had two of the University's Creative Arts Fellows in residence—Mr Stanislaus Ostoja-Kotkowski continued to live in the House for much of the year and Miss Norma Redpath visited the House on three occasions.

Visitors

The House was pleased to have many of the distinguished visitors to the University in residence including a high proportion of those listed in the sections on Visiting Research Workers and Visitors.

At the time this report is being prepared considerable alterations are taking place. The area of the old bar, together with the adjoining service area, is being altered to provide a bar-bistro area which will increase the flexibility of the House for serving food and drink with longer meal hours. The Meetings Room in the Eastern Annexe which is an important part of the House's facilities for small conferences is being renovated and refurnished. Work on the renovation of the individual rooms and sets of rooms will begin soon.

*Buildings and
Grounds*

The library has been in constant use during the year and many new books were acquired either by gift or by purchase. The excellent equipment in the music room, which was greatly improved at the beginning of the year, has provided pleasure to many people who have enjoyed the wide range of music available on the records.

*Library and
Record
Collection*

During the year the House received, on extended loan, a share of silver, ceramics, glass and antique furniture from the Lyttelton-Taylor Collection.

Gifts

The presentation of the new mural by Leonard French for the Hall was the most notable event of the year. The painting 'Regeneration', in brilliant colours of enamel on panels, covers the entire end wall. This gift was made possible by generous donations from a small number of members of the House.

The Commencement Dinner, held early in March, was attended by a large number of members. Guest Nights were held in both second and third terms. About 170 people attended the St Andrew's Day Dinner which was also a farewell occasion for the Master, prior to his becoming Director of the Research School of Biological Sciences. The University Consort presented musical programs at each of these dinners. The occasion of the installation of the Leonard French mural was marked by a dinner to entertain the donors and the artist. In collaboration with 2CA and the ANU Chamber Music Society, the Canberra Wind Group gave a Concert in Hall which was very well attended and received.

Functions

Guest tables have been arranged three evenings a week during term and twice a week out of term. The opportunities provided for members of the House to dine with casual residents and invited guests have been appreciated.

*Residents'
Committee*

The Residents' Committee was reorganised during the year and did valuable work in conjunction with the Governing Body. Mr I. Stimpson was Chairman until he moved out of the House and was succeeded by Mr R. Landrum.

*Council
Committee*

The Committee appointed by Council to look into the role and functions of University House continued its work in the early part of the year with some changes in its composition. It consisted of the Master as Chairman, Professor F. C. Courtice, Professor A. N. Hambly, Mr D. M. B. Butt, Dr G. Fox and Mr R. A. Hohnen, OBE. The final report of the Committee which was adopted by the Council in May, recommended that the House continue the policy adopted in 1972, that is with an increase in the conferences and casual residents.

PUBLICATION

ROBERTSON, R. N.

'Scientists and government in Australia.' *Impact Sci. Soc.*, **22**, 187-96.

STUDENT RESIDENCES

BRUCE HALL—*Warden*: Mr W. P. Packard

BURTON HALL—*Acting Warden*: Dr M. M. Gore

GARRAN HALL—*Warden*: Dr J. R. T. Short

GRADUATE HOUSE—*Chairman of the Governing Body*:

Miss E. Crosby (to September 1972);

Dr J. M. Potter (from September 1972)

(The three affiliated colleges report to their own governing bodies.) There was a further increase in the number of applications for residential accommodation within the University. The completion of Burgmann College in 1971 meant that there were some 1,450 places available and as a result the demand for hall and college accommodation was met in 1972.

For the three halls of residence the numbers of students in residence were:

<i>Halls</i>	<i>Undergraduates</i>			<i>Postgraduates</i>			<i>Total</i>
	<i>Men</i>	<i>Women</i>	<i>Total</i>	<i>Men</i>	<i>Women</i>	<i>Total</i>	
BRUCE	127	85	212	11	1	12	224
BURTON	130	112	242	5	—	5	247
GARRAN	137	91	228	8	—	8	236

The proportion of men to women students in the halls remained as it has been in recent years (men were about 60% of the total). A large majority of students in the halls held or were eligible to hold Commonwealth Scholarships and the examination results of the undergraduate residents continued at a high academic level. Only six hall students failed all subjects.

Social, cultural and sporting activities within the halls were organised by students and were successfully carried out and fulfilled a very desirable role in the community life. Students of Bruce Hall continued to service the Meals on Wheels community program in Canberra as they have done for several years which is a significant contribution to the organisation.

Ursula College opened its doors for the first time to men students as residents which helped meet the greater demand by male students. Just over thirty took up places in the College with a most satisfactory result for the general activity and life of the College. Both Ursula and John XXIII Colleges took in a small number of non-University people in order to fill spare places during the year.

Wardens and students of the halls and of the affiliated colleges were brought into discussions about the proposal to introduce a semester calendar in the University, because of the possible effect of the increased length of the residential year and of the likely change in conference usage. As the income from conference visitors affects the financial affairs of the halls and through them the fees charged to students, consultation was sought by the Vice-Chancellor to clarify the effects of the change. The results of meetings held in the halls and of a survey of some students were most helpful in the University's discussions.

Graduate House had its first full year of operation and showed that it is performing a successful role in providing a different form of residential accommoda-

tion in the University. Most of the occupants are full-time postgraduate students working towards a doctorate or degree of master, although some honours year students or students on second bachelor degree courses have been accommodated on short-term tenancies. Over the whole year the occupancy rate was 98%. Improvements were made in the Common Room to produce a more attractive and useful atmosphere for the residents; work was also done in landscaping. The Governing Body of seven, of whom five are residents, has been responsible for the successful operation of the House.

The Student Accommodation Officer continued to provide assistance to those students seeking various types of private accommodation. Students in their later years of study often prefer a non-institutional style of living and seek a share-house arrangement, flats, or even bed and breakfast.

STUDENT ASSOCIATIONS AND WELFARE

REPORT OF THE DEAN OF STUDENTS

Professor D. P. Scales

I succeeded Professor L. R. Zines as Dean of Students in May. My incumbency so far having been quite short, I consider it best to allow the reports from the Counselling Service, the Health Service and the student associations to be sufficient in themselves.

There are however three matters to which I wish to make particular reference—the recently completed review of the Counselling Service, the establishment of an Instructorship in Mathematical Methods and the decision to appoint an adviser to part-time students.

The Counselling Service comprises, along with the 'psychological' counsellors, a careers and appointments officer, lecturers in efficient English and efficient reading, the University Chaplains, and an office for the placement of students in part-time and vacation employment. In the course of its inquiry the Counselling Service Advisory Committee examined all aspects of the work of that body and invited representatives of its different branches to come and talk about their activities. This exercise proved highly beneficial and one useful result was a resolve to hold regular informal meetings of the Dean of Students with members of the Counselling and Health Services, some support to be provided by the University Administration in convening such meetings and keeping a record of them.

The Instructorship in Mathematical Methods is envisaged as a means of dealing with what has been identified as a numeracy problem in a significant proportion of students, in the Faculties of Science and Economics especially. An offer of appointment has been made and this service should therefore be available from the beginning of the 1973 academic year.

The other important initiative was Council's decision to establish within the Counselling Service, a position of adviser to part-time students. At the time of writing, an offer of appointment to this post has been made.

UNIVERSITY HEALTH SERVICE

Dr Robin Jenkins, a Sydney graduate, was appointed full-time physician to the University Health Service in March. Dr Margaret Wallner spent six months from November 1971 at the University of California at Los Angeles where she was able to study some of the approaches to health education employed by the Student Health Service.

*Staff
Activities*

The University will host the triennial conference of the Australia and New Zealand Student Health Association to be held for the first time in conjunction with the Australian Association of University Counsellors from 21–26 January 1973.

There was a 29% increase in the number of patients attending the Health Service and a 22% increase in the number of consultations compared with a 5% growth in the student population, relative to 1971.

*Consultation
Rates*

This rate of increase in consultations is less marked than the previous year (53%) and probably represents a levelling off in the demand for Health Service care.

Approximately 61% of all full-time undergraduate students enrolled at the University attended the Health Service, compared with 52% in 1971, while the proportion of eligible postgraduate students seen rose from 48% in 1971 to 63% in 1972. The proportion of part-time undergraduates rose slightly from 12% in 1971 to 14% in 1972.

Although numbers are still small, there was a marked rise in the use of the Health Service by the students' wives, by academic staff (mainly short-term visitors to the University) and by non-academic staff (mainly accounted for by occupational hazards in laboratories).

As in previous years, visits to the Health Service by students from the Faculties of Arts and Asian Studies tend to be over-represented and students from the Faculty of Science under-represented. This can be partly accounted for in the terms of sex distribution between faculties, women students more frequently presenting with emotional problems and for advice on contraception than do men; thus 66% of full-time enrolments in the Faculty of Asian Studies and 55% of full-time enrolments in the Faculty of Arts are women, compared with figures of 32% and 20% in the Faculties of Science and Law respectively. Other personality factors influencing choice of course and environmental activity such as laboratory work may also have a bearing on difference in health status between the faculties. Students from the Department of Forestry, for example, almost never present with stress symptoms, an observation which may be related to their greater maturity and motivation, active participation in laboratory and field work, and good employment prospects.

Mental Health

There was a 17% increase in the total number of consultations by students with problems of mental health. The most significant increase was in consultations by students presenting with anxiety, including examination stress, particularly in the second and third term.

The most consistent complaint from students was of an excessive work load imposed by a combination of continuous assessment and the semester examination system. Although there was no significant correlation between average age of enrolment and presentation of first-year students with stress reaction (as there had been in 1971), problems of personal identity and motivation were still more apparent in those who had enrolled while still seventeen or early eighteen than in the more mature students.

An encouraging feature of the year was the fall in the incidence of serious psychiatric illness, only five students requiring referral to a psychiatrist. This experience contrasts with that of universities in larger metropolitan centres. It could be an indicator of the retention of a sense of community at the University with the opportunities for a reasonable level of interpersonal communication between students and staff members with existing staff/student ratios. This is one argument which may be advanced in favour of limiting the size of the University.

A consultant opinion was obtained on 180 students during the year, representing a fall of 16% despite a rise in the total consultation rate of 22% compared with 1971. This trend would seem to vindicate the present policy of both the Health and Counselling Services towards integrated health care on campus, rather than towards introduction of specialist services.

There was a marked increase from 389 to 718 in the number of physiotherapy treatments carried out by Mrs P. Levick in the health laboratory area. Provision has been made for a minor physiotherapy area in the new health centre, so that acute injuries can be treated more quickly and conveniently, thereby minimising the time required for rehabilitation. This is particularly important in the case of sports injuries.

Physiotherapy

A total of 743 persons attended the Health Service during the year for inoculations and advice on overseas visits, representing a steady increase since 1969.

*Prophylactic
Inoculations*

One hundred and six fitness tests were performed on University personnel, including forty-three with cardiac monitoring on an oscilloscope and electrocardiographic print-out. Assessment of fitness was made from the heart-rate response to a submaximal work load and is presented as predicted maximum oxygen consumption (VO_2 max) in ml/kg body weight/min. The results indicate that about two-thirds of those tested were below normal in fitness for the age group.

*Fitness
Testing*

Attendance at the Health Service is to some extent a measure of maladaptation to the University environment. The following suggestions refer to possible preventive measures through which the situation might be improved: (a) the establishment of a 'contact' group by students themselves in the new Union Building, to provide a friendly information centre, to liaise with the Health and Counselling Services and to arrange informal seminars on topics relevant to health; (b) encouragement by the University of a policy of deferred enrolment for students between school and university to allow time for maturation and education through living outside an academic environment; (c) present academic work loads might be critically examined, particularly in regard to students who are faced with coping both with continuous assessment of their work and semester examinations; and (d) on the basis that education is as much a matter of personal development as of academic achievement, one afternoon per week should be set aside for extra-curricular activities.

*Conclusions and
Recommendations*

UNIVERSITY COUNSELLING SERVICE

Demand for the various forms of assistance offered by the Counselling Service strengthened again in 1972. Total registrations with professional staff were 1,159 although some students used more than one of the services available. All members of the Service were fully occupied and it was apparent that with greater staff availability many more students would have been seen.

Staffing

Staff matters, both actual and planned changes, have significantly influenced the operations of the Counselling Service. Mrs M. Evans was acting head during the interim period while the appointment of a director was completed. This was more time-consuming than had been anticipated and it was not until August that Mr K. N. Robinson, previously Student Counsellor at the Canberra College of Advanced Education, took up his new position.

For the first six months of the year Mrs C. Parker, who was familiar with the Service as a student enrolled in the course for the degree of Master of Science in Psychological Counselling provided assistance on a part-time basis.

Two new positions in the Counselling Service were approved and action initiated to fill them for the commencement of the 1973 academic year. The Instructor in Mathematical Methods will supplement the work being done in the study skills area and is expected to meet a significant need for assistance in the application of mathematical concepts in the sciences and social sciences. A Student Adviser will be appointed to give specific attention to the circumstances and needs of part-time students. With the addition of these two positions, together with supporting secretarial personnel, the staff strength of the Service will increase by almost 50% in 1973 and the range of services offered will be further diversified.

Structure

The Vice-Chancellor set up an advisory committee in 1971 to consider and make recommendations with regard to the future development of the Service and to appoint a successor to Mr J. E. Gough. The committee met on several occasions and recommendations will be forwarded to the Vice-Chancellor.

Following his appointment Mr Robinson was invited to attend further meetings of the committee to represent the Counselling Service which to that time had not been directly represented. He subsequently prepared a paper on the future structure and staffing of the Service and viewpoints of other staff members were also invited.

The considerations of the committee and the staff changes have given rise to lively discussion within the Counselling Service of the issues involved. It has become apparent that there are recognisably distinct functions encompassed within the Counselling Service and there is need for these distinct functions to be identified and understood in relation to their particular approaches and contributions. In 1973 those members of staff involved in communication and study skills work will probably come together as a functionally recognisable unit of the Service.

Accommodation

This will be the last year in which the Counselling Service is accommodated in the Copland Building. In January 1973 we shall move into a section of the new Union complex known presently as the Sports Union, Health and Counselling Building. We should like to thank the Faculty of Economics for their tolerance in housing us over the last five years.

Three of our staff will be joining Mrs L. Rose in the cottage in Kingsley Street. This cottage will be the focus of our study skills services.

Two group activities were offered during the year with very satisfying response. A 'communication' group operated during lunch hours early in the year, and an 'anti-exam anxiety' group took place in the early evening during third term. It is highly probable that group activities will assume an increasingly important role in our counselling effort in years to come. The largest single obstacle in offering groups is the lack of free time available during the week. This obstacle would also appear to affect many other group activities in the University.

Individual counselling remains our major function with most students being self-referred or coming on the recommendations of friends. Although an increasing number are referred by the Health Service and Faculty Secretaries the proportion coming from these sources and academic staff could well be enlarged as these staff are often the first persons to be aware of present or impending difficulties. The number of clients during the year (559 persons for 1,648 hours) showed a notable decline in comparison with 1971 (674 persons for 2,628 hours), reversing the usual trend. However, there were two main factors accounting for this reversal. Firstly, the Service was effectively one counsellor below establishment until the end of the academic year. Most of Mrs Parker's work was supportive to counsellors rather than direct counselling, as it was not feasible to involve her in possible long-term cases. After taking up his appointment in August, Mr Robinson continued to maintain the counselling functions at the College of Advanced Education until mid-September and then he was heavily involved in some administrative activities relating to the advisory committee and the new building. Mrs Evans, as acting head, had to devote some of her time to the administration of the Service. Secondly, fewer prospective students have come for counselling because of the increased emphasis on advice and enrolment with Faculty personnel early in February.

Many problems are presented to counsellors but one worthy of note here was the pressure of work and resulting anxiety during mid-year. A substantial increase (25%) for this time of the year appeared to relate to the semester system and its conflicts with the term/year system.

The Efficient English service continued to provide tuition to students who felt they could improve upon their performance in written assignments. All three academic terms produced a heavy demand and numbers overall were slightly higher than in 1971. Academic staff maintained their interest in and support for this service by referring their students where necessary. Some interesting new work was developed as a result of individual departments indicating the rather specialised writing needs of their students. Classes in business correspondence, for example, were provided for students in the first Legal Workshop course.

