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CHAPTER I

TWENTY FIFTH GENERAL ASSEMBLY

INAUGURAL CEREMONY

Sydney Opera House

July 15, 2003

Address by Professor Harry Hyland (Co-Chair of National Organizing Committee)

Astronomers of the World - Welcome to Sydney, Australia for the 25th General Assembly of the IAU, and tonight's Opening Ceremony held in the magnificent Sydney Opera House. A great thank you to Lauren Easton for her rendition of the National Anthem, and Goomblar and members of the Descendance Dance Company for their traditional welcome.

It has been thirty years since the General Assembly was last held in Australia, when it was at Sydney University. Only those of us who are now considered to senior citizen will remember back to that event (and some of us may not be able to remember that far back). It was also a very exciting event for Australian and international astronomers.

We have a long list of distinguished guests this evening whom I would like to recognize:

- The Honorable Dr Brendan Nelson, MP, Minister for Education Science and Training.
- The Deputy Lord Mayor of Sydney Councillor Dixie Coulton, and Councillor Amy Hoban representing the City of Sydney.
- Dr Robin Batterham, Chief Scientist of the Australian Government.
- Professor Franco Pacini, President of the IAU, and the Executive Committee of the IAU.
- Professor Rachel Webster, Chair of the National Committee for Astronomy, of the Australian Academy of Science, the Adhering body to the IAU.
- Dr. Dick Manchester, President of the Astronomical Society of Australia, co-host with the NCA and a major sponsor
- Ms Patricia Gruber, President of the Peter Gruber Foundation from whom we will hear later.
- *Representatives of our major sponsors*
- Mr Anthony Barry and Mr Robert Squire of Connell Wagner Ltd
- Mr Merhdad Baghai of CSIRO
- Professor Piet van der Kruit, Chair of the ESO Board

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- Professor Lawrence Cram of DEST
- Heather Couper and Nigel Henbest representing the British Council.

Distinguished guests, Ladies and Gentlemen, it is my great pleasure to introduce Professor Rachel Webster, Chair of the National Committee for Astronomy, to provide the Official Welcome from the hosts.

Address by Dr Rachel Webster, Chair, National Committee for Astronomy, Australia

The Honorable Dr Brendan Nelson, Minister for Education Science and Training

Distinguished Guests and

Fellow Astronomers

It is a great pleasure to welcome you to Sydney, on behalf of the National Committee for Astronomy and the Australian Astronomical community.

We wish to acknowledge the traditional, aboriginal owners of the land in this area: the Cadigal. Astronomy has been a part of European activity in Australia for over two hundred years. Indeed, as early as 1793, a visiting Spanish expedition used a house built here, at Bennelong Point, where the Opera House is now situated, for astronomical observations.

The Australian astronomical community takes its place in the international community

- By seeking excellence in the science we do
- By working with our international colleagues to uncover the extraordinary structures in our physical universe
- and by communicating our love of science with the wider public

The great strength of Australian astronomy has been in our collaborative ventures:

- Our premier optical telescope has been a joint venture with the UK for the past 30 years
- More recently we have become a partner in the Gemini collaboration. Unfortunately, the first major instrument we built for this telescope was destroyed in the Mount Stromlo fires, but already reconstruction has begun.
- Our radio astronomers are closely involved with astronomers from all the major radio facilities in the world, and we welcome *them* at our national radio facility
- At the national level, with the development of our major national facilities programs, and the Australian contribution to the Virtual Observatory, Australian optical, radio and theoretical communities are working together to ensure that Australia commands a significant place in the international astronomical community
- A key part of this activity has been strong linkages with our industry partners.
- Finally, on the horizon, we have exciting opportunities to participate in, – and possibly host, some of the next generation of radio and optical telescopes

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The General Assembly of the International Astronomical Union provides both Australian astronomers, – and the international community with the opportunity to celebrate the scientific achievements of the past 3 years.

To our Sydney hosts: thank you for the long hours you have labored and huge enthusiasm which you have brought to the organization Finally, to visitors to this magnificent city: enjoy its offerings.

The Prime Minister of Australia, The Honorable John Howard, is overseas. He maintains a strong link to the scientific endeavors of our community, through the Prime Ministers Science and Engineering Innovation Council. The Prime Minister has prepared a video message for us.

Address by The Prime Minister John Howard

International Astronomical Union, 25th General Assembly, Sydney

It is a great honor for Australia to host this event, and to welcome to Sydney the world's top astronomers for 10 days of discussions, business sessions and symposia.

