

burg, on May 17, and was observed by Messier and Maraldi at Paris until July 2. When first seen it was just visible to the naked eye. The interval between the perihelion passages is 114.91 years, and with such period of revolution, with the other elements of 1762, the descending node would fall about 0.27 from the orbit of Mars and the ascending node at a radius-vector of 3.35, or in the region occupied by the minor planets; thus the difference of inclination will not be easily explained on the supposition of identity of the comets, though it must be remarked that elements of the present comet founded upon the first few days' observations may be open to more sensible correction than is usually the case.

"THE OBSERVATORY, A MONTHLY REVIEW OF ASTRONOMY."—There is ample room for the new astronomical periodical, which has been launched by Mr. Christie, the First Assistant of the Royal Observatory, Greenwich, under the above title, during the last week. Its aim is to present in a popular form a general survey of the progress of astronomy and to afford early intimation of recent advances. Such a publication ought to be well supported in this country, where astronomical amateurs are in great force. The first number holds out good augury for the future; amongst the contents are a report of the proceedings at the last meeting of the Royal Astronomical Society, proceedings which are not detailed in the *Monthly Notices*, where the discussions following the reading of papers are, as a rule, ignored, but which, as everyone knows who has been in the habit of attending the meetings of our scientific societies, are frequently the most interesting feature in the evening's proceedings; and we hope this point will not be lost sight of in the new periodical. There is an article on the photographic spectra of stars, a subject known to have lately much occupied the attention of the president, by whom it is furnished; the first part of a contribution from Mr. Gill, on the determination of the solar parallax; remarks on the nebular hypothesis, by Mr. Darwin, being an account of an inquiry intended to suggest a cause which may fill up a hiatus in the theory, and an outline of the results of Dr. von Asten's [researches on the motion of Encke's Comet, recently communicated to the St. Petersburg Academy; also, ephemerides for physical observations of the moon and of Jupiter, by Mr. Marth, whose assistance in this direction deserves the high appreciation of observers. We will further express the hope that accuracy of typography may characterise the future numbers of Mr. Christie's publication; it is most important that this should be the case if the confidence of the practical astronomer is to be secured for it, and we are induced to offer this suggestion from remarking one or two inaccuracies in the first number, as on p. 4, where the search for an intra-mercurial planet by the Rev. S. J. Perry is dated in April instead of in March, and on p. 27, where Mr. Swift's discovery of the comet subsequently found by M. Borrelly, is erroneously referred to April 5, which was the date of discovery of the previous comet.

THE NEBULÆ—WHAT ARE THEY?¹

BEFORE the announcement of Mr. Huggins's discovery of the presence of bright lines in the spectra of nebulæ, it was generally, if not universally, accepted as a fact that nebulæ were merely stellar clusters irresolvable on account of their great distances from us. This view had become impressed on the minds of many of our greatest observing astronomers in the progress of their work, and is one therefore which should not lightly be abandoned.

It appears to me that Mr. Huggins's observations instead of being inconsistent with the view formerly held by astronomers, are rather confirmatory of the correctness of that view.

¹ On a Cause for the Appearance of Bright Lines in the Spectra of Irresolvable Star Clusters. Paper read at the Royal Society by E. J. Stone, M.A., F.R.S., Her Majesty's Astronomer, Cape of Good Hope.

The sun is known to be surrounded by a gaseous envelope of very considerable extent. Similar envelopes must surround the stars generally. Conceive a close stellar cluster. Each star, if isolated, would be surrounded by its own gaseous envelope. These gaseous envelopes might, in the case of a cluster, form over the whole, or a part of the cluster, a continuous mass of gas. So long as such a cluster was within a certain distance from us the light from the stellar masses would predominate over that of the gaseous envelopes. The spectrum would therefore be an ordinary stellar spectrum. Suppose such a cluster to be removed further and further from us, the light from each star would be diminished in the proportion of the inverse square of the distance; but such would not be the case with the light from the enveloping surface formed by the gaseous envelopes. The light from this envelope received on a slit in the focus of an object-glass would be sensibly constant because the contributing area would be increased in the same proportion that the light received from each part is diminished. The result would be that at some definite distance, and all greater distances, the preponderating light received from such a cluster would be derived from the gaseous envelopes and not from the isolated stellar masses. The spectrum of the cluster would therefore become a linear one, like that from the gaseous surroundings of our own sun. The linear spectrum might, of course, under certain circumstances, be seen mixed up with a feeble continuous spectrum from the light of the stars themselves.

It should be noticed that, in this view of the subject, the linear spectrum can only appear when the resolvability of the cluster is at least injuriously affected by the light of the gaseous envelopes, becoming sensibly proportional to that from the stellar masses, and that in the great majority of such cases it would only be in the light from the irresolvable portions of the cluster that bright lines could be seen in the spectrum.

The changes in form which would be presented to us by such a nebula might be expected to be small. These changes would depend chiefly upon changes in the distribution of the stellar masses constituting the cluster. It has always appeared to me difficult to realise the conditions under which isolated irregular masses of gas, presenting to us sharp angular points, could exist uncontrolled by any central gravitational mass without showing larger changes in form than appear to have been the case with many of the nebule. In my view of the nature of nebulæ this difficulty no longer exists.

THE RACES AND TRIBES OF THE CHAD BASIN

ON this subject a most valuable paper has been contributed to the last number of the *Zeitschrift der Gesellschaft für Erdkunde* by Dr. G. Nachtigal, one of the few living writers entitled to speak with authority on the ethnography of Sudan. While the great problems now being rapidly solved in the portion of Africa lying south of the equator are almost exclusively of a strictly geographical nature, those still awaiting solution in the northern half of the Continent are on the contrary mainly of an ethnological character. The reason of this pointed difference is very obvious. Although there are vast regions south of the line still unexplored, enough is already known to warrant the conclusion that what remains to be there discovered is peopled by the same great race holding almost exclusive possession of the parts already opened up by the spirit of modern enterprise. With the sole exception of the extreme south-western corner, occupied by the Namaqua and Cape Hottentots, and of some districts also in the south still haunted by a few straggling Bushman tribes, the whole of Africa from the equator southwards would seem to be the domain of what is now conventionally known to philologists as the Bantu