I have used the great Equatorial about thirty-five times during the year. My thanks are due to you as Director, and to Messrs. Searle, Rogers, and Peirce, Assistants, for aid and counsel in my work.

Respectfully yours,

N. S. SHALER.

PROFESSOR WINLOCK, Director of the Observatory, Harvard University.

During the three years following 1871, the Equatorial was mainly employed in obtaining numerous drawings, made by Mr. L. Trouvelot, and exhibiting the results of observations made by himself, as well as by Professor Winlock, upon the appearance of various celestial objects. From these drawings were selected, to be engraved and issued to subscribers, those forming the greater part of the series known as the "Astronomical Engravings from the Observatory of Harvard College." To provide materials for another part of the series, the large solar spectroscope was attached to the West Equatorial, in the manner already described, so that it could readily be turned aside in order to allow the telescope to be used in examining the disk of the sun, by projection or otherwise. Besides many other sketches of solar spots and prominences made during 1872, 1873, and 1874, there are now preserved at the Observatory 947 drawings of the disk of the sun, exhibiting the position and form, from day to day, of its spots, and often of its prominences, with notes by the observer, Mr. Trouvelot: the series includes 235 drawings made by him at Medford, before his connection with the Observatory. The notes have been translated (the originals being in French), and have been copied into books.

So far as any of these sketches have been published, they appear in the second part of this volume, where will be found additional information respecting the nature and origin of the "Astronomical Engravings," no further account of which seems to be required in this place. The annexed chart of stars in the Trifid Nebula (Plate X., p. 54) exhibits the manner in which the forms of the nebulæ represented in the Astronomical Engravings were determined. A plate of glass was ruled with lines corresponding to those shown in the chart, and placed in the focus of the telescope. With the positive eye-piece (power 103) used by Mr. Trouvelot in making this chart, each side of each of the smallest squares formed by the ruled lines corresponds to 65″.1. The chart represents the view given by an ordinary astronomical refracting telescope, so that the lower side (or that where the title is printed) is the northern, and the left side the preceding. There is a figure of the nebula by Sir J. F. W. Herschel in his "Results of Observations made at the Cape of Good Hope," and pages 10 and 11 of that work contain an account of the observations from which the figure was derived. They were probably not sufficiently precise to warrant any conclusions with regard to

the relative proper motions of the stars in the nebula up to 1874, the date of Mr. Trouvelot's chart.

The East Transit Circle was in frequent use until the mounting of the Meridian Circle in 1870. Besides the ordinary observations for determining clock errors, a series of transits was taken, chiefly in 1867 and 1868, for the purpose of facilitating determinations of longitude; the stars selected for observation ranging from 70° north to 30° south declination, and following each other at intervals of about two minutes. The superior claims to publication of the work since done with the Meridian Circle leave no funds available for publishing the original observations made as just stated: their results are given in the tenth volume of this series.

After the mounting of the Meridian Circle, it was kept in more constant employment than any other instrument belonging to the Observatory. As the observations made with it will occupy a large part of some future volumes of these "Annals," no detailed account of them can here be necessary. The stars observed are, first, those between 50° and 55° north declination (as a part of the well-known revision of the "Durchmusterung," undertaken jointly by many observatories); secondly, the stars of a General Catalogue, identical to a great extent with the catalogue previously observed with the East Transit Circle; and, thirdly, the stars of a Polar Catalogue, drawn up for the purpose of supplying additional means for the determination of instrumental error in transit observations.

Observations for longitude, in co-operation with the United States Coast Survey, have also, as in previous years, formed part of the work of the Observatory. Among these observations may be mentioned those made in 1867, when telegraphic signals were exchanged between Cambridge, Washington, and Albany; those made in February and March, 1869, the stations, besides that at the Observatory, being at Omaha, Salt Lake City, San Francisco, Allegheny, and Ann Arbor; those made between December 13, 1869, and February 20, 1870, for determining differences of longitude between the Observatory, Duxbury, Brest, in France, and Hanover, N. H.; and those made in the summer of 1872, the purpose of which, like that of the preceding series, was to redetermine the difference of longitude between America and Europe. The results of these operations will be found in the volumes published by the United States Coast Survey.

