H·A·D NEWS

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

Number 104 * December 2024

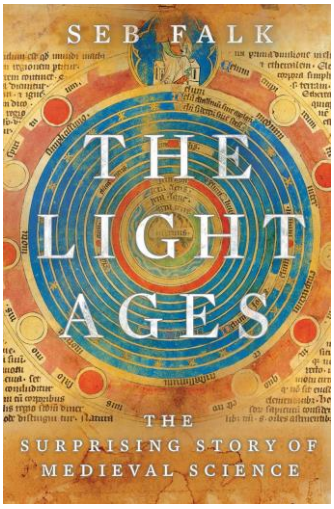
In This Issue

The 2025 Donald E. Osterbrock Book Prize

Kevin Krisciunas, Chair
HAD Prize Committee

The prize committee of the Historical Astronomy Division of the American Astronomical Society is pleased to announce that the winner of the Donald E. Osterbrock Book Award for 2025 will be Seb Falk of Girton College, Cambridge University (UK) for his book *The Light Ages: The Surprising Story of Medieval Science*, published in 2020.

This exceptionally well-written book begins with a mystery that arose in 1951 with the discovery of a manuscript dated 1392, written in Middle English, not Latin, and appearing to be the work of Geoffrey Chaucer. In 2014 a Norwegian scholar identified the author as John Westwyk, a Benedictine monk who lived in the second half of the fourteenth century. *The Light Ages* tells the story of how astronomical knowledge was applied and used during this era through the eyes of this monk, whose



The Light Ages, winner of the 2025 Donald E. Osterbrock Book Prize, and its author Seb Falk.

work has not been covered by other writers. The narrative involves the construction of clocks that gave the phases of the Moon, told solar time, and tracked the tides at London bridge, along with analog devices like John Westwyck's six-foot diameter analog calculator. Seb Falk's book is based on his laborious scholarly research but reads like a pleasurable detective story.

I'd like to thank the members of this year's Prize Committee: Terry Oswalt (HAD Chair), Susana Deustua (Secretary-Treasurer), Marcia Bartusiak, and Sethanne Howard. They have devoted a tremendous amount of time and effort in selecting the winner of this year's award. With sixteen nominated books it was not an easy task!

krisciunas@physics.tamu.edu

Figure 1.7 from *The Light Ages*. The caption reads: "*The image of Arithmetic*. Frontispiece to Book IV of Gregor Reisch's *Margarita Philosophica* (1503). Illustration by Alban Graf."

New HAD Officers!

Ken Rumstay, Editor
HAD News

Well, as I write this our nation's Presidential election is over. And so is the election of new officers for the Historical Astronomy Division! When the polls closed on October 28th votes had been cast by 167 individuals. This represents just 24% of the membership; to be honest we had hoped for a larger turnout.

Our newly-elected Vice Chair is Tiffany Nichols, an assistant professor of history and engineering at Northeastern University. She will assume office during the HAD Town Hall at National Harbor on January 13th, and will serve two years as Vice Chair (in charge of obituaries) followed by two years as HAD Chair, and then two years as Past Chair (and Chair of the HAD Prize Committee). Also at January's Town Hall, Sethanne Howard (US Naval Observatory, retired), and Alison Crisp (a Post-doctoral Scholar in the Department of Astronomy at The Ohio State University) will begin two-year terms as At-Large members of the HAD Committee.

At the conclusion of the Town Hall on January 13th our current Chair, Terry Oswalt, will pass the gavel to Vice Chair J. Allyn Smith. We expect a peaceful transfer of power.

Finally, we would like to express our gratitude to current Past Chair Keven Krisciunas for his six years of devoted service to HAD, and to outgoing At-Large members Loretta Cannon and Stephen Maran. Their hard work during the past years has been the key to HAD's success!

krumstay@valdosta.edu

The new officers of the Historical Astronomy Division. From left to right: Tiffany Nichols (Vice Chair), Sethanne Howard (At-Large Committee member), and Alison Crisp (At-Large)

From the Chair

Terry Oswalt
Embry-Riddle Aeronautical University

I'm feeling a bit wistful as I write this last column. The HAD gavel will soon be passed to our incoming Chair, Allyn Smith, at the upcoming AAS meeting in National Harbor, Maryland. My sincere thanks to those on our HAD leadership team whose terms also will be expiring in January: Allyn Smith (transitioning from Vice Chair to Chair), Loretta Cannon (At-Large Committee member) and Steve Maran (also At-Large Committee member). It has been a pleasure working with you all. Your work and dedication to HAD is very much appreciated.

It's my pleasure to report the results of our recent election and welcome new HAD officers! Our incoming Vice Chair will be Tiffany Nichols from Northeastern University. Tiffany holds a Ph.D. in the History of Science. She brings strong connections with the American Physical Society and will collaborate with the AAS Committee for the Protection of Astronomy and the Space Environment (COMPASSE). The new At-Large Committee members are Alison Crisp, a post-doc at The Ohio State University (you may recall her work on the Arlo Landolt archive at Louisiana State University) and Sethanne Howard, formerly of the U.S. Naval Observatory and author of *The Hidden Giants*, detailing 4000 years of women in science. Our new officers bring new breadth and depth to the HAD leadership team. I look forward to personally welcoming them at the HAD Town Hall in National Harbor, Maryland on January 13th.

Below are a few highlights from the past few months:

Susana Deustua, HAD Secretary-Treasurer, represented our division at the October 17th AAS Division Leaders meeting. Look for her summary elsewhere in this Newsletter.

Past HAD Chair Kevin Krisciunas chaired this year's Donald E. Osterbrock book award committee. Out of an unprecedentedly large field of nominations, *The Light Ages*, by Seb Falk, was selected for the 2025 award. He will present a plenary talk and accept his award at next summer's AAS meeting in Anchorage, Alaska. Congratulations, Prof. Falk!

Since 2016, HAD member Michael Marotta has provided the *AAS News Digest* with the *This Month in Astronomical History* (TMIAH) column. You can find all the back issues on the HAD website. Michael is stepping down from this position, effective with the publication of the December 2024 *TMIAH* column. A call for applications was recently posted by HAD Secretary-Treasurer Susana Deustua. Those of you with science writing skills, please consider applying. And to Michael, my sincerest thanks for your many years of service to HAD and the AAS.

HAD At-Large member Loretta Canon, whose term expires in January, will continue to host the *H'ad astra historia* podcast. Do you have an interesting story to tell? If so, please contact her (neptuneedit42@gmail.com).

Finally, Joe Tenn, who has managed the *Astronomy Genealogy Project* for over a decade, plans to retire soon. We're still looking for someone to take over this valuable resource.

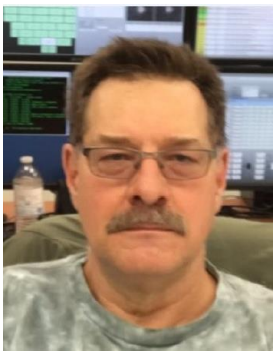
Looking back at my (nearly) two years as HAD chair, I have to say I'm proudest of our *History of the AAS Divisions* special session at the January 2024 AAS 243 New Orleans meeting, which celebrated the 125th anniversary of the AAS. All six AAS divisions provided speakers on the history of their divisions. We hope this establishes a tradition for HAD serving as the venue for the preservation and celebration of the AAS history.

HAD is your division. We depend entirely upon the volunteer spirit of our membership. Please consider working with us on one of the above projects—or create a new one.

I hope to see you all in January at the HAD Division sessions at the AAS meeting.

terry.oswalt@erau.edu

Terry with his pet eagle; photographed at the Genghis Khan Equestrian Statue in Mongolia.



From the Vice Chair

J. Allyn Smith
Austin Peay State University

Thanksgiving is upon us, and soon the other year-end holidays. Then it starts all over again with the AAS meeting in Washington, D.C. The HAD program is shaping up to be a full slate of talks and posters, plus the business meeting. Terry Oswalt steps down as Chair for the past two years (has it been two years already?) and the new officers step into their roles. I want to publicly thank Terry for his leadership over the past two years as Chair of HAD and many more years of mentoring me. Terry was primarily responsible for me becoming a professional astronomer: 40 years ago (back in March) he took me on an observing run to Lowell Observatory and I was hooked. Ironically, I'm now taking students to that same telescope. Who knows, maybe one of them will be doing the same thing in another 40 years.

2024 has been a year of successes and advancements in Astronomy and space. Two that are near-and-dear to my heart: the Dark Energy Survey (DES) and the Rubin-Legacy Survey of Space and Time (LSST). The DES is finished with the on-sky portion of the survey (it has been for a couple of years) and the data analyses are continuing to reveal new finding in everything from Solar System objects to Cosmology. We can expect even more insights in the next few years. Meanwhile, the LSST is beginning to ramp-up activities. The simulations have been run (several of them anyway), the hardware has been built and mostly assembled. The main telescope is up and running on Cerro Pachón and the survey camera has been delivered. The ComCam (commissioning camera) is in place and taking data. It looks to be giving great results, a harbinger of things to come. The data pipelines are being tested. This year will be mostly commissioning activities and when the time comes, there won't be enough graduate students to keep up with the data flow. This promises to be a historical time.

But, since this is the historical division, one day we'll look back at it all with fond memories. Perhaps in 25–35 years some current LSST postdoc will present a talk at the HAD meeting on "The LSST at 25"… This year's (well 2025's) HAD meeting will look back at the 25+ years since the Sloan Digital Sky Survey (SDSS) started and the early contributions to astronomy by Washington D.C. institutes; primarily the US Naval Observatory. Come on in and join us in January.

smithj@apsu.edu

From the Secretary-Treasurer

Susana E. Deustua
National Institute of Standards and Technology

On October 17th, the AAS Division Leaders Meeting took place at AAS Headquarters in Washington DC. At least one representative from each Division's leadership attended, as well as some of the AAS Officers (Secretary, Senior Vice President, Executive Officer). Every Division had the opportunity to give a short presentation about their Division's organization, leadership structure, meetings, prizes, membership. A couple of highlights from this meeting, in addition to getting to know more about the other Divisions, meeting new people and sharing experiences, were about the Division prizes— the logistics of disbursing funds to the recipients and the whole process of selecting the prize candidates. The discussion on the latter centered on how to minimize biases during the evaluation of nominees and the importance of developing and applying standard metrics to each nomination, i.e. implementing best practices. One outcome of this meeting was the need for a Treasurer's Summit held in November, a training session on all things Treasury. The Division Leaders

meeting was quite informative, and here's to having them be a regular event in the HAD Leadership's calendar for 2025 and beyond.

susana.deustua@nist.gov

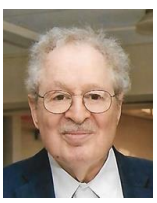
HAD's Podcast

Loretta J Cannon, HAD Leadership Committee 2023-2024, HAD Podcaster, Science Writer/Editor
NeptuneEdit42 @ gmail

For those of you who haven't heard, H'ad astra historia is the official podcast for the Historical Astronomy Division of the American Astronomical Society. We're here to share stories from and about the people who study the stars, planets, and the cosmos. We'll be hearing from individuals who not only study the history of astronomy, but also those who lived it, who were "in the room" during pivotal events within the last 50 years or so.

Here are the 2024 episodes:
Ep 101 "Women in Science History"
Ep 102 "Egyptian Star Clocks"
Ep 103 "A Distinguished Career I"
Ep 104 "A Distinguished Career II"
Ep 105 "Astronomy Oral History Project I"
Ep 106 "Astronomy Oral History Project II"
Ep 107 "Where No One Has Gone Before"
Ep 108 "Put a Ring on It"
Ep 109 "2025 Osterbrock Book Prize"
Ep 110 35th Anniversary-Solar System Portrait

I wrote about our first two episodes for the May *HAD News*. In the May and June episodes, we meet



Dr. Steve Maran who shares stories from his 'Distinguished Career' — 65 years of work and fun in astronomy. He is currently a senior advisor with AAS and has written twelve books and over 100 popular astronomy/space articles. My favorite quote about him is from *The Dallas Morning News*, "Dr. Maran takes up where Carl Sagan left off, telling the story of space to anybody who's interested. Except that Dr. Maran is funnier."[1]

In our September and October episodes, we meet Cultural Astronomer/Astrophysicist Dr. Jarita_ Holbrook (with the Harvard Smithsonian Center for Astrophysics, Univ. of Edinburgh, Univ. of the Western Cape) who talks about the 'Astronomy Oral History Project' (see her picture and article on p. 9). In Ep105, we also hear some really good advice for navigating grad school (hint: learn to write effective grant apps); and in Ep106, we hear about her favorite Oral History interviews. If you're attending the AAS 245th Meeting (12-16 Jan 2025) in National Harbor, MD, you are invited to sign up to be interviewed for the Oral History Project (https://tinyurl.com/AASInterviews2025).

In our next two episodes, we meet Dr. Linda Spilker, Voyager Project Scientist, who talks about the *Voyager* mission in 'Where No One Has Gone Before' and the *Cassini* mission in 'Put a Ring on It' (available 26 Dec 2024). During her over 48 years with NASA, Linda worked 12 years on *Voyager* and 30 years on *Cassini*. We have plans to discuss the *Voyager* Interstellar Mission and the Golden Record next year!!

For 2025, I've lined up two fun episodes! In the first episode of the new year (avail 23 Jan 2025) we meet with Cambridge Prof Seb Falk, recipient of the HAD 2025 Osterbrock Book Prize for *The Light Ages: The Surprising Story of Medieval Science* (2020, Norton); see picture and article on p. 1 for details. His book follows St. Albans monk John Westwyck's educational and career journey in 14th century England.

For February, we'll celebrate the 35th anniversary of the Solar System's only Family Portrait – a series of images captured by *Voyager 1* on 14 Feb 1990. I'll be speaking with Dr. Candice Hansen-Koharcheck, Senior Scientist with Planetary Science Institute, who spent her early career working on *Voyager* and has since worked on both *Cassini* and *Juno* among other projects.

Astronomy has been called the first science – humans have been observing, *remembering*, and (later) recording the movements of the objects in the heavens. There was an immediate and direct

connection between what they saw in the sky—night or day—and their lives. They took the 'order' of the sky and applied it to themselves and their belief systems. Astronomy and religion were two parts of one whole that explained who they were, what they should do, and why things happened. It's only within the last few centuries that astronomy grew into the secular endeavor we know involving research, testing, and analysis. Today, astronomers continue the search to understand "*Life, the Universe, and Everything*."

Through H'*ad astra historia*, we want to tell the stories of all of these astronomers.

If you have a story to share from either your personal, professional experiences or your research in the history of astronomy, please contact me and we can talk!

NOTES

[1] From "Stars' spokesman no dummy when it comes to astronomy," by Tom Siegfried, *The Dallas Morning News*, February 14, 2000.

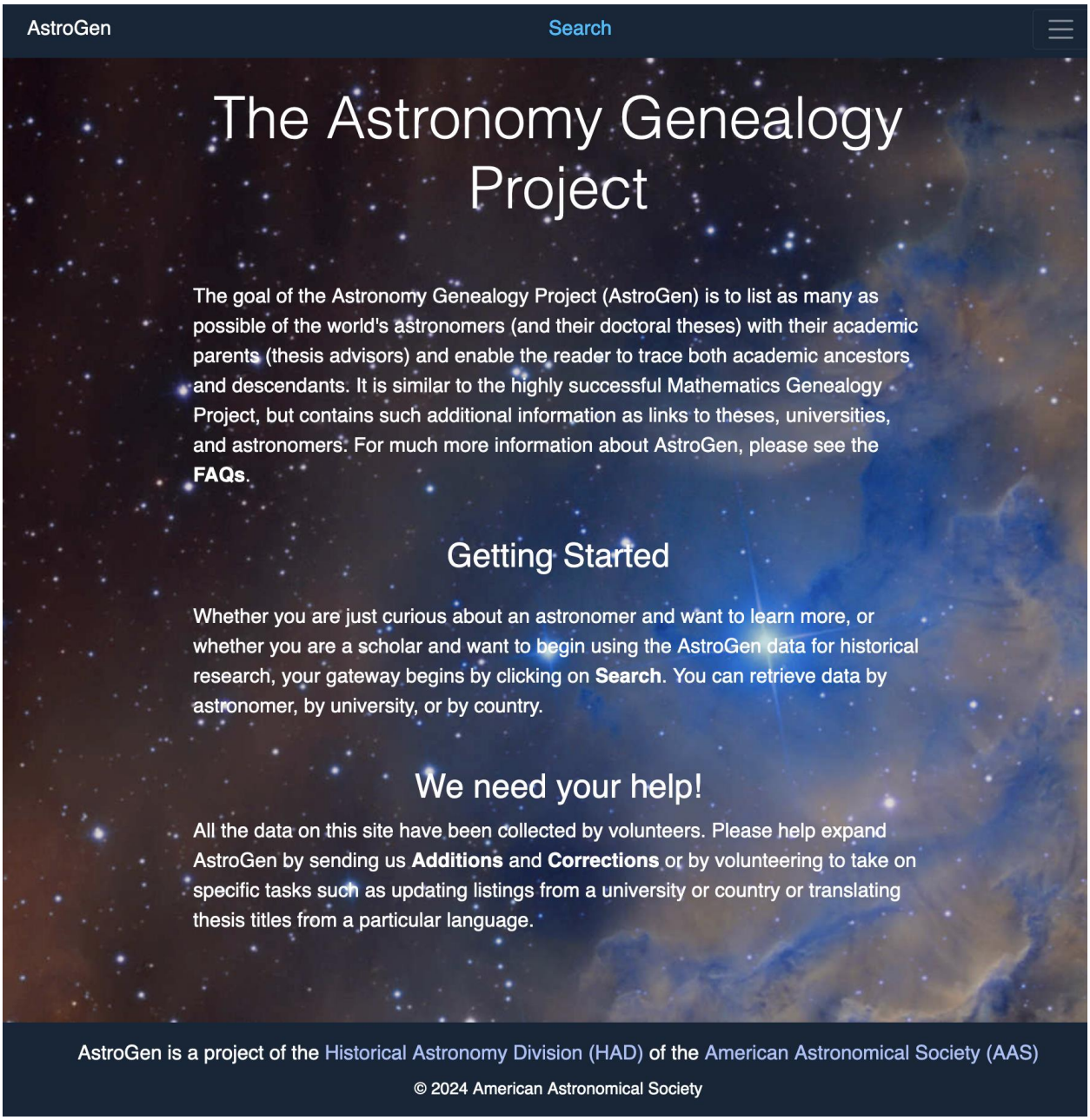
The Astronomy Genealogy Project

Joe Tenn
Sonoma State University

The Astronomy Genealogy Project, sponsored by HAD since 2013, has been thriving. Thanks to a number of volunteers, including a few HAD members, it now has about 49,000 people in its online database, courtesy of the AAS, at https://astrogen.aas.org. Of these, about 43,000 have earned Ph.D.s with astronomy-related theses. The other 6000 are included in AstroGen because they supervised such theses. Half of these are known to have other higher degrees, either doctorates in other fields, such as physics, or lesser degrees. The other 3000 or so are awaiting volunteers to search for them online and find out what their highest degrees were. This could be a fun project for a HAD member with a few hours to spare.

