resembles, intended for the optical study of sounds. A complete description of the instrument is not, however, given.

ACCORDING to Herr H. Schwarz, an admirable cement for glass, and one which completely resists the solvent action of water, may be prepared by the following process: From 5 to 10 parts of pure, dry gelatin are dissolved in 100 parts of water. To the solution about 10 per cent. of a concentrated solution of bichromate of potash is added, and the liquid is kept in the dark. When articles joined by means of this cement are exposed to the light the gelatine film is acted upon by the chemical rays, the chromate being partially reduced, and the film of cement becomes extremely tough and durable.

THE "meter" devised by Edison for his system of domestic electric lighting depends upon the electro-deposition of copper upon an electrode in a branch circuit whose resistance bears a known ratio to that of the circuit of the user, the movable copper electrode being weighed at stated intervals in order to gauge the consumption. There is also in the "meter" a most ingenious contrivance whereby if any consumer draw too largely on the supply the armature of an electromagnet in the circuit is attracted and "cuts out" the transgressing consumer, actually fusing up the only remaining metallic connection!

LIPPMANN'S principle that if by mechanical means we deform a mercury surface, an electrical liberation is produced which tends to arrest the movement of the mercury, has led M. Debrun to contrive an apparatus (*Jour. de Phys.*, January) in which mercury is admitted in drops, with acidulated water between, down a conical tube, into a vessel arranged as a Florentine receiver (giving separate outflow to the two liquids). The upper and lower masses of mercury are connected with platinum wires, which take their polarity, and a current is found to proceed in the direction of the globules. With a tube 0·30 m. long, 2·5 mm. diameter at top, and 1 mm. at the lower part, and containing at least twenty mercury globules, and not more than thirty-five, the electromotive force is about 1·4 volts, giving decomposition of water with Wollaston points. Only 2 kg. of mercury are expended in the hour. Letting the mercury flow twenty-four hours, M. Debrun was able to silver strongly a five-centimes piece. Several experiments may be made with the apparatus; thus, if the poles are disconnected the mercury flows slowly and difficultly, but when they are connected it flows very rapidly.

A NEW galvanic battery with circulating liquid, described by Signor Ponci in *Natura* (3, p. 402, 1879), has the following form:—Rectangular lead channels, beak-shaped at one end, are so placed over one another in slanting position that the beak of the first is over the broad end of the second, and so on. In each channel is an amalgamated zinc plate, and above this a carbon plate insulated from it by two rings of caoutchouc; the carbon plate is perforated under the beak of the lead channel above. The lead channels have wires, and the carbon plates, at their upper ends, binding screws, with which they are alternately connected. By means of a caoutchouc siphon a solution of chromate of potash is conducted through the system (200 gr. $K_2Cr_2O_7$, 21 water, 11 commercial muriatic acid; for long use 3 to 6 litres water and 100 to 150 ccm. muriatic acid may be added to each litre of the solution). A battery of 99 such elements gives a light-arc equal to that of a battery of 60 Bunsens, and is constant in duration.

THE following reaction, proposed by M. Jorissen, for discovering very weak traces of morphine, is reported by M. Donny (*Bulletin* of Belgian Academy) to be very sensitive. The morphine is treated first with sulphuric acid, then with ferrous sulphate; a nearly colourless liquid is thus obtained, but on letting it fall drop by drop into concentrated ammonia, a very intense blue-purple coloration is immediately produced.

GEOGRAPHICAL NOTES

AT the meeting of the Geographical Society on Monday evening, the Earl of Northbrook announced, amidst great applause, that Colonel Gordon had been elected an Honorary Corresponding Member, and at the same time passed a high eulogium on his character and his services in Egypt and elsewhere. Major-Gen. Sir M. A. S. Biddulph, K.C.B., who commanded a column in the last Afghan campaign, afterwards read a paper on the eastern border of Pishin and the basin of the Loras. The country dealt with had never previously been examined by Europeans, all our information having been derived from native sources, and consequently the particulars so laboriously collected by Sir M. Biddulph, with the aid of the survey officers acting under him, will prove of the utmost value to cartographers. He mentioned several instances in which our present maps are entirely wrong, specifying one in which the position of a place would have to be shifted fifty miles. A peculiar characteristic of the country examined was the existence of long plains in the valleys, which rendered movement comparatively easy, another being the great number of water-partings. The basin of the Loras,—a name given to all streams in that region,—consists, in fact, of a curiously involved system of mountain ridges, about which Sir M. Biddulph furnished much valuable topographical information.

AT a committee meeting of the German African Society at Berlin, at which Dr. Gerhard Rohlfs was present, it was resolved to recommend Dr. Stecker to continue the expedition to Wadai, by way of Mursuk, Bornu, and Adamauk, as on this route he will travel under the protection of the Khedive of Egypt. According to the opinion of Dr. Rohlfs it is beyond all doubt that the Turkish government will fully compensate the Society for the loss sustained through the attack upon the expedition.

THE *Vega* left Port Said on the 6th inst., and may be expected to reach Naples to-day.

