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in Medicine and Biology. —23-27 August 1976, Univer-
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No Smyth— the rocket to Canberra from the Committee
will not be a Black Knight with 700 autographs.
Editorial
‘Beware the ies of March’

The title was inspired by the thought that the deadline for Caesar and the deadline for the March issue were the same and have the same sense of the inevitable. If there is a certain amount of turmoil and frustration to be expected in preparing any issue for a definite date then this issue has been no exception and as a new editor I admire the tenacity of the previous incumbents and their committees, who, month in and month out, have produced The Australian Physicist.

The prompt appearance of a monthly journal is guaranteed (apart from strikes and shortages) by a continuous flow of contributions so that issues can be planned and partially set up some time in advance. I ask as my predecessors have so often done before, for contributions from members. There are in each state Associate Editors willing to give advice and critical help to any would-be contributor and the Editorial Committee welcomes suggestions on features and special issues, particularly if they include offers of help in collection and preparation. The idea of special issues may well appeal to members in centres of specialized study. There are, if dinner conversations after meetings and conferences are any guide, many members with a fund of physics humour and memories of earlier physics and physicists. Please write them down and let us have them. They ought to be preserved before it is too late and to an editor they are a godsend for filling the spaces between larger articles.

To end this editorial, I wish to draw attention to an apparently unrecorded variation of Murphy’s Law. ‘The copy for any issue is complete up to the moment of handing it to the printer’.

—Bill Boundy.

President’s Column

How good it was to see Alan Harper’s name in the Australia Day Honours list! He became an Officer of the Order of Australia, for distinguished public service of a high degree in the field of metric conversion.

Alan was the foundation Honorary Secretary of the AIP, having previously held the same position in the Australian Branch of the IPPS (as it then was). On him fell the main task of setting up the corporate structure of the AIP, drafting the Memorandum and Articles of Association and the By-Laws, and doing all the many other complex jobs involved. Experience in the 14 years since has shown that structure to be well built. Alan moved on to become President of the AIP in the years 1969 and 1970 and we elected him an Honorary Fellow last year.

Talking of By-Laws, dear old By-Law 71 is up for review again. This is the one that prevents Groups from making public statements without Council’s authority. Groups sometimes feel that this unfairly muzzles them.

The reason for the By-Law is that Groups are set up around special subject interests, and they accept into their voting membership people who are not corporate members of the AIP (e.g. Students, Subscribers and members of some other associations). Those non-corporate members can also hold office; I recall one very energetic and effective Group Chairman who was a Subscriber.

That is fine for technical discussions. It allows everyone interested in a field to take part, in the best spirit of scientific openness. However when it comes to expressing opinions to the outside world that is another matter. A Group’s opinions can be formulated and voted on by people who are not professional physicists, and therefore those opinions should not be put out in the name of the Australian Institute of Physics. The AIP is the one and only body representing professional physicists in Australia, and it must be very careful to ensure that its public statements represent genuine professional opinion.

Putting it another way, and assuming that a Group’s opinions were in fact representative of the views of the corporate members within that Group, then remember that Groups are by their nature formed around special interests and can therefore have special barriers to push.
If a Group puts a view forward which is not accepted by Council, which must represent the broad spectrum of the profession as a whole, across both its range of specialised fields and its geographical distribution around Australia, then that view can hardly be put forward to the public carrying the AIP label.

Branches are in a quite different position. Both voting and office-bearing functions in Branches are restricted to corporate members who have ipso facto been recognised by their peers as fully qualified members of the profession. Therefore Branches are quite entitled to make public statements representing the viewpoint of physicists in their States, and in fact have done so.

The distinction between Branches and Groups is an important one. Branches are integrally bound up with the government of the Institute, which is basically "federalist". Each corporate member is a member of only one Branch, through which he exercises his vote to elect the Branch Chairman who takes his seat on Council. On the other hand he may belong to several Groups, or none at all. Groups are concerned with their specialised interests and are not related at all to the government of the Institute, which is why Group Chairmen attend Council meetings only as observers without voting rights.

The Canadian Association of Physicists is organised quite differently, along "centralist" lines, but that's another story.

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Home thoughts from abroad . . . .
Impressions of the Edinburgh International Conference on Physics

J. R. Prescott, Physics Department, University of Adelaide.

Introduction

Where does one start to set down the main achievements of a Conference that set out "to analyse trends and trace the way ahead" for the entire range of Physics Education from pre-school to post-graduate? What can Australia learn from such a Conference?

The Conference was organised by the International Union of Pure and Applied Physics and sponsored by UNESCO, The Royal Society, The Institute of Physics and the University of Edinburgh. The total organisation was impeccable, the hospitality wonderful, the locale ideal and the weather defied hundreds of years of Edinburgh precedent and was rainless and hot.

Physics teaching round the world.

Here was a conference that can legitimately lay claim to be the most representative and important conference on physics education so far. Its claim to be representative is probably almost unchallengeable, with 350 representatives of over eighty countries - albeit without a delegate from China and with the U.S.S.R. unrepresented. One small study group in which I sat had members from Brazil, Malawi, U.K., Malaya, Spain, Australia, Libya, Niger, Indonesia, U.S. and Argentina. Australia was very well represented with fourteen delegates, whose interests covered the complete range from active school teaching through teacher training to the Australian Academy of Sciences. Sydney University's Brian McInnes was the invited Chairman for sessions on Educational Technology in Physics. UNESCO must take the credit for providing the finances that enabled such a wide representation from the developing countries. How long is it since you met a physicist from Kuwait, Lesotho, Zaire, Cuba or Chad?

It was questioned by some delegates whether such a wide-ranging conference is really very effective. Tony French, Chairman of the International Organising Committee conceded that it was not a pattern to be repeated often but pointed out that physics is at something of a cross-roads at the moment and that a review of trends and in 1975 a formulation of plans for the way ahead was timely. The next conferences will be specialist and regional ones: for example, the conference on Teaching of Physics for Related Professions to be held in New York later this year and the Teaching of Mathematics for other Disciplines planned for 1977. Australia might well consider acting as host to a South East Asia and South Pacific regional conference in a year or two.

Official languages were both English and French and a simultaneous translation was available. However, the habit of the Conference delegates to speak mainly English emphasized the often-made point that a good knowledge of English is an essential part of the training of a physicist nowadays.

It should be remarked here that the problem of language came up in a variety of other contexts. Most of us who teach physics in English are familiar enough with the fact that the use of everyday English words for specialised concepts in Physics constitutes something of a stumbling block for the tyro. Nevertheless, the language of industrialised societies already contains, in one form or another, a large number of the ideas and concepts on which a scientific/technological society is based. The teacher of physics in a developing country, however, may well find that his own language does not contain either the words or the concept needed. Swahili we were told, contains no word for "density" but Jan Elstiegest pointed out that this need not necessarily be a disadvantage and described a programme worked out by a group of primary school children in Lesotho to define the concept of density by experiment and then to find words for it. They came up with what translates into English as "original heaviness". Elstiegest also told of the small boy who approached him in such a laboratory class which was studying pendulums and asked, "Please sir, can I borrow your period?"