*Efficient
English*

Mr B. G. Palfrey ran two more courses in Communication and Expression for university administrators. The eight-weeks course has established itself as a regular feature of the University calendar and provides a useful stimulus in this very important area of the administrator's role. While the work with undergraduates will continue to be the major task of the Efficient English service, further opportunities to develop work in the University at large will be explored.

Courses were offered in January/February for undergraduates who wished to take a course before commencement of the academic year and again in first and

*Efficient
Reading*

second terms. In third term, courses were offered to graduates and staff of the University. For educational and space reasons groups are limited to twelve persons.

The undergraduate courses included practice in faster reading and consideration of study skills in general. An assessment was made of the study habits and attitudes of each student followed by a one-to-one interview with the teacher if it was desired.

The course for graduates concentrated largely on faster reading techniques. For both groups reading was viewed as an information gathering skill. While it is unlikely that comprehension can be significantly improved in adults, it seems likely that time spent on the improvement of information gathering skills may be fruitful.

Enrolment figures for undergraduates in all courses was 151 students for the year.

Careers and Appointments

The Careers and Appointments office maintained its full range of services during the year without any large increase in the demand made upon it. Again, approximately one-third of completing students registered with the office to receive information about career prospects and job vacancies and they were sent such information throughout the year. Approximately half this number had personal interviews with the Careers and Appointments Officer, together with a large number of earlier-year students, prospective students, graduates and others. As in previous years over four hundred people in those various categories had individual interviews during the year.

Employer interviews were again arranged to provide students with an opportunity to meet employers face-to-face. The number of employers participating was lower than in previous years as several employers had curtailed their programs of campus visits due to a planned reduction in their graduate intakes. Maintaining a program of this kind is a problem in Canberra as it is fairly expensive for representatives to travel from interstate for a day for interviews which are principally for the students' benefit.

Mr S. J. Rawling, Careers and Appointments Officer, participated during the year in the planning and organisation of the national conference 'Graduates for What?' sponsored by the Graduate Careers Council of Australia and the Centre for Continuing Education. He is also working for the Council on the design of a continuing nation-wide survey of the first destination of graduates which will provide important information in understanding the nature of graduate employment problems. The existence of those problems will continue to provide a strong and increasing demand for the services of the Careers and Appointments office.

Student Employment

Mrs S. Kral, the Student Employment Officer, had to meet a sharply increased demand on her services during the year. In most categories of work the numbers of jobs filled during the year almost doubled those of 1971. A greatly increased number of summer positions in the Commonwealth Public Service assisted markedly here.

It has been pleasing to note the increased willingness of employers to use students for short-term assignments. This is particularly so in the case of ACT authorities (principally the Department of the Interior and the NCDC) who have used numbers of students in survey work in the community.

The total number of individual jobs found for students (both casual and vacation) increased from 1,493 in 1971 to 2,536 in 1972. It is likely that this strong demand for student employment will continue, even in the event of abolition of fees by the Commonwealth Government, as many students are working to support themselves through the year, quite apart from the problem of paying fees.

UNIVERSITY UNION

In 1972 the Union had 4,176 undergraduate, 896 postgraduate, fourteen staff and thirty-six life members—a total of 5,122, an increase of 252 over the 1971 membership level. This increase in membership of slightly over 5% is within the growth pattern anticipated by the Union.

In order to promote the interest of past members in the life and development of the Union, the Union Board of Management, with the approval of the University Council, recently instituted a new life membership scheme, allowing for the admission of a new category as life members of the Union. This new category allows the admission of past students who have paid fees for five years if they were enrolled as part-time students and for three years if they were full-time students, upon payment of a substantially lower life membership fee than the level approved hitherto, provided that, at the time of application, they were not enrolled at the University for study towards a degree. This new life membership fee is equal to the annual fee applicable to part-time undergraduate students in the year of application.

Discussions are also under way to achieve an ideal University Union wherein all staff and students of the University would be members. The Union hopes that under this proposal the University would provide some financial contribution to allow the Union the extension of their subsidised services to every member of the campus population.

Well contested elections were held in July and ten members were elected. The present composition of the Board of Management is as follows: Mr W. R. C. Jay, Vice-Chancellor's nominee; Mr G. A. Colman, Council representative; Mr W. C. Fairbanks, Bursar's deputy; Mr W. P. Packard, Staff Association representative; Mr A. Urquart, Sports Union representative; Mr R. O'Connor, Research Students' Association representative; Mr C. Macphillamy, Students' Association representative; Mr J. Castellari, Mr V. K. Bhalla, Mr F. Keighley, Mr A. McCredie, Mr M. Marks, Mr P. Power, Mr R. C. Refshauge, Mr D. Spratt, Mr G. Smith and Miss L. Smith, elected by the general membership.

The Board elected Mr Power as Chairman and Mr Refshauge as Deputy Chairman for 1972-73. During the year the Research Students' Association's representation has changed, Mr O'Connor replacing Mr A. N. Stokes on the Board.

The staff of the Union consisted of the Secretary, Mr E. C. de Totth, the Assistant Secretary, Mr H. E. Folvey and sixteen other permanent members. At

the end of the year the Assistant Secretary resigned and due to the resulting re-organisation, the post was abolished. Instead, the posts of an administrative officer and a book-keeper were created to suit the administrative and related other needs in the new building. As the Union's services are designed to grow in 1973 the management of the Catering and Liquor Services was also divided into two departments, the managers of which are directly responsible to the Secretary.

Revenue was received from four major sources—annual membership fees, initial enrolment fees, development fees and an allocation from the service fees levied by the University on postgraduate students.

Financial accounts for the year are not available as yet, preliminary figures suggest however that the Union's financial position is healthy. Over the year the total revenue income has increased by \$4,000 to \$103,300, while the total overall expenditure was reduced by \$1,880 to \$70,580. This latter became possible as a result of economies and by the avoidance of a trading loss in spite of higher wages and material costs. It was achieved without detriment to members, who still enjoy a varied range of wholesome, cheap meals.

The Union continued to provide a reasonable level of service to its members and, in spite of wage and price increases mentioned above, food and drink prices in the Union were kept unchanged right through the academic year. As a response to the need of less well-off students some highly subsidised items were also introduced for sale in the Refectory.

During the year the popularity of the Union Bar increased substantially and this area assisted in improving social life on campus. There were on average, two functions held there weekly and the control which management has exercised in this area assured a trouble-free operation throughout the year. Among Union functions worthy of special mention I would list the traditional Annual Dinner, the Staff-Student Cricket Match, the Union Art Exhibition and a series of staff-student socials and folk-music nights. The number of participants at these functions exceeded 25,000 members and their guests.

In complying with a request from members expressed at a General Meeting, the Board introduced a series of anti-pollution measures in the Union. At present the comparative cost of these measures is high due to only a limited co-operation from the general membership. It is hoped that the cost of these measures will decrease when members will become used to them and would be willing to suffer slight inconveniences to do their share in combating pollution. The ANU Union was the first University Union in Australia to introduce such measures which arose from the community consciousness of its members. Students on other campuses are watching this experiment with interest. This serves as another reason to make this pioneering project a success.

Arrangements for the Union's \$250,000 bank overdraft to assist payment for the new building were completed close to the end of the year. The first amount against this overdraft will be drawn early in 1973 to secure the necessary cash flow. By March 1973 the Union is scheduled to have contributed \$280,000 towards its new building and the Board authorised the expenditure of another \$80,000 against accumulated funds to furnish the building as far as possible. It

is regretted that in spite of this substantial financial effort amounting to about 30% of the total cost, some areas of the new building will still have to remain incomplete and/or sparsely furnished and equipped and a further union effort will be necessary to complete the project.

The Board hopes that the new building will open for members' use sometime in March 1973. This building will be approximately twice the size of the Union's Ellery Circuit home, the services provided therein will be better, the facilities will be more varied and the design allows for the necessary flexibility of use.

On behalf of the Board I should like to place on record the Union's appreciation for the Commonwealth grant and the University's assistance in helping the Union to obtain a new and better building. The Board further gratefully acknowledges the assistance and consideration the Union has received from the University Council, the Vice-Chancellor and from all other University officers throughout the year and wishes to express the Union's hope and confidence that at the new site it will be able to perform its task as a social and amenities centre of the University in an improved manner to the satisfaction and benefit of the whole campus population.

STUDENT ASSOCIATIONS

Perhaps the single most important event of the past year was the completion of a survey of postgraduate supervision and attitudes to course work. Over 70% of research scholars responded to the survey which is an indication of the growing importance of these two areas of postgraduate studies. A report of the results of the survey will be submitted to Council in March 1973.

*Research
Students'
Association*

Representatives of the Research Students' Association (RSA) were members of many University committees; some of these have an important bearing on research scholars. Firstly, a working party on dependent's allowances and travel grants has devised, in principle, a system of ensuring more equitable distribution of dependent's allowances. With respect to travel grants, the University is now in a position to take advantage of scheduled budget-class air fares. More important to the Association, however, was the agreement by the University to accept commitment to return travel assistance for spouses and dependent children acquired during the tenure of a scholarship. Finally, Association representatives on the Sub-Committee on Rental Policy have submitted proposals for changes in the bases of applied rents for research scholars to remove anomalies existing under the present system.

During the year the RSA became a full member of the Australian Union of Students (AUS). The main advantages of this are eligibility to join the AUS Health Scheme and take advantage of the AUS Travel Scheme.

In the area of internal administration, the RSA has undergone and continues to undergo substantial change. A project of prime importance is the establishment of a permanent RSA office, hopefully in the new Union building, and the employment of a part-time secretary.

The Thesis Typing Scheme has been reorganised again. The commercial typing company previously employed failed during 1972. The result of subsequent

negotiations with the University has been the entitlement of all RSA members to free thesis printing; the typing of the thesis is now solely the responsibility of the member. The savings scheme which previously operated as a condition of eligibility for free printing is now accessible on a voluntary basis.

*Students'
Association*

Activities within and outside the University were of equal concern to the Students' Association. This also led to a greater activity amongst students in general both through the formal organisations and from individual initiative.

Family planning and Aboriginal land rights proved to be the most significant issues about which the Association attempted to influence public opinion. In the former, success was achieved when the newly-elected Labor Government adopted all the reforms for which the Association had been pressing. Substantial effort by officers and members of the Association to support the Aboriginal 'Embassy' and the move for land rights met with less success but undoubtedly contributed to wider appreciation of the issue both by members of the Government and by the public.

Consumer protection also became an important student interest, and successful moves to prevent Dutch auctions being held in Canberra, the establishment of an active Students' Consumer Protection Society, and the careful evaluation and rejection of a commercial speed reading course were the most significant activities.

Within the University a greater attempt has been made to improve the quality and level of student participation in the decision-making processes. Two well-researched submissions on the abolition of the financial barrier to university entrance and on the proposed introduction of the semester pattern were presented to University committees, and the level of student participation in the affairs of the Faculty of Economics was significantly raised.

Activity within clubs and societies was high with an increased budget being once again overspent. Fourteen new clubs were affiliated to the Students' Representative Council and three were revived. Guest speakers brought by clubs and the Association spoke on a wide range of issues, and the Political Science Society convened a most successful seminar on 'Elections '72'.

The Association and its Cultural Affairs Committee promoted a large number of concerts, the latter accepting responsibility for concerts on campus with the financial help of the University. The Postmaster-General's Department granted a licence to operate a campus radio station and with considerable help from the Radio Club and generous donations from the University student bodies and some commercial firms, Radio ANU is confident of commencing operation early in 1973.

Despite the clash with the Aboriginal 'Embassy' demonstrations, Bush Week proved an outstanding success and students collected nearly \$1,600 from a generous public. The continuing high standard of *Prometheus* was repeated in the 1972 edition, and the *ANU Historical Journal* and *Forestry Log* continued the tradition of quality journals published and edited by students of this University. A growing number of journals and newsletters of varying quality appeared under the sponsorship of various clubs and societies.

'Inside Out', the Association's radio program on station 2CA, consolidated its position, improving the standard of presentation and building up a useful expertise. *Woroni* encountered the usual strife with the establishment, and built up to become a quality newspaper, widely read and effective in moulding student opinion. This high standard has been partly responsible for the decision to employ a full-time editor in 1973.

The welfare of members has always been of prime concern to the Association and this year the Loan Fund continued to serve the financially needy. An extension of this scheme to allow students to borrow from the Credit Union was made possible by the Vice-Chancellor and has given students access to funds and conditions that the Loan Fund has not been able to provide. Lennox House continued to provide cheap accommodation for needy students, though its short future has led to an investigation of alternatives that the Association could develop. The Association also assisted in the establishment of a co-operative child-minding centre for parents on campus.

The Association continued to participate in the activities of the AUS but contributed more to its operation while deriving greater benefits than in previous years. This was partly due to the election of two Association members to full-time positions, Mr A. Bain as Education Vice-President and Mr B. Havenhand as National Abschol Director, and to our membership of various AUS boards. Former Association members will edit *National U* in 1973.

The continuing operation of a full-time President has increased the output of the Association, though heavy reliance is still placed on the enormous contribution of part-time members of Council. Secretarial assistance has been provided by an Administrative Secretary and two part-time typists.

The last year of the Sports Union's activities has perhaps not shown the concrete and apparent results seen in past years but has nevertheless been an extremely active one. The final stages of the Sports Union's program for the 1970-72 triennium—Stage I of the Sports/Recreation Centre—unfortunately was not completed in time to open in 1972. However, it is expected that the new offices of the Sports Union in the Centre will be opened in January 1973 and that all six squash courts will be operating in early March.

*Sports
Union*

Over the past seven years the Capital Development Fund has been built up to \$60,000 but this will be exhausted when the payment of the projects undertaken in the 1970-72 triennium have been made. However, the strenuous policy of funding monies for the Capital Development Fund should ensure a continuing expansive development program by the Sports Union should Government funds also be forthcoming.

It was with some disappointment that the Sports Union learned the AUC had not recommended funds for the sporting development for the 1973-75 triennium. The loss to the Sports Union of the use of the Canberra High School ovals and tennis courts may necessitate further development in this area in the near future. Some considerable successes in intervarsity contests were achieved during the year. The most notable results being first place gained by our teams in skiing, skindiving and cricket. The Sports Union also hosted intervarsity netball and

table-tennis which brought favourable comment from those competing. An outstanding event of the year was the visit to Europe and America by the University Rugby Union Club team—the first such comprehensive tour undertaken by any university in Australia.

It is regretted that Mrs Patterson, the Sports Union office secretary, left at the end of the year after a period of five year's devoted service. In order to cope with the additional work that is expected with the opening of the squash court complex, the staff to be employed in the office in 1973 will be increased to four.

The Sports Union has, as usual, received the utmost consideration and help from the University Administration, particularly in connection with the building of Stage I of the Sports/Recreation Centre. Such help is always greatly appreciated.

PUBLICATIONS

*University
Counselling
Service*

PALFREY, B. G.

'Communicating in the University.' *The Australian National University News*, 6, 3, 9-11, 1971.

'Saying what you mean.' *Hemisphere*, 16, 6, 36-8.

RAWLING, S. J.

'Is there a surplus of the highly educated?' *The Australian National University News*, 7, 1, 1-3.

RAWLING, S. J. & GRAVELL, K.‡

Destinations of University Graduates, 1971. Graduate Careers Council of Australia, 4 + 9 tables.

‡ Not a member of this University.

