

to have been bright enough to be well seen in the comparatively small telescope used in the formation of the chart (aperture 3.8 inches); this would be at the epoch 1840 ±. On March 7, 1856, Winnecke found it pretty bright with the Berlin refractor. D'Arrest, on February 19, 1863, noted a considerable diminution of brightness: "Hodie aperte non supra tertiam classem," and he adds: "Locum hæc nebula non mutat, an lucem?" On April 10, 1878, it had again brightened, Winnecke recording: "Bei hellem Mond, deutlich gesehen, gewiss I. Classe." On March 21, 1879, he considered it "wohl nicht I., aber gut II. Classe." This nebula is of the elongated class, the direction of elongation not very far from the parallel; the longest diameter about 1½'. It is evidently well deserving of continuous observation.

Prof. Julius Schmidt directed attention in 1862 to another very suspicious case in the same quarter of the heavens. The object to which he refers in his communication to the *Astronomische Nachrichten* appears to be H. IV. 4, though he does not mention the identity. Sir W. Herschel, observing on February 22, 1874, describes it as "extremely faint, small, like a star with a very faint brush s.p.; 240 shows the star." It will be remembered that Sir W. Herschel's fourth class included "stars with burs, with milky chevelure, with short rays, remarkable shapes, &c." Sir John Herschel's description on April 13, 1828, does not differ from his father's; he calls it a "star 13'14 m., with a faint, small, nebulous brush." In the General Catalogue, where it is No. 2403, it is noted "very faint, small; attached to a star 13 m." Prof. Schmidt commences his note upon the probable variability of this object by remarking that it is found upon Chart No. 6 of the Bonn Durchmusterung, and must have been seen in the zone-telescope, a Fraunhofer comet-seeker of three inches aperture and two feet focus; it is No. 2436 at p. 24 in vol. iii. of the Bonn Observations. At the date of his communication (1862, March 29) he says: "This nebula is at the limit of visibility for the Athens refractor." He determined the position of the nebula and of two small neighbouring stars by reference to Weisse No. 315, with the following results for 1855.0:—

	h.	m.	s.			
Nebula R.A.	11	16	22.6...	Decl.	- 0	18 36
						} Light of nucleus =
						13 m.
x	...	11	16	28.1...	..	- 0 21 59... 12'13
y	...	11	16	42.5...	..	- 0 20 34... 11'12

The Bonn position reduced to the same epoch gives R.A. 11h. 16m. 28.8s., Decl. - 0° 21' 8", agreeing almost precisely with Schmidt's small star x. There may be a suspicion, therefore, that the place of greatest condensation of the nebulosity changes, as would appear to be the case with the first variable nebula in Taurus, discovered by Mr. Hind in 1852, according to M. Otto Struve's observations at Pulkowa. These objects require, and certainly merit, very close observation with adequate instruments.

TOTAL SOLAR ECLIPSES IN THE NEXT DECADE.—The report of the observation of an intra-Mercurial planet, during the total eclipse of the sun on the 11th inst., from one of the higher mountains in California (which, however, at the time we write, has not received the confirmation that might have been expected), naturally directs attention to the similar opportunities for observation of such a body that are approaching, and we may briefly particularise the circumstances under which the total eclipses of the sun, within the next ten years, will take place. The first is the eclipse of 1882, May 17, where the central line passes over Egypt, not far from Luxor, near Teheran, and so across Asia to Shanghai; the greatest duration of totality is 1m. 48s., but at the most accessible stations will not exceed 1m. 15s.; maps exhibiting the general features of this eclipse are already published in the *Nautical Almanac* and the *American Ephemeris*. Then follows the eclipse of 1883, May 6, in which the course of the central line is wholly on the Pacific Ocean, avoiding apparently, with the exception of the Marquesas, the inhabited islands. From the Admiralty chart of this group, it seems that the total phase may be observable at Chanel Island, where it will commence about oh. 42m. local time, continuing 2m. 52s. The eclipse of 1885, September 9, may be well observed in New Zealand, where the sun will have risen to an altitude of fifteen or sixteen degrees, the duration of totality on the central line in the longitude of Wellington being 1m. 54s. Next follows the great eclipse of 1886, August 29, a recurrence of that of 1865, August 17, which was observed in India. Unfortunately in this case we have again an ocean track for the belt of totality, except

