It will be especially welcomed in those laboratories where considerable attention is already given to vertebrate work; and it will do good service in aiding to bring about a more equitable division of time and opportunities in those laboratories where the invertebrates have hitherto received the lion's share of attention, and in some cases have taken nearly, or quite all, the time in a course supposed to be devoted to general zoölogy.

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

MATHEMATICS.

Attractions. — M. Angelitti discusses the case of the attraction exerted between two masses when the attraction varies as the product of the masses and some function of the distance. The particular function of the distance employed is the inverse *n*th power. The author considers the attraction of lines and plane figures upon a point in the plane, and finally briefly considers the attraction of surfaces and solids upon points external to them. Nearly all of the results are known, many of them having been given by Jellett and Townsend. — (*Giorn. mat.*, xx.) T. C. [584

Bernouilli's numbers. — Mr. Ely, in a paper read before the J. H. U. mathematical society, Jan. 17, 1883, gave an account of the numbers $A_{n,m}$ (generally known as $\Delta^n O^m$) which occur in the proof of Staudt's theorem concerning Bernouilli's numbers. After giving the definition of these numbers in the form of a series, and stating some of their known properties, Mr. Ely proceeds to enunciate a number of new properties. Without using a great many algebraical symbols, it is impossible to give a fuller notice of Mr. Ely's interesting communication. — (*Johns Hopkins univ. circ.*, No. 21, 1883.) T. C. [585

Partitions. — Professor Sylvester defines partitiongraphs, and makes certain applications of their properties to infinite series and infinite products, and particularly to the two forms of representation of the theta functions of one variable by means of an infinite series and an infinite product. A partitiongraph is defined as a series of points lying in lines parallel to two fixed lines. The number of points, or lines parallel to one of the boundaries chosen at will, will represent the successive components of the partition, and the number of the lines themselves will be the number of parts in the partition. The lines in question are termed *magnitude*-lines, and the crossing ones *part*-lines. The graph is termed regular when the magnitude-lines never increase as they recede from the rectilinear boundary to which they are parallel. This cannot happen without the same being true of lines parallel to the part-boundary. A regular graph is thus one in which the lines and columns of points neither of them increase as they recede from their respective boundaries. A partition is self-conjugate when its representative graph, after an interchange of the names of the part- and magnitude-lines, gives the same reading. Such a graph is therefore symmetrical. By application of the properties of the above-described partitiongraphs, Prof. Sylvester proves the equation between the reciprocal of $(1-ax)\,(1-ax^2)\,(1-ax^3)\,\ldots$ and the infinite series

$$1+\frac{x}{1-x}\cdot\frac{a}{1-ax}+\frac{x^4}{(1-x)(1-x^2)}\cdot\frac{a^2}{(1-ax)(1-ax^2)}+\ldots$$

He also shows how to obtain the development in infinite series of the infinite products $(1+ax)\,(1+ax^3)\,(1+ax^5)\,\ldots$ and $(1+a^{-1}x)\,(1+a^{-1}x^3)\,(1+a^{-1}x^5)\,\ldots$ A parallel bipartition of u is defined as a couple of sets of numbers written on opposite sides of a line of demarcation, so that the number of numbers on the left always exceeds that on the right by a given difference, δ, which may be any number from zero upwards, and such that the sum of all the elements collectively is equal to n. Then the co-efficient of $x^n a^j$ or $x^n a^{-j}$ in the above products is the number of parallel bipartitions of n to the difference j, limited to contain only odd numbers, which must not appear in the same arrangement more than once on the same side of the line of demarcation. In vol. v., No. 3, of the *American journal of mathematics* Prof. Sylvester will give a full account of this new series of partitiongraphs. — (*Johns Hopk. univ. circ.*, No. 21.) T. C. [586

PHYSICS.

(*Photography.*)

Speed of drop-shutters. — M. Vidal has suggested a method of measuring short exposures. He employs a large clock-face painted black, with white figures, numbering from 1 to 100, painted upon it. A white index-hand is revolved from behind at a uniform speed of one turn per second. Photographs taken of this apparatus themselves register the time of exposure. — (*Brit. journ. phot.*, March 9.) W. H. P. [587

Photographic defects and their remedies. — A short article by Mr. E. H. Farmer gives a list of all the principal photographic defects, together with their remedies. They include gray or metallic, pink, green, yellow, red, and white or opalescent fogs; also frilling, halos, want of density, and spots on the film. — (*Brit. journ. phot.*, March 9.) W. H. P. [588

Notes. — To make plates tropical. Heat them for two hours in a hot oven.

To clean plates. Soak them in hot water, which will dissolve the gelatine.

A convenient plate-lifter. Solder a long, pointed piece of metal to an ordinary thimble. By this means, the plates can readily be lifted from the trays. — (*Phot. times*, Feb.) W. H. P. [589

Electricity.

Efficiency of an electric motor. — Professor S. P. Thompson shows very simply, by means of a graphical method, the laws of work and efficiency of an electromotor, as dependent upon the ratio of its electromotive force to that of the electric supply. — (*Phil. mag.*, Feb.) E. H. H. [590

The electrostatic and electromagnetic systems. — The French have been taking their turn in discussing this matter. MM. Mercadier and Vaschy seek to reconcile the two systems by means of co-efficients depending on dielectric and magnetic inductive capacities. Their arguments and experiments are criticised by M. Maurice Lévy. One who has followed the discussion of this matter, as it has appeared in the *Philosophical magazine* during the

past year, and has read in particular the article of Dr. O. J. Lodge in the November number, will probably learn but little from the French treatment of the subject. — (*Comptes rendus*, Jan. 8, 22. 29, and Feb. 12.) E. H. H. [591

A new dynamometer. — Dr. H. Hertz calls attention to the fact, that, in a Weber's dynamometer, the ratio of the apparent resistance offered to an alternating current of period (T) to the real resistance (r) of the instrument is $\sqrt{1+\left(\frac{P^2\pi^2}{T^2r^2}\right)}$, where P is the co-efficient of self-induction. He concludes that the instrument can give no information as to the presence or absence of a current which changes its direction more than ten thousand times in a second; nor can it be applied to such problems as the discharge of a Leyden jar through a short metal conductor. He therefore proposes a new dynamometer, which measures the energy by the heating of a small silver wire through which the current passes. The expansion of the wire is made to rotate a steel needle to which a mirror is attached. It is claimed that a change in temperature of a thirtieth of a degree, cent., can thus be detected. The self-induction of this instrument is, of course, zero; and its resistance need not be large. From experiments on an instrument of resistance .85 S. U., the author concludes that a current of one Daniell's cell through 30 S. U., and, by shunting, currents of any strength, may be determined with sufficient accuracy. — (*Zeitschr. f. instrumentenkunde*, Jan.) J. T. [592

CHEMISTRY.