Approximately two-thirds of the theses themselves are online. There is much more information about the astronomers, the theses, the advisors, and the universities that awarded the degrees on the website. One of the goals of the project was to be a resource for those who would like to investigate the astronomical community, past or present. As an example, I will present an iPoster at the January meeting in National Harbor comparing the careers of graduates of different universities a dozen years after receiving their Ph.D.s. The universities will be selected from those that have produced the most astronomy-related doctorates in the 39 countries where we currently deem AstroGen to be "nearly complete". For other examples, feel free to check out previous iPosters presented in 2024, 2023, and 2022.

tenn@sonoma.edu


AstroGen
Search
The Astronomy Genealogy Project
The goal of the Astronomy Genealogy Project (AstroGen) is to list as many as possible of the world's astronomers (and their doctoral theses) with their academic parents (thesis advisors) and enable the reader to trace both academic ancestors and descendants. It is similar to the highly successful Mathematics Genealogy Project, but contains such additional information as links to theses, universities, and astronomers. For much more information about AstroGen, please see the FAQs.
Getting Started
Whether you are just curious about an astronomer and want to learn more, or whether you are a scholar and want to begin using the AstroGen data for historical research, your gateway begins by clicking on Search. You can retrieve data by astronomer, by university, or by country.
We need your help!
All the data on this site have been collected by volunteers. Please help expand AstroGen by sending us Additions and Corrections or by volunteering to take on specific tasks such as updating listings from a university or country or translating thesis titles from a particular language.
AstroGen is a project of the Historical Astronomy Division (HAD) of the American Astronomical Society (AAS)
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The IAU General Assembly: Cape Town, South Africa

Steven Gullberg
University of Oklahoma

For the first time the IAU held its general assembly on the African continent, and it was a tremendous success. It was held in Cape Town, South Africa and was a wonderful experience for all who attended. The two-week event had a fascinating schedule that included all aspects of astronomy. One of the Focus Meetings that was organized by Commission C3 History of Astronomy was for "History of Astronomy in South Africa: The Late Modern Period." Sessions and activities throughout the two weeks were awesome, including an Indigenous astronomy art exhibit from local artists who had painted for both sides of the SKA – South Africa and Australia. This collaboration has been great for gaining better acceptance from the local populations for both astronomical sites. Division C is for Astronomy Education, Outreach and Heritage and the Division Days were held on Friday at the end of the first week and Monday at the beginning of the second. Examples of contributions were such as "Modern Astronomy Education and Outreach Endeavors in Africa," "How History Touches the Sky: Historical Instruments, Archives, and Observatories: Why History is Vital to Modern Astronomical Research," "Cosmovisions of the Pacific: Advancing Indigenous and non-Indigenous Collaboration with Integrity," "The SKA's Development and its Impact on South Africa," "The Cultural Heritage of the African Arc of the 30th Meridian," and " Perspectives in Decolonizing Astronomy: Towards and Inclusive Environment."

The General Assembly was a momentous occasion for Astronomy in Culture as the IAU Executive Committee initiated a new Commission C5 Cultural Astronomy. Commission C5 was launched at its own session on Tuesday of the second week that was well attended, and the field now will move forward alongside the other branches of astronomy. Many new members have since joined and all are welcome! I am the President – let me know if you would like to be included. (srgullberg@ou.edu)

A terrific evening event included Indigenous singers and dancers for local culture and there were ample opportunities to sample local foods. There also was time for some great exploration of South African cultural events as well. My wife, Jessica (the artist) and I went on both land and sea safaris, visited South African wineries, and toured the Cape of Good Hope.

The General Assembly was a terrific event enjoyed by all and I look forward to the next one in 2027, which will be held in Rome. The 2030 General Assembly is now slated for Santiago, Chile. I hope to see you at one or both!

srgullberg@ou.edu

A new IAU Commission (C5 Cultural Astronomy) was introduced at the IAU General Assembly in August.

Steve and Jessica took time to make some new friends while in South Africa. No political affiliation is to be implied!

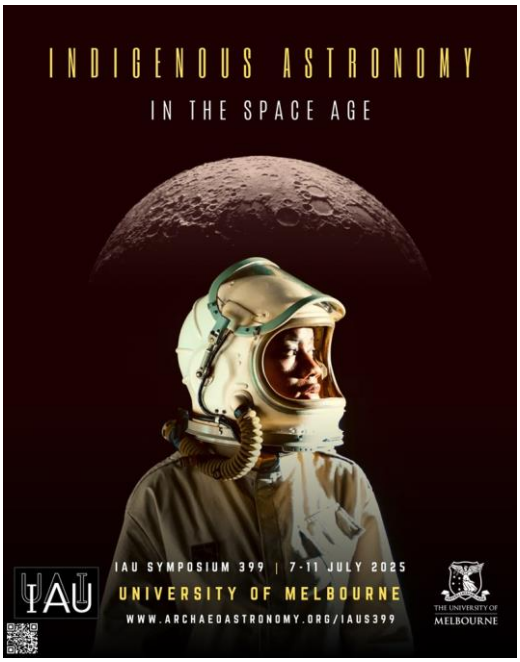
Ready for Indigenous Astronomy in the Space Age!

Jarita Holbrook
Harvard-Smithsonian Center for Astrophysics

July 2025 is the next big cultural astronomy conference taking place in Melbourne, Australia. First, the deadline for submitting abstracts is DECEMBER 15, 2024! You can submit your abstract at https://www.archaeoastronomy.org/iaus399/submissions .

Now that that is out of the way, let me set the stage: The Oxford series of conferences are organized by the International Society for Archaeoastronomy and Astronomy in Culture (ISAAC). I'm currently ISAAC president (don't forget that I used to be HAD Chair from 2011–2013). These flagship and foundational conferences take place every three years with the last one in Argentina being delayed due to the Pandemic. In the past, the conference has sometimes co-convened with INSAP, SEAC and SIAC (but never HAD!). More rarely, we have been able to secure IAU funding making an IAU symposium—we have done it for this conference! The last time was for the 2011 Oxford in Peru designated IAU Symposium 278. This means there is access to IAU monies for travel grants and there will be an IAU Symposium 399 conference proceedings published through Cambridge University Press. Next, why should HAD folks and those engaged with the history of astronomy consider presenting at Oxford XIII? The symposium poses three hard-hitting questions all of which point to the expertise of many of our HAD members. Specifically, experts on the history of ground-based observatories; experts on the preservation of astronomy related artifacts, knowledge and heritage; and experts on cross-cultural collaborations, teaching, and engagements with Indigenous students and communities would provide valuable input. If anyone has collected the names and PhD dates of astrophysicists of Hawaiian and/or Native American heritage, that would be of interest, too! Finally, there is Melbourne—English speaking, easy to fly into and out of, and is home to the Melbourne Observatory Collections, Swinburne University's astronomy department, U Melbourne's astronomy group, and Monash University's astronomy group. I return to my opening point – the abstract deadline is December 15th. See you at National Harbor and it would be great to see you again in Melbourne.

jc.holbrook@ed.ac.uk



Why I Co-signed IAU Resolution XX:

On a Suggested Renaming Of the Magellanic Clouds and Associated Structures"

Thomas Hockey
University of Northern Iowa

The comparatively few astronomical objects visible to the naked eye from the Earth (excluding ephemeral ones such as comets) have naming traditions associated with figures of deep veneration in their time. Even in 1522, it is unclear that a consensus would have agreed that Ferdinand Magellan was worthy of such status, based upon his treatment of indigenous peoples and his own crew.

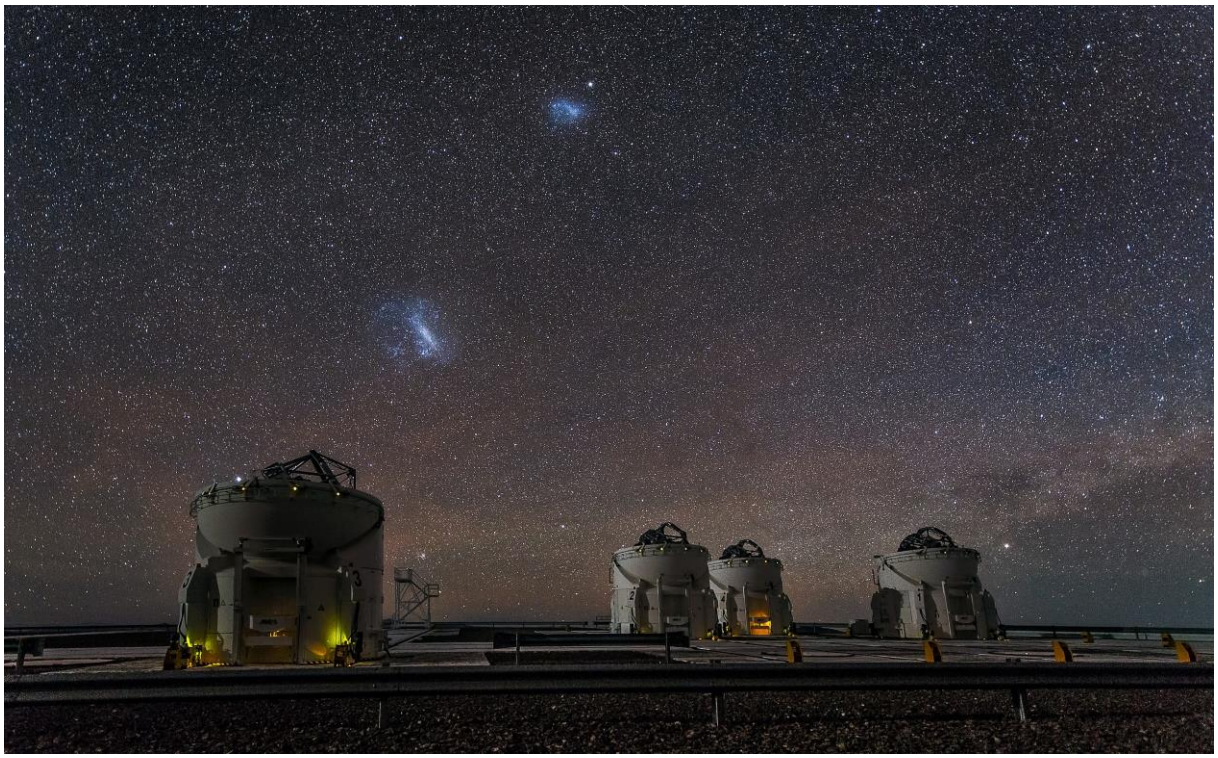
Magellan did not discover the Magellanic Clouds. Many pre-existing names exist from a variety of cultures. It is not even correct to say that *he* made knowledge of these objects widespread (the navigator himself died before returning to Spain). Most significantly, history records their acknowledgement, by western astronomers situated at latitudes where the Clouds are visible, before Magellan's time.

The names "Large Magellanic Cloud" and "Small Magellanic Cloud" were not used until well after Magellan's final voyage ended in 1522. For two-and-a-half centuries they were *Nubecula Minor* and *Nubecula Major*. The popularity of "Magellanic Clouds" dates only from the twentieth century.

"Large" and "Small" are confusing. Do they refer to physical or to apparent size? Similarly, "clouds" is anachronistic and now considered linguistically incorrect. Lastly, do we really wish to call a dwarf galaxy Large?

It is time to set Magellanic strait!

thomas.hockey@uni.edu



The Large and Small Magellanic Clouds over ESO's Paranal Observatory in Chile. Astronomer Mia de los Reyes (Amherst College, Massachusetts) published an opinion piece in the September 12, 2023 issue of *APS Physics*. Voicing the opinion of a coalition of astronomers, it outlined reasons why the 16th century explorer Ferdinand Magellan should not be immortalized by these celestial bodies.

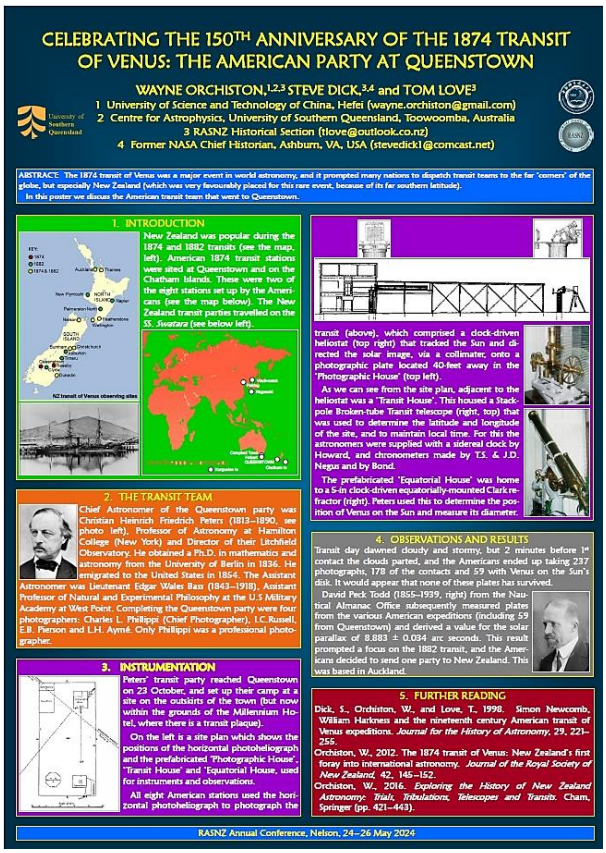
IAU Resolution XX, to rename these neighboring galaxies, was filed at August's General Assembly in Cape Town. A vote on the matter will, hopefully, occur at a later time. (*image courtesy European Southern Observatory*)

History of Astronomy at the 2024 Annual Conference of the Royal Astronomical Society of New Zealand

Professor Wayne Orchiston (Director, RASNZ Historical Section) and Glen Rowe (Deputy Director, RASNZ Historical Section)

Especially since the founding of the Historical Section of the Royal Astronomical Society of New Zealand in November 2022, history of astronomy has been a prominent component of annual conferences of the Society. The 24–26 May 2024 Conference was no exception. This was held in the charming, historic South Island coastal city of Nelson (near Rutherford's birthplace).

Between them, members of the Historical Section and their collaborators presented five different oral papers:



One of the many posters presented at the annual conference held in New Zealand in May. A list of all the posters presented at that meeting appears in the article below, and each is available online.

