

41. HISTORY OF ASTRONOMY (HISTOIRE DE L'ASTRONOMIE)

PRESIDENT: E. Rybka.

VICE-PRESIDENT: O. J. Gingerich.

ORGANIZING COMMITTEE: J. O. Fleckenstein, C. D. Hellman, Z. Horský, P. G. Kulikovskiy, W. Petri, V. L. Tchenakal.

I. INTRODUCTION

The investigations on the history of astronomy proceed rapidly and concern all branches, viz. the history of astronomy in particular countries, the historical development of the astronomical problems, biographies of astronomers, history of observatories and of astronomical instruments etc. They are being made by professional astronomers and historians of science at observatories and institutions destined for the history of science. The president of Commission 41 cannot give a comprehensive review of all directions of investigations on the history of astronomy, because their results frequently have been published in publications not accessible to the author of this report. The present draft report is based mainly on information received by the president from members and consulting members. Besides, the present report contains short information on the results of international conferences, which were held independently of IAU.

II. MEMBERSHIP

A characteristic feature of Commission 41 is that many eminent scientists, who are not astronomers but are working actively on particular problems of the history of astronomy, are consulting members of Commission 41. At present the Commission is composed of 44 members and 34 consulting members. We suffered a loss by the death on 30 Sept. 1967 of Prof. A. Birkenmajer (Poland) an eminent scientist in Copernican problems and medieval history of exact sciences. Two scientists have been coopted as consulting members: Dr. J. K. Ravetz (U.K.) and Dr. E. Rosen (U.S.A.).

III. GENERAL HISTORY OF ASTRONOMY

At the Thirteenth General Assembly of IAU in Prague (1967) a resolution was adopted which recognized the importance and usefulness of preparing an international history of astronomy, based on original materials. The president reported the plan of the General History of Astronomy, as printed in the Information Circulars of Commission 41, Nos. 10 and 14, at the Twelfth Congress of the History of Sciences in Paris in August 1968. Further remarks to the plan have been received by the president from members and consulting members. Detailed remarks to the plan of all three volumes have been sent by N. I. Nevskaja from Leningrad. Preliminary negotiations have been held with the aim to find a publisher and to organize the editorial board. The whole problem will be discussed during the General Assembly of IAU in Brighton.

IV. CONGRESSES AND SYMPOSIA

(a) Within a month after the Thirteenth General Assembly of IAU an international symposium "La révolution scientifique du 17e siècle et les sciences mathématiques et physiques" was held in Prague (25–29 September 1967). Four general reports were delivered by: (1) J. R. Ravetz – The evolution of science and its history, (2) I. B. Cohen – Dynamics: the key to the new science in the 17th century, (3) P. Costabel – Matière et lumière au 17e siècle, (4) A. P. Youschkevitch – Sur la révolution en mathématiques des temps modernes.

Some topics related to history of astronomy were touched in discussion. More than 10 members of Commission 41 attended the symposium.

(b) The Twelfth International Congress of History of Sciences was held in Paris, 25–31 August 1968. There was no special section of the history of astronomy, but reports concerning this field of science were delivered in five different sections. In all 22 contributions from different branches of the history of astronomy were delivered at the meetings of the Congress. Their titles were given in the Information Circular No. 16. Ten contributions were delivered by members of Commission 41. At the Paris Congress a Commission for the celebrations of the 400th anniversary of the birth of J. Kepler (in 1971) was appointed.

(c) The symposium entitled: "Oriente e Occidente – nel Medioevo: Filosofia e Scienze" (XIII Convegno Volta) was organized by the "Accademia dei Lincei", 9–15 April 1969 in Rome and Florence. 32 invited lectures were held at the "Convegno", six of them concerned the history of Islamic medieval astronomy. Their lecturers were: E. Rybka, E. S. Kennedy, W. Hartner, W. Petri, M. Cimino and E. Millas Vendrell. The titles of the lecturers have been published in the Information Circular No. 17.