THE new number of the *Annales de l'Extrême Orient* contains, among other matter, a paper on the languages and literature of Java, by Prof. P. J. Veth, President of the Dutch Geographical Society, notes on recent Dutch explorations in New Guinea, and some remarks on Lieut. Delaporte's work, entitled "Voyage au Cambodge."

MR. ALEXANDER FORREST contributes to the December number of the *Victorian Review*, published at Melbourne, a very interesting, though somewhat brief account of his explorations during his recent journey from Perth, West Australia, to Port Darwin, in the Northern Territory. We believe that Mr. Forrest is very sanguine that large tracts of the fertile country which he has discovered will shortly be taken up and occupied by settlers.

THE last number of the *Proceedings* of the Asiatic Society of Bengal contains a paper on the exploration of the Great Sanpo River of Tibet, by Major-General J. T. Walker, which is illustrated by a map. Capt. W. E. Gowan also furnishes a translation from the Russian of the geographical information regarding the Kirghiz Steppes and country of Turkistan, afforded by the Book of the Great Survey.

WRITING to *Les Missions Catholiques* from Landana, in Congo, Père Carrie supplies a few particulars respecting Mr. H. M. Stanley's expedition from the west coast, about which the International African Association has been remarkably silent. Mr. Stanley, it appears, has with him fourteen white men, one Arab, two natives of Sierra Leone, and sixty-one men from Zanzibar, whence a large additional number are shortly expected to arrive in charge of a European. Père Carrie adds that Mr. Stanley has already established a station at Noki, some miles above Mboma. He has with him a number of wooden houses all ready for erection at various points as he advances into the interior.

AS the result of fifteen years' research into the archæological riches of Hainault, M. Théodore Bernier has just published (Mons: H. Maneraux) a volume entitled "Dictionnaire Géographique, Historique, Archéologique, Biographique, et Bibliographique du Hainault."

IN connection with Mr. G. J. Morrison's paper on the Grand Canal, read before the Geographical Society on January 12, much interest attaches to a letter in the *North China Herald*, from its Tientsin correspondent, whose experiences are about eighteen months later. Being desirous of going to Tê-chow, in Shantung, he made the journey by the Grand Canal. The water in the Pei-ho at the time was higher than it had been for nearly ten years, but the Canal had risen but slightly, the water coming mainly from the streams to the south-west. On the second day, however, a sudden rise was apparent, the water wanting but an inch or two of overflowing. Still little effort was made to guard against danger; a few weeds or *kao-liang* (millet) stalks covered with earth, or simply a few shovels-full of earth in many cases, were the only defence against the rising water. To the west of the Canal was a vast expanse of flooded country, stretching for 100 miles or more. At one place where the bank was weak,

piles were being driven and an embankment of earth and weeds was being made, while at another point, much exposed to the force of the wind and water, a number of old grain junks had been drawn up in line against the bank to break the force of the waves.

THE just published *Bulletin* of the Société Normande de Géographie contains a note of some interest on Algeria, by M. E. Masqueray, whose address on the same subject is promised in the next number.

THE United States Government are about to despatch a party of military and naval engineers to examine the various routes proposed for an inter-oceanic ship canal across the Isthmus of Panama.

THE February number of *Petermann's Mittheilungen* contains two important papers on South American travel. Herr Fr. von Schenck describes a journey he made in 1878 in Antióquia, in the United States of Columbia, and another long paper gives an account of the travels of Messrs. Rogers and Ibar in South-West Patagonia in 1877, to which are added the journals of A. de Vicuna, in 1782, and J. H. Gardiner in 1867.

WE have to record the death of M. Capitaine, the editor of *L'Exploration*, at the early age of forty. M. Capitaine had been in former years a surgeon in the national navy, and has written numerous papers on subjects of geographical interest.

ON A NEW ACTION OF THE MAGNET ON ELECTRIC CURRENTS[1]

THE statement that "the mechanical force which urges a conductor carrying a current across the lines of magnetic force, acts, not on the electric current, but on the conductor which carries it," has often been a puzzle to students of electricity. Experiments have been made at various times to prove that the statement is not correct, but have hitherto uniformly resulted in failure. Mr. E. H. Hall working under the direction of Prof. Rowland believes himself to have been more fortunate than his predecessors, and describes an experiment which apparently proves a permanent effect of a magnet on the distribution of currents in a system of wires. As Mr. Hall promises a more extended investigation we shall describe his experiment as much as possible in his own words without comment or criticism.

The following experiment had apparently been formerly tried by Prof. Rowland, but without success :—

"A disk or strip of metal, forming part of an electric current, was placed between the poles of an electro-magnet, the disk cutting across the lines of force. The two poles of a sensitive galvanometer were then placed in connection with different parts of the disk, through which an electric current was passing until two nearly equipotential points were found. The magnet current was then turned on and the galvanometer was observed, in order to detect any indication of a change in the relative potential of the two poles."

No such change could be observed and Mr. Hall now repeated the same experiment substituting a piece of gold leaf, mounted on glass to the metal strip. Experimenting as above he obtained on October 28 a decided deflection of the galvanometer needle.

