

## WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

## GEODESY.

**The lake survey.**—There has just been issued by the chief of engineers, in a quarto of 920 pp. with thirty plates, a detailed report of the operations in the prosecution of the survey of the Great Lakes. This important work is now finished, and the report presents in a comprehensive manner the methods used and results obtained. While omitting the vast amount of uninteresting detail with which such works are usually encumbered, all important features are given mention; and the whole volume is indexed with such care that any particular subject may be instantly found. The report starts with a historical account of the survey, from its inception in 1841, to its completion; gives a synopsis of the work accomplished under the various officers who from time to time have had charge of the survey; gives an account of the standards of length upon which the surveys depend, of the measuring-bars used and methods of using them, and of the results obtained both in the measurement of the base lines and in the results of their connection by triangulation, and of the geodetic and astronomical work. The part devoted to the discussion of the base apparatus will be found of special interest to geodeticians. Full account is given of the determination of the constants of the apparatus used, and of the co-efficients of expansion. Also there is a discussion of the 'set' of a zinc bar when heated. A portion of the book is devoted to the consideration of the mean levels of the Great Lakes, and the methods by which the results were obtained. The question of tides in the lakes had been previously considered (*Report of chief of engineers, 1872*). The tides are perceptible, but of scientific rather than practical importance, the maximum being less than two inches. — (*Professional papers, corps of engineers*, no. 24.) H. W. B. [346]

## MATHEMATICS.

**Elliptic-function formulas.**—Integral forms are given for certain products and quotients of the elliptic functions  $\text{enn}$ ,  $\text{enn}$ , and  $\text{dnn}$ . The author, Mr. Craig, starts out from a formula of Mr. Glaisher's for the second derivative of the function  $\text{cn}^n u$ . — (*Amer. journ. math.*, v., 1882.) T. C. [347]

**Intersections of circles and spheres.**—Gen. Alvard gives geometrical solutions of the problems, — to draw a circle cutting three given circles at the same given angle, to draw a circle cutting four given circles at the same unknown angle, and the analogous problems for spheres. — (*Amer. journ. math.*, v., 1882.) T. C. [348]

**Symmetric functions.**—Mr. Durfee has given tabulated values of the functions (of weight twelve) of the co-efficients of the twelfthic in terms of the symmetric functions of its roots, also the values of these symmetric functions in terms of the co-efficients. — (*Amer. journ. math.*, v., 1882.) T. C. [349]

**Elliptic functions.**—This is the first part of a paper by Otto Rausenberger, in which he introduces a new idea into the theory of elliptic functions. Instead of, as usual, considering doubly periodic elliptic functions, he considers that an advantage is gained by considering what may be called transcendents, with simply multiply periods (*einfacher multiplikatörischer periode*); that is, functions satisfying the equation  $f(px) = f(x)$ . The notation which he has adopted is made to conform as nearly as possible with that employed by Königsberger in his '*Vorlesungen über die theorie der elliptischen functionen*.'

He defines certain functions,  $\eta_0, \eta_1, \eta_2, \eta_3$ , which are analogous to the ordinary theta-functions, and gives the values of functions  $S(p, x)$ ,  $C(p, x)$ ,  $D(p, x)$ , which correspond in the ordinary notation to  $\text{sn } x$ ,  $\text{cn } x$ ,  $\text{dn } x$ , in terms of these  $\eta$ -functions. The equations are identical in form with those giving  $\text{sn } x$ , etc., in terms of the  $\theta$ -functions. In conclusion a discussion of some of the properties of multiplicate periodic functions is given. — (*Journ. reine angew. math.*, xciii.) T. C. [350]

**Binary quintics.**—An extensive discussion of the Hessian of the binary quintic is given by Mr. F. Lindemann. The expressions for the invariants and quadratic covariants of this sextic covariant, in terms of the invariants and covariants of the quintic to which it belongs, are obtained, and a relation found to exist between them, which is the necessary and sufficient condition that a given sextic may be the Hessian of a quintic. The typical expression of the Hessian by means of its quadratic covariants is next found. In the course of obtaining this, it is observed, that, when a certain invariance condition is fulfilled, the quintic is reducible to a known soluble form. The remainder of the article contains the investigation of the peculiarities which attach to the Hessian on the supposition of any peculiarity in the quintic, and *vice versa*; the determination of a quintic whose Hessian is given; and, finally, a geometrical interpretation of the condition satisfied by any sextic which is the Hessian of a quintic. — (*Math. ann.*, xxi. 1, 1883.) F. F. [351]

**Theory of numbers.**—In an article on power-residues (*potenzreste*) F. Hofmann employs the device of representing the residues of the successive powers of a number with respect to a prime-number modulus as the successive vertices of a regular polygon inscribed in a circle, to prove Gauss's theorems concerning the sums of the primitive roots of the binomial congruence,  $x^{p-1} \equiv 1 \pmod{p}$ . He makes some remarks on binomial equations, and their connection with binomial congruences. — (*Math. ann.*, xx. 4, 1882.) F. F. [352]

## PHYSICS.

## Acoustics.

**Range of sounds in air.**—Allard has deduced a formula for the intensity of a sound in terms of the work done in producing it ( $T$ ), the rate of vibration ( $n$ ), and the extreme range ( $x$ ). The table given by him shows that the intensity of the sound in air decreases more rapidly than is indicated by the law of inverse squares. At the extreme range, all the sounds are reduced to the same intensity; while the values of  $\frac{T}{x^2}$  vary, for the six instruments used, from 0.10 to 13.46.

A cause of this enfeeblement of sound is the reflecting action of the successive layers of air of different density when the atmosphere is not homogeneous. A formula is deduced which takes this action into account, which, with its constants determined from the experiments described, gives for a moderate acoustic transparency of the air, —

$$T(0.473)^x = 0.0000277 n x^2.$$

The work necessary to cause a given increase of range, and the range of sounds of different pitch produced by the same expenditure of energy, can also be determined from the formula. The difference of

range for the extent of an octave is slight. — (*Comptes rendus*, Nov. 22, 1882.) C. R. C. [353]

#### Heat.

**Relation between latent heat, specific heat, and volume.**—It is pointed out by Mr. Trouton that the latent heat of gasification at constant pressure of any body, divided by the product of the relative volume of the gas and the specific heat of the body, is approximately constant. This constant is calculated for many substances. The only marked exceptions are water and acetic acid. — (*Nature*, xxvii., No. 691.) C. B. P. [354]

**Exception to the second law of thermodynamics.**—An ingenious method has been devised by Prof. H. T. Eddy to show that radiant heat is an exception to the second law of thermodynamics. The method is based upon the fact that heat is radiated, not instantaneously, but with a finite velocity, and consequently it is possible for occurrences to take place, during the exchange of radiations between two bodies, such as essentially to alter the ultimate distribution of heat. If three screens, composed of some perfectly reflecting material, are provided with suitable apertures, and are placed parallel between two radiating bodies, velocities can be communicated to the screens such that radiations from the first body will pass through the apertures to the second body, while the radiations from the second body will be intercepted, and reflected back. Thus, if the temperature of the first body is less than that of the second, heat can be transmitted from a colder to a hotter body without compensation, and without the expenditure of work.

The axiom of Clausius, that heat cannot of itself pass from a colder to a hotter body, and the similar axiom of Thomson, are thus only true with regard to radiations, if the velocity of radiation is infinite.