V. BIBLIOGRAPHY

As in previous years, P. G. Kulikovskiy (Sternberg Institute, Moscow), former President of Commission 41, with the assistance of N. B. Lavrova, continued the preparation and publication of yearly bibliographies of books, papers and articles on the history of astronomy. Three issues of the bibliography were published in the years 1967–69, containing bibliographical notes on publications issued in 1966, 1967 and 1968. Almost 1000 titles are contained in the three issues 1966–68. Together 10 issues of the bibliography on the history of astronomy were prepared and published in Moscow by P. G. Kulikovskiy.

VI. INFORMATION CIRCULAR

The president continued the publication of the Information Circular which was printed in Cracow under the auspices of the Committee of the History of Sciences and Techniques of the Polish Academy of Sciences. The Circular was distributed to all members and consulting members of Commission 41. It contained various information concerning congresses, symposia, anniversaries, personal notes and others. Four circulars were published since the Thirteenth General Assembly of IAU. The fifth one is planned to appear in the spring 1970.

VII. KEPLER AND COPERNICUS ANNIVERSARIES

(a) The Kepler Committee, appointed at the Paris Congress for History of Sciences met for the first time at Munich (DBR) 1–2 July 1969 under the presidency of J. O. Fleckenstein. A. A. Mikhailov (U.S.S.R.) has been elected as honorary President of the Committee. J. O. Fleckenstein (Switzerland) acts as President with the assistance of E. Rosen (U.S.A.) – the vice-president – and Z. Horský (Czechoslovakia) – the secretary. There are planned symposia in 1971 at Tübingen (D.B.R.), Linz (Austria) and Leningrad-Pulkovo (U.S.S.R.). Besides a scientific exhibition is to be organized in Prague. The participation of Commission 41 has been provided mainly in the organization of the Symposium in Leningrad.

(b) The Copernican Committee, which was appointed at the Eleventh Congress for the History of Sciences in 1965, met twice: in Warsaw (17–18 April 1968) and in Paris (26 August 1968). At the Warsaw meeting the plan of collective editions designed in Poland for the 500th Anniversary of the birth of Copernicus was adopted and approved. It is planned to publish *Opera Omnia* of Copernicus, the facsimile of the manuscript of *De Revolutionibus* and other papers relating to the Copernicus anniversary. After the death of Prof. A. Birkenmajer, Chairman of the Committee, the Committee was presided provisionally by Prof. J. Bukowski, Chairman of the Committee for the History of Sciences and Techniques of the Polish Academy of Sciences. At the Paris meeting of the Copernicus Committee J. Bukowski has been appointed Chairman of the Committee in question.

VIII. REPORTS FROM MEMBERS

Though the president requested twice all members and consulting members (Information Circular, Nos. 16, 17) to convey him information on their work in the years 1967–69, less than 20 answers have been received. The report which follows, represents therefore only partly the progress and trends of investigations, which are carried out by the members and consulting members of Commission 41. The information received by the president has been supplemented from papers being at his disposal. The summary of individual reports has been arranged according to countries in alphabetical order. The numbers in brackets refer to publications cited in the bibliography.

1. *Czechoslovakia*

Zd. Horský (Prague) was interested in general problems, which are on the border line of philosophy of sciences, as cosmology of Marsilio Ficino (1), aspects of changes in the scientific life (2), part of the platonism in the origin of modern cosmology (3) and others. He edited the facsimile of *Dialexis de novae et prius incognitae stellae* by Thaddaeus Hagecius ab Hayck (4). Together with O. Škopova he elaborated the catalogue of instruments of XV–XIXth centuries preserved in the National Technical Museum in Prague (see below Section XI.4).

