H·A·D NEWS

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

Number 101 * April 2023

In This Issue

The January 2023 HAD Meeting

Ken Rumstay, Valdosta State University

Just seven months after meeting in Pasadena, the American Astronomical Society and its Historical Astronomy Division (along with the High Energy and Laboratory Astrophysics Divisions) met in Seattle. The AAS has held its winter meetings in Seattle every four years since the turn of the century, and (according to Executive Officer Kevin Marvel) Seattle is one of the membership's favorite venues. At the Tuesday evening 40+E reception he claimed that some members measure time in four-year units called "Seattles"!

Our meeting began at 3:00 pm on Sunday, January 8th, with a special session organized by Jennifer Bartlett, Chair of the Working Group on the Preservation of Astronomical Heritage (WGPAH). In her introduction, Jennifer informed us that the AAS has charged the WGPAH "with

Entrance to the Seattle Convention Center, site of the January AAS and HAD meetings. Please note that this photograph was *not* taken during the meeting; it rained pretty much all that week!

establishing criteria and priorities for identifying heritage material and with disseminating best practices for preserving heritage resources so that our scientific legacy remains available for research, teaching, and outreach."

The next speaker was Tom Hockey, who described the Report from the Task Force on Historic Site Designation which had been presented for consideration to the AAS Board of Trustees. HAD member Virginia Trimble had suggested in 2021 that the AAS might consider operating an Historic Sites Designation program similar to that run by the American Physical Society since 2005. The AAS asked the WGPAH to investigate the feasibility of the proposed program.

There followed four talks by invited speakers on various topics related to the preservation of astronomical artifacts of historic interest. The final one, by historian Bart Fried (Founder and Past President of the Antique Telescope Society), was presented remotely via Zoom; the other speakers were in attendance in person. While the shift to hybrid meeting has not been an unmixed blessing (there was no lack of technical issues to be resolved), one cannot question the fact that it has allowed many individuals who would not be able to attend in person to participate!

At 5:30 pm the WGPAH held its annual meeting, with several members attending via Zoom. Julie Steffen (AAS Chief of Publishing Services) reported on the current status of the Abt archives. This collection of documents from Helmut Abt's years as Editor of the *Astrophysical Journal* are currently stored in approximately 450 boxes in NOIRLab's solar laboratory. Earlier reports on the preservation of these materials may be found in *HAD News* #89, pp.6-7 and #91, p. 7. Julie stated that at present there are no plans to digitize these documents.

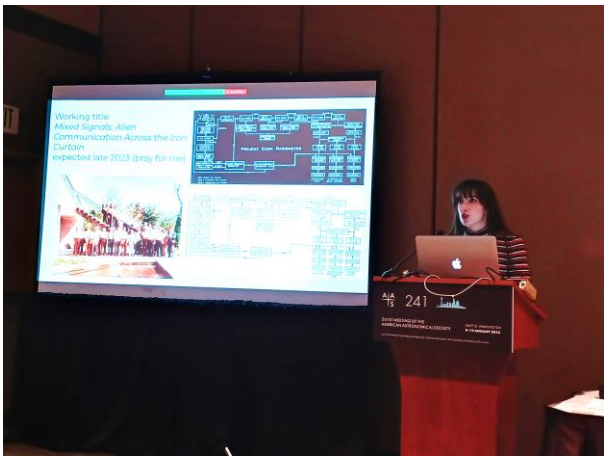
Next on the agenda was Thomas Hockey, who reported on the work of the Task Force on Historic Site Designation. Kevin Schindler then reported on the recently formed Alliance of Historic Observatories (*HAD News* #99, p.11); their next meeting will be at the Yerkes Observatory.

Joining remotely, Ken Kellerman informed us of the threat facing the famous radio telescope in Holmdel, New Jersey. This was of course used by Arno Penzias and Robert Wilson to detect the 3K cosmic microwave background radiation in 1963. Although designated a National Historic Landmark in 1988 and a "historic physics site" by the APS in

The meeting began with Jennifer Bartlett opening Sunday's special session "Got Stuff? How We Deal with Possible Astronomical Heritage Material."

Staged photograph used to promote the Boeing Observatory (at the South Carolina State Museum) as a wedding chapel. According to speaker Bart Fried, "Quite a few observatories have realized that they can be money-makers for weddings, concerts, and private events."

Members Tom Hockey and Jennifer Bartlett supervise the HAD table in the exhibition hall. Located next to the AAS booth, we enjoyed a lot of traffic and attracted several new student members. The HAD banners, picturing famous astronomers of the past, were located at the hall's entrance.



At the HAD III oral session on Monday afternoon, Rebecca Charbonneau described how SETI and the Department of Energy face very similar problems in determining how to effectively and unambiguously communicate with beings from another world and with humans in the far-distant future.

New HAD Chair Terry Oswalt presents the 2023 Donald E. Osterbrock Book Prize to Peter Broughton for his biography *Northern Star: J.S. Plaskett*. We thank Peter for traveling from Toronto to join us!

The meeting ended with our traditional HAD Minibanquet at the Elephant & Castle British Pub and Restaurant. Terry offered a toast to a successful meeting.

2008, the antenna is located on private property and receives no federal funds. On November 22nd the Holmdel Township Committee passed a resolution asking the town's Planning Board to determine if the site should be designated "an area in need of redevelopment." If the town permits development of the site, most likely to build high-density residences, the Horn could be removed or even destroyed. A report on the situation appears on page 14 of this issue, and more information may be found in a recent *Sky & Telescope* article.

On Monday we enjoyed two sessions of contributed oral talks. The 10:00 am HAD II session ("Pre-20th Century") consisted of seven talks on subjects ranging from early Arabic astronomy to the solar eclipse of August 1869, while the afternoon HAD II session ("The 20th Century and Beyond") featured seven speakers describing more recent topics. Four iPoster presentations (HAD IV) were available for viewing in the Exhibition Hall. Abstracts for all of these presentations may be found on our meeting website.

The final half-hour of the afternoon session was devoted to the presentation of the 2023 Donald E. Osterbrock award to R. Peter Broughton, for his book *Northern Star: J.S. Plaskett*. In his talk "Meet the Neighbours: J.S. Plaskett and Other Canucks" he described some highlights of Canadian astronomy drawn from the book. We were honored to have Laura Osterbrock, Donald's daughter, join us for that session!

The HAD Town Hall, our annual business meeting, was held at 2:45 pm (between the HAD II and HAD III sessions). A report on that meeting appears on page 8 of this issue.

With only fourteen contributed oral presentations there was no need for a session on Tuesday morning. The final event of this year's meeting was the traditional "minibanquet", held at the nearby Elephant & Castle British Pub and Restaurant. About two dozen people attended and, despite the rain, a good time was had by all.

Again, abstracts for all of the presentations may be found on our website at https://had.aas.org/sites/had.aas.org/files/HAD%20meeting%20schedule%20and%20abstracts%20(January%202023).pdf.

On the whole it was an excellent (though rainy) meeting, and it was good to see so many friends again. We hope to see you next January in New Orleans!

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From the Chair

Terry Oswalt, Embry-Riddle Aeronautical University

This is my first report to the HAD membership since receiving the gavel from Kevin Krisciunas at the HAD Town Hall during the January AAS meeting in Seattle. Kevin, thanks once again for your leadership these past several years.

The high point of the past few months for HAD was the January AAS meeting in Seattle, only the second in-person meeting since the pandemic—it was my first. HAD's activities began at the AAS Strategic Assembly, chaired by AAS President Kelsey Johnson on Sunday, January 8th. Each AAS Division, Working Group and Task Force provided a short update on their most recent activities. Kevin Krisciunas represented HAD.

Our Secretary, Ken Rumstay, has provided a summary of HAD activities in Seattle elsewhere in this Newsletter, so I'll just hit a few highlights here. Jennifer Bartlett kicked off our first HAD session on Sunday January 8th with a discussion of the Working Group on the Preservation of Astronomical Heritage's (WGPAH) efforts to find and preserve documents such as editorial records of the *Astrophysical Journal*. Thomas Hockey introduced an initiative to establish a committee on the preservation of historic astronomical sites such as the microwave horn with which Penzias and Wilson discovered the cosmic microwave background. Following a full slate of very interesting talks, both topics filled out our afternoon WGPAH splinter session.

That evening, Barbara and Woody Sullivan (who reside in Seattle) graciously hosted a dinner party for the HAD officers and a few friends. The high point of the evening was a tour of Woody's home study, the ceiling of which is a custom-painted sundial fed by reflected sunlight from his window—it is something akin to an astronomical "Sistine Chapel"!

Day two of our HAD meeting (Monday, January 9th) was again filled with lively talks, culminating in the HAD Town Hall, at which I had the pleasure of presenting the 2023 Donald E. Osterbrock Book Prize for Historical Astronomy to Peter Broughton for his book *Northern Star – J.S. Plaskett*. The conclusion of this very busy day was the HAD "minibanquet" at the Elephant & Castle, a few blocks from the convention center.

Between sessions, we informally kicked around some new initiatives for HAD. For example, could we serve other AAS divisions by cosponsoring special sessions devoted to their special histories? There is a growing number of student and early-career HAD members. How best might we serve and engage them? Let us hear your opinions on what initiatives we should pursue—and please volunteer to help make your idea work!

HAD member Steve Dick and I recently responded to an inquiry by American Institute of Physics

Kevin Krisciunas (left) hands the HAD gavel to incoming HAD Chair Terry Oswalt at the January 2023 AAS meeting in Seattle, Washington. (*Photo by Ian McLennan*)

Woody Sullivan's study with its hand-painted sundial calendar ceiling. Admiring the artistry are, from left to right, Brad Schaefer, Tom Hockey, and Woody Sullivan. (*Photo by T. Oswalt*)

writer Corinne Mona, who recently completed an article on the history of HAD's obituary program for the AIP Newsletter. She has graciously given us permission to reproduce her article in this issue of *HAD News* (page 12).

Did you know that we published the 800th AAS obituary this year? We've been working very hard to clear the AAS list of needed obituaries. Over 140 obituaries have been published during the past couple of years, many of them were for colleagues who died many years ago (see Figure 1 below). At this moment authors are tentatively committed to write about a dozen more. Even so, about three dozen deceased colleagues still await a volunteer to write an obituary for them (most died three or more years ago—see Figure 2). We could easily clear the list of needed obituaries AND keep up with new requests if you do your part. Your draft can be a simple MS Word, email, or text file. The turn-around time between approval of your draft and publication is usually just a matter of days. AAS obituaries are referenced in the NASA ADS and comprise a valuable record of what the astronomical community was doing throughout our history.

