



H·A·D NEWS

*The Newsletter of the Historical Astronomy Division
of the American Astronomical Society*

Number 63



February 2003

Report on HAD Meeting in Seattle

The HAD had its annual meeting in conjunction with the AAS at its winter meeting in Seattle. As usual, we started the day before the AAS with a special session on Sunday, Jan. 5 at the conference Sheraton Hotel. The special session on "Special Topics in the History of Astronomy," began at 2:00 pm and the papers were not given in the order listed in the program.

The first paper was given by past HAD Chair, **Barbara Welther** (Harvard-Smithsonian Center for Astrophysics), on "Donald Menzel: His Founding and Funding of Solar Observatories." In January 1961 Donald Menzel wrote to his cousin, M. H. Bruckman, "I am proudest of the observatories that I have built in the West." The first of those facilities, a solar observatory, was founded in 1940 in Colorado and later came to be known as the High Altitude Observatory. The second one, also a solar observatory, was founded a dozen years later at Sacramento Peak in New Mexico. The third facility, however, established at Fort Davis, Texas, was the Harvard Radio Astronomy Observatory. Although Menzel was primarily a theoretical astrophysicist, renowned for his studies of the solar chromos-

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Outgoing HAD Chair, Barbara Welther, passes on the "gavel" and the august plaque to the new Chair, Tom Williams.

The Chair's Corner

Tom Williams (trw@rice.edu)

As your new Historical Astronomy Division chair, I want to thank our immediate past-chair, Barbara Welther, for two successful years of leadership for the division. Both of the meetings Barbara organized (Washington, DC and Seattle) were excellent sessions. I also wish to thank retiring Committee members Brenda Corbin and Thomas Hockey for their services over the past two years.

HAD election results were announced in Seattle as follows: Vice Chair (Chair-elect), Donald Yeomans; Committee Members, John Briggs and Alan Hirshfeld. It is a pleasure to welcome these new members to the HAD Committee. All three are well known to the community of astronomers and historians of astronomy. I look forward to working with them for the next two years. I also wish to thank Joe Tenn, Dennis Danielson and Craig Waff for agreeing to be candidates for HAD leadership positions. This was an exceptionally well qualified group of candidates. HAD's interests were to be well served whatever the outcome of the election might have been.

The election was, however, a disappointment from the perspective of HAD member participation. Less than a quarter of our nearly three hundred members bothered to vote in this election. A last minute surge of e-mail ballots accounted for the final tally of only forty-three voters. The Committee will have to consider procedural changes and other means for increasing the participation of HAD members in our election process.

Equally disappointing was the participation of members in the HAD business session in Seattle. Other than the elected leaders and the AAS Executive Director, the number of HAD members present could likely be counted on the fingers of only one hand. Since the paper sessions were well attended in Seattle, it is unclear what kept members away from the business meeting; perhaps this is a scheduling problem. The Committee would welcome suggestions from HAD members on both the elections participation and on attendance at HAD business meetings.

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Sydney IAU General Assembly: Call for Papers

Every three years the International Astronomical Union holds its General Assembly (GA) in a different major city of the world, and this year the GA will be in Sydney, Australia, from July 13 to 26.

We have a rich history of astronomy program scheduled for Sydney with a range of meetings that can accommodate all research tastes. If you are planning to attend this GA then it is now time to start think about the paper(s) you would like to present—or prepare as poster papers. The presentation time for oral papers will be 15 or 20 minutes, depending on the numbers of papers accepted for each session.

The absolute deadline for submission of titles and abstracts is 2003 April 15. Please provide (a) your name, (b) the title of your paper, (c) which meeting it is for, (d) whether your preference is an oral or a poster paper, and (e) an abstract of no more than 200 words. You should e-mail (or failing that post) this information to the OC Chairperson of the relevant Science or Working Group Meeting (these are listed below). Please send separate e-mails if you have papers for more than one Meetings.

Here are the different Meetings you have to choose from.

