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## FRONT COVER

Patricia Wood, Dipl. Arts Studies W.A., designed the front cover. It is an artist's impression of the previous visit of the comet in 1910. The circle is an ancient astrological, astronomical symbol of 'Earth' and the rest is self-explanatory.
President's Column

To speak of Australian physics would be meaningless, if what was implied was that the physics was in some way peculiar to Australia. The laws of physics are universal, and the pursuit of their understanding is international. However, it is perfectly sensible to consider Australian physics in the sense of the research in physics that is undertaken by physicists in Australia.

Pure research may be conducted at any number of levels ranging from the truly innovative, breaking new ground, to the consolidating, filling-in-the-odd-corners. At all levels, advances in research techniques require continual upgrading of research equipment and facilities. The costs of establishing and maintaining the experimental facilities required for research at the forefront of physics are increasingly growing beyond the resources of a single country and international agreements to share costs are becoming more common. Such a trend towards sharing the expense of 'big science' has obvious advantages for the smaller and developing countries in that it provides access to facilities which allow the physicists in those countries to pursue their research at a level which would be otherwise unobtainable.

Where does Australia stand in regard to such international co-operation? Very much in the background, I would say. The bi-lateral science and technology agreements which exist between Australia and a number of countries only provide for the interchange of personnel. They do not guarantee access to scientific facilities and, to the best of my knowledge, there are no formal agreements that do.

Certainly, Australian scientists make good use of the facilities at CERN, CERN, and no doubt many other laboratories, but this has been very much by trading on the good will of the organisation involved. 'Suitcase' physics is one thing; but a reputation for 'hitch-hiking' is another. There is also the question of how much longer we can expect to continue to have free access to expensive facilities.

In its recent report on nuclear science and technology in Australia, the Australian Science and Technology Carrier (ASTEC) recommended that the Minister of Science should endeavour to secure access to overseas neutron beam and accelerator facilities, where possible by negotiation of reciprocal arrangements with Australian scientific facilities. Given the limited choice of scientific facilities unique enough in Australia to attract overseas interest, I can see little hope of any extensive trade-off arrangements of this sort.

An attractive and relatively inexpensive alternative is for Australia to respond to the various offers that have been made to have an involvement in the construction of instrument. Such programmes would also require provision for the employment of a full-time resident scientist at the overseas laboratory. One such proposal for Australia to construct an instrument for use on a beam at the dedicated X-ray storage ring, the 'photon factory', at Tsukuba, Japan, is being actively pursued by Stephen Wilkins following his recent visit to the laboratory.

I believe it is essential for the future of Australian physics that formal agreements be established with overseas facilities. Without such arrangements it will only be a matter of time before we find we are no longer welcome and Australian physics is relegated to filling in the odd corners left by others.

T.F. Smith
Editorial

In the President's column of the first issue of 1986, Fred Smith wrote: "the meeting of any organisation relies heavily on communication", a statement which in essence, supplies the reason for the existence of The Australian Physicist. I would therefore like to mention aspects of this subject starting with the physicist's contribution to communication followed by the effect of modern communication in Australia with particular reference to Australian physics, and to discuss in more detail communication as it relates to the publication of this journal.

The communication revolution of the past two centuries could never have taken place were it not for the fundamental scientific understanding of the material universe in which we live. This understanding was mainly derived from the hard work of physicists. The knowledge of the electron's behaviour in conducting and dielectric media, the ingenious unravelling of the nature of the electromagnetic field and its interaction with matter laid the foundations that made this revolution possible. Since World War II, we have witnessed the discoveries of the klystron, the magnetron, lasers, holography, semiconductor theory resulting in the transistor and, most recently, fibre optics. It would be fun to speculate what Maxwell and Hertz would think of these developments were they here today. Six hundred million telephones are now in use and we can only wonder how physicists would have fared if they could have patented the use of the electromagnetic spectrum outside the visible region. Of course, we physicists are aware of all these contributions by our profession, but are others? We can be proud and should remind the rest of the world, which at present recognises only advances in engineering, that none of these would have been possible without the understanding of the fundamental physics.

Especially for Australia, communication is vital. Since the days of complete isolation both enjoyed and suffered by the Aboriginal people, changes have been monumental. In 1788 it took 14 months for the news of the arrival of the first fleet to be reported in England. In the 1850's the telegraph was introduced, and the first message was telegraphed on Monday, 12 July 1854, by a telegraphist in Sydney to one in Melbourne, containing the following message: "A T. Talboys, Telegraph Constructor, to M. Bevan, Telegraph Constructor, at Sydney Town: 'Will be here in two days'.

Now we have AUSAT, the latest advance affecting all Australia. Officially opened on Australia Day, it is offering ABC and FM radio to many more Australians than is diminishing their isolation. As we have 8 readers of The Australian Physicist in the Northern Territory - sorry for not having a Branch of the AIP in the N.T. - we wish them good viewing and listening in 1986. While this rapid progress in communication has been beneficial to the Australian community, it is also essential to the Australian physics community as our work appears in an international forum. Isolation from the mainstream of rapidly changing concepts would stifle research work and we must, therefore, ensure that all avenues of communication including travel, scientific journals and books are readily available to us. But, of course, our own attitudes have to change with faster communication to be able to benefit from them. This puts more pressure on each individual in this community, as we are all forced to work at a pace in step with the rest of the physics world.

We, the Editorial staff of The Australian Physicist, have made our miniscule contribution to the improvement in communication by installing FAX in the Editor's office. FAX, short for facsimile transmission equipment, is a long distance photocopier. It receives and transmits digital information via the telephone line any time during the day or night for the cost of a telephone call. The document inserted into the transmitting device is copied onto thermal paper. An A4 page with double spaced typing takes less than 1 minute to transmit. From the large range of FAX's on the market, we have selected a Panasonic copier because it is best suited to our special needs, namely to be able to bypass both the hospital's central switchboard and the accounting system for STD and ISD without requiring that an ordinary telephone be connected into the same line. Thus, we are avoiding obvious misuse. Our FAX number is 03 389 3003. Should you experience difficulties in accessing this FAX please inform me as we are sure to have some teething problems. FAX has its own telephone book and the following Institutions are listed in this year's directory: Universities: James Cook, Macquarie, Adelaide, Melbourne, N.S.W., Queensland.

Government: A.A.E.C. Board Observatory, AAEC, CSIRO at Canberra, Clayton East Melbourne, Fitzroy, Hobart, Woodville, Yarralumba, Belconnen, Melbourne and Perth. The Department of Defence also has several FAX's. Public access is available at G.P.O's in all capitals except Darwin.

We are making our FAX available to all members of the A.I.P., the universities and hospital staff in W.A. We will be charging 10 cents per page for received copy or the price of the telephone call plus 10% on transmission. All documents have to be fetched or brought to my office and "paid on the nail."

FAX has diminished "the tyranny of distance" still further and thereby the excuse for not sending copy on time. Last minute dates for 1986 are: 10/2; 17/3; 14/4; 12/5; 16/6; 14/7; 11/8; 15/9; 13/10; 10/11 for early publication the following month. By reducing transfer time from 4 days ordinary mail to minutes we are hoping to attract more important advertisement and up-to-date news from the Branch Editors and Branch Secretaries, so FAX away!

Branch Editors are obviously the meat in the sandwich. From correspondence with the previous editor there seems to be some doubt about their duties, although Jim Graham has written specifically on several occasions on this topic. As far as I am concerned the Branch Editor should supply reports on all monthly meetings, University Newspapers and general physics news to me. I have written to all Branch Editors for a list of their local 1986 committee and a list of expected foreign visitors. You will find their replies under Branch News. Next year, I hope, we will receive the information following the Branch AGM in time for the first issue of the new year. Further duties of the Branch Editors are to act for me by proof reading and commenting on all documents submitted to them, although documents may also be sent directly to me. As this editorial committee is making a very great endeavour to reduce errors in The Australian Physicist, we require your cooperation, please!

Remember "careless communication causes consternation."

The physics content of the journal remains of primary importance, or we deteriorate into a trivial publication. I would enjoy receiving interesting physics review articles from you. This journal is your journal and its standard depends on you and your excellence in physics!

Trudi Thompson

The Australian Physicist, Vol. 23, March 1986 — Page 31
HALLEY'S COMET

Halley - Just Another Comet

Dennis N. Harwood, Astronomer, Perth Observatory

Halley's Comet has been, in a phrase common to the entertainment industry, well and truly overexposed. This applies to both the scientific and the general press. Aspects of the structure of the nucleus, molecular structures and composition of the tail have all been aired, with popular theories now commonplace topics of conversation. It was therefore a somewhat difficult task to select a topic of interest.

After some thought one question struck me as having some variance with most other publications — Why all this activity for what is scientifically thought to be nothing but a dirty snowball?

Is Comet Halley Special? — the true answer to this is no! However, people from all walks of life are now actively taking part in a great orchestrated display of Comet Halley Worship. Our children eat Comet Halley Icy Poles and Lollies. Our teenagers wear Comet Halley T-shirts while the wiley adults sit back smugly and purchase telescopes which will never be used again.

It's certainly not restricted to the public or amateur astronomers — just look at the professionals. One would think that this is the one and only comet, not one of a possible twelve which will be observed this year and any other year. But we have what every scientist would like, public interest which goes to make that age old formula work!

\[ \text{MA} \propto \text{PI} \]

Where \( \text{MA} = \text{Money available} \)

\( \text{PI} = \text{Public Interest} \)

That's our excuse for our sudden rush of Comet Halley activities.

But what really causes this public surge of interest reminiscent of the dark ages?

A widely accepted explanation is that Comet Halley is the brightest periodic comet known. This statement is true in one sense — it is the brightest periodic comet; but the claim that this is the reason for its popularity is rather simplistic. Halley has been extensively observed during the past 2200 years without the significance of its periodicity being known prior to the 18th century. However, since Sir Edmund's findings, its regular appearances combined with its brightness have done much to heighten its public image.

As mentioned above it is a bright comet and it returns every 76 years. So what? The Moon is brighter and bigger and comes around a lot more frequently. The same goes for the planets though Venus and Jupiter have much to answer for when it comes to their imitations of a U.F.O. Even if we stick to comets there have been many brilliant comets recorded throughout the history of man which have not produced the same degree of hysteria. Maybe the Professional Astronomers combined with the popular press have much to answer for after all.

Possibly it's not all their fault and to highlight this I will introduce to this discussion some fellow travelers. In Table 1 there is a list of bright comets observable with the naked eye over the past 20 years. The number of years is significant as it directly relates to my own interest in Astronomy. During this period we have had six bright comets including Halley, all of which were

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PLATE 1: PL 15147
COMET WEST 1976 VI

Taken at the Perth Observatory 1976 March 14, by Michael P. Candy. 8 minute exposure on 103cm plate.

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HALLEY'S COMET

brighter than Halley is, or will most likely be following perihelion in 1986.

Table 1

<table>
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<tr>
<th>Year</th>
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<td>1965</td>
<td>Ikeya-Seki</td>
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<tr>
<td>1969</td>
<td>Tago-Sato-Kosaka</td>
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<tr>
<td>1970</td>
<td>Comet Bennett</td>
</tr>
<tr>
<td>1976</td>
<td>Comet West</td>
</tr>
<tr>
<td>1982</td>
<td>Comet Halley</td>
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(1982 refers to the first sighting of Halley's Comet prior to Perihelion)

To place them in perspective Ikeya-Seki (1965VIII) is grouped with the great comets of 1106, 1843 and 1882 and is considered as being one of the most brilliant on record. It was observed with the naked eye within one degree of the Sun at a magnitude of about −10 or −11. Some 2½ degrees of tail was visible during daylight while just prior to sunrise it covered some 45° of the sky. With all this to recommend it who, but a very small band of comet enthusiasts still remembers it. It's still very much within living memory but something about it was wrong!

