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Akademische Sternkarten, Berlin 1830–59

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Abstract. Bessel proposed to the Berlin Academy that 24 astronomers should collaborate in mapping the sky within 15° of the equator. The projected completion date was 1829. The actual completion date was 1859.

1. Bessel's Proposal

The star charts published by the Berlin Academy between 1830 and 1859 are now largely remembered only for the fact that they enabled Galle to discover Neptune in 1846. The plan to produce them was proposed by F.W. Bessel (1822) in a letter to the Berlin Academy of Sciences. He suggested that the catalogues of Bradley, Lalande and Piazzi should be reduced according to a uniform scheme and collated with the zone catalogues within 15° of the equator containing 30,000 stars, which he had just completed. The catalogued stars were to be supplemented by un-catalogued stars which could be seen in a 'comet-seeker' of 76 mm aperture and 10× magnification. The first reason put forward for the project was to aid the discovery of comets and minor planets. Twenty four astronomers were to take part in the work, each taking an hour of right ascension and the results published by the Academy as both charts and catalogues. Accordingly, the Academy issued a prospectus in 1826 inviting astronomers to participate and offering a reward of 25 Dutch ducats as a reward for a successfully completed chart. Each volunteer would be alloted an hour of Right Ascension, but if no progress had been achieved within two years, the area would be re-allocated. They expected the project to be completed by 1829. In fact the charts were published between 1830 and 1859 as shown in the table.

Two charts were published of Hora XVIII. The table shows the date of completion of each chart, the number of catalogued stars included and, where appropriate, the number of stars observed with the Glasmikrometer. The additional stars in Hora XXII were observed with a meridian circle.

2. Execution

The first twelve sheets were engraved on copper plate by K. Kolbe with a machine built by Pistor. After his death the remainder were engraved by his daughter Auguste Kolbe. On the equator the scale of the charts was 12.7 mm/° in both co-ordinates and the same scale was retained to 15° declination, neglecting the convergence of the meridians. Each sheet, with its catalogue was published as

Table 1. Details of the 24 charts

Hora	Name	Date	Cat	Glas
0	Dr. Luther in Bilk bei Düßeldorf	1858	1356	
I	Prof. Olufsen in Kopenhagen	1849	1299	
II	Moerstadt in Prag	1835	1447	
III	Prof. d'Arrest Leipzig	1854	1427	
IV	Prof. Knorre zu Nicolajew	1835	1700	4036
V	Prof. Argelander in Bonn			
	& J.F.Julius Schmidt in Olmütz	1856	2095	7899
VI	Dr. C.Bremiker in Berlin	1853	2559	
VII	Sigmund Fellöcker zu Kremsmünster	1848	2373	3126
VIII	Prof. Schwerd in Speyer	1833	2045	
IX	Dr. C.Bremiker in Berlin	1858	1599	
X	Prof. Göbel in Colburg	1830	1680	
XI	Prof. v Boguslawskiin Breslau	1852	1304	
XII	von Steinheil in München	1834	1286	1180
XIII	Dr. C.Bremiker in Berlin	1843	1370	
XIV	Rev. Hussey in Chiselhurst	1831	1445	
XV	Prof. Harding in Göttingen	1830	1557	
XVI	Dr. Wolfers in Berlin	1843	1422	
XVII	Dr. C.Bremiker in Berlin	1840	1640	
XVIII	Inghirami in Florenz & Capocci zu Neapel	1831	2036	
XIX	Dr. Wolfers in Berlin	1840	1970	
XX	Dr. Hencke in Dresden	1852	1847	
XXI	Dr. C.Bremiker in Berlin	1845	1644	
XXII	Prof. Fr. Argelander in Åbo	1832	1436	65
XXIII	Prof. Harding in Göttingen	1834	1500	

soon as finished, the first in 1830. Most contributors confined themselves to the catalogued stars, only four made supplementary observations of fainter stars with a 'Glasmikrometer' invented by Steinheil.

3. Glasmikrometer

The Glasmikrometer was mounted on a telescope of 75 mm aperture with magnification 15× and field 4°. A smaller objective of 20 mm aperture and 163 mm. focal length re-imaged a square target, calibrated in units of 0′.1, into the field of the larger telescope.

4. Completion

Bessel died in 1846 and the project was not completed until 1859. The introduction to the final catalogue is signed by Encke and Dove (Harnack 1900). The precision of the published catalogue is a second of time in Right Ascension and a tenth of an arc minute in declination. A reduction of all Bessel's zones within 15° of the equator to their original precision of a hundredth of a second of time in Right Ascension and a tenth of a second in declination was published by Weisse (1846).

5. Extant Copies

5.1. Royal Astronomical Society

The Royal Astronomical Society Library has both atlas and catalogue which have been the primary source for this article.

5.2. Royal Observatory, Greenwich

The Royal Observatory Greenwich have an atlas, which lacks the title page, but no catalogue.

5.3. Crawford Library. Edinburgh

The Catalogue of the Crawford Library in Edinburgh lists two copies of the atlas but makes no mention of the catalogue.

5.4. United States Naval Observatory

The USNO Library Catalogue lists one copy of the chart and one of the catalogue.

5.5. Dunsink

There is a partial set of the charts unbound at Dunsink.

5.6. Request for Information

Information about other extant copies would be most gratefully received.

6. Unsuccessful Searches

6.1. Cambridge Observatory Library

Cambridge Observatory Library is well maintained and catalogued and no trace of either chart or catalogue can be found. There are, however, copies of Harding's Atlas (both 1822 and 1856 editions), Bishop's Ecliptic Atlas (1848, in fact observed by Hind) and the unfinished Ecliptic Atlas begun by Charconac and continued by the Henry brothers.

6.2. Cambridge University Library

Searches of the catalogue under several plausible keywords reveal no mention of the Berlin Star Atlas. This does not preclude its being catalogued under some untried keyword.

7. The discovery of Neptune

Leverrier wrote to Galle in Berlin asking him to search for his predicted planet, later named Neptune. d'Arrest, a junior colleague, volunteered to help in the search and suggested the use of Hora XXI of the Berlin Star Chart which had recently been completed by Bremiker but was still awaiting distribution. This sheet was based purely on catalogued stars with no further faint stars. Galle was initially reluctant because he had earlier been dissatisfied with Harding's (1822) star atlas. Once Galle and d'Arrest agreed to use the atlas, they discovered the new planet shortly afterwards.

It is generally believed that the lack of the Star Atlas in Cambridge prevented Challis from finding Neptune.

8. Significance of the Atlas

The project is an early paradigm of international co-operation. It led to the 'Bonner Durchmusterung' of Argelander, who was himself a contributor to the Akademische Sternkarten. The 19th century concept of a 'Durchmusterung' led to the 20th century concept of a 'flux-limited sample'.

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