SM1: Applied Historical Astronomy

This half-day meeting is concerned with examining ways in which historical data can be used to address current astronomical issues. Perhaps best-known are studies of historic supernovae, eclipses and comets from the Middle East, China, Korea and Japan, but many other possibilities exist. Nor does Applied Historical Astronomy relate solely to “ancient times”, for eighteenth and nineteenth century data supplied by those who practised positional astronomy have been used by those researching contemporary astrophysics.

The Organising Committee of this Science Meeting comprises Richard Stephenson (Chair), Liu Ciyuan, Nha Il-Seong, and John Steele. Offers of papers should be directed to Professor Stephenson (e-mail: f.r.stephenson@durham.ac.uk, or post to: Department of Physics, University of Durham, South Road, Durham DH1 3LE, UK).

SM2: The Early Development of Australian Radio Astronomy

This Science Meeting will feature a review of early Australian radio astronomy by a leading historian of astronomy, followed by papers given by retired radio astronomers who were involved in the development of Australian radio astronomy between 1945 and 1988. Speakers in this one-day Meeting will be by invitation only, and will include some very well-known names in the history of radio astronomy.

The Organising Committee of this Science Meeting comprises Wayne Orchiston (Co-Chair), Woody Sullivan (Co-Chair), Miller Goss, Dave Jauncey and Ken Kellermann. For further details contact Dr Orchiston (wo@aoapp.aao.gov.au).

SM4: Ethnoastronomy & Archaeoastronomy

This quarter-day Science Meeting is designed for those with a particular interest in the astronomical systems and beliefs of prehistoric peoples and contemporary ethnic groups. The plan is to publish the oral and poster papers from this Science Meeting, possibly in a special issue of Archaeoastronomy.

The Organising Committee of this Science Meeting comprises Clive Ruggles (Chair) and Keith Snedegar. Offers of papers should be directed to Professor Ruggles (e-mail to: rug@le.ac.uk, or post to: School of Archaeological Studies, University of Leicester, University Road, Leicester LE1 7RH, UK).

WG1: Astronomical Archives

This half-day Working Group Meeting is designed for those with a particular interest in astronomical archives or records to report on their research. We are happy to accept various types of papers, including national overviews, reports on the astronomical archives in a single repository, or a detailed discussion of a single historically-significant manuscript.

The Organising Committee of this Working Group Meeting comprises Suzanne Débarbat (Chair), Wolfgang Dick and Wayne Orchiston. Offers of papers should be directed to Dr Débarbat (e-mail to: Suzanne.Debarbat@obspm.fr, or post to: Observatoire de Paris, 61 av de l'Observatoire, 75014 Paris, France).

WG2: Astronomical Chronology

This quarter-day Working Group Meeting is designed to allow those who have been compiling a wide-ranging internationally-approved master list of major milestones in the history of astronomy (including key instruments, astronomical phenomena, discoveries and ideas) to discuss and review their progress.

The Organising Committee of this Working Group Meeting comprises Alex Gurshtein (Chair), Adriaan Blaauw, Teije de Jong and Brian Warner. For further details contact Professor Gurshtein (agurshtein@hotmail.com).

WG3: Historical Instruments

This half-day Working Group Meeting is designed for those with a particular interest in historically-significant astronomical instruments, observatories and sites. We are happy to accept various types of papers, including national overviews, reports on instruments in a single repository or at a single site (e.g. a group of historic radio telescopes), or a detailed discussion of a single historically-important instrument. "Instruments" not only include various types of telescopes, but also spectroscopes, photometers, polarimeters, multi-channel hydrogen-line radio receivers, etc.

The Organising Committee of this Working Group Meeting comprises Nha Il-Seong, John Briggs and Wayne Orchiston. Offers of papers should be directed to Professor Nha (e-mail to: SLISNHA@chollian.net, or post to: The Nha Il-Seong Museum of Astronomy, San-133 Gamchon-myon, Yechon-gun, Kyongbuk 757-910, Korea RP).

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Sydney IAU General Assembly: Call for Papers *(continued from page 3)*

WG4: Transits of Venus

This half-day Working Group meeting is designed for those with a particular interest in the seventeenth, eighteenth and nineteenth century transits of Venus. We are happy to accept various types of papers, including international overviews relating to one or more transits, reviews of the observations made of a single transit (either internationally or in a single country), or detailed accounts of an individual transit party's work and scientific results.