The next comet in order of brightness is Comet West (Plate 1) which reached a magnitude of about −3. This is brighter than Jupiter and again there was little public response. No one for instance publicly queried whether it may hit the Earth, should we take our children out of school, and so forth. It came, it shone, it vanished. This is unfortunately the truth in more ways than one. West on its last approach in 1975 gained substantially in momentum as a result of its close approach to the Sun and will not return. The interesting thing about this comet is that although it had a periodic orbit it has not had a previous appearance recorded.

Another bright comet was Comet Bennett (Plate 2) which visited our neighbourhood in 1970. With a magnitude close to 1 shortly after perihelion this comet was again readily visible with the naked eye. It is not a periodic comet and will not reappear. However, for a short period of time it produced quite a flutter amongst the Astronomical Community, if no one else.

The last comet in this list is another non-periodic comet Tago-Sato-Kosaka 1968 IX (Plate 3). Not a spectacular object visually but photographically quite a prize with a large coma surrounding the nucleus and a small narrow filamentous tail. Publicly this was very much a non-event and if this can happen with a comet which reached a magnitude close to 2 then if magnitude is the only consideration, Halley this time round should be a total non event. Tago-Sato-Kosaka however did not have a manager or publicity officer whereas Halley has several thousand of both scattered world wide.

To further enhance the comparisons the “Great January Comet of 1910” (1910 I) has been included along with the 1910 appearance of Halley. The Great January Comet was bright enough to be seen in daylight and reached a magnitude of about −5 compared with the later appearance that year of Halley, which only reached a magnitude of −1. Although in fact many elderly people who can remember seeing a comet in that year actually saw the Great Comet, most only remember the name Halley.

To facilitate the comparison of the visibility characteristics of the seven apparitions, the magnitude with respect to the time following perihelion have been included in Table 2. This data has been plotted in Fig.

PLATE 2: PL 12885
COMET BENNETT 1969 I
Taken at the Perth Observatory by Dr I. Nikoleff and Peter Birch 1970 March 16.
28 minute exposure on 103mp plate.
PLATE 3: PL 12723
COMET TAGO-SATO-KOSAKA 1969 g
1970 January.
Taken at the Perth Observatory by Dr I. Nikoloff.
60 minute exposure on 103ao plate.

PLATE 4:
COMET HALLEY 1982 i
Taken by Jeffrey Johnston at the Perth Observatory on 1985 December 31.
33 minutes exposure on 103ao plate.
HALLEY’S COMET

1. Where it is fairly obvious that two characteristics are common to both appearances of Halley. Both show a secondary brightening quite some time after perihelion, which occurs at the Earth’s orbit. The other feature is the length of time during which the comet is visible. In the case of the 1986 (Plate 4) appearance there are almost 60 days during which the comet will remain brighter than 6th magnitude. In sharp contrast to this is the very rapid drop in brightness of the two brightest comets 1910 I and 1965 VIII. Both are fainter than magnitude 6 by day 30. The other examples show similar behaviour and exhibit a fairly steady drop from the time of perihelion. Comet Tago-Sato-Kosaka does, in fact, show a similar magnitude relationship to that of Halley but finally drops to magnitude 6 some days before Halley.

Magnitude alone would not however constitute a significant effect but when combined with the elongations as shown in Table 3 there is support for the theory that the reason for Halley’s popularity is its duration of visibility combined with its convenient time of observation.

Elongation is the angular displacement in Longtitude (as seen from Earth) of the individual comet from the Sun. The greater the elongation the more easily observed is an object, the Sun being further below the horizon and the sky therefore darker. Table 3 shows that both appearances of Comet Halley have times during which the comet is visible for over half the night while still being brighter than 5th Magnitude. The other comets either fade rapidly or as with Comet Tago-Sato-Kosaka remain too close to the Sun for easy observing during their bright period.

From the above argument it could easily be stated that the data is too restricted. This is of course, quite true, however ephemerides calculated for Comet Halley for its previous appearances show the regular occurrence of both a long period of visibility following perihelion associated with a favourable duration of visibility each night. This explains why Comet Halley has been observed so frequently since the earliest recorded observations in 240 BC. It should be remembered that prior to Sir Edmund Halley’s findings there was no association between the different appearances of the comet and yet, records exist down through the ages.

Quite obviously there are other factors which influence its popularity which stem from the time of Sir Edmund Halley’s speculation. Human nature, being, what it is, was not slow in finding ways of using the comet for commercial purposes. During the 1910 appearance it sold all forms of consumer goods, from helmets to custard. This really stems from the public fear of the unknown and its readiness to accept some of the most outlandish explanations. This, combined with the mistrust some people seem to have in scientists makes for a very fertile environment in which unscrupulous individuals can operate. It is obvious that even today many of our public are still in ignorance of the true facts associated with much of our environment. It’s a pity that the public interest now being shown in Comet Halley can not be maintained in Astronomy and Science in general. It should be our responsibility as members of a select group working in a scientific field to make our knowledge more available. People should want to see Comet Halley because of its beauty and out of interest, not out of fear or as a result of a selling campaign.

Table 2

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Elongation — degrees

The Australian Astronomer, Vol. 23, March 1986 — Page 35
Future of Mawson Institute in Doubt

Pene Greet, Research Scholar, Mawson Institute, S.A.

At a time of growing recognition by Australians of the importance of the Antarctic region it seems likely that the Mawson Institute for Antarctic Research is to close. Dr F. Jacka, the director and only academic member of staff, is to retire in 1980. The University of Adelaide, of which the Institute is a department, has decided not to refill his position. This will effectively close the Institute.

Sir Douglas Mawson stood apart from other Antarctic explorers in his dedication to science. The Mawson Institute was set up in 1959 in his honour. The Institute's primary purpose has been to carry out research related to Antarctic regions. The Institute also maintains a library of Antarctic literature and a museum. This collection has been the primary source material for several books, articles, illustrations in various other publications, in television, films, the design of the S100 note and many exhibitions.

The current director, Dr F. Jacka, was appointed as the founding director in July 1965. At present the Mawson Institute's research programme is limited to upper atmospheric physics. In the past, work has been carried out in other scientific areas. However, these groups have folded due to insufficient funding. Dr Jacka has been the only academic in the upper atmospheric physics group. He has maintained a very active research group; he is currently supervising three full time and 6 part time PhD students, as well as his administrative duties, and an involvement in various committees. The other staff members in the Institute are a research officer (engineer), two technical officers, and a part-time secretary. Earlier this year the secretarial position was cut from a full-time Grade 6 position to a part-time Grade 4 position. One of the technical officers is to retire early in 1986 and will not be replaced.

The upper atmospheric research programme of the Institute has been based on three observing techniques using the following instruments:

(a) large dual scanning Fabry-Perot spectrometers, one at Mawson, Antarctica, and one at Mt Torrens, 50 km east of Adelaide.
(b) three field, six channel photometer, one at Mawson and Mt Torrens.
(c) Partial Reflection Drift (PRD) radar at Mawson.

The Fabry-Perot spectrometers (F.P.S.) are used to obtain wind and temperature measurements from various airglow and auroral emissions (Jacka, 1985). The first of the F.P.S. developed by the Institute in Adelaide was run at Mt Torrens (Jacka et al, 1979), (Cocks et al, 1980). Another improved instrument was taken to Mawson, Antarctica, in 1980. Both instruments can operate on a 24 hour basis. The Mawson instrument has been run regularly since 1981. The 630nm and 558nm atomic oxygen emissions have been used to obtain thermospheric winds and temperatures (Cocks and Jacka, 1980), (Cocks, 1983), (Jones and Jacka, 1984). Vertical winds have been observed (Wardill and Jacka, 1986) and the wind variations with magnetic activity. Analysis of the Mawson data is continuing. In the last few years the Mt Torrens instrument has mainly been used as a training ground for students going to Mawson. Lack of staff has prevented it from being run on a regular basis. However, it is now being upgraded to improve its daytime operation to permit studies on the sodium D line emissions from the 85 km level.

The three field photometer has been used at both Mawson and Mt Torrens to study atmospheric internal gravity waves in the 630 and 558nm emission bands. Horizontal phase velocities can be measured and have been used to locate the source regions of the gravity waves (Jacob and Jacka, 1984) and to estimate energy fluxes associated with the waves. The same photometer can be used to monitor any of the nighttime airglow emissions. Further work could be done with this instrument.

The PRD experiment was initially designed by the Atmospheric Physics group in the Department of Physics, University of Adelaide. The equipment at Mawson was substantially rebuilt by the Institute to cope with Antarctic conditions. It is run in collaboration with the Physics Department. The PRD data is used to determine winds and tides in the 60-110 km height range, (McLeod and Vincent, 1984). It runs on a 24 hour basis and has been operating for 2 years.

These experiments are soon to be supplemented by a stratospheric lidar sounder. The lidar, under construction, will give winds and temperatures in the 15-60 km height range. This region of the atmosphere is difficult to probe using techniques developed to date. The lidar will use a 12W (mean power) pulsed copper vapour laser with a 1m Cassegrain telescope and a dual scanning Fabry-Perot spectrometer. The profile of backscattered laser light is recorded and winds and temperatures calculated. The lidar should be operational in 1986 and will be the first of its kind in the world (as was the Fabry-Perot spectrometer and the three field photometer).

The University's intention to close the Mawson Institute for Antarctic Research has already had effects. The Institute can accept no more PhD students to work in its research programmes. This, coupled with the gradual reduction in staff, limits the amount and rate at which work on the research programmes continues. These programmes have been considered worthy enough to attract considerable ARGS monies over many years. Dr Jacka has notified the Antarctic Division, of the Department of Science, that unless more staff are appointed, the Institute will have to end its Antarctic research programme. Currently its programme comprises a large percentage of the research carried out at Mawson, Antarctica. The experiments there have been commissioned and run by the Institute's postgraduate students. Without either more students (and staff to supervise them), or staff to run the experiments they will end in 1987. Australia's scientific effort in the Antarctic is small
ANTARCTICA

enough without cuts such as this. In 1987 there will probably only be one scientist at Mawson base.

Dr Jacka has requested the Antarctic Division to appoint a second scientist to work at the Institute. This request has been rejected. The University and ARGS have been approached for more academic staff and neither have allocated sufficient priority to the Institute to secure its future.

The external review of Physics, Mathematical Physics and the Mawson Institute at the University of Adelaide, carried out last year, recommended that the Institute have at least two more staff members, one an academic and one technical position. The review of Australian Antarctic Upper Atmospheric Physics and Cosmic Ray Physics, carried out by the Australian Institute of Physics, for the Antarctic Research Policy Advisory Committee, recommended that the Institute have two postdoctoral research fellows.

Another effect of the doubt in the future of the Mawson Institute involves the collections it has in the library and museum. These were to be formally given to the University last year by the Mawson family; however, the family has refused to sign them over until their future, in the Institute, is secure. The decision to close the Mawson Institute for Antarctic Research reflects the inadequate levels of federal funding of universities and the detrimental effects of this on unique research programmes. It also reflects the short-sightedness of the Antarctic Division and its lack of interest in research, especially upper atmospheric physics. A relatively small amount of money is needed to secure two academic positions, one appointment now and one when Dr Jacka retires. This would enable an effective upper atmosphere research programme to be continued. It would be a tribute to the memory of Sir Douglas Mawson; a continuation of the tradition he started and which the Mawson Institute has struggled to maintain over the last 20 years.