BUILDING PROGRAM SUMMARY

<i>Buildings Completed in 1972</i>	<i>Date Completed</i>
<i>John Curtin School of Medical Research</i>	
Extensions to Animal Breeding Establishment	June
<i>Research School of Physical Sciences</i>	
Extensions to Cockcroft Building	May
Extensions to Mathematical Sciences Building	April
Tandem Accelerator Building	December
<i>Research School of Biological Sciences</i>	
Permanent Building, Stage 1	December
<i>School of General Studies</i>	
Extensions to Arts/Economics	May
<i>General University</i>	
Sports/Recreation Centre	December
Concessions Building	December
R. G. Menzies Building computer suite	June
Melville Hall computer suite	July
<hr/>	
<i>Buildings Under Construction in 1972</i>	<i>Estimated Completion Date</i>
<i>Research School of Physical Sciences</i>	
Extensions to Target Area	April 1973
<i>General University</i>	
Union Building	March 1973

UNIVERSITY STATISTICS

FULL-TIME STAFF

AS AT 30 APRIL 1972

<i>Designation</i>	<i>Males</i>	<i>Females</i>	<i>Total</i>
<i>Teaching and Research Staff</i>			
<i>School of General Studies and Centre for Continuing Education</i>			
Professor	44	..	44
Associate Professor	4	..	4
Reader	34	..	34
Senior Lecturer	91½*	11	102½
Lecturer	79½	14	93½
Senior Demonstrator, Senior Tutor	35	14	49
Demonstrator, Tutor, Teaching Fellow	9	7	16
Total Teaching and Research Staff	297	46	343**
<i>Research Only Staff</i>			
<i>Institute of Advanced Studies and Computer Centre</i>			
Professor	55	..	55
Professorial Fellow, Reader, Senior Fellow	117	3	120
Fellow, Senior Research Fellow, Research Fellow	254½	15	269½
Junior Research Staff	58	88	146
Total	484½	106	590½***
<i>School of General Studies and Centre for Continuing Education</i>			
Senior Research Staff	4	1	5
Junior Research Staff	18	31	49
Total	22	32	54*
Total Research Only Staff	506½	138	644½
<i>Technical Staff</i>			
Technical Officer	250	18	268
Assistant	234	90	324
Total Technical Staff	484	108	592
<i>Library Staff</i>			
Professional	13	53	66
Other	20	58	78
Total Library Staff	33	111	144

* References to half staff members indicate some staff, part of whose time has been made available for other purposes.

** Includes four staff of the Centre for Continuing Education.

*** Includes forty-five staff of the Institute of Advanced Studies supported by non-University funds.

FULL-TIME STAFF

AS AT 30 APRIL 1972—*continued*

<i>Designation</i>	<i>Males</i>	<i>Females</i>	<i>Total</i>
<i>Sundry Staff</i>			
Centre for Continuing Education*	1	5	6
Computer Centre**	7	5	12
Data Processing Unit	4	19	23
Counselling and Student Advisory Services	2	5	7
Health Services	1	3	4
Halls of Residence	1	2	3
Audio-visual Services	5	4	9
Multilith Service	6	3	9
Student Union, etc.	1	1	2
Translation Unit	1	..	1
Total Sundry Staff	29	47	76
<i>Central Administration Staff</i>			
Chief Administrative Officer	7	..	7
Senior Administrative Officer	5	3	8
Administrative Officer	27	2	29
Administrative Assistant	29	5	34
Clerk, Typist, etc.	106	214	320
Total Central Administration Staff	174	224	398
<i>Departmental Administration Staff</i>			
Administrative Officer	..	..	..
Administrative Assistant	..	..	..
Clerk, Typist, etc.	28½	194	222½
Total Departmental Administration Staff	28½	194	222½
<i>Development Work and Construction Staff</i>			
Professional Staff	13	1	14
Tradesman Staff	..	..	..
Other Staff	11	10	21
Total Development Work and Construction Staff	24	11	35
<i>Maintenance and Other Staff</i>			
Maintenance of Buildings	58	1	59
Caretaking and Cleaning	90	65	155
Gardens, Grounds and Playing Fields	41	..	41
Domestic Staff	53	105	158
Messengers, Porters, Attendants and other General Services	36	36	72
Stores	28	7	35
Total Maintenance and Other Staff	306	214	520
Total Staff	1882	1093	2975

* Excludes four staff who are shown under *Teaching and Research Staff*.

** Excludes five staff who are shown under *Research Only Staff*.

(A) THE INSTITUTE OF ADVANCED STUDIES—RESEARCH ONLY STAFF

AS AT 30 APRIL 1972

<i>Departments, etc.</i>	<i>Pro- fessors</i>	<i>Profes- sorial Readers, Senior Fellows</i>	<i>Fellows, Senior Research Fellows, Post- doctoral Fellows</i>	<i>Research Assistants, Research Officers</i>	<i>Total</i>
<i>The John Curtin School of Medical Research</i>					
Biochemistry	1	2	6	3	12
Clinical Science	1	2	2	3	8
Experimental Pathology	1	2	5	1	9
Human Biology . . . . .	..	2	3	4	9
Immunology	1	1	4	1	7
Medical Chemistry	1	5	6	2	14
Microbiology	1	5	8	2	16
Physical Biochemistry	1	2	6	3	12
Physiology	2	3	8	1	14
Other	1	..	1	..	2
Total	10	24	49	20	103
<i>The Research School of Physical Sciences</i>					
Applied Mathematics	1	..	6	..	7
Astronomy	2	3	12	5	22
Engineering Physics	1	3	8	3	15
Geophysics and Geochemistry	2	6	11	7	26
Mathematics	2	5	5	1	13
Nuclear Physics	2	3	11	5	21
Solid State Physics	1	1	4	2	8
Theoretical Physics	2	5	8	1	16
Diffusion Research Unit . . . . .	..	1	2	..	3
Electron and Ion Diffusion Unit . . . . .	..	1	2	..	3
Total	13	28	69	24	134
<i>The Research School of Social Sciences</i>					
Demography	2	2	6	10	20
Economic History	2	2	1	4	9
Economics	1	1	2	1	5
History	1	4	4½	2	11½
Law	1	3	3	2	9
Philosophy	2	3	4	1	10
Political Science	2	3	3	7	15
Sociology . . . . .	..	1	3	3	7
Statistics	2	1	2	..	5
Education Research Unit . . . . .	..	1	3	5	9
History of Ideas Unit . . . . .	..	1	2	1	4
Urban Research Unit . . . . .	..	1	4	3	8
Other	1	1	2	12	16
Total	14	24	39½	51	128½

(A) THE INSTITUTE OF ADVANCED STUDIES—RESEARCH ONLY STAFF

AS AT 30 APRIL 1972—continued

<i>Departments, etc.</i>	<i>Pro- fessors</i>	<i>Profes- sorial Fellows, Readers, Senior Fellows</i>	<i>Fellows, Senior Research Fellows, Post- doctoral Fellows</i>	<i>Research Assistants, Research Officers</i>	<i>Total</i>
<i>The Research School of Pacific Studies</i>					
Anthropology and Sociology	1	2	6	2	11
Biogeography and Geomorphology	1	3	3	3	10
Economics	1	8	5	8	22
Far Eastern History	1	5	4	6	16
Human Geography	1	2	2	3	8
International Relations	2	2	6	5	15
Linguistics	1	1	2	2	6
Pacific History	1	2	6	4	13
Prehistory	1	1	4	4	10
New Guinea Research Unit . . . . .	..	1	7	4	12
Director's Section	1	..	..	..	1
Total	11	27	45	41	124
<i>The Research School of Chemistry</i>					
Analytical Chemistry . . . . .	..	..	1	..	1
Inorganic Chemistry . . . . .	..	5	12	2	19
Organic Chemistry	1	1	10	..	12
Physical and Theoretical Chemistry	1	1	10	..	12
Other (recruitment pool) . . . . .	..	..	5	..	5
Total	2	7	38	2	49
<i>The Research School of Biological Sciences</i>					
Developmental Biology	1	3	6	2	12
Environmental Biology	1	1	6	2	10
Genetics	1	2	5	..	8
Neurobiology	1	1	6	2	10
Molecular Biology Unit . . . . .	..	1	1	1	3
Taxonomy Unit . . . . .	..	1	1	..	2
Other (Director's group)	1	..	..	1	2
Total	5	9	25	8	47
Total Research Only Staff	55	119	265½	146	585½

(B) THE SCHOOL OF GENERAL STUDIES—TEACHING AND RESEARCH STAFF

AS AT 30 APRIL 1972

<i>Departments, etc.</i>	<i>Pro- fessors</i>	<i>Assoc- iate Pro- fessors, Readers</i>	<i>Senior Lectur- ers, Lectur- ers</i>	<i>Senior Tutors, Demon- strators, Tutors, Teaching Fellows</i>	<i>Total</i>
<i>The Faculty of Arts</i>					
Classics	1	1	5	..	7
English	2	4	6	2	14
French	1	..	5	..	6
Geography	1	1	5½	2	9½
Germanic Languages	1	..	5	..	6
History	3	2	13½	5	23½
Linguistics	1	..	4	..	5
Mathematics—					
Applied	1	1	3	1	6
Pure . . . . .	..	..	8	2	10
Philosophy	1	2	6	2	11
Political Science	2	2	9	3	16
Russian	1	..	3	..	4
Sociology	1	..	3	1	5
Total	16	13	76	18	123
<i>The Faculty of Asian Studies</i>					
Asian Civilizations	1	2	6	1	10
Chinese	1	1	2	1	5
Indonesian Languages and Literatures	1	..	5	1	7
Japanese	1	1	2	1	5
South Asian and Buddhist Studies	1	..	4	..	5
Total	5	4	19	4	32
<i>The Faculty of Economics</i>					
Accounting and Public Finance	1	1	4	3	9
Economic History	1	1	5	..	7
Economics	3	..	10	5	18
Statistics	2	2	8	3	15
Total	7	4	27	11	49
<i>The Faculty of Law</i>					
Law	4	2	13	2	21
Legal Workshop . . . . .	..	1	..	..	1
Total	4	3	13	2	22

(B) THE SCHOOL OF GENERAL STUDIES—TEACHING AND RESEARCH STAFF

AS AT 30 APRIL 1972—continued

<i>Department, etc</i>	<i>Associate Pro- fessors</i>	<i>Associate Pro- fessors, Readers</i>	<i>Senior Lecturers</i>	<i>Senior Tutors, Demon- strators, Tutors, Teaching Fellows</i>	<i>Total</i>
<i>The Faculty of Science</i>					
Biochemistry	1	..	5	3	9
Botany	1	1	6½	4	12½
Chemistry	2	3	7	4	16
Forestry	1	1	11½	6	19½
Geology	1	2	5	4	12
Physics	1	2	7	3	13
Psychology	2	2	7	7	18
Theoretical Physics	1	..	2	1	4
Zoology	1	3	7	3	14
Total	11	14	58	35	118
Total Teaching and Research Staff	43	38	193	70	344

(C) UNIVERSITY CENTRES

AS AT 30 APRIL 1972

<i>Centre</i>	<i>Pro- fessors</i>	<i>Profes- sorial Fellows, Readers, Senior Fellows</i>	<i>Fellows, Senior Research Fellows, Research Fellows, Post- doctoral Fellows</i>	<i>Research Assistants, Research Officers</i>	<i>Total</i>
<i>Research Only Staff</i>					
Computer Centre . . . . .	..	1	4	..	5
<hr/>					
<i>Centre</i>	<i>Pro- fessors</i>	<i>Assoc- iate Pro- fessors, Readers</i>	<i>Senior Lectur- ers, Lectur- ers</i>	<i>Senior Tutors, Demon- strators, Tutors, Teaching Fellows</i>	<i>Total</i>
<i>Teaching and Research Staff</i>					
Centre for Continuing Education	1	..	3	..	4

ENROLMENTS

To 30 APRIL 1972

	<i>Full-time</i>	<i>Part-time</i>	<i>Total</i>
PhD Course—			
Institute of Advanced Studies	336	3	339
School of General Studies	140	48	188
Computer Centre	5	1	6
Total	481	52	533
Master Degree Courses—			
<i>Institute of Advanced Studies</i>			
Research School of Chemistry . . . . .	..	1	1
John Curtin School of Medical Research . . . . .	..	2	2
Total . . . . .	..	3	3
<i>School of General Studies</i>			
Arts	48	56	104
Asian Studies	10	7	17
Economics	22	19	41
Law . . . . .	..	5	5
Science	12	23	35
Total	92	110	202
<i>Computer Centre</i> . . . . .	..	2	2
Total Master Degree Courses	92	115	207
Bachelor Degree Courses—			
<i>School of General Studies</i>			
Arts	794	820	1,614
Arts/Law	207	13	220
Asian Studies	173	63	236
Asian Studies/Law	8	..	8
Economics	300	420	720
Economics/Law	81	3	84
Law	124	123	247
Science	561	127	688
Forestry	147	11	158
Total	2,395	1,580	3,975
Non-Degree Courses—			
Legal Workshop	26	..	26
Preliminary courses for the degree of master	29	92	121
Miscellaneous (single units)	13	188	201
Courses of research not leading to a degree	9	..	9
Total	77	280	357
Gross enrolments at the University	3,045	2,027	5,072
Adjustment	3	25	28
Net enrolments at the University*	3,042	2,002	5,044

* Adjusted for students in more than one category.

ASSISTED STUDENTS

To 30 APRIL 1972

	<i>Males</i>	<i>Females</i>	<i>Total</i>
<i>Higher Degree Students</i>			
Commonwealth Government Assistance	174	44	218
University Assistance	437	92	529
Other Assistance	12	1	13
Gross Total Assisted Higher Degree Students	623	137	760
Net Total Assisted Higher Degree Students*	510	107	617
<i>Students other than Higher Degree</i>			
Commonwealth Government Assistance	884	507	1,391
State Government Assistance	141	172	313
University Assistance	125	38	163
Other Assistance	6	2	8
Gross Total Assisted Students other than Higher Degree	1,156	719	1,875
Net Total Assisted Students other than Higher Degree*	1,113	717	1,830
Net Total Assisted Students at the University*	1,623	824	2,447

* Adjusted for students who received fees assistance from more than one source.

DEGREES CONFERRED

YEAR ENDED 30 JUNE 1972

	<i>Number Conferred on</i>		<i>Total</i>
	<i>Males</i>	<i>Females</i>	
Doctor of Letters (<i>honoris causa</i>)	2	..	2
Doctor of Philosophy	120	7	127
Master	38	16	54
Bachelor	423	186	609
Total Degrees	583	209	792

24 July 1973

The Vice-Chancellor,
The Australian National University,
Canberra, A.C.T. 2600.

Dear Sir,

**FINANCIAL STATEMENTS
YEAR ENDED 31 DECEMBER 1972**

In compliance with a request by the Treasurer in terms of section 33(1.) of the *Australian National University Act 1946-1971*, the accounts of the University have been audited for the year ended 31 December 1972.

The accompanying Statement of Net Assets and Operating Statement have been examined and are in agreement with the accounts. In my opinion, they show fairly the financial operations for the year ended 31 December 1972 and the state of the affairs of The Australian National University as at that date.