Australia's astronomers may be relatively few in number but they have never been afraid to think big and to seek answers to the big questions.

That is why Australia has a great record of scientific discoveries in the field of astronomy and continues to contribute to a range of international projects.

In the field of radio astronomy, in the areas of optical instrumentation and microwave receiver technology, Australia has been a pioneer.

The cosmological surveys conducted by the Anglo-Australian Telescope and the recent census of galaxies involving the Parkes Telescope represent significant contributions to the knowledge base for astronomers world wide.

We are proud of these achievements and the Government has strongly supported our astronomers and recognizes the contribution they make to the global astronomy community.

I was recently reminded of our great history in astronomy and its important role in our science community when, tragically, one of Australias oldest and best known scientific institutions, the Mt Stromlo Observatory, was destroyed in the bush fires that devastated Canberra, our national capital.

I know many astronomers around the world shared the sense of loss felt by Australia at the destruction of this facility.

When I visited the burnt out ruins in the days following the fires I gave a commitment, since backed up with funding, that we would see the Mt Stromlo Observatory rebuilt, and planning is now underway for that to occur.

As we look to the future Australia is increasing its involvement in the Gemini Telescope project and we are closely involved in discussions on both the International Square Kilometre Array and the Low Frequency Array.

Australia is keen to be involved in these exciting international projects that reflect the collaborative nature of astronomical science.

I welcome you to Australia and wish you a productive and stimulating General Assembly.

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Introduction of Dr Robin Batterham by Professor Harry Hyland

Our next speaker is Dr Robin Batterham, Chief Scientist.

Dr Batterham was appointed to the post of Chief Scientist in 1999 and re-appointed in May 2002. He is also the Chief Technologist Rio Tinto Ltd. He has had an extremely distinguished career in research and technology as well as in both the public and private sectors. He holds a PhD from Melbourne University and his research has covered areas such a mining, mineral processing, mining agglomeration processes and iron making.

He is a Fellow of the Australian Academy of Science, the Australian Academy of Technological Sciences and Engineering & the Australian Institute of Company Directors.

In his position as Chief Scientist he is responsible for providing advice on science, technology and innovation issues to the Prime Minister, and other ministers, and for providing a link between between Government and science, engineering innovation and industry groups.

Dr Batterham is also an accomplished organist, and will be performing for us later in the program.

I now have the pleasure to invite Dr Robin Batterham, Chief Scientist, to the stage to give his address.

Address by Dr Robin Batterham

Professor Hyland, thank you for your introduction. Let me add my words of welcome to you all to this magnificent venue, to Sydney and to Australia. Last week Sydney hosted the 5th National Congress of Industrial and Applied Mathematics which I had the privilege to attend, as it is my background. An in the next few weeks Australia will host the 19th International Congress of Genetics, and in the next few weeks Australia hosts the 25th Congress of IEEE. And for some people, far more importantly, a little later on in the year, the Rugby World Cup.

But I must say, this congress is very special. Astronomy holds a very special place in Australia, as you would gather from the opening words, including those of the Prime Minister. But it is after all a splendid location for an international congress, partly because of the splendid geography the attractions, and so on. But in particular, it is because we in Australia, as a fairly small land, and as a fairly small part of the World's efforts in science. And we therefore welcome especially your presence and the opportunity you will have to interact with members of the International Astronomical Union, the Australian Academy of Science, National Committee of Astronomy and with the Astronomical Society of Australia.

My role as Chief Scientist, as you have heard, is to offer advice. That is a delightful role. I am there to offer advice to government in response to requests about matters in science and technology and innovation. I must say, looking around, - across the spectrum of science in this country, - and technology and innovations, that the signs are pretty good. We have had a significant increase in funding. And that has come about because there has been recognition of the importance of science to Australia, - indeed to all countries. We are seeing increasing, ever increasing, levels of collaborations. The nature of science today is that we have to have cross-cutting collaborations that build improvements, that bring new techniques. It is the new leadership and directions being set in this Commonwealths Scientific and Industrial Research Organization, one of the Worlds great institutions. We see it in the Global Science Forum, and we see it improving.