REFERENCES:

South Magnetic Pole located at sea by Australian Expedition

A Bureau of Mineral Resources (BMR) experiment conducted aboard the Australia Antarctic charter vessel M.V. Icebird has succeeded in locating directly the position of the South Magnetic Pole. This is the first time this has been done using a ship. The Pole was last visited 34 years ago, by a French Expedition to Adelie Land, when it was still on the Antarctic continent. The current location, at latitude 65 degrees 18 minutes South and longitude 140 degrees 02 minutes East at midday on 6th January, 1986, places the Pole offshore 152 km north-northwest of the French Antarctic research base Dumont d'Urville, and 3370 km south of Adelaide.

The magnetic poles are the principal points on the globe where the Earth's magnetic field points vertically upwards (the South Magnetic Pole), or vertically downwards (the north Magnetic Pole). Unlike the geographic poles, which are determined by the rotation axis of the Earth and are fixed, the magnetic poles drift gradually in response to slow changes in convection patterns of molten iron in the core of the Earth. Superimposed on this is a rapid daily motion due to magnetic fields produced by electrically charged particles moving around the Earth. The diameter of the path traced out daily by the Pole ranges from as little as 20 km to many hundreds of kilometres on days when the magnetic field is highly disturbed by emissions from the Sun.

On only three occasions in the past have direct determinations of the position of the South Magnetic Pole been made. The first, in 1909, was the target of the epic 2000 km man-hauled sled journey inland from Ross Island by the Australians Douglas Mawson, Edgeworth David and Alistair Mackay during Shackleton's 1907-1909 British Antarctic Expedition. Subsequent visits to the Pole were made in 1912 by Eric Webb during Mawson's 1911-1914 Australasian Antarctic Expedition, and in 1952 by Pierre Mayaud during the French Antarctic Expedition to Adelie Land.

During the 19th century there was tremendous interest in terrestrial magnetism, largely due to its importance for navigation, particularly in higher latitudes, and several expeditions were mounted to search for the South Magnetic Pole. This effort was given additional impetus by the remarkable prediction by the famous German physicist Karl Friedrich Gauss, that the Pole would be found at latitude 66 degrees South, longitude 146 degrees East. The most successful attempt to test this prediction was made by James Clark Ross during his first Antarctic research voyage in "Erebus" and "Terror" in 1840-41. After penetrating the sea named after him, Ross found his passage to the...
magnetic pole barred by the Trans-Antarctic Mountain chain. His final observations indicated the Pole to be some 250 km to the west. Since then the Pole has drifted 1300 km in a north-northwesterly direction at an average speed of 9 km per year. The reason the pole moves is still unknown. However scientists speculate that the movement is caused by changes in the electric current in the molten outer core of the earth.

At polar latitudes, the magnetic field is generally undisturbed for only a few days per month, and even then the Pole moves along a cyclic daily path. Hence, it is practically impossible to reach the magnetic poles exactly, unless one is singularly fortunate enough to have the pole beneath one’s feet. In fact, this is very nearly what happened to Mawson’s party on 16th January 1909.

Two of the observations made an hour apart by Rodney Hutchinson, the BMR geophysicist on board the M.V. Icebird, indicated the pole had moved some 30 km. Measurements were made using a sensitive magnetometer, specially designed and assembled by BMR’s Engineering Services Unit, and mounted on a non-magnetic boom protruding from the stern of the “Icebird.” The observational technique is designed to compensate for the magnetic effect of the vessel and disturbances due to its motion.

A new location for the South Magnetic Pole is declared every five years at a meeting of the International Association of Geomagnetism. The next meeting to announce a new position will be held at Hamburg in the Federal Republic of Germany in August this year. The project is being run by Dr. Charles Barton from the Bureau of Mineral Resources in Canberra, in collaboration with Dr. Patrick Quilty from the Antarctic Division of the Department of Science and Dr. Anthony White from Flinders University of South Australia.

For further information, contact: Dr. C.E. Barton, Bureau of Mineral Resources, Canberra, ACT, 2601. Telephone (062) 499 111.

Honours

The following Australian Physicists were honoured with Australia Day awards:

AC — Paul Wild — see page 52.
AO — Max Brennan — Professor of Physics, U. of Sydney
David Caro — Vice Chancellor, U. of Melbourne
AM — John Carver — Director, School of Physical Sciences, A.N.U.
Michael Gore — Director, Questacon.

The following scientists also received the A.M.
Isabel Bear — Mineral Chemistry
GERM NAINE Joplin — Geology
Wallace Read — Solar Energy

Citation:

Professor Peter Mason Macquarie University (School of Mathematics and Physics) shared a citation with Robyn Williams and Halina Szewczyk of the ABC Science Unit for the series, Blood and Iron, based on Professor Mason’s book of the same name. The Media Peace Prize judges said the radio series was impeccably researched and highly informative, as might be expected of its author, but was simultaneously entertaining radio and a major contribution to the message of peace.

Iuvsta Scholarship

International Union for Vacuum Science, Technique and Applications

Welch Foundation Scholarship 1987

Announcement

A scholarship is offered to a promising scholar who wishes to contribute to the study of vacuum science, techniques or their application in any field.

Conditions of the Scholarship

This scholarship is offered for a one-year period starting September 1, 1986. If for some reason, the candidate cannot begin his work as scheduled, he can begin within three months after September 1, 1986. In the case of a delay of more than three months, another candidate will be chosen. The laboratory where the candidate wishes to work must approve any delay in the commencement of work.

The scholarship holder is encouraged to seek funds in addition to the scholarship but should obtain the authorization of the Chairman of the Welch Committee of the IUVSTA before accepting any additional funds. Traditionally, the authorization has been granted.

The amount of the Scholarship will be approximately $10,000 US.

The scholarship money is paid in three installations — one of $5,000 at the beginning, another of $4,500 six months after he/she has started work and a third of $500 upon delivery of a final report after completion of work. A brief mid-term report is required before payment of the second installment.

Applicants are asked to select a laboratory of their choice. Because of the international nature of the scholarship, strong preference will be given to applicants who propose to study in a foreign laboratory in which they have not yet studied.

Candidates for the scholarship should have at least a Bachelor's degree; a Doctor's degree is preferred.

Application Procedure

Candidates can obtain the necessary forms for the scholarship from the IUVSTA Welch Foundation Administrative Office:

Dr. J.P. Hobson
Division of Electrical Engineering
Room 162, Building M-50
National Research Council
Ottawa, Canada KIA 0R6

Candidates for the Welch Scholarship are invited to send their applications to the above-noted address before 15 April 1986.

Each Candidate's Application should include the following:

• A curriculum vitae.
• A photocopy of, or attestation of, all diplomas.
• Name and address of laboratory chosen; a 200-word abstract describing the research he/she proposes; and a letter indicating that the facilities of the host laboratory will be available.
• A declaration that the candidate will not violate any laws of his own country during his tenure of scholarship.
• A declaration that the candidate will not violate any laws or engage in any political activity in the country where he/she intends working.
• Two recommendations from present or past professors, or research directors.

Candidates will be informed of the results of their applications as soon as possible but probably before the beginning of August 1986.

The successful candidate must produce satisfactory evidence (preferably in the form of examination certificates, etc.) of reasonable fluency either in the language of the country where he/she will work during the tenure of his/her scholarship or in English.

NOTE: Researchers who applied unsuccessfully for previous Welch Scholarships may apply again for the 1987 grant.

Applications for renewal of the Scholarship are not accepted.
TEACHING

Schools Urged to Strengthen Links with CSIRO

A senior CSIRO executive called tonight for closer links between the schools system and CSIRO and industry to make science education more relevant to national needs.

Mr Peter Dunstan, CSIRO's Director of Information and Public Communication, said education and science and technology were the key factors in ensuring Australia's future as an advanced nation.

"The importance of science education for an increased public awareness of the significance of science and technology to our society must be communicated more effectively.

Mr Dunstan was giving an after-dinner address at the 22nd meeting of the Australian Association of Directors of Teacher Education Institutions, held at the Gold Coast, Queensland.

"Applauded the moves underway in Australia to relate the teaching of science more closely to its applications and its social context and impacts; to everyday life, the jobs students will move on to and the issues they read about in the papers or see on TV.

"The development of science, technology and society studies for schools offers enormous potential for closer interactions between the secondary education system and CSIRO.

"While we already have a fair amount of interaction with it, we are exploring ways of strengthening these links, just as we are with the other sections of the community, particularly industry.

Mr Dunstan said trainee teachers could spend some months at CSIRO divisions or other applied research institutions learning about, and contributing to, research work.

CSIRO could also participate in curriculum advisory panels or syllabus committees and have small groups of science teachers visit CSIRO divisions to gain first-hand experience of the research environment and the application of science to industrial or other problems.

For further information, please contact:
Richard Eckersley — 062 48 4484 (W)
CSIRO Media Group — 062 81 4519 (H)

Aussat as a Teaching Aid

A team of fourth year engineering students at Canberra College of Advanced Education have designed, installed and operated a microwave satellite earth station as part of their thesis project for 1985. They succeeded in acquiring the telemetry beacon signals at a frequency of 12.74975 GHz from Aussat K1 on Monday, 2 September 1985, the day on which the satellite was placed in orbit.

This project was initiated to follow up the successful use of the ATS-1 VHF communications satellite as a teaching aid (AP 22, 4(1), 104). Dr Paul Edwards, Head of the Department of Electronics Engineering and Applied Physics at the College believes that satellite projects of this type are an ideal means of introducing graduate and senior undergraduate students in engineering and applied physics to a wide range of design and application skills and concepts — covering the fields of civil and mechanical engineering, microwaves and electromagnetics, signal processing, instrumentation and control through to remote measurement.

Members of the team have subsequently acquired and demodulated telemetry and video signals from Aussat K1 and 2 and Intelsat 4. In the current year it is proposed using the geostationary meteorological satellite, GMS-3, to provide students in the new Applied Physics course with access to satellite imagery and remote sensing data relevant to atmospheric physics and meteorology.

Dr Paul Edwards

BOOK REVIEWS


Reviewed by S.M. Hamberger, Research School of Physical Sciences, The Australian National University.

"Fully ionized hydrogenic plasma, when subjected to a weak electric field, obeys Ohm's law with an electrical conductivity which increases as (temperature)^12, becoming as high at 10^11 as that of room temperature copper and reaching almost superconducting values at laser reactor temperatures. In addition to obvious adverse consequences for its electrical heating of laboratory plasmas, since the conductivity determines the time scale at which magnetic fields diffuse into plasmas, it has important implications for concepts involving 'frozen-in' magnetic fields in astrophysical plasmas.

This simple form of the conductivity follows directly from the dominance under conditions of thermal equilibrium (i.e. electron-proton) encounters in scattering the drifting electrons, since such 'Coulomb collisions' have a cross-section which decreases as (velocity)^4. However, among plasma's special properties is its propensity to allow its charged particles to accumulate (on a scale of order the Debye shielding distance) and so act collectively, rather than as individuals. Although the number of such charges is (by definition of a plasma) large, the thermal equilibrium effect of their collective fields can usually be ignored. However, in a non-equilibrium situation with some suitable source of free energy, instability of the charge distribution can occur resulting in their 'bunching'. In that case the collective electric fields may become amplified until they, rather than those due to the individual charges, dominate the scattering process, while the plasma enters a turbulent state. In that case the conductivity loses its temperature dependence and is, in general, much reduced, often by many orders of magnitude; it is then termed 'anomalous'. Not surprisingly, many other plasma properties (e.g. its electromagnetic radiation) are also radically changed.