In one of the sessions of the discussion group on laboratory work, the Chair suggested that delegates whose mother tongue was English should keep quiet. I, for one, bridled a little at this suggestion at first, until I realised how easily native-speakers can dominate a discussion. The apparently high-handed action of the Chair in fact cleared a language space into which a whole new set of questions and ideas was introduced.

There was a wide range of exhibits of indigenous projects for teaching physics in the schools using locally produced study materials, teaching guides and apparatus, some of which were very impressive. Nevertheless, there is a dearth of text books in local languages, even in translation. Somebody did quote the number of countries where Halliday and Resnick is used, which prompted Robert Resnick to ask plaintively in discussion if he had become a "Multi-national".

One of the major impressions that I personally carried away from the conference was a more realistic view of the status of physics teaching elsewhere, particularly in the developing countries, and the enormous range of differing problems that exist. For example, the amount of physics taken by students by the time they reach the Secondary-Tertiary interface ranges from zero in Malawi to eight years for some students in the U.K.

I was particularly struck with the address given by Abdul Razak Kaddoura, of Damascus who, under the title of "Where is Education Going?", reviewed what he saw as some of the major challenges of education generally. His thesis was that while the problems in education
are similar in all countries, the developing countries are like a magnifying glass in which all the problems are exaggerated in scale. In 1960, 44% of the world was illiterate; in 1980 the percentage will be 20% but there will still be more illiterate individuals than there were in 1960! The learning stream of physics stretches some two decades from primary school to research laboratory. Each country reaches economic saturation somewhere on this line. In Australia universal tertiary education is almost with us. Other countries must inevitably saturate earlier. In some countries there just won't be time or money for research and their physics education programs will essentially stop at a point where the requirements for technical expertise and the supply of funds reach some sort of balance.

Physicists and educators seeking a challenging and thoroughly thought-provoking book are recommended to read the UNESCO publication, *Learning to Be* (1972) to which Prof. Kaddoura was a distinguished contributor.

Addresses and working groups.

Because of the very broad scope of the conference, no one participant was able to take part in more than a small fraction of the activities. Each day there were invited speakers (some fourteen) including such distinguished individuals as Hermann Bondi, H.B.G. Casimir and Victor Weisskopf. These generally ventilated the broad issues with which physics and education are concerned but it was remarkable how frequently they returned to the theme of the interaction of physics with society. These addresses will be published in *Physics Education* for November 1975 and January 1976.

Twenty different areas of physics teaching were discussed in working groups, each of which met for three half-days. Each of the twenty or so themes was developed in a "trend paper". These papers will be published by UNESCO in *New Trends in Physics Education* and the working groups offered criticisms, suggestions, new data and new viewpoints on the basis of which a revised trend paper will be written for publication. The most "popular" sessions were, "New Approaches to Teaching and Learning", "The role of the Laboratory in Physics Education", "Assessment of Student Achievement" and "The Interface between Physics and Mathematics". I attended the sessions on Laboratory Work and Women in Physics.

Most people that I spoke to felt, like me, that there was not enough time available for really coming to grips with the working group topics but it was evident that the whole conference was effective in raising issues that may not have been in the mind of individuals before. In retrospect, it may be that the achievement was more solid than appeared through the jet-lag fuzziness.

Laboratory work

In the working group on laboratory work, the major thrust of the discussion concerned the purposes of experimental work and how different emphases are needed for different levels of education. One conclusion seemed to be that in relation to formal "text book" instruction, the proportion of laboratory time should be high in elementary and postgraduate school but rather less in the middle - something like the shape of an hour glass.

So far as laboratory work was concerned, I felt that the Australian physics community has not a great deal to learn (or unlearn) and this was perhaps reflected in Australia being included in a drafting party charged with the task of setting out a statement of aims for laboratory work in terms that would not so much satisfy the professional physicists present, but which could be used by conference delegates on their return home to convince government agencies of the need for funds for laboratories. I do not have a copy of the exact wording of the final statement on this point but it went more or less as follows:

Physics is an experimental science. Its very nature means that experimental work must play a central role in the learning of physics at all levels. There are many aspects of physics which can only be learned through experiment and many that can best be learned in this way. It is not appropriate here to give a comprehensive list of objectives. However, in order to indicate the breadth and value of the purposes of laboratory work, we give two of its principal aims:

The learning of the science of experimentation which includes: experimental design, measurement technique, data analysis and interpretation. To experience and understand the way in which the theory and concepts of physics are derived from questions asked of nature by experiment. It is in the laboratory that the student learns to be a scientist or to understand what physics is and how it works. In addition to those aims which are specifically related to physics or science, the laboratory is also a good environment in which to pursue the more general aims of education; for example, to develop creativity, autonomy, self-confidence and maturity, to give interest and enjoyment.

As might be expected, there was a considerable variety of other points raised. Professor Som of Malawi pointed out that while it is natural to complain about the quality of the prior preparation of the students that we are called on to teach, one does better in the end to accept them as they are and build on what they do know. (A similar comment was made elsewhere in relation to the mathematical preparation of physicists. It is a common complaint that students are not taught the mathematics they "need" for the physics course. Presumably all that time spent on maths was not completely wasted and perhaps it is the physicists who should be finding out what has been taught and be adapting their courses to match the contemporary style of mathematics. Maybe we need to read a bit of Piaget too!).

One of the Conference's more quotable quotes came from the session on laboratory work: "Lab work should be interesting and enjoyable - at least up to University level".

Women in physics

The other discussion group in which I took part dealt with *Women in Physics*. I shall deal with this topic rather briefly since Gillian Robertson recently discussed it in this journal (1975). It seems abundantly clear that the strongest determinant of attitudes in this area is social expectation. Girls do not do physics (in Australia or Chad say) because society expects them not to, and they do physics (in Poland say) because society there does expect it.

The Australian Physicist, March 1976 41
Such socially-determined attitudes do not change overnight, or even within a generation. If the physics community is to encourage more girls to do physics (and the working group was in no doubt about the wisdom of this) then it must look not towards a massive change in community attitudes but to putting together what Ed Jossem described as “the 5% solutions”. The sum of a collection of small changes can make a large change in the end. For example, text-books can be made less male-oriented. The horrible (?) example of the Nuffield Physics Pupil’s Question books was quoted: of the 150 questions dealing with experimenting or with illustrations from everyday life, 127 directly referred to males, 20 were sexual and only three referred to females. The Harvard Project Physics Course on the other hand, deliberately set out to achieve not only a sex balance but an ethnic balance as well and, according to Jim Rutherford, attracts an ever-increasing proportion of girls. It also seems established that physics is unattractive to girls because of the way it is taught. It is said, for example, that it is too mathematical, lacking in consideration of its social relevance, and that it favours students with spatial as against verbal abilities. These factors do seem to make the subject less appealing to girls than boys. Whether this is because of inherent (i.e. genetically determined) differences between girls and boys or is part of the social conditioning process was a matter for lively debate in the working group. It was nevertheless agreed that, whatever the reason, changes to teaching patterns should be encouraged to bring more girls into the discipline.

The philosophical grounds for this whole exercise lie not in a conviction of the need to establish women’s rights or to correct social injustice but the conviction that physics is worth studying for its own sake. Surely much is amiss with a state of affairs in which half the population is essentially ignorant of the immense contribution of physics to our contemporary society. In my view, Australian physics should begin applying the 5% solutions forthwith.