The Organising Committee of this Working Group Meeting comprises Wayne Orchiston (Chair), Steven Dick, Alex Gurshtein, Rajesh Kochhar and Luisa Pigatto. Offers of papers should be directed to Dr Orchiston (e-mail to: wo@aaoepp.aao.gov.au, or post to: Anglo-Australian Observatory, PO Box 296, Epping, NSW 2121, Australia).

SM3: Recent Research

If your research work does not fit comfortably into the themes of the Working Group Meetings or any of the afore-mentioned Science Meetings, then SM3 is just for you! This one-day Science Meeting is a "grab-all" category so that no matter what your field of research interest there is a special time and place at this General Assembly where you can talk about your work. We anticipate accepting a wide variety of papers for this one-day Research Meeting.

The Organising Committee of this Science Meeting comprises Tsuko Nakamura (Chair), Wolfgang Dick, Rajesh Kochhar and Brian Warner. Offers of papers should be directed to Dr Nakamura (e-mail: tsuko@cc.nao.ac.jp, or post to: The National Observatory of Japan, 2-21-1 Osawa, Mitaka, Tokyo 181, Japan).

HISTORY OF ASTRONOMY AT THE SYDNEY IAU GENERAL ASSEMBLY

1. The Program

IAU Commission 41 and the Inter-Union Commission for History of Astronomy (ICHA) have ended up with the most diverse and most exciting history of astronomy (HoA) program of any IAU General Assembly (GA), and we look forward to a big turn-out at the 2003 July GA in Sydney, Australia.

Because of timetabling strictures, we have only been assigned two and a half days for our program, during the second week of the General Assembly, but we will be running two parallel HoA streams throughout much of this period. This means that there is a rich program to choose from, and we have done our best to slot sessions against one another that are as different as possible.

The final HoA 'package' involves a mix of Science Meetings (SM), Working Group Meetings (WG) and a Business Meeting (BM), and is shown below. Sessions 1 and 2, 2 and 3, and 3 and

4 are separated by morning tea, lunch, and afternoon tea, respectively.

Monday 21 July

Stream 1, Sessions 1 & 2
SM1: Applied Historical Astronomy

Stream 1, Sessions 3 & 4
WG1: Astronomical Archives

Stream 2, Sessions 1-4
SM2: The Early Development of Australian Radio Astronomy

Tuesday 22 July

Stream 1, Sessions 1 & 2
WG3: Historical Instruments WG

Stream 1, Sessions 3 & 4
WG4: Transits of Venus WG

Stream 2, Sessions 1-4
SM3: Recent Research

Wednesday 23 July

Stream 1, Session 1
Vacant

Stream 1, Session 2
WG2: Astronomical Chronology

Stream 2, Session 1
BM1: C41/ICHA AGM

Stream 2, Session 2
SM4: Ethnoastronomy & Archaeoastronomy

Note that because this program has been developed by a Commission and does not form part of any of the GA Symposia, Joint Discussions, or Special Sessions, it may not feature in full in the IAU Information Bulletins. You should therefore rely on the ICHA Newsletter, the C41/ICHA web site and personal e-mails from the C41/ICHA OC, to keep up with the latest developments regarding the Sydney HoA program.

2. Attendance by Non-IAU Members

There have been a number of enquiries about this and the situation is that non-IAU members can attend General Assemblies as guests of a Commission or Divisional President. Richard Stephenson is the President of C41/ICHA, and he is keen to see a good turn-out for the HoA sessions in Sydney so is happy to extend a blanket invitation to non-IAU members of the ICHA to attend as his guests. If you are a non-IAU member at the moment and are interested in attending the Sydney GA please e-mail Wayne Orchiston as soon as possible (on: wo@aaoepp.aao.gov.au) so that we can make the necessary arrangements.