Yours faithfully,

(Sgd.) D. R. STEELE CRAIK

(D. R. STEELE CRAIK)
Auditor-General for the Commonwealth

FINANCIAL STATEMENTS

STATEMENT OF NET ASSETS

As at 31 December 1972 (1)

	Net Current Assets	Non-Current Assets	University Reserves	Commonwealth Superannuation Reserve for Employer's Liability	Sub-Total University General Funds	Restricted Funds	Ancillary Activities	Total Non-Trust Funds	Trust and Agency Funds
CURRENT ASSETS									
Cash at Bank and on Deposit	706,035		1,870,385	14,735 Cr	2,561,685	779,295	2,704 Cr	3,338,276	54,058
Cash held in Imprests	19,119				19,119		510	19,629	
Debtors	80,395			4,025	84,420	40,391	141,654	266,465	10,070
Prepayments	785,370				785,370			785,370	
Materials in Stores and Service Pools (at cost)	370,215				370,215		277,987	648,202	
	<u>1,961,134</u>		<u>1,870,385</u>	<u>10,710 Cr</u>	<u>3,820,809</u>	<u>819,686</u>	<u>417,447</u>	<u>5,057,942</u>	<u>64,128</u>
NON-CURRENT ASSETS									
Buildings (at cost or valuation)									
Non-residential and service installations		46,050,969			46,050,969			46,050,969	
Halls of Residence		6,237,126			6,237,126			6,237,126	
Dwellings		5,126,181			5,126,181			5,126,181	
Equipment and Furniture (at cost or valuation)		24,679,001			24,679,001			24,679,001	
Teaching and Research		3,174,384			3,174,384			3,174,384	
Central Areas		539,430			539,430			539,430	
Dwellings							906,288	906,288	
Halls of Residence									
Books and Publications (at cost)									
University Library		4,353,305			4,353,305			4,353,305	
INVESTMENTS (at cost or valuation)		90,160,396		8,718,156	90,160,396	186,729	906,288	91,066,684	3,332,769
					8,718,156		13,293	8,918,178	
TOTAL ASSETS									
Less: Liabilities									
Sundry Creditors and Accruals	106,517				106,517		104,666	211,183	
Provision for Return Fares	218,573				218,573			218,573	
Loan from Superannuation Fund		345,661			345,661			345,661	
	<u>325,090</u>	<u>345,661</u>			<u>670,751</u>		<u>104,666</u>	<u>775,417</u>	
NET ASSETS									
	<u>1,636,044</u>	<u>89,814,735</u>	<u>1,870,385</u>	<u>8,707,446</u>	<u>102,028,610</u>	<u>1,006,415</u>	<u>1,232,362</u>	<u>104,267,387</u>	<u>3,396,897</u>
Contingent Liability									
Guarantees - Staff Housing Loan Program	399,260								

R. M. WILLIAMS,
Vice-Chancellor

LOIS A. BELLINGHAM,
Accountant

STATEMENT OF CHANGES IN NON-CURRENT ASSETS

For the Year Ended 31 December 1972 (ii)

	ADDITIONS							Balance 31 December 1972 (8)
	Balance 1 January 1972 (1)	From Capital Works & Services Vote (2)	From Recurrent Votes (3)	From Other Sources (4)	Total Additions (5)	Reductions (6)	Net Increase (7)	
<i>Buildings and Site Services</i>								
Non-residential	42,344,311	2,903,699	177,246	656,757	3,737,702	31,044	3,706,658	46,050,969
Halls of Residence	6,235,822	35,475	1,640	27,278	64,393	63,089	1,304	6,237,126
Dwellings	5,280,764	13,655	2,119 Cr	61,136	72,672	227,255	154,583 Cr	5,126,181
<i>Equipment and Furniture</i>								
Non-residential	23,243,912	972,631	2,779,601	1,110,295	4,862,527	253,054	4,609,473	27,853,385
Residential	534,583	2,140	2,707	7,461	4,847		4,847	539,430
<i>Library Books</i>	3,844,936		500,908	7,461	508,369		508,369	4,353,305
	81,484,328	3,927,600	3,459,983	1,862,927	9,250,510	574,442	8,676,068	90,160,396

OPERATING STATEMENT

For the Year Ended 31 December 1972 (iii)

REVENUE	\$	\$
Commonwealth Grant, 1970-72 triennium received in 1972	30,685,000	
Reserve funds transferred for operating expenses in 1972	161,664	
Student and examination fees	1,074,064	
Rentals from dwellings	316,406	
Sundry income	<u>231,525</u>	32,468,659
OPERATING EXPENSES (iv)		
Salaries	19,374,078	
Superannuation provision	2,042,968	
Payroll tax and workmen's compensation insurance	578,153	
Scholarships and fellowships	1,422,006	
Field research expenses, study leave, conference and visitors	621,042	
Materials and supplies	1,783,150	
General operating and service expenses	2,748,206	
Subventions	193,182	
Transfers to reserves	<u>471,176</u>	<u>29,233,961</u>
Balance carried forward to Statement of Sources and Uses of Funds (v)		<u><u>3,234,698</u></u>

ATTACHMENT TO OPERATING STATEMENT
For the Year Ended 31 December 1972 (iv)

	Salaries	Superannuation Provision	Payroll Tax, Workmen's Compensation Insurance	Scholarships and Fellowships	Field Study Leave & Conferences	Materials and Supplies	General Operating and Service Expenses	Subventions	Reserves	Total
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
<i>Institute of Advanced Studies</i>										
John Curtin School of Medical Research	2,113,145	228,479	67,242	246,741	54,993	334,924	137,229	..	..	3,182,753
Research School of Physical Sciences	2,762,340	347,622	85,423	223,806	64,488	723,935	287,494	..	..	4,495,108
Research School of Social Sciences	1,441,493	159,204	42,348	125,700	84,480	19,215	108,432	..	7,000	1,987,872
Research School of Pacific Studies	1,571,644	144,335	43,524	189,740	171,869	69,487	138,017	..	..	2,328,616
Research School of Chemistry	958,005	101,146	28,799	62,796	23,914	180,081	111,061	..	..	1,465,802
Research School of Biological Sciences	939,002	81,039	28,346	61,574	52,654	198,203	111,372	..	..	1,472,190
Total	9,785,629	1,061,825	295,682	910,357	452,398	1,525,845	893,605	..	7,000	14,932,341
<i>School of General Studies</i>										
Faculty of Arts	1,523,388	173,870	43,502	..	49,461	9,197	92,862	..	..	1,892,280
Faculty of Economics	588,708	65,679	16,822	..	14,630	3,302	35,091	..	5,400	729,632
Faculty of Law	352,432	33,896	10,068	..	7,775	3,821	32,546	..	..	440,538
Faculty of Asian Studies	457,968	47,937	13,110	..	19,218	..	19,052	..	..	557,285
Faculty of Science	2,192,794	227,889	67,852	..	58,541	236,915	173,976	..	24,740	2,982,707
Language Laboratory	27,414	2,285	..	..	..	3,503	603	..	..	33,805
Unallocated Posts	..	..	..	..	..	..	400	..	..	52,021
Scholarships	..	..	..	414,850	..	..	..	..	..	414,850
Total	5,142,704	551,556	151,354	414,850	149,625	256,738	354,530	..	81,761	7,103,118
<i>The Library</i>	879,900	77,223	24,284	..	..	..	73,966	..	..	1,055,373
<i>Academic Service Centres</i>										
Computer Centre	154,047	11,180	4,168	5,638	2,667	..	166,912	..	..	344,612
<i>Student Services</i>	96,612	7,421	2,681	..	..	..	8,720	..	..	115,434
<i>General University Services</i>										
Administration	1,935,253	220,942	55,330	91,161	3,000	..	413,509	..	298,415	2,628,034
Miscellaneous	1,277,553	100,929	41,698	..	11,866	..	158,277	..	84,000	559,719
Maintenance and Services	3,212,806	321,871	97,028	91,161	14,866	..	664,544	..	382,415	2,168,724
Total	3,212,806	321,871	97,028	91,161	14,866	..	1,236,330	..	382,415	5,356,477

246 ATTACHMENT TO OPERATING STATEMENT
For the Year Ended 31 December 1972 (iv) — continued

	Salaries	Superannuation Provision	Payroll Tax, Workmen's Compensation Insurance	Scholarships and Fellowships	Field Research, Study Leave & Conferences	Materials and Supplies	General Operating and Service Expenses	Subventions	Reserves	Total
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Subventions										
University House . . . . .	..	..	..	..	..	..	..	67,253	..	67,253
Union . . . . .	..	..	..	..	..	..	..	17,529	..	17,529
English/Malay Dictionary . . . . .	..	..	..	..	..	..	..	40,000	..	40,000
Australian National University Press . . . . .	..	..	..	..	..	..	..	68,400	..	68,400
Total . . . . .	..	..	..	..	..	..	..	193,182	..	193,182
Community Services										
Centre for Continuing Education	102,380	11,892	2,956	..	1,486	567	14,143	..	..	133,424
TOTAL UNIVERSITY	19,374,078	2,042,968	578,153	1,422,006	621,042	1,783,150	2,748,206	193,182	471,176	29,233,961

STATEMENT OF SOURCES AND USES OF FUNDS FOR CAPITAL PURPOSES

For the Year Ended 31 December 1972 (v)

FUNDS WERE PROVIDED BY:

Recurrent Funds (iii)	3,234,698
Capital Works and Services — Commonwealth Grant	4,261,000
University Reserves	109,534
Superannuation Fund and Provident Account Reserve	1,568,762
Restricted, Special Purpose and Scholarship Funds	1,960,200
Ancillary Activities	978,307
Capital Adjustments	848,709
	<u>12,961,210</u>

FUNDS WERE APPLIED TO:

Fixed Assets — Erection of buildings and service installations (ii)(5)	3,874,767
Acquisition of equipment and furniture (ii)(5)	4,867,374
Acquisition of library books and publications (ii)(5)	508,369
Absorption of cost of buildings demolished and obsolete equipment	273,651
Investments	1,707,974
Adjustment of University Reserves	656,464
Restricted, Special Purpose and Scholarship Funds	56,115
Ancillary Activities	1,016,496
	<u>12,961,210</u>

**UNIVERSITY HOUSE, GRADUATE HOUSE AND HALLS OF RESIDENCE
CONSOLIDATED OPERATING STATEMENT**

For the Year Ended 31 December 1972 (vi)

	University House	Graduate House	Bruce Hall	Burton Hall	Garran Hall	Total
	\$	\$	\$	\$	\$	\$
<i>Income</i>						
Tariff received — Residents	233,890	69,021	183,406	188,292	188,292	862,901
— Visitors	50,756	..	68,800	33,843	33,843	187,242
Membership Fees	7,133	..	..	..	..	7,133
Registration Fees	..	..	1,800	2,476	2,476	6,752
Reimbursement of Board — House Staff	4,663	..	1,698	2,855	2,855	12,071
Income from Casual Meals and Catering	50,650	..	46,361	10,209	10,209	117,429
Sundry Income	2,914	800	159	187	187	4,247
Beverage Sales — Gross Profit	21,371	..	4,616	4,019	4,019	34,025
Canteen Sales — Gross Profit	..	..	1,928	2,108	2,108	6,144
Subvention from University	40,000	..	..	..	..	40,000
Subsidy based on UFA Act 1966 Section 8	..	..	11,820	12,290	12,290	36,400
	411,377	69,821	320,588	256,279	256,279	1,314,344
<i>Less: Expenditure</i>						
<i>Operating Costs</i>						
Cost of Foodstuffs	85,702	..	74,653	59,685	59,685	279,725
Fuel, Light, Power and Heating	19,484	9,014	16,160	18,018	18,018	80,694
Cleaning, Laundry and Sundry Materials	9,023	4,154	9,922	8,362	8,362	39,823
Domestic Staff Wages	171,552	..	126,628	94,140	94,140	486,460
Provision for Long Service Leave — Domestic Staff	2,000	..	1,185	1,236	1,236	5,657
Losses, Breakages and Replacements	3,146	46	1,971	2,365	2,365	9,893
Local Transport, Freight and Supply Expenses	689	..	523	281	281	1,774
Other Operating Expenses	1,459	186	374	189	189	2,397
	293,055	13,400	231,416	184,276	184,276	906,423
<i>Administrative Costs</i>						
Administrative Salaries	41,811	4,666	31,871	25,939	25,939	130,226
Payroll Tax, Workmen's Compensation Insurance and Superannuation	11,834	947	9,760	7,605	7,605	37,751
Postages, Telegrams and Telephones	2,012	37	1,697	1,304	1,304	6,354
Stationery, Printing and Office Expenses	2,200	56	793	1,062	1,062	5,173
Newspapers and Periodicals	748	1	..	18	18	785
Master's and Fellows' Entertainment Expenses	708	..	..	..	..	708
Warden's Entertainment Expenses	..	..	396	400	400	1,196
Advertising, Appointments, Travelling, etc.	1,238	..	396	369	369	2,372
Residents' Committee Expenses	1,872	..	..	..	..	1,872
Accounting Service Fee	6,295	1,050	4,938	3,922	3,922	20,127
Provision for — Long Service Leave — Administrative Staff	300	200	331	174	174	1,179
— Warden's Study Leave	..	..	262	343	343	948
— Relieving Warden's Salary	..	..	966	1,011	1,011	2,988
Other Expenses	..	35	258	176	176	645
	69,018	6,992	51,668	42,323	42,323	212,324

**UNIVERSITY HOUSE, GRADUATE HOUSE AND HALLS OF RESIDENCE
CONSOLIDATED OPERATING STATEMENT**

For the Year Ended 31 December 1972 (vi) — continued

	University House	Graduate House	Bruce Hall	Burton Hall	Garran Hall	Total
	\$	\$	\$	\$	\$	\$
<i>Property Maintenance and Service Costs</i>						
Maintenance and Electricity Warden's House	627	5,062	473	239	239	478
Rates and General Services . . . . .	..	35,256	..	79	79	6,320
Repayment of Loan . . . . .	..	928	4,956	1,603	1,603	35,256
Maintenance of Grounds	21,200	1,898	8,534	7,133	7,133	9,090
Provision for Replacement of Equipment	10,400	8,183	12,219	10,857	10,857	45,898
Provision for Building Maintenance	32,227	51,327	26,182	19,911	19,911	149,558
TOTAL EXPENDITURE	394,300	71,719	309,266	246,510	246,510	1,268,305
<i>Net Operating Loss — Transferred to Accumulated Profits and Losses (viii)</i>	..	1,898	..	..	..	1,898
<i>Net Operating Profit — Transferred to Accumulated Profits and Losses (viii)</i>	17,077	..	11,322	9,769	9,769	47,937

SIDING SPRING LODGE — OPERATING STATEMENT

For the Year Ended 31 December 1972 (vii)

	\$	\$	\$
<i>Income</i>			
Tariff — ANU Staff . . . . .	..	9,167	..
— AATP Astronomers . . . . .	..	380	..
— Visitors . . . . .	..	1,223	..
Domestic Staff Board . . . . .	..	1,070	..
Casual Meals . . . . .	..	<u>116</u>	11,956
<i>Less: Expenditure</i>			
<i>Operating Costs</i>			
Foodstuffs Consumed	3,003	..	..
Fuel, Light, Power and Heating	3,419	..	..
Cleaning, Laundry and Sundry Materials	335	..	..
Domestic Staff Wages	9,638	..	..
Losses, Breakages and Replacements	290	..	..
Freight and Supply Expenses	90	..	..
Other Operating Expenses	<u>108</u>	16,883	..
<i>Administrative Costs</i>			
Administrative Salaries	6,054	..	..
Payroll Tax, Workmen's Compensation Insurance and Superannuation	1,603	..	..
Postages, Telegrams and Telephones	583	..	..
Stationery, Printing and Office Expenses	34	..	..
Newspapers and Periodicals	55	..	..
Advertising, Appointment and Travel Expenses	744	..	..
Accounting Service Charge	179	..	..
Provision for Long Service Leave	200	..	..
Other Administrative Expenses	<u>53</u>	9,505	..
<i>Property Costs</i>			
Rates and General Services	228	..	..
Maintenance of Grounds	743	..	..
Provision for Replacement of Equipment	1,000	..	..
Provision for Building Maintenance	<u>2,500</u>	<u>4,471</u>	<u>30,859</u>
NET OPERATING LOSS —			
Transferred to Accumulated Profits and Losses (viii) . . . . .	..	..	<u>18,903</u>

UNIVERSITY HOUSE, GRADUATE HOUSE, SIDING SPRING LODGE AND
HALLS OF RESIDENCE FUNDS

For the Year Ended 31 December 1972 (viii)

	Balances as at 1 January 1972	Income, Interest and Subsidies Received during 1972	Disbursed or Transferred during 1972	Balances as at 31 December 1972
	\$	\$	\$	\$
<i>University House</i>				
Profits Equalisation Fund	2,056 Dr	..	..	..
Add: 1972 Trading Profit . . . . .	..	17,077	..	..
Interest . . . . .	..	938	..	..
Adjustment of Imprests . . . . .	..	60	..	..
	<u>2,056 Dr</u>	<u>18,075</u>	<u>..</u>	<u>16,019</u>
Internal Maintenance of Buildings Fund	3,316	10,412	13,686	42
Replacement of Equipment Fund	44,609	22,366	6,540	60,435
Long Service Leave Fund	3,307	2,405	..	5,712
Staff Amenities Fund	406	313	719	..
Fund for Purchase of Gifts	14	37	..	51
Improvements Fund	20	..	..	20
Bistro Building Fund . . . . .	..	14,000	6,282	7,718
	<u>49,616</u>	<u>67,608</u>	<u>27,227</u>	<u>89,997*</u>
<i>Bruce Hall</i>				
Accumulated Profits and Losses	8,271 Dr	..	..	..
Add: 1972 Trading Profit . . . . .	..	11,322	..	..
Adjustment of Imprests . . . . .	..	10	..	..
Less: Transfer Visitors Income Equalisation Fund . . . . .	..	..	632	..
Adjustment Non-Inventory Items . . . . .	..	..	718	..
	<u>8,271 Dr</u>	<u>11,332</u>	<u>1,350</u>	<u>1,711</u>
Visitors Income Equalisation Fund	6,710	632	..	7,342
Building Maintenance Fund	4,470	12,347	10,792	6,025
Maintenance and Replacement of Equipment Fund	15,483	8,911	11,487	12,907
Long Service Leave Fund	2,903	1,597	206	4,294
Study Leave Fund	656	277	1,350	417 Dr
Relieving Warden's Salary Fund	3,130	1,045	..	4,175
Staff Amenities Fund	110	..	106	4
Junior Common Room Fund	25	149	..	174
Fellows' Fund	2,342	1,129	292	3,179
Art and Library Fund	573	401	365	609
	<u>28,131</u>	<u>37,820</u>	<u>25,948</u>	<u>40,003</u>
<i>Burton Hall</i>				
Accumulated Profits and Losses	1,317 Dr	..	..	..
Add: 1972 Trading Profit . . . . .	..	9,769	..	..
Adjustment of Imprests . . . . .	..	10	..	..
Less: Transfer from Visitors Income Equalisation Fund . . . . .	..	..	843	..
	<u>1,317 Dr</u>	<u>9,779</u>	<u>843</u>	<u>7,619</u>
Maintenance of Building Fund	14,630	11,021	11,780	13,871
Maintenance and Replacement of Equipment Fund	17,864	6,253	7,085	17,032
Study Leave Fund	129	352	..	481
Long Service Leave Fund	2,989	1,508	..	4,497
Relieving Warden's Salary Fund	2,639	43	1,089	1,593
Staff Amenities Fund	15	..	..	15
Junior Common Room Fund	25	35	..	60
Art and Library Fund	1,813	452	101	2,164
Society Fund	110	..	..	110
Visitors Income Equalisation Fund	383	843	..	1,226
	<u>39,280</u>	<u>30,286</u>	<u>20,898</u>	<u>48,668</u>