Before leaving this topic it might be remarked that both the working groups that I attended were chaired by women: Profs M. Palma-Vittorelli of Italy and Vera Kistiakovsky of M.I.T.

Physics and society

A second major general conclusion that I drew from the conference was certainly shared by a very large proportion of the delegates. It was this: that physics has become too intellectual a discipline, that the vast majority of people see physics as having no relevance to society (and to them in particular) and that it is high time something was done about it. Hermann Bondi wove the first threads of a pattern based on this theme in the opening session and the pattern was repeated with variations by most of the main speakers and emerged time and again in the working groups. Bondi phrased his arguments in the language of the Sales-Manager but it was no less effective for being in an unconventional idiom. In short, physics faces a crisis of marketing. We are failing to sell our product. The bankruptcy courts are full of people who produced a superb product but didn’t get customers to buy it and physics, with a product of decreasing appeal and falling standards, faces a similar crisis. Physics can be good physics without a great deal of money, it can be good physics without fancy buildings but it cannot be imagined without good physicists. The main trouble as Bondi saw it was that we have tailored our courses for future academics. Some arithmetic outlines the problem. A typical university physics department has a student to staff ratio of about 10 to 1. The staff member spends 30 years as a teacher, the student spends about 3 years as an undergraduate; To preserve this ratio only 1% of the students are needed to staff the halls of Academe. In the expanding sixties when the transient solution overwhelmed the steady state this fraction was still only around 10%. It is foolish to go on teaching physics primarily for that 1%.

The exaggerated bias reaches down into the schools where the proportion of students committed to a career in physics is actually infinitesimal but where the proportion of students who should have some knowledge of physics as part of an entire education is very large.

Physics was variously described by other speakers as “too mathematical”, “too self-satisfied”, “too introjective”, “too austere”, “too over-loaded”, “too difficult”, “insulated from society”, “a soul-less neutral factor in the educational system”, “human but not yet” and “unaware of its own place in the total pattern of human thought and activity”.

The dilemma of physics may well be expressed by the story that was going the rounds at the Conference: A lawyer, a doctor and a physicist, the sole survivors of an aircraft accident, found themselves wandering on the coasts of a certain banana republic where they were promptly arrested and condemned to death in the electric chair for espionage. The lawyer was strapped into the chair and asked if he had any last words, “Yes”, he said, “This is a gross miscarriage of justice. I have spent my life in social concerns; I have consistently defended the weak against the strong; I have upheld the cause of justice; I have fought for social and legal reform, I pray you spare my life”, “Very interesting”, said the executioner, and pulled the switch. Nothing happened. The electric chair had failed to work. After some discussion, it was decided that since the prisoner could not be put in double jeopardy and executed again, he should be released. The doctor was then strapped in the chair and asked if he had any last words “Yes”, he said, “This is a gross miscarriage of justice. I have spent my life in social concerns, I have ministered to the sick and dying at all times of the day and night, often without fee, I have advanced the cause of social medicine and public health. I pray you spare my life”. “Very interesting”, said the executioner, and pulled the switch. Nothing happened. The electric chair had failed to work again. After some discussion it was decided that the doctor should be released in the same way as the lawyer.

The physicist was then strapped in the chair and asked if he had any last words, “Yes”, he said, “I have spent my life in pursuit of an elusive and intellectual goal which I admit has no social relevance whatsoever - and if you connect this wire to that one I think that this electric chair will work”.

Caricature or not, this story strikes a little too close to home for comfort.

I am convinced (as I was not before the Edinburgh Conference) that the foregoing criticisms are valid.
criticisms, that they apply to the Australian scene too and that a non-adiabatic change in teaching style is called for. I make no apology for identifying “Project Physics” as the sort of programme that I think we should be encouraging. Among the various attempts I know of to meet the criticisms set out above, this one seems to me to come closest to success. Its philosophy is expressed in the “Dear Student” letter that concludes the final volume of the series. (Project Physics, 1975)

Perhaps the Editor will be willing to reprint that letter in its entirety elsewhere but it is worth making a part-precis of it here. It lists several special reasons why physics, among all sciences, is of basic importance:

Firstly: It is intellectually exciting. To quote Einstein, “. . . . not only to know how nature is and how her transactions are carried through, but also to reach as far as possible the utopian and seemingly arrogant aim of knowing why nature is thus and not otherwise . . . . . . . . . . Thereby one experiences, so to speak, that God himself could not have arranged these connections in any other way than that which factually exists, anymore than it would be in His power to make the number 4 into a prime number . . . .”

Physics is the study of what makes the whole world go and it is too beautiful to be kept only for professional physicists.

Secondly: Immediate practical and social benefits to society.

These are not difficult to find: transistors, nuclear medicine, radio communications, computers and many others are part of our society now. But physics has contributions to make to the solution of many short-term problems which do not yet have answers – including some which have followed from technological advance. In addition, discoveries of physics sparked some long range social changes e.g. study in the eighteenth and nineteenth centuries of work and energy led to the industrial revolution even as the contemporary world will be moulded by the input of physics to the solutions of the energy crisis.

Thirdly: Science is bound up with all other fields of knowledge.

It borrows ideas and language from, for example, mathematics and philosophy and returns ideas and language to them and elsewhere. As I. Rabi wrote “Science should be taught at whatever level, from the lowest to the highest, in the humanistic way. By which I mean it should be taught with a certain historical understanding, with a social understanding and a human understanding, in the sense of biography, the nature of the people who made this construction, the triumphs, the trials, the tribulations”. In a deep sense, physics is part of the study of history and language and philosophy and mathematics and sociology; and in a very real sense, they are part of it.

It seemed to many at the Conference that physics has been traditionally taught in an incomplete way: Not wrong but incomplete, and that one of the ways ahead for which the Conference was seeking lay in a path that can be walked not only by the future dedicated professional physicist, but by the future woman and man in the street. It is a confident expectation that each will profit from the others’ company.

Envoi

Two brief quotations conclude my account. The first is one of the poems composed by Ernst Hamburger for his contribution to the Symposium, “New Science and Old Cultures”.

New Science and Old Cultures
Old Science and New Cultures
Old and New
Science and Culture
Science and Progress
Science and Development
Economic Development
Multinational
Power
Energy
War
Science, Power and War
New Science
Old Cultures
Is development progress?
Is progress development?

Chatter Singh of Malaysia summed up the Conference as follows: “Each delegate came with hopes for solutions to each and every one of his own problems. Each readily realised that physics and its problems are world-wide and most of the solutions are to be found at home”.

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John Prescott is a graduate of the Universities of Adelaide, Melbourne and Oxford. After graduation he joined the CSIR (as it then was) and was a foundation member of the staff of the Australian Atomic Energy Commission. He left the AEC in 1956 to join the Physics Department of the University of British Columbia and moved from there to the newly-formed University of Calgary. He returned to a Chair at Adelaide in 1971. His research interests have been mainly in the fields of nuclear spectroscopy and cosmic ray showers. He is now developing a research programme in archaeometry. He has published a number of articles on the teaching of physics.
The 27th Meeting of the AIP Council was held at Churles Ross House, Parkville, Victoria, on 13-14th November, 1975. The President, Dr. J. G. Campbell was in the Chair.