"This deflection was much too large to be attributed to the direct action of the magnet on the galvanometer needle, or to any similar cause. It was moreover a permanent deflection and therefore not to be accounted for by induction."

Some rough quantitative experiments were tried with the result "that with a given form and arrangement of apparatus the action on the Thomson galvanometer is proportional to the product of the magnetic force by the current through the gold leaf. This is not the same as saying that the effect on the Thomson galvanometer is under all circumstances proportional to the current which is passing between the poles of the magnet. If a strip of copper of the same length and breadth as the gold leaf but $\frac{1}{4}$ mm. in thickness is substituted for the latter the galvanometer fails to detect any current arising from the action of the magnet, except an induction current at the moment of making or breaking the magnet circuit." A. S.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

THERE will be an examination for at least one open scholarship in Queen's College, Oxford, on April 6 and following days. Papers will be set in Physics, Chemistry, and Biology (Comparative Anatomy and Physiology, the study of the Animal Kindom). No candidate will be expected to offer more than two of these subjects. There will also be a practical examination in one or more of the above subjects, if the examiners think it expedient. Candidates are requested to signify by letter to the Provost, *not later than March* 1, their intention of standing, and to state at the same time the subjects they propose to offer.

M. JULES FERRY has published a report stating that the development of primary instruction in France has progressed in proportion to the subsidies made by the public treasury for this purpose, and which we noticed in one of our previous numbers. In the fifty years from 1827 to 1877 the number of public schools has been increased in the proportion of 100 to 175, and the number of pupils from 100 to 182.

[1] By E. H. Hall, Fellow of the Johns Hopkins University (*American Journal of Mathematics*, vol. ii. p. 287).

SCIENTIFIC SERIALS

American Journal of Science and Arts, January.—Prof. Stockwell here gives a detailed account of the principal periodic inequalities in the motions of the moon arising from the oblateness of the earth.—Prof. Leconte contributes further ideas on the glycogenic function of the liver. He represents that waste tissue is not burned or changed into final products at once, but circulates as incombustible matter dissolved in the blood, is carried to the liver, and there prepared for final combustion and elimination. Only thereafter does it unite with O to form CO_2 and H_2O.—Dr. Nichols proposes an optical method for measurement of high temperatures; it corresponds to one of three methods proposed by M. Crova, who, however, ignored the serious practical difficulties, especially in the varying values of the emissive and absorptive capacity of different bodies.—The first results from a new diffraction-ruling engine (which appears to be a very perfect piece of work) are given by Mr. Rogers.—Mr. Hill's electrodynamometer for measuring large currents has been noticed in our columns, also Mr. Todd's observations on solar parallax from the velocity of light.—Mr. Levison describes certain curious electrolytic phenomena capable of exhibition to an audience.—Prof. Marsh describes new characters of Mosasauroid reptiles, Mr. Whitfield new fossil crustaceans from the upper Devonian rocks of Ohio, and there are also geological papers on the Henry Mountains and the Wappinger Valley limestone.

Annalen der Physik und Chemie, No. 1.—Among the original matter in this number we note a chemical monograph of the mica-group, by Herr Rammelsberg; accounts of a new condensation or absorption-hygrometer, by Herr Matern, of some phenomena of phosphorescent light produced by electric discharges, by Herr E. Wiedemann, and of the phenomena, in polarised light, of a plate of magnesium platinum cyanide, cut at right angles to the optic axis, by Herr Lommel; a paper by Herr Korteweg, proving that, by the theory of dielectric polarisation, volume-changes of a dielectric body under the action of an electric force may be anticipated and calculated; one by Herr Edlund, controverting Helmholtz's views as to the cause of electric currents produced in flow of liquids through tubes; and one by Herr Herwig, defending his conclusions regarding the electric conductivity of mercury vapour. We also note valuable papers (communicated to Academies) on the conductivity of iron for heat, by Herr G. Kirchhoff and Herr Hansemann; on the differences of the two electric states, by Herr Mach and Herr Doubrava; and on a direct measurement of the work of induction, and a determination therefrom of the mechanical equivalent of heat, by Herr von Waltenhofen.

THE *Journal of Anatomy and Physiology, Normal and Pathological*, vol. xiv., part 2., January.—Dr. A. H. Young, the intrinsic muscles of the marsupial hand (pl. 7), and on the myology of *Viverra civetta*.—Mr. W. R. Williams, the anatomy of the knee-joint.—Dr. D. J. Hamilton, development of fibrous tissue from the hepatic parenchyma in cirrhosis of the liver (pl. 8).—Dr. P. McBride, contributions to the pathology of the internal ear (pl. 9).—S. G. Shattock, a new bone in human anatomy, together with an investigation into the morphological significance of the so-called internal lateral ligament of the human lower jaw.—Dr. G. T. Beatson, the disease called sturdy in sheep, in its relation to cerebral localisation.—Dr. J. Carmichael, two cases of lesions of the temporo-sphenoidal lobe of the brain, with pathological examination by Dr. D. J. Hamilton (pl. 10).—Dr. Osler, two cases of striated myo-sarcoma of the kidney.—Dr. G. A. Gibson, the sequence and duration of