H·A·D NEWS

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

Number 30 ∽ February 1994

Astronomy & the State: U.S. and C.I.S. Perspectives

Ron Doel and LeRoy Doggett

For a year HAD's International Relations Committee met monthly, planning the session on Astronomy and the State, challenging the world record for doughnut consumption. On the day of the session everything seemed in order. Three historians from the Commonwealth of Independent States had arrived on schedule at Dulles Airport. But where was Steve Dick? He had come down with the flu. And where was the speaker we had taken for granted? Vladimir Strelnitski, who had been working at the Smithsonian, returned to Moscow before Christmas to get final information for his paper. Because of visa problems, he could not get back to the U.S. until two days after the session.

Abstracts of the formal papers were published in the previous issue of *HAD News* and in the Bulletin of the AAS, Vol. 25, No. 4. In addition to the formal session, we had a week of personal interaction with our CIS colleagues, including oral history interviews. We summarize here some of their comments from the panel discussion.

Alina Eremeeva described how the pressures of the anti-cosmopolitan campaign affected the awarding of prizes within Soviet astronomy. Vassily G. Fesenkov was initially awarded the Stalin Prize for his book on meteorites, but after three astronomers complained that Fesenkov had not paid sufficient attention to Soviet scientists, the prize was

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Hertzsprung & Russell and their Diagrams, part 1

David DeVorkin

We continue our exploration of strange bedfellows—individuals lumped together by history for their complementary yet independent work. Last time it was Saha and Boltzmann. Now we come to possibly the best-known example: Hertzsprung and Russell. Here is how each came to create his diagram.

Ejnar Hertzsprung (1873–1967), a Dane trained as an engineer specializing in photochemistry, was one of the first to apply Planck's radiation law to astrophysical questions. From 1902 to 1909, Hertzsprung, as a private astronomer in his hometown of Frederiksberg, near Copenhagen, worked along several lines to establish the existence of giant stars. Very interested in J.C. Kapteyn's program for determining stellar distances and absolute magnitudes from statistical studies of proper motions, he found a correlation between absolute magnitude and a spectral peculiarity noticed by Antonia Maury in the 1890s. Stars she designated subclass c had normal spectra, except that hydrogen lines were narrow and sharply defined, though generally less intense than corresponding lines in other subclasses. Hertzsprung found that stars with this characteristic were typically very distant and luminous. Once he removed the c-class stars from the general statistical sample, the absolute magnitudes of normal stars decreased (got fainter) with redness. During the years 1905–1907, Hertzsprung

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published several papers on his findings, buttressing them by showing, by use of Planck's law, that stars like Antares were indeed huge, bloated things. He sent reprints to many American observatories because he knew that astronomers did not read the *Zeitschrift für Wissenschaftliche Photographie.* His major effort was directed at Edward C. Pickering to convince him that Maury's system had great astrophysical significance. Their correspondence dates at least back to March 1906. But by July 1908, Hertzsprung, worried that Pickering was dropping Maury's subclasses, told Pickering that neglecting these critical features was "nearly the same thing as if the zoologist, who has detected the deciding differences between a whale and a fish, would continue in classifying them together."

Pickering remained unconvinced by Hertzsprung's arguments. He felt that the spectra Maury had used were not good enough to justify such a detailed classification, and, of greater concern, most of his staff's effort had been put into developing a simpler classification system, one managed by another assistant, Annie J. Cannon. With almost two dozen known systems of spectral classification in use at that time, no one system dominated. Pickering had to be very careful about what system he supported.

Henry Norris Russell (1877–1957), a young Princeton astronomer, met Pickering at an AAS meeting in the spring of 1908. There, Russell told Pickering about his current research. He was at the time reducing photographic plates for a stellar parallax project he had participated in at Cambridge with A. R. Hinks. In particular, he was looking for all sources of statistical and instrumental error, including the effects of magnitude, color and spectra. At the meeting, apparently, Pickering offered to provide that data, something that he was known to do commonly. After reading Russell's preliminary papers, Pickering repeated the offer, suggesting that "The material would perhaps be sufficient to determine which were the most distant, stars of [Cannon's] Class A or Class K."

The curious question here, of course, is that by 1908 Pickering would have had an answer to that question from Hertzsprung's letters and publications. Nevertheless, without reference to Hertzsprung, Pickering supplied Russell with the data he required. By September 1909 Russell found that among his star sample, "the fainter ones average redder than the brighter ones (even though) Antares and α Orionis are of enormous brightness..." Although Russell stated that "I do not know of any previous direct evidence on this question," Pickering still remained silent about the similar findings by Hertzsprung.