General Policy

A major issue, which was raised by the Chairman of the Nuclear and Particle Physics Group, concerned the present procedures governing Groups and the making of public statements in the name of the AIP. At present, Groups are bound by By-Law 71 of the AIP which reads 'A Group shall not communicate with an outside body on any matter whatsoever beyond those concerning arrangements for meetings or the supply of technical information for the benefit of the members of the Group, without the express prior authority of the Council'. Attempts to word By-Law 71 during the meeting was unsuccessful. The matter was referred to the Science Policy Committee for review before the May Council Meeting. In discussion, the differences between Branches and Groups were stressed. Branches may make public statements without reference to Council, Groups may not. Whereas within the Branches only corporate members of the AIP may vote or hold office, this is not so in the Group where Group Affiliates, Subscribers and Associates, all of whom are non-corporate members, may vote as well as hold office.

The 50% subscription rise for 1976 decided at the 26th Council Meeting prompted discussion of ways in which members of the AIP might make their views known to their Branch Chairmen before Council Meetings. It was agreed that, while Branch Chairmen must represent their Branches, they should not be sent to Council Meetings with a rigid instruction on how to vote on matters such as subscription levels.

The Australian Physicist (AP) was considered to have an important role to play in providing a forum for discussion of matters within the AIP.

A matter which crops up from time to time is that of whether grades of Membership should be abolished. The Hon. Registrar pointed out that, as a matter of fact, all those Members who had been invited to become Fellows in the past year had done so.

Science Policy Committee

The existence of the Science Policy Committee over the past year was welcomed as a sensible initiative of the AIP. There was general recognition that the AIP is not a sectional pressure group and that any submissions sent to the government should be carefully considered, based on the best scientific evidence available and be thoroughly professional documents.

Following the May Council Meeting, the AIP had offered its services to both the Parliamentary Inquiry into uranium mining and enrichment and the Ranger Inquiry into environmental aspects of uranium mining. Because the AIP has no single point of view to present, no submission will be made to the Parliamentary Inquiry. No response has been received from the Ranger Inquiry.

In connection with the funding of large physics projects, it was noted that articles had been promised to the AP on the case for High Voltage Electron Microscope (ANSE) and the case for an Electron Linear Accelerator (University of Melbourne).

Dr. J. G. Jenkin of Latrobe University had drawn up a detailed list of matters relating to prices for physics equipment. It was agreed that the Federal Industry Liaison Officer, Dr. R. M. Green, should take action on the more urgent issues raised by Dr. Jenkin.

Finance

At the 25th Council Meeting, the Hon. Treasurer had been empowered to transfer to Council controlled funds half of the accumulated Reserve Funds held on behalf of the Branches in order to finance the deficit in the 1975 budget. This proved to be unnecessary because the AP had agreed to delay receipt of part of its grant and several of the Branches did not claim their full grants early in the year. Thus the financial liquidity of Council funds was maintained and Branch Reserves remain intact. Furthermore, since the expected production costs for the AP had not risen in 1975, the budget deficit was considerably reduced.

Remission of $1 for prompt payment of subscriptions, agreed to at the 26th Council Meeting, was claimed by most members who paid before the deadline. Council considered a $1 remission to be too small to be significant.

In the budget adopted for 1976, there is provision for a surplus of approximately $2000 and this will provide a cushioning effect in the Institute's operations. It was stressed by the Hon. Treasurer that the 1976 budget merely allows for continuation of services to members at the same level as in 1975.

Administration

The office at Churles Ross House, Melbourne, continued to be shared very successfully with the Australian Institute of Refrigeration, Air Conditioning and Heating (AIRAH). Each society employs its own full-time Assistant Secretary and a part-time secretary shares her time between the two organizations.

The Hon. Secretary initiated discussion about the future location of the Institute's office. He explained that by the end of 1976, the office will have been in Melbourne for ten years. In view of the intended retirement of both the present Hon. Treasurer and Hon. Registrar at the end of 1976, it seemed appropriate at this time to consider an alternative location. It was agreed that any Branch wishing to accept responsibility for the office would need to find candidates for the position of Hon. Secretary, Hon. Treasurer and Hon. Registrar since these three office bearers would all need ready access to the facilities of the office.

Membership

The Hon. Registrar reported that as at the October 1975, corporate membership stood at 1570 (an increase of 15 since the last Council Meeting), total membership
was 1793 (an increase of 50) while there were 21 Company subscribers (decrease of 1). Student membership had increased, particularly among students in Colleges of Advanced Education.

It was reported by the Hon. Registrar that the Executive had declared the American Physical Society a Cognate Society for those domiciled outside Australia. The AIP has now declared twelve bodies to be Cognate Societies. (For a list of other Cognate Societies see Aust. Phys. 12, 102 (1975)).

The B.App Sc. (multidiscipline) course, at the Caulfield Institute of Technology, with a major component of physics, has been approved for graduate subject to inclusion of units PA25 and PA26 in the course.

Minor changes to the B. App. Sci. course of the Western Australian Institute of Technology had been notified to the Membership Committee, and the Gordon Institute of Technology had advised that its degree course would be incorporated into the new Denison University. Council considered that courses in the Colleges of Advanced Education need to be reassessed only when changes were major as distinct from minor ones.

Council discussed the general issue of assessment of courses in Colleges of Advanced Education and whether, in view of changes which had taken place in tertiary education, new courses in Universities should also be assessed.

It was decided that the Membership Committee should review resolution 19 of the 1st Council Meeting, which defines qualifications for membership of the Institute as "... appropriate degrees in physics from all Universities in Australia or New Zealand and degrees and diplomas accepted by the Institute of Physics".

The Australian Physicist

The Hon. Editor reported that, since May, a concerted effort had been made to reduce the average length of articles in The Australian Physicist. He stressed that there was a continuing need for a supply of good material. Production costs had not risen in 1975 because of an expected increase in printing changes had not eventuated.

Council discussed whether or not the Hon. Editor of The Australian Physicist should be a member of the Executive. It was agreed that the Editor must be free to comment upon, and even disagree with, AIP policy and that he should not be constrained by being on the Executive. The President's view was that he should be invited to attend council meetings as at present.

Dr J. R. Bird, who had been Editor since May 1972, tendered his resignation from the completion of the December 1975 issue. The President reminded Council of Dr Bird's excellent contribution especially the topical discussion he had encouraged as well as outstanding control of the finances. A motion of congratulations to Dr Bird for his successful term of service was carried with acclamation. In reply, Dr Bird explained that he had been supported by a very keen and able Editorial committee in Sydney.

Council appointed Mr W. S. Boundy of Adelaide as the Hon. Editor of the Australian Physicist from the January 1976 issue. Because Mr Boundy was overseas, the January issue would be edited by Dr E. R. Sandercock. A new Editorial committee is to be set up in Adelaide.

Dr Sandercock pointed out that from January, 1976, The Australian Physicist would be produced in A4 format.