During the longitude work of February and March, 1869, some of the experiments by which the time of transmission of the telegraphic signals was determined, were made with an apparatus planned by Professor Winlock, and described as follows in his report. It "consisted of a pendulum held from a vertical position at the extremity

Woodburytype Print.

CENTRAL PART OF THE NEBULA IN ORION.

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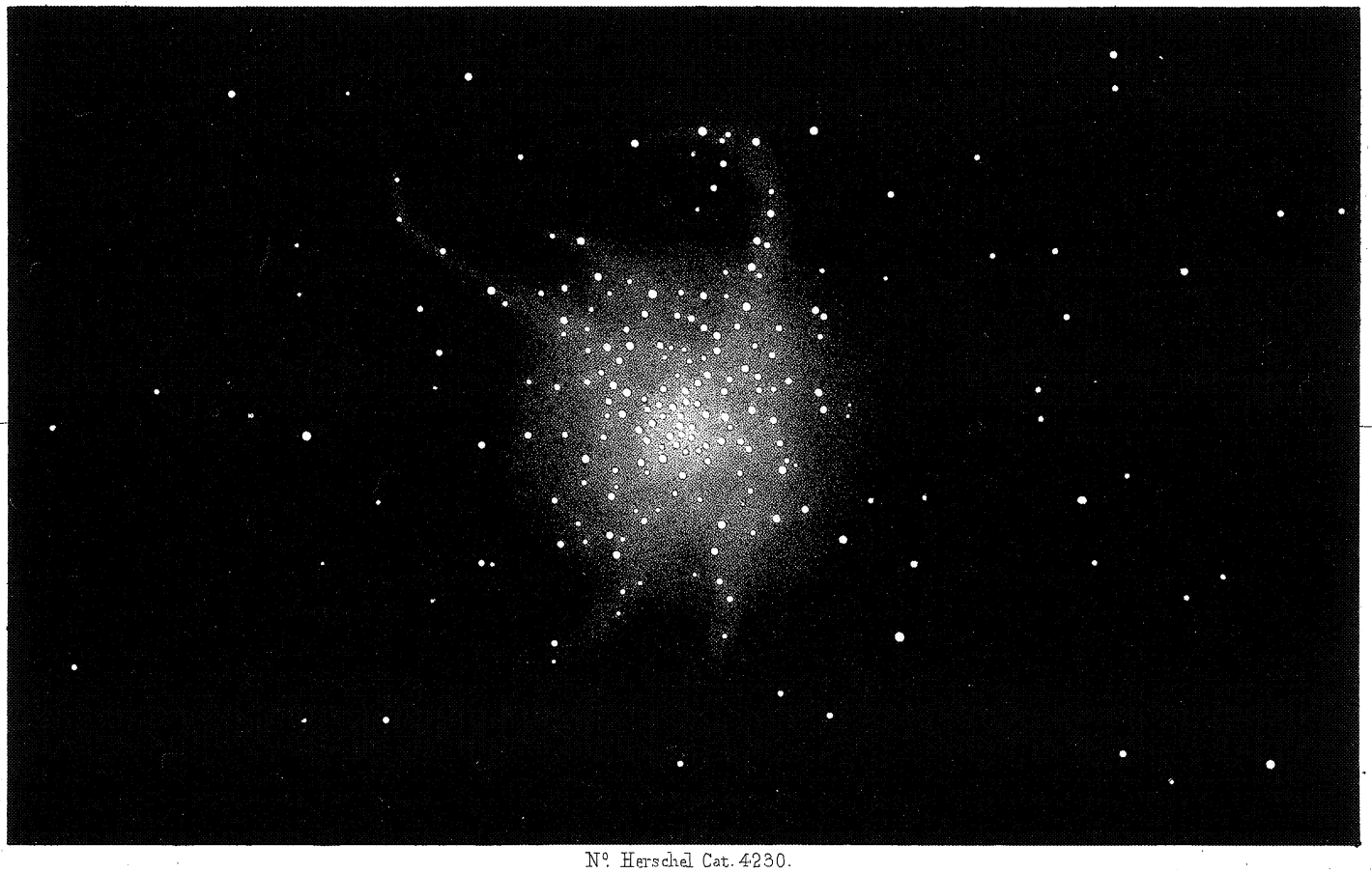

