

The physiology of protoplasmic motion. By Th. W. ENGELMANN. Translated by C. S. DOLLEY. Rochester, N. Y., Davis & Leyden, n.d. 40 p. 8°.

This pamphlet, without date or any statement as to the original, is a good translation, with very poor reproductions of the illustrations,

of Engelmann's chapter in Hermann's well-known *Handbuch der physiologie*. It is to be regretted that the author did not see fit to date his translation, nor give the source of the original. The latter omission we are fortunately able to supply.

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

MATHEMATICS.

Orthogonal transformations.—Mr. W. J. C. Sharp has investigated the invariants of a certain orthogonal transformation with special reference to the theory of the strains and stresses of an elastic solid. If a, b, c, f, g, h , are transformed according to the same law as $x^2, y^2, z^2, yz, zx, xy$ (x, y, z , being the rectangular Cartesian co-ordinates of a point, transformed without change of origin), they will have a system of invariants entirely unaffected by the transformation. The author gives the three invariants corresponding to these quantities, and makes a large number of exceedingly interesting applications to different geometrical and physical problems. As Mr. Sharp's paper consists almost entirely of algebraical work it is impossible to give it more than this brief reference, and to commend it to the notice of those interested in the subjects which he touches upon.—(*Proc. Lond. math. soc.*, xiii.) T. C. [1137]

Elliptic functions.—The Rev. M. M. U. Wilkinson has given a number of general formulae arising from the differentiation of the elliptic functions with respect to the modulus.—(*Proc. Lond. math. soc.*, xiii.) T. C. [1138]

Unicursal twisted quartics.—Mr. R. A. Roberts considers in this paper some properties of the unicursal twisted quartic curve; namely, the intersection of a quadric and a cubic which contains two non-intersecting generators of the quadric. Almost exclusive use is made of the expressions for the co-ordinates of a point on the curve in terms of one independent parameter. A reduction is first given to the canonical form, and, after examining a particular property of the curve, the author obtains the condition that four points of the curve shall be coplanar; then certain points on the curve are examined, and invariant conditions are obtained for degenerate forms of the curve. The next five sections treat of polygons circumscribed about the curve, and the five concluding sections treat of circular unicursal quartics.—(*Proc. Lond. math. soc.*, xiv.) T. C. [1139]

PHYSICS.

Acoustics.

Maintained vibrations.—Lord Rayleigh discusses mathematically that type of maintained vibration which is most familiar in the form of Melde's experiment in which a fine string is kept in transverse vibration by connecting it at one end with one prong of a vibrating tuning-fork, the direction of the motion of the point of attachment being parallel to the length of the string. The string settles into a state of permanent vibration whose period is double that of the point of attachment. The equations indicate that an absolutely rigorous adjustment of pitch is necessary, a conclusion not borne out by experiment.

This is accounted for by the slight variation of rate with variation of amplitude. The *son rauque* of Savart is probably caused in a similar way, as the periodic variations of tension accompanying longitudinal vibrations will produce associated transverse vibrations. For lecture illustration, a soft-iron pendulum vibrating on knife-edges may be placed vertically over a vertical bar electro-magnet, through which are sent intermittent currents whose frequency is twice that of the pendulum vibrations. Of the same nature are the crispations observed by Faraday on the surface of water which oscillates vertically. The author has shown that Faraday was correct in his opinion that there are two vibrations of the support for each vibration of the liquid.—(*Phil. mag.*, April.) C. R. C. [1140]

Hydrogen-whistles.—Le Conte calls attention to an error in Galton's calculations, as he assumes that the number of vibrations of the whistle, when blown with different gases, is in proportion to the density, while it is actually in proportion to the square root of the density. Hence 86,533 instead of 312,000 vibrations would be given by Mr. Galton's proposed whistle.—(*Nature*, May 17.) C. R. C. [1141]

Electricity.