The arrangement employed by Prof. Eddy, which he calls the 'radiation siren,' proves that we can no longer regard the law of dissipation of energy of universal validity, and we cannot accept the principle of Clausius, that the entropy of the universe tends to a maximum. — (*Proc. Amer. phil. soc.*, xx. No. 112.) C. B. P. [355]

#### Electricity.

**Electric railways.**—Professor Ayrton, in a lecture at the Royal Institution, showed that the weight of a train on an electric railway would be comparatively small, because stationary engines would be used, and each pair of wheels on all the cars could be used as drivers. Hitherto the objection to the extension of electric railways has been, that the insulation of the rails used as part of the motive circuit was imperfect. Prof. Perry and the lecturer have devised an arrangement by which the passing train depresses a series of corrugated steel disks mounted on stands some inches above the track, and thus makes a carefully protected contact with the insulated main cables on each side; at the same time putting a temporary earth fault in an auxiliary wire, which records at the station the progress of the train. The track is divided into sections, from each of which the current is cut out while a train is on the section next in advance. If a train enters the section so cut out, its electromotors are shunted, so as to powerfully resist the motion of the train. The electric lighting of the cars is kept up, in such a contingency, by the automatic switching-in of Faure batteries. — (*Nature*, Jan. 11.) J. T. [356]

**Wimshurst's electrical machine.**—Two circular glass plates 14½ inches in diameter, and ½ of an

inch apart, with 12 brass strips cemented on the outside of each at equal angular intervals, rotate in opposite directions on the same axis. Opposite strips on the same plate are connected once in each revolution by a curved metallic rod terminated with brushes. The electricity is collected by combs opposite the horizontal diameter. With the instrument described, under ordinary atmospheric conditions, a 4½-inch spark was obtained once in every 2½ revolutions. The only apparent exciting cause is the friction of the air between the plates. — (*Engineering*, Jan. 5.) J. T. [357]

**New telephone receiver.**—S. P. Thompson has devised an improvement on the instrument of Philip Reis, who utilized the sound emitted by a magnetized bar due to fluctuations in the magnetizing circuit. The improvement consists in making the magnetized core slender and subject to adjustable tension, and attaching one end to a suitable vibrating plate. In one form two cores are used, one being of nickel, which contracts when magnetized; the opposite movements being used to increase the distortion of the membrane. It is claimed that articulation, especially of sibilants and certain other consonants, is more distinct with this than with the common receiver. — (*Engineering*, Jan. 26.) J. T. [358]

**Value of the Siemens unit.**—E. Dorn, by a modification of Weber's second method by which he eliminates the influence of terrestrial magnetism, establishes the relation

$$S \cdot U = .94825 \times 10^{10} \frac{\text{mm.}}{\text{sec.}},$$

and compares this result with those of other observers in this table:—

Lorentz . . . . .	.9333	Brit. Assoc. . . . .	.9530
Rayleigh . . . . .	.9413	Rowland { from . . . . .	.9431
Kohlrausch . . . . .	.9440	{ to . . . . .	.9459
H. F. Weber . . . . .	.9550	Dorn . . . . .	.9483

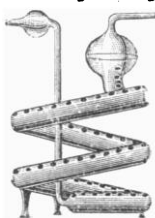
(*Ann. phys. und chem.*, xvii. 13.) J. T. [359]

#### CHEMISTRY.

##### (Analytical.)

**Absorption apparatus for elementary analysis.**—For absorption of the products in organic analysis, C. Winkler proposes the spiral apparatus shown in the accompanying illustration.

It should be capable of holding 20 grms. of sulphuric acid or 15 grms. of potassium hydrate solution; and it may be used to absorb either water or carbonic dioxide. — (*Zeitschr. anal. chem.*, 1882, 545.) C. F. M. [360]



**Separation of barium from strontium or calcium by potassium chromate.**—J. Merscherzski finds that barium chromate is soluble in 23,000 parts water, more soluble in acetic acid, and it has a great tendency to carry down other salts from the solution in which it is precipitated. Since strontium chromate requires 840 parts water for solution, it would be precipitated in a solution containing more than one per cent. The author therefore concludes that this method affords a convenient and sufficiently accurate means for a qualitative separation; but it cannot be relied upon for quantitative purposes. — (*Zeitschr. anal. chem.*, 1882, 399.) C. F. M. [361]

<sup>1</sup> These results depend on the ratio, given by Kohlrausch,  $\frac{B \cdot A \cdot \text{unit}}{S \cdot \text{unit}} = 1.0493$ .

**Testing for barium or sulphuric acid.**—The minimum strength of a solution of barium chloride in which barium can be detected with certainty, according to S. Pickering, is 1 part barium in 833,000 parts water; and the re-action is equally delicate with sulphuric acid or ammonium sulphate. The precipitation was observed against a black background by means of an artificial light placed almost vertically above the test-tube. — (*Chem. news*, xlv. 223.) C. F. M. [362]

**Estimation of sulphur in iron and steel.**—G. Craig meets with good results by passing the gases evolved with hydrochloric acid through an ammoniacal solution of hydrogen peroxide. — (*Chem. news*, xlv. 199.) C. F. M. [363]

**Detection and estimation of titanium.**—A. Weller finds that the change in color produced when titanitic acid is formed by oxidation of the sulphate with hydrogen peroxide is sufficiently delicate to render the re-action a suitable means for the determination of titanium. — (*Berichte deutsch. chem. gesellsch.*, xv. 2592.) C. F. M. [364]

**Estimation of titanitic acid in presence of iron.**—A method proposed by Pasani for the volumetric analysis of a solution containing titanitic acid and iron depended upon his observation that the acid oxide of titanium ( $TiO_2$ ), when reduced to the sesquioxide ( $Ti_2O_3$ ) by nascent hydrogen, could be completely oxidized by potassium permanganate, even in presence of iron in the ferrous condition. According to E. Wiegand, this method is incapable of giving constant results. He finds that ferrous oxide undergoes partial oxidation before oxidation of the titanitic sesquioxide is complete, and therefore infers that ferric oxide and titanium sesquioxide can exist in the same solution. — (*Zeitschr. für anal. chem.*, 1882, 510.) C. F. M. [365]

**Volumetric analysis of peroxides.**—A comparison of Bunsen's and Mohr's methods for the determination of available oxygen in peroxides by W. Diehl shows that digestion with hydrochloric acid and potassium iodide, recommended by Mohr, gives as exact results as the distillation in Bunsen's method. Digestion with acetic instead of hydrochloric acid affects as complete decomposition of manganese dioxide, either freshly prepared or in pyrolusite; and at the same time potassium iodide is without action upon ferric acetate. The available oxygen and the percentage of iron in manganese dioxide may therefore be ascertained by two determinations, in one of which hydrochloric acid is used, and in the other acetic acid. In lead peroxide the available oxygen may be as accurately determined by digestion with acetic acid and potassium iodide as by Bunsen's method. — (*Dingler's polytechn. journ.*, 246, 196.) C. F. M. [366]

#### METALLURGY.

**The Siemens direct process.**—This consists in heating mixed fine iron-ore and coal in a horizontal, slowly revolving cylinder. The iron forms a sponge ready for rolling, while the silica and earthy impurities form a slag, which removes the hurtful sulphur and phosphorus from the iron. Mr. James Davis of Landore, Wales, gives his experience. He makes one ton of wrought iron with one ton of gas-producer coal, reduces the sulphur to a trace, and the phosphorus to .05 per cent. He finds magnesia bricks to stand the best. In 32 days 21 hours net working time, with 200 heats, using 200 tons of ore and 120 tons hammer scale, he made 217 tons 5 cwt. of blooms. — (*Eng. and min. journ.*, Jan. 6, 1883.) R. H. R. [367]

**Recovery of precious metals from slags.**—A patent has been obtained by Mr. Richard Pearce of Denver, on an improvement in smelting gold and silver ores. The process consists in throwing upon the slags, as soon as the charge is perfectly melted, a fine-powdered oxide of copper or roasted copper matte. The furnace is then closed a short time. A reaction takes place, and a matte descends, thereby robbing the slag of its precious metals. For a charge of 3 tons of ore, 30 lbs. of oxide of copper are needed. — (*Min. and sc. press*, Dec. 16, 1882.) R. H. R. [368]