Thanks to those of you who have already helped give a proper tribute to the friends and colleagues that are no longer with us. Will you do your part to clear the list? If so, please send a note to Allyn Smith, our new Vice Chair / Chair Elect.

terry.oswalt@erau.edu

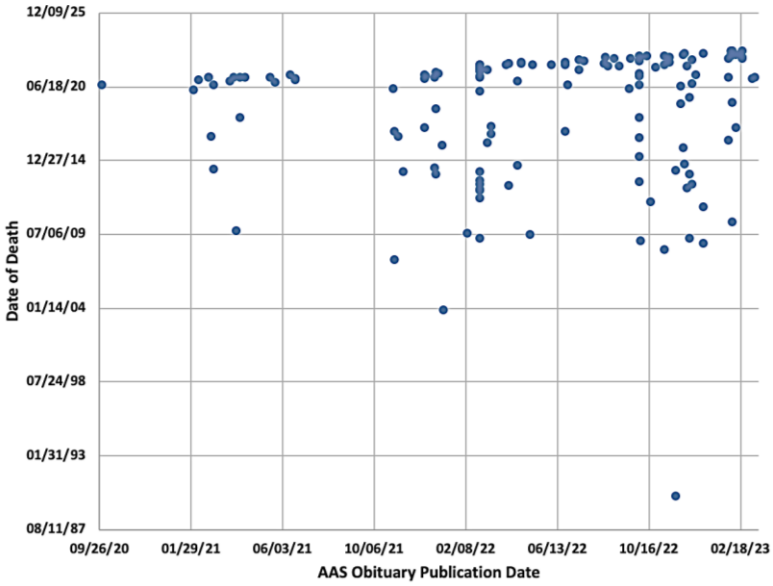


Figure 1: AAS obituaries published during the last two years.

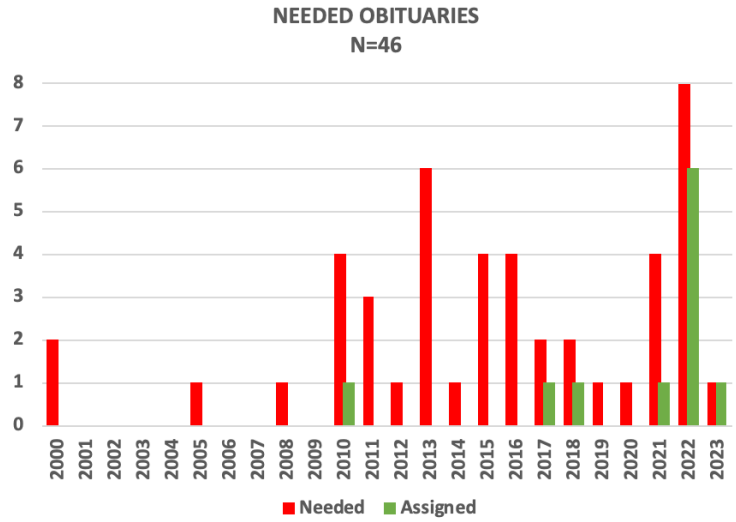
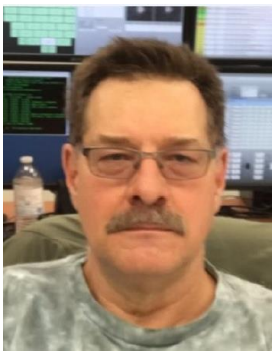


Figure 2: Current status of AAS obituaries. Green bars denote 11 obituaries for which authors have tentatively committed; red bars denote all 46 colleagues who still deserve an obituary.



From the Vice Chair

J. Allyn Smith, Austin Peay State University

This has certainly been a busy, and interesting, few months. I was looking forward to the first "in-person" AAS meeting in nearly four years in Seattle, but got way-laid by a minor medical issue, now solved. I did attend some of the meeting via Zoom and remembered why I really do not like virtual meetings. I spent more time than I should have attending to technical issues with the connection interfaces and not enough time actually being in the sessions. Toss in "can you do just one more thing" requests from the Dean and Provost and my week was shot. I did manage to make most of the HAD Business Meeting and heard about half of it. I'm looking forward to New Orleans in January 2024.

The primary function of the Vice Chair is to stay on top of the obituaries for our colleagues who have passed on. Terry sent me his files and I am going through them to see how to proceed. Though I'm falling behind a bit, I am making progress (if drowning is considered treading water) and will get caught up soon. I've started looking through the on-line files of published obituaries which the AAS has and occasionally I notice a name that is missing but I want to make sure I'm not overlooking something before I try to secure additional obituaries. In most of these cases I assume, or know, the obituary exists but possibly has not been forwarded to the AAS. More in this vein as it develops. Most importantly I want to thank the membership for their support in this important task.

Our membership growth has been outstanding in the past few years. I feel the no-cost option for students and emeritus members might be the main reason for this growth, but it probably is not the only one. I know my students are interested in this feature when I talk to them about our Division. Whatever the reasons, it is nice to see the growth and most importantly it is not concentrated in one age group.

I will close without additionally waxing poetic, which is good as all I write is haiku. I look forward to serving you for the next few years and to working with the other officers as we carry the HAD banner. Looking forward to seeing everyone in New Orleans; it will be upon us before we know it.

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From the Past Chair

Kevin Krisciunas, Texas A&M University

On the Sunday of the AAS meeting in Seattle (January 8th) I attended the all-day Strategic Assembly meeting of AAS administrators, officers, division heads, and other interested people. One of the questions that came up was this: "Why has the AAS and the Historical Astronomy Division not made known to the Society and to the people of the United States the remarkable life of Frank Kameny?" I was unfamiliar with this name. It turns out that Frank Kameny (1925-2011) was an astronomer and, most notably, a civil rights advocate. An online obituary (Kinne 2011) is available at the AAS website, from which I quote below.

Frank Kameny studied RV Tau stars and yellow semiregular variables from 1952 to 1954. He earned a Ph. D. in astronomy from Harvard in 1956, and the next year was hired by U. S. Army Mapping Service. However, "His astronomical career was terminated when he was fired from this position due to the discovery of his sexual orientation. Denied his first occupation as an astronomer, Kameny became a pioneer in the struggle for equal rights and was involved in many issues leading to just and equitable treatment of all people. One of his most notable achievements was working for the removal of homosexuality from

the American Psychiatric Association's manual of mental disorders. One of his most recent achievements was helping to push through the Washington, DC, marriage equality act."

A more extensive account of Kameny's life, including photos and copies of key documents, can be found at this link (accessed February 9, 2023): https://artsandculture.google.com/story/OAXhX_1Z90rAJg

Less well known than the Red Scare of the 1950s (the purge of Communists and suspected Communists working for the U. S. Federal Government) was the Lavender Scare, which relates to the purge of gays and lesbians from the government at the same time. I recommend the monograph published by David K. Johnson:

The Lavender Scare: The Cold War Persecution of Gays and Lesbians in the Federal Government, by David K. Johnson (University of Chicago Press, 2004, ISBN-13: 978-0226404813). Also available in paperback and as a Kindle e-book.

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From the Secretary-Treasurer

Ken Rumstay, Valdosta State University (Emeritus)

Greetings, everyone, and welcome to a new year! It was wonderful to see so many of you at our Seattle meeting a few months ago. It was of course a hybrid meeting, and while we were plagued by some technical issues, I hope that our online participants enjoyed the presentations.

Hybrid AAS (and HAD) meetings will, it appears, be the norm for the foreseeable future. The issue has been discussed extensively by the officers of the AAS. In-person meetings are recognized as being vitally important, especially for early-career astronomers; at the same time the hybrid format allows the possibility (if required by future events) to rapidly transition to an online format. Of course, it also allows individuals to participate who may be unable to travel for financial or other reasons. As we grumble about our meeting registration fees, we should recall that a hybrid meeting is considerably more expensive than an in-person one! According to AAS Executive Officer Kevin Marvel, making the Seattle meeting hybrid added roughly $260,000 to the cost.

In our last issue I'd made a reference (with regard to the importance of recording obituaries of our colleagues) to Dr. William Pinson, my freshman-year astronomy professor at MIT. I was very gratified to hear from other HAD members who had also been enrolled in his class, and who recalled him with great fondness!

In his two years as Vice Chair, Terry Oswalt has done an outstanding job in obtaining obituaries for recently deceased AAS members. Terry is now Chair, and Vice Chair Allyn Smith is continuing that important work. But one member of the HAD Executive Committee is not elected by the membership. The Secretary-Treasurer is appointed by the Chair and Vice Chair. With the January 2024 Town Hall I will have completed a second four-year term as Secretary-Treasurer, and the HAD Bylaws prevent me from continuing in that capacity beyond that. At that point we'll need a new Secretary-Treasurer. If you think you might like to fill that office (I must say I've found it very rewarding), please contact us!

Finally, if you are an AAS member and need to update your Membership Profile, please do so as soon as possible. Diane Frendak has kindly prepared a new video which demonstrates the procedure for doing so.

I wish you all the best in the coming months, and hope to see you in New Orleans in January!

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One aspect of the Seattle meeting which made me laugh was the key cards provided at the Sheraton Hotel. I'm not sure what the relation is between cats and the Carina Nebula, but I am fairly certain that this is *not* what the JWST observed!

Report on the 2023 HAD Town Hall

Ken Rumstay, Valdosta State University

The 2023 HAD Town Hall convened at 12:45 pm on Monday, January 9th, in Room 614 of the Seattle Conference Center. About two dozen people were in attendance.

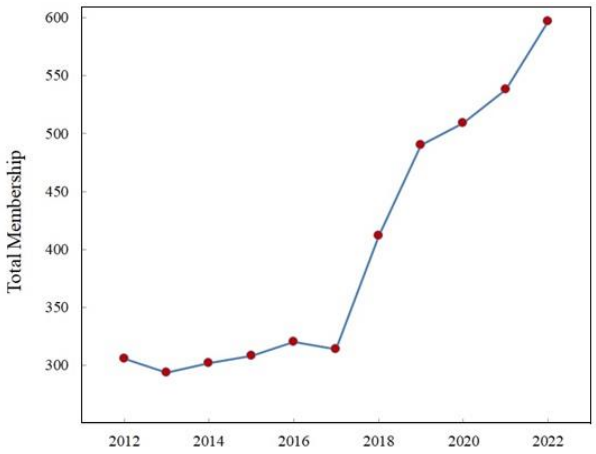
Chair Kevin Krisciunas welcomed everyone to the meeting and presented statements from a few well-known researchers in the history of astronomy. He then stated that HAD's annual report to the AAS had been submitted in March of the previous year, and that all three current HAD officers had attended the AAS Strategic Assembly on Monday. He further noted that the 2023 Osterbrock Prize would be presented to Peter Broughton at 3:00 that afternoon (in the HAD III session), and reminded everyone of the HAD minibanquet that evening.

Stepping to the podium, Vice Chair Terry Oswalt described the progress made during the previous year with regard to obituaries of deceased AAS members. More than thirty years have elapsed since the Historical Astronomy Division assumed responsibility for procuring and publishing these tributes (see the article by Corinne Mona on p. 12), and Terry proudly noted that more than 800 had been published in the *Bulletin of the American Astronomical Society* as of 2022! The data which Terry presented at the Town Hall appears in his column on page 5 and will not be repeated here. He challenged those in the audience, and indeed all HAD members, to help reduce the backlog of needed obituaries. He concluded by naming forty-two colleagues who had passed away in 2022; we observed a moment of silence in their memory.

As HAD's Secretary-Treasurer, I then presented data related to the health of the Division. Our membership has grown significantly during the past five years, as demonstrated in the chart at right. During the first fifteen years of the 21st century our numbers held steady at approximately 300 members (in all categories). In 2018 our membership began to grow at a steady rate, and at the end of 2022 stood at 597! The causes of this doubling in membership are not well-understood, but probably reflect our decision to no longer charge dues to student or emeritus members, and to the creation of new membership categories (notably the amateur affiliate) by the American Astronomical Society.

