

THE purity of the metropolitan water supply has been seriously affected by the winter floods. Professor Frankland, in his last monthly report, states that the water supplied by the East London Company was very turbid and contained vibrios. This is the first occasion in which Dr. Frankland has detected these organisms, which are abundant in putrid sewage, in the London water.

A VERY interesting paper on the Pearl, Coral and Amber Fisheries, was read at the meeting of the Society of Arts held on the 19th inst. The chair was occupied by Professor Owen, who in proposing a vote of thanks to the lecturer, Mr. T. L. Simmonds, made some instructive remarks on the origin of pearl, coral and amber. Both the paper of Mr. Simmonds and the observations of Professor Owen, will be found at full length in the last number of the Society's Journal.

WE are glad to know that an "Athenæum" has been established in Belfast. It contains a large reading-room, provided with most of the daily and weekly papers and the monthly and quarterly reviews. There is also a commercial, literary and scientific reference library and all the usual accessories of a club. Such an undertaking deserves every support. A series of lectures on scientific and literary subjects has already been commenced in connection with this institution.

THE Lowndean Professor of Astronomy in the University of Cambridge intends to give a course of lectures on the Lunar Theory, with special reference to M. Delaunay's method of treating the subject.

Land and Water announces that the Prince Pless, who has large possessions in Siberia, has succeeded in crossing the common Red Deer with the Wapiti (*Cervus Canadensis*) and the perfect fecundity of the hybrids appears to be well established.

ACCORDING to *Les Mondes*, the Mont Cenis tunnel will certainly be finished during the present year. On the 1st ult., the galleries opened measured 10,598 metres and there only remained 1,621 metres to be excavated.

THE *Photographic News* announces that a Photographic Society has just been formed at Dresden. Among the members are the names of Krone, president, Hahn, Hanfstängl, &c. The society publishes a monthly journal entitled *Helios*, this being the sixth photographic journal published in Germany.

IS Sicily about to lose the monopoly of sulphur which she has so long enjoyed? By recent intelligence from America, we learn that a bed of pure sulphur, 135 feet in thickness and about 530 feet below the surface, has been discovered on an island in Bayou Choupique, in the delta of the Mississippi. The place is within ten miles of the sea, from which it may be anticipated that shipment of the mineral will be comparatively easy. The extent of the deposit has not yet been ascertained; but the local formations are such as to lead to the inference that it is "immense." Besides the sulphur, there is a deposit of gypsum, of perhaps equal extent; hence we may anticipate that the company formed to work the one, will also turn the other to profit. Sulphur is so much in demand for the manufacture of sulphuric acid and for many other purposes in the arts, that this discovery of a deposit in a country teeming with energy and enterprise, seems opportune. When in full work it will most likely occasion a fall in the price of sulphur and a corresponding falling off in the use of pyrites. This sulphur bed was discovered during the sinking of a well in search for petroleum. But instead of "oil" the boring discharges a copious stream of water, which is described as a saturated solution of sulphuretted hydrogen, combined with a small amount of gypsum and common salt. It is clear that the company which is about to explore the sulphur, will have to provide for an abundant drainage, as well as for ventilation. The locality may be found on a good map, near Lake Calcasien, on the western border of the Mississippi delta.

SCIENTIFIC SERIALS

THE new number of Pflüger's Archiv. (III. i.) contains a paper by Prof. L. Hermann "On the absence of currents in uninjured inactive muscle." Munk's views are criticised and a new experiment described, in which the gastrocnemius of a frog is prepared for investigation, in such a way that no contact between the cutaneous secretion and the surface of the muscle (a source of currents in previous observations) takes place. With a galvanometer of 1,600 windings, giving a deviation of 300 sc. for an ordinary nerve current, the muscle so prepared gave only a deviation of 10 to 20 sc. "We are hereby justified," says the author, "in supposing that with a still more careful method of preparation, by the avoidance of yet other unknown causes of injury, we shall at last get a muscle perfectly free from currents."

In another paper "On the course of the development of currents in dying muscle," Prof. Hermann shows that when part of a muscle is killed and rendered rigid by exposure to a temperature of 40° C., the development of the current takes place just at the moment when *rigor mortis* makes its appearance.

The same author has also a paper "On the danger of drinking cold water when the body is heated," in which an attempt is made to submit the matter to an experimental inquiry. The only result obtained, however, was that in curarized animals, the injection of ice-cold water into the stomach caused a sudden and great rise in the arterial tension in the carotid and crural arteries, apparently from spasm of the visceral arteries in the neighbourhood of the stomach. Such a sudden increase of tension would prove dangerous in the case of unsound vessels. When the animals, however, were not curarized, very little rise of tension was observed, suggesting the idea that some compensating mechanism was at work, e.g. respiratory movements.

There are also papers "On acute phosphorus poisoning," "On convulsions due to disturbances of the cerebral circulation (venous obstruction)" and "On simultaneous contrasts" by Prof. Hermann and his pupils; "On the action of Hydrocyanic acid on the red blood corpuscles" by Geinitz; "On the interference of the bile with gastric indigestion" by Hammarsten; and, "On serum-albumin" by Zahn.

