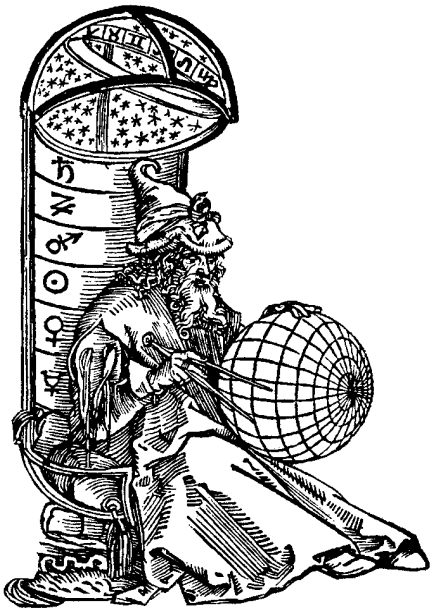

H·A·D NEWS

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

Number 60 ☙ May 2002

HAD Elections
Preliminary Slate of Candidates

Thanks to the fine work of the Nominating Committee (Virginia Trimble, Woody Sullivan, and Steve Dick), we have an excellent preliminary slate of candidates for office for 2003-2005. The candidates are:

HAD Vice-Chair (Chair-Elect):
Joseph S. Tenn, Sonoma State University
Donald K. Yeomans, Jet Propulsion Laboratory

One of the HAD Vice-Chair's duties will be to serve as Chair of the AAS Obituary Committee. At the end of the Vice-Chair's two year term, he or she will succeed to be the Chair of HAD.

HAD Committee Members (at-large):
John W. Briggs, National Solar Observatory
Dennis R. Danielson, Univ. of British Columbia
Alan W. Hirshfeld, Univ. of Massachusetts, Dartmouth
Craig B. Waff, Grolier, Inc.

HAD members are to vote for no more than two of the candidates. The two candidates with the greatest number of votes will be selected for the HAD Committee.

At this time, additional candidates may be nominated by petition. The petition must be signed by at least 10% of the HAD membership, i.e. 28 members., and submitted to the HAD Secretary within 30 days of this notification.

The final slate of candidates and the ballots will be included in the August 2002 *HAD News*. The ballots must be received by the HAD Secretary at least two weeks prior to the next HAD business meeting in Seattle, Washington, on Jan. 5, 2003.

Detailed information, including their statements, about our preliminary slate of candidates can be found on page 5 of this issue.

HAD News Online!

I am pleased to announce that, with this issue, *HAD News* is now also available online at the HAD website. *HAD News* will appear as an Adobe Acrobat PDF file which will look exactly like the printed version. The online version will be available much earlier than its printed counterpart due to the delays in printing and mailing. And because it is in PDF format, it can be printed out on your printer identical to the version mailed to you. Should you ever lose your copy of *HAD News*, you can instantly obtain a new one from the HAD website.

Due to the rising cost of paper and mail, it is becoming increasingly more expensive to produce the printed version of *HAD News*. If you prefer the online version and don't feel the need to receive a printed copy via the mail, please let me know at **brashearr@si.edu** and I will remove you from the print mailing list. You will receive an email letting you know when the latest online version is available.

Call for Nominations for the 2004 LeRoy E. Doggett Prize for Historical Astronomy

We would like to urge HAD members to submit nominations for the 2004 Doggett Prize. In order to be considered for the 2004 prize, we need to have nominations to the Secretary of the Prize Committee (Ron Brashear) no later than December 5, 2002. Nominations consist of a detailed letter of support and a complete CV for the nominee; for those being nominated primarily for a single publication, copies need to be made available to the Prize Committee. Nominations may be proposed by any Member or Affiliate Member of HAD. Members of the Doggett Prize Committee are willing to assist in preparing the supporting materials necessary for nomination. The Prize Committee is made up of Virginia Trimble, Barbara Welther, Ron Brashear, Curtis Wilson, and Owen Gingerich.

For more information about the Doggett Prize and the rules. please see the webpage at: **www.aas.org/had/doggett.html.**

HAD in Washington, DC January 2002

Continued from HAD News 59: In the last issue we were discussing the second paper session on Monday with the theme, "The Development of American Astrophysics: Ideas, Instruments. Observatories, and Astronomers." We pick up after the award of the Doggett Prize to Donald Osterbrock and his talk, "The View from the Observatory: History is Too Important to be Left to the Historians." Most of the descriptions of the papers that follow are taken liberally from the author's abstracts.

Woodruff T. Sullivan, III of the University of Washington, followed with his paper, "Is a 'radio telescope' a telescope?: The integration of early radio astronomy into astronomy." In the first five to ten years after World War II the technique that came to be called "radio astronomy," mostly conducted by radio physicists and engineers (who came to be called "radio astronomers") had a problematic relationship with the existing astronomy community (who eventually came to be called "optical astronomers"). Sullivan's talk examined how this relationship evolved over the postwar decade, and how it varied in the leading nations. By the mid-1950s it was clear that radio astronomy would not be a separate discipline, but rather a new technique within the discipline of astronomy. To learn more about Woody and his research, we encourage you to go to his web page, **www.astro.washington.edu/woody/**.