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HISTORY OF ASTRONOMY AT THE SYDNEY IAU GENERAL ASSEMBLY *(Continued)*

3. Registration

All those planning to attend the HoA sessions, whether IAU members or not, are required to register for the GA. A copy of the Registration and Proceedings Pre-Order Form was attached to IAU Information Bulletin 91, and this form is also available electronically on the GA web site:

www.astronomy2003.com

Those submitting their Registration Forms prior to 2003 May 1 are entitled to a reduced rate. Late registration is possible up to 2003 July 11. Further information relating to registration, including payment options and cancellation and refund policy, can be found in IAU Information Bulletin 91 (pages 24-25).

Note that accommodation options and a booking form are included in the Registration and Proceedings Pre-Order Form. The GA web site and Information Bulletin 91 also include information about the GA venue, the overall GA program (including the Opening and Closing Ceremonies, and the General Assembly Dinner), and associated tours, visits and excursions. Note also that apart from Australian and New Zealand citizens, all travellers must hold a valid visa in order to enter Australia. It is important to check with the Australian Embassy or Consulate in your country of residence well in advance of travel. It may take up to 8 weeks to obtain a visa [Don Yeomans has pointed out that you can obtain a visa (actually an Electronic Travel Authority) online at www.astronomy2003.com and it only takes 5 minutes].

5. The Weather in July

July is mid-winter in Australia and the weather can be rather variable. Rain showers are typical, so bring an umbrella and/or raincoat. Temperatures generally range between ~7 and 17 degrees Celsius (though in 2001 and 2002 we had peak daytime July temperatures in the mid-20s), so warm clothing is advisable.

Wayne Orchiston
Sydney HoA Program Co-ordinator



Barbara Welther (outgoing HAD Chair) introduces the newly elected HAD Committee member, John Briggs, at the Seattle meeting

HAD Meets in Seattle

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where, he was also an entrepreneur who had a talent for developing observatories and coping with numerous setbacks in funding and staffing. Where many others would have failed, Menzel succeeded in mentoring colleagues and finding sources of financial support.

The next paper was presented by **Peter Abrahams** of Lake Oswego, OR, the President of the Antique Telescope Society. His paper was, "Telescopes for solar research; from Scheiner's Helioscopium to De la Rue's Photoheliograph." Abrahams pointed out that early telescopes used for solar observation were usually standard instruments, equipped with a filter or used in projection mode. The occasional exceptions were telescopes designed or modified for viewing, drawing, or photographing the sun. Christoph Scheiner observed sunspots regularly & systematically for 15 years, beginning early



Peter Abrahams

in 1611. A simple projection telescope was replaced with his Helioscopium, which was probably the first equatorially mounted telescope. Robert Hooke published a booklet in 1676 titled "Helioscopes," filled with an array of highly ingenious telescope designs, some of which were designed for solar observation and some of which were constructed and used. Warren De la Rue designed a photographic solar telescope, built by Andrew Ross in 1857 for the use of the Royal Society to establish a continuous record of solar activity. This photoheliograph was responsible for several important discoveries. Abrahams concluded by noting that improvements in solar instruments led to major advances in knowledge of the sun. For more information about this talk, please visit Peter's website at <http://home.europa.com/~telscope/binotele.htm>, or contact him at telscope@europa.com.

Karl Hufbauer (formerly of UC-Irvine, now at U. Washington) followed with his talk, "Coronal Science and Researchers, 1860s-1970s." He started with a narrative of coronal science's highlights from the 1860s (when eclipse observers reached consensus that the corona is a solar feature) to the 1970s (when space scientists began observing stellar coronae, and in so doing imposed new constraints on coronal theorizing), and went on to discuss the backgrounds of the scientists who played the main roles in initiating fresh lines of coronal research. They tended to come to their achievements with more training in physics than astronomy, with a stronger orientation to instrument development than to astronomical observing or theorizing, and with but modest knowledge of the current state of coronal science. Their "outsider" profiles were probably a consequence of both the exceptional difficulty of observing the corona during most of this period and of the resultant smallness of the core group devoting a sizeable amount of time to coronal research. If you have any comments about this research, please contact Karl at hufbauer@u.washington.edu.