Company Subscribers

The newly appointed Federal Industry Liaison Officer, Dr R. M. Green, presented a report to Council on his plans to increase Company subscribers and the Institute. He plans to prepare a questionnaire to be sent to all present company subscribers and to produce a brochure which will be presented to all companies with a technological bias.

Dr Green suggested that Company subscriptions should be designated for educational purposes and in this way Company Subscribers would have a focus for their support. Council agreed with this in principle. One suggestion was that a Visiting Lecturers' Fund be set up.

Pawsey Memorial Lecture

The 1975 Lecture, attended by 250, was presented in Canberra in October by Mr J. G. Bolton, FASA FRS. A dinner held beforehand was attended by the Minister for Science and Consumer Affairs, the Hon. C. R. Cameron, MHR.

2nd AIP National Congress

Plans for the Congress which will be held at the University of NSW from 23-27 August, 1976, are well advanced. Copies of the first circular were circulated at the Meeting. An equipment exhibition will be held, and Company Subscribers who exhibit will be charged a reduced fee. The Education Group plans to arrange a Physics Education Workshop.

On the financial side, it is planned to run the Congress with a slight surplus. In addition, a letter to the Minister of Science will be prepared requesting a grant of $6000 from the Australian Government to provide funds for three overseas speakers and some support for graduate students.

Groups

The Biophysics Group discussed its future during the 15th Annual Conference on Physics in Medicine and Biology held in Sydney last May in conjunction with the Hospital Physicists Association, Australian Regional Group. There are moves being made towards forming a learned society. The 16th Annual Conference on Physics in Medicine and Biology will be held in conjunction with the 2nd National Congress in August 1976.

The Education Group continued its activity with meetings in both Melbourne and Sydney. It plans to up-date the 1974 Survey on Tertiary Physics Courses. As a result of initiatives from within the Group, Council resolved to set up an Education Committee of Council and to encourage Branches to appoint an Education representative on Branch Committees. Dr P. E. Clark of Monash University is to be invited to be Hon. Secretary of the Education Committee of Council. Among the tasks to be entrusted to the Council Education Committee...
will be a review of the number of physics courses in Universities and the Colleges of Advanced Education. The eventual dissolution of the Education Group was foreshadowed and it is to be discussed again at the May Council Meeting.

The Nuclear and Particle Physics Group plans a Summer School on 'Low Energy Nuclear Physics' in 1977. The Australian Academy of Science has agreed to sponsor the 'International Conference on Nuclear Reactions' in 1978 and has granted $2000 towards the expenses. Support from the IUPAP will be sought through the Academy. The Group sought to have a member formally appointed to the Science Policy Committee but this was not agreed to by Council. Council decided that a revised version of the document 'The Future of Nuclear Physics in Australia' be prepared and submitted to the Science Policy Committee.

The Vacuum Physics Group is now based in Queensland where plans are well advanced for the 5th National Conference on Vacuum Physics and an associated course in Vacuum Technology to be held in Brisbane in July 1976.

Conference of Allied Societies

The President and Hon. Secretary attended the 13th meeting of the Conference of Allied Societies in October. A major matter discussed was the book bounty publication subsidy for professional publications. The Australian Institute of Agricultural Science had ascertained that publications which are either 'text' books or 'non SERIAL' conference proceedings qualify, but periodicals do not. It was reported that the Australian Science and Technology Library (ANSTEL) had been opened in Canberra on October 2nd and that the Australian Library Based Information Service (ALBIS) was now functioning. It was agreed that these services must be made known among professional and scientific organizations.

Concern was expressed about the role of the Australian Science and Technology Council because of the interest of the Minister for Science and Consumer Affairs in consumer affairs rather than science.

—J. R. Pilbrow
Hon. Secretary

Two Years of Measurement

The Biennial Report (1973-5) of the CSIRO National Measurement Laboratory gives short synopses of over 120 projects occupying 140 professional and 230 support staff. The following samples illustrate something of the flavour of the report which covers practically the whole range of physical measurements and research in topics such as solid-state physics, optics, acoustics, the physics of fluids and solar physics.

The NML has developed an iodine-stabilised laser which is potentially superior to the krypton discharge lamp now used internationally for the primary standard of length. Tests on the laser show that variations in frequency (or wavelength) are less than 1 in $10^{11}$ for time intervals of several hours and that the day-to-day reproducibility is better than 1 in $10^{10}$. The laser has a compact rigid cavity and requires no special anti-vibration mounting.

The NML has recommended to the international Committee of Weights and Measures that the basic photometric unit be redefined in terms of the watt. The current SI unit of photometry, the candela, is defined in terms of the black-body radiation at the temperature of freezing platinum. This is a difficult standard to set up and is not sufficiently reproducible. The temperature of freezing platinum is uncertain by up to 1.6°C and this makes secondary standards difficult to derive. The system recommended jointly by the NML and the US National Bureau of Standards uses a room temperature radiometer to measure radiant power in watts. The lumen, the unit of luminous flux, would become the basic unit instead of the candela. The radiometer is used with a green filter and this enables tungsten filament lamps to be used as secondary standards. Suitable radiometric equipment has been developed at NML and two groups of lamps have been calibrated.

Solar magnetic fields have traditionally been assumed to be weak and to be twisted and compressed by the plasmas at the surface of the sun. Work at NML suggests that the magnetic fields are wound and twisted into magnetic ropes long before they appear through the surface. At the optical surface of the sun the plasma motions would have very little effect on the fields.

The new building complex for the NML is nearing completion at West Lindfield, 11 km NW of Sydney. The Laboratory buildings will be screened against electric interference and each of the three laboratory blocks will have air conditioning control. The complex is expected to be completed by early 1977.

—J. Harries
A.I.P. Science Policy
an invitation

The Science Policy Committee is very conscious that many AIP members are interested in science policy, or the lack of it, in Australia. We also know that, as a committee, we cannot invite those people to join sub-committees without some foreknowledge of their location and interests. We therefore invite any member of the AIP to offer his or her services — in particular to assist in the consideration of questions relating to uranium and nuclear power.

The first question being considered at some depth by the Science Policy Committee is the uranium policy of the Australian Government. We are not seeking a yes or no vote on specific policies but we wish to ensure that there is adequate public debate and that the public, who must make the decisions, are fully informed on the scientific and technological issues involved.

Underlying the topics of uranium mining and processing are such physics studies as:
(a) Health physics — radiation hazards, monitoring and protection;
(b) Meteorology — airborne dispersal of radioactive and other pollutants;
(c) Hydrology — dispersion of pollutants in surface and ground waters;
(d) Geophysics — stability of mining areas;
(e) Energy research; environmental research; enrichment technology.

It is hoped to have these and related topics evaluated by sub-committees which would include self-nominating AIP members. Most of the work would be done by post but we hope to find opportunities at AIP National Congresses for sub-committee members to meet. We plan to investigate a scheme whereby sub-committee members may obtain recompense for portion of their expenses.

Would any interested members please contact the Hon. Secretary of the AIP indicating areas in which they are interested. Without such support the Science Policy Committee cannot hope to carry out a thorough investigation and any effort would probably not prove worthwhile.