The session closed with a paper from Joe Tenn of Sonoma State University, on "The Bruce Medalists." The Astronomical Society of the Pacific (ASP) has presented the Catherine Wolfe Bruce gold medal for lifetime contributions to astronomy most years since 1898. The ninety-four medalists include most of the scientists whose work has greatly changed astronomy since the late nineteenth century such as William Huggins, Edward C. Pickering, William W. Campbell, George Ellery Hale, Arthur Stanley Eddington, Henry Norris Russell, Walter S. Adams, Vesto M. Slipher, Ejnar Hertzsprung, Edwin P. Hubble, Harlow Shapley, Jan Oort, and Walter Baade. Major exceptions include those who died young, those who worked in teams, and, in the early years, women. Mathematicians appear to have been as likely to be honored as astronomers from the beginning, but the fortunes of physicist nominees have varied. The nomination process is an unusual one, with the directors of six observatories, three in the U.S. and three abroad, asked to nominate up to three candidates each year. For the first six decades the observatories rarely varied, and directors had long tenures. They nominated the same individuals repeatedly. Now both observatories and their directors vary regularly. Tenn pointed out that much can be learned about the changes in astronomy from the late nineteenth century, when observers worked alone with long refractors and a theorist could spend a lifetime computing the orbit of one comet, to the present, when most papers have multiple authors and a single project may include millions of objects. For example, celestial mechanics was the specialty of many of the early medalists but none since 1966. Tenn has posted photographs, brief biographies, extensive bibliographies, and links to publications by and about all of the medalists, from Simon Newcomb in 1898 to Hans Bethe in 2001, at: **phys-astro.sonoma.edu/BruceMedalists/**.

The last of the Monday oral sessions was based on the theme, "Some Controversies in the History of Astronomy." The first paper was from Vance Rusell Tiede of Yale University and the title was, "Solar Orientation of Irish Early Christian Oratories." And in case you wanted to know what an oratory is, the *OED* tells us it is "a place of prayer; a small chapel or shrine…." Tiede talked about the Hiberno-Latin literary metaphor of "Xpistus sol verus" (Christ the True Sun) and how it finds an architectural analogue in the orientation of the single eastern window of Irish monastic stone chapels or oratories. His field surveys in Ireland, Hebrides, Orkney, and Shetlands revealed that the window of Irish rectangular dry stone oratories framed the rising solar disk on the Feast Days of selected saints of the Celtic Early Christian Church, AD 800-1100. The most frequent target skyline declinations were to sunrise on the Feast Days of St. Patrick (March 17th) and St. Aidan of Lindisfarne (August 31st). During the Early Christian period, St. Patrick's Day coincided with the Vernal Equinox, and heralded the Paschal Full Moon (i.e., Passover crucifixion) and Easter Sunday as proclaimed by Emperor Constantine at the Council of Nicaea (AD 325). St. Aidan of Lindisfarne (d. AD 651) inspired the Irish monks who, at the Synod of Whitby (AD 664), remained loyal to the Jewish 84-year cycle determining Passover and refused to replace it with the new orthodox nineteen-year computus for Easter adopted by the Roman Catholic Church (AD 527). Tiede also discussed the hypothetical affiliation between monastic communities whose oratories share common solar orientation, interior length/width ratios (e.g., 4:3 and 3:2) and units of measurement (e.g., Scottish ell, Coptic cubit, or Roman pes). He would like to acknowledge the Michael D. Coe Fund and Augusta Hazard Fund of Yale University for research grant support in 1999. For comments on this paper, please email Vance at **biletine@aol.com**.

The second paper was a highly-anticipated and provocative one and generated a standing-room-only crowd in the meeting room. This was Kenneth Brecher's (of Boston University) paper, "Should Astronomy Abolish Magnitudes?" Brecher started out by saying that astronomy is riddled with a number of anachronistic and counterintuitive practices. Among these are: plotting increasing stellar temperature from right to left in the H-R diagram; giving the distances to remote astronomical objects in parsecs; and reporting the brightness of astronomical objects in magnitudes. Historical accident and observational technique, respectively, are the bases for the first two practices, and they will undoubtedly persist in the future. However, Brecher argued, the use of magnitudes is especially egregious when essentially linear optical detectors like CCDs are used for measuring brightness, which are then reported in a logarithmic (base 2.512…!) scale. He pointed out that the use of magnitudes has its origin in three historical artifacts: Ptolemy's method of reporting the brightness of stars in the *Almagest*; the nineteenth-century need for a photographic photometry scale; and the nineteenth century studies by psychophysicists E. H. Weber and G. T. Fechner on the response of the human eye to light. The latter work sought to uncover the relationship between the subjective response of the human eye and brain to the objective brightness of external optical stimuli. The resulting Fechner-Weber law states that this response is logarithmic: that is, that the eye essentially takes the logarithm of the incoming optical signal. However, after more than a century of perceptual studies, most intensively by S. S. Stevens, it is now well established that this

relation is not logarithmic. For naked eye detection of stars from the first to sixth magnitudes, it can be reasonably well fit by a power law with index of about 0.3. Therefore, the modern experimental studies undermine the physiological basis for the use of magnitudes in astronomy. Brecher then asked the question, should the historical origins of magnitudes alone be reason enough for their continued use? His answer: probably not, since astronomical magnitudes are based on outdated studies of human perception, make little sense in an era of linear optical detection, and provide a barrier to student and public understanding of astronomy. Perhaps, Brecher noted in closing, it is time to add astronomical magnitudes to the dustbin of scientific history, along with caloric, phlogiston and the ether.