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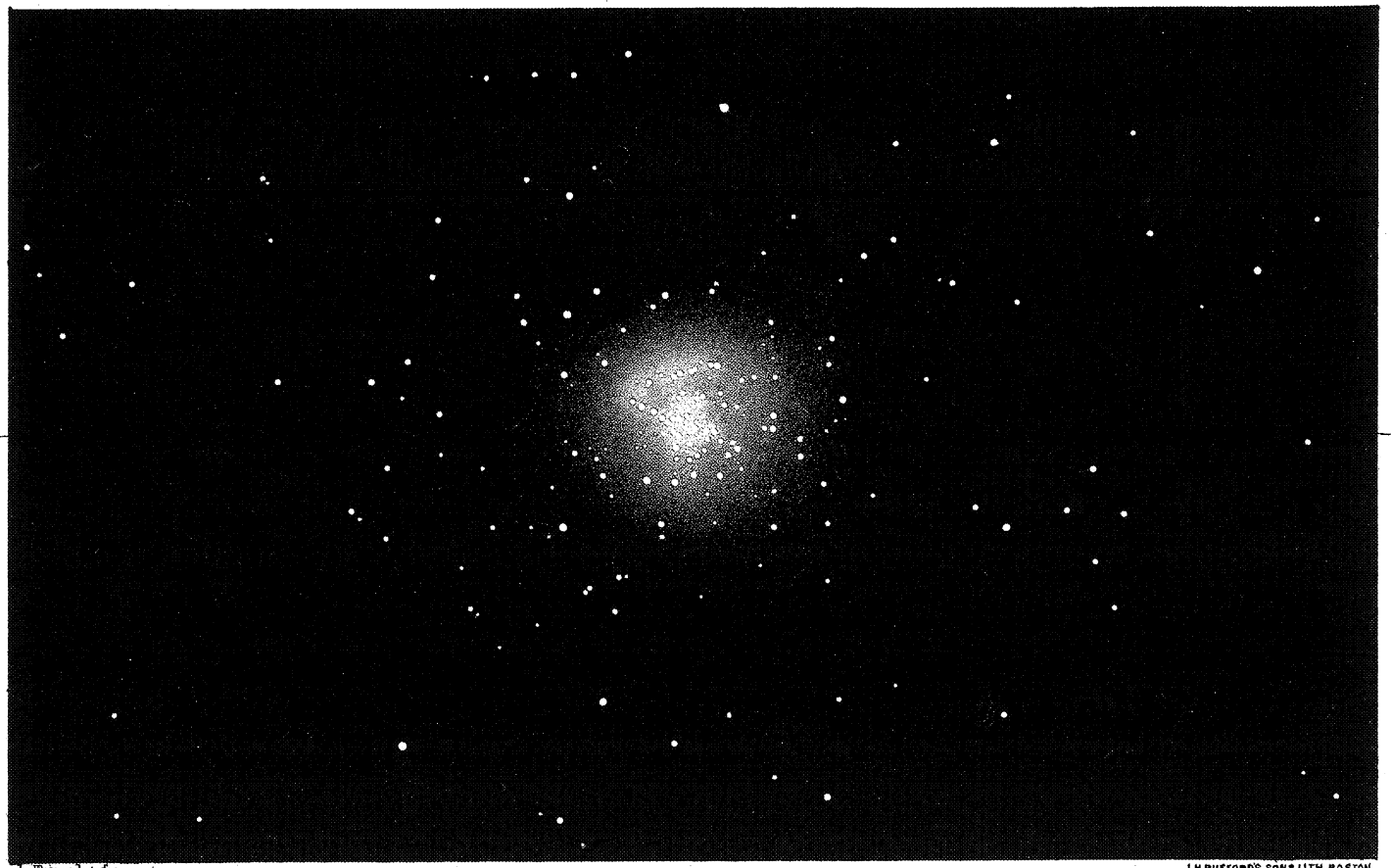