Winding electro-magnets.—Professors Perry and Ayrton have experimented upon the following types of electro-magnets:—

1. Wires wound equally over the whole length.
2. Wires coned toward each end.
3. Wire wound equally over half the iron bar, leaving the other end bare.
4. Wire wound on one half, but coned towards the end.

It was found that the effect of coning the wire is to produce a strong field very near the pole, but that the force falls off very rapidly as the distance from the pole increases. At considerable distances from the end of the electro-magnet the uniformly coiled magnet, No. 1, produces the most powerful field. At very small distances from the end of the magnet, Nos. 3 and 4 give the strongest effects. They conclude therefrom, that with a definite length of wire, of core, and strength of current, the mode of coiling the wire determines the strength of the magnetic field at different distances from the end of the electro-magnet.—(*Phil. mag.*, June, 397.) J. T. [1142]

CHEMISTRY.

(Analytical.)

Ammonic hyposulphite as a reagent in qualitative analysis.—A. Orlowsky suggests the use of ammonic hyposulphite instead of hydric sulphide in a qualitative separation of the metals. In a systematic course of analysis which Orlowsky proposes, lead, barium, strontium, and calcium are precipitated

with ammoniac sulphate. The filtrate is acidified with hydrochloric acid, heated to boiling, and sodic or ammoniac hyposulphite added, avoiding an excess. The precipitate, which contains antimony, arsenic, tin, platinum, mercury, silver, copper, bismuth, cobalt, and nickel, is next treated with ammoniac sulphide. On neutralizing with ammonia the filtrate from the precipitate thrown down by the hyposulphite, cadmium, manganese, and zinc are precipitated. In the last filtrate the alkalis, calcium and magnesium, must be looked for, as well as antimony and tin, since the last two metals are not precipitated completely by ammoniac hyposulphite. — (*Journ. russ. phys. chem. gesellsch.*, 1883, 32; *Berichte deutsch. chem. gesellsch.*, xvi. 807.) C. F. M. [1143]

Separation of nickel from cobalt.—For the detection of a small quantity of nickel in presence of much cobalt, or of a trace of cobalt with nickel in large quantity, G. Vortman converts the cobalt into the luteo-salt by oxidation with sodic hyposulphite in an ammoniacal solution. Nickel may be precipitated from this solution by sodic hydrate, and, in the filtrate, cobalt by ammoniac sulphide. — (*Monats. chemie*, 4, 1, *Berichte deutsch. chem. gesellsch.*, xvi. 810.) C. F. M. [1144]

Determination of zinc as sulphide.—In igniting zinc sulphide, R. Macarthur suspends the crucible containing the sulphide in a Hessian crucible with a hole drilled through the bottom large enough to admit the flame of a Bunsen burner. Another hole is drilled through the side of the crucible, through which is passed a glass tube for introducing a stream of hydric sulphide. — (*Chem. news*, xlv. 159.) C. F. M. [1145]

METALLURGY.

Copper-smelting plant.—The Pacific copper-smelter has a peculiar arrangement of the water-jacket. By means of circulating plates, a rapid circulation of the water is secured, and also great economy in the use of water. The thirty-ton smelter requires about twenty-five thousand gallons of water per day, if allowed to run to waste; if collected and cooled for use again, only about three thousand gallons are needed. — (*Min. sc. press*, April 28.) R. H. R. [1146]

The dephosphorization of pig iron.—The following is the process for which a patent was granted, May 22, to Mr. James Henderson of Bellefonte, Penn. The iron is taken from the Bessemer converter at the end of what is called the third period, or after the boil, transferred by means of a ladle to the hearth of a reverberatory furnace, which is capable of being heated to the melting-point of wrought iron or higher. The metal is treated in this furnace with fluorspar and titaniferous iron in the proportion of forty parts by weight of fluorspar to one hundred of titaniferous iron. If there is one per cent of phosphorus in the metal, about three hundredweight of the mixture will be required to a ton of steel. Thus the dephosphorization is effected after the decarbonization. — (*Eng. min. journ.*, May 26.) R. H. R. [1147]