Unfortunately Daniel Green of the Harvard-Smithsonian Center for Astrophysics was unable to be at the meeting to present his paper, "History and Myth: Trans-Neptunian Objects and Their Terminology." His abstract described the paper thusly: "Trans-Neptunian Objects (TNOs) are generally defined as (a) those objects orbiting the sun with perihelion distances > 30 AU (that of Neptune) and (b) those objects with semi-major axes > 30 AU but having short-order resonances with respect to (and exterior to) Neptune. TNOs with the 2:3 resonance (called "plutinos" after the prototype, Pluto) and 1:2 resonance are now known, and some such objects have parts of their orbits pass just inside that of Neptune. Pluto was discovered some sixty-two years before the second TNO was found, and hundreds are now known. I shed some light upon who really made predictions about large numbers of TNOs and when (beginning with F. C. Leonard 1930, *A.S.P. Leaflet* 30); the results differ from what many astronomers now believe them to be (for example, G. Kuiper did not actually predict a large number of objects to be now located beyond Neptune). In this context, I also briefly delineate changing perceptions of planethood vs. minor bodies in our solar system over the last two millennia, including the waxing and waning perception of Pluto since 1930 as a 'major planet.'"

Peter Usher of Penn State University then proceeded to present his paper, "Sixteenth Century Astronomical Telescopy." Usher began by noting that Ophelia in Shakespeare's *Hamlet* is named for the "moist star" which in mythology is the partner of Hamlet's royal Sun. Together the couple seem destined to rule on earth just as their celestial counterparts rule the heavens, but the tragedy is that they are afflicted, just as the Sun and Moon are blemished. In Act 1, Scene 3 (1.3), Laertes lectures Ophelia on love and chastity, describing first Cytherean phases (crescent to gibbous) and then Lunar craters. Spots mar the Sun in 1.1 and 3.1. Also, Usher pointed out references to Jupiter's Red Spot (3.4) and the resolution of the Milky Way into stars (2.2). These interpretations, Usher argued, are well-founded and support the cosmic allegory. Observations, according to Usher, must have been made with optical aid, probably the perspective glass of Leonard Digges, father of Thomas Digges. Notably absent from *Hamlet* is mention of the Galilean moons, owing perhaps to the narrow field-of-view of the telescope. That discovery, according to Usher, is later celebrated in *Cymbeline*, published soon after Galileo's *Siderius Nuncius* in 1610. In 5.4 of *Cymbeline* the four ghosts dance "in imitation of planetary motions" and at Jupiter's behest place a book on the chest of Posthumus Leonatus. His name identifies the Digges father and son as the source of data in Hamlet since Jupiter's moons were discovered after the deaths of Leonard ("leon+hart") and Thomas (the "lion's whelp"). Lines in 5.4, Usher says, urge us not to read more into the book than is contained between its covers; this is understandable because *Hamlet* had already reported the other data in support of heliocentricism and the cosmic model discussed and depicted by Thomas Digges in 1576. Usher concludes therefore that astronomical telescopy began in England before the last quarter of the sixteenth century. For more details about Usher's work, please go to his website at:
www.astro.psu.edu/users/usher/er.html.

Robert A. Fesen of Dartmouth College followed with his paper on "Flamsteed's Supernova of 1680." He started by stating that a recent proper motion study of forty knots in the Cassiopeia A (Cas A) supernova remnant indicated a knot convergent date of A.D. 1671.3 ±0.9 assuming no deceleration (Thorstensen, Fesen, & van den Bergh 2001, *AJ*, 122, 297). However, because these optical knots are made visible by their shock passage through the local ISM/CSM, some deceleration is expected. A deceleration of just ~1.6 km s^{-1} yr^{-1} over a three hundred year time span would yield an explosion date around A.D. 1680, consistent with a suspected sighting of the Cas A supernova by John Flamsteed in August 1680 (Ashworth, 1980, *J. Hist. Astron.*, 11, 1). Fesen discussed Flamsteed's likely observations of SN 1680 in terms of their constraints on the light curve and peak brightness and possible implications regarding the Cas A supernovae subtype. References to Fesen's recent publications on Cas A can be found at his website:
www.dartmouth.edu/artsci/physics/faculty/fesen.html.