Since one way of opening this Pandora's box of quite spectacular effects is simply to apply a much larger electric field than usual, advantage can be taken of the high resistivity temporarily produced during the
TEACHING

kinetic instabilities of current-carrying plasma, presents a detailed description of experiments, separating linear discharges (with electrodes from toroidal, (with induced electric fields). The final chapter deals with those observable phenomena, such as microwave emission and scattering, which can be used to explain how to examine the turbulent state induced by the current. Given their self-imposed limitations, the bibliography appears to be comprehensive.

The translation itself is good. The actual production is less so, being printed directly from typewritten manuscript of modest quality. There is no index. It is a valuable addition to the literature, although its high price will no doubt restrict its sales to the library.

Reviewed by S.J. Colloque, CSIRO Division of Applied Physics, Sydney.

One of the newest and fastest developing area of solid state physics is that of two-dimensional electronic systems. This area is generating a wealth of interest ranging from fundamental phenomena, such as the quantum Hall effect, through to semiconductor devices, such as solid state lasers and very high frequency transistors. This volume contains the proceedings of the "International Winter School on Heterostructures and Two-Dimensional Electronic Systems in Semiconductors" which was held at Mauterndorf, Austria, during February 1984. The book covers topics of both fundamental and applied interest, with the various authors aiming at producing review articles rather than specialist technical papers. This approach results in a book that will be useful to those already established in and those seeking to enter this field.

Newcomers to the theory of two-dimensional electronic systems will find the contribution by Zawadski most helpful as he starts with the Schrodinger equation, solving it in one dimension for the infinite square well (heterostructures of different semiconductors), parabolic well (i-n-i periodically doped crystals), triangular asymmetric well (metal-insulator semiconductor devices) and a symmetric triangular well (b-crystals). Those already familiar with the theory and seeking greater theoretical insight should consult the excellent review article by Ando, Fowler and Stern (Reviews in Modern Physics 54(2) 437-672 (1982)) as it seems to form the basis of the other theoretical contributions. The sections on growth cover the techniques of MBE (molecular beam epitaxy) and MOCVD (metal organic chemical vapour deposition) and discuss in detail devices, such as double heterostructure lasers, multiquantum-well lasers, LEDS, FETS and heterojunction bipolar transistors produced using these methods. Whilst the GaAlAs/GaAs system figures prominently, there is also discussion of the fabrication of thin films of IV/VI and II/VI compound semiconductors using the Hot-Wall Epitaxy (HWE) technique. There are also worthwhile contributions on the periodic doping of multilayer structures of GaAs to tailor the properties of the semiconductor. Throughout, there is strong emphasis on the various growth techniques to produce practical devices so those...
interested in the applied areas should find these sections most helpful.

K.V. Klitzing writes on the quantum Hall effect (QHE), including a summary on the latest results on the QHE and A.C. Gossard elucidates the fractional quantum Hall effect (FQHE). Klitzing pays particular attention to the accuracy of the values obtained for the quantized Hall resistance and its use as a material-and time-independent resistance standard. The book concludes with two contributions by R.B. Laughlin on his controversial ideas on the theory of the QHE and FQHE which evoke the idea of fractionally charged quasiparticles.

This well presented volume covers a very wide spectrum of the physics of two-dimensional electronic systems. Its most pleasing feature is its emphasis on the production of practical semiconductor devices, yet there are also sections to stimulate theorists and those more interested in fundamental phenomena. It should prove useful to anyone with an interest in the rapidly developing area of two-dimensional electronic systems.

Reviewed by G. White, CSIRO Division of Radiophysics, Sydney.

There is no doubt that “Colours of the Stars” by David Malin and Paul Murdin is the most spectacular and original astronomy book on the market today. In great part, the success of this work is the 68 colour plates of astronomical objects, many of which have not been widely seen outside the astronomical community. The release of these photographs in a popular format is to be applauded.

Malin’s world beating photography is a consequence of mature technique and the optical and mechanical perfection of the Anglo-Australian Telescope and the UK Schmidt Telescope of Siding Spring Observatory. Unlike much astrophotography seen elsewhere this work has true scientific merit. The techniques adopted are those of colour separation, contrast enhancement and unsharp masking. These result in accurate colours, enhanced dynamic range and increased sensitivity and show details normally too faint to photograph or fine detail often lost in over-exposed images. Many objects and phenomena (such as shells around giant elliptical galaxies) are seen for the first time on these plates.

The text gives a clear discussion on the nature of colour, perception and the photographic process. This is the first time I have seen this attempted in an astronomy monograph. In addition there are up to date descriptions of astrophysical phenomena.

The book is tastefully packaged and, at about $30.00, is very suited for the bookshelf (and coffee table) of every reader of the “Australian Physicist”.

Reviewed by N.G. Barton, CSIRO Division of Mathematics and Statistics, Sydney.

The goals of this book are simple and commendable: to display, between two covers, streamline and isocharts for 70 well-known potential flows. The author achieves these goals in a slender volume which is attractively presented and carefully prepared; although I imagine the target readership of “professionals involved with flow phenomena” and “senior and graduate-level engineering students” might bulk at the cost of the book.

There are several positive features of the book. For a start, the clear diagrams have been computer-generated and show, at a glance, the speed and direction of the flow. Also, many common potential flows (mainly culled out of well-known textbooks) are displayed, the author has included material to facilitate interpolation and engineering use of the diagrams, there is a section describing the computer code (in BASIC) which generates the plots, and a handbook of axi-symmetric three-dimensional flows are included.

An ungenerous criticism of the book, however, is that it is little more than an illustrated dictionary, and that users would like to see the inclusion of more flows. For example, many flows generated by simple Schwarz-Christoffel transformations are not included, and Kirchhoff’s book might need to be supplemented either by a more detailed dictionary of conformal mappings, or by a handbook on special co-ordinate systems. The best of such dictionaries known to the reviewer is “Dictionary of conformal representations” by Kober, whilst the book “Field theory handbook” by Moon & Spencer is an invaluable reference for the solutions of Laplace’s equation in exotic co-ordinate systems.

In summary, the book does satisfy a need — there is no question as to what the book is, merely to haggle over the price!

Bilateral Science and Technology Program 1987

SUPPORT is provided by the Department of Science for visits or seminars related to bilateral co-operation on research projects in science and technology.

FUNDING is normally restricted to economy class return air fare and living costs for the collaborating scientists and technologists. See “Guidelines for Applicants”.

THOSE ELIGIBLE are scientists and technologists with postgraduate experience or who are either Australian citizens or have permanent resident status.

APPLICATIONS are invited:
• under Australia’s seven Science and Technology Agreements with the US, Mexico, USSR, the Federal Republic of Germany (FRG), the People’s Republic of China (PRC), India and Japan.
• for bilateral scientific and technological co-operation involving countries with which Australia has no formal science and technology agreements.

CLOSING DATES for applications are:
• 1 April for activities commencing between 1 January and 30 June 1987
• 1 October 1986 for activities commencing between 1 July and 31 December 1987.

FURTHER INFORMATION and application forms may be obtained from:
Director, Bilateral Activities
Department of Science
PO Box 65
BELCONNEN ACT 2615 (Tel (062) 64 4246) by the appropriate closing date.

The Australian Physicist, Vol. 23, March 1986 — Page 41
New Long Travel Piezoelectric Motors Enhance Burleigh Inchworm Products

FISHERS, NY — Burleigh Instruments, Inc., has introduced two new piezoelectric motors with travels of 6.25 inches and 8.25 inches to its line of Inchworm micropositioning instruments. These solid state motors convert electrical signals to linear motion directly, and offer high-precision positioning over the entire range of travel.

The new Long Travel Inchworm Motor is an extension of the proprietary piezoelectric translation technology used in Burleigh's other short travel actuators. The Long Travel Motors feature mechanical resolution of 10 nanometers over the entire travel range without using gears or lead screws to generate backlash.

"Burleigh's new Long Travel Inchworm Motors satisfy a need that exists in optics, semiconductor testing and inspection, and other micro-positioning applications requiring high-precision movement over relatively long travels," explains Dane Ehric, Burleigh Product Manager.

The Long Travel Inchworm Motors are described in an informative data sheet now available from Burleigh Instruments. Delivery information will be provided on request.

Burleigh Instruments, Inc., a leading manufacturer of high precision electro-optic instruments, micropositioning systems and components, and infrared lasers, is represented in Australia by Quentron Optics Pty Ltd in Adelaide.

Quentron Optics Pty. Ltd., Laser Court, 75A Angas Street, Adelaide, S.A. 5000, Phone: (08) 223 6224.

Burleigh Introduces New Mirror Sets for Optical Spectrum Analyzers

FISHERS, NY — Burleigh Instruments, Inc., has introduced two new mirror sets which extend the spectral range of the company's SA-800 and SA-200 Series Optical Spectrum Analyzers. The new mirror sets cover the important wavelength regions of 800-900 nanometers and 1.06 microns.

Burleigh Spectrum Analyzer Systems, which are totally modular and feature an X, Y, theta and phi adjustable mount, provide complete control over the alignment process. Each system is delivered with Spectrum Analyzer, controller, detector, beamsplitter, mount and bases.

Mirror sets are interchangeable by the user, and are available with spacing for 2 gigahertz or 8 gigahertz Free Spectral Range.

"We developed our new mirror sets in response to an increased demand from users whose work involves semiconductor lasers in the 800-900 nanometer range, and YAG lasers operation at 1.06 microns," explained Michael Cook, Burleigh Product Manager.

Burleigh Spectrum Analyzer Systems, which were introduced earlier this year, are being used extensively as a diagnostic for mode-locked YAG systems. A new product brochure, which details features of each system is available on request from Burleigh's Australian distributor Quentron Optics Pty Ltd.

Burleigh Instruments, Inc., a leading manufacturer of high precision electro-optic instruments, micropositioning systems and components, and infrared lasers, is based in Fishers, New York, U.S.A.

New Robotics Training Programme

The Scrobot ER 111 system comprises a 5 axes computer controlled educational robot, comprehensive text books, instructors manuals, slides, videos, workbooks and audio visual programs.

The robot features 3 servo motors with closed loop control, load capacity of 1kg and repeatability of 0.5mm, optical encoders on all axes and the working envelope comprises: body joint 340°, elbow and pitch joint ± 150°, shoulder joint ± 85° and unlimited roll joint.

The Scrobot controller has 8 inputs and outputs plus 2 additional servo axes, an RS 232C interface for computer programming and provision for a tech pendent.

Seven text books provide a complete curriculum for robotics training and the instructors kit defines and organises training lessons and provides answers for text and workbook activities.

Measurement & Control Division, Electrical Equipment Limited, Unit C, 8 Lyon Park Road, NORTH RYDE, N.S.W. 2113.

For any further information please call David Hailes (02) 267 1122.

The Rolex Awards for Enterprise 1987

The Rolex Awards for Enterprise 1987 were officially launched by Mr. Andre J. Heiniger, Chief Executive and Managing Director of Montres Rolex S.A. Geneva, at a press conference in Geneva on 26 September 1985.