2. *Denmark*

A. V. Nielsen (Aarhus) described the sundial from Vestervig, dating from about 1200 A.D.

3. *German Federal Republic*

H. C. Freiesleben (Stuttgart) wrote two booklets, each comprising about 80 pages, concerning Galilei and Kepler as scientists. He compiled some details concerning Max Wolf (1863–1932), not contained in the biography published by him in 1962. He is writing eight biographies to the *Dictionary of Scientific Biography* (Gillispie, Scribner's Son, U.S.A.). H. Waltenberg and W. Gleissberg (Frankfurt am Main) have been engaged in the problem of astronomical orientation of antique temples. They suppose that one of the conditions of the orientation of the archaic and hellenistic temples of Didyma (Asia Minor) was to render a possibility of observing Castor and Pollux at the moments when the azimuths of both stars were equal (5).

4. *Greece*

C. Antonacopoulos and C. Fragakis (Athens) have studied the Andronicos Horologium at the Northern foot of Acropolis in Athens. The study concerned the eight sundials which exist on the corresponding sides of the octagonal tower. The sides might be used as solar calendars (6).

C. S. Chassapis (Pentele) has studied the Greek astronomy of the second millennium according to the Orphic Hymns, which according to the author were formulated between XIXth and XIVth centuries B.C. The author alleges that the Greeks had conceived the heliocentric idea in the orphic times and that they were aware of the sphericity of the earth and of its rotation. D. Kotsakis (Athens) studied two sundials made in the first century B.C. by Andronicos from Kyrrhos in Macedonia, one situated on the island Tenos, the second one in Athens. S. Plakidis (Athens) published a historical account on the foundation of the National Observatory of Athens and its activity 1842–1965 (7).

5. *Italy*

M. Cimino, C. Chełkowska and M. A. Giannuzzi (Rome) described the exhibition of Copernican mementoes which belong to the Museum of the Rome Astronomical Observatory, as sculptures, paintings, medals, books. The exhibition was opened December 1966–January 1967.

A. Fresa (Naples) has analyzed the rules which were applied in antiquity at the astronomical orientation of temples in Egypt, Mesopotamia, Greece and Great Greece. He has aimed to explain the orientation of cardinal points in Homer's works (8). V. Ronchi (Florence-Arcetri) published an article on the life and versatile activity of Ruggero Boscovich (1711–87) (9).

6. Poland

B. Biliński (Rome) wrote a study on the connections of Galilei with Polish circles against a background of scientific and cultural relations between Poland and Italy in XVIth–XVIIth centuries (10).

J. Dobrzycki (Warsaw) and L. Hajdukiewicz (Cracow) published in *Polski Słownik Biograficzny* (Polish Biographic Dictionary) the biography of Copernicus (1968). Besides, J. Dobrzycki is preparing commentaries to a new edition of *De Revolutionibus*, which is planned for the 500-year anniversary of Copernicus. T. Przyrkowski (Jędrzejów) described the Przyrkowski's Museum in Jędrzejów and its rich collection of sundials (11).

E. Rybka (Cracow) has composed the plan of the General History of Astronomy and published it in the Information Circular of Commission 41 and in (12). He wrote popular articles on Copernicus and biographies of Polish astronomers (Krasowski, Kubikowski) to the Polish Biographic Dictionary. He is writing biographies of Polish astronomers for the *Dictionary of Scientific Biography* (Gillispie, Scribner's Son, U.S.A.).

J. Witkowski (Poznań) wrote biographies of T. Banachiewicz: (1) to the *Dictionary of Scientific Biography*, and (2) for the Association of Polish Geodesists. He wrote a history of astronomy in the Poznań district.

7. Sweden

P. Collinder (Uppsala) published a paper on the accuracy of astronomical observations in antiquity (13), and wrote a short history of astronomy in Sweden from the XVth to the XIXth century, which is to be published in 1970.