Ian Bartky closed out the session with his paper on "What a Difference a Day Makes: A History of the Date Line." He began by pointing out that the so-called International Date Line represents no international agreement at all. Depicting its sweep across the Pacific Ocean from pole to pole is merely a convenient way to identify and separate the countries that use Eastern (Asiatic) dating from those governments that have adopted Western (American) dates. Bartky noted that there are actually two Date Lines, the other one coincident with the 180th meridian from Greenwich. On crossing that meridian, a navigator adds (or subtracts) a day to his vessel's reckoning, creating an unambiguous link to the Greenwich date. Somewhat surprisingly, this particular practice was not inaugurated by the world's navies until about 1840. Before then a navigator did not change the day and date in the ship's log until he had circumnavigated the globe—thereby making the en route reconciliation of the nautical day, the civil day, and the astronomical day subject to an additional error. Bartky then traced the history of the "place where the day begins." He also noted the speculations of twelfth- and fourteenth-century scholars, as well as the bewilderment of the world's first circumnavigators on finding they had lost a day. Bartky continued by describing nineteenth-century datings in various parts of the Pacific Ocean and concluded with the recent extension of the Date Line by the island nation of Kiribati.

For more information about the International Date Line's history, you should take a look at Robert H. Van Gent's informative webpage at: **www.phys.uu.nl/~vgent/idl/idl.htm**.

The Washington, DC, meeting also featured three HAD poster papers. These proved to be quite engaging and we encourage HAD members to continue to propose poster papers in future meetings. The poster session, HAD IV, had as its theme, "New Views of Historical Topics," and was on display from 9:20 am to 6:30 pm, Monday, in the Exhibit Hall. The three papers were:

"Who Really Coined the Word Supernova? Who First Predicted Neutron Stars?" by Donald Osterbrock, Lick Observatory, UC Santa Cruz. The abstract describes this paper thusly: "The answer to both questions is Walter Baade and Fritz Zwicky. They used the word and postulated that the remnants could be neutron stars in the abstract of their joint paper 'Supernovae and Cosmic Rays,' presented orally by Zwicky at an American Physical Society meeting at Stanford in December 1933. The abstract was published in the *Physical Review* in early 1934, and was a condensation of their two joint papers in *PNAS* in 1934.

"The concept that there is a special class of 'much more luminous novae' (Lundmark 1923), which we today call supernovae, was put forward by Knut Lundmark (1920), who called them 'giant novae,' and independently by Heber D. Curtis (1921). Hubble (1929) referred to them as 'exceptional novae,' and Baade (1929), writing in German, as 'Hauptnovae' (chief novae). According to a review article by Zwicky (1940), he and Baade introduced the term supernovae in seminars and an astrophysics course at Caltech in 1931. Lundmark (1933) actually first published the word (as 'super-Novae') in a paper dated December 31, 1932 but published in 1933. He was at Lick and Mount Wilson during the fall and winter of 1932-33, and it is much more probable that he heard it there than that he coined it himself.

"In their abstract and *PNAS* papers Baade and Zwicky 'advanced the view' that supernovae represent the collapse of 'ordinary stars into neutron stars,' because that gave about the right total energy released in the outburst. Many physicists believe that Lev Landau (1932) had introduced this concept, but actually his paper is about relativistically degenerate stars and does not mention neutrons, neutron stars, nor a density. Freeman Dyson (1971) in his published lectures on neutron stars and pulsars correctly credited the concept to Baade and Zwicky (1934)."

"The Road to Wadesboro: Site Selection for Expeditions to Observe the 1900 Solar Eclipse," by Thomas R. English, III, of Guilford Technical Community College in Jamestown, North Carolina, and Gayle Riggsbee of the Charlotte Amateur Astronomers' Club. As stated in the abstract, "One of the first committees of the AAS was formed by George Ellery Hale to organize preparations for the solar eclipse visible across the southeastern United States on 28 May 1900. Hale attempted to coordinate the efforts of all American astronomers who planned to travel to observe the event, so as to maximize the useful scientific data. Observers were spread throughout the southeast, but several major expeditions chose the small North Carolina town of Wadesboro. This convergence included many of the pioneers of American astrophysics, including Hale himself, S. P. Langley, C. A. Young, and a young Henry Norris Russell.

"The presentation will review the events at Wadesboro, the groups represented there (including Yerkes, Smithsonian Institution, Princeton, British Astronomical Association, and Vassar), and will discuss the factors and decisions that led so many astronomers to choose the site.

"This research has been supported in part by the Herbert C. Pollock Award of the Dudley Observatory."

"Light/Shadow Interactions at the Great Gallery," by Irene R. Little-Marenin, Stephen J. Little of the University of Colorado's Center for Astrophysics and Space Astronomy (CASA), and Gary Cox of Canyonlands National Park. The abstract gives us some good details about the presentation: "The Great Gallery is a wonderful collection of rock art in Horseshoe Canyon (Canyonlands National Park). Both pictographs and petroglyphs are found there. Archaic hunter-gatherers used Horseshoe Canyon (also known as Barrier Canyon) on their travels and left the rock art behind. On a 60-foot wall, there are over 50 painted life sized ghost-like figures as well as many smaller pictographs and petroglyphs. The Barrier Canyon Painters primarily used reds (hematite) ranging in color from dark purple to light red-orange and brown as well as white. A paint chip from a fallen piece of an anthropomorphic figure has been ^{14}C dated to 1200-1400 BC. This date is currently being rechecked with a different paint chip. At least one figure is painted over a partially rubbed out petroglyph of a big horn sheep with large horns indicating an earlier age for this petroglyph.