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The fourth talk was presented by **David DeVorkin** (Smithsonian National Air and Space Museum) titled, "What is a Theorist Doing in the Stratosphere?" David's paper concentrated on Martin Schwarzschild and posed a number of questions, including: how did Schwarzschild become PI on a project to study the Sun using a robotic telescope under a balloon floating in the stratosphere? And after he made observations sufficient for his needs, why did he continue to sponsor ever-larger ballooning projects? What does Schwarzschild's experience tell us about how the profession of astronomy in America changed in the years just before, and in the wake of, Sputnik? If you have anything to add to this, please contact David at david.devorkin@nasm.si.edu.

Eugene Milone (RAO, University of Calgary) followed with a paper done jointly by him and Byron Desnoyers Winmill (University of Toronto). The title was, "Possible Astronomical Alignments and the Interpretation of the Hierothesion at Nemrud Dagh." To answer your first question, a Hierothesion is a sacred resting place for the gods. And if you were wondering, Nemrud Dagh is a mountain in Turkey. They have examined the site for potential astronomical alignments of the architectural features of the three terraces of the hierothesion, constructed by Antiochus I of the ancient



Eugene Milone

Near Eastern kingdom of Commagene, on the summit of Nemrud Dagh in the Anti-Taurus range in the Anatolya region of modern Turkey. The terrain surrounding the hierothesion has been used to determine the positions of rising and setting astronomical bodies. Our evaluation of these potential astronomical alignments is consistent with an expected construction time frame in the second century B.C. They compared their conclusions to those of past studies, including that of Roger Beck, who proposed that a new dynastic cult emerged in the Middle East encouraged by the conjunction of the planets with the star Regulus. Please contact Eugene with comments at milone@ucalgary.ca.

The next speaker, **Jim Evans** (University of Puget Sound) then spoke on "The Astrologer's Apparatus: The Material Culture of an Astronomical Specialty in Greek Egypt." Jim started by pointing out that while astrology was certainly of Babylonian

origin, it was enthusiastically embraced by the Greeks in Egypt, starting in the second century BC. Astrology triumphed because it resonated with many other aspects of Greek culture: astronomy and mathematics, as well as religion and philosophy, magic and mysticism. We have half a dozen Greek and Latin manuals of astrology, written between the first and fifth centuries AD, so we know a lot about the history of astrological doctrine. However, until recently, we have known very little about the social and material circumstances of astrological consultations. Who were the practitioners? Where did they practice? What apparatus did they use? What took place in an astrological consultation? By drawing on a wide range of sources, including literary texts, mathematical papyri, engraved gems, coins, statues and mummy portraits, we can now sketch a very detailed picture of the professional practice of astrology in Greek Egypt.

The session continued with **Frank Winkler's** (Middlebury College) fine talk, on "How Bright was the 1006 C.E. Supernova? A Re-examination from 11th-Century Sources," a paper he co-authored with M. Kamal of UI-Chicago. SN~1006 is generally believed to have been the brightest stellar event in recorded human history. At maximum, it was definitely brighter than Venus, and was even compared with the Moon. Despite a southerly declination of -38 degrees, clear records of its sudden appearance are found in contemporary chronicles from Egypt, Iraq, Italy, Switzerland, China, and Japan, with additional references that may refer to sightings of the star from France, Syria, and elsewhere. Recorded observations are much more numerous and widespread than for the far more favorably positioned (for northern observers) SN~1054 that occurred in Taurus only 48 years later and that produced the Crab Nebula. Despite numerous recorded sightings, observations that can be used to estimate quantitatively the brightness of SN~1006 are few. Winkler and Kamal presented a new interpretation of the most explicit of these, a short Arabic text by the Egyptian astrologer Ali bin Ridwan (d. 1061) in a commentary on Ptolemy's Tetrabiblos. The result is in excellent agreement with a recent a posteriori estimate of peak visual magnitude $V_0 = -7.5 \pm 0.4$ based on a new measurement of the distance to the SN~1006 remnant and the absolute magnitudes for typical Type Ia supernovae.