(*Organic.*)

Kyanethine and certain of its derivatives. — In continuing the study of kyanethine, E. v. Meyer finds that nitrogen is eliminated by the action of nitrous acid with the formation of an oxy-base, $C_9H_{13}N_2(OH)$ (oxykyanconiine). Methyl iodide forms methylkyanconiine, $C_9H_{13}N_2(NHCH_3)$, in which the methyl group is attached to a nitrogen atom, as shown by the formation of methylamine and the oxy-base, when it is heated with hydrochloric acid. Methyl-, ethyl-, and ethylen-derivatives of the oxy-base were examined. By the action of bromine upon kyanethine, an oily product was obtained, which gave a fat acid (probably propionic), isodipic acid $\begin{pmatrix}CH\ CH_3\ COOH\\ |\\ CH\ CH_3\ COOH\end{pmatrix}$, and a third acid containing nitrogen. When mixed with two volumes of concentrated ammonia, the chief product was an amide of the same butylendicarboxylic acid. The formula

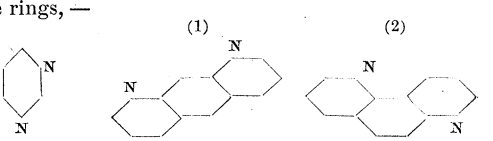
$$C_6H_3(CH_3)_3 - N = NH \quad (NH_2)$$

is regarded by the author as the most probable expression of the constitution of kyanethine. Kyanmethine was also prepared by the same method; viz., by the action of sodium upon methyl cyanide. Its derivatives and reactions were analogous to those of kyanethine. — (*Journ. prakt. chem.*, xxvi. 337, and xxvii. 152.) C. F. M. [593

Meconic acid and its derivatives. — That meconic acid is not a tribasic acid, as Liebig and others have asserted, is shown by a study of its ethers. E. Mennel prepared the mono- and diethyl-ethers with alcohol and hydrochloric acid; but the triethyl ether could not be obtained in this way. The third ethyl group was introduced by heating the silver salt of the diethyl ether with ethyl iodide. The absence of other hydroxyl groups was shown by ferri cchloride, which gave no red color when added to an alcoholic solution of the ether. Mennel assigns to this acid the formula $C_5HO_2\begin{matrix}COOH\\COOH\\OH\end{matrix}$. If it has this constitution, the ethyl group attached to the hydroxyl must have different properties from either of the two attached to the carboxyl groups. That this is the case, appears from the formation of ethylmeconic acid when the triethyl ether is heated with water, and from the conversion of ethylmeconic, when heated, into ethylkomenic acid, $C_5HO_2\begin{matrix}COOH\\COOH\\OC_2H_5\end{matrix} = C_5H_2O_2\begin{matrix}COOH\\OC_2H_5\end{matrix}$.

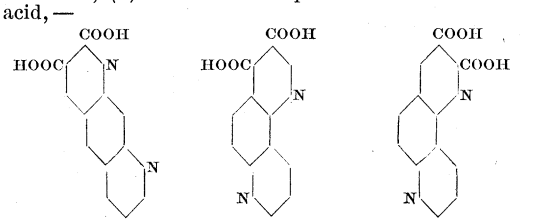
Bromoxylbromkomenic acid $\left(C_5HBrO_2\begin{matrix}COOH\\OBr\end{matrix}\right)$ was prepared by acting upon bromkomenic acid with bromine and water. With reducing-agents, it gave bromkomenic acid, which was converted into oxykomenic when heated with hydrochloric acid in an alcoholic solution. It seems that the hydrogen atom in the radical of meconic acid $(C_5HO_2)'''$ can be substituted only with difficulty, and but one hydrogen atom in the komenic-acid radical $(C_5H_2O_2)'$ can be replaced. — (*Journ. prakt. chem.*, xxvi. 449.) C. F. M. [594

Derivatives of dipyridyl. — By means of the glycerine-chinoline reaction, Skraup and Vortmann obtained from metadiamido- and metadinitro-benzol phenanthroline ($C_{12}H_8N_2$), which contains two pyridine rings, —



Diamidobenzol. Phenanthroline.

Although but one pyridine ring takes part in reactions with methyl iodide, bromine and acids, an octo-hydride ($C_{12}H_8N_2H_8$) resulted from the action of nascent hydrogen. By oxidation with potassium permanganate, beside chinolinic acid, dipyridyldicarboxylic acid was formed in small quantity. One carboxyl group was removed from this acid by heat alone; and, on heating with calcium hydrate, an oil (dipyridyl) distilled over. According to the authors, this is the first representative in the pyridine series of bodies analogous to diphenyl. If phenanthroline is an analogue of anthracen, (1) there would be but one form for the dicarboxylic acid; but if, as the authors regard more probable, it is similar to phenanthren, (2) there are two possible forms for this acid, —



— (*Sitzungsberichte kais. akad. Wien.*, lxxxvi. 304.) C. F. M. [595

On acetoxime. — A study of the benzyl-derivatives of acetoxime indicates the formula

$$(CH_3)_2 = C = N - OH.$$

This substance was obtained by v. Meyer and A.

Janny from acetone and hydroxylamine. From the formation of benzyl iodide when its benzyl ether was treated with hydriodic acid, the benzyl group must be attached to the rest of the molecule by the oxygen atom. — (*Berichte deutsch. chem. gesellsch.*, xvi. 170.) C. F. M. [596

Acetoximic acids. — C. Schramm obtained representatives of this class of bodies by the action of hydroxylamine chloride on isonitrosoethyl- and isonitrosobenzyl-acetone. In general, the reaction may be expressed by the equation

$$\begin{matrix}\chi - CO \\ | \\ \gamma - CNOH\end{matrix} + H_2NOH - HCl = \begin{matrix}\chi - C = NOH \\ | \\ \gamma - C = NOH\end{matrix} + H_2O + HCl.$$

— (*Berichte deutsch. chem. gesellsch.*, xvi. 180.) C. F. M. [597

METALLURGY.

Mexican copper-smelting. — A native process of working copper ores is described by W. B. Devereux, as now being practised in the state of Jalisco, Mexico, and as producing very pure copper by using two tons of charcoal to one ton of ore. A basin eighteen inches in diameter, and three inches deep in the centre, is made in the earth, and lined with oak-ashes. Upon one side of the basin two tuyeres are placed, which are blown by a hand-bellows. A log is placed with one end across the basin at right angles with the tuyeres, and is supported on a roller, so that it can be fed up as fast as it is consumed. The charcoal and calcined ore are placed on the side of the log opposite to the tuyeres, and are renewed as fast as they are burned and melted away. Three hundred pounds of ore are said to be smelted in four hours. The copper and cinder settle into the basin; and, when the latter is full, the charcoal is scraped away. The slag, as it cools on the surface, is lifted off in cakes until the copper is exposed. This is allowed to cool. The cake of copper is then removed, and the operation begins again. The copper is so pure that it can be rolled without cracking. The whole smelting process is performed without the aid of a single tool that cannot be obtained in the chase, in the woods, or in the clay-bank. The calcining of the ore is done in an English calciner, left on the location by a former company. — (*Trans. Amer. inst. min. eng.; Col. meeting*, 1882.) R. H. R. [598

The patio process in San Dinas, Mex. — As described by Richard E. Chism, the broken silver ore is ground in an arrastre till there is no more grit. It is then brought to the patio, or large, circular, concave, paved floor. Here it is treated at intervals with mercury, salt, and sulphate of copper, and is stirred and worked by the feet of mules. It is then exposed to the sun for some days. Finally, the amalgam formed is washed and retorted. The cheapness of the plant is its great recommendation. This paper is a carefully written description (giving figures) of the process as it is at present used. — (*Trans. Amer. inst. min. eng.; Col. meeting*, 1882.) R. H. R. [599

Charcoal-making in retorts. — In a paper on charcoal as a fuel in metallurgy, John Birkinbine states, that at the Bangor furnace, Mich., there are fourteen kilns of eighty cords capacity, in which sixteen thousand cords of wood are annually carbonized. At the Elk Rapids furnace, Mich., there are twenty-two one-hundred-cord kilns, in which forty thousand cords of wood are each year converted into charcoal. The acetic vapors are exhausted from all these kilns by Peirce's patent method, and converted into acetate of lime and methylic alcohol. The two plants produce daily seventeen thousand pounds of acetate of lime, and two hundred and fifty gallons of alcohol. That the charcoal is not deteriorated by the collection of the acetic vapors, is proven by the reports of the managers of these plants, and by the remarkable records made by both these furnaces. — (*Trans. Amer. inst. min. eng.; Col. meeting*, 1882.) [600

AGRICULTURE.