"Among the panel of large and small vertical anthropomorphs, we find a diagonal line of 11 small red painted Big Horn sheep. The inclination of the line is at a distinctly different angle to the rest of the figures. One of us (GC) noticed that on the winter solstice, the shadow cast by the cliff face on the western edge of the panel, lines up exactly with the Big Horn sheep as the shadow crosses the pictograph panel. We re-observed and documented this light/shadow interaction event on December 20, 2000 and confirmed the original observation. At the summer solstice, a large anthropomorph on a separate panel left of the major panel is pierced by a triangular-shaped shadow produced by the cliff face above. Our presentation will include pictures of the Great Gallery undergoing the light/shadow interactions."

Left to Right: Rudi Lindner, Steve Dick, and Tom Williams are trapped in the headlights at the HAD sesions in Washington, DC.

HAD Officers
Preliminary Slate of Candidates

HAD Vice Chair (Chair-Elect):

Joseph S. Tenn (Sonoma State University)
"Joe Tenn is chair of the Department of Physics and Astronomy at Sonoma State University, in the California wine country. He has written articles about astronomers, mostly those awarded the Bruce medal of the Astronomical Society of the Pacific (ASP), for *Mercury* and *Griffith Observer*. He created and maintains the Bruce Medalists website at http://physastro.sonoma.edu/BruceMedalists/. From 1993-99 he chaired the ASP history committee and organized history sessions at the Society's annual meetings. He currently serves as the HAD representative on the AAS Obituary Committee."

Donald K. Yeomans (Jet Propulsion Laboratory)
"It would be an honor to serve as HAD vice-chair, to coordinate the obituary notices for the AAS and to work toward increasing the HAD's membership and visibility. I have served on the Doggett Prize Committee and have served as secretary for the DDA, Vice-Chair and Chair for the DPS, and as a member of the Prize committee for the DPS.

"At JPL, I am the Supervisor of the Solar System Dynamics Group and Manager of NASA's Near-Earth Object Program Office. My interests in the history of astronomy include the development of ideas on comets (book published by John Wiley & Sons, 1991) and the pre-Sputnik views on interplanetary travel (work in progress)."

HAD At-Large Committee Members:

John W. Briggs (National Solar Observatory)
"John W. Briggs is an instrumentation engineer based at Yerkes Observatory of the University of Chicago. Briggs maintains a special interest in 19th Century observatories and instrumentation and is active as a collector. Recently president of the Antique Telescope Society, he currently serves on the History Committee of the ASP and on the Historical Instruments Working Group of IAU Commission 41. He is presently involved in a film documentary regarding G. E. Hale being produced by Mason Productions. Briggs believes that considerable opportunity exists for astronomers to exercise initiative in the preservation of astronomical history; thus HAD should encourage this as much as possible."

Dennis R. Danielson (Univ. of British Columbia)
"Perhaps I'm an oddity in HAD, having come to astronomy not via hard science but through intellectual history. My main contribution so far is *The Book of the Cosmos: Imagining the Universe from Heraclitus to Hawking*, an anthology showcasing some of the greatest writings in the history of astronomy and cosmology. And at the moment I'm writing a book about Copernicus. While all of this earmarks me as a proponent of the public understanding of science, probably my main mission within the AAS community is to encourage scientists' own awareness of the history of astronomy as important both in its own right and for our collective future.

Alan W. Hirshfeld (Univ. of Massachusetts, Dartmouth)
"As a longtime astronomy educator and writer, I have come to appreciate that a full understanding of scientific advancement cannot come without paying due attention to its historical roots. My experience in researching and writing a historically themed astronomy book has led to my desire to more actively promote the interests of the HAD. As a member of the HAD committee, I will explore ways to increase awareness among the public and among our colleagues of the history of astronomy, both in its scientific and its human dimensions.

A.B., Astrophysics, Princeton University, 1973.

Ph.D., Astronomy, Yale University, 1978.

Currently Professor of Physics, University of Massachusetts Dartmouth, and Associate of the Harvard College Observatory.

Author of the book, *Parallax: The Race to Measure the Cosmos*."

Craig B. Waff (Grolier, Inc.)
Craig B. Waff works for Grolier Educational (in Danbury, CT), where he is the physical sciences senior editor for the *Encyclopedia Americana*. In addition to working on various reference works for much of his career, he was also a contract historian at NASA's Jet Propulsion Laboratory for eight years. He received his Ph.D. in the history of science from Johns Hopkins University.