L. Trouvelot, from nat.

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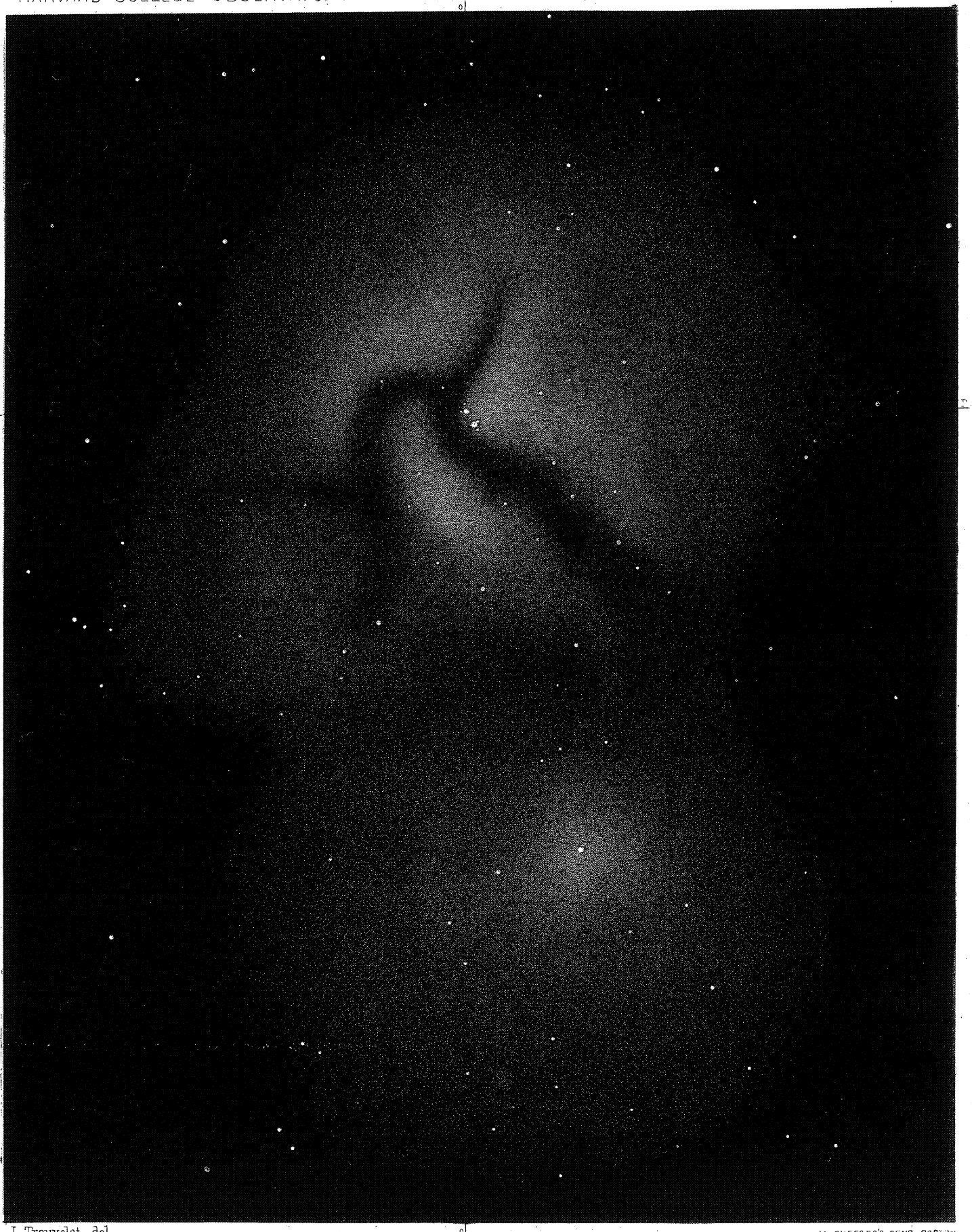
THE NEBULA IN ORION.