"A review of New Zealand observations of Comet 1P/Halley in 1910" by John Drummond

"Astronomy in Nelson: An Historical Overview" by Wayne Orchiston, Ralph Bradley and Dennis Goodman

"Eighteen years of observations with MOA-2" by Ian Bond

"Retrofitting the Gifford Observatory to become online: some of the challenges" by Duncan Hall

"The 1874 Transit of Venus Expedition to Aotearoa New Zealand by the United States: Marking 150 Years of Scientific Partnership Between the Two Nations" by Luise Piggin, Joshua Stewart, David Johnston and Jocelyn Powell

In addition, the following colourful Historical Section posters were on display throughout the conference:

"Welcome to the RASNZ's Historical Section: researching the past to understand the present and the future" by Wayne Orchiston and Glen Rowe

"Alan Maxwell and the monitoring of 100 MHz solar emission in 1947–1948: towards the world's first known MSc thesis on radio astronomy" by Wayne Orchiston and Scott Parkins

"Ashburton and the 'Canterbury Project': New Zealand radio-meteorological research following WWII" by Glenn Vallender, Alistair Perkins and Wayne Orchiston

"Celebrating the 150th anniversary of the 1874 transit of Venus: Arthur Stock and his little books" by Wayne Orchiston and Darunee Lingling Orchiston

"Celebrating the 150th anniversary of the 1874 transit of Venus: inspiration for 2004" by Emma Fairweather and Wayne Orchiston

"Celebrating the 150th anniversary of the 1874 transit of Venus: the American party at Queenstown" by Wayne Orchiston, Steve Dick, and Tom Love

"Celebrating the 150th anniversary of the 1874 transit of Venus: the British party at Burnham" by Wayne Orchiston, Glenn Vallender and William Sheehan

"Celebrating the 150th anniversary of the 1874 transit of Venus: the German party at the Auckland Islands" by Wayne Orchiston and William Sheehan

"Christchurch's first astronomical society and the founding of the Townsend Observatory" by David Hill

"Grigg, Skjellerup and their comet: the Kiwi connection" by Wayne Orchiston and John Drummond

"In search of New Zealand's missing meteorites: the role of 'Papers Past'" by Wayne Orchiston, James Scott, Jim Rowe and Steve Wyn-Harris

"Introducing Peter Read: the 'Patrick Moore of New Zealand astronomy' by Gordon Hudson, and Wayne Orchiston

"Passion, politics and personalities: the sad saga of Nelson's Cawthron Solar Observatory" by Wayne Orchiston, Martin Bush, Hamish Barker and Dennis Goodman

"Researching New Zealand meteorites: collaborative research by the RASNZ's Fireballs Aotearoa and Historical Sections" by Wayne Orchiston, James Scott, Jim Rowe and Steve Wyn-Harris

"The 1874 transit of Venus expedition to the Chatham Islands" by David Johnston, Louise Piggin, Joshua Stewart, Jocelyn Powell, Jenny Stein, and Ken Gledhill

"The astronomical paintings and sketches of the Nelson artists Edwin and Emily Harris" by Wayne Orchiston, Catherine Field-Dodgson, Michele Leggot, Ian Cooper and John Drummond

"The historic 18-inch Brashear Telescope at the Dark Sky Project, Lake Tekapo: an overview" by Kate Garner and John Hearnshaw

"The historic 18-inch Brashear Telescope at the Dark Sky Project, Lake Tekapo: the American era" by Richard Taibi, Wayne Orchiston, Darunee Lingling Orchiston

"The historic Carkeek Observatory: a lifeline emerges to save observatory remains" by Ray Lilley and Tom Love

"The potential for archival investigation of New Zealand auroral reports: a case study of the Carrington storm of 1859" by Hisashi Hayakawa, Bob Evans, Ross Dickie and Wayne Orchiston

"The space weather event of 30 October–1 November 1903: a review of the New Zealand evidence" by Wayne Orchiston, Hisashi Hayakawa, Ross Dickie and Bob Evans

"The world's first female radio astronomer: Dr Elizabeth Alexander, and the mysterious 'Norfolk Island Effect'" by Wayne Orchiston, Mary Harris and Graham Frazer

"William Wales and Astronomers' Point, Dusky Sound: Southland's first scientific observatory" by Wayne Orchiston, Darunee Lingling Orchiston and Glen Rowe

As can be seen from these titles, one of the objectives was to publicize New Zealand's involvement in the 1874 transit of Venus, as part of the international celebrations of the 150th anniversary of this important event. Another objective was to highlight some of the accomplishments of NZ-based scientists during the early days of radio astronomy, and a third objective was to celebrate Nelson's historical involvement in astronomy (through an oral paper and two posters).

A notable feature of the posters is their international authorship, with many overseas astronomical historians now members of the RASNZ Historical Section. USA members who feature on the above-listed posters are Drs Steve Dick, Bill Sheehan and Richard Taibi. Others overseas poster authors are from Australia (Dr Martin Bush), Japan (Dr Hisashi Hayakawa) and the UK (Dr Jim Rowe, and London academic, Mary Harris, who is Elizabeth Alexander's daughter).

Please note that pdf copies of all of these posters, along with other historical posters displayed at earlier RASNZ Conferences, are now available on the Historical Section's web site. These may be downloaded free of charge; simply go https://www.rasnz.org.nz/groups-and-sections/historical-section-1, click on Poster Papers and then the poster of your interest).

wayne.orchiston@gmail.com
growe511@outlook.com

Amazing Third Life of Spacelab Astro

Jennifer Lynn Bartlett
Chair, WGPAH

Taking shape in the main museum atrium of the U.S. Space & Rocket Center (USSRC) in Huntsville, Alabama is a remarkable "living exhibit" of space hardware that has flown to space and returned to Earth. A passionate team of engineers, representing both current and retired NASA and contractor personnel, are reassembling Astro, an ultraviolet (UV) telescope observatory flown as a Spacelab payload in the Space Shuttle. Having rescued the Astro hardware from excess and scrap metal dealers, the team is restoring it to its original flight configuration. Astro is the single largest astronomical observatory payload flown in space that has returned to Earth, and is now available for public viewing.

Astro-1 and Astro-2 flew on the Space Shuttle Columbia in 1990 (STS-35) and Endeavor in 1995 (STS-67), respectively. Astro-1 and Astro-2 included three UV telescopes:

- Wisconsin Ultraviolet Photopolarimetry Experiment (WUPPE), University of Wisconsin-Madison (UW-Madison), Arthur Code, Principal Investigator (1923–2009)
- Ultraviolet Imaging Telescope (UIT), Goddard Space Flight Center (GSFC), Theodore Stecher (1930–2017), Principal Investigator
- Hopkins Ultraviolet Telescope (HUT), John Hopkins University, Arthur Davidsen (1944–2001), Principal Investigator

Astro-1 also included a Broad Band X-ray Telescope (BBXRT), GSFC, Peter Serlemitsos, Principal Investigator.

Despite technical challenges, Astro-1 returned UV and X-ray observations of 130 objects. Astro-2 was a very successful record-breaking 16-day mission, resulting in 250 objects. WUPPE performed the first astronomical polarimetry measurements in the UV range. It detected the first bipolar outflow from interacting binary stars and studied interstellar dust clouds in the Milky Way. Also, during Astro-2, HUT detected a diffuse intergalactic medium for the first time. Another notable HUT observation was the detection of a trough in the spectrum of the high redshift (z = 2.72) quasar HS1700+64, due to absorption by singly ionized helium (He II) or the Gunn-Peterson effect, a key measurement of the early universe enabled by UV astronomy.

In the nascent history of the world-wide web, the Astro-2 mission webpages were accessed by over a million people, the most of any NASA mission at the time. Notably, professional astronomers worked as Payload Specialists during both Astro-1 and Astro-2 (Samuel T. Durrance (1943-2023) and Ronald A. Parise (1951-2008)), joining the Mission Specialist astronauts who were also trained in astrophysics (Robert Parker, John Lounge, Jeffrey Hoffman, Astro-1; Tammy Jernigan, John Grunsfeld, Astro-2). The astronaut astronomers operated the telescopes continuously in flight, during two 12-hour shifts every day. Data were downlinked during the mission and processed by support teams for each telescope, then presented during media conferences at the Marshall Space Flight Center (MSFC) Payload Operations Control Center. Many dozens of papers resulted from both missions, providing valuable foundational information about planetary and celestial objects in the UV. Some of the papers continue to be cited today, in an era when UV astronomy is seeing a resurgence in the design phase, for example, of the Habitable Worlds Observatory.

With the end of the Astro missions, the National Aeronautics and Space Administration (NASA) returned the instruments to the institutions that built them. Then, at the end of the Spacelab program, NASA repurposed or scrapped the remaining Astro-unique hardware.

The third life of this mission hardware began unexpectedly in 1998 when Byron Bonds, a mechanical engineer, stumbled upon the Astro Cruciform support structure in an Alabama salvage yard. This large 3,000-pound structure had held the three UV telescopes in precision alignment along with other sensors and avionics. Bonds recognized it from his previous work on Space Shuttle payloads at Teledyne Brown Engineering (TBE). With the help of Scott Vangen, NASA Payloads Engineer, he purchased the 1.5 ton, one-of-a-kind, ortho-grid machined aluminum structure. Later that year, Vangen acquired the Optical Sensor Package

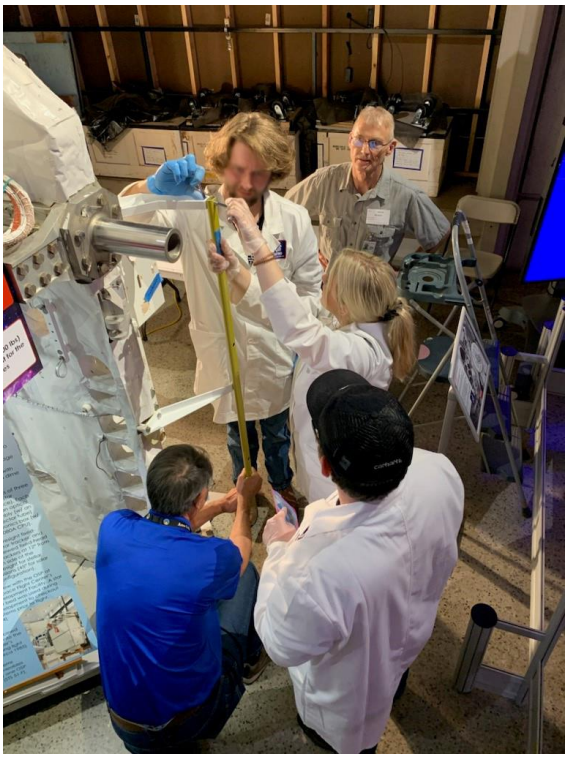
(OSP), the star trackers that ensured precision pointing of the telescopes, from a Florida dealer. Then, a piece here and a piece there …

In 2015, Valerie Neal, then a curator at National Air and Space Museum (NASM), met with Scott Vangen (Astro-2 Alternate Payload Specialist Astronaut) and John Grunsfeld (Astro-2 Mission Specialist Astronaut) at the GSFC 25th Anniversary of Astro-1. Discussions about the publicly acquired, "excessed" flight hardware opened the door for potentially re-creating a Space Shuttle payload for a NASM exhibit, specifically Astro. The Smithsonian Institution already had the Spacelab Instrument Pointing System (IPS) and two Astro telescopes: UIT and HUT. The Astro Restoration Project (ARP) led by Bonds and Vangen crystalized around a vision of restoring and re-uniting the Astro hardware so the public can appreciate and learn from what is inside such scientific instrument suites. Founded in November 2020, ARP is an all-volunteer, non-profit 501(c)3 organization composed of current and retired NASA and contractor personnel who worked on Spacelab and Astro.

In addition to parts recovered from across the country, the ARP benefited from documentation, drawings, and other records that still existed sequestered within Kennedy Space Center (KSC) databases. Fortunately, Sharolee Huet (1965–2018), a KSC engineer, had retained a list of all the drawings used to assemble Astro and a list of the procedures, an invaluable starting place for the restoration and curation of the Astro observatory. From this list of drawings, the ARP team was able to contact the Marshall Space Flight Center (MSFC) drawing archive, which still had all the drawings (electronically) in their database after more than 30 years. MSFC was able to provide the team with all drawings required to rebuild the flight hardware.

Restoring Astro's components to a "flight-like" state is a complex process and requires substantial technical expertise and working space. With NASM renovations underway on the National Mall and Neal's retirement, David DeVorkin became the NASM point of contact for ARP. He encouraged the newly formed ARP team to partner with USSRC to recreate the Astro payload with appropriate context for public display. USSRC supplies the working and display space; initially housing them in their Space Camp cafeteria building during COVID and now showcasing them in their main

Astro on display at U.S. Space & Rocket Center, including the newly installed large video screen and projector, 2024. (*photograph courtesy ARP*)



Students and faculty with "High Schools United with NASA to Create Hardware" (HUNCH) program installing fabricated flight-equivalent replacement hardware, 2022. (*photograph courtesy ARP*)

exhibit hall atrium. ARP supplies volunteers and expertise for the restoration and reintegration, drawing from many of the engineers and technicians who integrated the payload for launch on the Space Shuttle. Fortunately, Huntsville is also the home of TBE, which designed and built most of the original Astro payload's unique hardware. It is also home to MSFC, which was responsible for both Astro mission management and payload operations during the two missions.

After the restoration of the Astro Cruciform support structure, UW-Madison loaned WUPPE to ARP. In February 2022, ARP successfully re-integrated both WUPPE and the OSP onto the Cruciform structure. Now, ARP is working towards the integration of the Image Motion Compensation System (IMCS) and seeking the Integrated Radiator System (IRS). In addition, High Schools United with NASA to Create Hardware (HUNCH) fabricated missing pieces for ARP; HUNCH is a NASA experiential learning program to help provide high school students with technical training.

Ultimately, ARP would like to integrate the remaining two telescopes, UIT and HUT, to complete the Astro telescope observatory platform. NASM acquired these two instruments from the original payload developers, and currently has them in storage. From 2001 through 2022, HUT was part of NASM's Explore the Universe gallery. With all the instruments reunited, the entire Astro instrument suite could return to NASM for display as Neal envisioned nearly a decade ago.

Since 2021, the Astro has been a "living exhibit" in the USSRC Atrium exhibit hall, with supporting material placing these missions in the context of science exploration, evolving space technology, and NASA history. Eventually science lesson plans, multilingual translations, and digital displays will further increase access to the telescopes and their missions. ARP exemplifies the value of preserving scientific artifacts and illustrates the role they can play in STEM education. "Astro-3", as its new mission is as affectionally called, has been dubbed "Mission: STEM" and will inspire a new generation of space system engineers, astronomers, and space explorers.

The Working Group on the Preservation of Astronomical Heritage could not ask for a more comprehensive treatment of this piece of our space heritage. ARP is collecting, conserving, restoring, and displaying the instrument suite, locating technical documentation, sharing personal connections, and making everything accessible to scientists, historians, and museum visitors. Thanks to their dedication and expertise, Astro-3 will be available for astronomical and historical research, for the teaching of astronomy, and for outreach to the public.

wgpah-chair@aas.org

The Astro-2 payload in Space Shuttle Endeavor payload bay prior to launch. (*photograph courtesy NASA*)

James Lequeux and his 90th Birthday Celebration at Paris Observatory

Darunee Lingling Orchiston and Wayne Orchiston (Attribution)

We recently returned from Paris, where we were honored to attend the 90th Birthday Celebration that Paris Observatory organized for James Lequeux's 90th Birthday. On 11 September, around 60 French astronomers plus the two of us from Thailand assembled at 2 pm in the historic Cassini Room at the Observatory where we were treated to a succession of presentations, in French, about James' remarkable record in radio astronomy, optical astronomy, and history of astronomy extending over 70 years. Then it was our turn, and for five minutes we (well, WO) spoke—in English (so that Darunee Lingling could understand)—about two important contributions made by James that were hardly touched on by other presenters:

(1) His close association with the *Journal of Astronomical History and Heritage*, from soon after its founding in 1998, through to the present day; and

(2) His key involvement in the Early French Radio Astronomy Project, initiated by the IAU Working Group on Historical Radio Astronomy (which subsequently expanded to become a working group of both the IAU and URSI).

So, who is Dr. James Lequeux (Figure 1), and why belatedly celebrate his 90th birthday (which, James assured us, actually occurred on January 1st)?

James Lequeux was born in Laon on 1 January 1934. After completing a science degree at the École Normale Supérieure (ECN) and the Sorbonne University in Paris he joined Jean-Francois Denisse (1915–2014) and his fledgling radio astronomy research group at the ENS. This group comprised in particular Jean-Louis Steinberg (1922–2016), Jacques-Émile Blum (1923–2009), and Jacques Arsac (1929–2014). In his tribute to one of us (WO), James describes himself as belonging to the

Figure 1: James Lequeux in 2023

second generation of radio astronomers, who were active in the 1950s, 1960s, and beyond (Lequeux, 2023b: 277). He also notes that

> *None of us who chose radio astronomy was particularly interested in astronomy, about which we knew almost nothing. We soon discovered that this was almost the same for the elder members of the research group, except that a few of them had some knowledge of solar physics.* (Lequeux, 2021b: 862).

Nor did any of these pioneering French radio astronomers have prior (WWII) experience in radar, unlike their American, Australian, British, Canadian and even Japanese colleagues.