**Basic open-hearth steel process.**—Mr. O. T. Tellander has described the adaptation of this process at the Alexandrowsky steel-works, St. Petersburg, Russia. The steel is made from pig-iron, scrap-iron, spiegel, and ferro-manganese, which are melted in the usual Siemens-Martin furnace. The special feature of the basic process consists in lining the furnace with bricks made of dolomite mixed with 18 per cent of coal-tar. The joint between this lining and the outer Dinas bricks is made by a layer of chrome-iron-ore and coal-tar. A mixture containing .5 per cent of phosphorus yields steel with an average of only .04 per cent. The sulphur is also reduced as much, while the silicon is almost entirely removed. — (*Eng. and min. journ.*, Jan. 13, 1883.) R. H. R. [369]

#### AGRICULTURE.

**Value of sprouted and dried seeds.**—Experiments by Will led to the following conclusions:—

1. Mature seeds of common cultivated plants suffer no diminution of the proportion of seeds capable of sprouting, if soaked twelve hours in water, and then dried at ordinary temperatures. Some samples of peas constituted exceptions to this rule. Soaking twenty-four hours, and then drying, usually caused a slight decrease in the percentage of seed which germinated.

2. Some seeds even survive an interruption of germination in its first stages. The radicle dies, but is replaced by adventitious roots. The plumule is more enduring: even when the terminal bud is destroyed, lateral buds may develop.

3. The proportion of seeds capable of regermination is, in general, inversely proportional to the extent to which germination has progressed.

4. The extent to which the first germination may be carried varies in different kinds of seeds. Monocotyledonous seeds seem, in general, to withstand this treatment better than dicotyledonous.

5. In view of the fact that such seeds germinate only under the most favorable conditions, the use of seed that has once been germinated is not to be recommended in practice. — (*Landw. versuchs-stat.*, xxviii. 51.) H. P. A. [370]

**Prevention of potato-disease.**—According to Jensen, this disease, which is caused by a fungus (*Peronospora infestans*, Tul.), attacks first the tops, and is conveyed to the tubers by means of spores washed into the soil by rain. He therefore proposes to prevent this by running a plough between the rows, so as to throw up a furrow upon the top of the hills, while at the same time the tops are bent over so as to hang above the neighboring furrow. This should be done at least as soon as the disease shows itself on the tops; usually by the middle of August. In this way the washing of the spores into the hill is prevented. Furthermore, the potatoes should not be dug for at least two or three weeks after the tops are entirely wilted, to avoid infection from the latter. Field experiments with this method gave very favora-

ble results. — (*Biedermann's centr.-blatt.*, 1882, 755.)  
H. P. A. [371]

#### GEOLOGY.

**Impressions on Potsdam sandstone.** — At the meeting of the Natural history society of Montreal, Feb. 26, Mr. Walter Ferrier exhibited specimens of some new trails and impressions of animals from the Potsdam of Rainbow Falls, near Au Sable chasm on Lake Champlain. One of them is a cast of two narrow furrows about a quarter of an inch apart, with a rim of punctiform impressions about an inch distant at either side. This impression is repeated in two places on a ripple-marked slab. It may be the track of a trilobite with two prominent spines on the pygidium, possibly of some species of *Dikellocephalus*. Another is a trail about an inch in width, marked with transverse furrows and ridges, perfectly simple, and without any median ridge. In this last respect they differ from the trails known as *Rurichnites*, *Cruziana*, *Arthrichnites* (*Arthropycus*), and *Traena*. They resemble, though on a larger scale, impressions from the Erian sandstone of Gaspé, of which a slab from the collection of Dr. Dawson was exhibited for comparison. Such impressions, destitute of a central ridge, may have been made by gasteropods or by worms without any abdominal furrow. The name *Clydichnites* (wave-tracks) has been proposed for them by Dr. Dawson; and the Potsdam and Erian forms must belong to two distinct species. — J. W. D. [372]

**Newfoundland geology.** — The report of progress of the Geological survey of Newfoundland for the year 1881 contains a report of Mr. J. P. Howley on the structure of the peninsula of Avalon. He finds that the major part of the peninsula is made up of the various divisions of the Huronian or Intermediate system, as given in the report for 1868, resting upon a nucleus of gneiss, and succeeded by the fossiliferous beds of the primordial Silurian or Taconic, which skirt the shores of the bays, and form most of the islands therein. In division *d* of the Huronian system the fossils *Aspidella terranova* and *Arenicolites spiralis* occur. He recognizes two large intrusive masses of plutonic rocks, — one in the eastern, and the other in the western peninsula. That in the eastern peninsula he considers the older, as it has not affected the primordial strata, as has been the case in the western peninsula. The eruptive mass between Salmon cove and Collier's bay he considers as having been formed prior to the deposit of the higher members of the Huronian system, as the strata intersected are confined to the lower divisions, *a* and *b*. Mr. Howley failed to discover, in the auriferous quartz-veins of division *c*, a single example of visible gold. Some copper ores were found, mostly in divisions *a* and *b* of the Huronian system. Near Little Placentia, some argentiferous galenite occurred, which yielded, on analysis, 159 ounces of silver to the ton (2,240 pounds) of ore. Accompanying the report is an appendix with three plates, containing descriptions and figures of primordial fossils, by the late E. Billings. These figures and descriptions have already been published (*Geol. surv. Can., pal. foss.*, 1874, ii. 1). A geological map on a scale of four miles to the inch, and showing very plainly the distribution of the formations, accompanies this report; also a section-map showing the corrugations effecting the stratification of the Huronian formation near Brigus, Conception bay, on a scale of four inches to a mile, surveyed by J. P. Howley. — J. B. M. [373]

#### Lithology.

**Hunting for lost glaciers with a microscope.** — Considerable work has been done in this

direction in Germany and elsewhere by various observers. The work with which geologists are more or less familiar.

In the present paper the results of an extended study of the plagioclase rocks and phonolites of the Mecklenburg drift is given by one of the prominent young German lithologists, — Dr. Eugen Geinitz, of the Rostock university. Geinitz' method consists in examining thin sections of the rocks found in the drift, and comparing them with the descriptions given by the Scandinavian lithologists of rocks known *in situ* in that peninsula. In this way various basalts, diabases, gabbros, diorites, and phonolites are referred to certain localities in Sweden, whence they are supposed to have been derived. Interesting results can be obtained by such methods; but they are often uncertain, since it cannot be predicated that rocks of the same character do not exist, or have not existed, in the intermediate drift or water-covered areas.