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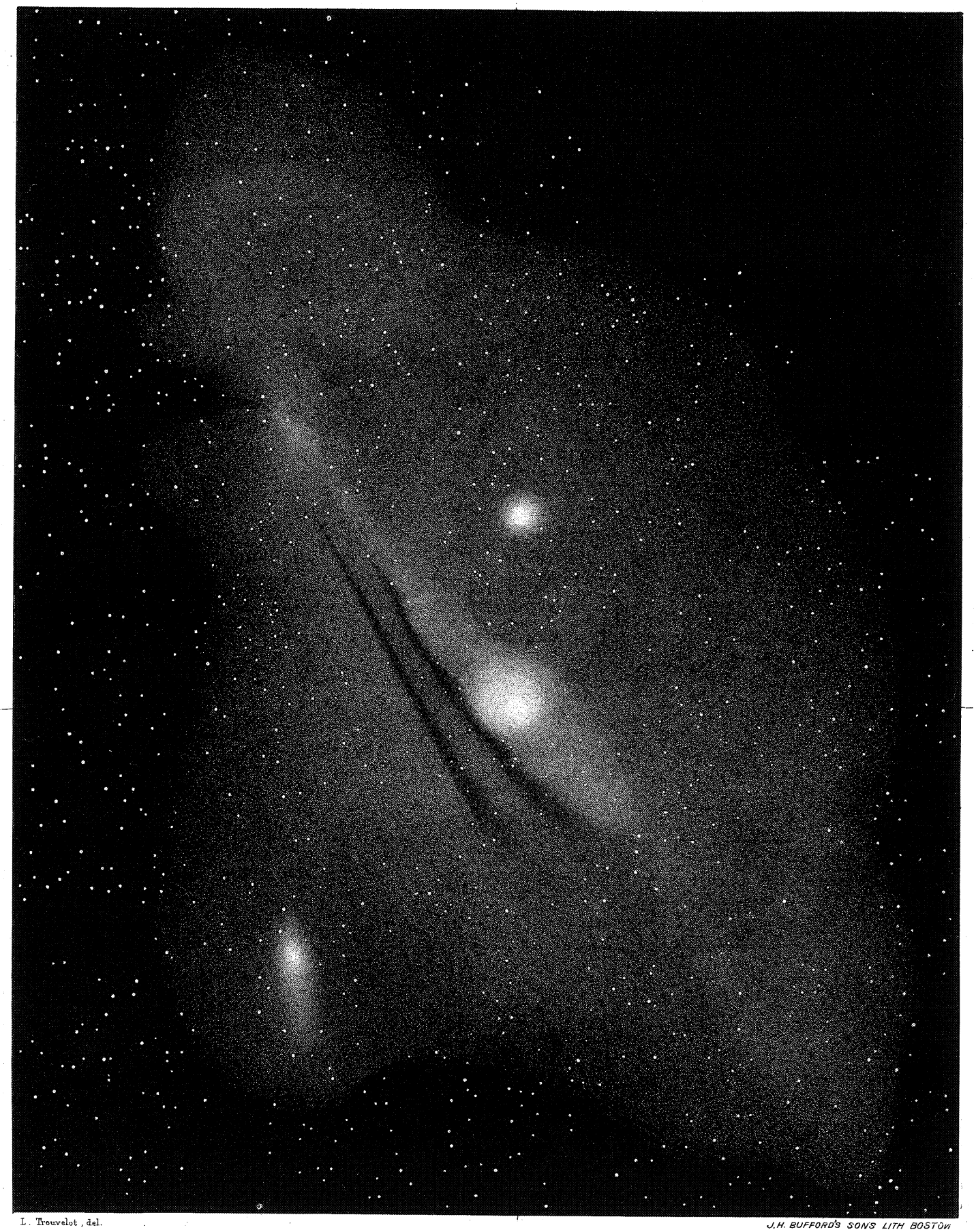
TRIFID NEBULA