Artificial and natural digestion of proteine. — Stutzer, having devised a method for the separation of the true proteine of fodders from the non-proteid nitrogenous matters, has applied this method to the study of the action of acidified pepsin solution on the proteine of feeding-stuffs. As the general result of his experiments, he finds that the nitrogenous matters of fodders may be divided into two groups, called by him proteine and nucleine; the former of which is entirely digestible, and the latter entirely indigestible. Stutzer's results on certain feeding-stuffs agreed quite closely with those that have been obtained in actual digestion experiments with animals, and suggested the possibility of thus artificially determining the digestibility of this important class of nutrients in a very simple manner; but no comparative experiments on identical samples were made.

This deficiency has been supplied by Pfeiffer, who has compared the actual digestibility of meadow-hay and lucerne-hay, by sheep, with the results obtained by Stutzer's method. The results of three experiments are given. In each case the actual digestibility was somewhat less than that indicated by Stutzer's method.

Calculated digestibility.	Observed digestibility.
68.4 per cent.	60.4 per cent.
76.1 "	73.0 "
76.1 "	74.5 "

A portion of the nitrogenous matter of the solid excrements, however, consists of billiary products, and other matters not derived directly from the food, and therefore not properly classed with its indigestible matters. When this was taken into account in calculating the actual digestibility, a closer agreement was obtained than is shown by the above figures.

On the other hand, however, the nucleine of the solid excrements, as determined by Stutzer's method, was twenty-five to thirty per cent less than the amount found in the fodder, showing that some of the latter must have been digested. It would seem, then, so far as conclusions can be drawn from three experiments, that Stutzer's proposed method may serve to give an approximation to the digestibility of the proteine of a fodder, and possibly prove a useful addition to the methods of fodder analysis, but that his artificial digestion does not correspond in all respects with natural digestion. — (*Biedermann's centr.-blatt*, 1882, 739.) H. P. A. [601

Digestive fluids of the horse. — Space permits only a summary of the more important results obtained in this valuable investigation by Ellenberger and Hofmeister.

a. The saliva. The mixed saliva contains an energetic diastatic ferment, which acts at once on cooked starch, but more slowly on uncooked. Potato-starch is not saccharified during mastication, but minute quantities of oat or barley starch may be. Both the parotid and the submaxillary saliva have a diastatic action, though it is not so energetic as that of the mixed saliva. The action of the mixed saliva equals 'the product of the actions of its components.' In

the blood of the horse, and also in most other fluids and organs, diastatic ferments are present, but in much less quantity than in the saliva. Slightly acidifying the saliva, or mixing it with small quantities of artificial (acid) gastric juice, does not hinder the diastatic action. Greater concentration of the acid hinders the action, but does not destroy the ferment. The saliva acts slowly upon cane-sugar. The parotid saliva contains traces of a peptonizing ferment. The saliva does not act upon cellulose. It can emulsify the fats, but does not decompose them.

b. The gastric juice, and gastric digestion. The gastric digestion of the horse is of more importance than has been hitherto supposed. It continues from one meal to the next. When oats are fed, the contents of the stomach constitute a comparatively dry, crumbly mass, containing sixty to seventy per cent of water. With hay-feeding, the contents are somewhat moister. The normal reaction of the contents of the stomach is distinctly acid. The proportion of acid seldom rises higher than two-tenths of one per cent. It is least immediately after eating, and increases gradually. The gastric juice of the horse is much less acid than that of the carnivora. At the beginning of digestion, only lactic acid is present. Subsequently, hydrochloric acid appears, and more abundantly with hay-feeding than with oats; but lactic acid is always present. In the contents of the stomach there is always found a diastatic, a lactic, and a rennet ferment, and a ferment which dissolves proteine. Starch is digested to a large extent in the horse's stomach: the action is most rapid during the first one or two hours, though depending somewhat on the quantity and quality of the food. Vegetable proteine is energetically digested, and converted into peptones. The action is slight at first, but augments, reaching its completion in three to eight hours, according to the amount of food present. When large amounts of food are taken into the stomach, much pepsin and acid must be secreted to neutralize the alkaline saliva, and initiate digestion; and, consequently, the time required for digestion is longer. If more food is taken in such a case, that previously eaten is crowded into the intestines in an undigested state. — (*Biedermann's centr.-blatt*, 1882, 805.) H. P. A. [602

GEOLOGY.

Atlantis revived. — Professor Hull has published twenty-seven "Paleo-geological and geographical maps of the British Islands and the adjoining parts of the continent of Europe," showing the distribution of the exposed strata of the different geological periods, and their concealed extension. In portraying the latter he has been largely aided by the numerous borings which have been made during the last twenty-five years. Some of the maps show the known and theoretical distribution of land and water during the different geological periods.

In preparing these maps, Prof. Hull has become forcibly impressed with two leading ideas, — first, that the present North Atlantic Ocean must for a long lapse of time have been a continental area, whence was derived, to a large extent, the sediment of which many of the British formations are composed; and, secondly, that the Old Highland districts of the British Isles, once they had sprung into existence as such, ever after endeavored to retain their ascendency. He considers "that the North Atlantic was mainly land during the Laurentian, Cambrian, and lower Silurian periods, and was the source of the sediment of which these great formations are composed. It probably first assumed large proportions as a sea or ocean, when so much of the *then sea* became land; namely, at the close of the lower Silurian period. But there are grounds for believing that it was largely in the condition of a land-surface in still later times; namely, during the carboniferous, Permian (dyassic), triassic, and Jurassic periods, as evinced by the thickening of the sediment both towards the north-west and south-west of the British Isles. This great continent of *Atlantis* was the parent of much of the strata which now overspreads the plains of Britain and of the adjoining continental areas. With the cretaceous period, its permanently oceanic form and features set in, and were vastly extended during that and the succeeding period of the nummulitic limestone." A description of each plate is given, which is clear and systematic, containing many references to different authorities used. A discussion of each map would require a memoir as large as the original: suffice it to say, that the work has been prepared with care, and reflects great credit on its author. There are many points in the geology of North America which would appear to be strongly in favor of Mr. Hull's views; such as the Jurassic age of the Rocky-mountain uplift, and the absence in the same region of any Silurian strata, the carboniferous limestone reposing on the Taconic or on older rocks, showing that region to have been land during the formation of the vast Silurian sediments of the Mississippi basin; the absence of more recent formations on the north-eastern coast; the fresh-water nature of the Richmond trias, etc. Prof. Hull has done well in attacking the theory of the permanence of ocean-beds, which, in my opinion, is not borne out by the geological facts; and a perusal of his work should encourage others to enter into this very interesting field of research. — (*Trans. roy. Dubl. soc.* (2) i. xix.) J. B. M. [603

Meteorites.

The Cranbourne meteoric iron. — Two large blocks of meteoric iron were found in Victoria, Australia, in 1854; one mass weighing several hundredweight, and the other three or four tons. This last was sent to the British museum, and has recently been studied quite thoroughly from the chemico-mineralogical point of view by Dr. Walter Flight, of that museum.