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There is willingness of sharing and collaboration this country. Each of us is keen to harvest Australia's potential that, and notwithstanding, there are some challenges, – and we share these challenges with many other countries. Perhaps one that is so common and that requires all of us to be active, even if it is not our fist thought, is the question of science literacy. Astronomy, in particular, has a certain appeal to the wider public. And I must say, when I look at the fall-off in several countries, – this country included, in the interest of science in schools, science and mathematics, I put both together, the fall-off in the post compulsory years, when the students have a choice, has been quite dramatic over the past 20 years. I see this as a real challenge. Part of the challenge can be answered by the science that you do, and by making that science available to our wider community and in particular the linkage through the schools, to encourage them to keep their interest. That, I think, is one challenge for all of us. If I could just give you a message that is somewhat peripheral to your main congress it would be to think about your outreach because you have that special place in the wider community. Think about your outreach in education to the wider community. Let me tell you one statistics that is a little frightening, that tells us why. The US National Science Board every now and then runs a survey. It is called "Science and Engineering Indicators". The last one was in 2002. Now, one of the questions was astronomical. It asked adults over a wide spectrum of the community: "Does the Sun go around the Sun?" Now, think that a good few people thought that out quite some time ago and you will be pleased to know that 75% of the adults got it right. But then this one: "How long does it take the Earth to go around the Sun? This was of course, blessedly a multiple choice question. 54% of the adults got that one right! So, just remember in your outreach, and I am encouraging your outreach, just remember what you are dealing with.

You see that I am very carefully avoiding talking about anything of real depth astronomically because I got two chances now; one closing remark that I'll make in encouraging you in this congress to think about collaborations, and that is the science message, and to behave as astronomers in this country have done so well, which is to focus on the path forward. Instead of innumerable requests for really expensive equipment, it tends to come down to a preferred list that hence has a much higher chance both nationally and internationally of being funded. Astronomers have been doing that superbly well, I have to tell you.

Apart from the messages about outreach and about collaboration, I am going to play a piece a little later on the organ which is composed especially for this occasion. The piece is called: "Out there". I could tell you some stories how that arrived, but I won't. You can listen to the piece and make up your own mind if it has any connection.

Introduction of the Honorable Brendan Nelson by Professor Harry Hyland

Our next guest speaker is the Honorable Brendan Nelson MP, Minister for Education, Science and Training.

Dr Nelson was elected to represent the Sydney electorate of Bradfield in the Commonwealth parliament in 1996. He was appointed by the Prime Minister to Cabinet, as the Minister for Education Science and Training in November 2001 following several years as the Chairman of the House of Representatives Standing Committee on Employment, Education and Workplace relations where he authored three major reports. Previously he had been Chairman of the Sydney Airport Community Forum, and then Parliamentary Secretary to the Minister for Defense.

Dr Nelson is a Fellow of the Australian Medical Association, and an Honorary Fellow of the Royal Australian College of Physicians.

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It is with great honor that I invite the Honorable Dr Brendan Nelson, MP, Minister for Education, Science and Training, to perform the Official Opening of the 25th General Assembly of the IAU.

Address by Honorable Dr Brendan Nelson, MP Federal Minister for Education, Science & Training

Dr Franco Pacini – President of the IAU, Professor Ron Ekers – President elect of the IAU, Professor Harry Hyland – Chairman of the Congress, Dr Robin Batterham – Chief Scientist, Professor Rachel Webster – Chair, National Committee for Astronomy.

I would also like to acknowledge the Cadigal people, the traditional custodians of this land and a people whose culture has a special significance for us today.

Indigenous Australians developed one of the great astronomical cultures of human history. For Indigenous Australians the sky was a textbook of morals and of stories. Their knowledge and beliefs about the stars evolved as an integral part of a culture that has been handed down through song, dance and ritual for more than 50,000 years.

Today, we know a great deal about the stars above this land, thanks largely to many of you. And as we celebrate this fact, though, we might like to remember that our knowledge was hard won, for it was built in part on the involuntary sacrifices of more ancient Australian astronomers.

The Australian Government welcomes the IAU and your membership from 67 countries. This is the 2nd occasion in 30 years Australia has had the opportunity to host the General Assembly of the International Astronomical Union.

Your 8,000-strong membership and your long heritage - with the Union's establishment going back to 1919 - brings great attention to the physical sciences, and the wonders of astronomy.

We congratulate the President, Dr Franco Pacini, for maintaining the IAU's tradition that the General Assembly every three years is held in a country which has a strong commitment to astronomy and astronomical research.

I also congratulate the incoming President-elect, Prof Ron Ekers an Australian and Foundation Director of the CSIRO Australian Telescope National Facility - on his election to this prestigious IAU position.

