



[And say: My Lord! Increase me in Knowledge.—Qur'an]

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THE RASA'IL OF BIRUNI AND IBN SINAN¹

A REARRANGEMENT

A. S. SAIDAN *

THIS is an attempt to identify and rearrange what seems to be intrusive pages in two of the Hyderabad publications of Da'ira-tal Ma'arif,² viz. *Rasa'il al-Biruni* and *Rasa'il Ibn Sinan*. The former is supposed to contain four tracts based on Bankipore's compendium of Mss; but more than half of the first tract is not connected with it, and a considerable portion of the second tract is missing. The latter is said to contain six tracts; but the third and the sixth are so much intruded that it is difficult to study them with much success. My attempt here will bring the number of tracts in the two collections to five and seven tracts substantially complete, as much as possible, and without intrusions. I base my study, however, on the contents as published; and, although some of my findings are to all appearances beyond doubt, yet others are only plausible conjectures. A better informed researcher, with access to the original Mss., may check my conclusions on pagination, hand, paper, and the like, and put me right.

I. BIRUNI'S BOOK ON THE EXTRACTION OF CHORDS

If the substance here from page 108 line 9 to page 224 fig. 119 is removed, the said book remains complete with probably a few lines, between the two sections so formed, missing. Happily, the missing lines can be easily interpolated.

II The removed pages of the above book should be divided into the following sections.

- S1 :- Page 108, lines 9-14.
- S2 :- Page 108, line 15, to page 138, first four words in the first line.
- S3 :- Page 138 (remainder) to page 153 middle of the last line.
- S4 :- Page 153 (remainder) to page 180 mid-line 15. To this must be added figs. 98 and 99. The latter is probably part of fig. 87.
- S5 :- Page 180 (remainder) to page 184 first word in the last line.
- S6 :- Page 184 (remainder) to page 206 line 10.
- S7 :- Page 206 (remainder) to page 209 mid-line 10, excluding fig. 111.
- S8 :- Page 209 (remainder) to page 214 end of line 10.
- S9 :- Page 214 (remainder) to page 219 mid-line 16.

1. Ibrahim-b-Sinan-b-Thabit-b-Qurra (d. 335 H.)

2. Published by Da'ira in 1948.

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S10 :- Page 219 (remainder) to page 223 excluding fig. 116.

S11 :- Page 224, fig. 117.

III. A NEW BOOK BY BIRUNI

I refer here to the book studied by Kennedy and Muruwwa in their article "Biruni on the Solar Equation" in the "Journal of Middle Eastern Studies," Vol. XVII, No. 2, 1958. It is probably the book called "*Hidayat al-'Arifin*," "*Al-Tahlil lil-Taqtī Wal-Ta'dil*." S2, 4, 7, 10 contain the so-far extant matter of this book. If these pages are arranged as S10, 7, 2, 4, the subject becomes continuous, and the material appears to be lacking only a small part of the introduction but much of the last (fourth) chapter.

IV. BIRUNI'S BOOK ON SHADOWS (TANGENTS)

This is the second in Hyderabad's collection. As it stands, it is lacking several chapters, as pointed out in the middle of page 5. The missing part stands in full in Ibn Sinan's "*fi Harakat el Shams*", from page 34 line 8 last two words to page 63 line 4 first two words. This fits in the place pointed out on page 5 and makes this book of Biruni's complete. Happily, Professor Kennedy, who is translating this book into English, has been informed of this finding, and consequently his translation will appear complete.

V. IBN SINAN'S RISALA "*FIL-HANDASA WA'ILM EL-NUJUM*"

Take the Risala under this name from the beginning to page 5 mid-line 7. Then add to it the part of Ibn Sinan's "*fi Harakat al-Shams*" from page 63, remaining part, to the end (page 70). These together give a small, but complete, *risala* in which Ibn Sinan describes the books already written by him on Geometry and Astronomy. It is probably the book that appears in Brockelmann under the name "*Wasf al-Ma'qud al-Mustakhrai fil-Handasa wa 'Ilm al-Nujum*."

VI. IBN SINAN'S "*FI HARAKAT EL-SHAMS*"

The above shows that, as it stands, this *risala* contains a mixture of disconnected material. But if one takes the book under this name up to the remaining part of page 34 and adds to it S8 in II above, excluding fig. 113, which should follow No. III, one will obtain a continuous discussion which is the only part here extant of this book.

VII. IBN SINAN'S SELECTED PROBLEMS

The remaining sections listed in II above, except S5, and the rest of the book published under the name "*fil Handasa wa 'Ilm al-Nujum*" are geometrical problems by Ibn Sinan. These are most probably the 41 problems which in V above he mentions under the name "*al Masa'il al Mukhtara*." A possible arrangement of their material is in the order: S9, 6, 1, 3, followed by the quoted part of "*fil-Handasa wa 'Ilm al-Nujum*." But S6 must be rearranged so that pages 201-206 should precede pages 184-201.

Apparently, this part of the MSS. has suffered great mishandling. For the figures also do not stand in their proper places. The reader must study

the problem and search for the figure that suits it. Here is a rough attempt to reallocate some of the figures :

Figs:- 117, 109, 111 (R. H. Part), 111 (L. H. Part), 105
to appear on pages :- 215, 218, 202, 204, 200.

VIII. STRAY MATERIAL

S₅, in II above is the remaining section that is not reallocated yet. Its substance seems to be of the type of the Islamic attempts at non-Euclidean Geometry that were dealt with by many geometricians and culminated by Nasir al-Din al-Tusi in his "*al-Risala al-shafia*." It may be difficult to identify these few papers before more of Bankipore's MSS. are published ; but as first approximation, my thoughts go towards Ibn al-Haitham.