When this mass was found, only a small portion projected above the soil, while the remaining portion was embedded in tertiary sandstone overlying basalt. Dr. Flight states that the entire mass consists of metallic minerals, and is destitute of silicates. In the course of the analysis, the nickeliferous iron was found to contain numerous minute, brittle, strongly magnetic, apparently square prisms, which form about one per cent of the mass. These prisms are slowly and with difficulty acted upon by H Cl, but are readily dissolved in H N O_3. To this, after analysis, the symbol $(Fe_4Ni_3)P$ was given, and it was regarded as corresponding to Gustav Rose's rhabdite.

Certain scales were observed lying on the faces and between the plates of the nickeliferous iron crystals, that were in the form of equilateral triangles, having the thickness of stout writing-paper, pliant, strongly magnetic, and of a pure white color. It was found to contain 70.138 % iron, and 29.744 % nickel, and was regarded as being the same as Gustav Rose's tänite, and Zimmerman's meteorine. Since the composition was first definitely made out by Dr. Flight, he proposes for it the name *edmondsonite*. It would certainly have been a more gracious thing if he had allowed Rose's name to stand, instead of yielding to the species-making mania, and thereby increasing the confusion in mineralogical nomenclature.

The analysis of a brittle, magnetic powder, which

dissolved easily in HNO_3, and which was regarded as schreibereite, gave the formula $(Fe_2Ni)_7P$. A large brass-colored, oblique crystal, showing perfect basal cleavage, dissolved readily in *aqua regia*, but was only slowly acted upon by HCl or by HNO_3 alone, and gave, on analysis, the formula $(Fe_9Ni_2)P_2$. Another crystal was found, which was apparently a square prism, having brilliant metallic sides, with a dark, almost black centre. Its analysis gave the formula $(Fe_7Ni_2)_8P$. Graphite occurs occasionally in this meteorite, both in nodules and in plates. The nickeliferous iron was also examined for occluded gases; and carbonic acid, carbonic oxide, hydrogen, nitrogen, and marsh gases, amounting in bulk to 3.59 times the volume of the iron, was extracted.

It is to be regretted that more attention is not paid by chemists to the question of the average composition of meteoric masses as a whole, instead of giving their time exclusively to the analysis of the distinct minerals the mass may happen to contain. — (*Geol. mag.*, Feb., 1883.) M. E. W. [604

METEOROLOGY.

Canadian weather-review for February, 1883. — This review has been issued very promptly. It consists of a compilation of items of interest relating to storms, temperature, precipitation, etc., for Canada. The mean temperature was much below the normal, especially in the maritime provinces. At Sydney, C.B., the defect was 7.1°. A very important table is presented, showing the total number of hours of sunshine at thirteen stations of the dominion. Since the well-being of crops is dependent, in large measure, on the amount of sunshine, such records, it would seem, would be of great value. The service finds 71.2 per cent of its probabilities fully verified. Full record is given of the special disturbances of the magnetic needles at Toronto. These show very markedly the intimate relation between the aurora and magnetism, as has been known for many years. Auroras were seen on the 1st, 4th, 22d, and 27th. — H. A. H. [605

State weather-services. — The Ohio weather-service has issued its report for January. This shows an addition of six stations since the November report, there being twenty-five in all at the present time. Thirteen of the stations have barometers. The observations, day by day, are published in full, and will form a more satisfactory basis for more detailed study than can be had from stations at greater intervals.

The Tennessee weather-service has issued its first monthly report for February. This shows that twenty-two stations are now observing the weather, and twenty-eight more are soon to join in the work. It is to be hoped that these stations of observation will not only add to our store of knowledge, but also increase interest in a large mass of people to whom an accurate forecast of the weather is of great consequence. The observation of rainfall, for example, is one of the simplest that can be made, and, all along the watersheds of our rivers, would assist very materially in the discussion of floods, droughts, etc. — H. A. H. [606

GEOGRAPHY.

Reviews. — 'Japans landwirtschaftliche und allgemeinwirtschaftliche verhältnisse,' by Georg Liebscher (Jena, 1882), is reviewed by Alf. Kirchhoff in *Ausland*, 1882, 881–887.

The geographic observations in Nordenskiöld's 'Umsegelung Asiens und Europas auf der Vega' (Leipzig, 1882) are summarized in *Ausland*, 1882, 947–954.

'In fernen osten; reisen des grafen Szechenyi in den jahren 1877–1880,' by G. Kreitner (Vienna, 1881), is reviewed by A. H. Keane in *Nature*, Dec. 21, 1882.

Elwes' translation of Capello, and Ivens' narrative, 'From Benguelâ to the territory of Yacca' (London, 1822), is noticed by E. C. Rye in *Proc. roy. geogr. soc.*, iv. 701. — W. M. D. [607

(*Africa.*)

Wissmann's letter from Cairo. — Under date of Jan. 5, Wissmann wrote to the German-African association from Cairo, where he was detained by sickness that began on his homeward voyage up the Red Sea. The following abstract notes his more important statements, but his route is difficult to follow from lack of his names on even the most recent maps. Early in December, 1881, Wissmann left Kingenge, with Pogge and a caravan of two hundred men, and, on passing the Lulua, reached the limit of the west African wooded savannahs, and entered the thickly populated prairies of central Africa. Lake Mukamba was reached in the middle of December, in lat. 5° 45′ S., concerning which further details will be given. Passing the populous district of the Bashilange, the explorers came to the Lubi on Jan. 5, 1882, and entered the country of the Bassonge (sing., Mussonge), — a fine, strong, industrious race, living in neat villages, with houses surrounded by gardens, and separated by straight streets shaded by palms and bananas. They work in iron, copper, clay, and wood, and understand weaving and basket-making. Two days' march through forests inhabited by elephants and buffaloes led them to the residence of the king, Katjitch, on the Lubilash (Sankuru), lat. 5° 7′ S., where they rested a week. On starting again, there was some difficulty at first in obtaining permission to go; for the king wished them to stay and help him against an attack from the Bakuba on the north. Leaving the Lubilash on Jan. 29, they crossed a fertile, well-watered region, occupied by warlike Bassonge, by long villages of Benecki (sing., Munecki), and by the timid Kalebue, nearly all of whom are cannibals, and, on March 8, came to the Lomami, lat. 5° 42′. From here to Tanganyika were found the Batua (Stanley's Watwa), who seem to be the remaining tribes of the early people of this region. They live in miserable huts, without industry or agriculture, and subsist on wild fruits and by hunting. On April 17, the party arrived at Nyangwe on the Lualaba, lat. 4° 13′ S., and were well received and aided by the Arabs of that half-civilized town. There the explorers parted. Pogge turned back on May 5; and, after some delay, Wissmann started eastward with a small party on June 1, having much trouble with his men and the people, on the way, till he reached the great lake. There, at Ruanda, he enjoyed the hospitality of the English missionary, Griffith, and made a four days' excursion to the Lukuga, concerning which he promises interesting information as to the part it plays as Tanganyika's outlet. Crossing to Udjidji, the rest of his way led through less unknown country. His most important *détour* was to 'Uhha' (Udjowa?), where King Mirambo received him in the most friendly manner, with roast beef and champagne. On Sept. 5 Wissmann was welcomed to Tabora by the French missionaries there, and shortly afterwards reached the German station in Gonda, where he found Böhm and Reichardt about to start on an extended journey farther inland, Kaiser having already set out. On Nov. 15 he arrived safely on the eastern coast. — (*Ausland*, 1883, 134; *Comptes rendus soc. géogr. Paris*, 1883, 90.) W. M. D. [608