"Having been involved with popular-level publications for many years, I would if elected like to urge HAD members to seek more opportunities to convey the results of their history-of-astronomy research to the general public. Much of my own research has involved the history of celestial mechanics—the introduction of gravitational theory into theories of the moon's motion in the late 17th and early 18th centuries; the origin of the American Nautical Almanac in the mid-19th century; and the exploration of various trajectory options by the Galileo space-probe project staff (in the late 20th century) when they were forced to consider major programmatic changes caused by delays in space-shuttle and upper-stage development. I would thus like to urge HAD members to pursue the many research opportunities available in the history of post-Newtonian celestial mechanics, an often neglected field. Finally, having become involved recently in several collaborative projects involving the discovery of Neptune, I would like to urge HAD members to undertake more collaborative projects in the history of astronomy (including ones with foreign scholars), especially in cases where the combination of different talents and research approaches can potentially produce new historical insights."

Be sure to stop by the HAD web page at: www.aas.org/had/had.html

"Heralds of Astronomy:" Landmark Works in the History of Astronomy. Part I.

(*This article is a version of a paper given at the HAD meeting by Ronald Brashear in Washington in January 2002. Continuations will appear at irregular intervals in future issues of* HAD News)

In 1955, the famous science book collector Bern Dibner published his classic work, *Heralds of Science*, a description of two hundred books from his collection that marked great moments in the development of the sciences and technology. He included seventeen astronomy titles that contained works by the great astronomers of the scientific revolution, works that marked the discovery of Uranus and Neptune, and even one on navigation or, as Dibner referred to it, "applied astronomy." Although he knew his list could not be comprehensive, it is interesting to note what works were not included, such as titles of ancient and medieval astronomers and anything printed after 1852. Nevertheless, Dibner's seventeen is a good place to make a start at developing a comprehensive list of the "greatest hits" of astronomical publications. So to begin, let us take a closer look at his "Heralds of Astronomy." They are:

1. Regiomontanus, Joannes, 1436-1476. *Epytoma Ioa[n]nis de Mo[n]te Regio in Almagestu[m] Ptolomei*. [Venice : Johannes Hamman, 31 Aug. 1496].
2. Rhäticus, Georg Joachim, 1514-1576. *Ad clarissimum virum D. Ioannem Schonerum, De libris revolutionu[m] ... Doctoris Nicolai Copernici ... / per quendam Iuuenem, mathematicæ studio sum Narratio prima ...* . Excusum Gedani : Per Franciscum Rhodum, 1540.
3. Copernicus, Nicolaus, 1473-1543. *De revolutionibus orbium coelestium. libri VI*. Norimbergæ : Apud Ioh. Petreium, 1543.
4. Brahe, Tycho, 1546-1601. *Epistolarum astronomicarum libri*. Uraniburgi : cum Caesaris et Regum quorundam privilegiis., 1596.
5. Kepler, Johannes, 1571-1630. *Astronomia nova aitiologetos* [romanized] *: seu physica coelestis, tradita commentariis de motibus stellæ Martis, ex observationibus G. V. Tychonis Brahe ...* . [Heidelberg : G. Voegelinus], 1609.
6. Kepler, Johannes, 1571-1630. *Harmonices mundi libri v*. Lincii Austriæ, sumptibus G. Tampachii, excudebat I. Plancvs, 1619.
7. Galilei, Galileo, 1564-1642. *Sidereus nuncius magna, longeque admirabilia spectacula pandens, suspiciendaque proponens unicuique ...* .Venetiis, apud T. Baglionum, 1610.
8. Galilei, Galileo, 1564-1642. *Dialogo ... sopra i due massimi sistemi del mondo tolemaico, e copernicano ...* . Fiorenza, Per Gio: Batista Landini, 1632.
9. Huygens, Christiaan, 1629-1695. *Systema Saturnium; sive, De causis mirandorum Saturni phænomenôn, et comite ejus planeta nova.* Hagæ-Comitis, ex typographia A. Vlacq, 1659.
10. Hevelius, Johannes, 1611-1687. *Machinæ coelestis pars prior*[*-posterior*]. Gedani, Auctoris typis & sumptibus imprimebat S. Reiniger, 1673-79.
11. Newton, Isaac, Sir, 1642-1727. *Philosophiæ naturalis principia mathematica*. Londini, Jussu Societatis Regiæ ac Typis Josephi Streater; prostat apud plures Bibliopolas, 1687.
12. Halley, Edmond, 1656-1742. *A synopsis of the astronomy of comets.* London : Printed for John Senex, next to the Fleece-Tavern, in Cornhill, 1705.
13. Herschel, William, Sir, 1738-1822. "Account of a Comet," in *Philosophical transactions of the Royal Society of London*, vol. 71 (1781): 492-501.
14. Laplace, Pierre Simon, marquis de, 1749-1827. *Traité de mécanique céleste*. A Paris : De L'Imprimerie de Crapelet : Chez J.B.M. Duprat ..., an 7 [1798]-1827.
15. Bowditch, Nathaniel, 1773-1838. *The new American practical navigator ...* . [Salem] : Printed at Newburyport, Mass., 1802, by Edmund M. Blunt, for Cushing and Appleton, Salem : Sold by every book-seller, ship-chandler, and mathematical-instrument-maker in the United States and West Indies, [1802].
16. Adams, John Couch, 1819-1892. *An explanation of the observed irregularities in the motion of Uranus : on the hypothesis of disturbances caused by a more distant planet ...* . London : Printed by W. Clowes & Sons ..., 1846.
17. Foucault, Léon, 1819-1868. *Sur divers signes sensibles du mouvement diurne de la terre*. Paris : Imprimerie de Mallet-Bachelier, [1852].

