BOOK REVIEWS

Astronomy and World Politics

History of the IAU. The Birth and First Half-Century of the International Astronomical Union. ADRIAAN BLAAUW. Published for the International Astronomical Union by Kluwer, Norwell, MA, 1994. xx, 296 pp., illus. $90 or £60 or Dfl. 150; paper, $49 or £36 or Dfl. 90.

The history of the International Astronomical Union is not simply the story of astronomers banding together for multinational cooperation. Rather, it is a case study in international politics played out against a background of national rivalries and hot and cold wars. The IAU had its genesis in the aftermath of World War I, when scientists of the Allied Powers were determined to break the hegemony of Germany in the Astronomische Gesellschaft, the most prestigious pre-war astronomical society with claims to an international membership. As one American physicist expressed it, "Science is the highest expression of a civilization. Allied Science is, therefore, radically different from Teutonic Science."

George Ellery Hale, then foreign secretary of the U.S. National Academy of Sciences, Arthur Schuster, secretary of the Royal Society, and Emile Picard, permanent secretary of the French Academy of Sciences, took the lead in organizing an International Research Council (IRC), out of which the IAU was created as a subsidiary unit in 1919. Thus 1994 marks the 75th anniversary of the IAU, which has occasioned this official history by the Dutch astronomer and sometime IAU president Adriaan Blaauw.

"The IAU, far from being the result of an idealistic move for internationalism under peaceful circumstances, was born in the atmosphere of miserable conflict between the belligerent nations of World War I," Blaauw writes. "For astronomy, traditionally so internationally oriented, to be chosen as the first one in the establishment of International Unions, was a natural thing. But the sky under which this happened looked rather gloomy."

Shortly after the formation of the IRC, the Allies decided to admit neutral nations such as Holland to their club. Not everyone agreed with the exclusion of Germany, however; the Dutch astronomer J. C. Kapteyn was deeply dissatisfied. His plan of a concentrated research attack on selected areas of the sky had been one of the principal international astronomical activities before the war, and when the Dutch Academy of Sciences accepted membership in the IRC he essentially discontinued his contacts with the academy.

As long as the IAU remained subordinate to the IRC, the astronomers had no independent option to bring Germany officially into the union, although eventually individual German astronomers were invited to the meetings. The rules changed in 1931 when the IRC statutes expired, and the transformation to the International Council of Scientific Unions (ICSU) took place. At the 1932 General Assembly, held in Cambridge, Massachusetts, it was announced that the German astronomers had formed a national committee to apply for admission as soon as their financial position permitted such action. Unfortunately, the Nazi period had begun, and German membership did not become a reality until 1951.

World War II placed a heavy stress on an international body such as the IAU. The secretariat in Leiden was cut off from the Allied countries by the German invasion in 1940, and the affairs of the Union were run on an *ad hoc* basis by its president, Sir Arthur Eddington, and one of its vice-presidents, Walter S. Adams of Mount Wilson Observatory. Putting the pieces together again after World War II soon became complicated by the tensions of the Cold War. At the last minute, a proposed General Assembly in 1951 in Leningrad was canceled because of the worries of Western astronomers who feared that such a meeting would run into too much political interference.

In the decade that followed, to the embarrassment of American astronomers, it became impossible to hold international meetings in the United States because the McCarran-Walter Act barred Communists and alleged sympathizers from entering the country. The American scientists were reluctant to agree to a General Assembly in Moscow when they could not reciprocate in their own country. Soon the situation became even more complicated by American foreign policy with respect to China, with the State Department's attitude that only Taiwan represented the real China. Blaauw tells this story as well as the IAU archives permit, but his account would have been considerably richer if he had had access to a detailed unpublished memoir written by the late Leo Goldberg, one of the key American players.

According to Goldberg, the U.S. National Committee for the IAU began as early as 1956 to seek assurances from the State Department that a General Assembly could take place in 1961 with visas being issued to all those members who planned to come. As a test case, invitations were issued to two European astronomers, Marcel Minnaert of Holland, whom the State Department considered a "bad boy," and Daniel Chalonge of France, a "naughty boy" (representing the two categories for questionable visa applicants). Just as this hurdle was being cleared, a more difficult obstacle loomed on the horizon. Spectroscopist Wallace Brode, who had taken a position as science adviser in the State Department, sided with the Far Eastern Desk and threatened to veto any meeting in which "Red Chinese" would be involved. Furthermore, Brode and his associates demanded that the IAU act swiftly on a hastily organized application for admission from Taiwan.

Frustrated, Goldberg offered his resignation as chairman of the U.S. National Committee, but Brode was unable to find a replacement more to his liking. In turn, Goldberg went over Brode's head to Christian Herter, Undersecretary of State. Herter assured him that the State Department was changing its policy about international scientific meetings in the United States and promised to give Goldberg a letter of understanding to take to the IAU executive committee at the 1958 General Assembly in Moscow. Not only did the letter not arrive, but rumors generated by Brode reached Moscow to the effect that the U.S. invitation would be rescinded unless the IAU promptly admitted Taiwan as a member. Such an action was clearly calculated to force the resignation of the People's Republic of China from the union. The IAU executive committee postponed action, realizing that such action in Moscow could well cause a walkout by the Soviet Union. Furthermore, they were offended by political pressure from the United States, especially because there was virtually no organized astronomical activity at that time in Taiwan.