Rio Bembe. — D. T. das Neves prefaces an account of his exploration of this river, generally given as the

Limpopo on the maps, with an historical sketch of the native government of the region, of which Muzila, son of Manicussa, is at present the head. After the Zambezi, the Bembe is the largest river of eastern Africa. Its valley is very fertile, — suitable for the growth of sugar-cane, cotton, etc., — and is well populated. To the northward the country is more healthy for Europeans. Its fine forests of valuable wood contain many elephants, and its saline lagoons are full of hippopotamus; but, "in consequence of the absence of native population, the tsetse-fly is found everywhere through it." In a somewhat exalted peroration, the author concludes with, "We have traversed a vast area of the province of Mocambique, finding it all most salubrious and excellent for occupation by the white race. It possesses all the conditions to make it suitable for the immigration of millions of Europeans, who will find its soil more fertile than that they have left. It is perhaps the most populous region of all tropical Africa; and its millions of natives, placed in contact with civilization, will become consumers of innumerable European wares." — (*Bol. soc. geogr. Lisboa*, 1882, 336.) W. M. D. [609

BOTANY.

Ice-plant (Mesembryanthemum crystallinum). — M. Herve Mangon calls attention to the ease with which this plant can be cultivated on a large scale as a source of potash. According to him, the fresh plant contains about half of one per cent of potash. — (*Comptes rendus*, Jan. 8, 1883.) G. L. G. [610

Loss and gain of nitrogen by arable soil. — M. Dehérain gives a very interesting account of his experiments at the station at Grignon, which may be summarized as follows: the loss of combined nitrogen which a harvested field sustains is not due exclusively to the removal of the crop, but is largely attributable to the oxidation of nitrogenous matter in the soil, and its escape in the form of nitrates in drainage-water. The loss is greatest when the use of fertilizers has been most generous, and it ceases when the fields lie fallow. The reason for the latter is, that then the air penetrates less deeply. The results are quite in accord with those previously reached at Rothamsted. — (*Comptes rendus*, Jan. 15.) G. L. G. [611

Solar radiation, and assimilative activity. — Timiriazeff, whose experiments upon the action of chlorophyll are of great importance, has lately published in a short note a few of his more recent results. Quantitatively determined, forty per cent of the amount of solar energy absorbed by a green leaf under the most favorable conditions is converted into chemical work. He calls attention to the usefulness of Langley's bolometer in such investigations. — (*Comptes rendus*, Feb. 5.) G. L. G. [612

The difference between the chemical constitution of living and dead protoplasm has been further studied by Loew; and the results of the investigation, too complicated for a short abstract here, accord in the main with those previously noticed in this journal. — (*Pflüger's archiv*, Feb. 12.) G. L. G. [613

Fertilization of Yucca. — The deliberate pollination of Yucca-flowers by a tortricid moth (Pronuba), to insure the production of seed for its young to feed upon, is will known through the publications of its discoverer, Prof. Riley. From an abstract of a paper read last summer at the Montreal meeting of the American association, by the same observer, it appears that the act of collecting pollen by Pronuba for the fertilization of the Yucca "is as deliberate and wonderful as that of pollination. Going to the top of the stamen, she stretches her tentacles to the utmost on the opposite side of the anther, presses the head down upon the pollen, and scrapes it together by a horizontal motion of her maxillae. The head is then raised, and the front-legs are used to shape the grains into a pellet, the tentacles coiling and uncoiling meanwhile. She thus goes from one anther to another until she has a sufficiency." The conclusion of Dr. Engelmann, that the apices of Yucca stigmas are not receptive, is confirmed. "The exceptional self-fertilization in Yucca aloifolia, the only species in which it is recorded, is shown to be due to the fact, that, in the fruit of this species, there is no style, the stigma being sessile, and the nectar abundant, filling and even bulging out of the shallow opening or tube. The flowers are always pendulous; and the pollen falling from anthers can, under favorable circumstances, readily lodge on the nectar." — (*Amer. nat.*, Feb.) W. T. [614

Pollination of the fig. — Some light has been thrown on the much-vexed question of caprification, and the relation of the caprifig or Caprificus to the fig-tree, by the studies of Fritz Müller and Paul Mayer. It appears that the caprifig is the male fig-plant, as Linné believed, and not a distinct race, as Solms-Laubach has recently maintained. Fig-seeds produce both Caprificus and fig-seedlings. The relations between these two forms of an originally monoecious species, and the gall-fly (Blastophagus), on which it now relies for crossing, are very curious. Three broods of the insects each year are brought to maturity in as many crops of flowers of the caprifig; the first two of which are absolutely infertile, while the last does not average one seed to two figs. On arriving at maturity, the wingless males, after escaping from the fruit in which they have developed, seek out other pistils containing females, which, being impregnated before their release, afterward escape, and penetrate other young figs belonging to the next crop, on either caprifig or fig-tree, to oviposit. Being dusted with the pollen of the strongly protogynous flowers from which they have come, they pollinate the receptive stigmas over which they creep; but the flowers of the caprifig only are accessible to their ovipositors. As a result of fertilization, the fig-tree ripens its fruit rapidly, and its seeds are soon scattered by frugivorous birds; but that of the caprifig never becomes eatable. — (Müller, *Kosmos*, Aug. 5, 1882; Mayer, *Mittheil. zool. stat. Neapel*, iii.; Abstracts, *Biolog. central-blatt*, Nov. 15.) W. T. [615

ZOÖLOGY.

Coelenterates.

The origin of the spermatozoa in Medusae. — In a short paper on this subject, Merejkowsky calls attention to the interesting fact, that the mature reproduction-follicle of Cassiopea or Rhizostoma bears a close resemblance to the same organ of Pelagia during its very young stages. At a very early stage of development, the immature follicles are almost exactly alike in all three genera; but in Cassiopea they undergo very little change. The mature organ is a simple ovoidal pouch, lined with endoderm-cells, and filled with spermatozoa. According to the brothers Hertwig, Pelagia passes through a similar stage long before maturity is reached; but its development in this genus does not stop here, and it finally becomes a long irregular pouch, the tortuous ramifications of which are interlaced in an inextricable tangle.

It is easy to discern that the simple pouches of

Cassiopea open, when mature, into the genital sinus, into which Merejkowsky has seen the ripe spermatozoa escape. He believes that similar openings probably exist in Pelagia; and he thinks the failure of the Hertwig brothers to find them is due to the great complexity of the mature follicle in this genus, rather than to the absence of openings.

The paper also contains a minute illustrated account of the transformation of the endoderm-cells which line the follicle into spermatozoa. — (*Arch. zool. exp. gén.*, 1882, 577.) W. K. B. [616

Endodermal nervous system in hydroids. — Dr. Lendenfeld states that he independently discovered in Australian species of Eudendrium and Campanularia the ring of glandular cells which has been recently described by Weissman and Jickeli in Eudendrium. He also finds in all the Campanularidae which he has examined a well-developed nerve-ring of endodermal origin, running around the proboscis, just inside the oral opening. In this region a number of sensory cells are found, with stiff hairs, which project among the cilia of the endoderm-cells. The study of sections shows that these sensory cells are connected with the ganglion-cells; and the processes which are given off from these ganglion-cells anastomose with each other in such a way as to form a complete nerve-ring around the mouth. This ring he regards as the central nervous system of hydroids; and he calls attention to the fact that it not only originates from the endoderm, but is without a homologue in the medusae, since none of the medusae are known to have a nerve-ring in this position. — (*Zool. anz.*, Feb. 5.) W. K. B. [617

Crustaceans.