The first item, the *Epitome* of Ptolemy's *Almagest* (or *Mathematical syntaxis*) by Regiomontanus, is an interesting selection. It certainly deserves inclusion even though it is not the complete text of the *Almagest*. In the fifteenth century, the Latin text of Ptolemy's work circulated in manuscript form, translated from Arabic by Gerard of Cremona in the twelfth century. In 1451, a translation from a Greek manuscript was produced by George of Trebizond, but some considered this to be a poor job at best. Shortly thereafter, in 1460, Johannes Bessarion, archbishop of Nicaea, arrived in Vienna and met with the Emperor's astrologer, Georg Peurbach, and his student, Johannes Regiomontanus. Bessarion was the leading figure in the trans-

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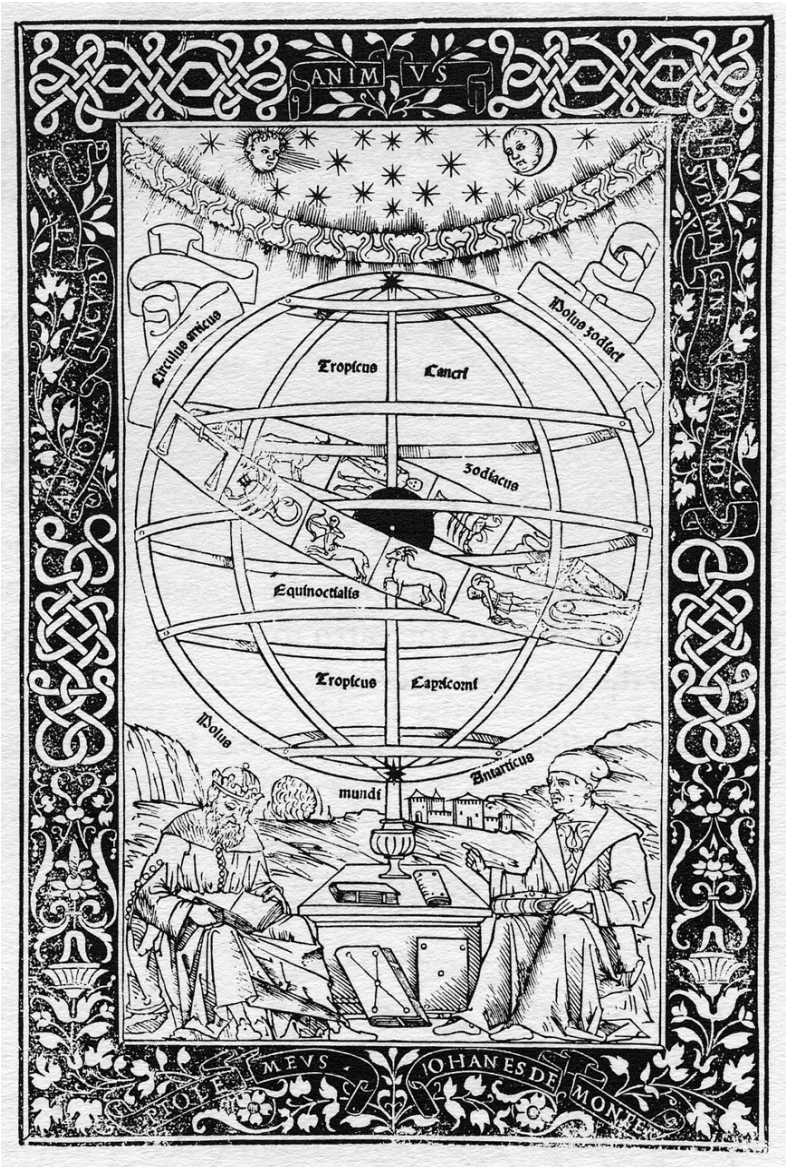
mission of Greek knowledge to the West, and in this case he was looking for assistance in producing a new Latin translation of the Greek *Syntaxis* as well as an epitome of the work that might be of more practical use to astronomers. Bessarion found willing accomplices in Peurbach and Regiomontanus, and they set about producing the *Epitome* from the translation by Gerard and an earlier abridgement of the thirteenth century known as the *Almagestum minor*. Peurbach's lack of fluency in Greek was the reason for the decision to use the Latin versions, but interestingly enough, the first propositions of Book I were paraphrased from the Greek text (Regiomontanus, whose Greek was much better than Peurbach's, was probably responsible for this section). The first six books were completed when Peurbach died suddenly in 1461 at the age of thirty-seven. According to the story, Peurbach, on his deathbed, made Regiomontanus pledge to finish the project (he most likely did not have to twist his student's arm too hard to get a commitment). Regiomontanus continued work on the *Epitome*, accompanying Bessarion back to Rome in the process, and completed the remaining seven books around 1463. The manuscript was ready to go to press, but it was long delayed, no doubt due to Regiomontanus's untimely death in 1476 at the age of forty. The fact that he did not manage to print the work is ironic, as Regiomontanus was, among his many achievements, the first science book printer. Before his death he managed to print some half-dozen works including Peurbach's *Theoricae novae planetarum* (circa 1474) and Manilius's *Astronomicon* (1473 or 1474) The *Epitome* did not see print until 1496, when Johannes Hamman produced the first edition in Venice. The printing was not done with the best of care and many errors crept in, but that did not diminish the impact of this edition of the *Almagest*. At half the length of the original, the *Epitome* was much more digestible to European mathematicians and was hailed as a model of clarity. Its influence was marked and it was in use up to the early 1600s. Later editions appeared in 1543 and 1550. The *Dictionary of scientific biography* declares that the "*Epitome* is the true discovery of ancient mathematical astronomy in the Renaissance because it gave astronomers an understanding of Ptolemy that they had not previously been able to achieve. Copernicus used it constantly, sometimes in preference to the *Almagest*; and its influence can be seen throughout *De revolutionibus*."