Revue des Cours Scientifiques, February 5.—This number contains an interesting paper read by M. P. I. Van Beneden, of Louvain, at the Belgian Academy of Sciences, on what he terms "commensalism" in the animal kingdom, or certain associations of animals for feeding purposes, which are not, in the ordinary sense, cases of parasitism. The author gives several illustrations of this fact, and he defines the parasite as an animal which lives upon another, while the commensal or messmate is merely a feeding companion. He distinguishes free and fixed commensals. Of the former there are numerous instances in the class Crustacea. The most interesting examples of the latter are the *Tubicinella diadema* or *coronula* covering the skin of whales; the *Remora*, found in the Mediterranean, and made use of, in fishing, by the inhabitants of Mozambique after the manner of a falcon on land. This number also contains a lecture by M. Ch. Robin, on Histology, delivered at the Faculté de Médecine in Paris.

In *Silliman's Journal* for January, Professor B. Silliman has a paper on the relation between the intensity of light produced by the combustion of coal gas and the volume of gas consumed, read at the Salem meeting of the American Association for the Advancement of Science last year, in which he gives as the result of many trials the theorem that, within ordinary limits of consumption, the intensity or illuminating power of gas flames increases as the square of the volume of gas consumed, according to which the method of computation hitherto adopted in photometry, would involve an error amounting to 40 per cent., in the case of rich gas, burning at the rate of 3½ feet an hour with an observed effect of 20 candles—the illuminating power reduced to the standard consumption of 5 cubic feet an hour, being in this case equal to 40 candles instead of 28·57 candles. Hence it follows that all photometric determinations obtained by computation from volumes greater or less than the standard of 5 cubic feet an hour, in the simple ratio of the volumes consumed, must be considered as absolutely worthless. This applies also to the case of sperm candles burnt at a rate different from the standard of 120 grains per hour. As a consequence of these observations it would appear to be essential for photometric observers, in their determinations, to bring the rates of consumption both of gas and sperm to the agreed standards. For the consumer of gas it is evident, also, that where it is important to obtain

the maximum economical effect from gas, this result is best attained with burners of ample flow. Prof. W. D. Alexander describes, in a letter to the editor, the results of a careful survey of the crater of Haleakala in the island of Maui. F. W. Clarke gives a new method of separating tin from arsenic, antimony and molybdenum, based on the solubility of the sulphides of tin in oxalic acid solution. E. Billings, paleontologist of the Canadian Geological Survey, continues his notes on the *Crinoidea*, *Cystidea* and *Blastoidea*. A paper on a newspectroscope, with contributions to the spectral analysis of the stars, by Dr. Zöllner, is translated from the Proceedings of the Royal Society of Saxony. H. J. Clark has a paper on Polarity and Polycephalism, extracted from a forthcoming memoir on the anatomy and physiology of *Lucernaria*, in which he treats of the discussion that has of late years prevailed as to whether the lower compound denizens of water are individuals or organs forming only a part of an individual. Dr. Sterry Hunt contributes a paper on Laurentian rocks in Eastern Massachusetts, in which he announces the discovery of Eozoön in the limestone of that district, by Mr. Bicknell. In a paper on the chemistry of common salt, Dr. Goessmann treats of the origin, occurrence and manufacture of salt. J. Lawrence Smith gives an account of the fall of meteoric stones in Alabama, with analyses, and points out the importance of a thorough re-examination of the mineral nature of meteoric stones. A. E. Verrill continues his contributions to zoology, from the Museum of Yale College, by describing Echinoderms and Corals from the Gulf of California and gives also a note on the generic relations and synonymy of the Common Sea-Urchin of New England (*Euryechinus Drobachiensis*) in which he replies to a criticism by M. Agassiz upon the author's classification of the species here referred to. E. S. Morse has a paper on the early stages of Brachiopods, describing the development of *Terebratulina Septentrionalis*, abundant in the waters of Eastport (Maine) and Dr. Jeffries Wyman has a paper on the existence of a Crocodile in Florida, said to have been killed near the mouth of the Miami river and considered by the author, as belonging to the sharp-nosed species (*C. acutus*).