Color in Idotea. — Carl Matzdorff has published an elaborate and fully illustrated memoir on the color of Idotea tricuspidata (= irrorata), — a variously colored isopod abundant on both sides of the North Atlantic. After describing the various color-varieties, which he arranges in five groups, and the minute structure of the integument, particularly the hypodermal pigment-cells, which he regards as true chromatophores, the author discusses at great length the physiology of the changes of color, and the origin of color-varieties. The changes of color are directly influenced, neither by food, temperature, light, nor saltness of the water, but are sympathetic changes induced by the color of the surrounding objects. Warmth and light, however, accelerate, and cold and darkness retard, the color-changes. As in other animals, changes in color are produced by contraction and dilatation of different sets of chromatophores. The synonymy of the species is discussed, and a long list of works cited is given; but Dr. Matzdorff, while agreeing with Harger, that the American irrorata and the European tricuspidata are the same species, rejects the earlier name because it has been used only by Americans! — (*Jena. zeitschr. naturw.*, xvi. 1.) S. I. S. [618

The Challenger Amphipoda. — The Rev. T. R. R. Stebbing gives preliminary descriptions of some of the more striking new forms of Amphipoda from the Challenger expedition. Only nine species and one genus are described. Unfortunately, no allusion whatever is made to the region or depth from which any of the specimens come. — (*Ann. mag. nat. hist.*, March, 1883.) S. I. S. [619

VERTEBRATES.

The reaction time of olfactory sensations. — The time elapsing between the moment of stimulation and the giving of a signal to indicate the perception of a sensation by the person experimented upon, has been measured for auditory, tactile, visual, and gustatory sensations. Beaunis has now added to the list by a series of observations made on himself in regard to the reaction time of olfactory sensations. From the table which he gives, it is clear that stimuli, as ammonia and acetic acid, which excite, not merely fibres of the gustatory nerve, but also nerves of common sensation, have a shorter reaction time than stimuli which act only or mainly on the nerve-fibres concerned with the sense of smell proper. Excluding ammonia and acetic acid, the table includes camphor, assafoetida, ammonium sulphide, chloroform, carbon disulphide, valerian, mint, and carbolic acid; and the reaction time increases in the above order from .50 to .67 of a second. It was found impossible to determine accurately the moment of olfactory perception of musk. The numbers show that the olfactory reaction time is longer than tactile, visual, or auditory.

In a foot-note the author states, that, since writing his paper, he has learned that Buccola of Turin had been, about the same time, at work on the same subject, and had reached results in the main concordant with those above stated. — (*Comptes rendus*, xcvi. 387). H. N. M. [620

Fine structure of bone. — G. Broesike has published an extensive memoir on this subject (*Archiv mikr. anat.*, xxi. 695), of which Eberth has published an abstract, here reproduced. The first part of the paper deals with the limiting-sheaths of the osseous canal system. The sheaths may be isolated by the action of acids on completely macerated bones. They are but slightly pliable, and reproduce perfectly the forms of the canals. They may be destroyed by certain reagents quicker than the basal substance of bone, from which they are therefore different, their substance resembling keratine in the author's opinion. The sheaths are wanting in embryonic and all young bone. The author speculates as to their origin: he thinks they must arise either as a precipitate from the lymphatic fluids, or else by decalcification of the basal substance. (Neither of these views appears probable.) The osseous corpuscles form a continuous network by the union of their processes. These cells probably have no membrane, and the nucleus soon degenerates. With increasing age, the cells loose their process, and become jagged and smaller, so that there is a space around them; then follows fatty metamorphosis of the protoplasm, and finally complete fatty degeneration, of which the products may be resorbed. The author advances the (very improbable) hypothesis, that the corpuscles are killed by smothering in carbonic acid, accumulated in parts of the bone remote from the blood-vessels. The basal substance consists of uncalcified gelatine, yielding fibrillae, embedded in a calcified cement. The lamellae are formed by primitive layers of fibrillae, which do not intercross and intertwine, although the sets of parallel fibrillae run in various directions. The author distinguishes between regular and irregular fibrillar tissue. — (*Fortschr. med.*, i. 10.) C. S. M. [621

Nerves of the small blood-vessels. — L. Bremer gives a brief *résumé* of previous opinions on this subject, and reports his own observations made principally on frogs and lizards. He asserts that his statements also apply to the warm-blooded vertebrates. The fine capillaries are accompanied by usually two naked nerve-fibres, which anastomose with one another, and give off fine branches which form a plexus around the vessel. The threads of the plexus give off fine knot-like thickenings on the side towards the wall of the vessel, and these knots are the ultimate terminations. On the veins and arteries there are

medullated nerves that give off the naked fibres to form the perivascular plexus. Bremer closes his paper with criticisms of previous writers on the subject. — (*Arch. mikros. anat.*, xxi. 663.) C. S. M. [622

Fish.

A pleuronectoid hybrid. — A curious flatfish was sent to Dr. K. E. H. Krause of Rostock, and has been noticed by him as hybrid between the plaice (Platessa vulgaris) and turbot (Rhombus maximus). No figures or descriptions are given to enable the reader to form an opinion for himself. — (*Arch. ver. freunde naturg. Meckl.*, xxxv. 119.) T. G. [623

The bones of Lophius piscatorius. — An article with this caption has been published by Robert Morrow. The bones of the skeleton are described in the sequence followed by Cuvier, but with Owen's nomenclature. The article is deficient in the clearness and precision which could only result from comparison with related forms. — (*Proc. trans. Nova Scot. inst.*, 5, 340.) T. G. [624

Fishes of Wisconsin. — A Catalogue of the cold-blooded vertebrates of Wisconsin has been furnished by Dr. P. R. Hoy to the geological survey of the state. The classification of the first edition of Jordan's manual has been adopted, and a hundred and forty-two species are catalogued. The list is little more than a nominal one, and is replete with typographical errors. It is not evident, either, to what extent the identifications of species can be relied upon, although the author acknowledges "great obligations to Prof. David S. Jordan, as well as to the lamented Copeland, for valuable assistance in determining species." Dr. Hoy thinks that "Wisconsin has, perhaps, the best facilities for fish-culture of any state in the Union," as there are 'not less than 1,800 lakes,' covering 'some 1,400 square miles,' in the state. — (*Rep. geol. surv. Wisc.*, i. 427.) T. G. [625

Mammals.

Development of the lachrymal duct in mammals. — Von Baer referred the development of the lachrymal canal to an evagination of the pharyngeal cavity; Burdach, to a fold in the skin starting from the corner of the eye. The first to assert that it arises as a groove between the upper jaw and external nasal process was Erdl, whose view was shortly after, but independently, advanced by Coste, and since has been widely accepted. Its accuracy became questionable when Born showed (*Morph. jahrb.*, ii.) that the canal arises in amphibians, lizards, and chicks, as an ingrowth from the inner surface of the epidermis. The ingrowing band becomes subsequently constricted, surrounded by connective tissue, and hollowed out into a canal. Ewetzky (*Arch. für augenheilk.*, viii.) found later the same mode of development in cattle.