near the beginning and ending of its course; at the southern extremity of the Island of Grenada the sun will be hidden for 3m. 15s., while at an altitude of about 20°; but in about 14° 13' west of Greenwich, and latitude 2° 58' N., where the sun is centrally eclipsed on the meridian, totality will continue for nearly 6m. 30s., and it may be expected that efforts will be made to secure in this part of the Atlantic, at least such observations as bear upon the existence of an intra-Mercurial planet or planets; when the central line reaches the African coast the duration of total phase will have diminished to about 4m. 45s., in 12° S. latitude. The next eclipse is that of 1887, August 19, which it was supposed for a long time would be total in this country, the central line, however, does not reach England; commencing in Central Germany, or in 11° 39' east of Greenwich, and 51° 38' N., it passes by Berlin and Moscow, to a point in 102° 15' E., and 53° 46' N., where the sun will be totally eclipsed on the meridian, and thence to 173° 47' E. and 24° 32' N., where the central phase passes off the earth; at Berlin, where the sun will only just be clear of the eastern horizon, totality continues 1m. 41s., and in the longitude of Moscow, to the north of the city, 2m. 30s., with the sun at an altitude of 17°; on the shores of Lake Baikal, where he will be near the meridian, the duration of totality is increased to 3m. 38s. The last total eclipse of the decade to which this note applies will take place on December 22, 1889; it may be observed at Bridgetown, Barbadoes, where the sun at an altitude of about 6° will be hidden for 1m. 48s.; at a point on the Angola coast in about 10° S., totality will continue 3m. 34s., the central eclipse passes off the earth in 60° 55' E. and 6° 53' N.

BIOLOGICAL NOTES

BEEs EATING ENTRAPPED MOTHS.—Mr. Packard, jun., writing in the January number of the *American Naturalist*, says that a flowering stalk of an asclepiad (*Physianthus [Aranja] albens*) was brought to him last September, with the bodies of several moths (*Plusia practionis*) hanging dead from the flowers, being caught by their tongues or maxillæ. "The e moths had, in endeavouring to reach the pollen-pockets of the flowers, been caught as if in a vice by one of the opposing edges of the five sets of hard, horny contrivances covering the pollinia." A very short time afterwards the Rev. L. Thompson, of North Woburn, Mass., a careful observer, sent Mr. Packard the following details of the behaviour of bees (*Apis mellifica*) also frequenting the flowers of the same asclepiad:—"My attention was attracted by two or three bees buzzing immediately around as many entrapped moths that were alive and struggling to get away. Every moment or two a bee suddenly and furiously darted upon a prisoner and seemed to me to sting it, despite its desperate efforts to escape. This onset was generally instantaneous, but was repeated again and again; and after a moth became still and apparently lifeless the bee settled upon and, if my eyes did not greatly deceive me, began to devour it." Mr. Thompson previously noticed tongues of the same species of moth caught in the flowers, the bodies to which they belonged having disappeared. At the time he fancied these were probably eaten by birds, but on further examination he came to the conclusion that the bees had really feasted on animal food, as well as upon the nectar of the surrounding flowers. Specimens of these bees being captured, the species was determined by Mr. Packard. On this fact being communicated to Mr. Darwin, he wrote that he "never heard of bees being in any way carnivorous, and the fact is to me incredible. Is it possible that the bees opened the bodies of the *Plusia* to suck the nectar contained in their stomachs? Such a degree of reason would require confirmation, and would be very wonderful." Hermann Müller wrote "that his brother Fritz in South Brazil has observed that honey-bees (species doubtful) licked eagerly the juice dropping from pieces of meat which had been suspended in the open air to dry; but he thinks nothing has been published on the carnivorous habits of bees." The well-known apiarist, Prof. A. J. Cook, however, reminds Mr. Packard "that honey-bee workers within the hive, on killing off the drones, tear them in pieces with their mandibles rather than sting them, and that he has seen them thus kill a humble-bee that had entered the hive." Huber, if we mistake not, also tells us that under certain circumstances the common hive-bee will devour the eggs laid by the queen bee.