* \$13,293 invested in BHP 7% debentures maturing 1.4.1977 (Face Value \$13,400)

UNIVERSITY HOUSE, GRADUATE HOUSE, SIDING SPRING LODGE AND
HALLS OF RESIDENCE FUNDS

For the Year Ended 31 December 1972 (viii) — continued

	Balances as at 1 January 1972	Income, Interest and Subsidies Received during 1972	Disbursed or Transferred during 1972	Balances as at 31 December 1972
	\$	\$	\$	\$
<i>Garran Hall</i>				
Accumulated Profits and Losses	309 Dr	..	..	..
Add: 1972 Trading Profit . . . . .	..	9,769	..	..
Adjustment of Imprests . . . . .	..	11	..	..
Less: Transfer from Visitors Income Equalisation Fund . . . . .	..	..	843	..
	309 Dr	9,780	843	8,628
Maintenance of Building Fund	14,630	11,021	11,779	13,872
Maintenance and Replacement of Equipment Fund	17,864	6,253	7,086	17,031
Study Leave Fund	1,029	374	..	1,403
Long Service Leave Fund	2,989	1,508	..	4,497
Relieving Warden's Salary Fund	494	1,041	..	1,535
Staff Amenities Fund	14	..	..	14
Junior Common Room Fund	89	453	12	530
Art and Library Fund	765	423	94	1,094
Visitors Income Equalisation Fund	383	843	..	1,226
	37,948	31,696	19,814	49,830
<i>Graduate House</i>				
Accumulated Profits and Losses	4,087	..	..	..
Add: Adjustment of Imprests . . . . .	..	20	..	..
Interest . . . . .	..	19	..	..
Adjustment 1971 Income . . . . .	..	200	..	..
Less: 1972 Trading Loss . . . . .	..	..	1,898	..
Common Room Improvements . . . . .	..	..	290	..
	4,087	239	2,188	2,138
Maintenance of Building Fund	5,962	8,385	2,548	11,799
Maintenance and Replacement of Equipment Fund	1,524	2,024	334	3,214
Long Service Leave Fund . . . . .	..	200	..	200
Residents' Amenities Fund	332	..	332	..
	11,905	10,848	5,402	17,351
<i>Siding Spring Lodge</i>				
Accumulated Profits and Losses	10,650 Dr	..	18,903	29,553 Dr
Long Service Leave Fund	200	209	..	409
Maintenance of Building Fund	2,490	2,576	1,499	3,567
Maintenance and Replacement of Equipment Fund	983	1,036	363	1,656
	6,977 Dr	3,821	20,765	23,921 Dr
TOTAL FUNDS (ix)	159,903	182,079	120,054	221,928

ANCILLARY ACTIVITIES — CONSOLIDATED STATEMENT OF BALANCES

As at 31 December 1972 (ix)

	University House	Graduate House	Bruce Hall	Burton Hall	Garran Hall	Siding Spring Lodge	ANU Press	ANU Staff Centre	Total
	\$	\$	\$	\$	\$	\$	\$	\$	\$
Assets									
Investments	13,293								13,293
Cash Held in Imprests	140	20	130	75	75		20	50	510
Sundry Debtors	36,439	4,948	7,682	6,861	7,819	1,027	64,782	12,096	141,654
Sundry Stocks	51,858	140	30,778	15,109	15,109	748		31,109	144,851
ANU Press Book Stocks							133,136		133,136
Furniture and Equipment at Cost	306,997	57,675	194,415	141,848	141,848	3,948		32,228	878,959
Works of Art	22,298		2,270	1,506	1,255				27,329
	431,025	62,783	235,275	165,399	166,106	5,723	197,938	75,483	1,339,732
Less: Sundry Creditors	11,676	8,835	5,354	2,801	2,800	2,474	44,926	10,000	88,866
Refundable Deposits		3,650	5,250	3,440	3,460				15,800
	419,349	50,298	224,671	159,158	159,846	3,249	153,012	65,483	1,235,066
Net Cash Position									
Share of General Cash (+)	57	24,729	12,017	34,609	35,099		52,366	33,513	2,704
Amount Overdrawn (-)						23,222			
NET ASSETS	419,292	75,027	236,688	193,767	194,945	19,973 Cr	100,646	31,970	1,232,362
Liabilities/Funds									
General Funds	88,714	17,005	39,285	47,697	48,851	24,042 Dr	100,646	258 Dr	317,898
Interest Accrued on Funds	1,283	346	718	971	979	121			4,418
Accumulated Funds				1,746	2,012				3,758
	89,997	17,351	40,003	50,414	51,842	23,921 Dr	100,646	258 Dr	326,074
	329,295	57,676	196,685	143,353	143,103	3,948		32,228	906,288
	419,292	75,027	236,688	193,767	194,945	19,973 Dr	100,646	31,970	1,232,362

STAFF CENTRE — OPERATING STATEMENT

For the Year Ended 31 December 1972 (x)

	\$	\$	\$
<i>Income</i>			
Accommodation . . . . .	..	352	..
Membership Fees . . . . .	..	12,892	..
Reimbursement of Board — House Staff . . . . .	..	916	..
Income from Casual Meals and Catering . . . . .	..	90,855	..
Punchboard Receipts . . . . .	..	1,118	..
Sundry Income . . . . .	..	1,165	..
Beverage Sales — Gross Profit . . . . .	..	<u>45,342</u>	<u>152,640</u>
 Less: Expenditure			
<i>Operating Costs</i>			
Foodstuffs Consumed	50,119	..	..
Fuel, Light, Power and Heating	4,028	..	..
Cleaning, Laundry and Sundry Materials	2,704	..	..
Domestic Staff Wages	41,997	..	..
Barmen's Wages	23,467	..	..
Losses, Breakages and Replacements	835	..	..
Local Transport, Freight and Supply Expenses	340	..	..
Other Operating Expenses	<u>2,090</u>	<u>125,580</u>	..
 <i>Administrative Costs</i>			
Administrative Salaries	19,121	..	..
Payroll Tax, Workmen's Compensation Insurance and Superannuation	2,944	..	..
Postages, Telegrams and Telephones	988	..	..
Stationery, Printing and Office Expenses	2,120	..	..
Newspapers and Periodicals	17	..	..
Governing Body Expenses	934	..	..
Accounting Service Fee	3,388	..	..
Cellar Committee Expenses	67	..	..
Other Expenses	<u>3,757</u>	<u>33,336</u>	..
 <i>Property Maintenance and Service Costs</i>			
Rates and General Services	81	..	..
Sundry Repairs	532	..	..
Building Maintenance	28	641	..
 TOTAL EXPENDITURE . . . . .	..	..	<u>159,557</u>
 Net Operating Loss — Transferred to Statement of Sources and Uses of Funds for Capital Purposes (v) . . . . .	..	..	<u><u>6,917</u></u>

THE AUSTRALIAN NATIONAL UNIVERSITY PRESS— OPERATING STATEMENT

For the Year Ended 31 December 1972 (xi)

	\$	\$	\$	\$	\$
<i>Income</i>					
Sales of Publications . . . . .	..	..	..	166,598	..
Permission Fees Received . . . . .	..	..	..	98 Dr	..
Income from Rights . . . . .	..	..	..	536	..
Miscellaneous Income . . . . .	..	..	..	60	167,096
<i>Cost of Sales</i>					
Stock of Publications 1 January 1972 . . . . .	..	..	143,465	..	..
Book Manufacturing Costs . . . . .	..	..	113,271	..	..
Editorial Expenses . . . . .	..	..	692	257,428	..
Less: Stock on Hand 31 December 1972					
Finished Books . . . . .	..	153,307	..	..	..
Works in Progress	2,511	..	..	..	..
Less: External Subsidies Applicable to Works in Progress	5,685	3,174 Cr	..	..	..
Less: Write-off Value of —		150,133	..	..	..
Unbound Stock	4,849	..	..	..	..
Bound Books	12,147	16,996	133,137	..	..
Total External Subsidies Received . . . . .	..	..	12,212	145,349	..
				112,079	..
Add: Commission on Sales . . . . .	..	6,927	..	..	..
Royalties . . . . .	..	15,291	..	22,218	134,297
GROSS OPERATING PROFIT . . . . .	..	..	..	..	32,799
<i>Administrative Expenses</i>					
Salaries . . . . .	..	..	103,342	..	..
Superannuation . . . . .	..	..	15,604	..	..
Payroll Tax . . . . .	..	..	2,762	..	..
Workmen's Compensation Insurance . . . . .	..	..	189	121,897	..
Stationery and Office Supplies . . . . .	..	..	..	4,539	..
Advertising . . . . .	..	..	..	12,590	..
Subscriptions to Trade Publications . . . . .	..	..	..	681	..
Electricity and Heating . . . . .	..	..	..	200	..
Cleaning and Maintenance . . . . .	..	..	..	1,735	..
Freight and Supply Expenses . . . . .	..	..	..	4,215	..
Postages and Telephones . . . . .	..	..	..	8,814	..
Bank Charges . . . . .	..	..	..	212	..
Other Expenses . . . . .	..	..	..	58	..
Travelling Expenses . . . . .	..	..	..	5,581	..
Appointment Expenses . . . . .	..	..	..	10	160,532
NET OPERATING LOSS . . . . .	..	..	..	..	127,733
Less: Adjustment of Imprests — 1971 . . . . .	..	..	..	..	10
Net Transfer to Accumulated Funds . . . . .	..	..	..	..	127,723
ANU Press Accumulated Funds 1 January 1972 . . . . .	..	..	..	159,969	..
Add: University Subvention . . . . .	..	..	..	68,400	..
Less: Operating Loss . . . . .	..	..	..	127,723	..
ANU Press Accumulated Funds 31 December 1972 (ix) . . . . .	..	..	..	100,646	..

STATEMENT OF UNIVERSITY RESERVES

As at 31 December 1972 (xii)

	Fund Balances 31 December 1971	Subsidies and Donations Received during 1972	Funds Disbursed or Transferred during 1972	Fund Balances 31 December 1972
	\$	\$	\$	\$
<i>University Reserves</i>				
University General Reserve	129,508	37,731	..	167,239
The Research School of Biological Sciences	10,000	..	..	10,000
The John Curtin School of Medical Research	20,000	13,928	13,928	20,000
The Research School of Physical Sciences	20,000	..	..	20,000
The Research School of Social Sciences	3,000	7,000	..	10,000
The Research School of Pacific Studies	6,850	650	..	7,500
The Research School of Chemistry	10,000	..	..	10,000
The School of General Studies	5,379	4,621	..	10,000
<i>Special Purpose Reserves</i>				
Equipment Reserve 1970/1972 Triennium Research School of Physical Sciences	Nil	192,000	100,000	92,000
1970/71 Reserve for 27th Payday . . . . .	..	161,664	161,664	..
Reserve for DCT 1000 Communication Terminal	Nil	5,400	..	5,400
Reserve for MSE Centriscan	Nil	24,740	..	24,740
Reserve for Legal Workshop	Nil	15,000	..	15,000
Reserve for Office of Research in Academic Methods	Nil	15,000	..	15,000
School of General Studies Research Fund	20,000	17,000	..	37,000
Reserve for Site Works — Property and Plans	Nil	68,000	..	68,000
University Art Reserve	1,514	5,300	5,798	1,016
University Film Reserve	13,540	2,500	..	16,040
University Theatre Group Reserve	463	..	..	463
University Performing Arts Council Reserve	14,442	5,000	500	18,942
Computer Facilities Fund	751,147	250,000	1,000,000	1,147
Chancelry Mural Fund	4,014	..	..	4,014
Nichol Smith Seminar Fund	1,641	2,617	2,111	2,147
Medical Education Fund	2,227	110	..	2,337
Staff Centre Building Fund	4,009	3,500	..	7,509
Staff Housing Replacement Reserve	855,694	385,879	65,219	1,176,354
Tandem Generator Tube Replacement Reserve	72,789	25,000	42,399	55,390
Waigani Seminar	7,081	..	..	7,081
Fund for International Conference to be held in Canberra	10,000	..	..	10,000
Fund for Siding Springs Tourist Facilities Building	5,000	5,000	..	10,000
Reserve for Maintenance Pool Surplus	Nil	16,000	..	16,000
Bookshop Concession	Nil	28,000	..	28,000
Director's Fund, John Curtin School of Medical Research	Nil	2,066	..	2,066
	<u>1,968,298</u>	<u>1,293,706</u>	<u>1,391,619</u>	<u>1,870,385</u>

STATEMENT OF FUNDS GRANTED FOR RESTRICTED PURPOSES

For the Year Ended 31 December 1972 (xiii)

	<i>Fund Balances 31 December 1971</i>	<i>Subsidies and Donations Received during 1972</i>	<i>Funds Disbursed or Transferred during 1972</i>	<i>Fund Balances 31 December 1972</i>
	\$	\$	\$	\$
<i>General Funds</i>				
Mount Stromlo Observatory Fund for Accumulated Furlough	3,086	152	..	3,238
Rockefeller Foundation Grant for General Purposes	5,069	..	..	5,069
Royalty Fund from the Patent of Influenza Vaccine	1,997 Dr	2,502	580	75 Dr
Copper Refining Project—Dr A. J. Parker	750	38,540	37,977	1,313
Duval Gift to the University	111,481	9,645	..	121,126
Students' Association contributions for the Performing Arts Centre	15,942	10,140	..	26,082
Portrait Fund	Nil	4,000	2,150	1,850
Australia and New Zealand Bank Ltd grant for art purchases	700	..	..	700
The John Darling Art Fund	21,639	21,688	24,800	18,527
Mount Isa Mines Limited grant	300	50	..	350
Mobil Oil Australia grant to University Counselling Service	300	100	..	400
Fibre Makers Ltd grant to University Counselling Service	25	25	..	50
Undistributed interest on restricted funds	4,976	235	5,211	Nil
Webster, Laver Influenza Vaccine Distribution	18,057	1,379	18,744	692
Department of Microbiology Fund Influenza Vaccine Distribution	14,446	1,496	3,181	12,761
John Curtin School of Medical Research Fund Influenza Vaccine Distribution	14,446	1,566	263	15,749
Vice-Chancellor's Special Fund Influenza Vaccine Distribution	43,337	4,638	30,966	17,009
Patent Establishment Fund—Influenza Vaccine	3,389	167	..	3,556
<i>Grants for the Library</i>				
Gift from Professor K. Mahler for the Joseph Needham Collection	6,383	301	208	6,476
Donations for McDonald Collection	1,757	87	..	1,844
Art and Library Fund	Nil	4,706	512	4,194
<i>Grants for Research</i>				
THE JOHN CURTIN SCHOOL OF MEDICAL RESEARCH				
Department of Physical Biochemistry				
Medical Research Council grant for research—Professor K. P. Strickland	80	..	80	Nil
Australian Dairy Board grant for research in lactoglobulins of milk—Dr H. A. McKenzie	50 Dr	750	928	228 Dr
Medical Research Council—contributions to Dr Stephenson	Nil	422	..	422
Department of Microbiology				
World Health Organization grant for maintenance of regional reference laboratory for anthropod-borne viruses	2,559	6,918	9,477	Nil
National Multiple Sclerosis Society (USA) grant for research—Dr P. D. Scotti	884	884 Dr	..	Nil
Various Grants for Support of Travel	860	..	..	860
World Health Organization grant for the study of Asian influenza viruses—Dr R. G. Webster and Dr W. G. Laver	198	1,137	1,335	Nil
Grants to Department of Microbiology for travel	Nil	1,000	1,000	Nil
Department of Physiology				
Burroughs Wellcome Fellowship	480 Dr	..	1,624	2,104 Dr
US National Institutes of Health grant for research—Dr S. Murray Sherman	838	..	838	Nil
Food and Agricultural Organization grant for priorities in agricultural research—Dr Marion Ward	Nil	840	840	Nil