Unfortunately (but not surprisingly), our finances are not in as good shape as in past years. The table

After welcoming attendees to the January 2023 HAD Town Hall, Chair Kevin Krisciunas offered thanks to the outgoing officers and Committee members for their years of service.



Graph illustrating the dramatic growth in HAD membership over the past decade. All membership types are included; the totals are for December 31st of each calendar year.

HAD Membership as of 2022 December 31

#		Member Classification
171	F	AAS Full Member
145	E	AAS Full Emeritus Member
94	GR	AAS Graduate Student Member
95	JR	AAS Undergraduate Student Member
33	AM	AAS Amateur Affiliate
21	HAD	HAD Division Affiliate only
25	ED	AAS Educator Affiliate
2	DA	Division Affiliate (two or more divisions)
5	IA	AAS International Affiliate
4	Staff	AAS staff member
1	P	AAS Patron Member
1	SPS	SPS Member (?)
597	Total	

Distribution of HAD membership among the various membership categories, as of 2022 December 31.

below tracks the start-of-year balances for HAD's three accounts during the past three years. Those balances had been slowly but steadily increasing for several years. The increase seen for 2022 was, in a sense, artificially large. In a typical year most of our income comes from investment, and the stock market performed rather well during 2021 despite the pandemic. However, because of that same pandemic we had no in-person meetings that year and saved on the usual meeting expenses. But then in 2022 the stock market turned south (resulting in a loss of income) and the June hybrid meeting in Pasadena incurred numerous costs. Kelly Clark, the AAS Chief Financial and Operation Officer, assures me that the market will recover. I try to avoid predicting the future myself as much as possible, but at least for the foreseeable future, HAD is in good financial shape. A summary of income and expenses for the calendar year 2022, provided by Kelly, appears at bottom.

Balance as of January 1st	2021	2022	2023
HAD Operating Account	$36,952.63	$46,653.70	$41,714.24
LeRoy E. Doggett Prize Fund	$51,385.62	$57,252.03	$46,674.93
Donald E. Osterbrock Prize Fund	$41,224.53	$45,955.51	$42,699.34
Total:	$129,562.78	$149,861.24	$131,088.51

AMERICAN ASTRONOMICAL SOCIETY
Historical Astronomy Division
For the Twelve Months Ending Saturday, December 31, 2022

	HAD Operating Budget	Doggett Prize Fund	Osterbrock Prize Fund	Totals
Revenue				
Individual Dues	3,557.50			3,557.50
Contributions	1,595.00	656.00	3,033.56	5,284.56
Interest	678.27	838.38	668.14	2,184.79
Investment Expense Offset	(82.91)	(99.60)	(79.57)	(262.08)
Distributed Market Value	(6,901.20)	(8,530.29)	(6,797.91)	(22,229.40)
Total Revenue and Transfers	**($1,153.34)**	**($7,135.51)**	**($3,175.78)**	**($11,464.63)**
Expenses and Transfers				
Printing	220.09			220.09
Service Charges	128.81	16.40	75.84	221.05
Non-Capitalized Equipment	327.35			327.35
General Mailing Charges		59.73		59.73
Domestic Travel	2,787.07	1,950.90		4,737.97
Prize Awards		1,000.00		1,000.00
Prize Certificates		219.75		219.75
Transfer (Division Affiliate)	115.00			115.00
Transfer for Admin Fee	207.80	194.81	4.55	407.16
Total Expenses and Transfers	**$3,786.12**	**$3,441.59**	**$80.39**	**$7,308.10**
Surplus/(Deficit)	**($4,939.46)**	**($10,577.10)**	**($3,256.17)**	**($18,772.73)**
Begining Balance (Yr.)	**$46,653.70**	**$57,252.03**	**$45,955.51**	**$149,861.24**
Ending Balance (Yr.)	**$41,714.24**	**$46,674.93**	**$42,699.34**	**$131,088.51**
CC Fees	128.81	16.40	75.84	221.05
Admin Fees	207.80	194.81	4.55	407.16

That report shows that contributions by HAD members account for a substantial fraction of our financial resources. We acknowledged them at the Town Hall, and I would like to do so here. If you donated to HAD in 2022 and don't see your name here, please contact me at once!

Individuals who Donated to HAD During 2022

Jennifer L. Bartlett
William T. Bridgman
Bella C. Chiu
Edward B. Churchwell
Brenda G. Corbin
Thomas E. Corbin
Harold G. Corwin, Jr.
Donald R. Davis
David H. DeVorkin
David W. Dunham
Joan Bixby Dunham
Denis A. Elliott
Thomas R. English III
Donald E. Groom
Arnold M. Heiser
David C. Jenner
Kenneth I. Kellermann
Carol LePage
Jeffrey Linsky
Julie H. Lutz
Harold A. McAlister
Stephen C. McCluskey
Liam McDaid
Simon Mitton
Alice K. B. Monet
Terry D. Oswalt
Robert A. R. Parker
Kenneth S. Rumstay
Woodruff T. Sullivan, III
Thomas R. Williams
Robert F. Wing

I ended my report by reminding members of the many resources available on HAD's website and of our publications (*HAD News* and *This Month in Astronomical History*). I also noted that we are soliciting nominations for the 2024 LeRoy E. Doggett Prize and proposals for special sessions at our next meeting. HAD is scheduled to meet on January 7–9 in conjunction with the 243rd meeting of the American Astronomical Society at the New Orleans Memorial Convention Center in Louisiana.

Next on the agenda was Thomas Hockey, Chair of the WGPAH Task Force on the proposed AAS Historic Site Designation initiative. He reviewed that proposal and noted that the AAS had instructed the WGPAH to proceed by preparing a formal proposal for funding the project.

After Tom came Jennifer Bartlett, who chairs the Working Group on the Preservation of Astronomical History and Heritage. Speaking in her capacity as Editor of the forthcoming third edition of the *Biographical Encyclopedia of Astronomers* (commonly referred to as *BEAIII*), she asked for assistance in preparing the forthcoming work. A related article appears on the following page.

The 2023 HAD Town Hall concluded with Kevin's turning the gavel over to Terry (image on page 4). As Past Chair, Kevin will oversee the HAD Prize Committee for the next two years.

The January 2023 AAS Strategic Assembly

Kevin Krisciunas, Texas A&M University

On the second Sunday of January, at the start of the Seattle AAS meeting, the full-day Strategic Assembly Meeting took place. Participants and speakers included the AAS President (Kelsey Johnson), Executive Officer (Kevin Marvel), and Secretary (Alice Monet). HAD was represented by its Executive Committee: Ken, Terry, and myself.

Such a meeting, attended by the society's top leaders, officers from all six AAS divisions, and AAS staff, gives us first of all the opportunity to connect faces to names, as we primarily communicate via email and were not able to get together in person for 2½ years owing to COVID. The Strategic Assembly also gives the opportunity to review the society's mission statement, vision statement, list of values, and priorities. Of course, we support science education, professional training, and the dissemination of knowledge through publications and public outreach. We advocate the preservation of dark sky sites and controls on space debris. We must develop and implement a plan for the role of the AAS in mitigating climate change, not just for astronomical observing but also for the preservation of life on Earth. As a society we continue to implement and support equitable, diverse, and inclusive practices so that all society members have a fair chance to succeed in their professional endeavors and are not disadvantaged by their ethnicity, gender, gender orientation, or sexual orientation.

Issues discussed of significance to HAD included:

- Are AAS Liaisons needed for AAS Division? It was noted that these aren't "used" much by their respective divisions. No change in the current structure is intended.
- What more could divisions do to engage their members? The online Frontier Seminar Series organized by the High Energy Astronomy Division was presented as a model.
- Should the AAS provide more financial support for invited speakers? It was noted that different speakers might have different needs. This issue continues to be discussed.

It was a privilege to represent our Division at this meeting!


Authors Sought for *BEAIII*

Jennifer Bartlett, AAS Fellow, and
Philip Nicholson, Cornell University

The editors of the forthcoming third edition of the *Biographical Encyclopedia of Astronomers* are soliciting authors for brief articles about the following astronomers:

Henri Andrillat (1925-2009)
Arthur (Art) Davidsen (1944-2001)
J. Bev Oke (1928-2004)
Herbert Rood (1937-2005)
José Sérsic (1933-1993)
Natarajan Visvanathan (1932-2001)

If you are interested, please contact the editors-in-chief. For more information about writing for the Encyclopedia, please visit the project website at https://meteor.springer.com/project/dashboard.jsf?id=246 .

Abraham Sharp, Anyone?

Did you write a biography of Abraham Sharp (1651–1742) for the first edition of the *Biographical Encyclopedia of Astronomers*, or think you know who did? Unfortunately, the article has been misattributed for years. The current editors would like to correct this mistake so that the piece can be included in the third edition. Sharp built astronomical instruments for Flamsteed, Newton, and others.

If you can help, please contact Jennifer Bartlett or Phil Nicholson directly. And thank you!

Portrait of Abraham Sharp from *Life and Correspondence of Abraham Sharp* by William Cudworth. Image credit: Public domain via Wikimedia Commons (https://commons. Wikimedia.org/wiki/File:Sharp_Abraham.jpg).

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Biographies are needed for these six individuals! Top row, left to right: Henri Andrillat, Arthur Davidsen, and J. Bev Oke; bottom row, left to right: Herbert Rood, José Sérsic, and Natarajan Visvanathan. Images courtesy of Geneastar (Andrillat), the AIP Emilio Segrè Visual Archives, John Irwin Slide Collection (Oke and Rood), the AIP Emilio Segrè Visual Archives, Physics Today Collection (Davidson), Dpaz2118, CC-SA (Sérsic), and Faulker, Freeman, & Noris 2002, CC-BY (Visvanathan).

For a Tribute and for History: The Historical Astronomy Division's Obituary Program

Corinne Mona, American Institute of Physics

This article was originally written for the American Institute of Physics History Newsletter, Vol. 55, No. 1 (https://www.aip.org/history-programs/history-newsletter). It appears here by kind permission of the author.

Unquestionably, obituaries are a vital resource for historical research. While many texts and objects in research can require context and background knowledge in order to make sense, conversely, obituaries are written to be easily understood by the average reader, making them a highly accessible historical resource. They can provide colorful details about a person's life and situation, information about their careers, families, and the people they knew, as well as basic facts such as place of residence and date of birth and death that might be difficult to find elsewhere. It is easy to find obituaries of famous people, but what about lesser-known people who nonetheless contributed to a field? This is the problem that the Historical Astronomy Division (HAD) of the American Astronomical Society (AAS) set out to fix for the field of astronomy in the late 1980s to early 1990s.

"AAS members felt that, except for famous astronomers who get obituaries in [big] publications, there was no venue for regular members' astronomical and historical contributions to be recorded for the future," says Terry Oswalt, HAD Chair, on the early days of the program. HAD's obituary program, which publishes obituaries of AAS members in AAS's publication *Bulletin of the American Astronomical Society (BAAS)*, was proposed by Steve Dick and other AAS members in 1989. After a bureaucratic process within the AAS, which involved setting up a committee, finding a home for the obituaries within the *BAAS*, and asking for a waiver for page charges, the first obituaries appeared in print in 1992, featuring 14 astronomers.