There were then two additional late papers, the first by **André Heck** (Strasbourg Astronomical Observatory), on "Strasbourg Astronomical Observatory Archives Revisited." André concentrated on the unique position of Strasbourg in the various partitions of land between France and Germany after 1871, particu-

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HAD News is published in February, June, and October, and sent to all individual members of the Historical Astronomy Division of the American Astronomical Society. The deadline for receipt of articles, news items, and announcements is the first of the month prior to the month of publication. Please send contributions as plain text in email or as email attachments in Microsoft Word to Ronald Brashear at brashearr@si.edu.

larly in the different laws and practices that apply in France and Alsace. The key work that Andre has been involved in is on the "Inventar der Kaiserlichen Universität-Sternwarte Strassburg" found after WW2 and in the French continuation.

The final speaker was **Robert McGowan** (Pine Mountain Observatory) on "The Diary of Francis Jacobs." McGowan talked about the discovery of an astronomical diary covering the years 1898-1899 of a woman, Francis Jacobs, in Oregon. Jacobs studied post-graduate astronomy from a visiting professor of the University of Toronto, Katharine Vale. The interest in this unusual diary is so great that the Museum of the Oregon Territory and the Jacobs Foundation are planning to publish the diary.

The AAS Seattle meeting was rich in material relating to extraterrestrial life, and this was reflected in the first HAD session on Monday morning, "History of IDEAS on Extraterrestrial Life." Attendance during the session was very good with 70 people in the room at its height.

The session was kicked off by **Donald Osterbrock** (UC Observatories / UC-Santa Cruz / Lick Observatory) with his talk, "America's First Carl Sagan: Ormsby MacKnight Mitchel, Pre-Civil War Astronomer and Lecturer on the Cosmos." In the years before television, videos, radio, movies, or even loudspeakers, Mitchel (1809-1862) was the best-known popularizer of astronomy and the scientific study of the universe in nineteenth-century America. Each winter he traveled the country by railroad, steamer, and stagecoach, speaking to large paying crowds in principal cities from Boston, New York, and Philadelphia, through Cincinnati to New Orleans, on the cosmos and our place in it, with special attention to possible inhabitants of planets orbiting other stars. Mitchel had much the same attraction as Sagan did in our time, and awakened many people's interest in astronomy through the human angle, as Carl did. His argument was simple, and according to Frank Triplett goes back thousands of years: other stars are suns, our sun has planets with people on one of them, why should not other stars also have populated planets? But first Mitchel, like Sagan, always explained clearly the discoveries of astronomy that fleshed out this argument with facts. He emphasized the "clockwork universe," governed by gravity, that Newton, Herschel, and Laplace had investigated and found to be stable. There were many other similarities between these two great popularizers. Mitchel's base was the Cincinnati Observatory, which he had founded, raising the funds for it himself in small contributions from hundreds of "members," which he publicized as far more democratic than support from European kings and lords. He went abroad to get a telescope, and finally found his "Great [12-inch] Refractor" in Munich, with help from John Quincy

Adams, Astronomer Royal George Biddle Airy, and Paris Observatory Director François Arago, in spite of a rebuff by President John Tyler. These episodes have similarities in Sagan's lobbying NASA for close-up images of Mars.

Going out of order from the official program, **Woody Sullivan** (U. Washington) followed with "From Ozma to Cyclops: The Beginnings of American SETI, 1959-70." The modern era in SETI (Search for Extraterrestrial Intelligence) began with two independent proposals in the late 1950s. In 1959 Phillip Morrison and Giuseppe Cocconi at Cornell published a short theoretical paper in *Nature*, while simultaneously Frank Drake at the brand-new NRAO in West Virginia developed a receiver for the first radio observations, called Project Ozma. In 1960 Drake monitored two nearby solar-like stars, Tau Ceti and Epsilon Eridani, for several months with a scanning one-channel radiometer at 21-cm on an 85-ft diameter dish. Drake's interest, along with that of his boss Otto Struve, then led to a remarkable small meeting at Green Bank in 1961, at which time the Drake Equation was first put forth as an organizing concept for estimating the possible number of extraterrestrial civilizations. The next milestone was the appearance of *Intelligent Life in the Universe* by Iosif Shklovsky and Carl Sagan (1966), which widely circulated the idea of SETI. The growth of NASA's exobiology program (although primarily focused on microbial life and the origin of life) throughout the 1960s also legitimized the field and culminated in the Viking mission to Mars in 1976. In 1970 NASA sponsored a large summer workshop charged with the task of designing a feasible radio telescope for SETI. The resulting report, "Project Cyclops: A Design Study of a System for Detecting Extraterrestrial Intelligent Life" (1971), was the first detailed look at all aspects of the problem, and set the tone for future NASA involvement in SETI. The talk featured a tape recording of a talk given by Drake in 1960 even as Project Ozma was in progress.