James Lequeux's radio astronomical focus was on Galactic and extragalactic sources, initially (in 1954) using an ex-WWII Würzburg Riese (7.5-m diameter) dish set up at the ENS's Marcoussis field station. After a 27-month diversion for military training James returned to the radio astronomy group which, in the interim, had transferred to Paris Observatory's Meudon Observatory campus. It was there that James co-authored what was to be the first of many books (Steinberg and Lequeux, 1960; Figure 2). This subsequently was published in English and Russian. Initially James used a 1420 MHz two-element interferometer at Nançay field station, based on two Würzburg dishes (Figure 3), which provided the data for his 1962 PhD thesis. For details see Orchiston *et al*., 2007a.

James was then involved in a major challenge: the design and construction of the Nançay Large Radio Telescope (artistically depicted in Figure 2). This ambitious new radio telescope was inspired by Kraus' meridian instrument at the Ohio State University Radio Observatory. Details are provided in Lequeux *et al*., 2010. After the completion of the

Nançay radio telescope, he founded the first French mid- and far-infrared group, which has developed substantially since.

With the passing of the years James attended his first IAU General Assembly (at Berkeley, in 1961); visited the CSIRO's Division of Radiophysics (RP) in Sydney and the new 64-m Parkes Radio Telescope (Figure 4) in Australia in March 1963, at a time when Dr. Bruce Slee and the second author of this article, then a young RP Technical Assistant, were observing planetary nebulae with this radio telescope—but we never met at this time; and attended an IAU Symposium in Armenia and was able to cross the USSR without surveillance by the KGB, which he suggests may have been due to Viktor Ambartsumian's influence (Lequeux, 2021b). In 1968 James spent a year at Caltech as a Research Associate, where apart from observing with the Owens Valley Interferometer he particularly enjoyed weekly lunches at a Pasadena restaurant attended by the following well-known astronomers from Caltech and Mount Wilson and Palomar Observatories: Halton Arp, Marshall Cohen, Ron Ekers, Jesse Greenstein, Alan Moffet, Wallace Sargent and Leonard Seale. James noted that "… we never saw Sandage or Zwicky!" (Lequeux, 2021b: 870).

Upon returning to France, James became immersed in millimeter radio astronomy, which led to the founding of the French–German–Spanish Institute of Radioastronomy at Millimeter Wavelengths (IRAM) and the construction of an array of 15-m parabolic antennas on the Plateau de Bure in the French Alps. While this was happening James was busy as the Director of the Nançay Radio Astronomy Station.

Two important changes then occurred in James' life: he became one of the Editors-in-Chief of the European journal *Astronomy & Astrophysics*, and he shifted his primary research focus to

> *… studying inter-stellar matter in spiral, irregular and compact galaxies, in particular in our own Galaxy, the Magellanic Clouds, M 31 and IZw18, in order to look at the effects of metallicity … For this, I used my own observations and other data in the UV, visible, near and far-IR and millimeter wave-length ranges. (Lequeux, 2021b: 873).*

By the late 1990s he was mainly involved with the European Infrared Space Observatory, but still maintained contact with the Paris-Meudon Observatory radio astronomers.

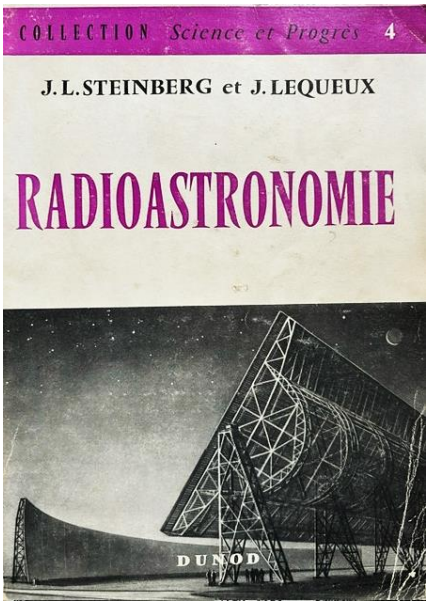


Figure 2: The front cover of the 1960 book by Jean-Louis Steinberg and James Lequeux, which is in the authors' library. This book formerly was owned by the famous Australian radio astronomer W.N. (Chris) Christiansen.

Figure 3: The two equatorially-mounted Würzburg antennas at Nançay were movable on rail-tracks (Image courtesy Paris Observatory).

Figure 4: The Parkes Radio Telescope, which James Lequeux visited in March 1963. (Image courtesy CSIRO Division of Radiophysics).

In 1999 James retired, which led to yet another change in his research, one which would impact directly on many readers of this newsletter: *"... the major part of my activity since 2003 or so has been devoted to the history of astronomy*." (Lequeux, 2021b: 873). After writing a history of astronomy from 1910 to 2005 (Lequeux 2005), he concentrated on famous French astronomers of the nineteenth century and wrote books in French about François Arago, Urbain Le Verrier and Hippolyte Fizeau. Subsequently, all three were published in English (Lequeux, 2013; 2016; 2020a), and their covers are shown in Figure 5.

The second author of this article (WO) was closely involved with the 2003 IAU General Assembly in Sydney, where he organized 1.5 days of well-attended meetings on the history of radio astronomy and though Commissions 40 (Radio Astronomy) and 41 (History of Astronomy—of which he was Secretary) also formed an Historical Radio Astronomy Working Group. After the 2006 Prague IAU General Assembly WO came to Paris where he had no trouble convincing James, Suzanne Débarbat, Jean-Louis Steinberg, and later Jacque Arsac, Émile-Jacque Blum, Andre Boischot, Jean Delannoy, Monique Pick and the US radio Astronomer Mukul Kundu to collaborate on writing a series of papers on the history of early French radio astronomy, and publishing them in English in the *Journal of Astronomical History and Heritage* (*JAHH*, which WO and the late John Perdix had founded in 1998). This led to the appearance of seven different research papers (Débarbat *et al.*, 2007; Encrenaz *et al.*, 2011; Lequeux *et al.*, 2010; Orchiston and Steinberg, 2007; Orchiston *et al.*, 2007a; 2009; Pick *et al.*, 2011) plus three conference papers (Orchiston, 2007; Orchiston *et al.*, 2007b, and Orchiston *et al.*, 2011). The plan now is for James and WO to publish a book in 2025 on the history of French radio astronomy. This will be in French, and will contain translations of the *JAHH* papers and supplementary material on more recent developments in French radio astronomy. James' substantial involvement in the 'Early French Radio Astronomy Project' was discussed at the September 11th Paris Observatory celebration, and the planned publication of this new book with WO was announced.

This initial association with *JAHH* obviously whetted James' appetite, for he went on to research and publish a succession of research papers in this journal on other aspects of French astronomy (Bobis and Lequeux, 2008; Lequeux, 2009; 2010; 2011; 2020b; 2021c; 2022b; 2023a), some of which included personal reminiscences (Lequeux, 2021a; 2021b; 2022c; Lequeux and Georgelin, 2022; Tobin and Lequeux, 2022). There also were obituaries for our mutual friends William Tobin (Lequeux, 2022d) and Suzanne Débarbat (Lequeux and Orchiston, 2024).

But this *JAHH* association went further, with James joining the *JAHH* team as an Associate Editor, where his prior experience editing *Astronomy & Astrophysics* has proved invaluable. His long-term multifaceted involvement in *JAHH* as both a contributor of papers and as an Associate Editor was emphasized and applauded during the Paris Celebration.

We would also like to think that James has been the catalyst that has inspired other French astronomers to publish their historical work or reflections in *JAHH*. For example, over the past decade there have been papers about the following topics published in *JAHH*: Space Studies (Lamy and Davoust, 2016); Foucault-Secretan reflecting telescopes (Tobin, 2016); Cassini's Moon map of 1679 (Gislén *et al.*, 2018); the Galilean satellites

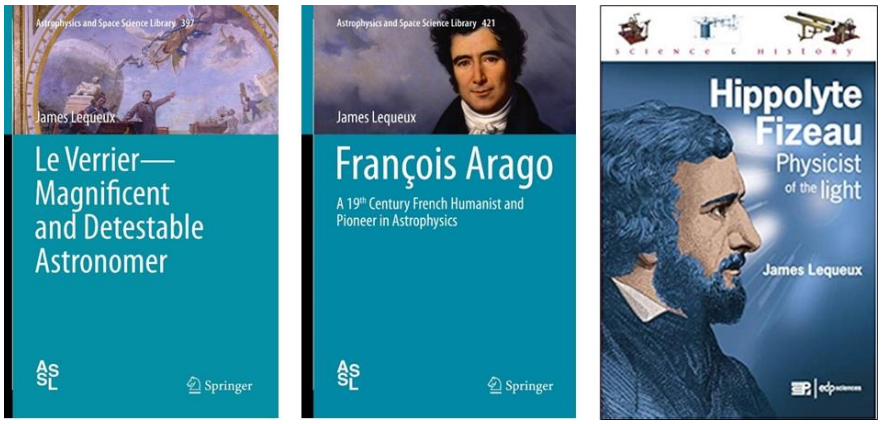


Figure 5: Covers of the English-language astronomical biographies by James Lequeux..

(Arlot, 2019), Raymond Michard and his solar group (Mein and Mein, 2020), the 1868 total solar eclipse (Launay, 2021); solar research at Pic du Midi (Muller et al., 2021; Roudier *et al*., 2021); the 1874 transit of Venus (Tobin, 2021); Jules Janssen (Malherbe, 2022); solar prominences (Engvold and Vial, 2024); the d'Azambujas (Malherbe, 2024); and an astrolabe (Davoust, 2024; Mercier, 2024). How many of these, we wonder, do we owe directly or indirectly to James?

Finally, apart from James' remarkable astronomical achievements, another talent that was mentioned by a number of speakers at the Celebration was his passion for the violin. Indeed, while studying science at the ENS James also attended classes in violin and musical theory, and upon joining the radio astronomy group he lost no time in setting up various musical groups in which he played the violin and his wife Geneviève (*née* Benoit) often played the harpsichord or pianoforte. Geneviève had studied at the female equivalent of the ENS and had joined the radio astronomy group the same time as James. They married in 1956 and have three children, a professional violinist and two physicists. After leaving the radio astronomy group Genevieve taught science at secondary schools (Lequeux, 2021).

Dr. James Lequeux has been a dear friend for more than a quarter of a century and in September 2024 we relished the opportunity to visit France once again and share these birthday celebrations with him.

wayne.orchiston@gmail.com

REFERENCES

Arlot, J.E., 2019. Four centuries of observations of the Galilean satellites of Jupiter: increasing the astrometric accuracy. *Journal of Astronomical History and Heritage*, 22(1), 78–92.

Bobis, L., and Lequeux, J., 2008. Cassini, Rømer and the velocity of light. *Journal of Astronomical History and Heritage*, 11(2), 97–105.

Davoust, E., 2024. Dating a Latin astrolabe. *Journal of Astronomical History and Heritage*, 27(2), 351–362.

Débarbat, S., Lequeux, J., and Orchiston, W., 2007. Highlighting the history of French radio astronomy. 1: Nordmann's attempt to observe solar radio emission in 1901. *Journal of Astronomical History and Heritage*, 10(1), 3–10.

Encrenaz, P., Gómez-González, J., Lequeux, J., and Orchiston, W., 2011. Highlighting the history of French radio astronomy. 7: The genesis of the Institute of Radioastronomy at Millimeter Wavelengths (IRAM). *Journal of Astronomical History and Heritage*, 14(2), 83–92.

Engvold, O., and Vial, J.-C., 2024. The role of prominences in the history of solar physics. *Journal of Astronomical History and Heritage*, 27(2), 3–27.

Georgelin, Y., and Lequeux, J., 2021. Interferometry and monochromatic imaging at the Marseilles Observatory. *Journal of Astronomical History and Heritage*, 24(2), 247–284.

Gislén, L., Launay, F., Orchiston, W., Orchiston, D.L., Débarbat, S., Husson, M., George, M., and Soonthornthum, B., 2018. Cassini's 1679 map of the Moon and French Jesuit observations of the lunar eclipse of 11 December 1685. *Journal of Astronomical History and Heritage*, 21(2&3), 211–225.

Lamy, J., and Davoust, E., 2016. Are Space Studies a scientific discipline in its own right? *Journal of Astronomical History and Heritage*, 19(2), 195–202.

Launay, F., 2021. Observations of the total solar eclipse of 18 August 1868 carried out by Jules Janssen at Guntoor, India. *Journal of Astronomical History and Heritage*, 24(1), 114–124.

Lequeux, J., 2005. *L'Univers Dévoilé: Une Histoire de l'Astronomie de 1910 à Aujourd'hui*. Les Ulis, EDP Sciences (in French).

Lequeux, J., 2009. Early infrared astronomy. *Journal of Astronomical History and Heritage*, 12(2), 125–140.

Lequeux, J., 2010. Charles Nordmann and multicolour stellar photometry. *Journal of Astronomical History and Heritage*, 13(3, 207–219.

Lequeux, J., Steinberg, J.-L., and Orchiston, W., 2010. Highlighting the history of French radio astronomy. 5: The Nançay Large Radio Telescope. *Journal of Astronomical History and Heritage*, 13(1), 29–42.

Lequeux, J., 2011. The Coudé equatorials. *Journal of Astronomical History and Heritage*, 14(3), 191–202.

Lequeux, J., 2013. *Le Verrier, Magnificent and Detestable Astronomer*. New York, Springer.

Lequeux, J., 2016. *François Arago, a 19th Century French Humanist and Pioneer in Astrophysics*. Cham (Switzerland), Springer.

Lequeux, J., 2020a. *Hippolyte Fizeau: Physicist of the Light*. Les Ulis, EDP Sciences.

Lequeux, J., 2020b. Geodetic arcs, pendulums and the shape of the Earth. *Journal of Astronomical History and Heritage*, 23(2), 297–326.

Lequeux, J., 2021a. Interferometry and monochromatic imaging at the Marseilles Observatory. *Journal of Astronomical History and Heritage*, 24(2), 247–284.

Lequeux, J., 2021b. Reminiscences of a radio astronomer. *Journal of Astronomical History and Heritage*, 24(3), 862–875.

Lequeux, J., 2021c. The rise of ultraviolet astronomy in France. *Journal of Astronomical History and Heritage* 24(1), 83–97.

Lequeux, J., 2022b. Henri Deslandres: from molecular to solar physics. *Journal of Astronomical History and Heritage*, 25(3), 553–575.

Lequeux, J., 2022c. Life at Meudon Observatory, 1876–1963. *Journal of Astronomical History and Heritage*, 25(2), 171–186.

Lequeux, J., 2022d. Obituary: William Tobin (1953–2022). *Journal of Astronomical History and Heritage*, 25(3), 576.

Lequeux, J., and Georgelin, Y., 2022. A history of astronomical optics in France. *Journal of Astronomical History and Heritage*, 25(1), 3–53.

Lequeux, J., 2023a. The total solar eclipse of December 1929: the French expeditions to Poulo Condore Island in French Indochina. *Journal of Astronomical History and Heritage*, 24(1), 179–187.

Lequeux, J., 2023b. Wayne Orchiston and the history of radio astronomy. In Gullberg, S., and Robertson, P. (eds.). *Essays on Astronomical History and Heritage: A Tribute to Wayne Orchiston on His 80th Birthday*. Cham (Switzerland), Springer. Pp. 277–282.

Lequeux, J., and Orchiston, W., 2024. Obituary: Suzanne Virginie Débarbat (1928–2024). *Journal of Astronomical History and Heritage*, 27(3), 695–696.

Malherbe, J.-M., 2022. Jules Janssen, the birth of solar physics, the foundation of Meudon Observatory, and the Mont Blanc adventure (1875–1895). *Journal of Astronomical History and Heritage*, 25(2), 187–207.

Malherbe, J.-M., 2024. Lucien and Maguerite d'Azambuja, explorers of solar activity (1899–1959). *Journal of Astronomical History and Heritage*, 27(2), 303–328.

Mein, P., and Mein, N., 2020. Raymond Michard and his Solar Physics Group at Paris-Meudon Observatory. *Journal of Astronomical History and Heritage*, 23(3), 582–600.

Mercier, E., 2024. On the dating of the Latin astrolabe of the Preaching Friars in the Musée des Arts Précieux in Toulouse. *Journal of Astronomical History and Heritage*, 27(3), 685–690.

Muller, R., Roudier, Th., and Malherbe, J.-M., 2021. Five decades of solar research at Pic du Midi Turret-Dome (1960–2010). Part 2: High spatial resolution imagery. *Journal of Astronomical History and Heritage*, 24(4), 921–934.

Orchiston, W., 2007. Highlighting the history of early French radio astronomy. Oral paper presented at the James Cook University History of Astronomy Conference, Townsville, Australia, April 2007.

Orchiston, W., and Steinberg, 2007. Highlighting the history of French radio astronomy. 2: The solar eclipse observations of 1949-1954. *Journal of Astronomical History and Heritage*, 10(1), 11–19.

Orchiston, W., Lequeux, J., Steinberg, J.-L. and Delannoy, J., 2007a. Highlighting the history of French radio astronomy. 3: The Würzburg antennas at Marcoussis, Meudon and Nançay. *Journal of Astronomical History and Heritage*, 10(3), 221–245.