Since 2010, *BAAS* has been an online-only and free-to-read publication, along with its obituaries section. The program has grown enormously from its initial 14 obituaries, and today, you can freely access its robust 900+ obituaries at https://baas.aas.org/obituaries. Whose obituaries might you find? The selection ranges from students, to amateurs, to support people, to "regular" astronomers, to "famous" astronomers. A small sampling includes Margaret Burbidge, Edgar Everhardt, John Fountain, Jose Flores-Velazquez, Ruth Freitag, Riccardo Giacconi, Roger Griffin, Arlo Landolt, Eugene Parker, Jay Pasachoff, Elizabeth Roemer, and Caroline Shoemaker.

When asked about the purpose and value of the obituary program, Terry Oswalt remarks:

"These obituaries record what the general astronomical community was doing across time; without them, only the most seminal contributions would be referenced in the literature. What the majority of the astronomical community was doing would not otherwise be represented in the records available to future historians."

The obituary program would not exist without the ongoing efforts of people in the astronomy community. Dear reader, you can get involved with this growing historical effort!

- Read and use the obituaries in your research (and perhaps bookmark https://baas.aas.org/obituaries).
- Write an obituary! Find the running list of people who need obituaries written for them and contact information at https://had.aas.org/obituaries/outstanding-obits.
- The obituary program depends entirely on the network of astronomical colleagues, including astronomy department and observatory administrators, for notification when an astronomer has died. Please contact current Vice Chair/Chair-Elect J. Allyn Smith at smithj@apsu.edu to announce the passing of a colleague or to volunteer to participate in the writing of an obituary.
- Spread word of the obituary program to your colleagues interested in the history of astronomy.

Many thanks to Terry Oswalt and to Steve Dick for their crucial contributions to this article.

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"Elegant, wise, fair, knowledgeable, original, and fiercely determined, Eleanor Margaret Burbidge was one of the great observational astronomers of the past century."

Quote from Eleanor Margaret Burbidge's obituary by Jeremiah Ostriker and Kenneth Freeman. Credit: Astronomical Society of the Pacific, courtesy AIP Emilio Segrè Visual Archives, Physics Today Collection, Catalog ID Burbidge Eleanor Margaret B2

"On cold winter mornings his mother would send him to school with a baked potato for each pocket to help keep him warm."

Quote from Arlo U. Landolt's obituary by Geoffrey Clayton and Juhan Frank. An influential observational astronomer, Landolt was involved with the creation of an important set of photometric standards used in the field. Image credit: AIP Emilio Segrè Visual Archives, John Irwin Slide Collection, Catalog ID Landolt Arlo A1

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What's the Buzz in Holmdel?

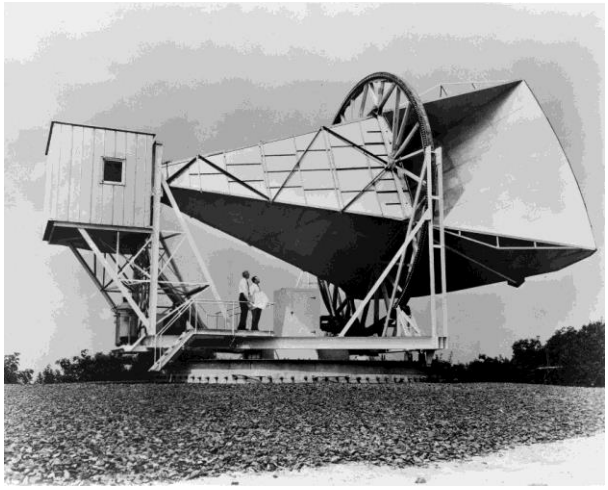
Jennifer Lynn Bartlett, Chair, WGPAH

The horn antenna with which Arno Penzias and Robert Wilson first detected the cosmic background radiation may be endangered if the land on which it sits is developed. Since December the Holmdel, New Jersey, township planner has been studying whether the surrounding site needs redevelopment. In February, at the request of the Working Group on the Preservation of Astronomical Heritage (WGPAH), AAS President Kelsey Johnson sent a letter to Mayor Domenico J. Luccarelli expressing the historic significance of this instrument and encouraging its preservation.

Last month, Luccarelli indicated that the township wants to preserve the antenna but cannot discuss details while in negotiations with Crawford Holdings LLC, which owns the property. Also, in March, the township attorney raised the possibility of condemning the property to acquire it. As a former Bell Laboratory property, the privately owned site is currently classified as a research laboratory in the community's land zone map.

Arthur B. Crawford (1907–1990) and his team designed the horn antenna for Project Echo, a National Aeronautics and Space Administration (NASA) telecommunications program. Bell Laboratories built it at their Holmdel facility in 1959 with a local steel company producing the base.

On August 12, 1960, NASA launched Echo I, its first passive communications satellite, which was a giant reflective balloon inflated in space. Later that day the horn received a transmission from the Jet Propulsion Laboratory (JPL) in California that had bounced off the Echo satellite. In a recorded statement President Dwight D. Eisenhower (1890–1969) invited other nations to use Echo for peaceful communication experiments. On August 13th the horn participated in a brief two-way telephone conversation between engineers located



ECHO Horn Antenna, c. June 1961 (credit: NASA; source: https://www.flickr.com/photos/nasacommons/16315677368/in/photolist-qRL7sd)

Echo 1 Fully Inflated, 1960 (credit: NASA/Goddard Space Flight Center, Source: https://www.flickr.com/photos/nasa_appel/4919282223/in/album-72157624664515095/)

Bell Labs Horn Antenna Crawford Hill NJ (credit: Fabioj CC-SA)

in Holmdel and in Goldstone, California.

In 1963, Bell Laboratories transferred the horn antenna from telecommunications work to radio astronomy. While calibrating it in 1964 at a wavelength of 7.35 centimeters, Penzias and Wilson found persistent excess noise of 3 degrees Kelvin. In 1965 Princeton astrophysicists Robert H. Dicke (1916–1997), P. James Peebles, and David Wilkinson (1935–2002) suggested that the noise was the remnant of extremely hot radiation permeating the Universe during its early evolution, now known as the Cosmic Microwave Background (CMB) radiation. This observation supported the Big Bang Theory in cosmology and sparked the growth of observational cosmology.

Penzias and Wilson shared the 1978 Nobel Prize for Physics with Piotr Leontevitch Kapitsa (1894–1984) of the USSR Academy of Sciences. The Swedish Royal Academy recognized the pair "for their discovery of cosmic microwave background radiation" while recognizing Kapitsa "for his basic inventions and discoveries in the area of low-temperature physics."

In 1990, the National Park Service designated the horn and its control shed a National Historic Landmark; the site is also listed on the National Register of Historic Places. In 2008 the American Physical Society commemorated its importance with a plaque as part of their Historic Sites initiative.

After the 1982 break-up of AT&T, the horn passed from AT&T-Bell Laboratories to Lucent-Bell Laboratories, to Alcatel-Lucent Bell Laboratories, to Nokia-Bell Laboratories, and then to its current owner. Douglas Twyman of Colliers International, who handled the most recent transaction in 2021, says its owner is supportive of preserving it.

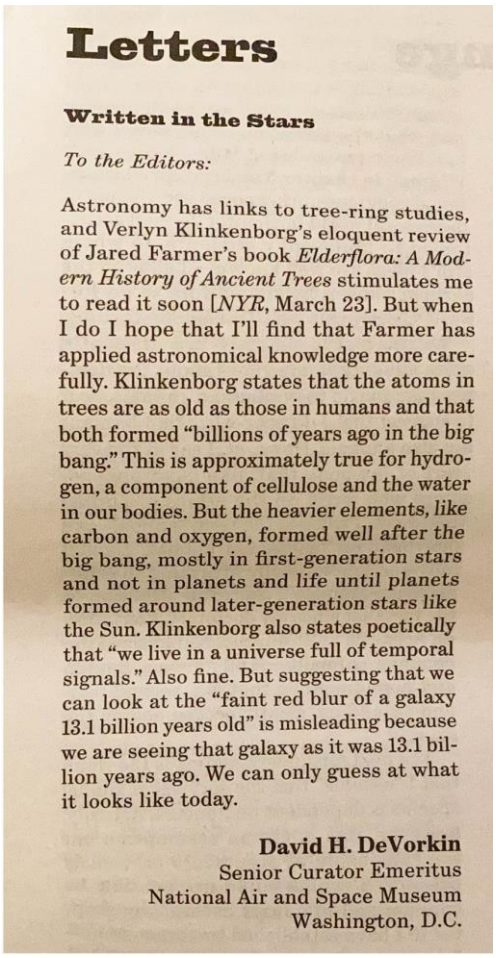
Now, local activists, including Citizens for Informed Land Use (CILU), Friends of Holmdel Open Space (FOHOS), Preserve Holmdel (PH) and students at Indian Hill School, are advocating for the preservation of the horn *in situ*. With local and international support, the community is likely to find a workable solution that will preserve the antenna as an inspiration to future generations of New Jersey scientists.

wgpah-chair@aas.org

News From HAD Members

Ken Rumstay, Valdosta State University

We've not received much news from HAD members during the past six months! But we did recently hear from long-time member David DeVorkin, who corrected a misconception which appeared in the *New York Times Review of Books*. His letter, published in early April, appears here. Thank you for setting the record straight, David!



Letters

Written in the Stars

To the Editors:

Astronomy has links to tree-ring studies, and Verlyn Klinkenborg's eloquent review of Jared Farmer's book *Elderflora: A Modern History of Ancient Trees* stimulates me to read it soon [*NYR*, March 23]. But when I do I hope that I'll find that Farmer has applied astronomical knowledge more carefully. Klinkenborg states that the atoms in trees are as old as those in humans and that both formed "billions of years ago in the big bang." This is approximately true for hydrogen, a component of cellulose and the water in our bodies. But the heavier elements, like carbon and oxygen, formed well after the big bang, mostly in first-generation stars and not in planets and life until planets formed around later-generation stars like the Sun. Klinkenborg also states poetically that "we live in a universe full of temporal signals." Also fine. But suggesting that we can look at the "faint red blur of a galaxy 13.1 billion years old" is misleading because we are seeing that galaxy as it was 13.1 billion years ago. We can only guess at what it looks like today.

David H. DeVorkin
Senior Curator Emeritus
National Air and Space Museum
Washington, D.C.

Jessica Heim is currently pursuing (remotely) graduate studies at the University of Southern Queensland. Her areas of expertise include light pollution, satellite megaconstellations, and ethics. She is also Vice Chair of Community Engagement for COMPASSE, the AAS's Committee for the Protection of Astronomy and the Space Environment). Jessica recently published an excellent article on the effect of "space junk" on the brightness of our night skies in *The Space Review* (https://www.thespacereview.com/article/4562/1).