5th. Committee Meeting

Uranium Mining and Enrichment

The committee concluded that this was a difficult issue and one for which the AIP had no clear policy. It was an international issue with social and political aspects for which physicists, as a group, had no special qualifications to provide advice. In order to prepare a significant report on this matter, the AIP would need access to all relevant data. Members of the AIP can and should speak as individuals. It is hoped that a working group might be set up to look into the matter further.

Large Physics Projects

The Committee discussed four main projects known to members:

(1) Electron linear accelerator
(2) High voltage electron microscope
(3) Research reactor
(4) Millimetre wave radio telescope

It was agreed that the organisers of the 2nd National Congress should be invited to arrange an open meeting during the Congress to which interested representatives should be invited to speak to each of these proposals.

High Technology Industries

It was agreed there was regrettably little that the AIP could do in cases of retrenchment of physicists in industry or when companies ceased operation because of economic difficulties.

Mention was made of the recently published “Guide to Scientific Instrument Manufacturers” by the Department of Industry and Commerce.

Groups and Public Statements and By-Law 71

The 27th Council meeting referred By-Law 71 to the Policy Committee for possible rewording. No agreement was reached about alterations and, in fact, a majority of the Committee felt it should remain in its present form. However, Dr. J.R. Bird was asked to invite members of the NUPP Group to devise an alternative. The difference in status between Groups and Branches was stressed. The main difference arises because members of Groups do not need to be corporate members of the AIP and within the Groups, Group Affiliates, Subscribers and Associates may vote as well as hold office.

Study Groups of the AIP

Drs. Bird and Sabine have agreed to prepare a list of possible issues which could be tackled by interested groups within the AIP. Offers of participation by members of the AIP will be sought via “The Australian Physicist”.

Future meetings are planned in April, in conjunction with the 75th Executive Meeting, and again during the National Congress in August.

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J.R. Pilbrow
Hon. Secretary

The Australian Physicist, March 1976 47
ELEMENTS OF ADVANCED QUANTUM THEORY, J. M. Ziman, Cambridge University Press 1969. xii + 269 pp. $7.25

This admirable book which was reviewed in AP March 1970 has now been published in paperback form at a price which brings it within the reach of any research student or physicist interested in advanced quantum theory.


Conferences on Theoretical Rheology organized by the British Society of Rheology are becoming a regular international event. The proceedings of the third such conference, held at Cambridge in September, 1974, are published in this book, the 20 papers grouped into four sections:

1. Converging and Diverging Flow
2. Thermomechanics
3. Composites and Suspensions, and
4. Rheometry.

The contributions, most of them invited, are of high quality. They include reviews, considerations of basic concepts and solutions to specific problems. A summated report on the conference discussion is given. The book will appeal mainly to rheologists but the general physicist will also find stimulation and interest in parts of the book, particularly the section on thermomechanics and the survey of the effects of non-Newtonian behaviour on flow fields.

PHYSICS OF IV-VI COMPOUNDS AND ALLOYS

This book contains the 31 papers presented at the Conference on the Physics of IV-VI Compounds and Alloys held at University of Pennsylvania, Philadelphia, 24-25 March 1972. In contrast to earlier and similar conferences, more papers appear on applied aspects, which provide much of the drive behind the interest in these materials. They are characterised by a delicate balance between ionic, covalent and metallic bonding, giving much scope for theoretical manoeuvring. There are complex Fermi surfaces (e.g. SnTe). Much general experimental information comes from Knight shift measurements, temperature and pressure dependence of energy gap and effective mass, and magneto-optical studies. Advances in thin film technology and improvements in p-n junction fabrication show much promise for device development, e.g. tunable diode lasers, and emitters and detectors of infra red radiation. Much current effort is aimed at understanding the surface chemistry of the materials. There is considerable data indicating ferroelectric instability e.g. GeTe and SnTe. For workers in the field the limited group of papers in this volume is valuable. For others there are sufficient remarks in various introductions and the clearer papers, to give a useful overview of progress in the field.

INTERACTIONS BETWEEN IONS AND MOLECULES, Pierre Ausloos (Editor), Plenum, New York 1975. ix + 690 pp. $64.80

This book contains the lectures presented at a NATO Advanced institute on ion-molecule interactions held in the middle of 1974. Since the quantitative study of ion-molecule reactions began in the early 1950's contributions to the subject have been made by physicists and chemists with widely varying interests. One of the purposes of this publication is to present a balanced view of the overall field and in this they have been substantially successful.

This volume is an excellent starting point for anyone wishing to enter or become familiar with the field of ion-molecule interactions. The articles, which are all written by experts, are generally clear and concise and contain adequate bibliographies.

Reviews

NEW USES OF ION ACCELERATORS, Editor James F. Ziegler, Plenum press, New York and London. xii + 482 pp. $33.60

Reviewed by J. R. Bird, AAECRE, Lucas Heights.

This is an off-the-cuff book designed to support the thesis that more ion accelerators are now used for applied purposes than for nuclear physics research. It deals with the application of nuclear backscattering, nuclear reactions and ion-excited X-rays for studies in atomic physics, materials analysis and routine analysis of samples such as air filters, semiconductors or biological specimens. It also has chapters on ion implantation in metals or superconductors.

Chaos results when energetic ions penetrate the surface of a sample. Electrons are torn from their shells, nuclei are jostled or fragmented and the disturbance reverberating through the sample may eject whole atoms from its surface. Selected radiation detectors viewing these events can tell much about the composition of the sample and the changes caused by the irradiation.

In this book we are told something about basic measurements of ionization and energy loss, radiation damage, atom location, and the effects of implanted ions. We are also given examples of applications to problems in diffusion, corrosion, surface contamination, thin film growth and element or isotope determination. The emphasis is on the methods rather than the results, with a smattering of the technology of irradiation of samples, detection of radiation and processing of results.

If you are not familiar with the rapidly developing applications of ion beams then this book will tell you
whether to hurry off to your nearest accelerator (now located in five out of seven of Australia's capital cities). It will not serve as a handbook in your use of the accelerator, but perhaps the many references that are given will go a considerable way towards doing that.

**ATMOSPHERIC DIFFUSION, F. Pasquill, John Wiley & Sons, 2nd ed, 1974, ix + 429 pp. $40**

*Reviewed by E. T. Linsley, School of Earth Sciences, Macquarie University, North Ryde, NSW.*

This excellent book is the 2nd edition of Pasquill's 1962 volume, expanded by 46 per cent in number of pages with a cost increase of 240 per cent, to $40. Despite this alarming price, the new volume will be required reading for anyone interested in the dispersion of air pollutants. The sections on the practical calculation of pollutant concentrations downwind, and on the theory of turbulent flow, have been doubled in size, and the section summarizing experimental investigations of atmospheric diffusion has also been expanded. Amongst the 400 references listed 150 have been published since 1961. Especially welcome is the consideration given to the mathematical modelling of dispersion and emphasis on the uncertainties of estimates of pollution concentration. The author has retained the original compact though lucid style.

**THE SOLID STATE: X-RAY SPECTROSCOPY**

L. Jacob, Butterworths, 1974, 96 pp. hard cover $9; soft cover $4.50

*Reviewed by J. Liebmann, Physics School University of NSW.*

This book serves to review the various soft X-ray techniques used to explore the band structures of (essentially) metals, semiconductors and alloys over the past 30 years. The principal techniques discussed are those of soft X-ray emission and absorption spectroscopy (SXS). Some discussion on X-ray photoelectron spectroscopy (XPS) is also presented.