The basic process at Steeltown.—The first heat of basic steel ever made in this country was effected on May 7, 1883, at Steeltown, by the Pennsylvania steel company. The excellent quality of the steel thus made is shown by the following tests. Some flat bars were plunged in water when hot, and then bent cold and hammered down without showing any fracture. A plate was also flanged hot, on which the flange is as perfect as if the material had been the best charcoal-hammered plate iron. In the same plate two holes were punched within a sixteenth of

an inch of each other without cracking the intervening steel. — (*Bull. Amer. iron steel assoc.*, May.) R. H. R. [1148]

Blast-furnace slag.—It is now proposed by Mr. A. D. Elbers of Hoboken, N.J., to utilize the well-known mineral wool for the manufacture of china cement, pigments and absorbents. The process consists in roasting and subsequent washing of the fine mineral wool so as to leave only the silicates of lime, alumina, and magnesia. — (*Eng. min. journ.*, May 26.) R. H. R. [1149]

The Siemens direct process.—A lot of separated magnetic iron sand from Moisie, Canada, was sent to Mr. James Davis, manager of the New steel-works, London, to be worked in the Siemens direct rotatory furnace. Mr. Davis reports that it is the best material for working in the rotator that he has seen. A charge of twenty-five hundredweight with six hundredweight of coal or charcoal gave the best results. The average time required was three hours forty-five minutes, and the yield of solid metallic balls was fifteen hundredweight three quarters. The balls were found very suitable for making mild steel in the Siemens furnace. The wages are estimated at five shillings per ton of balls; the fuel, at ten per ton. — (*Eng. min. journ.*, May 5.) R. H. R. [1150]

GEOLOGY.

Geology of the province of Jujuy, Argentine Confederation.—Brackebusch divides the formations of this province as follows. 1°. Sedimentary rocks: *a.* Silurian, *b.* cretaceous, *c.* post tertiary, *d.* modern. 2°. Eruptive rocks: *a.* granite, *b.* quartz porphyry, *c.* diorite, *d.* basalt, *e.* tragnite and andesite. The Silurian consists of two members, — the primordial (Taconic) fauna, being represented in a great thickness of beds, and the second or lower Silurian fauna.

The petroleum-bearing formation has been assigned to almost every geological period. The present author considers it as probably lower cretaceous, and makes a fair argument in support of his claim. Darwin considered it as cretaceo-Jurassic. These beds have an enormous distribution in South America. The same beds are said to reach to Puntas Arenas, where Dr. G. Steinmann (*SCIENCE*, p. 156) has lately recognized the neocomian, which would seem to support the view that they are of lower cretaceous age. Brackebusch thinks that the boring of wells for petroleum in the region he has examined will be attended with magnificent results.

In the quartz porphyries, many ores of copper and argentiferous galenite occur. The trachytes and andesites, and their accompanying tufas, are very widely distributed. To these the author refers numerous gold and silver mines of the province. — (*Anal. soc. cient. argent.*, 1883.) J. B. M. [1151]

Lithology.

Fossil-bearing schists.—Renard has published a valuable paper on the metamorphic rocks of the Ardennes, in which fossils had been found by Dumont and Sandberger, the latter describing a case in which garnets and fossils were together in the same hand specimen.

The fossils *Spirifer macropterus* and *Chonetes sarculatus* show that the schists belong to the lower Devonian. The paper gives the results of microscopic and chemical analyses, describing the principal minerals. Renard rejects entirely the view that these schists are chemical precipitates, and holds that they are metamorphosed sediments.

