

OUR ASTRONOMICAL COLUMN.

ORIGIN OF THE LUNAR FORMATIONS.—The experiments by which Scrope attempted to reproduce the characteristic features of the moon's surface have been repeated with slight modifications by M. Stanislas Meunier, and the results which he has obtained are certainly very suggestive, if, indeed, they do not furnish the key to the origin of the various formations which the moon presents to us. (*Comptes rendus*, January 28.) Plaster is mixed with water in which a little glue has been dissolved to prevent too rapid setting, and the mixture is heated in a frying-pan over a gas-burner until ebullition commences; the gas is suddenly turned off at an opportune moment, and the mass is left to cool undisturbed. Experimenting in this way, and by varying the consistency of the paste, M. Meunier has obtained many features besides the intermingling circular cavities produced by Scrope. The central peaks which are so frequently noticed in lunar craters are reproduced perfectly, being formed at exactly the same time as the circular borders, and even resembling their lunar prototypes in being generally somewhat lower than the edges of the craters. Further, the artificial craters tend to form in groups of two or three, or even more, and sometimes one ring will envelope several; some parts may be covered with cavities, with or without central peaks, and relatively large smooth areas at once recall the lunar "seas." If the experiment be carried on until nearly the whole of the water is evaporated, fissures also make their appearance.

By covering the paste with fine grey sand at the moment it begins to boil, the results are said to be still more striking, and better adapted for photography.

M. Meunier expresses the opinion that the moon has failed to pass through all the planetary stages, in consequence of the original relative scarcity of fluids, and he believes this conception to be confirmed to some extent by another modification of the experiment, in which the paste is covered with a rather thick layer of sand, representing the rocks forming the earth's epidermis; the "volcanic" manifestations then change character, and more nearly approach terrestrial types.

γ CASSIOPEIÆ.—This star has always possessed a special interest to spectroscopic observers since the discovery of bright lines in its spectrum by Secchi. Continued observations seemed to suggest a periodicity in the visibility of the bright lines, but this question can now be attacked more completely by the photographic method. Fifty-three photographs, extending over a period of six years, have been taken at South Kensington, and a first examination of the negatives has led to several important conclusions (*Roy. Soc. Proc.* vol. lvii, p. 173). The lines of hydrogen were constantly bright in the period covered by the photographs, and other bright lines were also seen in all good photographs. Further, the lines of hydrogen are double in all the photographs taken with sufficient dispersion, and the distance between the components is constant within the limits of error in measurement. Other conclusions are that the bright lines of hydrogen are superposed on broad dark bands, and that there are also other ill-defined dark lines in various parts of the spectrum; these dark lines correspond very closely with the lines seen in the spectra of ζ Orionis and Bellatrix. "This at once contradicts Prof. Scheiner's recent statement that he does not believe it possible that dark lines can exist in the spectrum." Dark lines have also been observed and photographed by Keeler.

It will be seen that the spectrum presents numerous peculiarities, and an explanation of the physical condition of the star or stars which produce the different appearances is by no means simple.

THE IDENTITY OF DENNING'S AND BRORSÉN'S COMETS.—It was pointed out in the *Astronomische Nachrichten*, No. 3271, that the orbits of the comet 1894 I (Denning), and Brorsén's comet, intersect in heliocentric longitude 285°, and that early in 1881 the two objects must have been close to one another near the point of intersection (see NATURE, January 24, p. 302). The elements used for the comparison were, in the case of Denning's comet, due to M. Schulhof. This computer gives new elements for the comet, in *Astr. Nachr.* No. 3276, and expresses an opinion upon the suggested connection. He thinks that the elements compared, with the exception of inclination, certainly present some points of resemblance. More important, perhaps, is the fact that the point of intersection of the two orbits is nearly their point of nearest approach to the orbit of Jupiter.

Applying M. Tisserand's criterion for the connection between two orbits, the value 0.47 was found for Brorsén's comet, and 0.50 for Denning's. It is therefore concluded that the two comets formed at one time a single body, and that after their separation their orbits were more and more modified by Jupiter.

THE ANTITOXIC SERUM TREATMENT OF DIPHTHERIA.¹

II.

The Treatment.

ASSUMING now that the antitoxic serum is available, how is it to be used? It has been strongly recommended that it should be used not only as a curative or direct therapeutic agent, but that it should also be used as a prophylactic—that is, as a protective agent against possible infection, especially during those periods when diphtheria is rife. It is almost too soon to consider this prophylactic property of antitoxic serum, as for some time to come the energy of those engaged in the preparation and use of this serum must be directed towards obtaining a sufficient supply for the treatment of cases of developed diphtheria.

Results of this Method of Treatment.

It may be well to consider what have been the results obtained up to the present, and for this purpose the statistical method will probably carry most conviction, especially if it is possible to give full and accurate detail; and now that these statistics have been criticised not only by those who have used this treatment, but also by those who oppose it because it runs counter to their feelings and ideas, they are every day more and more trustworthy, much fuller, and more valuable.

It is first necessary to determine the average case mortality in diphtheria for some considerable period before the antitoxic treatment was introduced; then to see what has been the lowest case mortality during an equal and similar period for which we have any statistics; and lastly, to compare these with the case mortality of the period during which the antitoxic serum has been used.

In Table I. are given the mean annual death rates from diphtheria per million living in England and Wales and in London, in four periods of three years each.

TABLE I.

	1881-3	1884-6	1887-9	1890-2
England and Wales ...	144	166	173	192
London ...	213	227	315	377

Dr. Sykes gives the following statistics:—During the year 1892 there were 1962 deaths from diphtheria in London, whilst in 1893 there were 3265, or nearly twice as many deaths.

Now let us see what has been the case mortality. Statistics after correction give the following results. During 1893 there were 13,694 cases of diphtheria notified in London. The mortality amongst these cases was 3195 (*Lancet* statistics corrected), or 23.3 per cent.

Table II. gives further information, and enables us to see what is the diphtheria case mortality in large well-found hospitals.

TABLE II.—Metropolitan Asylums Board: Admissions and Case Mortality, Diphtheria, 1888-93.

Year.	No. of admissions.	No. of deaths.	Percentage of case mortality.
1888 ...	99	46	46.4
1889 ...	722	275	38.0
1890 ...	942	316	33.5
1891 ...	1312	397	30.2
1892 ...	2009	583	29.0
1893 ...	2848	865	30.3

Note.—Diphtheria cases have only been admitted into the Hospitals since October 23, 1888.

In Table III. are given statistics dealing with the diphtheria case mortality where the serum treatment has been used. Wherever possible, the case mortality over a considerable period is given in the last column of the table, for purposes of comparison.

¹ A lecture delivered at the Royal Institution, on Friday, February 8 by Dr. G. Sims Woodhead. (Continued from page 406.)