Each of the five 1987 Rolex Awards consists of 50,000 Swiss Francs plus a gold Rolex chronometer.

In announcing the launching of The Rolex Awards for Enterprise 1987, Mr. Andre J. Heiniger issued a general invitation to all those who had devised projects displaying a true spirit of enterprise to submit their application under one of the three major areas of enterprise listed below:

- Applied Sciences and Invention
- Exploration and Discovery
- The Environment

Projects must display the "spirit of enterprise" plus qualities of innovation, originality, inventiveness, interest and impact. In addition, they must be feasible, and there must be a good likelihood that they can, in fact, be carried out.

Prospective applicants should write for an official Application Form to:

The Secretariat
The Rolex Awards for Enterprise
P.O. Box 178
1211 Geneva 26
Switzerland

Projects must be presented in English and should reach the Secretariat, at the above address, not later than 31 March 1986.

All projects will be systematically examined and classified by a scientific documentation centre. The Selection Committee will then decide which projects shall receive the Awards.

In spring 1987, the Laureates of The Rolex Awards for Enterprise 1987 will be invited to Geneva as the guests of Rolex to receive their Awards.
Letter to the Editor

Dear Madam,

Is the Aust. J. Phys. a national or international journal?

A misconception I often encounter when talking to physicists is that the *AJP* is in some way different from the other journals found on our library shelves. As the argument goes, because it is the only physics research journal published in Australia, and because of its very title, the *AJP* is essentially a national journal and therefore in a somewhat different class to most of the journals published overseas. Physics is, after all, an international pursuit and the fruits of one's research are best placed in one of the international journals, rather than in the more limited confines of a national journal.

How can we measure the degree to which a journal is either 'national' or 'international'? About 85% of the 1400 recipients of the *AJP* are overseas and so, in terms of its readership at least, the journal certainly qualifies as being international. Over the last four years, 42% of the papers submitted to the *AJP* came from overseas and 30% of the referees used were also overseas.

Perhaps the best indicator of the extent to which a journal is international is to look at the country of origin of each of the papers it publishes. In 1985, 40% of the papers published in the *AJP* came from overseas countries. The *AJP* is of course a general physics journal, not specialising in any particular branch of physics, and it is relatively easy to compare it with similar journals elsewhere. The largest general physics journal is the *American Physical Review*, a journal which many consider to be the flagship of the world's fleet. It may then come as a surprise that, as a count of recent issues shows, only 45% of the papers published in *Phys. Rev.* are by non-American authors. For its sister journal *Phys. Rev. Lett.*, the figure is 38%, slightly lower than the corresponding figure for the *AJP*. Few people would, however, charge these giant American journals with being too 'national' or insufficiently 'international' in their outlook, though this is often said about the *AJP*.

A major reason for this relatively small 'foreign' content in the American journals is their imposition of page charges, which many authors outside the United States are not in a position to meet. The large cuts made recently in their page charges will probably result in a higher representation of non-US authors. Perhaps, then, it is more realistic to compare the *AJP* with a journal published in a country such as Canada. The *Can. J. Phys.* publishes each year about twice the volume as the *AJP* and, similarly, imposes no page charges. And yet, only 47% of this material is by non-Canadian authors, again not substantially different from the *AJP* figure of 40%.

In general, the European journals fare much better in this type of comparison. For example, 76% of the papers published by the *Journal of Physics* are by authors outside Britain. Similarly, *Physica Scripta*, produced by a consortium of Scandinavian physical societies, has a non-Scandinavian content of 59%. However, a closer examination shows that the catchment area of journals such as these is largely confined to European countries. Only 38% of the papers carried by *J. Phys.* are by non-European authors and for *Phys. Scripta* the figure is 31%. Thus, although these journals do not rely as heavily on submissions from their home countries, they basically serve as outlets for Europe — in much the same way that the American and Canadian journals cater for the North American region.

The answer to our initial question is, therefore, that we are both 'national' and 'international'. The *AJP* is national in the sense that we provide a publishing outlet in our region of the world, in much the same way that comparable European and North American journals do for their own regions. On the other hand, the *AJP* is also international in the sense that we publish a share of papers from outside our region, again, in much the same proportion as similar journals in the Northern Hemisphere.

In 1985 the *AJP* published close to 1100 pages, the highest number for any year since the journal started in 1953. In 1986 we will endeavour to publish a similar volume of high quality papers — naturally, from both Australian and overseas sources.

R.P. Robertson
Editor

From The Editor

I am publishing the following correspondence in full, as the topic discussed may have a profound effect on the future of physics in Australia and readers' comment would be appreciated. I would also like to draw your attention to Prof. Hurst's article on The Second Asia-Pacific Physics Conference following this correspondence.

Prof. G.V.H. Wilson, Rector,
University Defence Force Academy,
University of New South Wales,
Canberra, ACT 2600.

Dear Prof. Wilson,

First of all, I would like to thank you for agreeing to be a member of the Editorial Board of the Asia-Pacific Physics News. I have enclosed a list of other members for your reference.

I would also like to apologise for the long delay in writing to you. It took me quite a while to find suitable physicists in the region to be on the Editorial Board.

It is quite definite that the first issue of the Newsletter will come out around March 1986. The most urgent task of the Editorial Board is to solicit good review articles on topics of current interest, to gather news on physics-related activities in your country, etc. (see the attached list of items). I hope all of us will work hard to make this new publication a success.

Professor Abdus Salam has already sent a congratulatory message supporting the publication of this Newsletter. Prof. K.K. Phua of the World Scientific Publication Ltd (Singapore) has agreed to publish the Newsletter. Now it is up to us to make the Asia-Pacific Physics News a respectable publication.

Please send me all items to be included in the

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Newsletter before 15 Jan, 1986 or the latest end of Feb., 1986.

The Newsletter needs strong support from the members of the Editorial Board. Please try your best to gather material for the Newsletter and also send me your suggestion and comments. Thank you.

With best regards,

Yours sincerely,

S.C. Lim
Department of Physics, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, MALAYSIA.

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Prof. Nguyen Van Hieu,
Director,
Institute of Physics,
Academy of Science of Vietnam,
Nghia Do, Tu Liem,
Hanoi,
Vietnam.

Additional members from Japan, Pakistan, etc. will be included soon.

The main objective of the Asia-Pacific Physics News is to foster a closer link and cooperation amongst the physicists in the region. It welcomes contributions that will help to achieve this objective.

Asia-Pacific Physics News will appear twice a year, with the hope that it will become a quarterly later on. The first issue is scheduled for March 1986.

It is hoped that the newsletter will cover the following items:

Review Articles
Book Reviews

MEDICAL LASER PHYSICIST/ENGINEER

Applications are invited for a career position at the Lions Eye Institute, Perth, for a laser engineer or physical interested in developing new applications for lasers in eye surgery. The Lions Eye Institute is an independent medical research organisation affiliated with the University of Western Australia and the Sir Charles Gairdner Hospital. Some 60 laboratories and offices are currently being progressively commissioned. The Institute has integrated basic laboratory research with patient care in the same floor and has set up several research teams aimed at bringing new technology to ophthalmic medicine and surgery.

The successful applicant will have tertiary qualifications in physics and/or engineering and have had some experience of lasers. A PhD or equivalent research training is essential. The position will be funded for three years in the first instance. Renewable fixed term contracts may be negotiated. An attractive salary and benefits including superannuation as well as reasonable removal expenses will be negotiated.

For further information, contact

Professor Ian Constable,
Lions Eye Institute,
2 Verdon Street, Nedlands 6009,
Western Australia,
Telephone (09) 389 3377 or
telex EYETECH AA6901.
CORRESPONDENCE

Regional Centres and Networks
Physical Societies
Conference Announcements and Reports
Research Activities
News On Individuals
Others (Jokes, cartoons, etc.)

Members of the Editorial Board are kindly requested
to give suggestions for the following:

(1) Acronym for Asia-Pacific News: How about ASPAP
News?

(2) Topics to be covered by the newsletter; Any other
items to be added to the attached list?

(3) Sponsorship
Do we want to seek sponsorship from Unesco,
Physical Societies in the region, etc?

(4) Distribution
We may need an agent to handle the distribution
of the newsletter. Is it possible to seek help from
the physical societies for the distribution?

(5) Subscription
It was suggested that we should sell the newsletter
to recover the cost of production (in addition, one
also has to consider the prevailing attitude that
anything that is free can’t be “good”). There would
be two subscription rates, which would be nominal
for those from the developing countries. How much
should we charge for a 30-page newsletter?

(6) Other suggestions.

From: Professor T.F. Smith
President
Australian Institute of Physics
e/o Department of Physics
Monash University
Clayton, Victoria 3168
28 January 1986

Dr G.H. Thompson
Department of Nuclear Medicine
Sir Charles Gairdner Hospital
NEDLANDS WA 6009

Dear Trudi,

I am enclosing copies of some correspondence that
has passed between Geoff Wilson and Dr S.C. Lim, the
Editor of a proposed Asia-Pacific Physics Newsletter.
It explains the situation and as you can see from Geoff’s
letter, I suggested to him that a direct contact with the
Editorial Committee of the AP would seem to be the
most efficient way of providing the information required
for the newsletter. Would there be someone willing to
do this? If so would you write to Lim and let him have
the details with a copy to me.

T.F. Smith

Professor S.C. Lim
Department of Physics
Universiti Kebangsaan Malaysia
43600 Bangi
SELANGOR
MALAYSIA

Dear Professor Lim,

Professor F. Smith, President of the A.I.P. has passed
your correspondence with Professor G. Wilson to me
as the newly appointed editor of The Australian
Physicist.

May I first be allowed to say how much I welcome
that you have made contact with us. I think that it is
vital for physicists in this region to start active
collaboration, if we are to survive in the fast moving
and expensive expertise of physics research in
competition with the colossi U.S.A. and Europe. Your
Newsletter could be the beginning of this enterprise and
has my strongest support.

The Editorial Committee of The Australian Physicist
will be meeting on Monday 10th February 1986 and
we will discuss mutual waiver of copyright with your
Newsletter. Following that meeting I will write to you
again on the various points that you have raised in your
letter and also on matters that I would like to discuss
with you.

Looking forward to close co-operation.

Your sincerely,

G.H. Thompson Ph.D.
Editor
The Australian Physicist

The Second Asia-Pacific
Physics Conference
Bangalore, India,

C.A. Hurst, Mathematical Physics
Department, University of Adelaide.

The Second Asia-Pacific Conference was in many
ways a success and in other ways a failure. The
responsibility for the former rests with the organising
committee under the gentle chairmanship of Professor
S. Chandrasekhar, Director of the Raman Research
Institute. The responsibility for the latter lies with the
physicists of those countries whose representation was
barely a token one, if at all.

There were 224 physicists from 20 countries present,
of whom India, with 121 participants had, as expected,
by far the largest. Japan had 29 and U.S.A. 24 and so
were well represented. China had 14, but after that
the next was 6 and most of the remainder were there in ones
and twos. The ASEAN countries, Malaysia, Thailand,
Singapore, Philippines and Indonesia could total only
3, and of these 2 were Americans visiting Indonesia. The
Australia-New Zealand contingent was 4, compared
with 12 at the first meeting. There were probably many
reasons for the uneasiness of this distribution of
attendance such as the difficult time of the year,
uneasiness about health standards, jealousy between
countries, competing conferences, etc., but whatever
they were they added up to something of a rebuff to
a dedicated and hard working committee. As an example
of the sort of crosscurrents which were involved, there
was to be, immediately following the Asia-Pacific
conference, a conference in high energy physics in
Singapore with almost no participants common to
the two meetings.
CORRESPONDENCE

Despite these reservations, it is pleasing to say that the meeting was very well organised and had a good scientific standard. It was held in the well appointed Hotel Ashok, near the centre of Bangalore. The latter is graced by many wide streets, fine buildings and large parks, and apologies for being only 400 years old!