SOCIETIES AND ACADEMIES

LONDON

Royal Society, February 3.—The following papers were read:—"Note on an Extension of the Comparison of Magnetic Disturbances with Magnetic Effects inferred from observed Terrestrial Galvanic Currents—and Discussion of the Magnetic Effects inferred from Galvanic Currents on days of tranquil magnetism." By George Biddell Airy, Astronomer Royal. (Received December 22, 1869.) The author, referring to his paper in the Philosophical Transactions for 1868, stated that he had examined the whole of the galvanic currents recorded during the establishment of the Croydon and Dartford wires (from 1865 April 1, to 1867 October 24). The days of observation were divided into three groups: No. 1 comprising days of considerable magnetic disturbance; No. 2, days of moderate disturbance, of which no further use was made and No. 3, days of tranquil magnetism. The points most worthy of notice are, that the general agreement of the strong irregularities, galvanic and magnetic, is very close; that the galvanic irregularities usually precede the magnetic, in time and that the northerly magnetic force appears to be increased. The author remarks that no records appeared open to doubt as regards instrumental error, except those of western declination; and to remove this he had compared the Greenwich curves with the Kew curves and had found them absolutely identical. In the discussion of the galvanic current-curves, on days of tranquil magnetism, for independent examination of the galvanic laws, the author explained the method of measuring the ordinates and connecting the measures into expressions for magnetic action, at every hour, grouping the measures, at the same nominal hour, by months and taking their monthly means for each hour. As these exhibited sensible discordance, they were smoothed by taking the means of adjacent numbers, taking the means of the adjacent numbers of the new series and so on, repeating the operation six times. The author explained the theory of this process and the way in which it tends to degrade the periodical terms of higher orders. He then explained an easy method of resolving the numbers so smoothed, into periodical terms recurring once or twice, or thrice in the day, &c. and applies the method to the numbers for every month. When these quantities (which from

month to month are perfectly independent) are brought together in tables, they present such an agreement, with gradual change accompanying the change of seasons, as to leave no doubt of their representing a real law of the diurnal changes of the galvanic currents. They also show the existence of a constant turn towards the north (explaining the apparent increase of force to the north observed in the results for days of great disturbance), and a still larger force towards the west (also well marked on the days of great disturbance). No light is obtained as to the origin of these turns; but they appear to be probably pure galvanic accidents, depending on the nature of the earth-connections. The author then exhibited, in curves, the diurnal inequalities of magnetism which the galvanic currents must produce. The form generally consists of two parallel lobes, making with the magnetic meridian an angle of nearly 60° from the north towards the west. The greatest east-and-west difference of ordinates, in the month of April, is 0.00044 of total horizontal magnetic force; it corresponds in the hours to which those ordinates relate, nearly with the ordinary diurnal inequality. But it is much smaller than the ordinary diurnal inequality and the daily law of the galvano-magnetic inequality differs greatly from that of diurnal inequality. For the greater part, therefore, of diurnal inequality the cause is yet to be found.

"On the fossil mammals of Australia.—Part III. *Diprotodon australis*, Owen." By Prof. Owen, F.R.S., &c. Received December 10, 1869. In this paper the author communicated his descriptions of *Diprotodon australis*, with figures of the fossil remains at his command, which have been received from various localities in Australia, since the first announcement of this genus founded on a fragment of lower jaw and tusk described and figured in the "Appendix" to Sir Thos. Mitchell's "Three Expeditions into the Interior of Eastern Australia," 8vo, 1838. The fossils in question include the entire cranium and lower jaw, with most of the teeth, showing the dental formula of:— $\begin{matrix} i & 3-3, & c & 0-0, & m & 5-5 \\ 1-1 & 0-0 & 5-5 \end{matrix}$ = 28; portions of jaws and teeth

exemplifying characteristics of age and sex; many bones of the trunk and extremities. The author described the skull and teeth and the result of the comparisons, establishing the marsupial characters of *Diprotodon* and its combination of characters of *Macropus* and *Phascolumys* with special modifications of its own, which are more fully and strongly manifested in the bones of the trunk and limbs, subsequently described. The pelvis and femora present resemblances to those in *Proboscidea*, not hitherto observed in any other remains of large extinct quadrupeds of Australia. But in all the bones described, essentially marsupial characteristics are more or less determinable. A summary of the characters of *Diprotodon* illustrated the conditions of its extinction, its analogies with the *Megatherium*, its affinities to existing forms of *Marsupialia* and the more generalised condition which it manifests of that mammalian type. A table of the localities, in Australia, from which remains of *Diprotodon* have been obtained and a table of the principal admeasurements of the skeleton, are appended to the text.

Royal Astronomical Society, January 16.—Third meeting of the Session.—Mr. De la Rue, vice-president, in the chair. The chairman announced that the president, though he was recovering his health, was not able to take the chair. Thirty-one presents were announced and the thanks of the society voted to their respective donors. The first paper read was a communication from Sir John Herschel, having reference to a supplementary list of eighty-four double stars observed at Slough since the year 1820. Amongst these were many observed by the elder Struve and an interesting portion of the communication referred to the relation between Sir John Herschel's estimate of the magnitudes of stars and Struve's. It appeared from the comparison that Herschel's magnitude 3.0 corresponded to Struve's 2.6 and the difference gradually widened from successive magnitudes until from the lowest orders the two lists were altogether discordant. A similar relation was observed (we believe by Mr. Knott) between the magnitudes in Admiral Smyth's Bedford catalogue and Argelander's estimates.—A communication from Mr. Joynson, having reference to observations made on occultations and on phenomena of Jupiter's satellites, was then read.—In a paper containing a list of occultations, Captain Noble referred to an estimate, by Mr. Penrose, of the latitude of the former's observatory as deduced from an occultation of ζ Ceti.—The next paper, by Commander Davison, on the November meteors as seen at Santa Barbara, California, con-