Thank you for your good work, Jessica!

hadsec@aas.org

The International Ultraviolet Explorer: Pathfinder to Space Observatories

Theodore R. Gull[1], Huib Henrichs[2], Albert Holm[2], Jeff Linsky[3], Joy Nichols[4], Geraldine Peters[5], and Chris Shrader[1]

[1]NASA/GSFC, [2]Retired, [3]University of Colorado, [4]Center for Astrophysics, [5]University of Southern California

1. INTRODUCTION

In late January of 2023, well over a hundred interested individuals gathered in three ZOOM sessions or in person at Villafranca del Castillo (VILSPA) near Madrid, Spain to celebrate the launch of the International Ultraviolet Explorer (IUE) 45 years ago on January 26, 1978. The IUE was an operational observatory for over eighteen productive years, recording in that time over 110,000 spectra of more than 10,000 astronomical sources. Through 2023, over 4100 refereed papers and 6400 articles with a greater than 500 doctoral theses utilized IUE spectra, and the usage continues today since the IUE data archive continues to be mined. This space observatory accomplished many firsts, not only by providing an encyclopedia of UV properties for astronomical sources but by rising to new levels of cooperation throughout the astronomical community.

IUE was a modest space observatory conceived to provide ultraviolet spectroscopy to the general astronomical community. The aperture was only 0.45 m (Figure 1). Two spectroscopic resolving powers were available, R= $\lambda/\delta\lambda$ = 300 and 10,000 with coverage in the near UV (1800 to 3200 Å) and far UV (1175 to 1900 Å) with a 3” diameter and a 10”×20” aperture. For the first time in astronomical space observations, large format detectors in the form of solar-blind secondary electron conduction (SEC) vidicons were used to record two dimensional spectral formats.

Placed in a geosynchronous orbit above the South Atlantic, the IUE was in direct communication with two ground-based Science Operations Centers (SOC) on a 24/7/365 basis, permitting continuous monitoring (Figure 2). While technical staff monitored the spacecraft health and safety at Goddard Space Flight Center (GSFC), daily three eight-hour shifts of operations were executed by a Telescope Operator (TO) and Resident Astronomer (RA) in partnership with the guest observer.

The real-time, interactive capability of IUE was key to opening up the ultraviolet spectral region to

Figure 1. The IUE telescope and spectrograph in the GSFC clean room. Note the modest size and structure.

observers long familiar with ground-based telescopes. Previously UV spectroscopy was limited to brief sounding-rocket flights that obtained spectra of individual sources and then the pioneering low-resolution studies by the Orbiting Astronomical Observatory-2 and high-resolution studies by the Copernicus Observatory. Each used a photometer to scan astronomical spectra. In both options, data was recorded for evaluation after the

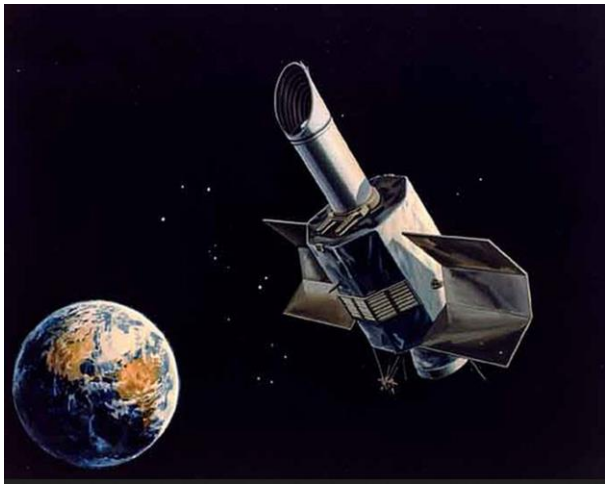


Figure 2. Artist's concept of IUE in geosynchronous orbit. Control stations at GSFC and VILSPA enabled real-time interactive operations by the science staff and guest investigator 24/7/365 in eight-hour shifts.)

observation. Now the IUE provided the two SOCs with a capability for real-time interaction by the observer with "quick look" evaluation of the spectrum within minutes after it was read down from the IUE. Adjustments in exposure with a quick repeat or moving on to the next source were possible (Figure 3).

The highly elliptical orbit provided two low-radiation shifts: the European/British eight-hour shift controlled from an operations center at VILSPA near Madrid, Spain and the United States shift, US1, controlled from GSFC. A third shift, US2, operated by GSFC was usually limited to short exposures, as across the lower portion of its orbit the spacecraft dipped into the outer Van Allen radiation belt, which lead to significant background radiation on the detector. Dependent on the variability of the radiation belt a significant number of US2 shifts proved to be usable for relatively deep exposures.

Pointing and acquisition was enabled by an external sun sensor and a fine error sensor (FES) that mapped a nominal 16' field of view with a nominal limiting magnitude of fourteen. Six onboard gyros and four momentum wheels enabled maneuvers from star to star across the celestial hemisphere away from the sun. RAs and TOs became very skilled at finding star patterns that correlated with microfiched displays of the Palomar and southern sky survey plates and thus determining position on the sky. From there the guest observer utilized finding charts to identify the target source.

The IUE observatory was designed to last for a nominal three to five years in orbit. Indeed, the elliptical orbit was chosen to ensure enough on-board propellent to last for that period of time, but the project conservatism led to an on-orbit reserve estimated to last at least 45 years. Initially a minimum three of six onboard gyros were needed for positional maneuvers, but with increased knowledge of the spacecraft behavior two- and even one-gyro operations were enabled with a potential zero-gyro limited operation in concept. These reserves led to an 18.5-year lifetime for the spacecraft, limited in the end to NASA funding limitations as the science goals declined[1]. Incredibly, all operations of the spacecraft were executed with a NASA Standard Space Computer containing 8 K memory and no onboard data storage capability!

[1]https://archive.stsci.edu/iue includes historical documents related to the development and operations of IUE.

The concept and development of IUE came out of several efforts that ultimately led to a three-way collaboration between NASA, the European Space Agency (ESA), and the British Engineering and Research Council (SERC). A lengthy learning process was necessary for the development of the spacecraft design and operations system. Initially conceived as a low earth orbit mission, considerable advantage was realized by extending the orbit to geosynchronous heights which enabled continuous access from ground stations. The spacecraft had to be designed to a mass limit defined by the lift capability of the available Delta rockets. For more detail on the process that led to the three-agency collaboration, see Boggess and Wilson (1987).

2. INNOVATIONS OF IUE

The IUE was a pioneering mission in many areas, among which are:

- first international space astronomy collaboration between NASA, ESA and SERC,
- first observatory capable of obtaining ultraviolet spectra of a wide variety of astronomical targets,
- first astronomical satellite placed in geosynchronous orbit, which enabled real-time monitoring and interactions by the observer,
- first two-dimensional detectors in space for astronomical UV spectroscopy,
- first NASA competitive peer review with funding for observing programs,
- dedicated science support team for scheduling, observations and data reduction including delivery of data products to users, simultaneous or coordinated multi-wavelength observing programs matching ultraviolet with X-ray, optical, and radio observations,
- training facility for HST and other Great Observatories, and
- a public archive of all IUE observations with publicly shared software for data analysis.

3. SOME HIGHLIGHTS OF IUE OBSERVATIONS

The IUE Science Commissioning Team chose a number of astronomical sources for initial observations to demonstrate the extraordinary capability of the observatory, including hot stars, cool stars, extragalactic objects and solar system

Figure 3. Guest Observer Geraldine Peters and Telescope Operator Muriel Taylor in the IUE SOC at GSFC.

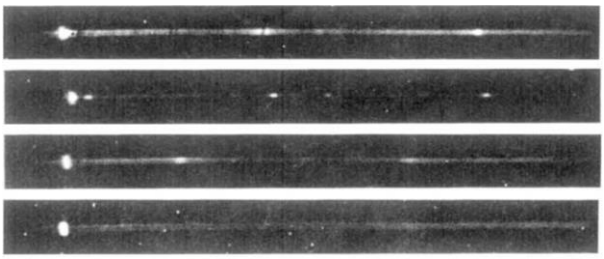


Figure 4. Photographic reproductions of unprocessed short wavelength spectra of four extragalactic objects: first, the Seyfert 1.5 galaxy NGC4151; second the Seyfert 2 galaxy NGC1068; third the QSO 3C273; and fourth the BL Lac object B2 1101+38 (Markarian 421). Wavelength increases to the right. The large emission feature at the left of each spectrum is geocoronal Lyα which fills the 10"×20" entrance aperture. (Reproduced from Boksenberg *et al.* (1978))

objects. By these observations key capabilities were demonstrated including slewing between astronomical sources, target acquisition, focus of the telescope, blind offsets from reference stars to objects not readily detected by the FES and moving targets (planets, moons, and comets). The capability of IUE and examples of acquired spectra were presented in a series of papers in the 5 October, 1978 issue of *Nature* (Boggess *et al.* (1978), and articles following).

Science commissioning ended on March 31, 1978 with the first guest observer on console April 1. While many operational procedures were yet to be optimized, science operations began first at GSFC and then VILSPA.

3.1. The IUE SOC enabled real-time operations

Even first-time observers arrived at the IUE Science Operations Center (SOC) knowing what they wanted. They had approved proposals describing the astrophysical problem they wanted to solve and how IUE data could help them solve it. At the SOC they met the RA and TO who were responsible for implementing their observations. These trained telescope operations staff members would run procedures – short software programs – to tell the IUE where to point, to locate the target and direct its light into the spectrographs, to start, modify, and end exposures, to read the images to ground, display them, and to prepare the camera for another observation. The TO would provide quick-look information on the displayed images, such as peak signal, background levels, and intensity traces along the spectra. Before each observation, the Guest Observer (GO) would fill out an observing script to provide the TO with specifications for the upcoming observation. In most cases, the observer would be on his or her way to conducting the remainder of the shift in coordination with the TO. For the GO, the procedures at VILSPA and GSFC were rather similar. A handover protocol by phone marked the transition every day.

3.2. Enabling UV spectroscopy of extragalactic sources

The first extragalactic source chosen to observe during the commissioning period was the AGN NGC4151 (Boksenberg et al. 1978). Telescope focus was not optimized nor was the drift of the gyros nulled sufficiently to set directly to the astrometric position so the first observation did not have NGC4151 centered within the 10"×20" large aperture. Offsets from reference stars were generated using copies of the Palomar Sky Survey plates using an available PDS microdensitometer. The second visit to NGC 4151 provided a spectrum, but with the telescope focus not yet optimized. As the third try is the charm, the desired spectrum was obtained at optimal telescope focus and the galaxy well centered in the aperture (Figure 4).

Prior to IUE, studies of Active Galactic Nuclei (AGN) were limited by a dearth of information below 3300 Å. Yet, measures of the UV emission are critical to understanding the primary AGN components: the broad-line region (BLR) and the blue bump spectral component associated with the central accretion disk. IUE offered the possible mapping of the geometry and kinematics of the BLR and thereby the measure of the central black-hole mass. The potential to obtain multiple spectra at a uniform cadence spanning a temporal baseline exceeding the light-travel time-scale of the active

region, made IUE monitoring a very attractive technique. However, no single investigator could obtain enough observing time with IUE. Proposals for a large block of observing time involving numerous Guest Observers and coordinated data analysis efforts were successfully received. The early efforts led to viable physical constraints on the Seyfert-1 galaxy NGC 5548. The obtained BLR scales surprisingly were in some conflict with earlier values inferred from photoionization modeling and ground-based, random-sample variability studies. These pioneering campaigns continue today with HST and ground-based observatories.