NEW MOSASAUROID REPTILES.—The Mosasaurid Reptiles are so rare in Europe that the famous type specimen described

by Cuvier still remains the most perfect yet discovered there. This was the specimen said to have been given up to the French army on the capture of Maestricht, and which is now in the Paris Museum. So much was thought about it that the story goes that the French gunners had orders not to point their artillery to that portion of the town where it was known to be. In America Prof. O. C. Marsh tells us, the group attained a marvellous development, and was represented by very many genera and species belonging to even diverse families. In a paper in the current number (January) of the *American Journal of Science* he gives some new characters of the group, based on the examination of an enormous collection in the museum of Yale College, which is calculated to contain the remains of not less than 1,400 distinct individuals. In not a few of these the skeleton is nearly if not quite complete, so that every part of its structure can be determined with almost absolute certainty. Already from this immense storehouse has Prof. Marsh made out various important details of the anatomy of the group. In the present paper he communicates several others which had escaped other observers. Several specimens, one of which is figured, prove the presence of a sternum which is of the true lacertilian type. The entire pectoral arch and paddles in several genera are described; the general structure of the paddles is Cetacean in type; hyoid bones have been found. In some genera the orbit was protected by a ring of osseous plates, composed of but a single row of plates overlapping; the transverse bone of Cuvier (ectopterygoid, Owen) is present in several of the genera. The accuracy of Cuvier's determination of the pterygoid bones can no longer be called in question; Cope errs in calling them palatines. All these newly-discovered characters and facts indicate a true lacertilian alliance, and a new sub-order of lizards should be formed, to be called Mosasauria.

NEW ENGLAND ISOPODS.—In the *Proceedings* of the United States National Museum (November 5, 1879) Oscar Harger briefly describes the marine isopods collected by the United States Commission of Fish and Fisheries. Fuller descriptions with figures of most of the species are promised later. As new species are described *Janira spinosa*, from Banquereau, and *Lepidochela rapax*, from Annisquam. There are forty-three species enumerated, of which eleven are to be found on the coasts of Europe.

THE FOSSIL HORSES OF CONSTANTINE.—Veterinary Surgeon P. H. Thomas has quite recently published an interesting account of the remains of some fossil horses found in the neighbourhood of Constantine, in Algeria. It will be remembered that the environs of Constantine are traversed by large and deep valleys, on the flanks of which, as far as an elevation seldom exceeding 600 metres, the stripes of a fluvial-lacustrine plicocene formation lie stratified. These, at their base, are characterised by the presence of a chalky marl, and towards their summits by gritty conglomerates, pudding-stones, and sand; the fluvial lacustrine deposits contain a somewhat transition fauna composed of some of the larger vertebrates, amongst which two species of horse have been found, one an Hipparion and one very near to, if not identical with, the *Equus stenonis* (Gaudry), of the plicocene of Europe. In the bottom of these valleys, at the base of the steep banks of the larger rivers, turfy deposits are found, appertaining in all probability to a recent quaternary period in which a fauna appears—which, though showing some affinities to the previously-mentioned fauna, is more clearly connected with that actually existing. Here are to be found remains of a horse (*Equus caballus*) differing by only a few secondary characters from the actually living African horse; an ass of small dimensions, presenting in its dentition some characters calling to mind the genus Hipparion, which genus had, however, disappeared since the preceding geological period. In the grey marl which immediately lie over the alluvial turf, and which appear to be very recent, there will be found in the lowest strata the remains of horses, horned cattle, and molluscs, differing in no way from those of the present day. In a middle stratum remains of flint weapons have been found (at about 2.50 m. from the surface of the soil), while at about 1 metre below this surface, vestiges of the Roman occupation will be met with.