Australia is a full member country of the IAU and has almost 200 individual members.

Tonight, I note the special contribution of Dr Jeremy Moulds, who six years ago made the bid for Australia to host this IAU General Assembly here in Australia. Congratulations Jeremy on your vision - for bringing the General Assembly back to Australia. It showed wonderful leadership, and mirrors the enormous gains being witnessed in Australia in science. Thank you so much, Jeremy.

It is often said that governments around the world are increasingly demanding economic and social returns from their investments in basic research.

If you've heard that - and I am sure that many of you have - then some of you may believe that politicians are generally only interested in practical justifications, in routes to commercialization, in economic outcomes, in applications, licenses, spin-outs, and so forth; in which case you're probably wondering what someone like me is doing here.

Well let me tell you. I'm her e for a number of reasons. But first, I'm here because in 1769 the Royal Society of London sent Captain James Cook on an expedition to Tahiti

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to observe a transit of the planet Venus across the face of the sun, and en route he charted the east coast of Australia and took possession of the land in the name of King George III.

There has been in human history perhaps only one society, and one nation, that owed its formation, its very existence, to a desire to understand the stars and the planets. Throughout the ages, many, if not most, human societies have made a virtue of astronomical knowledge. The drive to understand stars and the heavens has probably been a constant across all human civilizations.

But only the modern Australian nation perhaps was founded as a spin-off from an Astronomical expedition.

In this country, situated under the Southern Cross, that is a heritage we do not forget.

Between 1995 and 1999, Astronomers in Australia produced almost 4% of the world's publications in the Astronomical Sciences and they garnered almost 5

Australia is of course internationally renowned for its breakthroughs in a number of key areas.

Australian astronomers determined the history of the formation of elements in the nearest galaxies to earth, the Magellanic Clouds; and Australian astronomers elucidated the violent gravitational interactions that have occurred between the Clouds and the Milky Way.

Australian astronomers have led the world in the application of "interferometry" to measure the fine details of astronomical objects, both at radio and optical frequencies.

And, more recently, Australian astronomy developed the "Two Degree Field Galaxy Redshift Survey" conducted by an international team at the Anglo-Australian Observatory. Using a robotic device, the team has measured the light from over 200,000 galaxies, from which astronomers are now coming to understand much more about the distribution of matter in the cosmos, as well as answering profoundly important questions about the formation and fate of galaxies and the Universe.

Many notable Australians have also made enormous achievements in astronomy.

Our Young Australian of the Year for 1999 was Bryan Gaensler. Bryan is now Assistant Professor at the Department of Astronomy at Harvard University - and is involved in research on high-energy processes on the Milky Way.

The late Professor John Bolton often regarded as the father of Australian radio astronomy, is the man who oversaw the Moon landing transmission via the Parkes telescope.

Dr Paul Wild, who would rise to become the Chairman of the CSIRO, began his career in the test rooms of the CSIRO Radio Physics Division.

And Ruby Payne-Scott, the first woman radio astronomer, is remembered for having carried out some of the first radio astronomy experiments in Australia after World War II.

Today the Australian Federal Government continues to provide significant support for science, including Astronomy.

The combined Australian Governments' expenditure on science as a proportion of GDP is at the higher end of the range of OECD countries. From 2001, the Commonwealth Government provided an additional $3 billion five-year programme to support Australian science and innovation.

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This included Commonwealth investment in major national research facilities to provide support for the Australian astronomical community in developing new technology for the international next-generation radio telescope, the Square Kilometre Array, and to increase Australia's share in the Gemini consortium.

A grant of $7.3 million has been provided to assist in the rebuilding of the world class facilities at the Australian National University's Mt Stromlo Observatory, following its recent tragic loss during the January bush fires.

In this Government, we are proud of our support for Australian Astronomers. Of course we understand that Astronomy, like other frontier sciences, has been a source of inventions and technological spin-offs that benefit the community; but, in our nation there is a broader appreciation of Astronomy, and of its wider value to our society.

And I was very pleased to note therefore that, in addition to the conference, this IAU General Assembly will deliver to Australia.

Astronomy, as the exploration and discovery of the frontiers of space, holds a special place in the imagination. In no other area of human endeavor is one faced so starkly with the unknown, or does one wrestle with questions so profound and so tied up with human origins and our ultimate fate.

The questions we face on earth remain small compared with the mysteries of the universe. Astronomy reminds us that there is a broader context for all that we do. It foreshadows our final destiny. It represents one of the great human endeavors.