The first day was devoted entirely to plenary sessions and opened with a bang with talks by two Nobel laureates Abdus Salam and C.N. Yang. As expected they talked about problems in high energy physics, with Salam providing a broad survey and Yang talking about a specific problem in high energy scattering. Salam made the interesting point that, as it seems necessary for developed countries to spend money on non-renewable projects, it would be better for the world if the large sums were for funding expensive physics projects rather than for building nuclear weapons and nuclear submarines. Not unexpectedly he had just the right project to suggest, which was to search for proton decay on the moon. This would provide a more rapid test for the existing theories and would cost only about one billion dollars.

In addition to these two stars there were a number of other very distinguished speakers. One of these was Professor Roger Penrose from Oxford who spoke about gravity and quantum theory. He put forward the intriguing hypothesis that the problems of quantum mechanics are associated with the collapse of wave packets and the long range correlations of the Einstein-Podolsky-Rosen paradox on the one hand and the problems of time's arrow and the second law of thermodynamics on the other might simultaneously have their resolution in the specification of the initial conditions for the Weyl tensor of general relativity. This is admittedly not a solution that would immediately spring to everybody's mind, but his presentation was so clear and so coherent that his audience was deeply impressed.

Later in the program he spoke on a quite different subject, in response to special requests. This was to a general audience on the quasi-periodic tilings which are now associated with his name. He showed how the plane, for example, can be covered by repetitions of a very small number of different polygons, four or even two for example, without there being any periodicity of the patterns. He illustrated his construction with many beautiful examples, including a sign in a Tokyo station and some elegant coffee tables made in Mexico.

This talk by Penrose was not entirely recreational because the following day there were two plenary papers given by Professors Klein and Mackay on the experimental evidence which is now being obtained which shows clearly that nature is also making use of such non-periodic tilings in the form of alloys which do not have the regular lattice structure, which, for many years, was regarded as essential. The remarkable thing about such non-periodic tilings is that they have to be very carefully arranged so that a breakdown in order does not occur. It is usually not sufficient to make local decisions as to how the next cell is to be added because an error in the choice that is made can lead to defects appearing at arbitrary large distances. It is of interest then to study experimentally whether nature can control the growth of alloys without making such mistakes, and if so from where does the teleology that is implied come?

The fields that were covered by the conference were mainly in the basic sciences — high energy physics, nuclear physics, condensed matter physics and astrophysics. These were strongly supported with papers by speakers from all the countries represented and were full of real scientific interest. But perhaps this should not necessarily be the pattern for future conferences. A shift towards areas of physics which are more directly related to the technological needs of the countries in the regions in which these conferences are held would be a good thing. Solar energy, pollution control, water management, etc. are topics that need to be discussed by physicists at an Asian-Pacific meeting at least to the same extent as they talk about gauge field theories and black hole cosmology.

Whilst on this theme, there was a symposium on Physics for Development which had the variability that one usually associates with such events. There were some perceptive and thought provoking comments and some rather over extended talks. What was made clear however was the number of problems which different countries have in common, particularly the balance between basic and applied research. Over and over the point was made that basic research should not be neglected in favour of expected quick breakthroughs in applied science. But as a counter to this it was asserted that there should not be too much concentration on expensive fundamental research as this would distort the distribution of scientific manpower. It was interesting to hear that even in Japan there were reservations about how well they have managed to marry science and industry.

A report on this meeting could not be finished without mentioning one of the great highlights. This was not on physics but was part of the social program. It was an evening devoted to the Indian dance and consisted of over two hours of dancing by a single performer, the exquisite Malavik SurraJK. The entire audience was stunned by her virtuosity and grace, and she was a continuing topic of conversation for the rest of the meeting.

During the Conference there was a meeting of representatives of the countries in the Asia-Pacific region, and they unanimously resolved that the next meeting would be held at Hong Kong in January 1989. This should be a good venue as it is very easy to reach from everywhere.

With a third Conference now scheduled there is beginning to be seen a tradition for a regional consciousness in physics. There is still a long way to go before this is very firmly established — the remarks at the beginning of this report show some of the problems — but there is no doubt that there are many highly competent physicists working over a very wide range of fields in what is seen as Asia-Pacific. In view of this, it is obviously important for Australia and New Zealand to continue their support, and to try to increase it still further. Otherwise we might see a very active society upon which we have little influence. The motives for our being fully involved may be mainly altruistic now, but in the longer term they will certainly have a larger component of self-interest.

So there have been two very good meetings under the name of Asia-Pacific Physics Conference, and it is fully expected that at Hong Kong there will be a third. Perhaps Australia should consider being the host country for the fourth, or at least before the century is out.
POLICY AND POLITICS

Conference of Australian University Science Deans held at the ANU from 21-24 November.

The conference, apart from its involvement and interaction with politicians and other invited participants, resolved to concern itself with: (a) discussing means of dealing with commonly shared problems; (b) making contributions to government and professional decision making bodies (such as ASTEC, AVCC, CTEC and the Federation of Scientific and Technological Societies) and (c) fostering heightened awareness of science and its benefits in the community. To these ends it is anticipated that such conferences will be held on an annual basis and the next will be held from 6-9 November 1986.

Professor R.O. Slatyer, Chairman of ASTEC spoke to the deans informally of the role of ASTEC, especially its concern with policy formation regarding scientific and technological strategies and their impact on industry and the economy. ASTEC averages a supply of one briefing directly to the Prime Minister and Cabinet approximately every two weeks. About once per month either the Prime Minister seeks consultation with ASTEC or ASTEC advises the Prime Minister on current matters. Of significant importance is the role of ASTEC in the ranking of relevant ministerial proposals concerned with the framing of the federal budget.

Currently ASTEC is considering the broad view of public investment in R & D. It has already reported on the government's role in R & D and the future directions of CSIRO. It has also begun a review of the research funding of major tertiary institutions, including universities, and of defence science and technology organisations. In March 1986, ASTEC will also report on the generally parlous R & D state of affairs in the private industrial sector.

Professor Slatyer made reference to the government expectation of the establishment of R & D links between tertiary and manufacturing industrial bodies and the '150 per cent deductibility incentive' which is proposed to enhance this research marriage. Given a successful honeymoon period it seems likely that one outcome will be steady scientific research funding in universities rather than a decrease — certainly justification for increased funding in the current overall R & D climate would be difficult. He also referred to the situation from the viewpoint of manufacturing industry, pointing out the paucity of scientific representation in company boardrooms.

This situation is especially peculiar to Australia and follows a lengthy period in which scientific innovation and its involvement in production/export competition has been thwarted by tariff and other counterproductive protection mechanisms which affect R & D malaise.

Another invited participant, Professor Ian Ross (ANUTECH) spoke of details concerning tertiary/industrial R & D liaison. 'Know your true costs', he highlighted. Clear estimations of (up to 60 per cent) 'on costs' must be built into joint R & D proposals.

The Minister for Science, Barry Jones, reminded the conference that science is not usually viewed as 'part of political culture', and that fundamental research has a generally low profile in terms of community awareness or even scientific awareness of its tangible results. Political and public awareness of activities which demand attention usually focuses on the 'servicing of immediate needs'. One step towards arousing scientific awareness, however, has been taken by Caucus in its recent agreement to form a Science Committee of the House of Representatives.

Senator John Button, Minister for Industry, Technology and Commerce, in his response to informal questioning echoed many of the points and sentiments above. Industries such as steel, cars, textiles and footwear have all declined because of failure to use and develop native technology, he indicated. Newer Australian industries such as alloy development, solar energy products, biotechnology, scientific instruments on the other hand are showing marked and burgeoning success.

The Madigan Report on Australian involvement in the 'space industry' is also currently under government investigation and will hopefully bear fruit. The overall science and R & D policy environment and incentives, however, have not been fruitful for Australian industrial production. The new tax incentives should assist here, Senator Button indicated. Again, with reference to ASTEC, Senator Button pointed out that one of the government's motives in commissioning the many ASTEC reports on research institutions could be to assist with identification of national priorities.

These comments were supported by Dr Kevin Foley, Chairman of the Australian Industrial Research and Development Incentives Board, who described the 150 per cent tax deduction initiative as a powerful stimulus, but not without initial cost, for industry and universities to get their acts together.

The main thrust of Senator Ryan's (Minister for Education) address to the conference concerned the unsatisfactory educational outcomes of schooling associated with the fact that there exists very high sex-segregation in the labour market. Females are extremely poorly represented in science, a state of affairs which is purportedly due to females being 'closed off by school experiences'. It is becoming widely recognised that the middle years of secondary schooling are critical in the moulding and setting of sex-stereotyped roles.

Initiatives for increased female participation in science and technology have commenced through a project involving the CSIRO, whereby an evaluated video program for Year 10 females has recently commenced.

Through such initiatives and others aimed at fostering parental encouragement of greater female participation in science, it is hoped that the 'half of humanity' traditionally not involved with science will be motivated more positively in that direction.

Other invited speakers at the conference were Professor G.V.H. Wilson, Dean of Science, Australian Defence Force Academy, Professor Alan Betts, Deputy Vice-Chancellor, University of London, and Professor E.P. Batchelard, ANU.

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POLICY AND POLITICS

Professor Geoff Wilson spoke of the development and foundation of the new Federation of Scientific and Technological Societies, some 36 in number. He also made reference to ongoing developments relating to the ARCS. Professor Batchelard reported on the current review of regulations and course structures of the BSc at ANU. Professor Alan Betts provided interesting insight in respect of the rationalisation of the tertiary sector structure and funding in the UK, following the recommendations of the Jarratt Report. This report looked towards improving efficiency in the UK universities and the outcome has been one involving a search for alternative methods of operation with associated reduction in funding. 1981 saw a reduction of 10-13 per cent in funding and students, and from 1983-90 there will be a mooted reduction of 2 per cent per year. Professor Betts wished the conference better fare than was being handed to colleagues in the UK.

In terms of current organisation problems within Science Schools and Faculties the conference noted common concern with:

(a) a slow and insidious decline in tertiary funding extending over several years, recognising that the current Minister for Education had, however, stemmed the ebb tide somewhat. The overall level of funding remains significantly lower than was several years ago.

(b) this same funding problem being exacerbated by state government legislative measures to do with safety, workfare/workers compensation and the like, all of which have imposed severe additional (staffing) costs to university administration — cutting into the teaching and research funds; since such measures have not been catered for by the federal government in its recurrent allocations.

(c) a disquieting problem flowing from having to teach and research with obsolete equipment. Professor C. Hawkins, Dean of Science, Queensland, noted that ‘some departments are teaching students with equipment that is older than the students. This is no way to provide graduate manpower for the high technology input to industry so desperately needed,’ he said.

(d) planning standards for space provided to departments within universities. At present the national planning standards for space allocation vary widely within given disciplines/departments; for example one physics department has a current operational occupancy of five metres-squared/Weighted Student Unit (WSU), while others have in excess of 30m²/WSU.

The recent historical sequence of events has been that many universities have been required to take in additional new students in a state of declining funding and in a state of being underspaced. The urgent provision of new buildings is emerging as a problem which will be worsened before it will be solved.