3.3. Cool stars

The far-ultraviolet and near-ultraviolet spectra of a wide variety of stars obtained by IUE demonstrated the validity and range of the solar-stellar connection for understanding stellar atmospheres and their non-radiative heating processes. Figure 5 shows the far-ultraviolet spectrum of one of the first IUE observations as seen by observer Jeffrey Linsky looking at the computer screen in the GSFC Science Operation Center. The echelle high-dispersion spectrum of the G5 III+K0 III Capella binary system shows emission lines of C III, C IV, Si IV, and N V formed in the transition region between the chromospheres and coronae of both stars. Main sequence F-M stars and G and K giants show emission lines similar to the Sun, evidence that heating by magnetic waves or nano-flares is responsible for the high temperature outer atmospheres of the Sun and these stars. More luminous and cooler stars, however, show very weak or no emission in these high temperature lines, but instead show blue-shifted absorption features in other emission lines providing evidence of strong stellar winds.

Multi-shift IUE observations, often coordinated with X-ray, optical, and radio observations, studied stellar flares to obtain the total energy and time-scale of these events now seen as critical for evaluating habitability of exoplanets. Coordinated multi-wavelength campaigns also provided new information on active regions and starspots on active stars and binary systems such as RS CVn, BY Dra, and systems containing hot white dwarfs.
Far-ultraviolet observations of cool stars often showed evidence of previous unknown hot star companions.

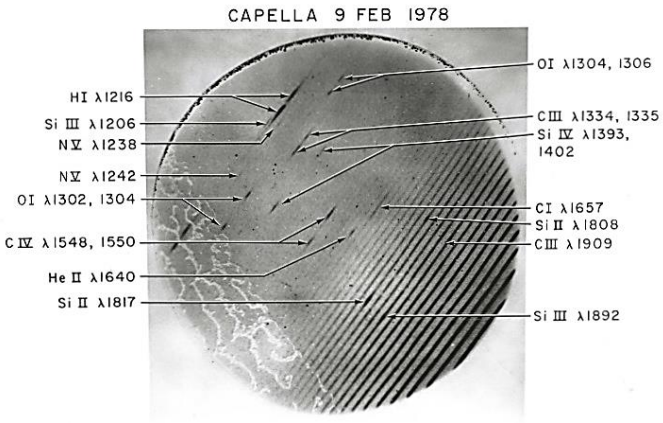


Figure 5. Photowrite display of the UV spectrum of Capella recorded in the high-dispersion echelle mode. The paisley pattern is a detector flaw.

3.4. Hot stars

The IUE observations of O and B stars led to the discovery of the overwhelming ubiquity (Howarth & Prinja, 1989) and unexpectedly short timescales (Kaper et al., 1996) of the earlier-known variable narrow absorption features in stellar wind lines, that are now called Discrete Absorption Components (DACs) (Doazan *et al.*, 1980; Peters 1982). This was quantified by multiple observations and then intensive campaigns in the latter years of IUE operations, only possible by its uniqueness of being in a geosynchronous orbit and real time. A highlight was the MEGA campaign (Massa et al. 1995). A typical observing cadence was a few hours.

More than 30 years later, the low orbit of the HST and heavy competition for observing time makes UV campaigns following DACs hardly feasible. Yet the origin of the DACs is still under close investigation. The exquisite IUE results stimulated a vast amount of 3D numerical studies, including radiative and magnetic effects.

The IUE-prompted discovery of specific stellar wind line behavior turned out to be the strongest indirect indicator of the presence of a magnetic field in early B-type stars (Henrichs *et al.* 2013). This led to a significant new, still rising research field of massive magnetic stars. One unique discovery was prompted by visual inspection of the OB star atlas on 267 microfiches nowadays hardly accessible (Bohlin *et al.* 1994). A recent discovery of Be+sdO binaries from IUE archival spectra reinforces the importance of binarity in evolution on the upper main sequence (Wang *et al.* 2018).

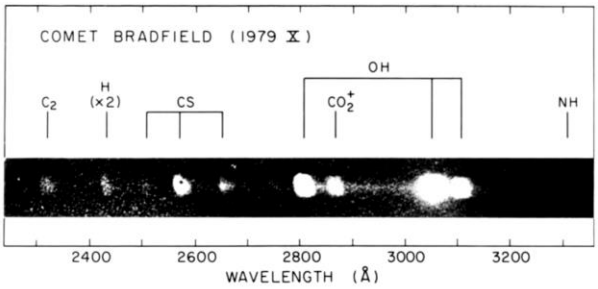


Figure 6. NUV spectrum of Comet Bradfield (1979X). Note that the continuum and CS bands do not completely fill the 10"×20" aperture while the OH and CO_2^+ do.

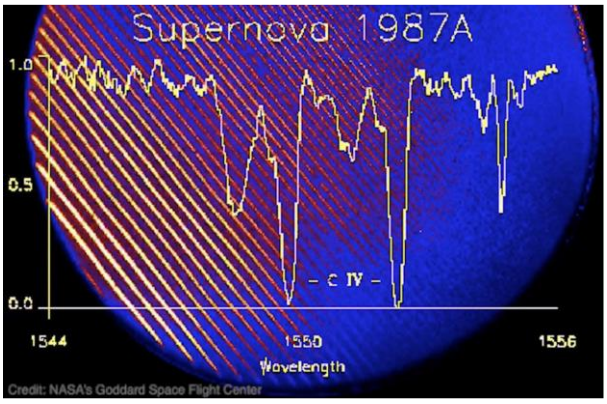


Figure 7. SN1987A C IV line profile overlaid on the console display.

3.5. Solar system: planets, comets and moons

Multiple observations of the outer planets and a number of their moons were accomplished with IUE in coordination with visible and infrared observations that led to diagnostics of lunar surface properties. One notable was the detection of SO_2 frost on Io that required both UV and IR spectroscopy. Dozens of comets were followed with IUE. Many new molecules were identified along with tracking their variations with distance from the Sun (Figure 6).

3.6. SN1987A: an example of real-time intervention [2]

The real-time, interactive aspect of IUE gave observing a high degree of flexibility which enabled quick response to new discoveries. For example, at 10 AM in the morning of February 24, 1987, Brian Marsden, the director of the IAU Central Bureau for Astronomical Telegrams, came running down the hall to the office of Andrea Dupree, a senior user of IUE, and reported the receipt of a telegram announcing the discovery of a supernova in the Large Magellanic Cloud. Dupree notified George Sonneborn, an RA at GSFC's IUE Science Operations Center. While Sonneborn obtained coordinates for the SN, Gary Wegner, the scheduled observer, completed his observations of subdwarf O star K433-05. Then the IUE slewed to the supernova position. The first spectrum was obtained at 2:36 PM, less than five hours after the telegram arrived and only 14 hours after the discovery! However, that first spectrum, exposed for 15 seconds in low dispersion with the long-wavelength camera, proved to be heavily saturated. Seeing how bright the supernova was in the near ultraviolet, Sonneborn obtained a 30-second exposure in low dispersion with the short wavelength camera. That too was heavily saturated. A second attempt with the short wavelength camera for 10 seconds was successful in recording a well-exposed, unsaturated spectrum. Sonneborn then adjusted the exposure time for the long wavelength camera down to 2 seconds. That spectrum was also saturated, but less so. Sonneborn then realized he could easily obtain echelle spectra in both cameras. Both proved to be successful obtaining not only the UV spectral distribution but also detailed information on the intervening interstellar medium in both the Large Magellanic Cloud and the Milky Way.

The ability to see results and adjust both exposures and observing modes in near real-time allowed excellent data to be obtained in little more than a few hours on the target. It takes days for an observatory like HST, in low earth orbit, to interrupt its scheduled activities, record first data, and then optimize the observations.

3.7. IUE as a training facility for HST and other Great Observatories

IUE provided ground-based observers and theoreticians with an entry to the ultraviolet universe. Senior, experienced astronomers such as Maarten Schmidt, Lawrence Aller, Beverly Oke, Jesse Greenstein, Erika Bohm-Vitense, Paul Vanden Bout, and many more became users of IUE. Many grad students and post-docs were trained in the techniques and rewards of ultraviolet astronomy through IUE observing runs. Observers arriving at the Telescope Operations Center (TOC) met the RA and TO who were responsible for implementing their observations. The staff would explain the routine processes and capabilities. If the observer had special needs, these would be discussed with the RA and special instructions

[2] From Andrea Dupree's talk at the IUE 45th celebration

prepared if necessary. Techniques for maximizing the number of observations and maximizing their usefulness would be discussed. Armed with this information, the observer could then proceed with a successful observing run. The knowledge base and the experienced ultraviolet researchers developed through IUE provided expertise for using HST, especially for the Goddard High Resolution Spectrograph, the Faint Object Camera, and the Space Telescope Imaging Spectrograph. The TOC staff also benefited from the presence of the observers. The RAs and TOs were at the center of a unique, vibrant environment for astronomers pursuing world class science across multiple sub-disciplines. This presented a unique opportunity not only for the exchange of knowledge and development of collaborations, but for inspiration from the contagious passion and enthusiasm of many visiting astronomers. A large fraction of the staff continued in astronomy-related, post-IUE careers, for example joining the staffs of all four NASA Great Observatories, particularly HST. Others pursued academic careers and various career paths at NASA, as scientists, engineers, and in management.

3.8. The IUE data archive: open access for research and as a teaching tool

IUE's public data archive is an innovation that has greatly expanded the value of its data by making them easily available to all researchers (Giaretta *et al.* 1987). This capability developed gradually over time. NASA made the observations generally available after one year, allowing the original observer a period of exclusive use of the data. However, obtaining data stored in the National Space Science Data Center (NSSDC) located at GSFC was cumbersome. Shortly after launch, Don West designed a 'Merged Observing Log', but the data still had to be ordered from the NSSDC and delivered on magnetic tape. In 1981, NASA established regional data analysis facilities (RDAF) at GSFC and at the University of Colorado. Don Lindler developed tools for the RDAF to allow astronomers to view the 'Merged Observing Log' and request observations of interest. In 1982, Sally Heap, Ed Sullivan, and Clarence Wade extracted all the spectral data files from the NSSDC and installed them at the RDAFs. This database was updated with new spectra as the proprietary period expired for them. In 1986, Sullivan, Ralph Bohlin, Heap, and Jaylee Mead developed software that allowed astronomers to access these data from remote sites.

The final IUE data archive processing was driven by inputs from the user community. Improved processing methods and calibrations were applied to all spectra. After a decade of using IUE data, several researchers had developed independent methods of processing and calibrating the data. A Final Archive Definition Committee, overseen by the IUE Three-Agency, was formed to evaluate these methods and identify the best processing methods for the creation of the IUE Final Archive (Nichols & Linsky 1996).

The achievements of the resulting Final Archive include 50-100% improvement in S/N for almost all of the data with more accurate flux calibrations based upon white dwarf models instead of standard stars, an approach subsequently adopted by HST. Other specific improvements include:

- Sub-pixel alignment of raw images with the Intensity Transfer Function calibration images,
- Virtual elimination of fixed pattern noise,
- Use of only one resampling of the data, conserving flux and noise characteristics to a high degree,
- Background determination method for echelle data that effectively eliminated the interorder overlap in most cases,
- Flux-weighted slit extraction for low dispersion data, and
- A noise model that allows an estimate of errors in extracted spectral data.