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STATEMENT OF FUNDS GRANTED FOR RESTRICTED PURPOSES

For the Year Ended 31 December 1972 (xiii)—continued

	Fund Balances 31 December 1971	Subsidies and Donations Received during 1972	Funds Disbursed or Transferred during 1972	Fund Balances 31 December 1972
	\$	\$	\$	\$
Department of Clinical Science				
Dalgety Agri-Lines Pty Ltd grant to Dr P. Nestel	Nil	2,287	..	2,287
Life Insurance Medical Research fund of Australia and New Zealand—grant-in-aid Dr Ardlie	Nil	..	3,503	3,503 Dr
National Heart Foundation grant for research—Professor H. M. Whyte and Dr R. B. Goldrick	2,120	723	2,376	467
National Heart Foundation grant for research—Dr P. F. Sinnett and Professor H. M. Whyte	Nil	660	660	Nil
National Heart Foundation grant for research—Dr R. B. Goldrick	60	74 Dr	14 Cr	Nil
National Heart Foundation grant for research—Dr P. Nestel	459 Dr	6,377	4,723	1,195
Australian Academy of Science grant to Department of Clinical Science—International Biological Programme Project in New Guinea	Nil	6,268	5,392	876
Department of Immunology				
Australian Kidney Foundation grant to Department of Immunology	Nil	3,000	2,844	156
Miscellaneous				
Anonymous donation for general purposes	100	..	46	54
RESEARCH SCHOOL OF PHYSICAL SCIENCES				
Department of Engineering Physics				
Australian Institute of Nuclear Science and Engineering grant to Dr A. H. Morton	Nil	2,408	69	2,339
Department of Nuclear Physics				
Australian Institute of Nuclear Science and Engineering grant to Dr K. H. Bray	Nil	8,309	4,872	3,437
Department of Geophysics and Geochemistry				
Department of Geochemistry—Special fund	Nil	604	..	604
Metropolitan Water Sewerage and Drainage Board and Snowy Mountains Hydro-Electric Authority grant for Seismological research	8,322	2,430	1,104	9,648
Electron Probe Micro Analyser fund	2,154	582	254	2,482
National Science Foundation grant for research—Dr R. J. Twiss	177	177 Dr	..	Nil
Department of Solid State Physics				
Australian Institute of Nuclear Science and Engineering grant to Mr I. R. Herbert	Nil	21	21	Nil
Department of Astronomy				
International Astronomical Union grant for distinguished visitors	14	..	14	Nil
Grant for 150 inch Telescope	68,279	5,081	25,726	47,634
Lowell Observatory grant—Mount Stromlo equipment rehabilitation fund	52,096	4,818	227	56,687
RESEARCH SCHOOL OF SOCIAL SCIENCES				
General				
John Curtin Memorial Lecture—The Honourable Dr J. J. Dedman	Nil	500	37	463
Department of Economics				
Australian Banks' grant for visiting professors	331	..	331	Nil
Grant to Department of Economic History—Dr R. G. Gregory and Mr B. D. Haig	Nil	108	..	108

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STATEMENT OF FUNDS GRANTED FOR RESTRICTED PURPOSES

For the Year Ended 31 December 1972 (xiii)—continued

	Fund Balances 31 December 1971	Subsidies and Donations Received during 1972	Funds Disbursed or Transferred during 1972	Fund Balances 31 December 1972
	\$	\$	\$	\$
Department of Political Science				
Federal Election Survey Fund	1,833	90	..	1,923
Department of History				
Assistance for preparation of guide to manuscripts relating to Australia and South-West Pacific	174	..	174	Nil
Department of Demography				
Director's Special fund	800	620	68	1,352
Australian Family Formation Project	26,440 Dr	39,231	10,527	2,264
Department of Immigration grant for Population Enquiry	8,981	40,639	37,803	11,817
The Population Council Inc. grant for the Fiji Family Planning Project	881 Dr	..	881 Cr	Nil
The Asian Population and Programme Project	10,756	466	2,919	8,303
Population Council Fund for Production of West African Book on Population Growth	3,013	145	76	3,082
Ford Foundation grant for research proposal 'Changes and prospective changes in Family and National Population Formation in Australia'	5,832	166	4,878	1,120
Australian Asian University Co-operative Scheme—T. S. McDonald Assignment in Indonesia	Nil	6,600	140	6,460
Department of Statistics				
Grant from Department of Supply for Statistical Research	4,038 Dr	14,010	7,046	2,926
Ford Grant No. 3				
Continuation of the Study of the Indonesian Economy	4,023 Dr	4,705	11,419	10,737 Dr
Demographic Study of Indonesia	328 Dr	3,953	10,929	7,304 Dr
Continuation of the Study of Contemporary China	4,905	26,179	27,140	3,944
Project Benefit Account	Nil	188	..	188
Department of Sociology				
Council for Aboriginal Affairs grant for research to Mrs K. Kitaoji	2,106	3,139	3,031	2,214
Council for Aboriginal Affairs grant for research to Dr F. Lancaster-Jones	368	..	368	Nil
Australian Dictionary of Biography				
Grant for Australian Dictionary of Biography	2,901	143	..	3,044
Australian Dictionary of Biography	194 Dr	6,207	6,500	487 Dr
Department of Economic History				
William Cooper & Nephews (Aust.) Pty Ltd	1,852	1,927 Dr	75 Cr	Nil
Pastoral Industry Research Fund	Nil	3,784	1,875	1,909
Goldsbrough Mort grant for research of wool industry history	572	647 Dr	75 Cr	Nil
Economic History Interest Accumulation fund	Nil	1,137	200	937
Rural Reconstruction in New South Wales	Nil	1,210	1,002	208
Anonymous grant for Publication of Monographs on historical statistics	182 Dr	1,000	1,311	493 Dr
Anonymous grant for study of the supply, utilization and earnings of graduates	1,412 Dr	1,367	918 Cr	873
Amalgamated Engineering Union grant to assist in research and publication of labour history and the economics of labour	2,074	166 Dr	99 Cr	2,007
Grant to Department of Economic History—Dr R. G. Gregory and Mr B. D. Haig	108	108 Dr	..	Nil
Urban Research Unit				
Australian Institute of Urban Studies grant for the study of urban development in Melbourne	4,033	21,947	24,901	1,079

continued on following page

STATEMENT OF FUNDS GRANTED FOR RESTRICTED PURPOSES

For the Year Ended 31 December 1972 (xiii)—continued

	Fund Balances 31 December 1971	Subsidies and Donations Received during 1972	Funds Disbursed or Transferred during 1972	Fund Balances 31 December 1972
	\$	\$	\$	\$
Education Research Unit				
Commonwealth Advisory Committee on Advanced Education grant for research into characteristics of students entering colleges of advanced education—Dr H. Maddox	2,189	6	153	2,042
Nuffield Foundation grant for an Investigation into Students who 'Drop Out' from Professional Courses at a number of Australian universities	4,000	..	4,778	778 Dr
Espada Educational Trust Fund grant—Mr D. S. Anderson	612	360	1,999 Cr	2,971
Ontario Institute for Studies in Education grant—Dr C. Selby Smith	1,516	75	..	1,591
Commonwealth Advisory Committee on Advanced Education grant to undertake Cost Benefit Analysis of Resource Allocation in Colleges of Advanced Education—Dr C. Selby Smith	6,453	4,432	500	10,385
Commonwealth Advisory Committee on Advanced Education grant to undertake a study entitled 'Some implications of extending three year engineering diploma courses to four years'—Dr C. Selby Smith	Nil	961	..	961
Study of the training of overseas students in Australia Australian Commission of Advanced Education grant for research on the regional college and its environment—Dr D. Anderson	Nil	10,000	10,426	426 Dr
	Nil	..	19	19 Dr
RESEARCH SCHOOL OF PACIFIC STUDIES				
General				
The Ford Foundation grant for international research and training program	39,431 Dr	137,491 Dr	176,431 Cr	491 Dr
Anonymous grant for research on the political, social and economic development in New Guinea	300	152	452	Nil
Bougainville Copper grant to Research School of Pacific Studies for Seminars	3,300	5	1,938	1,367
Director's Special Fund	4,008	259	499	3,768
Bougainville Copper grant to Research School of Pacific Studies for intensive studies	991	5,079	7,471	1,401 Dr
H. E. Maude research projects	Nil	1,003	..	1,003
Arthur F. Yencken Memorial Lecture Fund	Nil	2,005	460	1,545
Myer Foundation grant—field study in domestic policies in West Visaynas—Miss R. J. Abell	Nil	3,200	3,200	Nil
Department of Anthropology and Sociology				
E. M. Symon bequest for research	1,491	1,491 Dr	..	Nil
Department of Linguistics				
Australian Institute of Aboriginal Studies grant for linguistics research	758	3,321	3,898	181
Department of Prehistory				
CSIRO grant for co-operation with Division of Plant Industry in Carbon-14 Work	3,397	3,522	265	6,654
Australian Institute of Aboriginal Studies grant to Mr R. L. Vanderwal	Nil	6,707	3,857	2,850
Department of Biogeography and Geomorphology				
Australian Institute of Aboriginal Studies grant to Professor Mulvaney and Dr Bowler for research 'Quaternary research in Western N.S.W.'	Nil	2,618	..	2,618

continued on following page

STATEMENT OF FUNDS GRANTED FOR RESTRICTED PURPOSES

For the Year Ended 31 December 1972 (xiii)—continued

	Fund Balances 31 December 1971	Subsidies and Donations Received during 1972	Funds Disbursed or Transferred during 1972	Fund Balances 31 December 1972
	\$	\$	\$	\$
Department of Pacific History				
Republic of Nauru fund—Professor J. W. Davidson	10,143	556	. . .	10,699
Pacific Manuscripts Bureau	7,557	44,092	48,209	3,440
New England Microfilming Project	6,049	1,051	7,396	296 Dr
Department of Human Geography				
Rural Credits Development Fund grant for study of Labour migration in TPNG—Professor R. G. Ward	Nil	8,155	992	7,163
Department of Far Eastern History				
Morrison Papers project	111	. .	. .	111
International Development Research Centre grant for research on Chinese medical system—Dr P. Wilenski	Nil	3,832	3,278	554
Department of Economics				
Comprehensive survey of resources—Torres Strait region	Nil	7,017	1,720	5,297
Various grants for study of American investment in Australia	2,740	135	. .	2,875
International Bank for Reconstruction and Development grant 'High Yielding Programme in India'—Dr B. Lockwood	Nil	3,809	3,320	489
Anonymous grant for study of economy of Indonesia	11,788	3,220	12,778	2,230
Rural Credits Development Fund grant for study of nucleus estate development in rural sector of Papua New Guinea	5,446 Dr	2,350	965	4,061 Dr
Flow of funds study for Papua New Guinea	Nil	4,004	2,785	1,219
International Bank for Reconstruction and Development grant for research on professional structures in South-East Asia—Emeritus Professor Silcock	Nil	7,748	1,083 Cr	8,831
New Guinea Research Unit				
Rural Credits Development Fund grant for study of economic aspect of indigenous agriculture in Territory of Papua New Guinea	270	. .	. .	270
Mr and Mrs C. Banks grant for fieldwork in Territory of Papua New Guinea	679	. .	. .	679
Rural Credits Development Fund grant for study of Co-operatives in the Territory of Papua New Guinea	9,230	455	9	9,676
Rural Credits Development Fund grant for the project 'Outward migration from Chimbu'	Nil	7,379	1,068	6,311
Rural Credits Development Fund grant for the spread of Innovations amongst New Guinea villages	5,213	11,864	12,578	4,499
RESEARCH SCHOOL OF BIOLOGICAL SCIENCES				
World Wild Life fund for survey on captive growth and culture—Hawksbill Turtle	Nil	2,502	. .	2,502
World Wild Life grant for a survey of the status of the saltwater crocodile in north-west Western Australia	488	. .	. .	488
World Wild Life fund for survey work—Hawksbill Turtle—Dr Bustard	Nil	1,868	300	1,568
Australian Academy of Science grant for photosynthesis conference	20	20 Dr	. .	Nil
Office of Aboriginal Affairs grant to investigate the population dynamics of salt-water crocodiles and Green Sea Turtles	6,682 Dr	83,000	133,396	57,078 Dr
U.S. National Institute of Health grant for research—Dr J. C. Loper	141	. .	24	117
Rockefeller Foundation grant for studies on the modification of amino acid composition of plants	Nil	11,969	8,127	3,842

continued on following page

STATEMENT OF FUNDS GRANTED FOR RESTRICTED PURPOSES

For the Year Ended 31 December 1972 (xiii)—continued

	Fund Balances 31 December 1971	Subsidies and Donations Received during 1972	Funds Disbursed or Transferred during 1972	Fund Balances 31 December 1972
	\$	\$	\$	\$
THE SCHOOL OF GENERAL STUDIES				
<i>The Faculty of Arts</i>				
Commonwealth Literary Fund grant for lectures	65	..	..	65
Department of Classics				
Fund for purchase of classical antiquities	2,288	2,006	1,693	2601
Department of Geography				
Ford Foundation grant for research—Mr E. C. Chapman	1,249	21	500	770
The Myer Foundation grant—Dr L. Sternstein	Nil	662	..	662
Department of Pure Mathematics				
Pure Mathematics Publications Account	91	22	38	75
Department of Linguistics				
Australian Institute of Aboriginal Studies grant to Department of Linguistics—Mr M. Walsh	Nil	1,390	2,839	1,449 Dr
Department of Sociology				
Department of Health grant for Drug Control Project	5,315	18,738	16,060	7,993
Australian Institute of Aboriginal Studies grant to support Lecturer in Aboriginal studies—Dr B. H. Turner	Nil	8,096	4,089	4,007
<i>The Faculty of Economics</i>				
Department of Economics				
Anonymous grant for study of Australian manufacturing industry	1,735	76	429	1,382
Australian Academy of Science grant for study of Japanese innovation	714	500	388	826
Anonymous grant for study of money and finance in New Guinea—Dr D. W. Stammer	82	..	35	47
Anonymous grant for Econometric Program Proposal—Professor Terrell and Mr Pagan	Nil	3,510	3,469	41
Rural Credits Development Fund grant for study of economic effects of taxation and other fiscal devices on agricultural production in Australia	216	..	53	163
Grant for study of Japanese agriculture trade policy	4,793 Dr	4,771	22 Cr	Nil
Australian Institute of International Affairs project Japan and Australia in a Pacific Economic Community—Dr P. Drysdale	1,462	68	902	628
CSIRO grant for the development and testing of methods of utilising the economic potential of research projects as an aid to the planning of research programs	128	3,657	3,785	Nil
Anonymous grant for Industrial Research and Development in Australia—Dr C. A. Tisdell	5,768	..	5,768	Nil
Asian Development Bank grant for the study of trade in South-East Asia	181	..	181	Nil
Department of Statistics				
Wool Research Fund grant for national drought reserve study	156	..	156	Nil
<i>The Faculty of Asian Studies</i>				
Department of Indonesian				
The English/Malay Dictionary Project	11,588	40,799	30,986	21,401