J. Liesegang
Dean, School of Physical Sciences
La Trobe University

The Attack on Higher Education

John M. Ward Vice-Chancellor,
University of Sydney

It will soon be 23 years since the Robbins Report in Britain described the aims and purposes of higher education. They were said to be ‘instruction in skills, the advancement of learning, the promotion of the general powers of the mind and the transmission of a common culture and common standards of citizenship’. Robbins believed also that access to higher education should be available to everyone qualified by ability and attainment to undertake it.

Last year in the United Kingdom there was published a Green Paper on the development of higher education into the 1990s. The Robbins Report was severely qualified, although only implicitly, on both the basic points just quoted. The aims and purposes of higher education were given a severely utilitarian look. ‘It is vital’, the Green Paper stated, ‘for our higher education to contribute more effectively to the improvement of the economy’. The principle of access to education was also qualified. Access had to be ‘within the limits of national wealth’.

The Green Paper had a predictably poor reception among United Kingdom academics. Some attacked the whole notion that the national gain from higher education was something that could be measured by economic cost-benefit analysis. Some denied altogether that the universities had become institutional impediments to change and rejected the charge that their contribution to national wealth and employment had been unsatisfactory.

The Green Paper went close to saying, as might have been said about victory in wartime, that there was a single overriding national objective, which was to restore growth and prosperity to the economy by destroying the enemies of inflation, declining markets and other hindrances to British prosperity.

I have repeatedly called for universities in Australia to state clearly what they conceive their role to be. If they do not do so soon, they are likely to find themselves opposed to some Canberra equivalent to the United Kingdom Green Paper. Let there be no mistake. If short-sighted principles are followed and everything is subordinated to the immediate problems of saving expenditure, criteria will have been established that will destroy universities as we know them.

Just as in Britain, there are two answers to be given strongly to those whose policies would destroy good universities. One is that the standards of judgement used by critics of the universities are irrelevant and dangerous. The other is that, even on their own principles, the critics have the facts wrong. Universities do contribute much more to national prosperity and employment than has even been stated. However, because to do so is not their prime function, they have never demonstrated clearly what their achievements have been and are. In 1986 Australian universities should develop both points strongly, defining our true purposes and objectives and indicating the full scope of our achievements for Australia and the world.
Australia/Switzerland Nuclear Safeguards Agreement — January 1986

The Minister for Foreign Affairs, Mr Bill Hayden, and the acting Minister for Resources and Energy, Senator Peter Walsh, announced that Australia had concluded a nuclear safeguards agreement with Switzerland.

The Agreement entitled "Agreement between the Government of Australia and the Government of the Swiss Confederation Concerning the Peaceful uses of Nuclear Energy" was signed in Berne on 28 January by the Swiss Foreign Minister, Mr Pierre Aubert, and the Australian Ambassador to Switzerland, Mr D.A. Townsend. The Agreement provides a framework for nuclear transfers between Australia and Switzerland.

The Ministers said that the provisions of the Agreement had been examined closely in the light of the Government's nuclear policy statement tabled in Parliament on 23 May 1985 in response to the ASTEC report on Australia's Role in the Nuclear Fuel Cycle. The Agreement incorporated the strict non-proliferation and nuclear safeguards arrangements the Government believed were necessary to ensure the peaceful non-explosive use of exports of Australian origin nuclear material and the strengthening of the international non-proliferation regime. The Agreement extended the number of markets eligible to receive Australian uranium for peaceful non-explosive purposes.

The Agreement is of broad scope and covers nuclear material, non-nuclear material, equipment and technology transferred between the two countries as well as other possible cooperation in the development and application of nuclear energy for peaceful purposes.

In accordance with Australia's non-proliferation and nuclear safeguards policy, the Agreement provides for the prohibition of explosive and military use; the application of International Atomic Energy Agency (IAEA) safeguards; fall-back safeguards in the event that IAEA safeguards cease to apply; appropriate physical protection; administrative arrangements and consultations to ensure effective implementation of the Agreement; the continued application of safeguards until nuclear material, non-nuclear material or equipment transferred under the Agreement are no longer usable for any activity relevant from the point of view of safeguards; and prior consent of the Parties before retransfers or high enrichment of nuclear material subject to the Agreement can take place. In addition, nuclear material subject to the Agreement may be reprocessed only according to conditions which have been agreed upon in writing between the Parties.

The Ministers said that the Agreement was consistent with the ten other treaties forming the Australian network of nuclear safeguards agreements.

The conclusion of the Agreement was a significant contribution to strengthening the international non-proliferation regime based on the Treaty on the Non-proliferation of Nuclear Weapons, the single most important arms control and disarmament treaty in existence.

The text of the Agreement will be presented to Parliament in due course.

British Nuclear Tests in Australia

The Minister for Resources and Energy, Senator Evans, left Australia on Monday 20 January for a three week official visit to the United Kingdom, Canada and the United States.

In London, he held talks with the Foreign Secretary, Sir Geoffrey Howe, and with the Minister for Defence Procurement, Mr Norman Lamont, on the recommendations of the Royal Commission into British Nuclear Tests in Australia. These followed exploratory discussions at officials' level in Canberra on 9-10 January.

He issued the following statement at a press conference at Australia House in London on 22 January 1986:

"The first round in what is likely to be an extended series of ministerial and official talks on the recommendations of the Royal Commission into British Nuclear Tests in Australia concluded satisfactorily here today.

Satisfactory progress was made not only in identifying the matters on which the Australian and UK Governments have, at this stage, differing views, but — more importantly — on establishing procedures and processes which may ultimately enable those differences to be resolved.

Following talks with the Foreign Secretary, Sir Geoffrey Howe, the Minister of State in the Foreign and Commonwealth Office, Lady Young, and with the Minister for State for Defence Procurement, Mr Norman Lamont (who is immediately responsible for this issue), agreement in principle was reached on two major procedural issues.

First, there was agreement to the Australian Government establishing a Technical Assessment Group (TAG), to undertake field studies and laboratory research and report in detail on options — and costs — for the radioactive and toxic decontamination of the former British Atomic Test Sites in Australia. The group will consist of two Australian Scientists, Mr D.R. Dany, Chief of the Environmental Science Division of the Australian Atomic Energy Commission (Convener) and Dr K.H. Lokan, Director of the Australian Radiation Laboratory; a United States plutonium decontamination expert, Mr B.W. Church, Director of the Health Physics Division, Nevada Operations Office, Department of Energy; and two British experts to be nominated by the UK Government.

Second, there was agreement to the establishment of a Consultative Group, consisting of representatives from the Australian, South Australian and Western Australian Governments, and Aboriginal interests to discuss and monitor progress on the rehabilitation of the test sites. The UK Government has accepted Australia's invitation to be represented at meetings of this group.

Neither the Australian nor UK Government has yet discussed the creation of a formal "Maralinga Commission" of the kind recommended by the Royal Commission, taking the view that the matters in issue can only properly be resolved by direct intergovernment negotiation.

It was acknowledged that the most substantial of the various problems identified by the Royal Commission that remain to be resolved in discussions between the..."
UK and Australian Governments was the question of the nature and extent of the further clean-up required at Maralinga, and who should pay for it.

The main elements in the Maralinga contamination problem, and those with which the Australian Government is most concerned, are:

- The approximate 1.5 kg of plutonium dispersed in up to 100,000 contaminated fragments at unacceptable concentrations over a large land area, especially at the Taranaki test site;
- The approximately 20 kg of plutonium buried amid a mass of debris in over 20 burial pits at the Taranaki and TM101 sites, many of which pits are unsatisfactorily sealed; and
- The large quantities of uranium, and the toxic chemical by-products, dispersed over a significant land area at a number of minor trial sites.

The Australian Government's position is that the statement in the original 1956 Memorandum of Arrangements relating to the Maralinga site is still an appropriate description of both the legal and moral responsibility of the UK Government, viz. that the UK Government accepts liability for such corrective measures as may be practicable in the event of radioactive contamination resulting from tests on the site.

The UK Government's position is that it remains to be convinced — in the light of the clean-up of the site which took place in 1967 and the release signed by the Australian Government the following year — that it has either a legal or moral responsibility.

Although some preliminary discussions have taken place on these issues, both Governments agreed that at this stage the most constructive course would be to put to one side the question of liability for clean-up costs and to focus attention on what are in fact practicable solutions — in cost/benefit terms — to the remaining contamination problems.

The immediate need is for a full-scale scientific evaluation of the extent and degree of contamination, and the costs involved, in order to achieve varying possible degrees of access to, and habitation of, the contaminated test sites.

This was recognised by the Royal Commission itself: "Various options for clean-up were considered but the Royal Commission has not been able to make detailed recommendations because insufficient data were available for a comprehensive cost/benefit analysis." (Conclusion 182)

The UK Government has agreed to participate in the required scientific evaluations — to be carried out by the Technical Assessment Group — on a completely "without prejudice" basis, and the Australian Government has willingly accepted this.

When the Group produces its final report — identifying with precision the costs and benefits involved in a series of different clean-up options — a firm foundation will have been established on which further intergovernmental discussion on the question of clean-up responsibilities can proceed.

It is proposed that the TAG produce an interim report in May.

Research and evaluation required may take of the order of eighteen months before the final report is completed.

While the TAG exercise is proceeding, it is envisaged that communication on all the various matters raised in the Royal Commission report about the conditions and future of the test sites between the major interested parties — the Australian, UK, South Australian and Western Australian Governments, and Aboriginal interests — will be maintained through meetings of the proposed Consultative Group.

Hifar Spent Fuel to go to United States

The Government has decided that 450 spent reactor fuel elements will be transported from the Australian Atomic Energy Commission's Research Establishment at Lucas Heights to the United States for reprocessing.

Since 1958 spent fuel from the AAEC's principal research reactor HIFAR has been stored at Lucas Heights. The AAEC has returned spent fuel to the country of origin on only one occasion, in 1963, when 150 elements were returned to the United Kingdom.

There are currently over 1200 spent fuel elements of US and UK origin in storage, and a further 50 or so accumulate each year of HIFAR's operation.

Existing spent fuel storage capacity at Lucas Heights will be fully taken up during 1986 unless some fuel elements are removed or additional storage capacity is provided. The latter option is not desirable as it would merely defer a decision on eventual long term disposal.

The transportation and reprocessing of the spent fuel, which will occur during 1986/87, will not present any adverse environmental implications. Overseas spent fuel transport has been carried out for over 25 years, involving thousands of transport movements, without any environmental impact. The waste from the reprocessing will be retained in the US and isolated from the environment in accordance with US Government regulations.

The spent fuel will be transported from Lucas Heights to a Sydney container terminal in a specially designed and shielded container of a kind commonly used in international use and certified to meet international safety standards. The movement of the material will take place under strict security and safety arrangements. Proposed arrangements, particularly those relating to safety, have been discussed with representatives of unions which would be involved in handling of this material.

Transport will comply with New South Wales laws on transportation and safety of radioactive materials and will be in accordance with the requirements of the Australian Code of Practice for the Safe Transport of Radioactive Substances. This Code, which was published in 1982, adopts the International Atomic Energy Agency's (IAEA) Regulations for the Safe Transport of Radioactive Materials. These regulations form the basis for the safe transport of radioactive materials internationally.