8. Switzerland

J. O. Fleckenstein (Basel) has edited Vol. I of the Collected Works of Jacob Bernoulli (Astronomy and Physics) and together with the late L. Courvoisier, Vol. 23 (ser. II) of Collected Works of L. Euler (First Lunar Theory). He wrote a short history of astronomy in Basel (1460–1960) based on Basel publications and manuscripts and prepared the historical exhibition on the occasion of IAU Symposium No. 38 on The Spiral Structure of Our Galaxy, which has been held in Basel, 29 August – 4 September 1969.

B. L. van der Waerden published a book on the beginnings of astronomy (see below Section XI.10)

9. United Kingdom

E. J. Aiton (Manchester) published a paper on Kepler's second Law of planetary motion (14).

E. G. Forbes (Edinburgh) was engaged mainly in the history of the scientific activity of the 18th-century German astronomer, Tobias Mayer (1723–1762). He published several articles on this subject. He translated: (1) from Latin into English the work of Georg Christoph Lichtenberg *Opera Inedita Tobiae Mayeri I* (Göttingen, 1775), to which he added an introduction and over 300 annotations; (2) from German into English 31 letters between Leonhard Euler and Tobias Mayer whose central theme was the lunar theory (to these letters E. Forbes wrote the introduction and over 200 annotations). He wrote a comprehensive article on the bicentenary of the *Nautical Almanac* (15).

At present he is engaged in editing two volumes of Tobias Mayer's unpublished papers, one of which contains his astronomical treatises, lecture notes etc.

D. J. Schove (Beckenham, Kent) has been engaged in problems of Africanistics and in the so-called "Spectrum of Time" (Meteorological and Astronomical observations in History). He

published together with P. Y. Ho the Chinese records of sunspots and aurorae in the 4th century A.D. (16).

10. U.S.A.

A. Aaboe (New Haven) has been engaged in a detailed research work on cuneiform texts preserved in the British Museum. He published lunar auxiliary tables and related texts from the late Babylonian period (17).

S. L. Chapin (Los Angeles) published a study on the astronomical activity of the Paris Academy of Sciences during the XVIIIth century up to the eve of the Revolution (18).

D. S. Evans, J. Deeming, B. H. Evans and S. Goldfarb (Austin) have published the book *Herschel at the Cape* containing the diary and correspondence of John Herschel (1834–1838) (see below Section XI.2).

G. Hawkins (Cambridge) has undertaken a study of some peculiar straight lines in the desert near Nasca, Peru, and has shown that these lines do not have any obvious astronomical orientation.

C. D. Hellman (New York) has been engaged in a research work on Tycho Brahe and the Nova 1572 and she is writing a book on this subject. She wrote biographies of Tycho Brahe, G. S. Dörfel and G. Peurbach for the *Dictionary of Scientific Biography* and numerous reviews in various journals. She published a reprint with a supplement of the book *The comet of 1577*, originally printed in 1944.

O. Gingerich (Cambridge, Mass.) has continued his computer investigation of old planetary tables and ephemerides and he has calculated in cooperation with E. Poulle an extensive daily ephemeris from the Alphonsine tables. His English translation of Kepler's *Astronomia Nova* is virtually completed in an initial draft.

O. Neugebauer and R. A. Parker (Providence) published the third volume in the monumental *Egyptian Astronomical Texts*. Besides, O. Neugebauer and A. Sachs have been engaged in a detailed study of Babylonian astronomy, based primarily on cuneiform texts in the British Museum.

O. Neugebauer published the article "On the planetary theory of Copernicus" (19).

J. H. Reid (Houston) described the most improved planetarium, tellurian and lunarium at Dunsink Observatory (20).

Mr. and Mrs. R. Webster (Chicago) have been preparing an extensive *Index of Western Scientific Instrument Makers to 1850*; the first part is already available in draft form. In this work they have been particularly assisted by Derek de Solla Price.

11. U.S.S.R.

The following report on works concerning history of astronomy carried out in the U.S.S.R. in 1967–69 has been sent by the Astronomical Council of the U.S.S.R. Academy of Sciences.