The following year, however, the IAU executive committee felt compelled by its own statutes to act favorably on the Taiwanese application, with the consequence that the People's Republic promptly withdrew from the union. The General Assembly took place as scheduled in Berkeley, with other Communist members admitted

Vignette: Fond Hopes

He seemed reluctant to leave. He turned to her. "Claire," he said hesitantly, "there's . . . there's something I'd like to ask you."

"Yes? she answered in a choked voice. To her annoyance her heart had begun to beat very rapidly.

He looked down at his hands. "Would you—that is, later, of course, after this is all over . . . " He stopped and gazed at her anxiously; then the words came tumbling out.

"If we went down to Amargosa some time, could you take photographs of the *Scirpus validus?* Color photographs? See, then I could send them to the Herbarium in Berkeley, and if they confirm my identification, I'll get a citation in the new Jepson *Flora*."

—*The Bulrush Murders: A Botanical Mystery* by Rebecca Rothenberg (Mysterious Press)

but without participation from the mainland Chinese. Not until 1982 was an arrangement successfully made for adhering organizations in both Nanjing and Taipei to participate in the Union.

As Goldberg wrote, "Scientists active in international organizations must confront the problem of how to serve their countries' political interests without violating the statutes of the union."

Blaauw's *History of the IAU* provides a convenient archival reference work for finding past meeting sites, lists of officers, and the evolution of the IAU's rules, resources, and administrative structures. The broader canvas on which the most significant histories are written is only hinted at here, in the accounts of the exclusivist origin of the IAU and of the question of China's membership. What was the role of the Astronomische Gesellschaft and other astronomical societies in the era just before World War I? How did the International Solar Union, often considered a preliminary organization to the IAU, figure in this history? Are there examples of how the IAU actually fostered astronomical discoveries? How did the IAU legitimate its authoritarian role in establishing astronomical nomenclature? Such questions remain to be researched.

While historians of astronomy may believe that the "real" history of the IAU is still to be written, they surely owe a high debt of gratitude to Blaauw not only for providing this well-documented outline but for giving the IAU archives a high visibility and for taking the steps to ensure their preservation.

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High-Tech Partnership

International Cooperation in Space. The Example of the European Space Agency. ROGER M. BONNET and VITTORIO MANNO. Harvard University Press, Cambridge, MA, 1994. xii, 163 pp., illus. $39.95 or £29.95.

This book, whose authors are both actively involved in the European space effort, has three main objectives: first, to describe the activities of the European Space Agency (ESA), the intergovernmental organization responsible for Europe's collaborative civilian space effort; second, to explain ESA's science program, with particular reference to the place in it of international cooperation; and third, to identify the terms on which Europeans will collaborate with potential partners in the future, terms that have been shaped by a number of somewhat unhappy experiences in the past, notably with the United States.

ESA's science program is driven from the "bottom up"; that is, the scientists in the organization's 15 member states themselves decide what lines of research to follow and what experiments are best suited to them. This is primarily because, unlike those supported by NASA, scientists in universities and national research organizations have to appeal to their relevant home authorities for money to build their experimental equipment. ESA usually only pays for the common facilities (the satellite itself, which is contracted out to industry, the launcher, and so on). The agency is therefore necessarily reactive to the wishes of its scientific constituency. These are funneled from advisory groups up through a system of committees to the supreme governing body, the Council. Though scientific considerations dominate the first stage of the decision-making process, financial, industrial, and "political" considerations progressively come into play as priorities are set and choices made.

Since the mid-1970s fundamental science has enjoyed a secure if relatively small part of ESA's overall budget. Member states are obliged to contribute to the science program, which today takes some 13 percent (about $390 million) of ESA's overall budget. Funding is to be increased by 5 percent annually for about the next decade to support the so-called Horizon 2000 long-term plan, Europe's first really coordinated cluster of missions satisfying the wishes of its scientific community.

On the industrial front, ESA operates on a principle of "fair return." The member states see the agency as an arm of industrial policy and demand that the money that they spend on its programs be ploughed back into their national space industries. Governments have become increasingly emphatic that there should be a strict correlation between "input" and "output," particularly in projects involving the development of advanced technologies. This policy, the authors point out, is not well received by major contractors or in countries with important national space programs like France and Germany. It is also a policy that is being closely watched by the European Union in Brussels, who see it as potentially in conflict with the trade liberalization demanded by the Single European Act.

"Political" considerations impinge on ESA's activities in other ways. Countries that have big national space programs and feel constrained by the principle of fair return repeatedly question the role and purpose of the European effort. They are held in check by the benefits it brings, by the pressure from industries in smaller countries that cannot hope to stay in space without ESA, and by a general will to keep the European "family" intact.

International collaboration is of increasing importance in the post–Cold War era, when superpower rivalry can no longer prime the space effort. It is also crucial for science, which tends to be the Cinderella of space agencies even as the cost and complexity of its missions increase. And though U.S.-European collaboration in space can, overall, be said to have been harmonious, the authors stress that very real problems in the past have left a legacy of resentment in Europe.

The main source of the problem is the different funding mechanisms on the two sides of the Atlantic. In Europe a mission is adopted along with a cost-to-completion commitment, subject to certain safeguards.