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 (ecteopterygoid, 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 *Leptochelia rapax*, from Aunisquam. 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 pliocene 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 pliocene 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 1½ 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 Kohlrausch (*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° = 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 posison 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) 6, p. 98) a trough 6 m. long, 10 ctm. deep, and 5 ctm. wide. In one end of it dipped a wooden parallelepiped, which could

be moved up or down in guides, and served to produce waves. A movable apparatus indicated on a cylinder the movements of the surface at any point; the moment of immersion was also indicated. The following results were arrived at:—1. If the body be drawn out and a wave of depression produced, a whole series of other waves follows this, which are of gradually decreasing height. 2. Both the primary and the secondary waves are, from a certain distance from the origin onwards, propagated with uniform velocity, which, for the same depth, is independent of the mode of the immersion. The first primary wave has the greatest velocity; it coincides with that resulting from Lagrange's calculations. The velocity of the others decreases from wave to wave, so that their length increases proportionally to the distance from the origin. 3. The depth of the first wave is proportional to the volume brought out of the position of equilibrium; and it decreases inversely as the square root of the distance from the origin (this corresponds to Boussinesq's development). 4. The profile of each secondary wave is a sinusoid, but that of the primary is much more complicated. These results are in contradiction to nearly all analytical results on wave motion. The author is prosecuting his inquiry further.

In an interesting memoir presented to the Belgian Academy, on the influence of the form of masses on their attraction, M. Lagrange arrives at the following theorem, which he considers as fundamental for the mechanical theory of crystallisation: A mass of any form, at a distance from its centre of inertia, acts with maximum, mean, and minimum energies in three rectangular directions, and these directions coincide respectively with the three axes of maximum, mean, and minimum inertia of the mass; the attraction diminishing the more rapidly the less the mass in question. M. Lagrange offers some preliminary considerations on the structure of bodies, and one curious consequence of his formulæ is that the molecules of a body are not always distributed symmetrically with regard to the three rectangular directions, owing to the influence of certain secondary axes of attraction, which is combined with that of the principal axes of inertia. The principal modes of crystallisation of bodies seem to M. van der Mensbrugghe (who reports on the memoir), in perfect harmony with the classification of molecular groups, (1) according to their principal axes of inertia, (2) according to their secondary axes of attraction. M. Lagrange promises, in an early work, a complete solution of the problems of crystallisation of Lolies.

M. Thollon has recently observed, by the aid of his spectroscope of high dispersive power, a solar protuberance whose height equalled one-sixteenth of the diameter of the sun, or about 55,000 miles.

Herr Edelmann describes, in Carl's *Repertorium*, a novel quadrant electrometer in which the needle, instead of being a flat plate, consists of two quadrants cut vertically from a cylinder. This swings concentrically within another cylinder slit into four quadrants, which replace the usual pairs of flat quadrantal plates. The needle and its attached mirror are supported by a bifilar suspension, and the charge is given to the needle by connecting the cup of concentrated sulphuric acid, into which it dips, with the pole of a Zamboni pile. This latter arrangement is simpler than the usual replenisher and gauge of the well-known Thomson electrometers, but cannot be anything like as reliable.

Herr Böttger describes a process for steeling copper plates by electrolysis. 100 parts of ferrous-ammonia sulphate, together with 50 parts of sal-ammoniac, are dissolved in 500 parts of pure water, a few drops of sulphuric acid being added to acidulate the solution. The copper plate connected to the negative pole of a battery of two or three Bunsen elements, an iron plate of equal size being employed as an anode. The solution is maintained at from 60° to 80°. The deposit of iron is of a hard steel-like quality, and is very rapidly formed.

Prof. Graham Bell communicated a notice of "Some Experiments relating to Binaural Audition" to the recent meeting of the American Association for the Advancement of Science. The paper, which contains some extremely valuable observations, will be published *in extenso* in the *American Journal of Otology*.