"Soviet students of the history of astronomy have been engaged in studies of a history of the activity of individual scientists and particular institutions, as well as of a history of problems in various branches of the history of astronomy. The main results of the investigations may be summarized as follows:

(1) In 1967 considerable attention was paid to the preparation and edition of jubilee books and articles on the history of Soviet astronomy as a whole, as well as those on particular scientific institutions.

(2) The study of the history of Armenian astronomy since the beginnings of the XIXth century till 1920 has been completed and the results have been published (B. E. Tumanian).

(3) Rock engravings of astronomical contents, dated preliminarily to the period from the first to the 8th millennium B.C. have been found by B. E. Tumanian 60 km from Erevan at 2000 m above sea level. Investigations in question are being carried out in collaboration with archaeologists.

(4) A mention of the outburst of Supernova of 1006 was found in the "Matenadaran" manuscripts of Xth–XVIIth centuries (Armenia). There have been found records on meteor observations and among them those on "star showers" in 900 and 1070. The first date agrees with that one from Chinese and Japanese chronicles (B. E. Tumanian).

At present studies in the following main domains and problems of the history of astronomy are in progress:

(a) *History of astronomy in various epochs and countries*

I. N. Veselovsky (Moscow) is engaged in problems of Babylonian astronomy; B. E. Tumanian (Erevan) – in problems of the ancient Armenia and papers of Armenian authors who lived in Amsterdam in XIVth–XVIIIth centuries; Matvievskaya (Tashkent), Rosenfeld (Moscow) and Nevskaya (Leningrad) – in the medieval East astronomy; Kuzakov (Moscow) – in the astronomy in ancient Russia; Tchenakal, Nevskaya (Leningrad) – in the history of astronomy in Russia in XVIII–XIXth centuries; Zhelnin and Mürsepp (Tartu) – in the history of astronomy in Baltic countries (Estonia and Latvia).

(b) *History of particular problems.*

(1) Maistrov (Moscow) – carved calendars, Baranovskaja (Moscow) – Mongolian, Buriatian and Chinese calendars.

(2) Sokolovskaja (Moscow) – ground means for the study of the Universe.

(3) Straut (Moscow) – study of the Moon.

(4) Eremeeva (Moscow) – ideas on the structure of the Universe.

(c) *Personalia*

Life and activity of the following astronomers are being investigated: Eudoxos – by Veselovsky; Hevelius – by Kulikovsky; W. Herschel – by Eremeeva; directors of Tartu (Derpt) Observatory – W. Struve, Öpik, Rootsman, Maedler, Schwarz, Clausen, Levitsky, Pokrovsky – by Zhelnin; B. Schmidt – by Mürsepp and Tchenakal.

(d) *Preparations for publication of classical works*

al-Biruni “al-Qanun al-Mas’udi” in Russian – by Rosenfeld, Rozhanskaya and Smirnov.

Nasir al-Din al-Tusi “Tahrir al-Majisti” – exposition of “Almagest” in Azerbaijan by Mamedbeyli and others (Baku).

Ptolemy “Almagest” translated with comments by Veselovsky.

(5) Reference books have been prepared and printed, among them the Album-Catalogue of scientific instruments and the bibliography of Russian astronomical literature for 1800–1900. The following two books have been translated from English into Russian: *Astronomy of the 20th Century* by O. Struve and V. Zeberg; *The exact sciences in Antiquity* by O. Neugebauer. Several books are being prepared for an edition: (1) *Astronomy and Cosmonautics*; (2) *Calendar and Chronology* (Seleshnikov, Leningrad); (3) *Scientific devices of historical importance*, Vol. II (Maistrov); (4) *Album History of Astronomy in the U.S.S.R. in Illustrations* (Kulikovsky, Tchenakal), (5) *Bibliography of literature on stellar spectroscopy 1862–1961* (Korytnikov, Kasan); (6) *History of mechanics* (including a history of astronomy since Babylon times till D. Darwin) by Veselovsky.”