These results are similar to those of Reusch and

Brögger on the schists of Norway. Both found fossils in crystalline marble, in mica schist, and in other rocks of like metamorphic character. The latter even found the remains of Orthids enclosed in dodecahedral garnet. Likewise the Carrara marble of Italy has been shown to overlie and underlie fossiliferous strata. From these observations, there seems to be no doubt that the general belief that schists are metamorphosed sedimentary rocks is substantiated, so far as these regions are concerned; and they afford no aid to the revived and remodelled Wernerian hypothesis that has been made so prominent in this country during recent years. Without objecting to the work of the writers above referred to, attention may be called to the tendency in most observers, when they have proved the origin of a rock, to assume that all associated rocks are the same, leading one class to hold to the eruptive origin of all the rocks seen, and another to their sedimentary origin. In regions of crystalline rocks, both classes of rocks would naturally be expected to occur together, and it would be well if the utmost care should be used to prove the origin of every rock in the district studied. — (*Bull. mus. roy. Belg.*, 1; *Die silur. etagen 2 u. 3*; *Silurfoss. og kongl. i Bergensk.*; *Nature*, xxvi. 567, xxvii. 121.) M. E. W. [1152]

Carboniferous gneiss and schist.—Some gneisses and schists, which, from the associated plant-remains, are referred to the carboniferous, have been microscopically studied by Foulton. They are associated with the graphite deposits about Kaisereberg in Steiermark. The gneiss is composed of feldspar (albite) quartz, muscovite, and chlorite, with a little epidote, biotite, and, in one case, tourmaline. The phyllite gneiss is fine-grained, and composed of quartz, orthoclase (microcline), and tourmaline; while the graphitic schist is also a purely crystalline mass of quartz and chloritoid, excepting some portions in which are found plant-impressions and plates of a micaceous mineral. Zircon and an asbestiform mineral were also seen. — (*Verh. geol. reichsanst.*, Jan., 1883.) M. E. W. [1153]

MINERALOGY.

Some results of the alteration of minerals.—The following facts are communicated by F. A. Genth:—

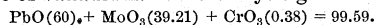
Albite from orthoclase.—This interesting alteration is well exhibited at the gneiss-quarries of upper Avondale, Penn., where flesh-colored orthoclase is found much decomposed, the cavities being filled with albite associated with muscovite.

Anthophyllite from talc.—At Castle Rock, Delaware county, Penn., talc occurs as the result of the alteration of olivine, but in some cases this alteration has proceeded farther. Radiating from a nucleus of talc is a white or grayish mineral, with silky lustre and prismatic cleavage at an obtuse angle, which proved, upon analysis, to be anthophyllite.

Talc pseudomorph after magnetite.—In Hartford county, Md., small octahedrons of scaly talc occur, the scales being parallel to the octahedral faces; and sometimes the crystals contain in the interior a small nucleus of magnetite. The author regards the crystals as pseudomorphs after magnetite, and suggests that a whole bed of steatite twelve to fifteen feet in thickness, occurring at the above-mentioned place, may have resulted from a like change from magnetite. — (*Proc. Amer. phil. soc.*, xx. 392.) S. L. P. [1154]

Wulfenite.—It has generally been accepted that the red varieties of wulfenite found at many localities

are colored by chromate of lead (PbCrO_4), which is isomorphous with the wulfenite PbMoO_4 . If this is true, lead chromate must be tetragonal in its crystallization, and trimorphic; for the natural variety, crocoite, is monoclinic, and again it is undoubtedly orthorhombic, isomorphous with anglesite (PbSO_4). In red crystals from Phoenixville, Penn., J. Lawrence Smith found vanadium and only a trace of chromium, while Wöhler detected vanadium in a variety from Bleiberg in Carinthia. Owing to the dissimilarity between molybdcic and vanadic acids, it is not probable that any isomorphism exists between them, while chromate and molybdate of lead, from a chemical stand-point, can well be regarded as isomorphous. To decide as to the true nature of the coloring-matter, P. Groth had various wulfenites examined by F. Jost, with the following results. In a highly colored, yellowish-red variety from Bleiberg, neither chromium nor vanadium could be detected. In the red crystals from Phoenixville, Penn., chromium was found, but no trace of vanadium. The analysis gave