continued on following page

STATEMENT OF FUNDS GRANTED FOR RESTRICTED PURPOSES

For the Year Ended 31 December 1972 (xiii)—continued

	Fund Balances 31 December 1971	Subsidies and Donations Received during 1972	Funds Disbursed or Transferred during 1972	Fund Balances 31 December 1972
	\$	\$	\$	\$
<i>The Faculty of Science</i>				
Department of Botany				
Food and Agricultural Organisation grant for collection of special tree seeds	997		69	928
Champion Research Fund	1,096	119		1,215
Department of Botany Native Plant Development Project	500	500	488	512
Department of Chemistry				
Wool Research Committee grant for wool research	654 Dr	10,101	9,143	304
Abbott Laboratories grant for research in organic chemistry—Professor W. D. Crow	47	47 Dr		Nil
Department of Geology				
Planet Management and Research Pty Ltd grant for work spectrometer	1,525	2,371	3,008	888
Western Mining Corporation Limited grant to support geological education	593	705	1,262	36
Esso Standard Oil (Australia) Ltd grant for advancement of earth sciences	80	500	287	293
Gifts for Fossil Appeal Research—Vertebrate Palaeontology Unit—Dr D. A. Brown	22,160	2,205		24,365
Department of Psychology				
Social Science Research Council grant to assist in processing data from a study of attitudes towards Aborigines	145			145
Office of Aboriginal Affairs grant for the 'Hermannsburg Project'—Professor G. N. Seagram	Nil	6,400	5,936	464
Northern Territory Administration grant for Aboriginal infant morbidity and mortality project	4,235 Dr	9,559	6,149	825 Dr
Australian Advisory Committee on Research and Development in Education grant for educational performance of Aboriginal children	Nil	9,127	6,937	2,190
Office of Aboriginal Affairs grant to support a five month field study of recent developments at Hermannsburg—Professor G. N. Seagram	Nil	3,500	2,527	973
Department of Zoology				
Rural Credits Development Fund grant for the project on the biological control of muscid flies	74		74	Nil
CSIRO grant for marsupial research	165 Dr	3,400	2,364	871
Indonesian Expedition—Mr D. M. Smyth	380	380 Dr		Nil
Rural Credits Development Fund grant for aphid research	17		17	Nil
Rural Credits Development Fund grant for research—Professor J. D. Smyth	767		767	Nil
US National Institutes of Health grant for research in vitro cultivation of Echinococcus granulosus	15		15	Nil
Australian Meat Board grant for immunological and in-vitro culture studies in relation to the control of cysticercosis in sheep	1,714	26,643	27,089	1,268
Rural Credits Development Fund grant for the Project Investigation of the Physiology and Metabolism of Economically Important Helminths with the ultimate Aim of Improving Methods of Control	1,480	3,204	2,890	1,794
Department of Forestry				
Department of Foreign Affairs grant for project on forest resources information with Asian and Pacific Council Registry of Scientific and Technical Services	367		8	359
National Capital Development Commission grant for the study on land use and development plan for the ACT	116	116 Dr		Nil
Various grants for research on fungus phytophthora	3,168	13,654	8,873	7,949

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STATEMENT OF FUNDS GRANTED FOR RESTRICTED PURPOSES

For the Year Ended 31 December 1972 (xiii)—continued

	Fund Balances 31 December 1971	Subsidies and Donations Received during 1972	Funds Disbursed or Transferred during 1972	Fund Balances 31 December 1972
	\$	\$	\$	\$
Nuffield Foundation grant for inventory of indigenous uneven aged broadleaved forests	596	596 Dr	..	Nil
Grants to support a Project in the Shoalhaven Catchment — Professor G. A. Petrides	700	700 Dr	..	Nil
Rural Credits Development Fund grant to the Department of Forestry for investigation of forest management strategies necessary to meet future social demands	Nil	18,066	6,380	11,686
Human Resources Project	Nil	32,166	..	32,166
AUSTRALIAN RESEARCH GRANT COMMITTEE GRANTS				
<i>Research School of Social Sciences</i>				
Department of Economic History				
For history of land use on Monaro — Emeritus Professor Sir Keith Hancock	404	404 Dr	..	Nil
Centre for Continuing Education				
For a history of adult education in Australia — Mr B. H. Crew	625	493 Dr	132	Nil
THE SCHOOL OF GENERAL STUDIES				
<i>The Faculty of Arts</i>				
Department of English				
For a preliminary investigation of the vocabulary of Australian English before 1830 — Dr W. S. Ramson	907 Dr	6,244	6,098	761 Dr
Department of History				
For British colonial native policies in East Africa 1919-1939 — Mr I. R. Hancock	2,514	..	2,195	319
For manuscripts in South Celebes — Dr C. C. Macknight	851 Dr	2,015	1,041	123
For sport and society in Victoria 1830-1900 — Mr W. F. Mandle	Nil	..	450	450 Dr
Department of Philosophy				
For edition of a volume on Scandinavian Realism and publication of writings by A. Hagerstrom — Dr T. R. Mautner	334	46 Dr	288	Nil
Department of Germanic Languages				
For a vocabulary and grammar relating to the German work of Andreas Cryphius — Professor H. Kuhn	355 Dr	6,262	5,975	68 Dr
Department of Linguistics				
For a linguistic description of the Yiden language — Professor R. M. Dixon	Nil	810	810	Nil
For a study of the phenomena of linguistic change — Dr K. H. M. Rensch	640	90 Dr	549	1
For a comparative study of surface structure constraints in the dialects of Gadsup — Dr J. M. Haiman	Nil	1,950	1,950	Nil
Department of Prehistory				
Biography Sir Baldwin Spencer — Professor D. J. Mulvaney	192 Dr	872	510	170
<i>The Faculty of Economics</i>				
Department of Statistics				
For graphical and numerical large sample statistical inference using the empirical characteristic function — Professor C. R. Heathcote	Nil	..	1,683	1,683 Dr

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STATEMENT OF FUNDS GRANTED FOR RESTRICTED PURPOSES

For the Year Ended 31 December 1972 (xiii)—continued

	<i>Fund Balances 31 December 1971</i>	<i>Subsidies and Donations Received during 1972</i>	<i>Funds Disbursed or Transferred during 1972</i>	<i>Fund Balances 31 December 1972</i>
	\$	\$	\$	\$
Department of Computer Science				
For interactive computer image processing and pattern recognition with applications in Biology and Medicine—Dr R. A. Jarvis	Nil	4,374	4,327	47
<i>The Faculty of Law</i>				
For report on legal education in Australia and the role of University law schools—Professor J. E. Richardson	4,154	334	144	4,344
<i>The Faculty of Asian Studies</i>				
Department of Chinese				
For an anthology of Chinese verse in translation—Dr J. D. Frodsham	421	1,972	252	2,141
Department of Asian Civilizations				
For participation in Thai-British archaeological expedition investigating the last Neolithic and early metal age of Thailand—Dr H. E. Loofs	15 Dr	15	..	Nil
For annotated selected bibliography of Chinese history—Associate Professor O. B. Van der Sprenkel	716 Dr	5,630	6,076	1,162 Dr
Department of South Asian and Buddhist Studies				
For a study of nearly extinct Aboriginal languages in the north-east of South Australia	Nil	2,069	2,069	Nil
<i>The Faculty of Science</i>				
Department of Botany				
The histochemistry and plant reproduction with particular reference to apomixis and flowering—Dr R. B. Knox and Dr D. A. Paton	Nil	8,212	9,193	981 Dr
Department of Chemistry				
For the mechanisms of high energy reactions—Associate Professor W. D. Crow	1,325 Dr	10,675	10,185	835 Dr
For time resolved electronic spectroscopy—Dr B. K. Selinger	259	7,582	6,404	1,437
For electrocyclic fragmentation reactions induced by thermal photochemical or gamma-radiation processes—Dr R. N. Warrener	856 Dr	8,492	7,793	157 Dr
For the synthesis of dibenzofuran derivatives—Dr J. A. Elix	364 Dr	5,279	5,561	646 Dr
For a nitrogenase enzyme model system—Dr J. A. Broomhead	403 Dr	5,498	5,274	179 Dr
For study on nuclear magnetic spectroscopy of enzymes—Dr J. H. Bradbury	1,440	5,315	5,469	1,286
Department of Geology				
For geochemical investigations of granite rocks and associated mineral deposits—Dr A. J. R. White	184	112 Dr	72	Nil
Department of Physics				
For research on the production and properties of very strong shock waves—Dr R. J. Sandeman	102 Dr	204	..	102
For study of hypervelocity aerodynamics—Dr R. J. Stalker and Dr H. G. Hornung	2,447	6,205	5,506	3,146
For study of ion scattering from single crystal surfaces—Dr R. J. MacDonald	70	..	70	Nil
Department of Psychology				
For studies in space perception—Associate Professor G. N. Seagrim	264	50	..	314

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STATEMENT OF FUNDS GRANTED FOR RESTRICTED PURPOSES

For the Year Ended 31 December 1972 (xiii) — continued

	<i>Fund Balances 31 December 1971</i>	<i>Subsidies and Donations Received during 1972</i>	<i>Funds Disbursed or Transferred during 1972</i>	<i>Fund Balances 31 December 1972</i>
	\$	\$	\$	\$
Department of Theoretical Physics				
For the study of optical aberration theory — Professor H. A. Buchdahl and Dr P. J. Sands	1,685 Dr	10,961	10,537	1,261 Dr
Department of Zoology				
For study of the relationship between endocrine and environmental stimuli in the appearance and develop- ment of enzyme — Dr P. A. Janssens	208	51	..	259
For studies on speciation and phyletic relationships among indigenous perciform fishes — Dr A. H. Weatherley	991	..	..	991
Department of Forestry				
For a survey of the distribution of the soil-borne fungus phytophthora cinnamomi — Dr B. H. Pratt and Dr W. G. Heather	785 Dr	6,132	5,568	221 Dr
For study of the effects of prescribed burning in forests on litter fauna — Dr D. M. Tanton	40 Dr	5,614	6,152	578 Dr
For study of micro-organism and soil water potential — Dr D. M. Griffin	151 Dr	3,328	3,633	456 Dr
For economic evaluation of forest resource allocation and forest policy in Australia — Dr I. S. Ferguson	Nil	5,817	5,129	688
Department of Biochemistry				
For the study on the control of enzyme synthesis in drosophila melanogaster — Dr A. J. Howells	304	1,622	1,974	48 Dr
For the study of biosynthesis of the membranes of mito- chondria — Dr F. T. Bygrave	98 Dr	8,483	7,575	810
For the study of biochemical aspects of insect metamor- phosis — Professor L. M. Birt	640 Dr	7,451	7,442	631 Dr
For studies on the mechanism of oxidative phosphoryla- tion — Dr F. T. Bygrave and Professor R. N. Robertson For study of energy producing mechanisms in the spleen — Dr M. J. Weidemann	944	1,855	2,365	434
For biochemical studies on the multiplication of arbo- virus in cultured vertebrate and mosquito cells — Dr L. Dalgarno	188 Dr	5,500	4,882	430
	160	4,448	5,505	897 Dr
	511,282	814,185	744,976	580,491

STATEMENT OF FUNDS FOR SPECIAL PURPOSES

For the Year Ended 31 December 1972 (xiii)—continued

	<i>Fund Balances 31 December 1971</i>	<i>Subsidies and Donations Received during 1972</i>	<i>Funds Disbursed or Transferred during 1972</i>	<i>Fund Balances 31 December 1972</i>
	\$	\$	\$	\$
SPECIAL PURPOSE FUNDS				
Centre for Continuing Education—Schools and Seminars	31,299	77,377	92,389	16,287
Centre for Continuing Education—UNESCO Seminar	4,212	135	4,347	Nil
28th International Congress of Orientalists	7,636	371	275	7,732
Wenner-Gren Foundation grant to Far Eastern Prehistory Association to aid attendance of Asian prehistorians in conjunction with 28th International Congress of Orientalists	344	..	..	344
Council on Library Resources grant to aid attendance for members of the Library Seminars in conjunction with 28th International Congress of Orientalists	2,422	59	2,372	109
Fifth University Administrative Staff Course	Nil	..	27	27 Dr
US-Australian Symposium on Vision	Nil	4,122	4,089	33
National Summer School for Talented Students of Mathematics	8,537	5,050	8,878	4,709
1973 Summer School in Theoretical Chemistry	Nil	550	..	550
Wood Science Utilisation Seminar	20	..	..	20
Seminar on Mathematics for Social Scientists	3,894	3,943	7,837	Nil
The National Conference on Crime Prevention	500	..	..	500
Audio Visual Seminar	Nil	13,067	13,090	23 Dr
Postgraduate workshop on the saga as literature	Nil	41	..	41
Board of Teacher Education grant for research in teacher training	Nil	849	180	669
Australian Institute of International Affairs grant for study group on international action and the environment	Nil	1,000	15	985
Grant for social origins selected elite occupation survey	Nil	25,702	148	25,554
Australian Institute of International Affairs grant for the study on the implications for Australia of the enlarged EEC	Nil	500	..	500
Centre for Research on Federal Financial Relations	Nil	13,000	3,588	9,412
Australian Mineral Industry research fund	1,184	33	550	667
Masters Degree Course in Agricultural Development Economics	Nil	29,744	21,939	7,805
Pacific Trade and Development fund—Dr P. D. Drysdale	285	..	257	28
Special Fund—Department of Engineering Physics	Nil	4,807	1,193	3,614
Research School of Social Sciences Faculty Fund	28	43	43	28
Research School of Pacific Studies Faculty Fund	72	..	..	72
Department of Biochemistry Fund	60	1	..	61
Grant by Professor B. H. Neumann to Department of Mathematics	1,731	86	..	1,817
Research School of Social Sciences special travel fund	620	..	..	620
General Purpose Fund, Department of Botany—Professor L. D. Pryor	2,361	1,662	1,537	2,486
Grant to Department of Clinical Sciences—Professor H. M. Whyte	821	4,764	1,271	4,314
Professor F. Fenner's Fund to provide books for the library of the Centre for Research and Environmental Studies	2,060	1,052	1,018	2,094
Professor P. H. Partridge Special Fund	860	..	..	860
Professor J. W. Davidson's fund for publications assistance	4,546	678	1,533	3,691
US Naval Air Facility Award to Miss J. Houston	Nil	658	677	19 Dr
Cornell Children's Tuition scholarship—Miss M. C. Bangs	Nil	568	568	Nil
Support to the Universities Service Centre—Hong Kong University of Ghana for Thesis Support—Mr S. K. Gaisie	50	650	..	700
Wenner-Gren Foundation grant to Dr D. Y. Wu	582	..	36	546
Convocation Weekend meeting—May 1972	679	..	679	Nil
Assistance on the development of Australian studies—University of Venice	Nil	180	180	Nil
	Nil	..	1,000	1,000 Dr

continued on following page

STATEMENT OF FUNDS FOR SPECIAL PURPOSES

For the Year Ended 31 December 1972 (xiii)—continued

	Fund Balances 31 December 1971	Subsidies and Donations Received during 1972	Funds Disbursed or Transferred during 1972	Fund Balances 31 December 1972
	\$	\$	\$	\$
Australian Capital Territory Postgraduate Committee in Medicine	2,872	7,133	7,429	2,576
Linguistic Circle Publications fund	574	2,388	2,534	428
Research Scholars' thesis typing scheme	26,937	4,368	9,865	21,440
Gifts of books to Russia	227			227
Australian Economic Review fund	10,094	17,327		27,421
Functions and farewells	124	551	101	574
Fund for purchase of portrait of Sir Mark Oliphant	11 Dr	77	9	57
Professor J. C. Jaegar Commemoration fund	Nil	506		506
Grant for publication of Campanian and Lucanian pottery	1,304	3,638 Dr	2,334 Cr	Nil
Vice-Chancellor's Special Fund	3,283	1,788	3,420	1,651
South Pacific Social Sciences Association — assistance in publishing	Nil	2,990	987	2,003
Staff Amenities Fund	43,420	11,528	6,000	48,948
Special Fund Retention Money	99,703	8,938	70,397	38,244
Special Fund — Professor L. Broom	Nil	17,034	7,279	9,755
Extension Undercroft Melville Hall	Nil	106,000	110,194	4,194 Dr
Contributions Concessions area	Nil	219,375	277,203	57,828 Dr
Campus Radio Station Committee fund	Nil	4,142	3,844	298
Sports Union	28	94	108	14
	263,358	591,293	666,752	187,899
SPECIAL PURPOSE ACCOUNTS — AGENCY FUNDS				
General				
The Ditchely Foundation Conference	2,439	4,849	2,970	4,318
The Saionji-Hammersley Memorial Scholarship Fund	816 Dr		379	1,195 Dr
Australia-Japan Business Cooperation Committee schol- arship fund	443 Dr		796	1,239 Dr
Japan-Australia and West Pacific economic integration study	Nil	331	2,772	2,441 Dr
Donations for PNG Famine Appeal	Nil	364		364
John Curtin School of Medical Research				
Canberra Hospital reimbursement clerical assistant	Nil	9,653	9,946	293 Dr
Research School of Physical Sciences				
Anglo-Australian Telescope project — Photometric Instru- mentation fund	50,933	86,853	22,531	115,255
Science Research Council of UK for 48" telescope project	26,895 Dr	217,708	177,795	13,018
Research School of Pacific Studies				
New Guinea artefacts fund	149		15	134
Fund for repair of Fijian House	17			17
Fund for repair of New Guinea Research Unit Houses	8,767	12,951	8,186	13,532
School of General Studies				
Forestry Environmental Consultancy Group	Nil	1,000	2,254	1,254 Dr
Nepal Forestry Project	Nil		332	332 Dr
Laos-Australian Reafforestation Project	1,741 Dr	5,331	5,479	1,889 Dr
Laos-Australian Forest school project at Dongdok	116 Dr	2,871	3,191	436 Dr
The Myer Foundation grant under Asian and Pacific Fellowship Scheme — Mr D. Kane	Nil	1,636	1,636	Nil
PUBLICATIONS				
John Curtin School of Medical Research				
National Heart Foundation grant for publication of modified fat cook book — Mrs N. L. Havenstein	583			583