The paper is a valuable one on account of the extended descriptions of the rocks examined. — (*Nova acta acad. Leop.-carol.*, xlv. 35.) M. E. W. [374]

**Hypersthene-andesite.** — The chief pyroxene of an apparently typical 'augite-andesite' from Buffalo Peaks, Col., was found by Whitman Cross to be hypersthene, both from its optical properties and chemical composition. The mineral was isolated for analysis by treating the rock powder with HFl, which dissolved the feldspar, glass base, and finally the augite, leaving only the hypersthene (richer in iron than augite) and ore particles. The latter, being magnetite, were separated by a small magnet. The microscopic examination of many European and American augite-andesites of the same type seems to prove that they, likewise, contain more rhombic pyroxene (hypersthene) than augite; and Cross claims that they should be separated from other andesites, and called 'hypersthene-andesites.' Nearly all other so-called augite-andesites have more of the trachytic habitus, and are so nearly related to hornblende and mica-bearing andesites, that, according to the writer, they cannot be consistently separated, and considered as a distinct group. Should the determination of hypersthene in this sub-group of the andesites be confirmed, a very interesting, widely distributed, and well defined rock-type will have been discovered. — (*Amer. journ. sc.*, Feb., 1883.) S. F. E. [375]

#### METEOROLOGY.

**Iowa weather service.** — Mr. Gustavus Hinrichs has issued an almanac for 1883, under the title of Iowa weather service annual, giving, in addition to the ordinary calendar, a summary statement of the climate of Iowa, illustrated by several diagrams. The mean temperature for Iowa City is, for the winter months, 25°; for the summer, 72°. The barometer is highest in December, lowest in April and June. The winds are strongest in March and April, being mostly westerly or north-westerly in winter, often easterly in spring, southerly or calm in summer, and westerly in autumn. Besides the general cyclonic storms, Iowa has the 'blizzard,' an intensely cold, high wind following a winter thunder-storm; the tornado, commonest in June, but occurring from March to October; and the squall, a sudden north-westerly wind with heavy clouds and rain, following sultry weather with light southerly winds. Precipitation is greatest from June to August, and least in December. It is shown on monthly maps compiled from 26,082 measures from 1876 to 1880. It is least in the north-west (26"), heaviest in the south (36") and east (38"), and seems to be "dependent on the distribution of

the timber in the State, being greatest timber is most abundant." — W. M. D. [376]

### GEOGRAPHY.

(South America.)

**Brazilian coast.** — R. A. Hehl describes the physical peculiarities of this coast, between 21° and 23° south latitude, under the headings of shore-lagoons, rivers, neighboring mountain ranges, and lowlands. — (*Peterm. Mittheil.*, 1882, 443.) W. M. D. [377]

**Fontana's unsuccessful search for Crevaux.** — The Argentine expedition under Fontana, sent last July in search of the remains of Crevaux and his party, who were lost on the Pilcomayo some months earlier, has returned to Buenos Aires without any information of the unfortunate explorers. It is concluded that any expedition, to be successful, must attempt the river from its head waters, whence a voyage down stream would require only four or five months; while, in ascending the river, at least ten months would be needed, and many great difficulties would be encountered. — (*Comptes rendus soc. géogr. Paris*, 1882, 466.) W. M. D. [378]

**Rumor of Crevaux's survival.** — M. Milhôme, a French settler in the province of Tarija, Bolivia, wrote last October that he was convinced that some of Crevaux's party were still alive, and held as slaves by the Tobas Indians. He had seen one of the party, named Zeballos, who had escaped the reported massacre, and who had seen another, named Blanco, kept as a prisoner. Moreover a cacique had brought information to Milhôme that the Indians had some white men as prisoners, and were learning the use of arms from them. — (*Compt. rend. soc. géogr. Paris*, 1883.) W. M. D. [379]

(Africa.)

**Wissmann's trip across Africa.** — At a meeting of the Khedival geographical society (Cairo) on Jan. 19, Lieut. Wissmann read a paper on his recent journey across equatorial Africa, stating, that, in company with Dr. Pogge, he had left Mukenge's town in the Tushilange country on Dec. 1, 1881, and crossed an unexplored country to the eastward as far as the Arab settlement Nyangwe, on the Lualaba, arriving there April 16, 1882. The route led them across the Lulua, Muansangoma, Lubilash, and Lomani rivers; and to the east of the last they came upon the route that Cameron had followed westward nearly ten years before. None of the large lakes previously reported in this region were found or heard of, except the Munkamba, which proves to be a small lakelet hardly three miles in length. It is fed by springs, and has no outlet, and lies at an altitude of 2,230 feet, in lat. 5° 45' S., long. 22° 55' E. Dr. Pogge at once returned westward from Nyangwe, but has not yet been heard from. Wissmann, after staying two months on the Lualaba, started eastward by a beaten track to Lake Tanganyika, which he crossed to Ujidi, and then passed by way of Tabora to Zanzibar on Nov. 17. His entire journey from sea to sea occupied twenty-two months. — (*Athenaeum*, Feb. 3, 1883.) W. M. D. [380]

**Pogge and Wissmann.** — B. Förster prepares for an account of the journey of these explorers across the Kongo basin and the lake-district by a review of the results of the earlier journeys in the same field by Livingstone (1852-54), Cameron (1874), Stanley (1876), and the travellers of the German-African association in the southern Kongo basin, within the last ten years. This is followed by a summary of Pogge and Wissmann's observations as far as Mukenge. — (*Ausland*, 1883, 33, 117.) W. M. D. [381]

(Atlantic Ocean.)

**Eruption of Teneriffe.** — C. Piazza Smyth learns from private advices, that for several months past there has been no snow on the upper part of the peak of Teneriffe, although the rest of the high land has been whitened, as is usual at this season, and that more recently (in January?) 'fire, like three great bonfires,' had been seen on the summit of the peak, and a lava-stream had begun to flow down it. Previous eruptions are recorded about 1582; again in 1703 from the side of the peak, giving forth lavas that threatened the town of Guimar, on the south, and destroyed Garachico and filled its bay, on the north; and, finally, in 1798, from the western side of the mountain away from the peak. — (*Nature*, Feb. 1, 1883.) W. M. D. [382]

### BOTANY.

**Action of fungi on cane-sugar.** — M. Gayon, in experimenting with *Mucor circinelloides*, found, that, in the absence of free oxygen, this fungus forms spherical cells, which produce alcoholic fermentation in beer-wort, grape-juice, and solutions of glucose and levulose, precisely like brewer's yeast; but, unlike that ferment, the *Mucor* produces no change in cane-sugar. But if a band of paper impregnated with invertine, or a fungus capable of producing invertine, as *Penicillium*, is introduced into a solution of cane-sugar, the *Mucor* is then able to produce an alcoholic fermentation. It is now known that several species of *Mucor* are not able to invert cane-sugar; and the same is true of *Saccharomyces apiculatus*. M. Gayon suggests an ingenious method of separating cane-sugar from other sugars, as in molasses, by fermenting with the *Mucor*, which leaves the cane-sugar unchanged and crystallizable, while, if brewer's yeast were used, all the sugar would disappear. — (*Ann. sc. nat.*, xiv. 46.) W. G. F. [383]

**Development of Ascomycetes.** — In order to decide the question of the sexuality of the Ascomycetes, C. Fisch has studied the formation of the asci and perithecia in the Pyrenomycetes. The principal genera studied were *Polystigma*, *Xylaria*, and *Claviceps*. In the first-named genus he finds that there are ascogons and trichogynes, which bear a strong resemblance to the organs of the same name found by Stahl in the lichen genus *Collema*; but, although spermogonia exist in *Polystigma*, Fisch could not be certain of a union of spermatia with the trichogyne, as was seen by Stahl in *Collema*. In *Xylaria* and *Claviceps*, however, he could find no evidences of sexuality, and the asci arose directly from the hyphae. Adopting the view advanced by DeBary in his paper on Saprolegniaceae, Fisch inclines to the belief that in the Pyrenomycetes we have a family in which apogamy exists as a rule, although in some cases, as in *Polystigma*, there is a connection with families in which there is a distinct sexuality. — (*Bot. zeit.*, Dec., 1882, Nos. 49-51.) W. G. F. [384]