GEOGRAPHICAL NOTES

A Reuter's telegram from Halifax, Nova Scotia, states that arrangements are in progress there for a new American Arctic Exploring Expedition, under the leadership of Dr. Emil Bessels, the scientific member of Capt. Hall's *Polaris* Expedition.

In opening the proceedings of the Geographical Society on Monday evening, Lord Houghton read a letter from Sir Bartle Frere, in which he spoke in the highest terms of Dr. Emil Holub as the most competent traveller he had met for a long time, and in which he also expressed the opinion that, with the exception of a very small portion, the Valley of the Zambesi was well suited for Europeans in regard to climatic conditions. After an amusing sketch of his early experiences in South Africa, and a brief account of his two preparatory journeys, Dr. Holub delivered an address, describing vividly and in considerable detail his main journey, which occupied twenty-one months, from the Diamond Fields to the upper waters of the Zambesi. Among other matters, he thus explained how the River Zooga flows at one time to the east and at another to the west. When the Shallow Lake Ngami is filled up by the streams falling into it from the west, its waters pass through the Zooga to the salt lakes on the east, but when these streams do not pour in such an amount of water, the level of the lake becomes very low, and the Zooga, often largely increased in volume from the overflowing salt lakes, sends its waters into Lake Ngami. This solution of a curious phenomenon agrees, we believe, with the conclusion arrived at by Major Serpa Pinto. Dr. Holub dwelt for some time on the Marutse Empire, which he considered to be some 400 miles long and 450 broad, and the languages and customs of which he had ample opportunities for studying from his prolonged stay at Shesheke. When examining the country to the north of this place, Dr. Holub was unfortunately prostrated by severe illness, which compelled him to give up all further explorations in this interesting region. He made his return journey through the western Makalaka region of the Matabele country, about which he gave many particulars. Dr. Holub exhibited a very carefully drawn chart which he had made of part of the course of the Zambesi, and gave some information respecting his various collections. These include ethnographical objects, a large number of skins of birds and animals, fishes, insects, reptiles, &c., besides numerous botanical specimens. Dr. Holub hopes that before long he may have an opportunity of exhibiting his collections in London.

We have received the first number of the new *Zeitschrift für wissenschaftliche Geographie*, edited by Herr J. I. Kettler, of Lahr, in Baden, assisted by an imposing staff of German geographers. We expected great things from this new journal, judging from the prospectus to which we referred some weeks ago; but we confess this first number disappoints us. Fifteen pages are devoted to a discussion of the first landing-point of Columbus, by Dr. R. Pietschmann, surely a great waste of space in a journal that professes to devote itself to scientific geography. The editor takes up seven pages with an article on the position of Brunswick; the old story of Severstoff's Ferghona expedition is related, and Dr. O. Krummel reproduces his discussion of the mean depths of the ocean, which has gone the round of the journals long ago. Behm's *Jahrbuch* for 1879, now out of date almost, is reviewed, and some old letters of Humboldt's are given, interesting only on the writer's account. An elaborate series of small charts are the only maps given, illustrating the paper on Columbus's landing-point. We trust the succeeding numbers will be both more scientific and more novel, else the new journal can scarcely justify its existence.

Last week the French expedition commissioned to explore the Sahara in connection with the proposed railway left Paris for Marseilles, whence it will sail for Algeria. The expedition will devote its attention mainly to the country south of Wargla, which is too imperfectly known at present to enable a decision to be come to as to the precise route which the railway ought to take. The expedition is under the command of Lieut.-Col. Flatters, who is accompanied by an efficient scientific staff of engineers and others. They will be accompanied by an escort of trustworthy frontier Arabs. At the last meeting of the Paris Society of Commercial Geography, M. Masqueray, the Saharan explorer, gave some interesting information concerning the land of Adrar, in the Western Sahara. This he derived from three pilgrims on their way to Mecca, who had been plundered in the desert, and supplied with funds by the French Government in Algiers to continue their pilgrimage. On their return they have promised to conduct the French explorer to their country. Adrar, or Aderer, presents two or three of the chief aspects of the Sahara, which is by no means the universal desert at one time