Russell started publishing his findings in 1909 and 1910, couched in terms of a revision of Lockyer's theory of stellar evolution — Russell's 'Giant-to-Dwarf' theory. He also linked his findings to a (George) Darwinian model for binary fission along the way. With his first graduate student, Harlow Shapley, Russell confirmed that what distinguished giants from dwarfs was density, not mass, using eclipsing binary data and a new and highly efficient mode of data reduction Russell had devised. These efforts culminated in a series of talks and, finally, in his famous paper, which was presented in 1913 and 1914 in various places. At this time he also devised his famous diagram, which he presented as the embodiment of his theory of stellar evolution.

Whereas Russell's diagrams were composed for field stars whose magnitudes were derived from parallax or proper motion data, Hertzsprung's earliest published diagrams were of the distribution in color and magnitude of stars in open clusters. These appeared in the *Astronomische Nachrichten* and in the Potsdam Publications in 1910 and 1911, presented first by one of his students, Hans Rosenberg. There is evidence that he used the diagram not so much as an explanatory tool, but as a means to assess cluster membership and the efficacy of Hertzsprung's color-equivalent system.

Since Russell commonly read the *Astronomische Nachrichten*, and in fact cited one of Hertzsprung's papers containing a diagram in a letter to a colleague, it is probable that he saw and knew of the diagram. Russell, however, often used graphic depictions to illustrate concepts; his March 1907 lecture notes contain depictions of courses of stellar evolution reminiscent of changes in color and temperature. One conclusion, however, is certain: Hertzsprung and Russell came to the diagram that bears their name from very different directions, and were kept apart for over a year by the one man who wanted independent proof of Hertzsprung's fundamental discovery.

So how did it become the Hertzsprung-Russell Diagram? See the next exciting set of Class Notes. ☆

Report from the Chair

Steven J. Dick

After a very successful meeting in Washington (which I unfortunately missed due to illness), we are looking forward to Tucson. First, however, I must thank those who made the Washington HAD sessions so productive. Woody Sullivan deserves special thanks for acting in my absence. The members of the International Relations Committee (Bob McCutcheon, chair, David DeVorkin, LeRoy Doggett, Ron Doel and Steve Dick) worked for a full year to bring the Russians to Washington for the "Astronomy and the State" session. This was truly a massive undertaking, the details of which no one can appreciate until they have done it! It could not have been accomplished without grants from the Smithsonian Office of Fellowships and Grants and the International Research and Exchanges Board. This also allowed HAD to sponsor the address to the entire AAS by Victor Abalakin, Director of Pulkovo Observatory in St. Petersburg. Brad Schaefer single-handedly put together the successful "Celestial Visibility" session, for which we are very grateful. And of course, as always, the contributed papers represented a cross-section of interests. To all of those who made these sessions possible, organizers as well as contributors, I relay my thanks.

Looking to the future, we hope to keep the momentum going with all of our activities. We will be actively involved in discussions about the celebration of the AAS centennial, and in creating a HAD Prize or Lectureship. The Obituary Committee continues to render faithful service, the results of which appear in the latest BAAS, marking the third year of this program. The International Relations Committee, not content to rest on its laurels, now has its work cut out in other areas, including aid to the Former Soviet Union, abstracts and translations. The Audit Committee (Peggy Kidwell, chair; Ruth Freitag, David DeVorkin) will be probing LeRoy's books as you read this; its report will appear in the next Newsletter. The Nominating Committee, consisting of John Lankford (chair), Dorrit Hoffleit, and Von Del Chamberlain, has begun its deliberations for the next round of officers, including the HAD Committee and the Vice-Chair. If you are called upon, I hope you will agree to serve.

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HAD Business

Minutes of the Annual Meeting

The annual business meeting was chaired by Vice-Chair Woody Sullivan, since Steve Dick was laid up for the week with the flu.

As chair of the Obituary Committee, Sullivan reported that eighteen obituaries were published in the Bulletin of the AAS during the past year. The committee has concentrated on members of the AAS who have not received major obituaries in other publications.

Bob McCutcheon, chair of the International Relations Committee (IRC), reported success in establishing contacts with historians of astronomy in the Former Soviet Union. This will facilitate the effort to provide financial aid.

Alex Gurshtein, of the Institute for History of Science and Technology in Moscow, offered a set of proposals for cooperation between HAD and Russian historians. These were referred to the IRC for consideration.

— New Business —

Sullivan proposed establishing a HAD prize or lectureship. The Executive Committee was charged with presenting a plan at the business meeting next January in Tucson.