**Structure and movements of leaves.** — The relations between particular structural features in certain leaves to the phenomena of nictitropic or sleep movements, and to those of movements following shock, must receive increased attention on account of recent papers by Gardiner and Cunningham. The former gave an account of his discovery (*Quart. Journ. of micr. sc.*, Oct., 1882) that the protoplasm in adjacent cells of the *pulvinus*, or cushion at the base of the petiole, of *Mimosa pudica*, is continuous; the continuity being maintained by protoplasmic filaments which pass through pits in the cell-walls. In a more recent paper (*Proc. roy. soc.*, Nov., 1882) Mr. Gardiner states that he has now found the same pe-

cular structure in the leaves of Robinia and Amicia; and he hints that the cases of continuity in protoplasm are numerous, being found not only in the *pulvini* of leaves, but in stems, roots, and tubers. Hugo de Vries found, that, when fresh, uninjured cells are treated with some neutral salt (say, potassium nitrate) in progressively stronger and stronger solutions, the protoplasm steadily contracts, until, with a 10% solution, it appears as a shrunken vesicle lying in the cell-cavity. In repeating these experiments, Mr. Gardiner finds, that, in a great number of instances, the contracted protoplasmic mass is connected with the cell-wall by fine protoplasmic threads. Moreover, the connecting-threads exhibit nodal thickenings, each node presenting a most perfect spherical form; and in several cases he has seen the threads in two adjoining cells exactly opposite each other. The method of treatment for this most interesting demonstration consists in subjecting thin, fresh sections to the action of a saturated solution of picric acid, washing with alcohol, and staining with aniline blue. Mr. Cunningham's paper is known to us as yet only through an abstract (*Proc. roy. soc.*, Nov. 16). From this abstract, which has been shortened as much as is consistent with clearness, we quote the following points: "The contractile organs, which are the chief determinants of movement, are, throughout the entire series of leaves, specially characterized by the porous nature of their component tissues. The porosity is very various in degree in different cases, and, according to the extent to which it prevails, converts the entire pulvinal organs, to a greater or less degree, into masses of a spongy texture, specially fitted to allow of the ready distribution of fluid contents. In those cases where it is most highly developed, as in *Mimosa pudica*, the pulvinal parenchyma is composed in greater part of finely porous cells, and in some portions contains masses of cells, which, in addition to the fine pores, are provided with one or more ostiola, — rounded openings with thickened margins." Again: it is asserted that the rapidity and magnitude of the movements in individual cases bear a direct relation to the degree of development of such structural features. — G. L. G. [385]

**Functional differentiation in stamens.** — Dr. Müller shows that some endogens possess staminal differentiations in the same flower analogous to those previously recorded in Melastomaceae. Species of *Tinnantia* and *Commelyna* are figured, in which the three upper stamens are shorter and more highly colored than the lower ones, the quantity of pollen they produce being at the same time lessened. Their function is clearly to attract insects, and supply them with food. The remaining stamens and the pistil are so situated that insects must effect crossing while collecting pollen from the short stamens. — (*Nature*, Nov. 9.) W. T. [386]

## ZOOLOGY.

### Ocoelenterates.

**The nervous system of hydroids.** — According to Jickeli, the ganglion-cells of Eudendrium may be seen without difficulty in a surface view of a tentacle which has been hardened in osmic acid, and stained with picrocarmine. They are granular cells, situated between the bases of the ectoderm-cells, and sending off long processes which may join processes from adjacent ganglion-cells, or they may run to nettle-cells, or in among the muscle-fibres. In some cases a process from a ganglion-cell could be traced upwards, between the ectoderm-cells, to a small, spindle-shaped 'sensory cell' near the surface. The ganglion-cells are most easily seen on the tentacles; but they are also found on

the body, the hypostom, and the glandular ring around the base. They are especially abundant in the stem of Eudendrium; and Jickeli believes that those found in the hydranth are developed in the stem. On the hydranth the ganglion-cells are sometimes aggregated in groups, and there is an indefinite nerve-ring around the base of the body. Jickeli has also succeeded in detecting the ganglion-cells of Hydra, although they are by no means so conspicuous as they are in Eudendrium. They are less granular, the nucleus is much larger, and the processes are more numerous. They are found in the ectoderm of all parts of the body, and they are usually situated among the groups of nettle-cells. — (*Zool. anz.*, no. 102; *Morph. Jahrb.*, viii. 380.) W. K. B. [387]

**Histology of hydroids.** — In addition to his interesting account of the nerve-cells of Eudendrium and Hydra, Jickeli describes other histological features of these two genera, especially the gland-cells and nettle-cells. In Eudendrium, the nettle-cells are most abundant in the stem; and he believes that this is the only place where new ones are formed, and that each hydranth receives its full share when it is formed as a bud. In Hydra each nettle-capsule is almost enclosed by a nucleated cell, which corresponds to the network of muscular fibres described by Chun in the Siphonopherae, and which sends muscular processes into the layer of muscle-fibres formed by the ordinary epithelio-muscular cells.

He points out the fact that the various species of Hydra may be identified by their nettle-cells alone.

The paper also contains a discussion of Kleinberg's *neuro-muscular* cell theory, and a bibliography of the minute anatomy of hydroids. — (*Morph. Jahrb.*, viii. 373.) W. K. B. [388]

### Crustaceans.

**Breaks in the exoskeleton of decapod Crustacea at the time of moulting.** — The apodemes of the exoskeleton, which form the sternal canal enclosing the chain of nervous ganglia in the Macrura, cannot be shed entire at the time of exuviation, as they have been said to be, without breaking the principal cords of the nervous system; and F. Mocquard finds, on examining the exuviae of *Palaemon* and the common lobster, that there is, in fact, a solution of the continuity of the apodemes along the median line at the time of moulting. He has not examined exuviae of *Brachyura*, where there is no proper sternal canal, but observes that the disposition of the venous sinuses necessitates the rupture of the apodemes at the time of moulting. — (*Comptes rendus*, Jan. 15, 1883.) S. I. S. [389]

**Origin of the species of Ocyropa from the Bonin islands.** — Among some specimens of *Ocyropa* from the Bonin islands, Mr. Ishikawa is quite certain he sees 'specific differentiation going on before our eyes' in the varying length of the ocular stylet, and some other slight differences. The specimens are said to be closely allied to *O. arenaria*; but the figures which accompany the paper show that they are really very different, that they probably belong to two well-known Pacific-ocean species (*O. ceratophthalma* and *O. cordimana*), and that the supposed 'stepping-stones' between the two forms are only well-known variations of the former species due mostly to age and sex. — (*Amer. nat.*, Feb., 1883.) S. I. S. [390]

### Insects.

**Habits of the basket-worm.** — Prof. William Macfarland called attention to two important facts in the history of *Thyridopteryx ephemeraeformis*. When large trees are inhabited by them, only the small ends

of the twigs become their winter habitat. The arborvitae, and small trees with many slender branches, are their favorite resorts, and, when once attacked, are frequently destroyed. After the basket is well constructed, they have few enemies; but so persistent are these few that they nearly exterminate the basket-worm. At least seventy-five per cent are annually consumed by very small ichneumon flies, about one-eighth of an inch in length. Only about five per cent of those opened had ovaries filled with eggs.

Most of the *T. ephemeriformis* thus infested with parasites are pupae; but some are found in the imago state, when the eggs have become the favorite food, and are wholly consumed.