I think I speak on behalf of all Australians, when I say that we are grateful for all that you do.

It is my great honor to officially open the 25th General Assembly of the International Astronomical Union.

Addition to pre-prepared text:

Quote relating to Mt Stromlo:

"And I'd share with you (that, after those events in January,) I phoned Professor Ian Chubb, who is Vice-Chancellor of the Australian National University which oversees Mount Stromlo on a day to day and year to year basis; and I advised him that I would take a very personal interest in the reconstruction of Mount Stromlo, and if he feels that there is a strong justification for additional resources I will be very receptive to receiving those arguments."

Introduction of Professor Franco Pacini by Professor Harry Hyland

The final speaker in this part of Ceremony is our own President of the IAU, Professor Franco Pacini who needs no introduction - however I will say a few words for those who do not know him.

Professor Pacini graduated in Physics from the University of Rome in 1964. Franco worked in France and at Cornell, before becoming A Scientific Director of the European Southern Observatory from 1975 - 1978. Since 1978 he has been a Professor at the University of Florence and Director of the Arcetri Observatory.

He is the author of many distinguished papers and books on the final stages of the evolution of stars more massive than the Sun. From this work he was able to predict, in 1967, the existence of rotating neutron stars which were subsequently discovered a year later in the UK - and named "pulsars".

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Franco is a great promoter of international collaboration, and this collaborative approach has resulted in Arcetri being part of the new Large Binocular Telescope at Mount Graham, which it is planned to open in 2003.

I have great pleasure in inviting Professor Pacini to address the Assembly.

Address by Prof. Franco Pacini, President of the International Astronomical Union

Honorable Doctor Brendan Nelson,

Dear Colleagues and Friends,

In these last twenty minutes, I have been increasingly envious of my Australian colleagues. Indeed, it happens so rarely to hear a Minister speak with such knowledge and pride of the achievements of the scientific community in his country. It would be very nice if this could occur in my country!

It is a great pleasure to be here in Sydney for the XXVth General Assembly of the International Astronomical Union and the associated scientific events. Many of us have traveled a long way to come to this continent whose great natural beauties are accompanied by the presence of a society which regards scientific research as a top priority. Australia has contributed fundamentally to the development of astronomy in many areas, from stellar interferometry to optical and radio astronomy, from solar physics to the study of cosmic rays. We are thankful to the Australian authorities and to our colleagues for having invited us.

Some scientific and administrative activities of the IAU have already begun and we are all enjoying the pleasure of seeing old colleagues and friends. New scientific and human relationships will be established in the coming days and they will increase the level of collaboration in the international scientific community. The mission of the Union, since it held its first general Assembly in Rome more than 80 years ago, has indeed been to foster collaboration among the astronomers of the world.

Wondering about the sky has certainly been one of the first activities of Mankind, in all continents and cultures of the earth. As Honorable Nelson has just recalled, the Indigenous Australians had a particular admiration for the sky: their beautiful forms of artistic expression show that this is still true.

The fascination of science, and in particular of astronomy, is continuously expanding in most countries, among adults and children. I believe that this is marvelous since it shows that human curiosity and respect for nature and knowledge is an unperishable value. Furthermore, because of its beauty, astronomy is some sort of 'Trojan horse' fostering the interest for science in general.

Applications and technological spin-offs are also very important and the development of astronomy has provided many benefits, for instance in the area of detectors which were initially built for the study of stars and then led to medical applications.

International collaboration in the study of the universe has been enhanced by the recent trend to build, in remote places, large international observatories. In this context it is sad to think of many colleagues who have not been able to come to Sydney for economic or political reasons or, worst of all, because of the wounds from horrible wars. I hope very much that the IAU will not only foster scientific progress but also continue (and possibly increase) its efforts so that, in a peaceful atmosphere, the pursuit of knowledge about the universe remains a common goal of Mankind.

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The activities of the IAU, its General Assembly and the other scientific events taking place here would not be possible without the contributions of many people. Above all I wish to thank once more those who have invited us to this beautiful city; the General Secretary, Prof. Hans Rickman; the Assistant General Secretary, Prof. Oddbjorn Engvold; our secretarial staff in Paris (especially Ms. Monique Orine); the National and Local organizers in Australia; the members of the IAU Executive Committee; the various sponsors. We would not be here without their intense efforts.

The XXVth Generally Assembly of the International Astronomical Union is now open.

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