The green pyromorphite accompanying wulfenite from the latter locality contained no vanadium, but a trace of chromium; while chromium was also found in a yellowish-red pyromorphite from Leadhills, Scotland. Here, certainly, no isomorphism can exist between the chromate and phosphate of lead; and the red color in the latter case must be due either to the mechanical admixture of some chromate or some pigment entirely independent of the chromium. The fact that wulfenites, entirely free from and containing a trace of chromium, occur of a red color, makes it probable that the color is due to some pigment, perhaps of organic origin, while the chromate is present as a mechanical admixture, and in no way related to the red color. — (*Zeitschr. kryst.*, vii. 592.) S. L. P. [1155]

METEOROLOGY.

Solar physics.—A recent report on this subject to the British government mentions India as a satisfactory field in which to prosecute investigations of solar radiation, and its connection with terrestrial phenomena; calls attention to the importance of a more satisfactory means of measuring directly the sun's heat, the great obstacles presented in the attempt to measure this heat at sea-level stations, owing to the very great fluctuations in the observed direct heat, even on clear days, due to invisible vapor; and refers to the expedition of Prof. Langley to Mount Whitney, and the permanent establishment of instruments at Leh in India, at an elevation of 11,000 feet, in order to overcome these obstacles if possible. A very useful, detailed catalogue of sun-spot observations, and photographs of the sun, from 1832 to 1877, is given. A discussion of the influence of the state of the sun upon the earth's temperature is entered upon, in which an effort is made to connect the range of temperature at the single station Toronto, Canada, with the sun's spots. The results arrived at seem to show that a maximum temperature range corresponds to a maximum number of spots, and that the Toronto phases of temperature range lag behind similar phases in solar spottedness between one and two days. The first of these conclusions differs from the opinions held by some, and, on taking the mean annual ranges, seems hardly sustained.

The following table gives the mean annual range of temperature from 1841 to 1880, and mean annual cloudiness from 1833 to 1880, at Toronto, Canada. Solar spot numbers are added for comparison.

Mean annual temperature range, { Toronto, Canada.
" " cloudiness,
" " with sun-spot numbers.

Year.	Range.	Cloudi- ness.	Sun- spots.	Year.	Range.	Cloudi- ness.	Sun- spots.
	°	%			°	%	
1841	16.8	-	37	1861	14.4	.62	77
1842	17.8	-	24	1862	14.4	.63	59
1843	16.7	-	11	1863	14.7	.61	44
1844	17.9	-	15	1864	14.6	.65	47
1845	17.9	-	40	1865	15.4	.61	31
1846	15.8	-	62	1866	15.0	.61	16
1847	13.9	-	98	1867	15.5	.61	7
1848	14.9	-	124	1868	15.3	.64	37
1849	13.6	-	96	1869	14.6	.66	74
1850	16.7	-	67	1870	15.7	.62	139
1851	13.9	-	65	1871	16.5	.64	111
1852	14.3	-	54	1872	17.6	.59	102
1853	16.9	.57	39	1873	16.9	.60	66
1854	19.8	.59	21	1874	17.4	.63	45
1855	18.2	.60	7	1875	17.4	.62	17
1856	18.3	.57	4	1876	15.7	.66	11
1857	16.4	.60	23	1877	16.2*	.60	12
1858	13.9	.60	55	1878	15.1	.62	3
1859	13.7	.61	94	1879	17.1	.63	6
1860	14.2	.60	96	1880	16.0	.62	-

If these figures be projected in curves, it will be seen that minimum ranges occur markedly about 1848 and 1859, while maximum ranges occur about 1844 and 1855; which are just the epochs of maximum and minimum sun-spot numbers respectively. Making full allowance for varying cloudiness, we still do not obtain any different results. The whole subject needs complete investigation. — (*Rep. com. solar phys. London, 1882.*) H. A. H. [1156]