IUE's data archive provided a model for making space astronomical data publicly available, including data from the Hubble Space Telescope, JWST, and many other missions. In 1997, the IUE archive was incorporated into the Multi-Mission Archive at Space Telescope (MAST). The IUE data archive continues to be used by researchers and, equally importantly, the archive has proven to be a very useful teaching tool incorporated in astronomy courses at many universities and research facilities.

4. LOOKING TO THE FUTURE

The IUE observatory operated for over 18.5 years providing an abundance of UV spectra that even today are used in research, especially of astronomical sources that potentially vary with time. Moreover the IUE archive, which resides online through the MAST facility maintained by

STScI, is a very useful teaching tool accessible to students learning to do scientific research.

The Hubble Space Telescope (HST), with upgrade capabilities provided by the Space Shuttle programs, initially provided UV spectroscopic capability with the Goddard High Resolution Spectrograph (GHRS) and the Faint Object Spectrograph (FOS). The Space Telescope Imaging Spectrograph (STIS) replaced both instruments, benefiting from large-format detector technology and the 2.4 meter aperture of HST with near-diffraction limited capability. Resolving power, R = 500, 8000, and 110,000 and $0\overset{''}{.}1$ angular resolution enabled greatly improved spectro-imagery that probes source substructures. Future UV spectroscopy must provide ability to reach an even wider range of astronomical sources with monitoring and quick response to time-variable sources. Near-term, intermediate-sized UV missions must be technology beds that will demonstrate improved detector and optical capabilities in preparation for the Habitable World Observatory, the future UV/Visible/IR major facility.

For further information, please see books dedicated to the IUE science: Kondo (1987); Wamsteker et al. (1994,1998)

Facilities: IUE

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Proceedings of the 1981 Potsdam Michelson Colloquium

H.J. Haubold (United Nations, Vienna, Austria)

Fifty years ago, in 1973, Dorothy Michelson Livingston published the first and only available comprehensive biography of her father, Albert A. Michelson, the first American Nobel Laureate in physics.

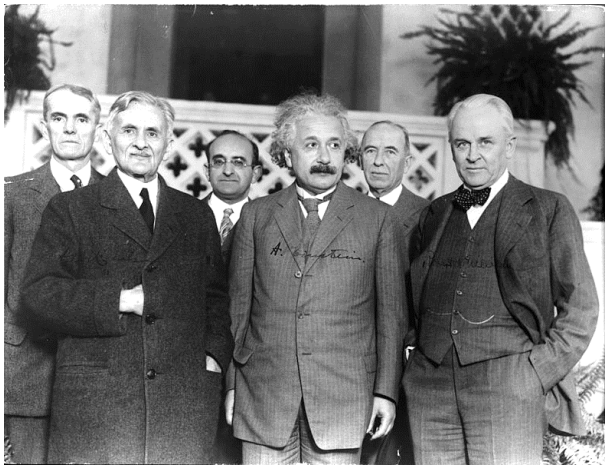
Michelson performed, as discussed with Hermann Helmholtz in Berlin, his first aether-drift experiment, which is part and parcel of the experimental and theoretical foundations of Einstein's relativity theory, in Potsdam, Germany, in 1881. He repeated a much more sophisticated installation of this experiment in close collaboration with Edward Morley in Cleveland, United States, in 1887 (https://digital.case.edu/islandora/object/ksl:physics.).

Today, the Michelson-Morley experiment is one of the most important experiments in physics education, teaching, and research. It is the technical basis for the discovery of gravitational radiation by LIGO/VIRGO, honored with the Nobel Price for three American physicists in 2015.

On the occasion of the 100th anniversary of the Michelson-Morley experiments in Potsdam and Cleveland, international meetings were held to recall the outstanding efforts of Michelson and Morley in their development of the experiment increasing more and more the precision of the respective measurements.

Taking note of the history of the above, we are planning to republish the extended proceedings of the Potsdam Michelson Colloquium held in 1981. It will be dedicated to Dorothy Michelson Livingston for her lifelong dedication to her father's research work and public education efforts, as reflected in her Michelson biography.

Members of the Historical Astronomy Division are invited to contribute to and participate in the



A 1931 meeting of intellectuals in Pasadena, California. Front row, left to right: Physicists Albert Michelson (1852–1931), Albert Einstein (1879–1955), and Robert A. Millikan (1863–1953). Back row, left to right: Astronomer Walter S. Adams (1876–1956), mathematician Walther Meyer (1887–1948), and historian Max Farrand (1869–1945).

Michelson, Einstein, and Millikan all received the Nobel Prize in Physics.

Photograph taken on the occasion of the 1960 dedication at Case Western Reserve University of a portrait of Michelson. Celebrating the event are Frederick Reines (chairman and Nobelist to be), Robert Shankland (chairman emeritus), and Michelson's daughter and biographer, Dorothy Michelson Livingston.

Dr. Haubold writes: "I received this photo a long time ago from William Fickinger. It always reminds me that I had interesting discussions with Fred Reines and Robert S. Shankland concerning the Einstein Centenary (1979), the Michelson Colloquium (1981), and the Michelson-Morley Centennial Symposium (1987).

outline of such extended proceedings of the 1981 Potsdam Michelson Colloquium. The original proceedings were published in the oldest journal dedicated to astronomy: the *Astronomische Nachrichten* (Volume 303, Issue 1: https://online library. wiley.com/toc/15213994/1982/303/1.

Back in 1979 and 1981 we collaborated with Dorothy Michelson Livingston in the preparations for the Einstein Centenary in Berlin and the Michelson Centenary in Potsdam. We are planning to incorporate in the extended proceedings some of Dorothy Michelson Livingston's correspondence with well-known physicists, among them Helen Dukas, Max Born, Louise de Broglie, J. Robert Oppenheimer, and Luis W. Alvarez, in her worldwide research for her father's life and science.

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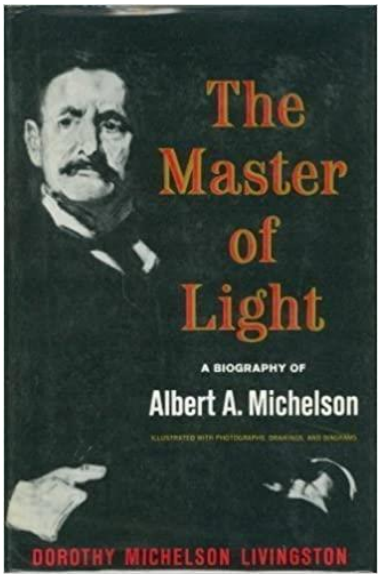


Cover of the first edition of *The Master of Light, A Biography of Albert A. Michelson*, by Michelson's daughter Dorothy Michelson Livingston. It was published in 1973 by Charles Scribner's Sons (ISBN-13: 978-0684134437). It has recently (2021) been made available by the Plunkett Lake Press as an Amazon Kindle electronic book.

This Month in Astronomical History

Ken Rumstay, Valdosta State University

In the May 2022 issue of *HAD News* (on page six), Michael Marotta described a few of the articles which had recently appeared in our monthly online feature *This Month in Astronomical History* (found at https://had.aas.org/resources/astro-history). Mike has served as Editor for this column for well over two years now, and we are most grateful for his devoted service in this capacity.

Each month, when a new article is posted online, an announcement appears in the American Astronomical Society's online News Digest. I'd like to take this opportunity to list the ones which have appeared in the last twelve months:

Scorpius X-1 and the Launch of X-Ray Astronomy
June 2022, written by Michael E. Marotta

Reading Isaac Newton's Rare Manuscripts: The Making of Newton's Principia Mathematica (1687)
July 2022, written by Aneka Kazlyna

Caroline Herschel's August Historiography
August 2022, written by Michael E. Marott

The Drapers' First Photograph of Messier 42
September 2022, written by Michael Marotta

The Discovery of Helium
October 2022, written by Alan Agrawal

Lunokhod 1 - The First Extraterrestrial Rover
November 2022, written by Kenneth Rumstay

Problems in Astrophysics (1903) by Agnes Mary Clerke
December 2022, written by Michael Marotta

The Huygens Probe Lands on Titan
January 2023, written by Michael Marotta

Edward Emerson Barnard: Nontraditional Student and "First Gen" Role Model
February 2023, written by Kristine Larsen

Voyager 1: The Jupiter Flyby
March 2023, written by Loretta Cannon

The Discovery of CTA-102 in April 1965
April 2023, written by Rebecca Charbonneau

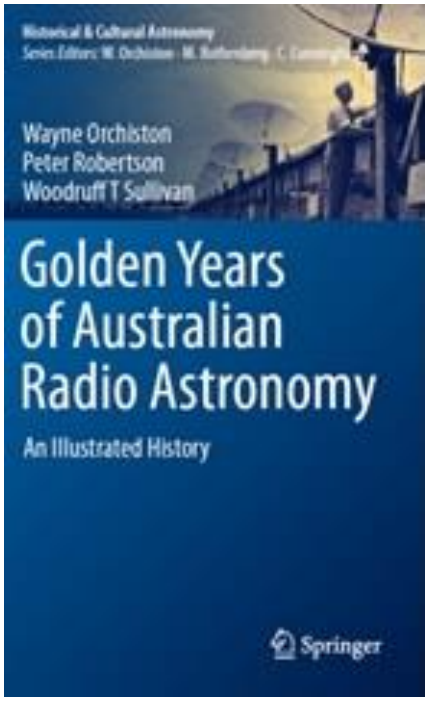
If you're not a regular reader of these columns I'd encourage you to take a look; all may be found at https://had.aas.org/resources/astro-history. And if you think you might like to write one, please contact Mike at mike49mercury@gmail.com. We are always looking for authors!

hadsec@aas.org

Book Review

Virginia Trimble, UC Irvine

Golden Years of Australian Radio Astronomy: An Illustrated History (Springer Historical & Cultural Astronomy series) by Wayne Orchiston, Peter Robertson, and Woodruff T. Sullivan III (Springer, 2021, ISBN-13: 978-3319918419). With a forward by Ken Kellerman and a Preface by the authors. Also available as a Kindle e-book.



The discipline now called radio astronomy had its origins in Australia (as well as in the UK, Netherlands, and elsewhere in Europe) among the people who had developed radar and its technology through World War II. The USA came relatively late to the new subdiscipline (though Karl Jansky and Grote Reber had done their pioneering work in the US), and one of the two major American efforts, at the California Institute of Technology, was developed under the leadership of John Bolton and Gordon Stanley, both from Australia.

The Golden Years described here extended from September 1945 to somewhere around late 1961, when the 210-foot monolithic Parkes dish came online, changing both the organization and the scientific focus of Australian radio astronomy. The initial administrative structure was the Australian CSIRO Radiophysics Laboratory, (called RP in the present volume), under the political and financial leadership of Edward G. ("Taffy") Bowen. The researchers to a certain extent came and went and held assorted titles, but the authors concur that the effective scientific leader during most of these golden years was Joseph Lade (Joe) Pawsey, who died in 1962. Much of the early work was devoted to what they initially called “solar noise." Soon after came looking at "cosmic noise," followed by the recognition, identification, and counting of "discrete sources”, this last speared spearheaded by John Bolton.