Frontispiece to the 1496 edition of the *Epitome* of Ptolemy's *Almagest*. The figure at the lower right is Regiomontanus; Ptolemy is at the left.

The influence of the *Epitome* notwithstanding, an edition of the full text of the *Almagest* should probably be included as an astronomy Herald as well, but which one? The likely choice would be the first appearance of the *editio princes*, that is, the version with the text in its original language (Greek) and this would be the 1538 Basel edition edited by Simon Grynaeus. But others might argue that the first appearance of any form of the text is more deserving of the status of a Herald and this would pass to the 1515 Venice edition of Gerard of Cremona's Latin text.

It could be argued that another of Peurbach's works deserves inclusion as a Herald of Astronomy, the *Theoricae novae planetarum*. This work was intended as a new elementary textbook on astronomy and was completed in 1454. As mentioned earlier, Regiomontanus printed the first edition around 1474 and the book proved to be wildly successful and influential. Over fifty editions were produced by 1650 and it was the subject of numerous other printed commentaries. Many of the earlier editions placed it with some other basic astronomical texts, Sacrobosco's *De sphaera*, and Regiomontanus's *Disputationes contra Cremonensia in planetarum theoricas deliramenta*. The *Theoricae novae* contained useful information on the Sun, Moon, planets, eclipses, and latitude theory. Perhaps the most important aspect of Peurbach's work was his description of the spheres that carried the planets around the central earth. All descriptions of the planetary spheres up until the time they were no longer in vogue (by 1600) were based on those provided in the *Theoricae novae*. We could add the first edition of this work to a list of astronomy Heralds without too much argument, I think.

Ronald Brashear
(to be continued…)

AIP Center for History of Physics Grants-in-Aid for History of Modern Physics and Allied Fields (Astronomy, Geophysics, etc.)

The Center for History of Physics of the American Institute of Physics has a program of grants-in-aid for research in the history of modern physics and allied sciences (such as astronomy, geophysics, and optics) and their social interactions. Grants can be up to $2500 each. They can be used only to reimburse direct expenses connected with the work. Preference will be given to those who need funds for travel and subsistence to use the resources of the Center's Niels Bohr Library (near Washington, DC), or to microfilm papers or to tape-record oral history interviews with a copy deposited in the Library. Applicants should name the persons they would interview or papers they would microfilm, or the collections at the Library they need to see; you can consult the online catalog at our Website, **www.aip.org/history**, and please feel free to make inquiries about the Library's holdings.

Applicants should either be working toward a graduate degree in the history of science (in which case they should include a letter of reference from their thesis adviser), or show a record of publication in the field. To apply, send a vitae, a letter of no more than two pages describing your research project, and a brief budget showing the expenses for which support is requested to: Spencer Weart, Center for History of Physics, American Institute of Physics, One Physics Ellipse, College Park, MD 20740; phone: 301-209-3174, Fax: 301-209-0882 e-mail: sweart@aip.org.

Deadlines for receipt of applications are June 30 and December 31 of each year.

Ethno– and Archaeoastronomy in the Americas Symposium: Call for Papers

There is a call for papers for the symposium ARQ-13: Ethno and Archaeoastronomy in the Americas, which was accepted by the Organizing Committee of the 51st ICA, International Congress of Americanists (Santiago de Chile, 14-18 July 2003). The deadline for sending proposals is 31st of September 2002. Information on the Symposium can be found at: **www.ctio.noao.edu/~boccas/ica51_simposio_arq13.html**. Please feel free to contact the executive coordinators, Maxime Boccas (mboccas@gemini.edu) and Gonzalo Pereira (gonzalo@astro.bo) for additional questions. Their hope is to gather all the serious investigators who have worked in this field in North, Central, and South America over the last few years.

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