E. Legal now reports his investigations on this theme, carried out principally on pigs, but also on mice and rabbits. The first indication of the lachrymal canal is at the time when the nasal pits communicate with the mouth by the primitive choanae, and the Jacobson's canal is well developed, — while externally the so-called lachrymal furrow may be seen (pigs, 4.2 cm., extreme length). The epithelium of the lachrymal furrow is thicker than the rest of the epidermis, because there are one or two layers of cells between the basal cylinder and the superficial flat cells, which elsewhere alone constitute the epidermis. The inner surface of the epidermis of the furrow grows into a ridge, which begins at the opening of Jacobson's organ into the nasal cavity. The ridge grows higher, and finally separates from the skin, forming a rod, the separation becoming completed soonest at the nasal end. The upper end of the rod is connected with the upper lid, but soon forms a stout branch, which grows towards, but does not reach, the lower lid of the eye. The details of the growth of the rod are fully entered into. The canalization begins late, and at the ocular end, and is effected by the separation of the central cells of the rod. — (*Morph. jahrb.*, viii. 353.) C. S. M. [626

Morphology of the mammalian germ. — The strange hypothesis is advanced by Repiachoff, that the impregnated ovum of mammals is a distinct individual, which divides into two individuals. One of the descendants only, Van Beneden's 'entodermatic' segmentation-sphere, grows up like a spore into the complete sexual individual. (This seems over-fanciful.) — (*Zool. anz.*, vi. 65.) C. S. M. [627

Harder's glands in rodents. — Karnocki has recently made some studies upon the nature of these structures in rabbits, guinea-pigs, and rats. In rabbits and hares, in contradistinction to all other rodents, the gland consists of two portions, — a superior (white) and an inferior (reddish gray) half, having a common duct. The latter opens near the free border of the eyelid, and, passing backward directly to the gland, divides, giving off many branches to each half. Within the gland the branching increases until the terminal vesicle is reached. The latter consists of proportionally long, broad, and repeatedly branched serpentine passages, with lateral expansions. There is no constriction of the gland proper at its juncture with the duct. This structure distinguishes the Harderian glands of rodents from true acinose glands, and brings them close to the pyloric and other similar glands. The contents of the glands consist of a protoplasmic stroma in which, in the red portion, large fat globules, but in the white portion only small globules, float. The globules in the red portion vary with the age and condition of the animal.

In guinea-pigs the gland corresponds to the red portion in rabbits. The duct is very small, and hard to find. The fat globules of the secretion are of more equal size than in the rabbit. The Harderian glands of rats contain a large quantity of a granular, red coloring-matter, which is not altered by alkalies or dilute acetic acid, but becomes bleached in dilute mineral acids. The red-colored secretion is confined to that portion of the gland outside the lumen, that within being colorless. It contains no large fat globules.

The remainder of the paper is devoted to the histology and embryology of the glands.

The author doubts if the glands of the corner of the eye in other groups of animals, hitherto described as Harderian glands, are in reality such. — (*Proc. Cracow acad.*; abstr. in *Biol. central-blatt*, ii. 709.) F. W. T. [628

The color of horses. — Notes by a large number of observers upon the color of horses in different parts of the globe have been brought together by Dr. Langkavel in a very interesting manner. White and gray horses are, perhaps, the most general favorites; but a great variety of other colors are held in esteem. It is noticeable that black horses are little sought for, except by Europeans. — (*Zoolog. garten*, xxiv. 38.) F. W. T. [629

The baleen whales. — The recently published part of Van Beneden's description of the vertebrate fossils of the vicinity of Antwerp contains a summary of the present knowledge of the geographical distribution, habits and identity, of existing species of baleen whales. Five species of Balaena, four of Balaenoptera, and two of Megaptera, are recognized. — (*Ann. mus. hist. nat. Belg., pal.*, vii.) F. W. T. [630

ANTHROPOLOGY.

India. — In a course of lectures delivered before the University of Cambridge, entitled 'India: what can it teach us?' published by Longmans, London, Max Müller points out some of the manifold lessons which India can teach all students of history, whether religious, political, or social.

The first is of a general and introductory character. The second is meant to remove some of the prejudices which Europeans often entertain against orientals, and, in particular, to show how groundless is the charge of untruthfulness brought against the natives of India. The third dwells on the study of Sanscrit, with regard both to its practical utility and its historical interest. A new chronological division of Sanscrit literature is put forward.

The author claims a high value for the ancient literature, both Vedic and Buddhistic, showing that some of the greatest problems of all times receive an unexpected light from a study of ancient Sanscrit literature. The two phases of human life and human thought presented to us by the Aryans of India on one side, and by the Aryans of Greece, Italy, and Germany, on the other, are contrasted.

The fourth lecture deals with a number of objections which have been raised against the claims of the Veda as the most ancient historical monument of the whole Aryan world.

In the fifth lecture some of the principal lessons which the Veda can teach are explained. The original character of the Vedic gods is discussed. They are divided into three classes, — gods of the earth, air, and sky.

The sixth lecture deals with the god of fire and of the air. Next follows a description of the gods of the highest heaven. The origin of solar myths is shown to be inevitable.

After an explanation of the manner in which the ancient literature of India was preserved by oral tradition, the last lecture is devoted to an analysis of the ancient Vedic religion into its three compound elements, — a belief in the Devas, or the gods of nature; a belief in the Pitris, or the ancestors; and a belief in the Rita, or the law, order, and reason which underlie both the natural and the moral world.

The text of the seven lectures is followed by Notes and illustrations: 1. The treasures found at Mykenae, and their similarity to treasures found on the Oxus; 2. Names of the cat and the cat's eye; 3. Village estates; 4. Venial untruths, according to Indian views; 5. The Yueh-chi; 6. Some letters on Buddhism; 7. Renaissance of Sanscrit literature; 8. Texts illustrative of the deluge in India; 9. Parganya in German; 10. The Pitris, or fathers; 11. Srâddhas, or ancestral worship.

In the note on the renaissance of Sanscrit literature, evidence has been collected in support of the author's theory that the whole of it, with the exception of the Vedic and Buddhistic, is later than the fourth century of our era. Kâlidâsa's plays are relegated to the sixth century, and the Laws of Manu are assigned to a date not earlier, and possibly much later, than the fourth century after Christ. — H. W. H. [631

Iroquois. — Under title of 'Legends, traditions, and laws of the Iroquois,' Eliah Johnson, a Tuscarora chief, engages in the very laudable attempt "to animate a kinder feeling between the white people and the Indians, established by a truer knowledge of our civil and domestic life, and of our capabilities for future elevation." It needs but a cursory examination to show that the manner in which the desired end is to be attained was by no means clear to the writer's mind; and it is not probable that the book will have the success which the evident sincerity and earnestness that pervade it would seem to deserve. Some of the historical facts presented are interesting, and certain of the traditions are of value to the student of ethnology. Under the heading 'Creation' is an interesting Tuscarora tradition, treating of the beginning of the world, and the formation of the celebrated league.

Who were the Squawkihaws, Kah-Kwahs, and the Eries, has always been an enigma; and in answering that the three were formerly known as Squawkihaws, a remote branch of the Senecas, and speaking the same language, the author has done a service to all students who interest themselves in tribal nomenclature and relationships.

The tradition relating to the expulsion of the Squawkihaws, or, as they have been usually called, the Eries, is peculiarly interesting and important, inasmuch as it is stated with all desirable precision, that, after a hot pursuit by the Senecas, a considerable portion of the tribe succeeded in making their escape, and, as was supposed, disappeared in the Far West under a changed name, leaving a large number of prisoners to be adopted into the conquering tribe.