In 1969 Vol. X of “Istorikoastronomicheskiye issledovania” (Investigations on history of astronomy) has been printed (Ed. P. G. Kulikovsky). It contains 14 papers written by Soviet historians of astronomy, L. Euler’s letters to Wettstein, L. Euler’s unknown letters, the selected bibliography of the literature on the history of astronomy 1965–68.

N. I. Nevskaya (Leningrad) advises that she is engaged in the study of ample archives of J. N. De l’Isle, L. Euler, M. V. Lomonossov and other Russian scientists of the XVIIIth century. She is studying arabic manuscripts preserved in the Institute of Asia-Peoples, viz. those of Aristotle, Ibn ash-Shatir, Ibn al-Haytham and Shichab ad-Din’Ali al-Madjdi, in connection with the problem of contacts between European and Arabic astronomy. She is engaged also in problems of Greek navigation and astronomy.

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IX. MICROFILMING OF ASTRONOMICAL MANUSCRIPTS

The working group for the description and microfilming of astronomical manuscripts, under the chairmanship of O. Gingerich has been instrumental in arranging for the microfilming of the material relating to the first four Astronomer Royals at the Greenwich Observatory, viz. J. Flamsteed, E. Halley, J. Bradley and N. Bliss. This program is now complete. Attention is called to another completed microfilm of the papers of G. E. Hale, which has been prepared by the Carnegie Institution of Washington and the California Institute of Technology. The working group has been in communication with Dr. E. W. Maddison of the Royal Astronomical Society Library, who is working on a description of the astronomical manuscripts of certain English astronomers.

More detailed information on the microfilming was printed in the Information Circular No. 16 (November, 1968).

X. JOURNAL FOR THE HISTORY OF ASTRONOMY

Since 1970 a new journal entitled *Journal for the History of Astronomy* is scheduled to be published every six months in London under the editorship of M. A. Hoskin (Cambridge University). The Journal will contain surveys of the present state of knowledge in various fields of history of astronomy, reviews of new books, regular critical bibliographies, details of manuscript collections, and information of theses completed and of how access may be obtained to this material. The subject matter of the Journal will extend to allied fields, including the history of navigation, time-keeping, and geography, and the history of relevant branches of mathematics and physics.

XI. NEW BOOKS ON THE HISTORY OF ASTRONOMY

1. *Vistas in Astronomy*, Vol. 9. New aspects in the history and philosophy of astronomy. (First Joint Symposium of the IAU and the Union Internationale d'Histoire et de Philosophie des Sciences, held at the University of Hamburg), 1967, Pergamon Press.
2. D. S. Evans, T. J. Deeming, B. H. Evans, S. Goldfarb (Eds.); *Herschel at the Cape: Diaries and Correspondence of Sir John Herschel*, 1969, University of Texas Press.
3. W. Hartner, *Oriens-Occidens, Ausgewählte Schriften zur Wissenschafts- und Kulturgeschichte. Festschrift zum 60. Geburtstag*, 1968, Georg Olms Verlagsbuchhandlung, Hildesheim.
4. Z. Horský, O. Škopova, *Astronomy-Gnomonics, A catalogue of instruments of the 15th to the 19th centuries in the collections of the National Technical Museum Prague*, 1968, Prague.
5. T. N. Kary-Niyasov, *The Astronomical School of Ulugh Beg* (in Russian), 1967, Tachkent.

investigations on the history of astronomy. A proposal has been made late in 1967 that the Commissions of History of Astronomy in both unions should consist of the same members. The president of Commission 41 has not been authorized to decide in that question. After the consultation with members of the organizational Committee of Commission 41 the whole question has been postponed to the Fourteenth General Assembly of IAU, when final decisions are to be taken.

During the Fourteenth General Assembly of IAU it should also be decided where the General History of Astronomy is to be published and how its Editorial Board should be organized.

E. RYBKA

President of the Commission