Introductory theoretical sections serve to assist in interpretation of the various types of types of spectra obtained; though the complete mathematical description of various models is left to be sought elsewhere. As an introductory text it is informative at the third and fourth year tertiary physics level.

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**UNIVERSITY OF NEW SOUTH WALES**

**LECTURERS**

**SCHOOL OF PHYSICS**

(Ref. 193)

Applicants should have a good academic record with a minimum qualification of PhD in Physics. Candidates with some experience in teaching physics at university level would be preferred. The research interests of the school cover a wide range and these are as follows:

**Experimental:** Physics Education; Solid State Physics, Biophysics (including NMR), Surface Physics, Solar Energy, Atomic Physics, Acoustics, Magnetism and Crystallography.


Preference will be given in the Theoretical area to candidates with experience in Theory of laser-plasma interaction, nonlinear forces, absorption, instabilities, exotic nuclear reactions, relativistic effects and laser induced pair production.

The selected candidate will be required to teach at the undergraduate and postgraduate levels and to pursue active research programmes in his particular field. Adequate computing facilities are available.

Salary: $12,063 range $16,193 per annum. Commencing salary according to qualifications and experience.

For details of appointment and application form write (quoting reference number) to Appointments Office, P.O. Box 1, Kensington, N.S.W., Australia 2033. Applications close on 30th April, 1976.
Conferences and Courses

COURSES

Lasers and their applications

The Physics Department and The Centre for Continuing Education, Monash University, Clayton, Victoria, will offer a special 16 week course on lasers and their applications beginning on June 7, 1976. This lecture/demonstration series is designed for people in technical or professional fields who feel the need of a practical introduction to laser technology.

Further information is available from The Centre of Continuing Education, Monash University, Clayton, Victoria, 3168: Telephone 341 0811, Extension 3718 or 3719.

CONFERENCES

International Conference — 50th Anniversary of the Discovery of Electron Diffraction

The Institute of Physics is organizing a Conference to mark the 50th Anniversary of the Discovery of Electron Diffraction. The Conference will be held on 19-22 September 1977 at Imperial College, London. For further information contact: The Meetings Office, The Institute of Physics, 47 Belgrave Square, London SW1X, 8Qx.

IOP Conferences 1976


Theoretical Methods in Polymer Physics — University of Leeds, 5-7 July.


Fifth International Symposium on Equatorial Aeronomy (5th ISEA) — August 25-31, 1976. Physics Department, James Cook University, Townsville, Queensland.

A broad variety of subjects bearing directly and indirectly on equatorial aeronomy will be discussed. In addition to problems in low-latitude aeronomy, symposium topics may include problems in radio propagation, spread-F scattering, etc., lower atmospheric behavior, low-latitude storm characteristics compared with high- and middle-latitude storms, and solar-interplanetary effects on equatorial aeronomy-climatology.

Further particulars are available from:
The Australian Organizing Secretary,
5th ISEA,
Physics Department,
James Cook University,
P.O. James Cook University, Q. 4811
Australia.

Letters

SIR:— My daughter has commenced NSW Higher School Certificate studies in Physics and Chemistry. I quote her Chemistry teacher, “We will be doing a lot of prac and I hope you will find it interesting”. Physics teacher, “I am not going to waste my time making the course interesting for you lot. I do not want to see eager faces looking up at me in the morning. By the middle of second term I expect a lot of you to have dropped physics as you will not be able to cope”.

What hope have we got?

— T. M. Sabine

Elitism kills!

The Australian Physicist, March 1976
People and Institutions

Sirotherm Desalination Plant

The first full-scale Sirotherm desalination plant is now operating at the ICI Australia Ltd., Osborne, S.A., alkali factory. The plant treats 600,000 litres of Adelaide’s water a day, reducing its salt content from up to 800 to less than 100 parts per million. Special resin beads do the desalting. Unlike the resins in other desalination processes, these can be reused after a simple washing in hot water. **CSIRO Industrial Research News, 113, December, 1975.**

National Measurement Laboratory Booklet


Solar Absorbers

Dr Alan Reid of CSIRO Division of Mineral Chemistry has found a simple, economical way of making the black copper panel, the heart of a solar water heater, even blacker. Copper absorbers are made black by dipping them for a short time in an alkaline bath of sodium chlorite. The black coating (fine grained cuprous oxide) turns brown after a period of time and becomes a less efficient absorber. In an attempt to make copper black films more stable Dr Reid tried, among other things, dipping them in a chromate solution. The absorbers came out of the solution very much smoother with a blue-brown iridescence. The new surface, probably the very stable cupric chromite, is more durable and a better absorber of sunlight. The improvement in absorption is partly due to the strong absorption of visible light by chromium ions and the reduced scattering of light by the fine-grained surface. **CSIRO Industrial Research News, 114, January 1976.**

Acoustic Tiles From Wastes

Mr H. Peppinlhouse, CSIRO Division of Building Research has used a mixture of broken glass and red mud to make acoustic tiles. The red mud is a residue from the refining of bauxite to alumina. The mud and glass tile does not burn and is being weather proof is suitable for outdoor use. For manufacture the red mud is dried, extruded, fired and crushed and then mixed with powdered glass and binders. Pressed into moulds, the finished tiles emerge after a second firing. **CSIRO Industrial Research News, 114, January 1976.**

New Year Honours

A. F. A. Harper (Hon. FAIP), Executive Officer of the Metric Conversion Board, was made an Officer of the Order of Australia in the latest awards. The same honour was conferred on Dr M. Lipson, who retired in February as Chief of the Division of Textile Industry, CSIRO.

“Atomic Energy in Australia”

The October 1975 issue of this publication by the AAEC introduces a special series of informative papers on aspects of the uranium and nuclear power industry. The first two papers are ‘The effects of ionizing radiation radiation on Man’ by G. M. Watson, and ‘Radiation hazards of uranium mining and milling’ by R. M. Fry. The issue also contains details of Ministerial Statements on the Atomic Energy Act and the Ranger uranium project, as well as lists of AINSE grants for 1975 and of AAEC technical documents.

Acting Director for AAT

Dr E. J. Wampler, who has been Director of the Anglo Australian Telescope, returns to the USA in March. Dr J. P. Wild of CSIRO will act as Director until a new appointment is made. **Coresearch, January**

Press Release

The Australian American Education Foundation will be supporting the visit to Murdoch University of Professor Donald E. DeGraaff of the Department of Physics and Astronomy, the University of Michigan at Flint, Michigan. Professor DeGraaff is an expert on the development and implementation of new approaches to curriculum design especially in physics teaching.

While visiting Murdoch University Professor DeGraaff will continue his research into levels of thinking used by undergraduates in physical science courses and incorporate the results into improved independent study programmes adapted to the individual needs of undergraduates.