The Government is, of course, concerned to ensure that its stringent nuclear non-proliferation and safeguards requirements are met, and reprocessing will take place in accordance with the Australian/United States Safeguards Agreement as elaborated in an exchange of notes concluded on 2nd August 1985 and recently tabled in Parliament. This will ensure that all nuclear material recovered through reprocessing will remain solely in peaceful use.
ELECTION OF OFFICERS FOR 1986

(Branch Secretaries on page 30)

ACT
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Cf: University College
Australian Defence Force Academy
Northcott Drive
Campbell, A.C.T. 2600
Tel: (062) 68 8802

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Hon. Treasurer: Ms E.M. Wakefield
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Prof J.H. Carver, Mr T.W. Coulter,
Dr P.J. Edwards, Dr D.F. Hedlard,
Dr S.P. Kravis, Dr T. Lund,
Dr P. Lynam, Dr O.J. Raymond,
Dr J.P. Rayner, Dr G.A. Stewart

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Dr J. Cross, CSIRO. Textile Physics
Prof P. Fisher, University of Wollongong
Prof. H. Hora, University of N.S.W.

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Prof R. MacDonald, University of Newcastle
Prof J. Olmara, University of N.S.W.
Dr J. O'Connor, University of Newcastle
Dr G. Smith, N.S.W. Institute of Technology
Mrs M. Storey, University of Sydney
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Tel: 228 56467

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Flinders University.
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International New Technology
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G. Sorrel, J. Pockey, T. Walsh,
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Vice Chairman: Dr M.L. Duldig Tel: (02) 202022

Physics Department,
University of Tasmania,
Box 252C, G.P.O.
Hobart, Tasmania 7001

The preponderance of academics on the branch committee is offset by the three remaining committee members, who are:
Dr J.J. Church, CSIRO. Division of Oceanography
Dr R. Chappell, Peter MacCallum Clinic, Royal Hobart Hospital
Mr C.W. Wilson, Department of the Environment

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Bureau of Meteorology,
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Tel: 669 4558

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Parkville, Vic. 3052
Tel: 341 5122

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Tel: 544 0533

Committee: Dr M.A. Chaudhri, Austin Hospital
Dr Elizabeth Cohen, La Trobe University
Dr P. Dyson, La Trobe University
Prof G.I. Opat, Melbourne University
Dr R. Pretty, Alfred Hospital
Dr J.D. Riley, La Trobe University
Mr G. Moorhead, Melbourne University
Mr T. Davis, Swinburne Institute of Technology
Prof J. Cashion, Monash University
Dr D. Arnott, Aeronautical Research Laboratories
Dr R. Warner, Melbourne University

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School of Mathematical & Physical Sciences
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Physics & Geosciences
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Tel: 350 7539

Committee: K.J. Benthart, D.W.K. Collins,
C. Edwards, R.F. Fleay, R.A. Fox,
J. Graham, B.M. Hartley,
M.J. Lynch, P. Palumbo, C.J. Pearce,
P.J. Ryan, A. Stetovics, L. Taylor,
P.J. Turner

VISITORS

N.S.W.
University of Sydney
Prof M.V. Goldman
Dept of Astrophysics
University of Colorado,
Boulder U.S.A.
Contact: Prof Don Miller

CSIRO Division of Applied Physics
Dr J. Rayne, Solid State from U.S.A., here at present leaves July — August.

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Dr Klemens, Solid State, University Connecticut, 2 months, July — August.
Dr G.F. Zosi, Metrology, Italy, here now leaves April.
Dr Leanne Pitchford, Gas Discharge Section (Manager), G.T.E. Waltham Mass U.S.A., here now leaves 28 February 1986.

University of N.S.W.
Prof Miley, Director Fusion Energy, University of Illinois, Urbana, U.S.A., July for 3 weeks.
Prof Jacob Ben Aryeh, September — October.

N.S.W.
Prof Marnix Van der Weil Deputy Director FOM Institute for Atomic & Molecular Physics, Amsterdam, here now leaves end March
Dr V. O'Neil Ontario Hydro Research Institute, here now until December 31, working on laser isotope separation.

TAS
Dr Frank Close Rutherford-Appleton Laboratory, U.K., around 5 to 9 May.
Prof M.A. Pomerantz Bartol Research Foundation, University of Delaware, U.S.A., approximately May 10, for a short period.
Dr Paul Davies, University of Newcastle-upon-Tyne, U.K., approximately April 23.
Drs Close and Davies are coming here following visits to the University of Adelaide. Prof Pomerantz is coming partly as the guest speaker for the annual meeting of the Astronomical Society of Australia, to be held here from 11 to 16 May, and partly for research discussions.

W.A.
Dr W.T. Menzel Head Advanced Satellite Products Group, NOAA-NESDIS, Madison Wisconsin, U.S.A. 53708, dates of visit 12 March — 29 March.
Contact: Dr M. Lynch, WAIT, Applied Physics.

ACT News
Dr. Paul Wild at the ACT Branch AGM, 1985

The annual general meeting of the ACT Branch was a dinner function, as usual, held on 22 November 1985 at Oodles Restaurant in the Yowani Country Club. About 65 members and guests enjoyed very fine fare before the brief business conducted by the Chairman, Dr Don Chaplin. He then introduced the guest speaker and immediate past Chairman of C.S.I.R.O., Dr Paul Wild, C.B.E.

Dr Wild's address comprised in the main a series of vignettes etched in his memory from successive stages in his career. He began by quoting Niels Bohr who once said that he had to be careful never to express himself more clearly than he thought, which Dr Wild parenthetically equated to the definition of quantum mechanics! Paul Wild's first job after graduating began in 1943 when he joined the Royal Navy as a probationary sub-lieutenant in the RANVR. He then became a radar officer and soon joined HMS King George V. He escaped imminent battle with the Tirpitz when the RAF got there first but later endured the Japanese kamikaze attacks. A very graphic incident in this period occurred during manoeuvres when the King George V was at the centre of a flotilla of smaller warships. The captain called him to the telephone to say the admiral would speak to him. In some trepidation he waited and the admiral eventually spoke, saying, 'Wild, I understand you are a bit of a mathematician; tell me what is the meaning of 'normal'? Clutching at a straw, Wild replied, 'It means at 90 degrees, sir' to which there was a short, unprintable response and the line went dead. Wild returned to the radar screen, where he then observed the whole pattern of blips representing the flotilla rotate through 90°.

At the end of the war he joined C.S.I.R.O., where he remained until his retirement. One of his very early recollections there concerns the organisation of the Christmas party in 1947 by the Radiophysics Division. Amongst the staff auditioning was a young technical assistant whose efforts, although creditable, were judged hardly up to the standard required. Her name? Joan Sutherland! Dr Wild was deeply involved in the design, realisation and application of C.S.I.R.O.'s radioheliograph at Culgoora, N.S.W. At its official opening by the then Senator John Gorton in 1967 he conducted Gorton personally over the installation. In his explanation of the purpose of the 3 km circle of antennas, he said that ideally they should have had a single, 3 km parabolic dish antenna. Grasping his arm, Gorton interrupted, saying, 'If that is what you need, you shall have it.'

Dr Wild was promoted to Chief of the Division of Radiophysics. A project of close concern during this time was Interscan and he recollected the tense scene at the Montreal headquarters of the International Civil Aviation Authority until Interscan emerged triumphant. Later, when he became Chairman of C.S.I.R.O., Dr Wild was heavily committed to planning, administration and public relations. He recollected an amusing incident when a Russian party led by the ambassador visited the C.S.I.R.O. headquarters. The ambassador made a short speech emphasizing Russia's peace-loving, altruistic nature to Dr Wild and his executive secretary, who had been delayed and appeared suddenly. When the ambassador asked who this might be, Dr Wild broke the ice by saying that this was his KGB man.

There were other anecdotes. In his retirement Dr Wild hopes to pursue two particular interests. One is continued promotion of the high speed rail link between Sydney and Melbourne. The other is further study of unified field theory.

In closing, he commented on the change, particularly in recent years, in the public perception of the scientists' role from one deserving and receiving automatic trust to one which must be described and justified to the person in the street before support is forthcoming. He wished his colleagues and successors well in responding to the new challenge. He is convinced that science will continue to be the most exciting experience.

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### Conferences and Meetings

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<td><strong>1986</strong></td>
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<tr>
<td>May 5-9</td>
<td>7th International Conference on Plasma-Surface Interactions in Controlled Fusion Devices, Dr. Samuel A. Cohen, Plasma Physics Laboratory, Princeton University, P.O. Box 451, Princeton, NJ, 08544 USA (609) 683-3185.</td>
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<tr>
<td>May 11-16</td>
<td>13th Congress of the Council of Mining and Metallurgical Institutions — Canberra</td>
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<tr>
<td>May 12-14</td>
<td>3rd Conference on Control Engineering — &quot;Towards a more Competitive Industry&quot; — Sydney</td>
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<td>May 14-16</td>
<td>The Institution of Engineers, Australia, 11 National Circuit, Barton, ACT 2600</td>
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<tr>
<td>May 19-21</td>
<td>1st Aust. Software Engineering Conf., Canberra</td>
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<tr>
<td>Aug 11-15</td>
<td>ICCM 1986 Conference — Adelaide, &quot;Conserving our Past for the Future&quot;</td>
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<tr>
<td>Aug 20-22</td>
<td>The State Conservation Centre, 70 Kintore Avenue, Adelaide, S. Aust. 5000</td>
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<td>Aug 25-29</td>
<td>The National Congress, AIP, Adelaide</td>
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<tr>
<td>Aug 25-28</td>
<td>The Institute of Physics, 47 Belgrave Square, London SW1X 8QX, UK. Tel. 01-235-6111, Telex 918453.</td>
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<td>Aug 27-31</td>
<td>'Directions and Priorities', Dr. Rob Wilkins, Biomedical Engineering, Westmead Hospital, Westmead 2145, (02) 633-6171.</td>
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<tr>
<td>Aug 27-31</td>
<td>11th International Congress on Cybernetics, International Association for Cybernetics, Palais des Expositions, Place Andew Rijckmans, B-5000, Namur, Belgium.</td>
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<tr>
<td>Sep 7-10</td>
<td>4th International Conference on Molecular Beam Epitaxy (MBE-IV)(C), G.J. Davies, Conf. Sec., British Telecom Research Laboratories, Montlesham Heath, Ipswich IPS 5RE, UK.</td>
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<tr>
<td>Sep 15-17</td>
<td>Carbon Fibres — Properties and Applications, University of Salford, Lancs, U.K.</td>
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<td>Nov 18-20</td>
<td>4th International Conference on Quantitative Surface Analysis. Dr. Graham Smith, National Physical Laboratory, Teddington, Middlesex TW11 0LB, UK.</td>
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<td><strong>1987</strong></td>
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<td>Feb 02-06</td>
<td>Eighth NUPP Summer School, Australian Maritime College, Launceston, TAS 7250. The Secretary, 8th NUPP School, Physics Dept., University of Tasmania, Hobart, Tas. 7001.</td>
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<tr>
<td>Dec 16-18</td>
<td>Solid State Physics, Bristol. Meetings Officer, I.O.P., 47 Belgrave Sq., London SW1X 8QX, U.K.</td>
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<td><strong>1988</strong></td>
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<td>Jan 24-29</td>
<td>8th National Congress, A.I.P., University of New South Wales. Mr. D. Bailey, Centre for Appl. Sci., Nepean CAE, PO Box 10, Kingswood, NSW 2750.</td>
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<tr>
<td>Oct 13-14</td>
<td>&quot;Technology for Living on Frontiers&quot; — Sydney, N.S.W.</td>
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