Orchiston, W., Lequeux, J., Pick, M., Slee, B., and Steinberg, J.-L., 2007b. The role of eclipse expeditions in early French and Australian radio astronomy. Poster paper displayed at the HAD/AAS Winter Meeting, Seattle, USA, January 2007.

Orchiston, W., and Steinberg, J.-L., Kundu, M., Arsac, J., Blum, É.-J., and Boischot, A., 2009. Highlighting the history of French radio astronomy. 4: solar research at the École Normale Supérieure, Marcoussis, and Nançay. *Journal of Astronomical History and Heritage*, 12(3), 175–188.

Orchiston, W., Boischot, A., Delannoy, J., Kundu, M., Lequeux, J., Pick, M., and Steinberg, J.-L., 2011. The IAU Early French Radio Astronomy Project. Poster paper displayed at the HAD/AAS Winter Meeting, Seattle, USA, January 2011.

Pick, M., Steinberg, J.-L., Orchiston, W., and Boischot, A., 2011. Highlighting the history of French radio astronomy. 6: The multi-element grating arrays at Nançay. *Journal of Astronomical History and Heritage*, 14(1), 57–77.

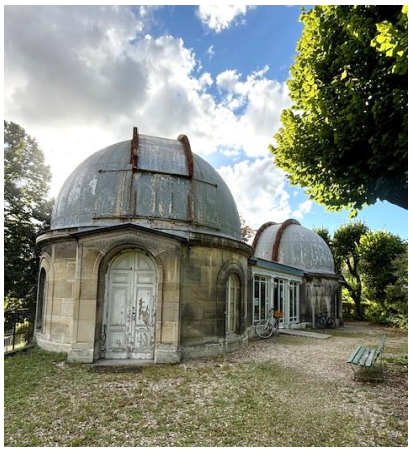
Roudier, Th., Malherbe, J.-M., Rozelot, J.-P., Mein, P., and Muller, R., 2021. Five decades of solar research at the Pic du Midi Turret-Dome (1960–2010). Part 1: Overview of instrumentation and observations. *Journal of Astronomical History and Heritage*, 24(3), 585–606.

Steinberg, J.-L., and Lequeux, J., 1960. *Radioastronomie*. Paris, Dunod (in French).

Tobin, W., 2016. Evolution of the Foucault-Secretan reflecting telescope. *Journal of Astronomical History and Heritage*, 19(2), 106–184.

Tobin, W., 2021. Photographs from the German transit of Venus expedition to the Auckland Islands in 1874. *Journal of Astronomical History and Heritage*, 25(3), 457–467.

Tobin, W., and Lequeux, J., 2022. In search of the *Promontorium Somnii*. *Journal of Astronomical History and Heritage*, 25(3), 457–467.


Some photographs from the celebration in Paris, courtesy of Wayne and Darunee Lingling Orchiston. Left: Dr. James Lequeux thanking speakers and others in the audience. Center: The historic observatory building erected at Paris Observatory as headquarters for the Carte du Ciel and Astrographic Project. Right:. The original 13-inch (33-cm) astrograph and 10.25-inch (26-cm) guidescope built by Paris Observatory's Henry brothers, Paul and Prosper, for the Carte du Ciel Project.


Left: A group photograph showing (left to right) Professor Wayne Orchiston, Darunee Lingling Orchiston, Dr. Ji Chen, and Dr. James Lequeux. Chen, who was doing research at the Paris Observatory at the time, is a Post-Doctoral Fellow in History of Astronomy at the University of Science and Technology of China (which employs Wayne as a Co-Editor of the *Journal of Astronomical History and Heritage*) and is one of two Assistant Editors of the Journal, while James is one of six Associate Editors of the Journal. On the table beside James are examples of his many books on astronomy. Right: Dr. Laurence Bobis and Wayne Orchiston. During the 2000s Laurence was Head Librarian at Paris Observatory when James and Wayne were researching early French radio astronomy, and she strongly supported the *Journal of Astronomical History and Heritage*. Indeed, she and James even published a paper in the Journal. Laurence is now Director of the Sorbonne Interuniversity Library.

Two Sides of Marcia Bartusiak

Michael Marotta
AAS Amateur Affiliate

"Everything I want to say is in my books," she told me. However, in addition to her seven books and very many periodical publications on the history of astronomy, Marcia F. Bartusiak taught science writing for 20 years and now is Professor of the Practice Emeritus in the Graduate Program in Science Writing at the Massachusetts Institute of Technology. She also serves on the AAS committee for the Donald E. Osterbrock Book Prize for Historical Astronomy. Marcia and I exchanged emails and then talked on the phone twice for about an hour each time. I sent her my notes and told her that this article would be a profile, not a Q&A.

We all write for an intended audience but we cannot pick our readers and I found that her books target either professional astronomers or the general public. *The Day We Found the Universe* (Pantheon Books, 2009) is about Edwin Hubble's proof that the Milky Way is not Everything. The 278-page story is supported by 269 endnotes. It should be read by every primary investigator and be required of every undergraduate because astronomy is also about the people who discovered what we believe to be true today. How we came to that is the subject of *Archives of the Universe: A Treasury of Astronomy's Historic Works of Discovery* (Pantheon Books, 2004). From proof that the Earth is a sphere and the measurement of its circumference to the discoveries of exoplanets and the accelerating universe, each of the 75 presentations rests on specific citations as well as the bibliography of a thousand works, both original (Aristotle, Aristarchus, *et al.*) and peer-reviewed reports (British eclipse expeditions, etc.). On the other hand, *Einstein's Unfinished Symphony: The Story of a Gamble, Two Black Holes, and a New Age of Astronomy* (Yale University Press, 2017) seems intended for the reader who gets their science from television: it is factually correct, but not burdened by direct citations to the source publications in theoretical astrophysics. "I was one of the first people to talk to the LIGO scientists," she said. "I was talking to Rai Weiss in the 1980s when he was talking to the NSF people. I was proud to be able to be on the ground floor in the 1980s through 2000 when the second edition of the book captured the discovery."

Explaining how we came to build the LIGO and discover gravitational waves, Bartusiak engages the reader by bringing them into the places and times to meet the people who made modern astronomy. You get that fly-on-the-wall or espionage-operative revelation of character, conversation, and conflict that we tend to wring out of science when we reduce it to four lines of calculus. The explanatory fact for all of that is that Marcia Bartusiak began her professional life as a television news reporter assigned to cover Goddard Space Flight Center. Captured by the subject, she enrolled at Old Dominion University to earn a master's degree in physics. Her work was supported by a NASA grant and her dissertation, *Proton-induced Coloring of Multicomponent Glasses*, (available on Research-Gate) is still cited.

Marcia Bartusiak approaching and receding

It is an easy assumption that she dedicates herself to her work. However, she also said: "Writing is at once a talent and an interest. Do I enjoy writing? I love having written. I can be a nervous wreck at times when writing, pulling my hair out. I feel the rush after it is done. That's where I get my high."

After she left television, she turned to fulltime freelance writing in 1982, and in 2003 she joined the faculty of the MIT graduate program in science writing. There, she worked alongside Thomas Levenson (bachelor's degree in East Asian Studies from Harvard; author of *Newton versus the Counterfeiter*), and Alan Lightman (Ph.D. from CalTech under Kip Thorne). She said that MIT wanted distinguished, seasoned writers with experience in producing for the public.

Explaining the development of astrophysics in the 1950s and 60s, she said: "The history of astronomy is very relevant because we learn from the mistakes of the past and this history provides clues to new discoveries, especially when something exotic was seen before. Back then black holes were science fiction. We tried to interpret the data based on what we knew. … Chemical and nuclear forces were not enough; only a very dense body, a black hole could do that. We could not quite acknowledge that, that neutron stars existed. No one thought that they could give off radio waves." By "no one" she indicated that she meant no one except Thomas Gold, pointing out that we eventually come to understand from empirical evidence the objects that were proposed from theory.

That stands contrasted against the work of Edwin Hubble. "The way it is written up in the textbooks [is] that he sat down at the 100-inch [and] saw the expanding universe. He could have done it with the 60-inch, but not without [the previous work of Henrietta Swan] Leavitt. It pains me to see the way Hubble is portrayed as discovering the expanding universe which he did not accept because he came from an era of the serene and quiet universe. … I never felt that anyone had yet told the full story of Edwin Hubble and the era in which he was immersed. *The Day We Found the Universe* was my attempt to engage the public with a more complete narrative."

In *The Day We Found the Universe* Bartusiak brought into sharp focus the fact that Hubble did not want to go to the combined conference of the American Association for the Advancement of Science and the American Astronomical Society in Washington DC over New Year's week 1924/25 to announce his proof that "nebulae" (galaxies) exist beyond the Milky Way "because he did not want to get slapped in the face if he was wrong. … He felt that there was a lot of pressure on him. Hubble was very concerned with his image. He saw the others [at the Mount Wilson Observatory] as a bunch of farm boys. He considered himself to be above them. He hung out with the Hollywood crowd, the aristocrats of the Los Angeles area."

She labels herself "a narrative story journalist … a close observer of the world" employing the techniques of fiction to tell a factual story. "When I am reading a notebook, I think about how to take the simple facts and find the story line. … I spent a day with Hubble's log book when he found the nova, later recognized as a variable star. I was picking up the weather, what the conditions were and turning that into a narrative, applying those fictional skills to draw people into the story. We steal a lot from the fiction world." That being as it may, she underscored the fact that when developing a book she is always in consultation with historians to ensure that she has not been "adding extra flourishes that may not be true."

In that context, Bartusiak also revealed that she "never liked Bill Bryson's *A Short History of Nearly Everything* because he did all of his research at one small library and it has almost a mistake on every page. It's a best seller but I wouldn't trust it at all."

It is perhaps paradoxical that she uses no special authoring software. Instead, she said that she relies on a system that she developed for herself in the 1980s, keeping on her computer a running list of citations, indexed by number. That way, she also builds the bibliography.

Although historians always seek original sources, Bartusiak allowed that newspaper reports often are not reliable. "The people reporting were just repeating what they picked up in the moment," she said, adding: "A great example is the newspaper accounts of the debate between Compton and Millikan on the nature of cosmic rays. Some newspapers were very pro-Millikan." However, she does rely on newspaper archives "for color, to provide a sense of the time" and how people were understanding scientific discoveries when they were first announced. She also cautioned that memories are malleable, and pointed to the oral history transcripts of the American Institute of Physics, warning that "people are remembering 30 or 40 years after the awarding of a Nobel Prize." In

her opinion, "Wikipedia remains more reliable than the *Britannica* because there is a value to those public watchdogs who are experts in their fields and its content is constantly being vetted."

mike49mercury@gmail.com

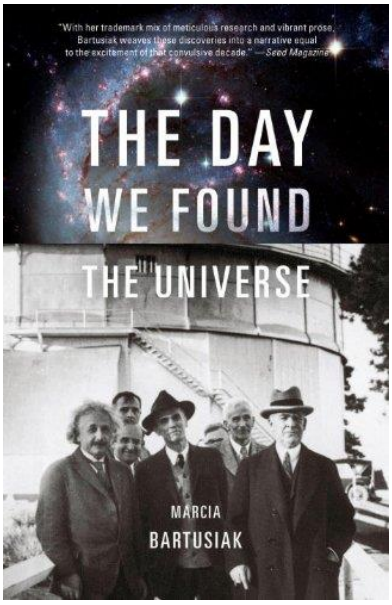
Further Reading

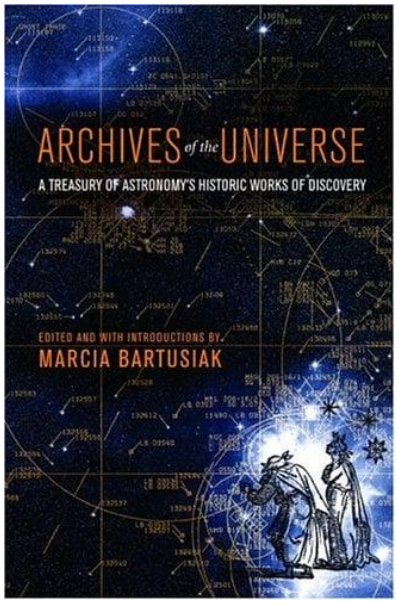
Her Website: *https://www.marciabartusiak.com*

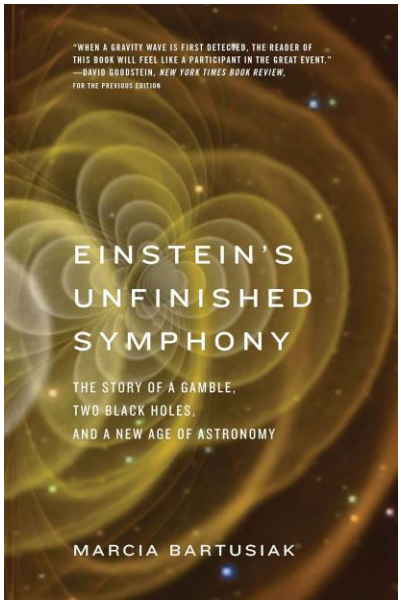
Her Wikipedia entry: *https://en.wikipedia.org/wiki/Marcia_Bartusiak*

A Nod from MIT: *https://cmsw.mit.edu/profile/marcia-bartusiak/*

Author contact: *mike49mercury@gmail.com ; https://necessaryfacts.blogspot.com*







The three books by Marci Bartusiak mentioned in the article

Ruby Payne-Scott

Dalia Maram
Indiana University East

Ruby Payne-Scott was born on the 28th of May 1912 in Grafton, New South Wales in Australia. At the age of 16, she enrolled in the University of Sydney and would graduate in 1933, obtaining a First-Class Honors in both physics and mathematics. This would make her only the third woman at the University of Sydney to graduate with a physics degree (Glorfeld, 2020). In 1936 she earned her MSc in physics as she worked at the Cancer Research Institute at the University of Sydney on a medical physics project. Spanning the years from 1936 to 1938, she was a physicist at the Cancer Research Institute but was forced to find another job when the cancer research project was shut down. Unfortunately, there were no available positions for a woman in physics, so she went on to obtain a Diploma of Education from Sydney Teachers' College in 1938 and taught in a Grammar School in South Australia (Ward, 2011).

The onset of World War II spelled a change for Payne-Scott and her career. Due to the war and the vacuum left behind from men enlisting, she and countless other women found themselves working in a traditionally male-dominated area. She began her career as a librarian at Amalgamated Wireless Australasia (AWA) in 1939. She spent her time cataloging and calibrating equipment used by the radio technicians. This work bored her and led her to apply for a government job posting looking for a physicist. Her academic experience in the field aided her in landing the job. In the August of 1941, she was recruited by the Commonwealth Scientific and Industrial Research (CSIR, the precursor to CSIRO) Division of Radio Physics. This rather obtuse name of the Division was meant to mask the true reasons for their radar research. Her work was top-secret and involved the use and improvement of radar systems in tracking Japanese warplanes. This job enabled Payne-Scott to gain extensive knowledge and expertise in the field of radio physics as she worked to distinguish Japanese warplanes from amongst the data littered with other radio statics from ships, buildings, and lighthouses (Halleck, 2018).

As the war was favoring a victory by the Allied forces, it was in 1944 that Payne-Scott and her colleagues began to search for applications of their research outside of the military sphere. The path to establishing radio astronomy as a new field of scientific study began with a publication by a British physicist, James Stanley Hey. This classified report was circulated amongst a small number of Allied scientists, a group which included Payne-Scott. The paper theorized that a mysterious radio noise was not the result of aircraft or signal jamming, but was rather emanating from the Sun. This publication led Payne-Scott and many others to join the world of the now newly legitimized field of radio astronomy (Halleck, 2018).

In 1944, Payne-Scott, along with her colleague Joseph Pawsey, spearheaded research in this new field when they performed the first ever radio astronomy experiment in the southern hemisphere. The following year she continued this momentum at Dover Heights, Sydney, Australia upon the cliff top that overlooked the waves of the Tasman Sea. It would be at Dover Heights again, in 1946 where Payne-Scott would carry out the first ever interferometry observations in radio astronomy. Their equipment was a repurposed Australian Army radar antenna turned radio telescope. She played a pivotal role in the discovery and clarification of the properties of three of the five categories of solar bursts that originate in the solar corona (Heffernan, 2021).

In September 1947, Payne-Scott and Pawsey made observations using a new instrument constructed at RPL and at Potts Hill. These observations would leave a long-lasting impact on the progression of solar physics in the second half of the twentieth century. This instrument was the first ever "vertical interferometer," as well as the first swept-lobe interferometer built in the field of radio astronomy. The interferometer panned the sky dozens of times per second which enabled the radio astronomers to zoom in on and identify single wave formations. This instrument would also allow radio astronomers to make observations during the daytime when they were previously limited to dawn and eclipses. These limitations gave ambiguous

results due to the infrequency of observations. The newly-gained ability to make high resolution observations at most times during the daytime hours represented a crucial step forward in the field. Her method gave astronomers a more comprehensive and complete picture of the frequency and the shape of waves emerging from space (Goss & McGee, 2010).