There is only one brood annually; and, from what has been observed, it is quite evident that all shrubs and trees may be ridded of these pests by picking the cases off during the winter or early spring. — (*Trenton nat. hist. soc.*; meeting Feb. 13.) [391]

**Fertile eggs from a dead moth.**—Mr. F. G. Schaupp states that last July he captured a ♀ of *Arctia virgo*, and obtained about a dozen eggs. As the specimen was useless for the cabinet, having lost half a wing, he dissected the abdomen, and found about fifty eggs therein, sticking together. After washing them with tepid water, he put them in a hatching-box, and in due time about twenty young larvae made their appearance. Could the same thing not be done when capturing a poor ♀ of a rare species? — (*Brookl. ent. soc.*; meeting Feb. 3.) [392]

#### VERTEBRATES.

**Relation of spinal-cord nerve-cells to fibres in the spinal nerves.**—A careful enumeration of the large 'motor cells' in the anterior cornua of the spinal cord of the frog, and of the number of nerve-fibres in the anterior and posterior roots of the spinal nerves, has been made by Birge. He finds that there are just as many motor cells in the cord as fibres in the anterior roots, and that in regions where the fibres joining the cord are numerous, the motor cells are proportionately increased in number. When an individual shows some abnormality in the distribution of nerve-fibres between its anterior roots, a corresponding irregularity is found in the cells of the anterior cornua. It is therefore almost certain, that each motor nerve-fibre has its own single nerve-cell as its central organ, and that these cells lie in the spinal cord near the level at which their fibres join it. As the frog grows, the number of nerve-cells in the anterior horns of the gray matter, and the number of fibres in the anterior spinal roots, increases, proving a continued development of motor cells and motor fibres as the muscles increase in mass.

In any given specimen the fibres in the sensory roots are more numerous than those in the motor. The sum of the fibres in the anterior and posterior roots of a spinal nerve is equal to the number of fibres in the common trunk formed by their union beyond the ganglion of the posterior root. Hence, in traversing its ganglion, the sensory root experiences no increase or diminution in the number of its nerve-fibres. — (*DuBois' Archiv.*, 1882, 435.) H. N. M. [393]

**Irritability of motor-nerve cells in the spinal cord.**—If parts of the spinal cord of the frog be cut or pricked, tetanus occurs in certain groups of muscles. Such tetanus does not follow cutting or pricking a nerve-trunk. Working with special apparatus, and with methods making it possible to ascertain exactly what part of the spinal cord was pricked, Birge finds that in the region of the spinal cord from which the sciatic plexus originates, the insertion of a needle-point only causes tetanus (with

rare exceptions) when the needle has passed through the region of the gray matter in which the motor cells lie. Pricking the gray matter elsewhere has no effect on the muscles, or only causes a 'twitch' instead of a tetanic contraction. He concludes that the motor cells are capable of direct mechanical stimulation, and that a momentary stimulus throws them into a state of activity which lasts longer than the application of the stimulus. As his previous work (see 393) had made it pretty certain that each motor fibre ended in one definite motor spinal-cord nerve-cell, he concludes that any normal stimulus (voluntary or reflex), acting in the ordinary working of the body on the motor cells of the spinal cord, will, no matter how transient it may be, cause, not a twitch, but a tetanic muscular contraction of longer or shorter duration. — (*DuBois' Archiv.*, 1882, 481.) H. N. M. [394]

**Influence of respiratory movements on arterial pressure.**—In a previous work Schweinberg had shown that in dogs the normal respiratory variations of arterial pressure disappeared upon cutting the phrenics. He concluded that the variations were due to changes of intra-abdominal pressure, dependent on diaphragmatic contractions and relaxations. If this be so, the respiratory curves of arterial pressure ought to disappear even with intact phrenics, if all circulation through the abdominal arteries be prevented: this Schweinberg finds to be the case. When the thoracic aorta is tied above the diaphragm through an opening made in the back of the thorax with care to leave the pleurae intact, then, unless the breathing becomes forced and abnormal, all the respiratory variations of arterial pressure cease. — (*Arch. für physiol.*, 1882, 540.) H. N. M. [395]

**The fatigue curve of striated muscle.**—A short paper on this subject by Valentin contains as its chief novelty the fact that repeated feeble exercises of functional activity by a frog's muscle through which no blood is circulating aid in restoring the fatigued organ, so that subsequent contractions become more powerful. — (*Pflüg. arch.*, xxix. 506.) H. N. M. [396]

#### Birds.

**Germinal disk of birds.**—Gasser has published an article containing several matters of interest. He first supplements his previous observations on the neurenteric canal, and reviews Kupffer's work. He still maintains that in birds "the primitive groove first becomes distinct on the anterior part of the primitive streak, and there becomes deepest; this deepest part corresponds to the spot where in many bird embryos the perforation of the neurenteric canal subsequently occurs." He then passes to the consideration of Koller's investigations, whose conclusion is, that the primitive streak is normally preceded by a 'sichel' (a crescent-shaped thickening of the inner germ layer on the edge of the *area pellucida*). On the contrary, Gasser maintains that the 'randwulst' is thicker behind than in front, and the thickened portion may present sometimes in surface views the figure of a crescent, and that a *sichel* as a structure distinct from the *randwulst* is not proved by Koller to exist. Further Gasser argues against Koller's assertion that the primitive streak grows forward out of the supposed *sichel*; and he declines to admit any morphological importance for the groove, which is occasionally found in the *randwulst* (Koller's *sichel*), and upon which Koller lays such stress. Next follows a brief notice of Balfour and Deighton's paper. The remainder of the article is occupied by the author's own recent investigations on the chick, goose, and dove,



concerning the origin of the primitive streak. In a series of five chick-embryos, 5-8 $\frac{3}{4}$  hours incubation, the first important development noted was in the entoderm, which in the front part of the *area pellucida* remains thin, while in the posterior part it is thickened, until at the edge of the *opaca* behind it is five or six layers of cells thick. In the next stage there is a short primitive streak (but without its cephalic process) within the *area pellucida*, and formed essentially by the thickened outer germ-layer. The inner layer now includes both mesodermic and entodermic elements, and does not correspond to the definite entoderm of later stages. Around the edge of the germinal disc the upper layer bends over, and is united with the inner layer; the bend marks the germinal wall and later *randwulst*, which is thickened posteriorly, forming Koller's *sichel*, which is not a distinct structure. The inner layer forms one mass with the germinal wall, and it is probable that the latter furnishes the cells to thicken the former. The thickening of the inner layer may be best interpreted as a step towards the formation of the mesoderm. Gasser also reports in detail his observations on the goose and dove. Unfortunately the memoir is without plates, and contains no summary of the author's conclusions. — (*Arch. f. anat. physiol.; anat. abth.*, 1882, 359.) C. S. M. [397]

**Colors of feathers.**—In continuation of previous communications Dr. Hans Gadow discusses the colors which are not the result of pigments: blues he considers to be the result chiefly of a series of fine lines on the walls of the prism cells; greens as the result, most often, of decomposition of light from a yellow pigment; metallic feathers are considered to work on the simple principle of a prism. — (*Proc. zool. soc. Lond.*, 1882, iii.) J. A. J. [398]

#### Mammals.

**Notochord of mammals.**—Strahl in the paper above noticed showed that the neurenteric canal appears in the anterior end of the primitive streak, and that its wall is concerned in the formation of the notochord. His observations refer to lizards. Lieberkühn has found a canal in guinea-pig embryos, which occupies a similar position, and leads to the formation of the notochord (*chorda dorsalis*). This canal is, therefore, probably homologous with that of lizards, although it is developed in the interior of the mesoderm without connection with the ectoderm. Lieberkühn's views on the early development of mammals may be summarized as follows: After the completion of segmentation, fluid accumulates between the outer cell layer and the inner cells in such manner that the latter finally mark out the embryonic disk, which accordingly consists of the outside covering of flattened cells (ectoderm), and the inner layers of round yolk cells (entoderm). The ectoderm then grows on all sides, and becomes thinner. The flattening-out of the ectoderm is evidently a rather complicated process, which Lieberkühn tries to elucidate, following Balfour (*Comp. embryol.*, ii. 181, 182). Next appears the mesoderm, before the primitive streak becomes visible. The cells of the middle layer appear between the two primitive layers, at first at the posterior end of the disk. They are certainly derived in part from the ectoderm, and very probably in part also from the entoderm, since in the region of the primitive streak the three layers are not limited one from another. Yet at first the mesoderm appears in the mole as a simple layer of cells between ento- and ectoderm. The primitive streak is a thickening of the mesoderm, and terminates anteriorly in a special thickening known as the cepha-