The Jesuit relations contain the generally accepted idea that the Eries were utterly exterminated, — one of the many instances where extermination, so called, really means a comparatively small number killed, and a large remnant incorporated into other tribes. The tribal name, indeed, is lost; but the individual members of the tribe live on under new tribal ties. — H. W. H. [632

The distribution of the Negritos. — M. A. de Quatrefages sends us, in pamphlet form, his paper, which appeared in vol. i. of the *Revue d'ethnographie* (111–161), upon the geographic distribution of the Negritos, and upon their identification with the Asiatic pygmies of Ctesias and Pliny. The author, like Crawford, Pickering, and many others, distinguishes two dark-skinned races in the Australasian and Malaysian area, — the Papuans and the Negritos. The former are large, muscular, and have their crania dolichocephalic and hypsistenocephalic; the latter are short, plump, and brachycephalic or sub-brachycephalic (0.80 and upwards). A few words are devoted by M. de Quatrefages to the former; the bulk of the essay, to the latter. When the Spaniards began to colonize the Philippines, they met in the interior of Luzon, beside the Tagals, of Malay origin, black people, with woolly hair, short in stature, and living in the mountains, to whom they gave the name *Negritos del monte*. The local name was *Aigtas* (Aëtas), 'black.' Under diverse names they are found, either pure or mixed, in the midst of other peoples, from the south-east extremity of New Guinea to the Andaman Archipelago, and from the Sunda Island to Japan. M. de Quatrefages is acknowledged to be the most indefatigable anthropologist in France, and in this monograph, as well as in others relating to the same subject, has thrown much light upon the Negrito race. We must demur, however, to the *a priori* methods employed in the last part of the essay, wherein he adopts the pygmies of the classical writers. — J. W. P. [633

Voyages of Moncatch-Apé. — M. Le Page du Pratz, in his *Histoire de la Louisiane*, tells of a voyage made by Moncatch-Apé, a Yazoo Indian, up the Mississippi and the Missouri Rivers, across the Rocky Mountains, and down the Columbia to the Pacific Ocean. He there ascertained the trend of the coast north-westward, and the existence of the peninsula of Alaska. From his narrative we also learn of white

men, bearded, and carrying fire-arms, not Europeans, coming annually to the mouth of the Columbia to procure dye-woods, and occasionally to carry off slaves. M. de Quatrefages revives this narrative with notes and comments, arriving at the following conclusions: 1. Neither when du Pratz was in Louisiana nor when he published his book was there sufficient geographical knowledge to invent the story told by Moncatch-Apé; 2. The voyage was really accomplished; 3. The truth of Moncatch-Apé relative to waters, productions, inhabitants, etc., renders his story about bearded white men plausible; 4. The agreement of his account of the bearded white men with that of Basil Hall and others, concerning the people of Loo Choo, leads to the presumption that they were speaking of the same people; 5. Therefore, anteriorly to the advent of Europeans, the mouth of the Columbia was visited by this people. It is best always to allow writers to speak for themselves, and to stand or fall on their own merit. But it does seem that the distinguished anthropologist is grasping at a straw. — (*Rev. d'anthrop.*, (2) iv. 593.) J. W. P. [634

The report of Professor Baird. — Although all the matter of the Smithsonian annual report has been in the printer's hands a year, the preliminary portion, or report proper, has just appeared, and the volume, or appendix, still drags its slow length along. Under the guardianship of the Smithsonian institution are to be found several quite distinct enterprises; such as the International scientific exchanges, the Museum of archeology, the National museum, the Fish commission, and the Bureau of ethnology. A full account of the operations in each of these departments will be found in the report of Professor Baird. Here we shall speak of anthropology only. During the year 1881, Mr. S. T. Walker explored Indian mounds and graves in Florida; Judge J. G. Henderson of Illinois completed his investigations of the mounds of that state; Mr. S. B. Evans and Mr. F. A. Ober conducted some explorations in Mexico; Mr. L. Guesde of Guadalupe sends a portfolio of beautiful water-color sketches of West-Indian polished-stone implements, with descriptions; Mr. Nelson adds to his already splendid collection of Esquimaux culture-objects. Mention is made of the following publications: Bransford's Antiquities of Nicaragua, the Annual report of 1880, and Vol. xxiii. of the Contributions to knowledge. The work of the ethnological bureau in 1881 included the explorations of Mr. Cushing, Col. Stevenson, Dr. E. Palmer, Mr. W. J. Taylor, Mr. S. T. Walker, Major Powell, Mr. Mendeleff, Mr. J. K. Hillers, Tichkematse, and George Tsaroff. — J. W. P. [635

INTELLIGENCE FROM AMERICAN SCIENTIFIC STATIONS.

GOVERNMENT ORGANIZATIONS.

National museum.

Invertebrate fossils of Brazil. — The museum has received from Museu nacional of Brazil, through Dr. Orville A. Derby, the first set of duplicates of the invertebrate fossils acquired during the recent geological exploration of that country. The collection comprises about seventy species of fossil gasteropods, the greater proportion of which are now being described for the first time, together with other invertebrates equally interesting.

Lectures upon materia medica. — A course of eight lectures upon materia medica, based upon and illustrated by the collection in the national museum, will be delivered by Dr. D. Webster Prentiss. The course will open on the 7th of April, and be continued on consecutive Saturdays. Admission will be by ticket.

Naval bureau of ordnance.

Gunnery. — A series of experiments has been commenced at the Naval experimental battery near Annapolis, Md., with the breech-loading steel rifle recently completed at the South Boston iron-works.

With a charge of 25 pounds of powder, and a projectile weighing 68 pounds, a muzzle-velocity of 1,996 feet per second has been attained, with a pressure in the bore of the gun of but 27,000 pounds per square inch. This gun has a calibre of six inches, a bore fifteen feet in length, and is capable of withstanding an internal pressure of 55,000 pounds per square inch. Considering the conditions of chamber-space (920 cubic inches), length of bore, and weight of projectile, the results are unsurpassed by any hitherto obtained abroad. — J. M. R.

Annapolis, March 21.

Ordnance experiments. — The experiments with the new six-inch rifle have been continued this week by Lieut. Commander W. M. Folger, who is in charge of the experimental battery at this place. Yesterday a projectile weighing 68 pounds was discharged with a muzzle velocity of 2,130 feet per second, the charge of powder being 32 pounds, and the pressure 30,720 pounds per square inch. The velocity was ascertained by means of two Le Boule chronographs working independently, the difference between the results recorded being only a few feet. — J. M. R.

Annapolis, March 23.

Department of agriculture.

Contagious diseases of animals. — The subject of the prevention and cure of contagious diseases of animals has for many years been considered in this country. For a long time, extirpation was resorted to, and with good results; notably in the work of the commission appointed by the state of Massachusetts in 1860, which entirely succeeded in freeing that state of pleuro-pneumonia. Of late years, inoculation or vaccination has been employed with such success abroad, by Pasteur, that we are justified in anticipating the most beneficial results from the prosecution of his methods in this country. Pasteur has been engaged in efforts to establish some law, through the agency of which such diseases as pleuro-pneumonia, charbon, foot and mouth disease, and other diseases of domestic animals, could be controlled and cured. Dr. D. E. Salmon has been pursuing similar experiments under the direction of the department, though necessarily in a more limited way, and has met with such success that he has great faith in the result of the more elaborate and extensive experiments which he is about to undertake in the District of Columbia. Commissioner Loring has determined to place at the disposal of Dr. Salmon the necessary land, buildings, animals, and apparatus, to enable him to make the proper microscopical observations, and to carry on any experiments that will tend to establish some economical method by which our farmers or breeders may control the diseases of their animals. Dr. Sal-