However, Payne-Scott was a woman working in a time when women's rights were scarce. At the time, the Commonwealth government had legislation in place stating that a married woman was not allowed to hold a permanent position within the public service (Debakcsy, 2018). This meant that when Payne-Scott married William Hall in 1944, she was forced to keep her marriage a secret so she could remain working in her current position. She wore her wedding band on a necklace for 6 years, hiding her marriage. During a restructuring of the department in 1950, Payne-Scott's secret was revealed. She fought against the rule in a series of letters to the head of department, but she was still forced to resign and forego her pension. Pawsey hired her back on with a "temporary" status, however, she resigned from her position a year later as she was five months pregnant with her son, Peter. Due to the lack of any maternity leave, she didn't have a choice (Ward, 2011).

Ruby Payne-Scott developed dementia at an early age and passed away a few days shy of her 69th birthday on May 25, 1981. She left behind an incredible legacy in science through her work although she went relatively unacknowledged until The New York Times published a belated obituary for her in 2018.

daliaamaram@gmail.com

REFERENCES

Debakcsy, D. (2018, October 24). *Ruby Payne-Scott, the world's first woman radio astronomer*. Women You Should Know. https://womenyoushouldknow.net/ruby-payne-scott-first-woman-radio-astronomer/

Glorfeld, J. (2020, September 11). Ruby Payne-Scott stood out in the crowd. *Cosmos*. https://cosmosmagazine.com/space/ruby-payne-scott-stood-out-in-the-crowd/

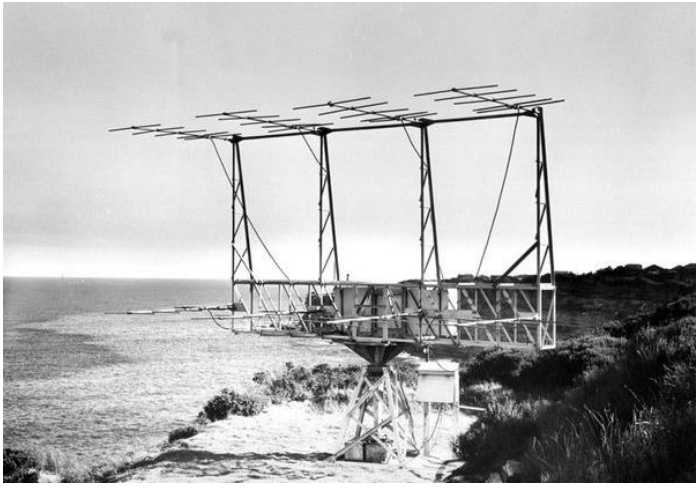
Goss, W. M., & McGee, R. X. (2010). Under the radar. In *Astrophysics and space science library*. https://doi.org/10.1007/978-3-642-03141-0

Halleck, R. (2018, August 29). *Overlooked No more: Ruby Payne-Scott, who explored space with radio waves*. The New York Times. https://www.nytimes.com/2018/08/29/obituaries/ruby-payne-scott-overlooked.html

Heffernan, E. (2021, February 22). *Ruby Payne-Scott (1912-1981)*. Royal Australian Historical Society. https://www.rahs.org.au/ruby-payne-scott-1912-1981/

Ward, C. (2011, March 23). *Ruby Payne-Scott [1912-1981]*. CSIROpedia. https://csiropedia.csiro.au/payne-scott-ruby/

Ruby Payne-Scott as a student, possibly while she was studying at the University of Sydney between 1929 and 1932. (*Image courtesy Commonwealth Scientific and Industrial Research Organisation*)



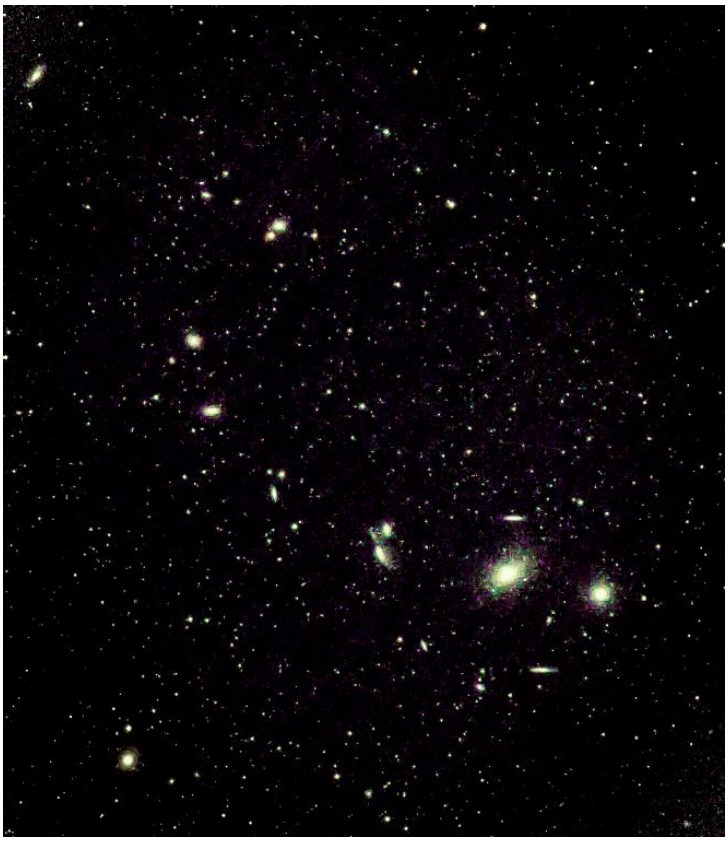
The 'sea-cliff' interferometer at Dover Heights, located north of Sydney's Bondi Beach. At sunrise, on 26 January 1946, Ruby Payne-Scott conducted the first known radio interferometric observation using this device. (*Image courtesy National Radio Astronomy Observatory*)

Markarian's Chain

Douglass F Rohrman
Amateur Astrophotographer

Astronomers, professionals and amateurs, are fully aware of the dramatic asterism in the Virgo galaxy supercluster—"Markarian's Chain". It is a beautiful sight. But, one might wonder—just who was Markarian?

Beniamin Egishevich Markarian (1913–1985) was a well-known 20th century astronomer and compiler of galactic data, from a not-so well-known country. Markarian was born in Shuhumian, Georgia (then part of the Russian Empire), and educated in Russia and Armenia. Losing his parents early, without any assistance during the Armenian depression or the "hungry '30s", he moved to Yerevan and entered the Physical- Mathematical Department of the Yerevan State University. He graduated from Yerevan in 1938 with a diploma of excellency. In 1939 Markarian entered the post-graduate study in astrophysics at the Armenian branch of the USSR Academy of Sciences, and entered Leningrad University. From 1938 to 1941 he also worked at the Yerevan Correspondence Institute as a senior lecturer of High Mathematics. Like many young men in the Soviet Union, he then served in the Soviet Army in WWII. Thereafter, he returned to his academic life at Yerevan University. However, he was so focused on his career that he never completed his doctorate— a fact that never deterred him. He notably became a senior research fellow and co-founder with Viktor Ambartsumian of the Byurakan Astrophysical Observatory in the remote village of Byurakan in Soviet Armenia (now the Republic of Armenia). He personally supervised the installation of many of the instruments in the Observatory. The International Astronomical Union has listed the Byurakan Observatory in Armenia as one of its objects of Outstanding Astronomical Heritage.



The author's 1 hour, 5 minute, 30 second mosaic integration of 393 images taken at f/4 on June 16, 2023 of "Markarian's Chain" of galaxies in the Virgo Constellation.

In the period of his discoveries and surveys he was Director of the Department of Galaxies at Byurakan. But early on he began to accumulate accolades from the Soviet scientific community. In 1950 Markarian was awarded the USSR State Prize, and in 1961 the title of "Deserved Figure of Science of Armenia". For achievements in the development of the Soviet science he was awarded the order of "People's Friendship" and "Sign of Honour", as well as medals "For Labour in the Great Motherland War", "Veteran of Labour", honorary letters of the Presidium of the Academy of Sciences of the USSR and the Academy of Sciences of the Armenian SSR, and an honorary letter of the Armenian Supreme Soviet. He also was well-known internationally, being an active member of the International Astronomical Union from 1955– he was elected as a Vice-President of the IAU Commission on Galaxies (1973-1976) and its President (1976-1979). He never travelled in the West, so most of his American colleagues only got to know him indirectly. His effect on many of their professional lives, however, was profound.[1] Markarian's legacy lives on: from his surveys, galactic research, and his namesakes, to his other abiding personal interest: an excellent orchard on the Observatory grounds.

Beniamin Egishevich Markarian (1913–1985)

Dome of the ZTA-2.6 meter telescope, the largest at the Byurakan Astrophysical Observatory

Markarian at the telescope

The Chain

This striking chain of galaxies was first observed, as individual links, in the late 18th century by William Herschel and, likely, by Johann Gottfried Koehler. Messier identified and listed at least two associated objects in 1781. But it wasn't until 1960 that Markarian studied and proved that all of the galaxies in the "chain" were part of a "physical system" and exhibited what he termed: a "common motion". They are linked as a group and act coherently, within the larger Virgo constellation's veritable swarm of about 2,000 galaxies.

Prior to his honorific, in 1961 Markarian first wrote that this system consisted of:

"Galaxies… [that] form a slightly bent chain."[2]

From the start, Markarian posed the issue: "The question arises whether the formation of this chain in the Virgo cluster is the result of chance projection of galaxies."[3] He concluded that eight of the galaxies exhibited a common motion outweighed the probability of chance alignment. Except for M84, seven of the eight were later confirmed being in commonality in the 1980s by E. Lizroth, just before Markarian's death.[4]

Mrk Galaxies

While Markarian may be best remembered for the Chain, his legacy is actually much broader. If one had to pick an astrophysicist's descriptive for him, he would be "Mr. Active Galactic Nuclei". He followed the efforts of Vesto Slipher (1875–1969) and Carl Seyfert (1911–1960) and filled in many of the "blanks" they left. Starting in 1963, Markarian began to note galaxies with prominent colors, especially those that demonstrated excessive ultraviolet spectra. He formulated and supervised several groundbreaking and painstaking surveys using the then newly constructed 1-meter Schmidt telescope at Byurakan with which he compiled galactic data for the famous Byurakan surveys (First Byurakan Survey, "FBS" or Markarian survey, consisting originally of 1500 "Mrk" galaxies, but revised in 1989 to number 1515).

Thereafter, Markarian launched the more ambitious, Second Byurakan Survey, "SBS". The SBS extended the Mrk survey to fainter objects (brighter than magnitude 17.5), listing 1863 galaxies (SBSG) and 1700 stars (SBSS); 761 of the galaxies are AGNs (155 Seyferts, 596 quasars, and 10 blazars).

Markarian and his colleagues used specially-constructed objective-prism techniques to identify galaxies with strong non-thermal ultraviolet presence. In sum, Markarian found two main types:

a. Where the source of the ultraviolet radiation is the nucleus of the galaxy, and
b. Where sources of emission and ultraviolet continuum radiation are spread throughout the galaxy.

The first type is further subdivided into (1) Seyfert galaxies and (2) simple, bright-nucleus galaxies. The surveys, still resident at Byurakan, according to his colleagues there, consist of:

"[O]bservations with the objective prism at the 40" Schmidt telescope were finished in 1978, and the review of all plates and search for objects—in 1980. More than 2500 photographic plates were obtained. About 40,000,000 images were reviewed visually. The survey consists of 1133 fields (4×4 degrees) and covers the sky area of about 17,000 square degrees. Basic results were published in the series of 15 papers (1967–1981) comprising 1500 objects"

of the whole Northern sky and a part of the Southern sky at high galactic latitudes.[5] In further recognition of his work, Markarian Galaxies are now known by the official nomenclature abbreviation "Mrk".

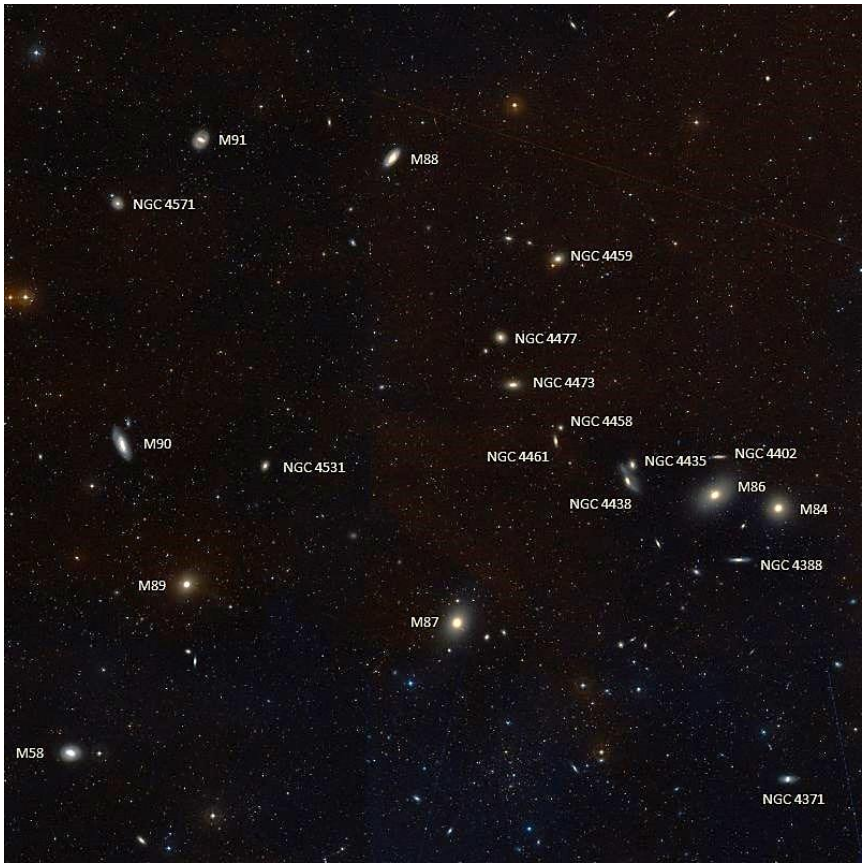
The 1-meter Schmidt telescope at Byurakan

Who Discovered the Chain?

When viewed from Earth, as with the image on the following page (courtesy *Sky and Telescope* - Joe Renzetti), the galaxies lie along a smoothly curved apostrophe-like line from NNW to ESE. Markarian identified eight as having "common motion". Seven of those have now been proven to exhibit common motion and are parts of the "Chain", other objects may be somewhat associated. One thing is clear: Markarian described the common motion of the chain—and brought fame to the asterism, but he did not discover the individual links.

Markarian had a historical model for his later Surveys, none other than the Herschels. William Herschel and Caroline Herschel collaborated from December 1783 to September 1802 in systematically "sweeping" the skies visible from Slough, near Windsor, UK, for "nebulae" and clusters of stars. A sweep was done by pointing the telescope to an area of the sky in a fixed position and simply following diurnal motion and performing notations of the stars and other objects as they swept by.[5] In historic context, Herschel was engaged in the discovery and cataloguing of the Chain objects on April 8 and April 17, 1784– only three months after the Revolutionary War concluded in America on the previous January.

Additionally, as to NGC 4406/Messier 86 — while listed on March 18, 1781 by Charles Messier, recent information credits Johann Gottfried Koehler (1745-1801) on May 8, 1779 [Herschel actually notes it on April 17, 1784 (sweep 199)]. As to NGC 4374/Messier 84 — while listed on March 18, 1781 by Charles Messier, recent information credits



Galaxies within the Virgo cluster; Markarians Chain appears at right

Johann Gottfried Koehler on May 5, 1779 [Herschel notes it as "B" on April 17, 1784 (sweep 199)]. Koehler's colleague, Johann Elert Bode (1747-1826), mentioned in his Year Book that Koehler found "three other somewhat nebulous stars the area of the northern shoulder of Virgo" on May 5, 1779. Wolfgang Steinicke speculates the three are M84, M86, and M87.[6]

Neighbors of the Chain

The large Galaxy in the far NW corner of the author's first image, M88, while listed in the Virgo cluster of galaxies, is not gravitationally connected with the others in the Chain. It is 47,000,000 light years from earth and is about the size of the Milky Way, 105,000 light years in diameter.

In the SW of the Chain, and also unconnected with the Chain, is M87, also known as Virgo A or NGC 4486. M 87 is the "big dog", a supergiant elliptical galaxy in the constellation Virgo that contains about a trillion stars, and is home to a well-known black hole. M87 is one of the largest and most massive galaxies in the local universe; t has a large population of globular clusters (about 15,000 compared with the 150–200 orbiting the Milky Way) and a blazar, a jet of energetic plasma that originates at the core and extends at least 4,900 light years from the galaxy's core, traveling at a relativistic speed. It is one of the brightest radio sources in the sky.