Chief, Division of Process Technology

Professor A. V. Bradshaw has been appointed Chief of the CSIRO new-formed Division of Process Technology. Professor Bradshaw, a leading British metallurgist has been for twelve years Professor of Applied Metallurgy at London’s Royal School of Mines. **Search, Vol. 7, No. 1-2, January-February 1976.**

Appointment to CSIRO Executive

Professor H. W. Warner has been appointed to the Executive of CSIRO. Professor Warner has been Professor of Metallurgy at the University of Melbourne since 1956. He has served as President of the Australian Institute of Nuclear Science and Engineering (1963-64). **Search, Vol. 7, No. 1-2, January-February 1976.**

Medallist

The David Syme Research Medal has been awarded to a member of the staff of the Division of Atmospheric Physics in Melbourne.

The recipient is Dr G. W. Paltridge for research which, in the opinion of the panel of examiners, represents the most important contribution to one of the branches of science involving biology, chemistry, geology or physics during the two years preceding the award.

Lecture

Dr Alan Walsh, the Division of Chemical Physics, has been invited by the Analytical Section of The Swedish Chemical Society to give the 1976 Torbern Bergman Lecture.

In honour of one of Sweden’s greatest scientists,
the lecture is given every second or third year by a prominent scientist in the field of analytical chemistry.

Dr. Walsh is a foreign member of the Royal Swedish Academy of Scientists.

Astronomer

The world's first radioastronomer, Dr. Grote Reber, an honorary Research Fellow with the Division of Radiophysics who works from Tasmania, is visiting the United States to give the Jansky Lecture.

The lecture is named after Karl Jansky who first detected radio waves from the Milky Way Galaxy in 1931. While he is in the States, his native country, Dr. Reber will be working with the Bell Telephone Laboratories to give them all the information he can about his early work for archival purposes.

Rutherford Medal to Australian woman physicist

The Sydney Morning Herald of February 19, 1976, carried a report concerning the first woman to receive the Rutherford Medal. Dr. Joan Freeman was recently awarded this medal, jointly with Professor Roger Blin-Styvoll, for research in nuclear physics. Dr. Freeman, who has worked at Harwell for twenty-five years, has been in charge of a team measuring the B-activity of complex nuclei. She originally graduated from Sydney University with an MSc, worked briefly for the CSIRO and was then sent to Cambridge to study nuclear physics.

Obituary

We record with regret the death of Mr. R.W. Boswell OBE. Mr. Boswell had been Chairman of the Australian Atomic Energy Commission since April 1972. He had served as Governor for Australia to the International Atomic Energy Agency since 1972 and in 1974 was President of its General Conference. Before being appointed Chairman of the AAEC, Mr. Boswell was Deputy High Commissioner for Australia in London. This appointment followed a long and distinguished career in the Commonwealth Public Service.

Mr. Boswell was born in Melbourne on 30 September 1911. He was educated at Melbourne University High School and graduated from the Melbourne University as Master of Science. He served with the Radio Research Board of CSIR from 1934 to 1936 and was the Fred Knight Travelling Scholar for 1937-1938. He was an Engineer in the PMG Laboratories from 1938-1942. During World War II, Mr. Boswell saw service going into the Royal Australian Navy where he played an important role in the introduction of new electronic systems, including radar. In 1948 he joined the Weapons Research Establishment in SA and was Director of the Establishment from 1958-1965. He was appointed Secretary of the Department of National Development and then also a member of the AAEC and Chairman of the Snowy Mountains Council. He filled these positions until 1969, when he was appointed Deputy High Commissioner in London.

Mr. Boswell had many interests in the arts, science and education. He was a Member of the Council of the Canberra College of Advanced Education, a Member of the Committee of Inquiry on Museums and National Collections, and Member of the Science and Industry Forum of the Australian Academy of Science.

Death of Professor W. Schottky

On Friday March 5, 1976, Professor Walter Schottky died in West Germany, aged 90. Professor Schottky's pioneer work with rectifiers paved the way for solid state diodes, transistors and integrated circuits. The Australian, Saturday, March 6, 1976.

What people are saying

Recession in Physics

'The Science Research Council's budget for 1974/75 was 2% lower in real terms than for 1973/74 and it is expected to drop by a further 2% in 1975/76. The damaging effects of inflation on research and possible ways of minimizing them are the major topics for comment and discussion in the Report of the Science Research Council for the Year 1974/75.' — Physics Bulletin, December 1975.

'...although the future for physics as a major discipline for secondary and tertiary level study is bleak, perhaps it is inevitable and may indeed be welcomed in providing an opportunity for continuing the development of the more motivational and relevant curricula which have begun. The present generation of physicists has a vital role to play in these developments, but it will require a flexibility of attitude and not emotional reaction to the apparent threat situation which attacks the purity and elegance of physics studies'.


'Over the period 1967 to 1975 Federal obligations for basic research in physics declined at a much greater rate than for the basic research as a whole. After multiplying the 1975 figure by the Gross National Product price deflation factor, one finds that physics basic-research support declined by 26%, whereas total basic-research support declined 16%.' — Physics Today, November 1975.

Physics is a jigsaw puzzle with many of the pieces missing. The picture is the picture of the universe, but we must paint it in ourselves. When somebody discovers a new piece they try to determine its shape and then fit it to the existing picture. Sometimes the result is a quite spectacular new concept or useful device, shape or the job turns out to be quite wrong. Then somebody prostitutes the whole thing by using it to make a weapon.

— R. Bird.
Conference Reports
The Study of Artefacts

Bronze came late to China but quickly flourished. Archaic bronze bells and vessels such as the li and the ting are often elaborately constructed and decorated and carry informative inscriptions. Chemical analysis reveals a great variability in composition and is therefore of little use for studies of time and place of origin. However, thermoluminescent dating of small inclusions of ceramic mould material can give useful information.

Obsidian was to pre-metal societies in the SW Pacific what steel is now—a universal cutting edge. Because obsidian was thoroughly brewed before being poured from nature’s volcanic furnaces, it has a remarkable uniformity throughout each flow. It is therefore possible to determine the origin of an obsidian artefact (spear head, dagger, and so on) just by measuring a few major components or trace elements.

These and other techniques brought together physicists, chemists, metallurgists, historians, archaeologists, museum curators and others at the National Gallery of Victoria for a symposium on scientific methods of study of ancient Chinese and South East Asian artefacts. A. Mortlock (ANU) described thermoluminescence dating studies of ancient Chinese bronzes using techniques which will be known to readers of the Australian Physicist (9:102; 10:105; 11:213).

T. Wall and R. Bird (AAEC) discussed the characterization of obsidian using neutron activation and prompt nuclear analysis techniques. A few minutes measuring time per sample allows the plotting of ratios of intensity of several gamma-ray peaks observed after thermal neutron irradiation or during proton bombardment (figure 1). Samples of each obsidian flow cluster in separate regions of the plot and this allows the determination of the origin of artefacts even when they are found hundreds of kilometres away.

The variety of interests represented at the symposium produced discussions ranging from laboratory techniques (“Chemical analysis is of no use unless you already have a hypothesis to test”) to the methods of ancient village craftsmen (“Why does the iron slag which is found in large quantities at one site in the Talaul Islands, still contain 60-70% iron oxide?”) and the work of the forger (“A replica carries the name or mark of the maker, a forgery does not”).

—R. Bird
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