Sullivan noted that the AAS will celebrate its centennial in 1999. The Executive Committee is exploring ways for HAD to contribute most effectively to the celebration.

Frank Edmondson requested that HAD officially recognize the 175th anniversary of Indiana University and the 100th anniversary of its Kirkwood Hall. This was approved. The Chair will write a letter to the appropriate people.

— Future Meetings —

HAD will next meet in Tucson in January 1995 with the AAS. The membership approved a special session on The Use of History in Teaching Astronomy. This will be coordinated with the AAS Education Officer Mary Kay Hemenway.

Ron Brashear noted that the *Astrophysical Journal* was founded in Pittsburgh in 1895; the AAS will meet there in June 1995. Ron is exploring the possibility of a relevant thematic session.

Sullivan proposed a special session on Applied History of Astronomy for the January 1996 meeting in San Antonio. A decision on this was deferred to the next business meeting, January 1995 in Tucson. — LeRoy Doggett, Secretary

FSU Journal Fund

To aid historians of astronomy in the Former Soviet Union, HAD's International Relations Committee (IRC) is establishing a fund to purchase institutional subscriptions to the *Journal for the History of Astronomy*. The idea was proposed by Owen Gingerich and Albert Van Helden, who learned that the Russian Academy of Sciences could no longer pay for a subscription. Conversations with our Russian guests during the AAS meeting revealed that other institutions have also had to drop subscriptions to the JHA.

Owen and Albert have generously offered to pay for missing back volumes, thereby bringing the Academy's collection up to date. The IRC would like to develop this idea. Please consider making a tax-deductible contribution for any amount. Checks payable to H.A.D., with designation for the FSU Journal Fund, should be sent to LeRoy Doggett, Nautical Almanac Office, U. S. Naval Observatory, Washington, DC 20392. ☆

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Finally, our most important activity is sharing our research and ideas. For Tucson in January '95 we will have a half-day thematic session on "The Use of History in Astronomy Education," for which we solicit your ideas and participation, both from those who have experience and those who would like to see more done in this area. This session will be in coordination with the AAS Education Officer, Mary Kay Hemenway. Anyone interested in serving on an Organizing Committee for this session, please let me know. Also we will return to two full sessions of contributed papers, so be thinking about papers for Tucson (remembering that Tucson in January can be better than many other places in the U.S.). There is talk about a session on the centennial of the ApJ at the Pittsburgh '95 summer meeting, and Woody has proposed an "Applied History of Astronomy" session at the San Antonio winter meeting in '96.

The theme of history in teaching, as well as the other projected themes, should appeal to a broad spectrum of AAS members. Our HAD membership continues to rise, and I believe with a little effort, the number could double. With more publicity in the AAS Newsletter, and some lobbying by current members, I would like to see that happen over the next year. ☆

History and the IAU

The XXIInd IAU General Assembly will be held August 15–27 in The Hague, The Netherlands. This Assembly is of particular interest to historians, for it marks the 75th anniversary of the IAU. In honor of this occasion, about a dozen papers on IAU history are scheduled, including an invited lecture by Adriaan Blaauw and reminiscences by past Presidents and General Secretaries. These, along with general contributed papers, will comprise Joint Discussion 7 on Friday the 19th.

This General Assembly is also important because of a proposed reorganization of commissions. The first proposal was cause for alarm, since Commission 41 (History of Astronomy) was not among the proposed commissions to remain or to be combined! Protests and lobbying by the Commission 41 Organizing Committee, led by Commission President Suzanne Débarbat, resulted in a later version in which our commission is combined with Commission 46 (Teaching of Astronomy). This might have a beneficial synergistic effect. The proposed reorganization will be voted on by the national representatives of the IAU. The U.S. National Committee is chaired by our own Don Osterbrock, a former chair of HAD. You should contact him if you have special concerns. He will do his best to serve our interests. ☆

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withdrawn and given to another astronomer.

Alex Gurshtein noted that Russian historians of astronomy are not doing oral history interviews. The absence of supplies (recorders, tape, etc.) is a factor in this.

Victor Abalakin described how visas needed to attend international meetings were withheld until the last moment. Scientists themselves did not know until the final moment whether they would be able to travel. He displayed documents, obtained from the former KGB, that revealed the fates of astronomers caught in the Stalinist purges.

All participants seemed to concur to varying degrees that material in archives that went against the regime was often destroyed.

Despite the valiant efforts of the moderator, Cathy Lewis, we were unable to get clear answers to such questions as how much political pressure had influenced the election of Soviet astronomers to the IAU, etc. ☆