Cosmically, we know the universe is expanding, and it is moving around…constantly, fast, and in different directions. It is busy out there. However, where there is mass, there is gravity. These galaxies carry immense mass so their influence is considerable. Recent analysis of the distance-velocity relationships of these galaxies revealed that seven of the eight do indeed form a rigid chain system with equal velocity. Markarian was right. The bright lights in these images, including the spectacular M84 and M86, while visually connected, are about 2,000,000 light years further away from the chain. Nevertheless, they are still technically part of the asterism. Interestingly, of all galaxies in the Messier catalog, M86 is moving *towards* the Sun at the fastest speed, about 244 kilometers per second. However, the chain as a whole moves away from the Sun at about 1000 kilometers per second. M84 was recently found not to fit into this pattern at all, although it may follow the chain on its own special trajectory, perhaps a retrograde loop.

Markarian's Eyes

A final tribute. NGC 4435 and NGC 4438 have been known since the 1950s as "Eyes Galaxies". They have at some point become known as "Markarian's Eyes". Attention to the "eyes" was first made by amateur astronomer and venerable writer Leland S. Copeland (1886-1973) in a February 1955 *Sky and Telescope* article.[7] In any event, the "eyes" are, among the chain and also among themselves, interacting galaxies — NGC 4435 and NGC 4438. NGC 4438 is peculiar; it shows a highly distorted disk, including long fuzzy tidal tails (see author's image at top and ESA's exceptional photograph below). It is certainly a fascinating galaxy; indeed, it made the cut to be listed in Halton Arp's Atlas.[8] This may be due to the gravitational interactions with other galaxies in the cluster and its companion, NGC 4435. It is oddly shaped, so much so that astronomers differ as to its classification, either as a lenticular or spiral galaxy.

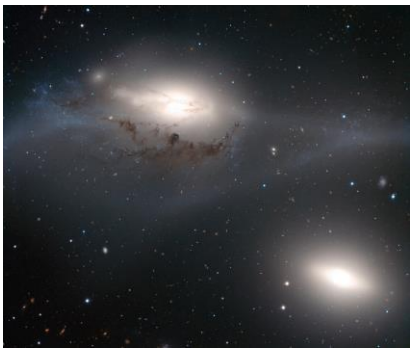
NGC 4435 itself is a barred/lenticular galaxy that shows a population of new stars, likely occurring from its interaction or a collision with 4438. While there is evidence to suggest that the environmental damage to NGC 4438 may have been caused by an off-center collision with NGC 4435 many millions of years ago, when they were thought to be as "close" as 16,000 light years from each other. However, a recent discovery of several filaments of ionized gas linking NGC 4438 with the large neighbor, M86, in addition to a discovery of gas and dust within M86 that may have been stripped from NGC 4438 during a past encounter between the two. Gravity strikes again! This phenomenon, first described by yet another leading sky-surveyor, James Gunn and his Princeton colleague, J. Richard Gott, is called "ram pressure" or "stripping."[9]

So, the author's curiosity about a well-known group of fabulous objects led him down an interesting story of an extraordinary astronomer working in and out of the mainstream of modern astronomical history, Beniamin Egishevich Markarian.

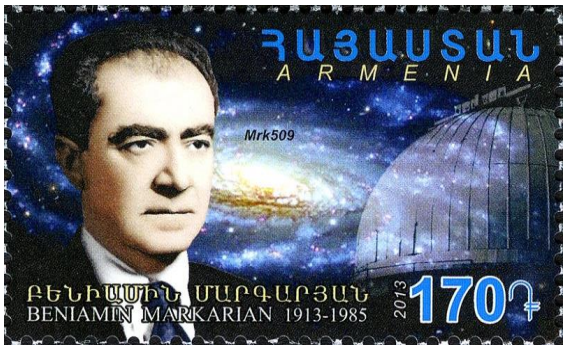
A final tribute from one of his colleagues, Anatoly Zasov, of the Sternberg Astronomical Institute:

"He developed a new very effective way of searching of active extragalactic objects, but this is not just a realization of a successful idea, it is a titanic manual job, a tremendous volume of which is even hard to imagine, and also an inexplicable paradoxical intuition of a researcher behind it."[10]

drohrman@gmail.com



"Markarian's Eyes", formed by NGC 4435 (at lower right) and NGC 4438 (at upper left; photo courtesy ESA-GEMS).



The Republic of Armenia honored Markarian with a commemorative postage stamp in 2013

ENDNOTES

1. See online Markarian.aras.arm and the testimonial by Professor Daniel W. Weedman.
2. Markarian, B. E. (1961). "Physical Chain of Galaxies in The Virgo Cluster and Its Dynamic Instability", *Astronomical Journal*, **66**: 555–557. [emphasis added]
3. Ibid.
4. Lizroth, E. (1983). "Die Markarian-Galaxienkette Im Starbild Virgo", *Astronomische Nachrichten*, **304**, 69–72; see also Tom Trusock's "Small Wonders" Column in Online Cloudy Nights: "Deep Virgo Markarian's Chain", (April 13, 2008).
5. See online Markarian.aras.arm.
6. See SEDS Messier Database Online — Koehler.
7. Copeland, Leland S. (1955). "Adventuring in the Virgo Cloud", *Sky & Telescope*, **66**: 147–151.

8. Arp, Atlas of Peculiar Galaxies, as ARP 120
9. Gunn, James E. and Gott, J. Richard, III, (1972). "On the Infall of Matter into Clusters of Galaxies and Some Effects on their Evolution", *Astrophysical Journal* **176**:1–19.
10. See online Markarian.aras.arm.

This Month in Astronomical History

Ken Rumstay
Valdosta State University (Emeritus)

As I write this, eight years have passed since our online column *This Month in Astronomical History* (https://had.aas.org/resources/astro-history) made its first appearance. Drawing upon a suggestion by Virginia Trimble, the column was originated by Teresa Wilson

Each month, when a new article is posted on the TMIAH website, an announcement appears in the American Astronomical Society's *News Digest*. We would like to take this opportunity to list the columns which have appeared since the last issue of this newsletter.

November 2024: Carl Sagan
Written by Michael Marotta
October 2024: Sputnik 1
Written by Michael Marotta
September 2024: The Carrington-Hodgson Event
Written by Michael Marotta
James Tennant and "The King of Siam's Eclipse"
August 2024, written by Lauren Kokinakis
Beatrice Tinsley: Pioneer of Galactic Evolution
July 2024, written by Ananya Kaalva

We owe a tremendous debt of thanks to this column's editor Mike Marotta, who has spear-headed it for nearly four years. If you would like to contribute a feature article, please contact our Secretary-Treasurer at hadsec@aas.org.

krumstay@valdosta.edu

Drawing by former *This Month in Astronomical History* editor Jason E. Ybarra, prepared for this website.

News From HAD Members

Ken Rumstay
Valdosta State University (Emeritus)

We begin by congratulating former HAD Chair Thomas Hockey! Tom is perhaps best known to us for his outstanding work as Editor-in-Chief for the 1st and 2nd editions of the *Biographical Encyclopedia of Astronomer*. The 2nd edition (*BEA II*), published by Springer in 2014, received HAD's Donald E. Osterbrock Book Prize in 2017.

Tom is Professor of Astronomy at the University of Northern Iowa, and was named the Distinguished Scholar for 2024 at that institution.

The award cites some of the significant research contributions he has made during his career:

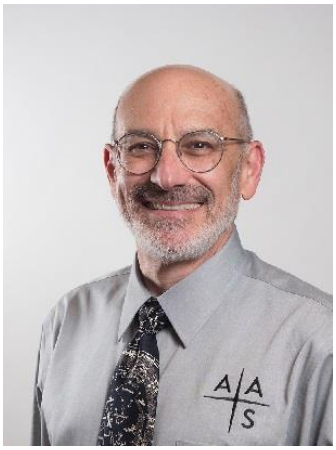
- Co-discovery that the chromophore coloring Jupiter's "Little Red Spot," which appears aperiodically at the same latitude in the North as that at which the Great Red Spot sits in the South, is the same as that belonging to the GRS. This suggests a common (deep, based on theoretical considerations), planetary atmospheric sub-stratum of the same chemical composition.

Tom is presented with the 2024 Distinguished Scholar award by Stephanie Huffman, Associate Vice President of Strategic Initiatives at the University of Northern Iowa.

- Demonstrating, based on historical data of visible Jovian morphology, that the Comet Shoemaker-Levy 9 impact with Jupiter was not (broadly defined) unique. This proposal has since been borne out by positive results from targeted monitoring of the giant planet for impact-produced features.
- Correcting the narrative of several episodes in the history of solar-system astronomy.

I can't help feeling a bit miffed (as I'm sure several readers will) that, as Tom reports, the *Biographical Encyclopedia of Astronomers* was not explicitly mentioned!

Congratulations, Tom! You are most deserving of this honor and recognition!

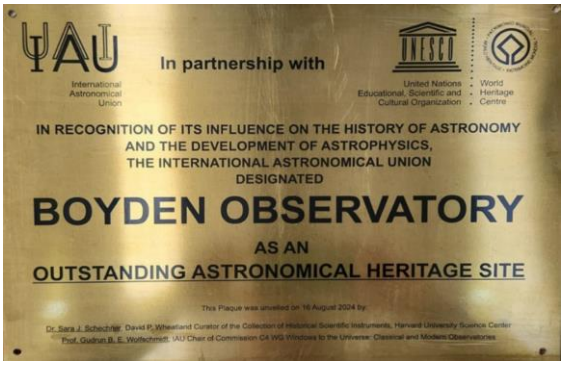


In more good news, the Astronomical Society of the Pacific has awarded its 2024 Klumpke-Roberts Award to Richard Fienberg! A longtime member of HAD, and the American Astronomical Society's former Press Officer, the award recognized Rick's outstanding contributions over more than four decades to the public understanding and appreciation of astronomy.

The ASP established the Klumpke-Roberts Award in 1974 for outstanding contributions to the public understanding and appreciation of astronomy. Past awardees include Carl Sagan, Isaac Asimov, and an impressive number of HAD members! Rick will be presented with his award at the ASP Awards Gala on November 9th. For further information, please see the AAS Press Release from September 16th.

Following the August IAU General Assembly in Cape Town, Sara Schechner (former HAD Chair and former curator of Harvard's Collection of Historical Scientific Instruments), Ken Launie, (former president of the Antique Telescope Society), and Gudrun Wolfschmidt (Hamburg University's Center for the History of Science and Technology and Chair of IAU Commission C4 WG Windows to the Universe: Classical and Modern Observatories) visited Boyden Observatory, located 20 kilometers north-east of the city of Bloemfontein. Drs. Schechner and Wolfschmidt unveiled a plaque announcing Boyden's designation as an IAU Outstanding Astronomical Heritage Site.

Sara Schechner and Gudrun Wolfschmidt unveil the plaque.



From left to right: Matie Hoffman (Physics Dept. of the University of the Free State and Head of the Friends of the Boyden Observatory), Sara Schechner, Gudrun Wolfschmidt, and Dawid Van Jaarsveldt (University of the Free State).

The Boyden Station of Harvard Observatory was founded in 1889 by Harvard University at Mount Harvard, near Lima, Peru, in 1889. It was relocated to Arequipa, Peru in October 1890, and was moved to its present location in 1927.

In September, Tiffany Nichols (our newly-elected Vice Chair!) informed us of a recently published article. The citation is: Nichols, Tiffany. "Hidden in Plain Sight: Discerning Signal from Noise in the Expanded Laboratory Environment," *Historical Studies in the Natural Sciences*, **54**, no. 3 (2024): 335-364. doi: 10.1525/hsns.2024.54.3.335 .

Congratulations Tiffany!

In last year's April (p. 23) and November (p. 12) issues of *HAD News*, Hans Haubold reported on the Potsdam Michelson Colloquium held in 1981 and on plans to republish the extended proceedings of that meeting. This volume will be dedicated to Dorothy Michelson Livingston, who has dedicated her life to preserving and promulgating the work of her famous father, Albert Abraham Michelson.

Hans has recently published a paper in the journal *Creative Education*, titled "History and Education of the Albert A. Michelson Exhibition Developed at the Occasion of the Einstein Centenary Berlin 1979 and the Michelson Colloquium Potsdam 1981". The paper is dedicated to the 200th Anniversary of the oldest astronomical journal, *Astronomische Nachrichten*, founded by H. C. Schumacher in 1821, and the 150th Anniversary of the establishment of the *Astrophysikalisches Observatorium Potsdam* (AOP) on 1 July 1874. He wishes to share this comment (with an offer that may be of interest to some HAD members)

> *Albert A. Michelson was the first American Nobel Laureate in physics. My family (spouse Barbara and son Alexander) and I had the privilege to become familiar with Dorothy Michelson Livingston and her husband Goodhue Livingston from 1978 to 1994 in Potsdam and New York. I assume there are sensibilities concerning the handling of the history of the American Michelson interferometers and experiments. If there are HAD members who would like to do research on the Potsdam experiment, I will provide all material available to me and I would also provide financial resources to pursue further research on the Potsdam experiment if requested and required.*

There is also now a website devoted to the project available for viewing. I must say, it is well worth investigating! In his message, Hans made two comments on the website:

1. *The website shows efforts in education, teaching, and research implemented in the period from 1974 to 2024 (50 years) in the fields of astronomy, physics, and mathematics/ statistics, particularly focusing on the so-called solar neutrino problem and the Michelson experiment Potsdam 1881. The efforts were pursued also in ESA/NASA/ JAXA workshops on basic space science organized under the umbrella of the United Nations for the benefit of 193 Member States.*
2. *The author undoubtedly failed to include publications by other authors that have equally good connections with, or illuminating commentary on, the issues told on this website. The author shall be grateful to those who write to him to point out such deficiencies.*

Thank you, Hans, for your devotion to this project!

To end on a sad note, during the past months we were informed of the passing of three individuals who, while not HAD members, were of great importance to our discipline:

- Wil Tirion, the famous Dutch celestial cartographer, passed away on July 5th at the age of 81. He is known primarily for his *Sky Atlas 2000.0* (published in 1981) and Uranometria 2000.0 (1987), but he also provided beautiful star charts for numerous books and magazines. He provided much content for Sky & Telescope magazine, which noted his passing on its website.
- David Crawford, co-founder of DarkSky International (formerly the International Dark-Sky Association), passed away on July 22nd. A nice memorial may be found on the Dark Sky International website.
- We learned from Sara Schechner that Suzanne Debarbat passed away during the night between the 5th and 6th of August. Madame Débarbat was active in the Scientific Instrument Commission and the history of astronomical instruments. She was President of IAU Commission 41 (History of Astronomy) (1991-1994), and continued working on History of Astronomy at the Paris Observatory up through recent years. An obituary appears in the September issue of the *Journal of Astronomical History and Heritage*.

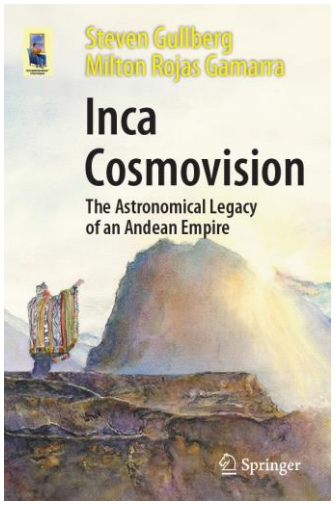
krumstay@valdosta.edu

Book News

Ken Rumstay
Valdosta State University (Emeritus)

We always enjoy informing our readers of recently published books, particularly when the authors are members of our division! Here are four which are of particular interest. The descriptions, which appear in italics, are provided by the publishers.

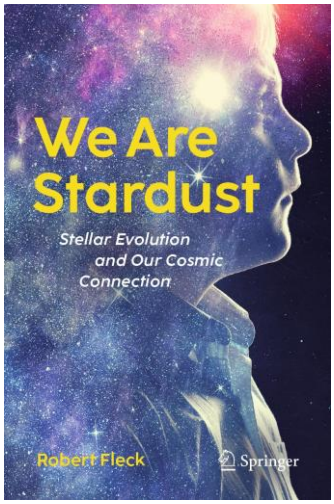
If you would like to suggest a recently published book for inclusion in this column, or review one, please contact me at krumstay@valdosta.edu!



Inca Cosmovision: The Astronomical Legacy of an Andean Empire, by Steven Gullberg and Milton Rojas Gamarra (Springer, 2024, ISBN 978-3031675799). Also available as a Kindle e-book.

The Inkas (Quechua spelling) worshipped the Sun, and their emperor was thought to be the son of the Sun. They conquered most of the Andes and their former empire is replete with examples of their astronomy. They used solar positions on the horizon for calendrical purposes and managed their crops and religious festivals in this manner. Many examples remain of their intentional light and shadow effects that demonstrate their sophisticated understanding of the Sun's movement and of solar horizon events.