lic process. This appears in guinea-pigs on the thirteenth day. The mesoderm in the process is entirely separated from the ectoderm, which rises in a slight convexity over it. The passage of the adherent (mesodermic) primitive streak to the free 'process' is known as Hensen's knot, it being marked later by a slight enlargement. The process grows forward; and at the time it reaches the dark edge of the disk a longitudinal canal appears in the midst of it, short at first, but rapidly elongating. The canal subsequently breaks through into the entoderm; the opening gradually, but irregularly, extends the length of the canal, which thus becomes, as it were, a trough or furrow in the dorsal wall of the entoderm. The cells of the canal are cylindrical and high; the furrow flattens out, and its wall then appears a constituent part of the entoderm. This stage has been seen by previous observers. By the time the canal is opened about to the middle of the germinal disk, the formation of the medullary groove begins. In the next stage Hensen's knot is relatively nearer the posterior end of the disk. The protovertebrae appear. By the time there are four, the chordal canal continues to grow backward in the primitive streak in the same manner as at first; but at the posterior end the differentiation of the chorda no longer precedes, but follows, that of the medulla and intestine. The manner in which the notochord becomes finally separated from the entoderm has been accurately described in other publications. (The author's text and plates are arranged in inexcusable confusion. Those who wish to read the original are counselled to begin with a careful study of the explanation of the plates.) — (*Arch. anat. physiol.; anat. abth.*, 1882, 399.) C. S. M. [399]

**Foetal envelopes of Chiroptera.**—According to Robin, the foetal envelopes of the Phyllostomidae resemble rather those of the rodents than of other Chiroptera. — (*Comptes rendus*, Dec. 26, 1882.) C. S. M. [400]

**The evolution of deer-antlers, and atavism in the hog-deer.**—A pair of antlers of the hog-deer (*Axis porcinus*) is described by J. Cockburn, in which the left horn bears five tines. The first two are normal; the third is bent inward and backward; the fourth and fifth correspond somewhat closely to the 'royal' and 'sur-royal' of the Wapiti (*Alces canadensis*). Caton's opinion that such unusual forms are due to accident is not concurred in, the present and other similar cases being explained by atavism.

Garrod's law, according to which the typical antler consists of a bifurcated beam, with a brow-antler near the base, is set aside in favor of Dawkin's theorem, which is recast in the following words: "The development of the antlers of individual species of cervines is a recapitulation of the history of the development of antlers in the group." The typical or primeval antler, according to Cockburn, is a simple spike, "capable of extensive furcation, reduplication, arrest and redundancy of growth in parts." An attempt is made to explain the form of the antlers of various species of deer according to this theory. — (*Journ. Asiat. soc. Bengal*, li., 1882, 44.) F. W. T. [401]

**Behavior of the American flying-squirrel in confinement.**—Mr. F. H. King, who kept three young flying-squirrels (*Sciuropterus volucella*) in confinement for several months, gives an interesting account of their actions. They were strictly nocturnal, assuming an especially playful mood at 10.45 P.M. and 3.30 A.M., which, in each case, lasted an hour or more. When on the wing, and just prior to alighting, the fore-limbs were made to vibrate as if in true flight. One of the specimens, having broken a hind-leg,



strongly objected to the splints which were applied, and cut them loose at once; but soon after, it submitted to the treatment a second time with grace, and made no effort to free himself. Nuts were the favorite food; but animal food was not always rejected. Acorns, when first offered, aroused remarkable emotion, and an effort was made to bury them. After they were added to the *menu*, all other nuts were rejected, except hazelnuts. The squirrels, when taken, were too young to have had any experience in storing nuts. The chief pet did not fail to recognize Mr. King after an absence of three months. — (*Amer. nat.*, 1883, 36.) F. W. T. [402]

**Taxonomy of the hoofed quadrupeds.** — E. D. Cope, taking cognizance of both living and extinct forms, emphasizes the taxonomic value of the arrangement of the carpal and tarsal bones. He recognizes the following orders and suborders: Taxeopoda, including suborders Hyracoidea and Condylarthra; Proboscidea, including suborders Proboscidea and (probably) Toxodontia; Amblypoda, including suborders Pantodonta and Dinocerata; and Diplarthra (equals Ungulata of most writers), including suborders Perissodactyla and Artiodactyla. The forms in which the two rows of carpal and tarsal bones do not alternate are mostly extinct, while those in which they do alternate have endured. The Perissodactyla and Artiodactyla, as well as the Proboscidea, are regarded as descendants of the Taxeopoda, representing different branches of that order. — (*Proc. Amer. philos. soc.*, xx., 1882, 238.) F. W. T. [403]

**A mole pursues an earthworm** to the surface of the ground, and drags it below (F. Lang). — (*Zoölogist* (3), vii. 76.) F. W. T. [404]

#### ANTHROPOLOGY.

**Michlucho Maclay's travels.** — Our readers will recall the charming letters we used to read a year or two ago from this distinguished traveller, and will be pleased to learn that he has resumed the publication of his researches by a series of lectures before the Russian geographical society. He has brought home from New Guinea and the Malacca peninsula both objects and drawings illustrative of the person, dress, implements, dwellings, activities, social life, and religion of the natives.

The natives of the north-west coast are at the lowest stage of culture. Before Mr. Maclay's visit, they used only implements of stone, bone, and wood, and knew not how to make fire. They do not bury their dead, but place the corpse in a sitting position, and, having covered it with palm-leaves, dry it by means of fires. There is but one race of Papuans, those of the interior belonging to the same race as those of the coast. Both dolichocephalic and brachycephalic crania have their representatives among the purest Papuans of the Malay coast; the transversal diameter of the Papuan skulls varies from 62 to 86 per cent of the length. The clustered hair often insisted on by many writers does not exist among Papuans, not even among children. Furthermore, the size of the curls is no criterion of distinction between the Papuans and Negritos. The method of race mixture is very well explained in the traffic in girls carried on between Celebes and New Guinea. At Port Maresby (Anaputata) on the southern coast, a mixture of Polynesian blood among the Papuans was noticed. These Metis have a lighter skin and uncurled hair, and practise tattooing. The women tattoo themselves from the forehead to the feet, and often shave the head to tattoo it. The men are marked only to

exhibit some of their exploits. Mr. Maclay made five visits to New Guinea, and the full account of his work will be eagerly looked for.

In a subsequent communication Mr. Maclay reported his extended travels, full of most valuable information, in the Malay peninsula, and among the islands of Malaysia, Micronesia, and Melanesia, as well as in Australia. — (*Nature*, Dec. 7, 21.) [405]

**Documentary history of New York.** — Those who have had occasion to study the Indians of eastern United States during the colonial period will recall the invaluable help they received from the ten ponderous volumes of the Documentary history of New York, compiled by Mr. O'Callahan. It is not to these that we wish to recall attention, but to the thirteenth volume of the series, just received, containing documents relating to the history and settlements of the towns along the Hudson and Mohawk rivers, from 1630 to 1684, and also illustrating the relations of the settlers with the Indians, translated and edited by B. Fernow, keeper of the historical records. The work is prefaced by a letter from Joseph B. Carr, secretary of state, and concludes with an appendix by Dr. J. G. Shea, being an extract from the narrative of the captivity of Father Isaac Jaques, among the Mohawks in 1642 and 1643. A complete table of contents and a good index leave nothing to be desired in the way of perfecting the volume. — J. W. P. [406]