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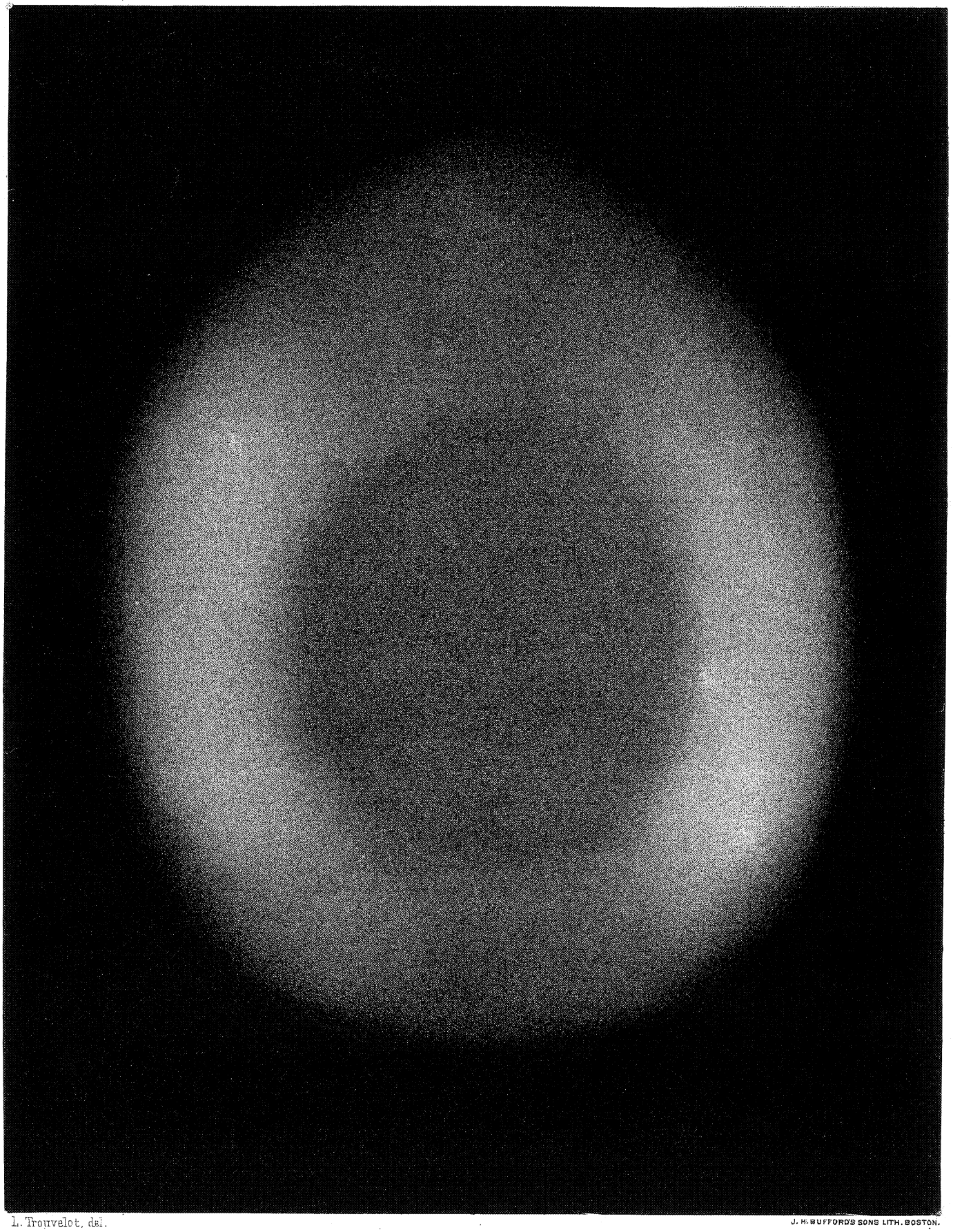
