

I realise however, ladies and gentlemen, that you have come to Sydney not only to study Lord Mayors but to apply combined force of your intellects to even more important topics.

I hope however, that your programme will enable you to take some time off from your considerations of the wonders of outer space, to observe more closely the beauties and interest of a particular part of the planet Earth; that part lying at 151°12' east of Greenwich and 33°52' south latitude which the rest of the world knows as Sydney but which we in Sydney know as the most beautiful place on Earth.

But I must stop pretending. At heart the rest of us envy the astronomer. You have as your kingdom the wonder and mystery of the stars. By miracles beyond the range of normal human understanding you are able to project your thoughts to the most distant galaxies and beyond into the infinite night. Above all sciences astronomy – in the eyes of the lay population – stands supreme. For if there be a riddle of the Universe, if great truths touching the origin and purpose of life are to be discovered, it is surely an astronomer who will one day point the way. Was it not Gertrude Stein who on her death bed said to her faithful companion – ‘Alice, what is the answer?’ and on being told ‘Gertrude, you know there is no answer’ replied ‘well, if there is no answer, what is the question?’? When one day we have the answer and having it will at last know the question, it will be an astronomer who, in all probability, will give us both. For all that you and your predecessors have revealed the city of Sydney honours you to-night.’

The Chairman thanked Alderman Griffin for his words and then invited Emeritus Professor W.M. O’Neil, Acting Vice-Chancellor, The University of Sydney, to take the floor.

ADDRESS BY THE ACTING VICE-CHANCELLOR OF THE UNIVERSITY OF SYDNEY,
EMERITUS PROFESSOR W. M. O’NEIL

‘On behalf of The University of Sydney I issue a very warm welcome to the participants in the Fifteenth General Assembly of the International Astronomical Union and I express the wish that their meetings will be comfortable, pleasant and highly rewarding.

International assemblies of this kind are important for several reasons. Though there is a full and fairly rapid exchange of information through the journals and even more rapid exchange through personal correspondence, it is important for scholars in a field to get together for oral exchanges of information, views and interpretation, especially where the material is preliminary and tentative. Another important reason is that an opportunity is provided for older workers to renew acquaintance with one another and for younger workers to make acquaintances which will be useful to them in their later work. It is much easier to write to someone we have met than to someone we have never. Finally international assemblies help to break down parochialism and nationalism: not that astronomy has ever suffered much from this sort of defect.

It seems to me appropriate that astronomers, the practitioners of the oldest empirical science, are holding their first meetings as an International body in Australia in the halls of The University of Sydney. First, it is the oldest of the Australian universities. Second, it is one of the few Australian universities with strong and diverse astronomical research programmes; perhaps as befits a young nation, our main programmes each involve a unique or novel installation. Third, I think Sydney was the first Australian university to have a Professor of Astronomy, a post occupied jointly from 1912 to 1926, with the post of New South Wales Government Astronomer. Fourth, though many Australian universities feature the Southern Cross in their coats of arms, Sydney has a reference to the constellations in its motto: *Sidere mens eadem mutato*, though the constellations be changed the spirit is the same, a reference to our hope to preserve northern intellectual interests, traditions and values under southern skies.

Let me say just a little about the age of astronomy, much greater, of course, than that of The University of Sydney and about its origins. It seems to have begun with star watching and recording for two main purposes. The first was quite practical, namely timekeeping. It was quite important to keep track of the days and to have some convention for deciding when they began and ended. The Moon with its phases marked out a convenient period of 29 or 30 days, and with its quarters sub-

divided this period into sets of about 7 days or so. Finally the Sun in its north-south movements in the sky marked out the round of the seasons so important for agrarian peoples. Twelve months measured by the Moon almost equalled one year measured by the Sun, and much observation, recording and thought had to be given to finding a method of reconciling the two periods. By the middle of the first millennium B.C. the Babylonians, the Greeks and possibly earlier the Chinese, found a workable mode of reconciliation in the form of the Metonic and the Callippic cycles. We have abandoned that form of reconciliation in favour of getting the year almost right and of being satisfied with vestigial or schematic months no longer tied to the phases of the Moon.

The second purpose was theoretical, made in the attempt to satisfy human curiosity and to find some regularity somewhere in the scheme of things so as to provide some sense of security. Life on Earth was obviously confused, capricious and uncertain. Husbands deserted wives, children rebelled against their parents, debtors failed to pay their debts, thieves robbed us of our property, the animals and plants sometimes failed to breed true, droughts or floods or insects sometimes destroyed the crops, our food sometimes spoiled and made us sick, other diseases molested us, even the lead pipes made of so obviously a suitable material for the delivery of water poisoned us, wages chased prices and in catching up forced up prices, lightning and earthquakes ruined our dwellings and so on and so on. Somewhere there must be some regularity, something that could be counted on. And there it was to be found if only we cared to look up, watch and record carefully and calculate. There were, of course, unexpected events in the skies such as eclipses and the appearance of comets, but even they proved amenable in the long run to prediction.

The events which at first sight seemed so regular proved on closer inspection to be less rational and less regular than may have been expected. Thus the Sumerians seem to have thought that the year ought to be 360 days, a good round sexagesimal number but the year proved not to be exactly even the 365 days which the Egyptians elected early in the second millennium B.C. Observation of a short run of months suggested that they were either 29 or 30 days in length, so 29.5 days would seem a good average for anyone unafraid of fractions. But who would have expected the average to be a silly number like 29.5305879 days, that the actual months varied between about 29.26 and 29.80 days and that the average was increasing by about 0.00000012 days or one hundredth of a second per century.