**Urgent need in anthropology.** — Mr. William L. Distant writes to *Nature*, that, while zoölogy and geology have each a yearly 'record,' anthropology still remains without that aid to its proper advancement. The bibliographies of the German publications, and of Prof. O. T. Mason in the *Naturalist*, are referred to. It would be well for those interested in such matters, while waiting for a more systematic annual test, to keep a close lookout for the *Revue d'anthropologie*, the more extended bibliography of American anthropology by Mr. Mason, in the Smithsonian Annual Report, and especially for the *Index medicus*, published in Washington. In the last-named periodical, under the words, 'biology,' 'physiology,' 'craniology,' and 'anthropology,' will be found the titles of almost all the best productions upon anthropology. — (*Nature*, Nov. 30, 1882.) J. W. P. [407]

**Cannibalism in New England.** — Mr. Henry W. Haynes has discovered evidences of this horrid custom on the coast of Maine. The shell-heaps of Mount Desert and vicinity yield the evidence; and the people who practised the eating of their fellow-mortals were the ancient aborigines. The author cites other writers as witnesses to the fact. — (*Proc. Boston soc. nat. hist.*, xxii.) [408]

#### EARLY INSTITUTIONS.

**Universities.** — In a rectorial address to the students at Aberdeen, Alexander Bain describes the history of universities and the university ideal. It is interesting to read this in connection with the address of Dr. Behrend at Greifswald, in the *Deutsche Rundschau* of last December. — (*Pop. sc. monthly*, Feb., 1883.) D. W. R. [409]

**The early Germans.** — R. Schröder sums up the conclusions of Louis Erhardt, *Aelteste germanische staatenbildung* (Leipzig, 1879), as follows: 1°, Germanic origin of the Nervii, Treviri, and other Belgic peoples; 2°, many small kingdoms (*pagi*) among the Germans; 3°, each kingdom governed by a king and senate of a hundred members (*centeni ex plebe comites*); 4°, the *pagi* of Caesar and Tacitus must not be confounded with the later hundreds. — (*Hist. zeitschr.*, 6 heft, 1882.) D. W. R. [410]

**Statistics of population.** — Dr. H. Paasche writes regarding the population of the cities of western Europe during the middle ages, that, even as late as the seventeenth century, no regular estimates of population were made. Nobody cared for statistics of this sort: consequently there is a gap in our knowledge

of economic and social life of those times, which can only be filled up by reasoning from incidental items in town and city records. The writer takes up the history of Rostock in the fifteenth and sixteenth centuries, and shows how this may be done. — (*Jahrb. nat.-ökon. statist.*, Nov. 15, 1882.) D. W. R. [411]

## INTELLIGENCE FROM AMERICAN SCIENTIFIC STATIONS.

### GOVERNMENT ORGANIZATIONS.

#### Coast and geodetic survey.

**Recent deep-sea soundings of unusual depth.** — In the prosecution of recent deep-sea soundings off the West-Indian islands by the U. S. steamer 'Blake' (Lieut.-Comdr. W. H. Brownson, U.S.N., commanding), for the purpose of ascertaining the extent of the continental plateau and the border of the oceanic basin, some extraordinary depths have been reached, and successfully measured by the method of wire-sounding; the specimen-cup and thermometers having been brought up from depths exceeding five miles.

The following extracts from the report of Lieut.-Comdr. Brownson, addressed to Prof. J. E. Hilgard, superintendent of the survey, will be of general public interest. It is written from St. Thomas, under date of Jan. 29, 1883.

"I enclose, herewith, approximate positions of soundings taken on lines, first, from Mariguana to Ocean plateau, thence down through Turks island passage to coast of Hayti, — second line from Samana promontory to Navidad bank, — and thence out to Ocean plateau. . . . From an inspection of the chart to the northward of this island, in connection with the result obtained by me on last line, and the soundings taken by Sir George Nares in the 'Challenger,' I thought it more than probable that the deep water found by him (3,875 fathoms) would extend to the westward. . . .

"On the 27th inst., in lat. 19° 40' 50", long. 66° 23' 40", seventy-one miles west of 'Challenger's' greatest depth, with long rolling sea, fresh trade-winds, with frequent squalls of wind and rain, sounded in 4,561 fathoms. In reeling in, cross-heads of sounding-machine showed great strain on wire: so shipped cranks to assist reeling-engine over the centre to prevent sudden strain on wire; and, by using every care to ease the strain, we succeeded in recovering the sounding-rod and thermometer. The bottom was brown ooze; temperature 36¼° F.

"Fifteen and a half miles south-east of the latter station sounded again in 4,223 fathoms, bottom of two layers of ooze, brown on top, with under-strata of gray; temperature 36°. When the wire was nearly in, the reel showed signs of being crushed, cracking in several places; but fortunately it did not give way. With the last sounding, two bottom-thermometers were sent down, — a Miller Casella No. 49,406, and a Tagliabue No. 531. The latter came up crushed by the excessive pressure. The reading of the Miller Casella I have no reason to doubt.

"I doubt if the sounding machine and wire has ever before successfully withstood so great a strain.

"In the soundings taken by Capt. Belknap in the Pacific, in no case that I can find were the sounding-rod and bottom-thermometer recovered in over 4,356 fathoms.

"In the second sounding, the wind had freshened considerably, and there was a short ugly sea in addition to the long swell."

#### Geological survey.

**The Grand Cañon Group.** — Marble Cañon and the Grand Cañon constitute together a continuous gorge, through which the Colorado river courses for 250 miles. The walls of the gorge are not sheer precipices, but are terraced on a grand scale; the succession of platforms and cliffs being determined by the succession of strata, which, for the most part, lie horizontal. The top of the wall is everywhere upper carboniferous; and thence downward for about 4,000 feet there is a nearly uniform system of paleozoic rocks, conformable in dip. The principal member of this conformable series is so massive that the cliff formed by it is unscalable at nearly all points; so that almost the only access to the depths of the gorge has been by boats. In Major Powell's first exploration of the Colorado, he discovered at the head of the Grand Cañon, where the gorge is deepest, a system of inclined rocks which had been greatly eroded before the deposition of the conformable series. These unconformable rocks, which he named the *Grand Cañon Group*, rest in turn upon schistose and granitoid rocks having the general facies of the archæan. The difficulties of the voyage, and especially the exhaustion of supplies, rendered it impossible for him to make extended search for fossils; and, in lack of paleontologic evidence, he assigned the Grand Cañon Group provisionally to the Silurian, and referred the whole of the conforming series above it to the carboniferous. Mr. Gilbert, examining soon after the section at the lower end of the gorge, discovered no unconformity, except that between the metamorphic and non-metamorphic rocks; and, finding Cruziana in the lowest member of the unaltered rocks, he referred it provisionally to the lower Silurian. He named this member the *Tonto Group*. Still later Mr. C. D. Walcott, making a careful study of the section at an intermediate point, discovered an unconformity by erosion above the Tonto, and at the same time obtained additional fossils which served definitely to place the Tonto in the Cambrian. The question then arose, whether the unconformity by erosion, observed by Walcott, was the equivalent of the unconformity by dip observed by Powell. If it was, then in Powell's section the Tonto lay immediately above the archæan, and the Grand Cañon Group was Cambrian. If it was not, then the Tonto was to be found at the base of Powell's conforming series, and the Grand Cañon Group was Pre-Cambrian. For the sake of settling this question, and at the same time of exploring the Pre-Cambrian rocks, if such they should prove to be, Major Powell, last autumn, made an excursion to the locality, with great difficulty constructing a horse-trail from the upper plateau to the brink of the river, where the rocks are best exposed. He found the Tonto at the base of the upper series, and thus demonstrated the Pre-Cambrian age of the Grand Cañon Group. The rocks being unmetamorphosed, and the series having a thickness of more than ten thousand feet, there is great reason to hope that they will prove fossiliferous, and thus add a prefatory chapter to the