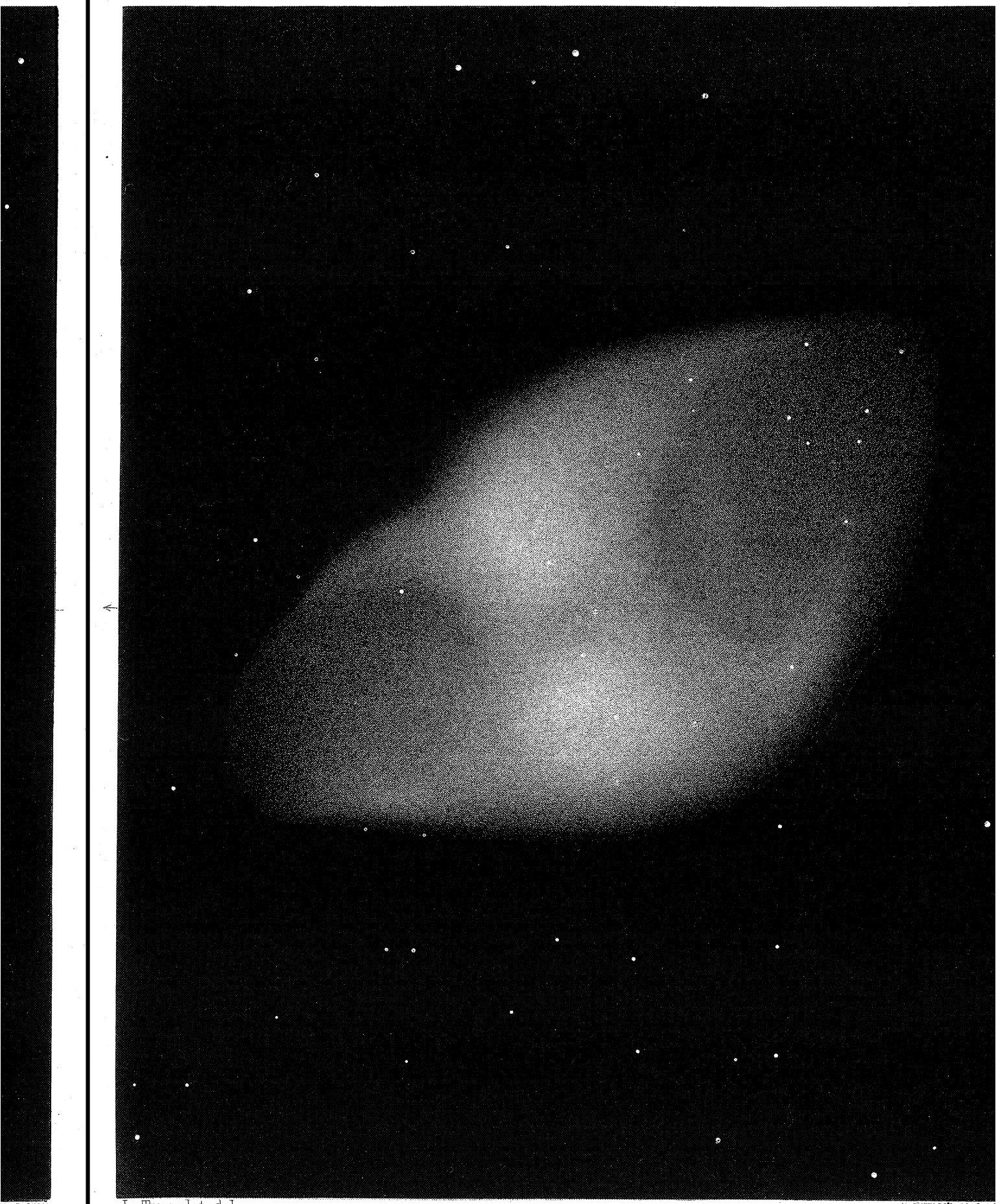
THE ANDROMEDA NEBULA.