PHYSICAL NOTES

MEASUREMENTS of the movements of glaciers have hitherto been directed either to approximate determination of the yearly or daily mean velocity, or to showing that the motion of glaciers

resembles that of liquids. Some new measurements by Herr Koch and Fr. Klocke (*Wied. Ann.*, No. 12) have been limited to ascertaining the motion of a point of the surface in a vertical plane parallel to the direction of length of the glacier, with a view to finding the real nature of the glacier's progress, whether continuous and in the same direction or not. Two scales were placed, one vertical, the other horizontal, being attached to a post, fixed half a metre deep in the ice, and having a cone of ice and *débris* formed round it. This was on the west side of the Morteratsch glacier, about $1\frac{1}{2}$ km. from its principal extremity. The observations were made in August and September, the scales being watched by day only, through a fixed telescope with cross-wires. The number of scale parts passing the cross gave the direct and horizontal components of the motion. Another similar post with scales was set up near, and in the field of vision. The observations proved that the motion of the glacier is by no means uniform, for one and the same point may move now upwards, now downwards, towards the mountain, or towards the valley. Further, two points of the surface, about 50 to 60 metres separate from each other, may, at the same time, move in different, and even in opposite directions.

THE behaviour of membranes in sounding columns of air has been recently investigated by Herr Kohlrusch (*Wied. Ann.*, No. 12), and with the following results (which sufficiently indicate the line of research):—1. Open membranes (freely in contact with the air on both sides) vibrate in the ventral segments of stationary waves, and come to rest in the nodes; covered membranes (shut off from the external air on one side) vibrate in the nodes and come to rest in the ventral segments. 2. A fine open membrane stretched over a ring is a very sensitive means of determining the position of the nodes in stationary waves. 3. If a solid body be brought between two nodes of the stationary vibrations of a pipe, the half wave between these two nodes contracts, while the others are lengthened, and the pipe gives a tone corresponding to the longer half-waves, consequently a deeper one.

FROM a comparison of the temperature co-efficients of fluidity and galvanic conductivity for a number of substances (*Wied. Ann.*, No. 12), Herr Grotrian finds that with increasing concentration of a solution, both coefficients vary in the same sense. In solutions of NH_4Cl , KCl , KBr , and KI , the galvanic conductivity increases nearly in proportion to the percentage proportion. The fluidity, on the other hand, varies but little with the concentration.

A SLIGHT improvement has been introduced into the Bunsen grease-spot photometer by Herr Toepler (*Wied. Ann.*, No. 12), rendering the observations much less dependent on the position of the observer (the angle between his line of sight and the paper screen). The grease spot is done away with, and the thickness of paper is reduced instead, to give a spot. Between two very thin moderately transparent sheets of parchment paper, having a small circular aperture, is placed a sheet of ordinary strong paper.

DR. BAUMGARTNER has recently made, in Prof. Pfaundler's laboratory (*Wied. Ann.*, No. 12), a series of determinations of the specific heat of water by a method of mixtures, in which boiling water was poured directly into the cold water of the calorimeter. The specific heat at 100° (that at $0^\circ = 1$) was found 1.0307 (as against 1.0130 by Regnault; 1.0220 Regnault, according to Bosscha's calculations, 1.0302 v. Münchhausen and Wüllner, 1.0720 Heinrichsen, 1.1220 Jamin and Amaury, 1.1255 Marie Stamo).

THE telephone has been found by Herr Niemöller (*Wied. Ann.*) capable of determining very quickly and accurately the resistance of liquids. It is substituted for the galvanometer in a galvanic bridge, and an induction current is used, then, if the resistances compared are a large liquid resistance on the one hand, and a Siemens's resistance-box on the other so that the electro-dynamic constants of the branches are very small; if, further, a German silver or platinum wire be used as measuring wire, it is found that in the position where the galvanometer shows no deflection, the tone in the telephone has a well-marked minimum of intensity. Supposing the liquid resistance has 2,000 units, a variation of it, even four units, reveals itself in a displacement of the minimum position.

FOR study of liquid waves Signor Bazzi lately used (*N. Cim.* (3), p. 98) a trough 6 m. long, 10 cm. deep, and 5 cm. wide. In one end of it dipped a wooden parallelepiped, which could