Woody Sullivan

Joann Palmeri of Norman, OK, followed with "Harlow Shapley's Biological Universe: Cosmic Evolution and its Uses." Shapley was an astronomer with a lifelong interest in biological questions. During his years in California, Shapley made frequent trips to La Jolla biological station and interacted with prominent biologists. At Harvard in the 1920s Shapley initiated a series of interdisciplinary seminars, one of which was on "The Origin of Life." At this time he also displayed an interest in the question of



Don't you wish you were here? HAD frenzy at the Sunday session!

life in the universe. In response to an inquiry from Charles Abbot of the Smithsonian, Shapley identified "life in the universe" as one of the most important scientific questions of the day. Shapley's continuing interest in these questions found expression in his many popularizations - articles, books, lectures, and other media. (A decade before Sagan's memorable appearances on the Johnny Carson show, Shapley was engaging in his own dialogue with the American public on life in the universe, through Tonight Show host Jack Paar). Evolution was the idea that underlay Shapley's discussions of these biological themes and the vehicle through which he popularized science as well as his own vision of the wider significance of science for humanity. As an astronomer with a profound interest in biological subjects, Shapley was uniquely positioned to popularize cosmic evolution, and to use this theme to promote his belief that science could serve as a kind of "stellar theology." Shapley's promotion of cosmic evolution throughout the 1950s and 1960s can be understood against the backdrop of developments in the sciences as well as the historical and personal factors that shaped his career as a spokesman for science. Contact Joann at palmerij@ou.edu.

Steve Dick (USNO) closed the session with "Billions of Planetary Systems: Turning Point at Mid-20th Century." The search for planetary systems, an elusive goal for most of the 20th century, is reminiscent of the search for stellar parallax in earlier centuries. Of the latter, John Herschel once wrote that it seemed within reach of the astronomer, "only to elude his seizure when apparently just within his grasp, continually hovering just be-

yond the limits of his distinct apprehension, and so leading him on in hopeless, endless, and exhausting pursuit."

Such was the case for planetary systems, until the discovery of pulsar planets in 1992, and of planets around solar-type stars beginning in 1995. For the early decades of the century the Jeans-Jeffreys tidal theory of planet formation via close stellar encounters predicted that planets should be very rare. But the 15 years between 1943 and 1958 saw a remarkable turning point in the fortunes of planetary systems. It began with Russell's criticism of the Jeans-Jeffreys theory, but was fueled by the revival of a modified nebular hypothesis (von Weizsacker, 1944), developments in fields as diverse as double star astronomy (Kuiper, 1951), the measurement of stellar rotation periods (Struve, 1950), and geochemistry (Urey, 1952) and—most surprising of all—by claims that planetary systems, or their effects had actually been observed (Strand, 1943; Reuyl and Holmberg, 1943). Struve (1952) even suggested a means for planet detection by the radial velocity method. As Harlow Shapley made clear in his work, *Of Stars and Men: Human Response to an Expanding Universe* (1958), the new cosmology was a continual force in the background favoring abundant planetary systems. All this work was in the background as Peter van de Kamp played out his solitary search for planetary systems, culminating in the announcement (1963) of a planet around Barnard's star. The limits that Herschel spoke of have now been breached, and the search is no longer solitary.

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