I can express only the greatest admiration for Naburiannu and Kidinnu, both Babylonians, and of the 5th and 4th centuries B.C. who estimated the mean lunar periods with errors of only two seconds, and half a second respectively and the year, sidereal I suspect in Naburiannu's case and tropical in Kidinnu's, with errors of only six minutes (too long) and eight minutes (too short) respectively. If Kidinnu did not distinguish the two solar periods, Hipparchos, perhaps the greatest Greek astronomer, did so in the 2nd century B.C. Further his estimate of the tropical year was only 5.5 minutes too long. Meanwhile the Greeks were working on the geometry underlying apparent celestial motions, major contributors being Eudoxos, Hipparchos and Ptolemaeus. If only Seleucus of Babylonia had had the geometrical talent of his near contemporary, Hipparchos, there would have been no need for us to have had to wait for Copernicus to generate a viable heliocentric planetary theory.

I have excused most astronomers from manifesting nationalism and parochialism. Not being one, perhaps I can be excused for manifesting both. One base used by Hipparchos to estimate the length of the tropical year was the difference in the angular separation of the bright star Spica or *alpha Virginis* from the Sun's Spring crossing point on the Celestial Equator, the First Point in Aries, as observed by him and as observed by Timocharis some 135 years before. My colleague Professor Hanbury Brown not long ago concluded some work with his Stellar Intensity Interferometer at Narrabri on this same Spica, a binary star. As a result he has developed an entirely new method of estimating stellar distances at ranges beyond reliable estimate by use of the parallax method. It may be used for stars which are not Cepheid variables though they must be binaries. I like to think that it would be nice to arrange a meeting between Hipparchos and Hanbury Brown, so that they could talk to each other about Spica and their observations of it. I must confess, however, that though Hipparchos would find Hanbury Brown a nice man whose Greek was deplorable, he would be very

puzzled by his style of thought, his equipment and his discoveries. I must confess that as a non-astronomer, I feel more at ease reading about what Naburiannu, Kidinnu, Eudoxos, Hipparchos and Ptolemaeus were working on than I do in reading about quasars, pulsars, black holes, 21 cm frequencies, radiation pressures, electron streams and so on. Astronomy is a very old science but it has come a long way. May Astronomy go a little further as a result, direct or indirect, of your meetings in Sydney.'

Dr Wood expressed his thanks to Professor O'Neil for his address, and invited Professor Dr G. P. Wild, Australian Academy of Science, to speak.

ADDRESS BY PROF. DR G. P. WILD, AUSTRALIAN ACADEMY OF SCIENCE

'Mr Chairman, My Lord Mayor, Mr President, Mr Vice-Chancellor, Ladies and Gentlemen,

On behalf of the Australian Academy of Science, it is my very great pleasure to welcome you here on the occasion of the 15th General Assembly of the IAU.

I hope that in the coming days, besides meeting old and new friends, everyone of you derives new creative ideas and inspiration not only in the meeting room but perhaps more importantly from informal discussions while sipping coffee (or some other fluid). Welcome especially to the younger astronomers attending their first meeting; and perhaps at the other end of the scale we could extend a special welcome to the one astronomer with us who has been to every meeting since the Union began – that is, every astronomer's friend, Professor Jan Oort.

The President of our Academy, Sir Rutherford Robertson, would of course have been with us himself tonight had he not been out of the country, but he has specifically asked me to convey to you, Professor Strömgren, and to all participants his very good wishes and the sense of honour he feels that the General Assembly should be held in Australia. (Little did he know what a tussle it was.)

Academies of Science vary quite a lot from one country to another. In Australia's case the Academy is a body of scientists whose operations are quite independent of those of the government of the day, although it is of course dependent on the general goodwill of governments for financial support. One of the responsibilities decreed to the Academy by its Charter is 'to establish and maintain associations and relations between Australian scientists and the International Scientific Unions' For the present General Assembly, therefore, the Academy has been the formal interface between the IAU and the host country. That is why I, as Foreign Secretary of the Academy, am on this platform tonight. (Not only tonight; in the words of the American mathematician Tom Lehrer, 'Come back tomorrow night, we're going to do fractions'.)

But tonight I promise not to keep you long at all. It is on occasions such as this that I do well to remember the famous story of Laplace, who once wrote profoundly and at very great length on a certain scientific topic. He finished by apologizing for writing so long a paper. 'Had I had time', he said, 'I would have written a short one'.

Mr Chairman, as I survey this gathering of people, one rather macabre thought occurs to me: perhaps never again am I likely to see such a strong concentration of people whose internal biological clocks are in such a state of complete disarray. (I hasten to say there is no outward evidence of it). To those of you who have travelled half way round the world to come and visit us, may I say thank you for being prepared to put up with this temporary inconvenience and assure you that in a few days all will be well. And thank you also for sacrificing part of your August for the equivalent of part of February. Although we are unable to supply you with summertime our orchestra will do its best with the next item by Vivaldi. Finally I hope those of you who find yourself so far south for the first time will find abiding compensation when you have the chance of getting away from the city lights to see our most treasured possession (the Lord Mayor excepted) – the southern sky: the Clouds of Magellan, the Southern Cross, and the sight of Sagittarius in the Zenith.

Ladies and Gentlemen, once again, welcome to the Southern Hemisphere, and welcome to Australia.'