continued on following page

STATEMENT OF FUNDS FOR SPECIAL PURPOSES

For the Year Ended 31 December 1972 (xiii)—continued

	<i>Fund Balances 31 December 1971</i>	<i>Subsidies and Donations Received during 1972</i>	<i>Funds Disbursed or Transferred during 1972</i>	<i>Fund Balances 31 December 1972</i>
	\$	\$	\$	\$
<i>Research School of Social Sciences</i>				
Education Research Unit — publications	Nil	159	. .	159
Urban Research Monographs/Business activities	1,707	2,249	1,261	2,695
Department of Economic History publications	358 Dr	1,473	611	504
Preparation for publication ALP Caucus Minutes 1901-46	Nil	10,450	74	10,376
<i>Research School of Pacific Studies</i>				
Pacific History Publications promotion fund	268	84	. .	352
Far Eastern History publications	369	262	1	630
Publication of Luksave	668	551	1,387	168 Dr
F.E.P.A. Newsletter	Nil	159	. .	159
Publication — 'The Politics of Melanesia'	164	2,566	2,703	27
Department of Prehistory 'Terra Australis'	2,031	809	1,928	912
Sales of Report on Indian Agriculture	21 Dr	. .	. .	21 Dr
Sales of Monographs — Department of Economics	Nil	1,007	39	968
<i>School of General Studies</i>				
Legal Workshop publications	Nil	76	. .	76
Department of Japanese publishing account	1,861	85	. .	1,946
Law Publication fund	12,763	9,299	10,274	11,788
	<u>315,687</u>	<u>964,069</u>	<u>923,312</u>	<u>356,444</u>

STATEMENT OF FUNDS FOR SCHOLARSHIPS

For the Year Ended 31 December 1972 (xiii)

	<i>Fund Balances 31 December 1971</i>	<i>Subsidies and Donations Received during 1972</i>	<i>Funds Disbursed or Transferred during 1972</i>	<i>Fund Balances 31 December 1972</i>
	\$	\$	\$	\$
GRANTS FOR SCHOLARSHIPS				
THE INSTITUTE OF ADVANCED STUDIES				
<i>The John Curtin School of Medical Research</i>				
National Heart Foundation Fellowship—Dr P. Sinnett	154 Dr	302 Dr	420 Cr	36 Dr
CSIRO grants-in-aid for scholars	1,750	350	..	2,100
British Commonwealth Scholarships and Fellowships and Colombo Plan Scholarships	1,821	500	180	2,141
Leukaemia Society of America Fellowship—Dr Martin Murphy	Nil	13,332	5,872	7,460
<i>The Research School of Physical Sciences</i>				
Carnegie Institution of Washington—Gratuity Dr Robertson	Nil	3,342	615	2,727
CSIRO grants-in-aid for scholars	2,575	58	25	2,608
Queen Elizabeth II Fellowship grant—Dr K. C. Freeman	540	..	123	417
Queen Elizabeth II Fellowship grant—Dr A. F. Collings	169	..	..	169
Queen Elizabeth II Fellowship grant—Dr G. D. Symons	487	..	487	Nil
Queen Elizabeth II Fellowship grant—Dr J. M. Morris	3 Dr	..	3 Cr	Nil
Australian Institute of Nuclear Science and Engineering Fellowship—Dr L. E. Carlson	5,912	4,354	8,440	1,826
British Commonwealth Scholarships and Fellowships and Colombo Plan Scholarships	3,220	1,500	1,317	3,403
General Motors Holden Research Fellowship—Mr J. L. Davy	741	3,462	3,313	890
Queen Elizabeth II Fellowship grant—Dr P. Richmond	6	9,835	10,408	567 Dr
Queen Elizabeth II Fellowship grant—Dr C. Pask	2,151	9,893	10,004	2,040
Queen Elizabeth II Fellowship grant—Dr M. O. Diesendorf	612	10,909	9,718	1,803
Queen Elizabeth II Fellowship grant—Dr M. Barber	Nil	4,064	2,986	1,078
Rothmans Junior Fellowship grant—Mr E. N. Dancer	Nil	6,261	2,914	3,347
<i>The Research School of Social Sciences</i>				
British Commonwealth Scholarships and Fellowships and Colombo Plan Scholarships	3,917	500	..	4,417
Leverhulme Trust Fellowship grant—Professor K. Kat-suda	102 Dr	56	46 Cr	Nil
Leverhulme Trust Fellowship grant—Professor T. Totoki	Nil	2,515	2,515	Nil
<i>The Research School of Pacific Studies</i>				
British Commonwealth Scholarships and Fellowships and Colombo Plan Scholarships	2,642 Dr	1,500	2,087	3,229 Dr
Reserve Bank Senior Fellowship in Agriculture—Dr M. L. Parker	6,197	31,112	19,262	18,047
Council of Aboriginal Affairs and Institute of Aboriginal Studies Fellowship—Professor W. E. H. Stanner	2,000	7,000	4,448	4,552
Zoecon Chemical Research Fellowships	20 Dr	..	20 Cr	Nil
Leverhulme Trust Fellowship—Professor Koentjaraningrat	Nil	..	1,000	1,000 Dr
<i>The Research School of Chemistry</i>				
CSIRO grants-in-aid for scholars	875	..	875	Nil
Leverhulme Trust Fellowship grant—Professor S. Ot-suka	587	1 Dr	586	Nil
Queen Elizabeth II Fellowship grant—Dr L. Radom	Nil	..	1,428	1,428 Dr

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STATEMENT OF FUNDS FOR SCHOLARSHIPS

For the Year Ended 31 December 1972 (xiii)—continued

	Fund Balances 31 December 1971	Subsidies and Donations Received during 1972	Funds Disbursed or Transferred during 1972	Fund Balances 31 December 1972
	\$	\$	\$	\$
<i>The Research School of Biological Sciences</i>				
Queen Elizabeth II Fellowship grant — Dr G. M. Polya .	3,580 Dr	10,161	4,536	2,045
CSIRO grants-in-aid for scholars .	175	775	94	856
Queen Elizabeth II Fellowship grant — Dr B. G. Rolfe	2,680 Dr	14,424	10,020	1,724
Queen Elizabeth II Fellowship grant — Dr J. T. Andrews	Nil	5,920	4,887	1,033
<i>The School of General Studies</i>				
British Commonwealth Scholarships and Fellowships and Colombo Plan Scholarships	5,942	5,750	4,223	7,469
Leverhulme Trust Fellowships grant	2,537	3,930	3,835	2,632
Leverhulme Trust Fellowship (Keio University)	803	. . . . .	. . . . .	803
Drapers Company Scholarship — Dr R. D. N. Topham	243	1,108	1,108	243
Imperial Chemical Industries of Australia and New Zealand Limited Research Fellowship	97	3,250	2,344	1,003
CSIRO grants-in-aid for scholars	3	1,050	1,713	660 Dr
Ampol Scholarship	1,200	. . . . .	1,200	Nil
Esso Standard Oil (Australia) Ltd Scholarship to Department of Geology	600	. . . . .	800	200 Dr
NATO Postdoctoral Fellowship grant — Dr J. B. Haviland	170	. . . . .	. . . . .	170
Australian Wool Board Postdoctoral Fellowships grant — Dr G. B. Fox	1,879	9,339	9,909	1,309
Australian Wool Board Scholarship — Mr G. E. Ford	494	371 Dr	123	Nil
Australian Wool Board grant — Support for Supervisor of Mr G. E. Ford	427	427 Dr	. . . . .	Nil
Department of Interior Scholarship — Mr P. A. Taylor	1,104	. . . . .	2,816	1,712 Dr
	40,053	165,149	135,722	69,480
<i>Summary</i>				
Restricted Funds	511,282	814,185	744,976	580,491
Special Purpose Funds	315,687	964,069	923,312	356,444
Scholarships	40,053	165,149	135,722	69,480
	867,022	1,943,403	1,804,010	1,006,415

Prepayments from Restricted Funds and Special Purposes Funds \$ 2,549
 Restricted Funds — Invested as at 31 December 1972 \$186,729

Represented by:

Investments as at 31 December 1972	186,729
Sundry Debtors	40,391
Cash	779,295
	<u>\$1,006,415</u>

STATEMENT OF TRUST AND AGENCY FUNDS
For the Year Ended 31 December 1972 (xiv)

	Income Received			Total	Disbursements	Transferred to Reserve	Fund Balance 1.1.72	Fund Balance 31.12.72
	Subsidies Donations and Subscriptions	Interest and Capital Appreciation						
<i>University Funds</i>	\$	\$	\$	\$	\$	\$	\$	\$
The Supplementary Superannuation Benefits Fund	1,686	12,315	14,001	12,297	1,704	202,710	204,414	
1966 Supplementary Superannuation Benefits Fund	263,398	107,774	371,172	59,484	311,688	1,424,610	1,736,298	
Staff Superannuation Scheme — Members' Accumulations	109,304	41,463	150,767	10,968	139,799	555,443	695,242	
Non-Academic Staff Retirement Provision — Cash Accumulations	113,372	20,190	133,562	24,926	108,636	270,391	379,027	
Mount Stromlo Observatory Fund	..	329	329	750	421 Dr	6,070	5,649	
<i>Gifts and Endowments</i>								
Lord Rutherford Memorial Trust Fund	..	819	819	770	49	15,092	15,141	
Morrison Oration Trust Fund	..	86	86	..	86	1,577	1,663	
Sir Littleton Groom Memorial Scholarship Trust Fund	..	189	189	..	189	3,122	3,311	
Norwegian-Australian Cultural Trust Fund	..	299	299	..	299	5,203	5,502	
Danish-Australian Cultural Trust Fund	..	270	270	..	270	4,727	4,997	
Swedish-Australian Cultural Trust Fund	..	200	200	540	340 Dr	3,737	3,397	
Canberra University College Public Subscription Fund	..	2	2	..	2	104	106	
R. G. Menzies Scholarship Fund	20	2,136	2,156	1,891	265	35,741	36,006	
Alexander McTaggart Memorial Fund	..	521	521	..	521	6,533	7,054	
Floreys Memorial Fund	2,055	10,233	12,288	13,195	907 Dr	167,395	166,488	
A. M. Cohen Trust Fund	..	335	335	4,158	3,823 Dr	4,746	923	
Pension Fund	3,409	93	3,502	3,526	24 Dr	1,635	1,611	
S. J. Butlin Fund	4,384	3,678	8,062	..	8,062	42,347	50,409	
<i>Prize Funds</i>								
The John Deans Prize Fund	..	8	8	8	..	205	205	
The Lady Isaacs Prize Fund	..	17	17	23	6 Dr	275	269	
The Robert Ewing Prize Fund	..	33	33	24	9	552	561	
The Andrew Watson Prize Fund	..	5	5	5	..	111	111	
The George Knowles Memorial Prize Fund	..	31	31	42	11 Dr	477	466	
The W. J. Lind Prize Fund	..	5	5	5	..	111	111	
The Alliance Francaise Prize Fund	..	10	10	10	..	224	224	
The Tillyard Prize Fund	..	49	49	50	1 Dr	821	820	
The J. B. Chifley Memorial Prize Fund	..	55	55	37	18	730	748	
Rachel Dorph Memorial Prize Fund	..	11	11	22	11 Dr	229	218	
The W. B. Clarke Prize Fund	..	54	54	100	46 Dr	56	10	
Peter William Stroud Memorial Prize Fund	..	297	297	297	297	5,744	6,041	
Priscilla Fairfield Bok Prize Fund	..	63	63	126	63 Dr	1,213	1,150	
Schlich Memorial Prize Fund	..	24	24	..	24	640	664	
Australian Society of Accountants' Prize Fund	..	..	..	..	..	54	54
CAUW — Tillyard Prize Fund	120	11	131	..	131	367	498	
Hanna Neumann Memorial Fund	5,993	84	6,077	200	5,877	602	6,479	
Sundry Prize Funds	1,399	..	1,399	2,551	1,152 Dr	1,150	20,630	
Sulman Bequest	20,000	630	20,630	..	20,630	..	20,630	
The Stanley Melbourne Bruce Fund	5,000	13	5,013	..	5,013	..	5,013	
The Vice-Chancellor's Discretionary Fund	..	1,333	1,333	..	1,333	34,076	35,409	
	530,194	203,611	733,805	135,708	598,097	2,798,800	3,396,897	

STATEMENT OF TRUST AND AGENCY FUNDS

For the Year Ended 31 December 1972 (xiv) — continued

	Face Value	Purchase Price Appreciated to Date	Purchase Price	Total
	\$	\$	\$	\$
<i>Investments</i>				
The Supplementary Superannuation Benefits Fund	207,300	205,698		
1966 Supplementary Superannuation Benefits Fund	1,726,065	1,717,439		
The Staff Superannuation Scheme — Members' Accumulations	688,620	674,447		
Non-Academic Staff Retirement Provision — Cash Accumulations	368,900	359,145		
Mount Stromlo Observatory Fund	6,290	6,290		
The Lord Rutherford Memorial Trust Fund	15,260	14,858		
Morrison Oration Trust Fund	1,600	1,600		
Sir Littleton Groom Memorial Scholarship Trust Fund	3,220	3,212		
Norwegian-Australian Cultural Trust Fund	5,450	5,412		
Danish-Australian Cultural Trust Fund	4,900	4,877		
Swedish-Australian Cultural Trust Fund	3,650	3,645		
Pricilla Fairfield Bok Prize Fund	1,150	1,150		
The Vice-Chancellor's Discretionary Fund	24,900	24,977		
R. G. Menzies Scholarship Fund	37,800	37,671		
The Florey Memorial Fund	168,500	168,458		
Alexander McTaggart Memorial Fund	7,200	6,861		
S. J. Butlin Fund	50,400	50,352		
Sulman Bequest	20,400	20,337		3,306,429
Schlich Memorial Prize Fund	480		480	
Canberra University College Public Subscription Fund	36		36	
The John Deans Prize Fund	160		160	
The Lady Isaacs Prize Fund	248		248	
The Robert Ewing Prize Fund	456		456	
The Andrew Watson Prize Fund	100		100	
The George Knowles Memorial Prize Fund	420		420	
The W. J. Lind Prize Fund	100		100	
The Alliance Francaise Prize Fund	200		200	
The Tillyard Prize Fund	840		788	
The J. B. Chifley Memorial Prize Fund	700		700	
Rachel Dorph Memorial Prize Fund	200		200	
Peter William Stroud Memorial Prize Fund	5,800		5,800	
A. M. Cohen Trust Fund	900		900	
Pension Fund	1,600		1,600	
CAUW — Tillyard Prize Fund	400		400	
Hanna Neumann Memorial Fund	6,100		6,100	
The Stanley Melbourne Bruce Fund	5,000		5,000	
	3,365,345			23,688
Loans from the Vice-Chancellor's Discretionary Fund				3,330,117
Sundry Debtors (including \$7,195 interest free loans from the Vice-Chancellor's Discretionary Fund)				2,652
Cash at Bank				10,070
				54,058
				3,396,897