The community was, for its times, "diverse," including two women. These were Elizabeth Somerville Alexander, who had spent the latter war years working on radar in New Zealand (in effect being the first woman radio astronomer), and Ruby Payne-Scott, who worked on radar and then on solar radio noise at RP until 1951, when circumstances involving marriage and children forced her resignation. And in 1954 there came two visitors from India: R. Parthasarthy and Govind Swarup, whose story you can read in the 2021 volume of *Annual Reviews of Astronomy and Astrophysics*. Their contribution was a modification of an E-W array to work at 500 MHz ("short wavelength” then).

This brings us to the unique features of the early Australian radio astronomy endeavors and, therefore, to the organization of the book under consideration. RP did not do its work from any one place, but rather at about twenty field stations, stretched along the coast for about 100 miles (with Sydney somewhere in the middle) and inland for about 30 miles. Many had been radar installations, and the authors discuss ten of them in detail, specifying who did what and why at each, what was learned, and what was built. There was also a mobile laboratory that circulated among them, occasionally getting stuck in ditches. Will you have heard of any of the stations before? Possibly not, although Dover Heights was the one where Bolton used the sea cliff interferometer to improve

position measurements. And it is impossible not to love a place called Potts Hill, which probably had the widest range of projects, grouped around a reservoir. That staff at the various field stations were free to pursue their own research interests most of the time was another unusual feature.

And then there were the antennas or aerials (I think the authors used the two words inter-changeably). Yes, some were the parabolic dishes (solid or mesh) that we now associate with radio astronomy observatories, though the Australians never succeed in prying loose for their use a left-over German Würzburg radar dish of the sort that contributed to the founding of radio astronomy in the Netherlands and elsewhere. Instead there were numerous arrays of Yagis, a sort of border fence at Hoskinstown, a barley-sugar (not explained) antenna at Freeman's Ranch, a sort of frame for a child's sandbox broadside array at Badgerys Creek, rhombic antennas (like wind mills) at Dapto and Penrith, hurdles for a horse race at Georges Heights, a pie crust holder also at Georges Heights (the first Australian antenna to see the 21-cm line of neutral hydrogen), a bunch of telegraph poles at Hornsby Valley, a child's jungle gym at Hobart, Tasmania, and a giant cousin of my popcorn popper at Dover Heights. There were also aerials for microwave links, because the Australians were doing interferometry very early and perhaps also were the inventors of earth-rotation aperture synthesis.

The authors leave at least a few things for readers to verify. They give "circa" birth years for John N. Briton, John Murray, and Peter August Georg Scheuer (for him the 1930 is confirmed in an oral history with author Sullivan; and we always celebrated on March 31st).

What about the style and tone of the book? A first, be brief introductory chapter makes everything sound very exciting (and Chapters 3 and 4 confirm this), but in between we get the details of many field stations, leaving one a bit like a first reader of the Iliad, coming upon the catalogue of boats. The authors are closely connected to their subject, Orchiston having come to RP near the end of its glory days, Robertson as a new-minted science historian (he did his PhD after retiring from a real job and Sullivan has a long, distinguished track record as a historian of radio astronomy and other astronomical topics. A few things go unexplained (why lunar libration leads to radar echoes fading, and that “barley-sugar" antenna). And I caught only one nasty dig among about 200 fully-justified pages of praise for the early accomplishments of Australian radio astronomers. After Frank Kerr did the moon radar bounce experiments, he thought about and published on the possibility of radar reflections from more distant solar system bodies, "and since it was the first paper ever written on this topic he later came to regard it as a classic." Ouch! I regard Frank Kerr as a good friend, and indeed know (or more often knew) considerably more than half the people listed in the index, but then I am very old.

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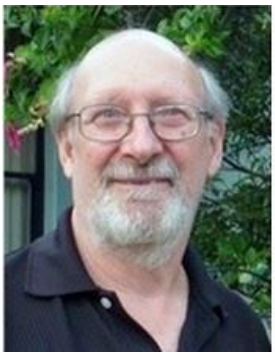

The *Journal of Astronomical History and Heritage* and the Astronomical History and Astronomers of the Americas

Wayne Orchiston and Shi Yunli
University of Science and Technology of China, Hefei, Anhui China

1. Introduction

The *Journal of Astronomical History and Heritage* (*JAHH*) was co-founded in 1998 by the New Zealander Wayne Orchiston and the late John Perdrix (from Australia), to provide an outlet other than the *Journal for the History of Astronomy* for those researching astronomical history after the RAS closed down its *Quarterly Journal* and the new owners of *Vistas in Astronomy* decided to no longer publish papers on historical topics. The *JAHH* was launched with the blessing of IAU Commission 41 (History of Astronomy), and the first number featured papers by well-known astronomers Steve Dick (USA, who was then the President of C41), the late Mary Brück (Scotland), the late Jay Pasachoff (USA), and Wayne Orchiston (Australia).

From those humble beginnings the *JAHH* has grown into an open access international e-journal that is now published four times a year (in March,

June, September and December), and can be downloaded (free of charge) from the ADS and Rizal Technological University (Philippines) web sites (e.g. see https://www.rtu.edu.ph/card/issues/) and its own dedicated web site (http://jahh.ustc.edu.cn).[1] All papers are refereed prior to publication, and there are no page charges. On 1 August 2022 ownership of *JAHH* transferred from Wayne Orchiston to the University of Science and Technology of China, which has a strong History of Science and Scientific Archaeology Department, led by the astronomer, Professor Shi Yunli. Professors Shi and Orchiston were appointed as Co-Editors of the journal.

The aim of the *JAHH* is to encourage worldwide research on archaeoastronomy, ethnoastronomy, and the history of astronomy, and to provide an avenue for publication of such research. Although the *JAHH* is happy to accommodate papers on any aspect of these topics, we have a special interest in ethnoastronomy, historic solar and lunar eclipses, historic transits of Venus, cometary astronomy, observatory histories, nautical astronomy, and the history of radio astronomy.

The *JAHH* now has a new Editorial Board of well-known astronomers from Argentina, Australia, Canada, China, England, Germany, Greece, Honduras, India, Indonesia, Japan, Netherlands, South Africa, South Korea, Sweden, the USA, and Uzbekistan. The Co-Editors, Professors Wayne Orchiston (Thailand) and Shi Yunli (China), are supported by six Associate Editors: Dr Clifford Cunningham (USA), Professor Richard de Grijs (Australia), Associate Professor Duane Hamacher (Australia), Dr James Lequeux (France), Professor Mohammad Mozaffari (China) and Dr Peter Robertson (Australia). Before joining the 'Editorial Team', Richard, James and Peter all had many years of experience editing highly-regarded astronomical or physics journals.

2. The *JAHH* and the Astronomy and Astronomers of the Americas

Over the years, many papers of special interest to HAD members have been published in the *JAHH*, including the following:

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3. Concluding *JAHH* Remarks

Notwithstanding the foregoing listing, the four issues of the *JAHH* published in any one year cover a much wider range of topics, as illustrated by the following Contents Pages of the December 2022 issue and the upcoming March 2023 issue (which, alas, is running a little late). Note that each issue of the *JAHH* has a dedicated cover, and the cover of the December 2022 issue is shown below at right. In addition to research papers, each issue of the *JAHH* contains a selection of book reviews, and from time-to-time reports are published of IAU Commission C3 (History of Astronomy) and its Working Groups and Project Groups, along with reports of other groups.

The *JAHH* is a valuable resource available free of charge to HAD members. We invite you to plunge into this pool of information and make full use of it in your research projects.

4. The *JAHH* History and Heritage Lectures

We are happy to report that back in January 2023 *JAHH* and the University of Science and Technology of China began a series of twice-monthly "USTC Lectures on Astronomical History and Heritage" that are freely available to HAD members (and others). These Zoomed lectures are held on the first and third Saturdays of the month from 2 pm to 4 pm eastern China time. Each lecture is publicized on HASTRO-L and an associated poster with the lecture topic, an abstract, and biodata about the lecturer(s) is emailed to interested astronomers worldwide. If you would like to receive information about these lectures and are not already on the email list, please send a message to Ms Ziwei Tao, the *JAHH* Editorial Assistant. Her email address is: ziweitao@ustc.edu.cn

Meanwhile, videos of all previous lectures in this series have been posted on the *JAHH* web site (see http://jahh.ustc.edu.cn and click on 'LECTURES').

5. Notes

1. At the time of writing (March 2023) the University of Science and Technology of China was in the process of developing a new website for the journal (http://jahh.ustc.edu.cn). While this is now up and running it still needs a little fine-tuning. All future issues of the journal will be posted on this web site and will continue to be available also on the ADS and Rizal Technological University websites, but note that the National Astronomical Research Institute of Thailand ceased posting new issues of the *JAHH* on its web site after the first author of this article left that Institute on 30 September 2021.

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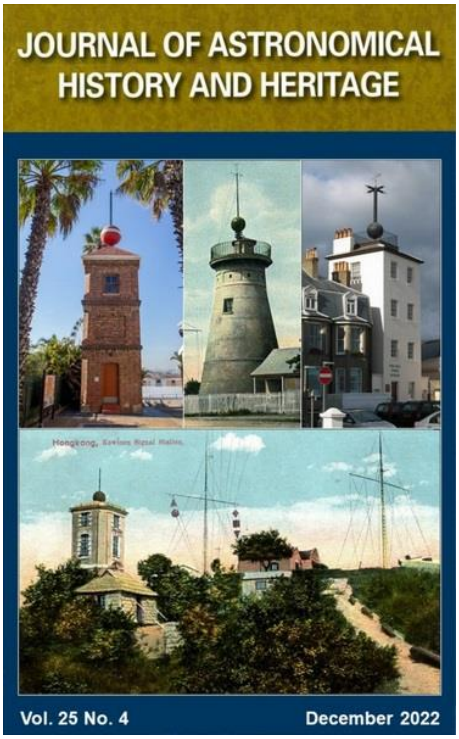

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CONTENTS

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CONTENTS

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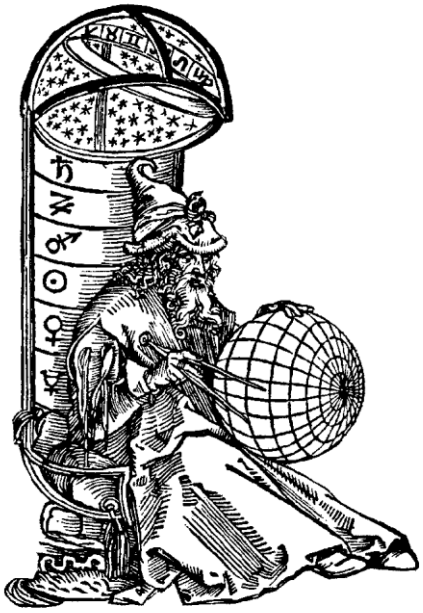

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A complete version of this newsletter, with color photographs and active links, may be found on our website at https://had.aas.org/sites/had.aas.org/files/HADN101.pdf .

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