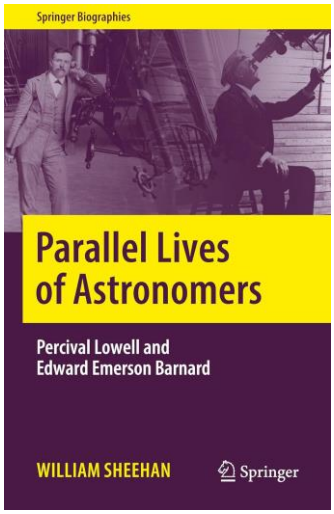
Evidence of their astronomy can only be fully understood in its cultural context, and that is the focus of this book. Inka Cosmovision explores the cosmic worldview of the Inkas from the perspective of oral traditions passed from one generation to the next among the Inkas' living descendants. You will learn about Inka astronomy in a way that you perhaps have never encountered. An author of the book is Quechua, a descendant of the Inkas, and what you will read benefits greatly not only from the field research of both authors, but from the many stories he learned from his parents and grandparents and from his Amauta, a highly respected Indigenous teacher of Inka culture. This book enlightens about Inka cosmovision as no other has before.



We Are Stardust: Stellar Evolution and Our Cosmic Connection, by Robert Fleck (Springer, 2024, ISBN 978-3031672743). Also available as a Kindle e-book.

This concise and accessible book explains one of the most profound and inspiring discoveries ever made, namely, the fact that we ourselves—and all we see around us—are a natural product of the workings and wonders of the Universe, tied directly to distant events spread across space and time reaching back to the beginning, back to the Big Bang, and continuing through the birth and death of successive generations of stars. Modern science has shown that, in a very real and profound way, we are intimately connected to the Cosmos: we are, as Joni Mitchell tells us in her song Woodstock, stardust—in a very real sense, children of the stars—star folk made from chemical elements ("starstuff") cooked by nuclear reactions in stellar furnaces throughout the various stages of stellar evolution. Life as we know it is an inevitable consequence of the life cycle of the stars. Our story begins at the beginning with the Big Bang some 13.8 billion years ago when, during the first three minutes in the history of the Universe, all of the hydrogen and most of the helium, by far the most abundant elements in the Universe, formed from a cooling plasma of protons, neutrons, and electrons. We then trace the life cycles of the stars from birth to death highlighting the synthesis in the stars of the heavier chemical elements so essential to life, along the way touching on many of the hot topics in

astrophysics today including exoplanets, supernovae, pulsars, black holes, white dwarfs, and, since these conditions are found throughout the Galaxy, life in the Universe. The reader, awed by the power and beauty of this cosmic perspective, will leave with a better understanding and appreciation of our true cosmic connection. Surprisingly, despite its significance, this fascinating story of our connection to the stars has largely gone unnoticed outside a small circle of scientists. Understanding that the stuff we are made of traces its origin to nuclear processes accompanying the Big Bang, and thereafter to billions of years of the birth and death of generation after generation of stars, is an important and beautiful story that deserves more attention. Intended for a broad audience, this book provides inspiring reading for all students and afficionados of science.

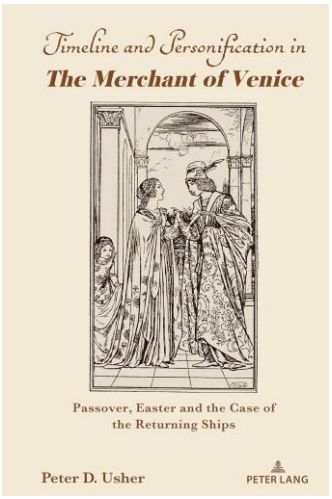


Parallel Lives of Astronomers: Percival Lowell and Edward Emerson Barnard, by William Sheehan (Springer Biographies, 2024, ISBN 978-3031687990). Also available as a Kindle e-book.

Using the "Parallel Lives" approach adopted by the Greek biographer Plutarch, noted historian of astronomy William Sheehan contrasts the lives and research careers of two famous astronomers, Percival Lowell and Edward Emerson Barnard. Drawing on vast archival materials and hitherto unpublished source materials, Sheehan documents in detail the contributions of these two late 19th and early 20th astronomers.

Living at a time when controversies about Mars peaked, when great observatories were being built, and when research increasingly turned away from the Solar System toward the stellar and extra-galactic universe, these observers made spectacular contributions to astronomy. Their work still inspires, and continues in Perseverance rover's explorations of the surface of Mars carrying forward Lowell's dream of showing that Mars may once have been "the abode of life," and in Barnard's pioneering wide-angle photographs of the Milky Way which first showed the sweep, majesty and complexity of the Galaxy.

The work of decades of research and writing, Sheehan has produced what is likely to become the definitive work on these two great astronomers.

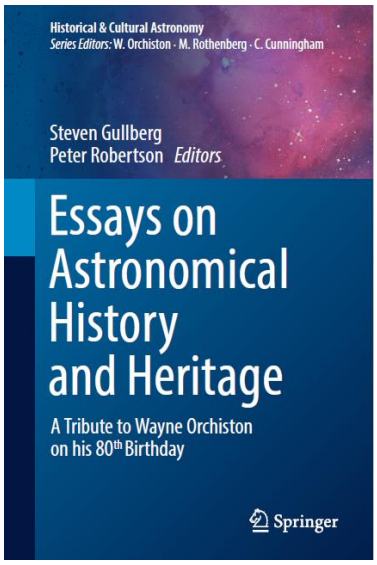


Timeline and Personification in The Merchant of Venice: Passover, Easter and the Case of the Returning Ships, by Peter D. Usher (Peter Lang, 2024, ISBN 978-1636677590).

This book presents an innovative, scientifically grounded interpretation of Shakespeare's The Merchant of Venice. It offers solutions to problems inherent in the text which have hitherto been ignored or inadequately addressed: problems relating to the flow of time, the phases of the moon, and the significance of April Fool's Day. The author, astrophysicist Peter Usher, pays careful attention to astronomical and chronological clues in the play, shedding new light on scenes that have long been a cause of confusion: Lancelot's riddling masque speech to Shylock, Antonio's melancholia, Portia's foreknowledge of the contents of a letter, and the ring subplot.

The book builds on the author's long-running research on Shakespeare's knowledge of astronomy. It should appeal to students, teachers, actors, and all readers who have puzzled over this enigmatic play.

krumstay@valdosta.edu



Book Review

Ken Rumstay
Valdosta State University (Emeritus)

Essays on Astronomical History and Heritage: A Tribute to Wayne Orchiston on his 80th Birthday, edited by Steven Gullberg and Peter Robertson (Springer, 2023, ISBN 978-3031294921), pp. 700 + xli. $139.99. Also available as an ebook).

Wayne Orchiston celebrated his 80th birthday last year, and thirty-three of his friends and colleagues organized a *Festschrift* (a German term, loosely translated as "celebration publication") in his honor. This book was described on page 23 of the November 2023 issue of *HAD News*.

It is difficult to review a *Festschrift*. Their chapters typically span a wide range of topics, and each often combines an eclectic mix of original research and personal reminiscences of the authors' experiences with the honoree. I applaud the courage of those who edit such volumes!

As is traditional with a volume of this nature, it begins with a Preface describing Wayne's life and career, written by the editors (two of Wayne's former students). Then follow the thirty-three contributed papers, arranged into six sections:

Part I	Astronomy and Society
Part II	Emergence of Astrophysics
Part III	History of Radio Astronomy
Part IV	Solar System
Part V	Observatories and Instrumentation
Part VI	Ethnoastronomy & Archaeoastronomy

Each section contains four to eight articles. With this range of topics, I'm sure anyone can find much of interest! Most, if not all, of the thirty-seven authors (four articles had multiple authors) will be known to our members: they include four Doggett Prize winners, one Osterbrock Prize winner, and six former Chairs of HAD. Within each of the six sections of the volume the papers are arranged alphabetically by author surname. Given the wide variety of topics in each section, this seems a reasonable and equitable plan. It would be tempting to list here the authors, and to test the reader's skill at guessing which authors appear in each section. But there are numerous surprises: I sure thought Ken Kellermann would have a paper in Part III (History of Radio Astronomy)! But his, dealing with the history of SETI, is correctly placed in Part I (Astronomy and Society).

As befits a *Festschrift*, many (but not all) of the papers include an acknowledgement of Wayne's contributions to the topic under discussion, and brief mention of the author's association with him. The wide range of subjects reflects Wayne's incredibly wide range of interests. As Virginia Trimble notes early in her paper (pp. 239–251):

> *"When the editors invited me to participate in this Festschrift and to suggest a topic or title, my first thought was, "Well, what is Wayne Orchiston interested in?" So I went hunting on the search engines and the answer that came back was, just about everything, which was not terribly helpful."*

Given this variety, it would be indelicate on my part to suggest that I had favorites among the thirty-three contributions. I will, however, note three (out of many) things which struck me while reading:

- In twelve pages (145–156), Alan H. Batten traces how "astrophysics" evolved from a mere 'fanciful abstraction' (in the words of George Biddell Airy) into a mature and respected physical science. Clifford J. Cunningham devotes twenty-six pages (341–366) to a detailed study on how the word "meteor" evolved throughout English history. I thoroughly enjoyed both articles, and learned much from both!
- Jay Pasachoff's vivid account of his eclipse-chasing adventures with Wayne ("Solar Eclipses, Wayne Orchiston, and Me", pp. 393–399) is excellent, but I was saddened by his opening line:

  > *"I am hopeful about reaching my 81st year—that is, 80th birthday—jointly with Wayne Orchiston in 2023.*

Sadly, Jay passed away on 20 November 2022, at the age of 79. During his lifetime he had observed 74 solar eclipses, a feat noted in the August 19, 2017 issue of *The New Yorker*.

- Finally, I was delighted that Sara J. Schechner ended her excellent article (pp. 401–428) on John Winthrop's Observations of the Transits of Venus with an account of how she met her husband. In my opinion, we could use more of this sort of thing in the literature!

This book is very well edited; I'm sure it must have at least a few typographical errors, but I didn't find them. While it contains a comprehensive index, a future edition might benefit from cross-references among the thirty-three chapters; some discuss similar topics.

In summary, I found this to be a wonderful book and a wonderful tribute to Wayne Orchiston. I highly recommend it to you all!

krumstay@valdosta.edu

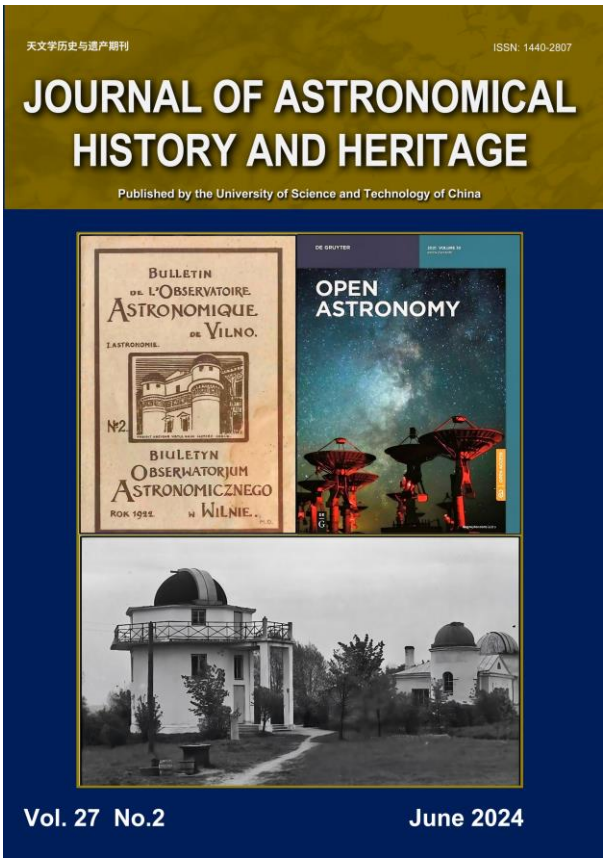
What's New in the JAHH

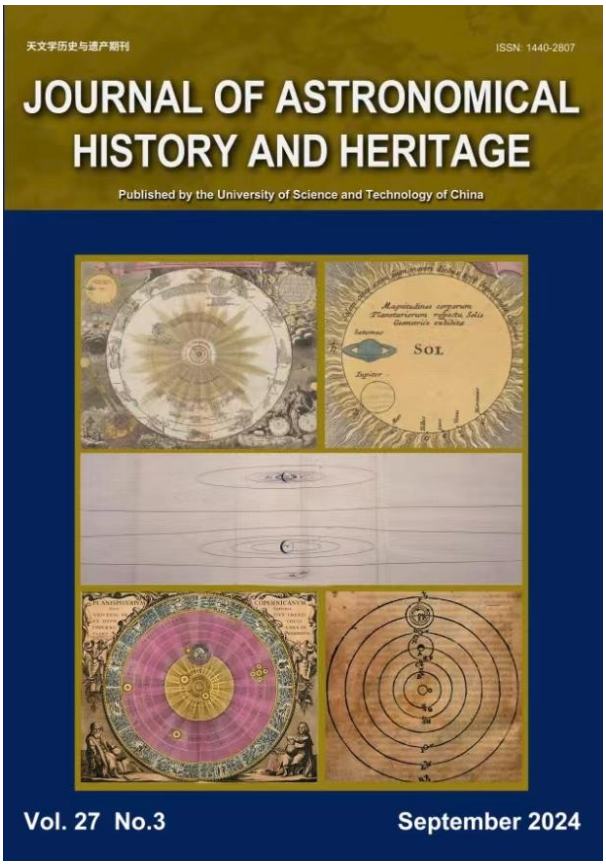
Ken Rumstay
Valdosta State University (Emeritus)

The *Journal of Astronomical History and Heritage* is an open-access online publication, founded by John Perdrix and Wayne Orchiston in 1998. Four issues are published each year. Wayne and many other individuals on the editorial team are HAD members, as are many of the authors who present their research on its pages. If you would like to submit an article or book review, please contact the editors at jahh@ustc.edu.cn .

As a benefit to our readers, the content pages of the June and September 2024 issues of the *JAHH* are reproduced on the following pages. These, along with all past issues, are freely available online at https://www.sciengine.com/JAHH/home. Please do take a look; there is a wealth of information to be found there!

krumstay@valdosta.edu





The front covers of the two most recent issues of the *Journal of Astronomical History and Heritage*. On the cover of the June issue are images from an article by Agnė Poškienė, Carlos Viscasillas Vázquez and Šarūnas Mikolaitis. "The Bulletin of the Vilnius Astronomical Observatory: a comprehensive overview (1960–1992) may be found on pages 329–350 of that issue. The cover of the September issue features illustrations of the Copernican cosmology dating from the 16th and 17th centuries, taken from the paper by Pedro Raposo and Christopher Graney, "A true and exact description of the Sun's palace": constructing the image of the Solar System in the seventeenth and eighteenth centuries", on pages 537–558.

JOURNAL OF ASTRONOMICAL HISTORY AND HERITAGE
ISSN 1440-2807
VOLUME 27 NUMBER 2 JUNE 2024

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Published by The University of Science and Technology of China,
96 Jinzhai Road, Hefei, Anhui 230026, China.

JOURNAL OF ASTRONOMICAL HISTORY AND HERITAGE
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Historical Astronomy Division
of the American Astronomical Society

HAD News #104, December 2024, edited by Ken Rumstay and Loretta Cannon. Please send comments or contributions for the next issue to krumstay@valdosta.edu or to hadsec@aas.org.

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/HADN104.pdf .

Photo credits: p.1: W. W. Norton & Company, Seb Falk; p.2: Reproduced from *The Light Ages* (Fig. 1.7, p. 38), Tiffany Nichols, Sethanne Howard, and Alison Crisp; p.3: Terry Oswalt; p.4: J. Allyn Smith, Susana E. Deustua; p.5: Loretta Cannon, Steve Maran, Linda Spilker, Candice Hansen-Koharcheck; p.6: Joseph Tenn; p.8: Steven Gullberg; p.9: Jarita Holbrook; p.10: Thomas Hockey, European Southern Observatory; p.11: Wayne Orchiston, Glen Rowe, Royal Astronomical Society of New Zealand; p.13: Jennifer Bartlett; p.14: ARP (Astro Restoration Project); p.15: NASA; p.16: Wayne Orchiston and Darunee Lingling Orchiston; James Lequeux; p.17: Darunee Lingling Orchiston, Paris Observatory, CSIRO Division of Radiophysics; p.18 Springer; p.21: Wayne Orchiston and Darunee Lingling Orchiston; p.22: Michael Marotta, Marcia Bartusiak; p.24: Pantheon Books, Yale University Press; p.25: Dalia Maram; p.26: courtesy Commonwealth Scientific and Industrial Research Organisation, National Radio Astronomy Observatory; p.27: Douglass Rohrman; pp.28–29: Markarian.aras.arm; p.30: *Sky & Telescope* (vol. 66, p.151); p.31: ESA-GEMS, Ken Rumstay; p. 32: Jason Ybarra, Thomas Hockey; p.33: Richard Fienberg, Dawid Van Jaarsveldt; p.35: Springer; p.36: Springer, Peter Lang; p.37: Springer; pp.38–42: *Journal of Astronomical History and Heritage*.