L. Trouvelot, del. J. H. BUFFORD'S SONS LITH. BOSTON.

THE RING NEBULA IN LYRA.



L. Trouvelot, del.

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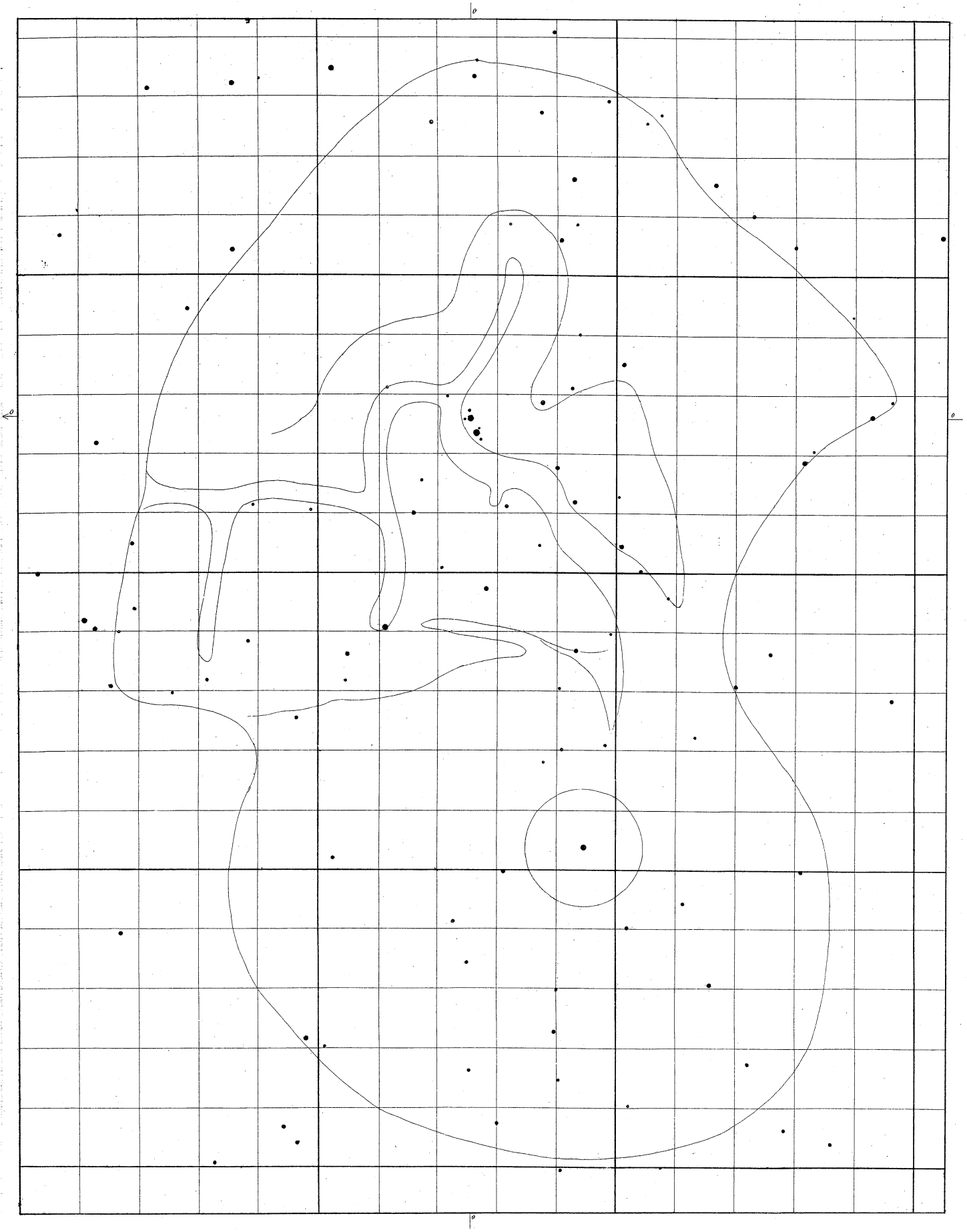
TH BOSTON

THE DUMB BELL NEBULA.

N° 4532 of J. Herschel's General Catalogue.



STARS IN THE TRIFID NEBULA.