Applications of photography to meteorology. — Photography is constantly finding new applications in the other sciences. By its means, under the direction of Capt. Abney, experiments are being conducted at Kew, Eng., to determine the height and velocity of clouds. Two similar cameras are set up at a distance of about six hundred feet apart, and provided with instantaneous shutters, which can be released at the same instant by electricity. By knowing the angle of inclination of the cameras, and measuring the position of the cloud as photographed on the two plates, we at once have a trigonometrical observation which will give us the distance of the cloud with great accuracy. The axis of a cyclone is probably not vertical, its upper portion being in advance of the lower in relation to the direction in which the cyclone is moving; hence the higher clouds are sometimes affected by an approaching storm before its influence affects the winds blowing at the surface of the earth. The cirrus clouds are, therefore, the ones to whose observation is attached the greatest importance. Occasional observations only have so far been made, but the Meteorological council has under consideration the plan of adopting the instrument for continuous use at its central station at Kew. The observations made so far would seem to indicate that the cirrus clouds are not situated at so great an elevation as has heretofore generally been supposed. — (*Brit. journ. phot., May 4.*) W. H. P. [1157]

PHYSICAL GEOGRAPHY.

Old river-courses by Vicenza and Padua. — F. Molon gives geological and historical evidence to show considerable changes in the rivers Astico and Brenta, on the northern margin of the plain of Lombardy, in post-glacial times. On issuing from the

mountains, both of these streams formerly turned westward, toward a depression produced by an old fault running along the eastern margin of the hills from Schio to Vicenza; but, as this district was raised by their deposits, they ran more directly south, and now the Astico is laying its sands on the old beds of the Brenta, while the latter has abandoned the channel which led it through or even west of Padua, and flows farther east. By such diversions from old channels, the volume of some of the lower streams has been greatly affected. The name Retrone was formerly applied to a river of considerable size, extending to Padua; but it is now limited to a small stream west of Vicenza. The Bacchiglione, an Italian corruption of the German Bachlein, was named when its size justified its meaning; but it has now usurped the place and volume of the old Retrone. — (*Atti ist. veneto, i. 1882-83, 247, 347.*) W. M. D. [1158]

Origin of fiords. — Fr. Ratzel calls attention to the broken form of polar coasts in both hemispheres, and the bare, rocky surface of the adjoining lands, and concludes that both of these characteristics result from the strong erosive action of ice. He lays the excavation of not only our Great Lakes and Onega and Ladoga to the same cause, but the Baltic, the North Sea, and Hudson's Bay as well (*Ausland, 1883, 223, 254*). The barrenness of polar lands may well be ascribed to ice-action, which has undoubtedly produced some modification of the surface as well; but to consider all their diversity of form due to glacial erosion exaggerates the power and duration of the ice as greatly as it neglects other and efficient causes. — W. M. D. [1159]

GEOGRAPHY.

(Arctic.)

Northern voyages in the fourteenth century. — Baron Nordenskiöld has begun the publication, under the title of '*Studier och forskningar,*' of a popular scientific account of early voyages to the high north, as a sort of supplement to the '*Voyage of the Vega,*' in which so many early northeastward voyages were noticed. The first volume contains an account and discussion of the voyages of the brothers Antonio and Nicolo Zeno of Venice, who are supposed to have journeyed to the Faeroe Islands, Iceland, and East Greenland toward the close of the fourteenth century. The author brings forward reasons for believing that the voyages were actually made, and the narrative authentic, a general disbelief in them having been (with a few individual exceptions) hitherto prevalent. The volume contains a photographic reproduction of the map of Claudius Clavus in 1427, — a remarkable discovery by Nordenskiöld himself, who found it in the city library of Nancy, included in an old manuscript copy of Ptolemy's *Cosmographia*. The period when all early voyages were regarded with suspicion or open disbelief seems to have passed away, and the truthfulness of some of them is established; while the misapplication of others (as the Chinese voyages to Fu-sang, now known to be a province of Japan, but formerly interpreted by enthusiastic geographers as north-west America) has been rectified. The danger of running into the opposite extreme of credulity is not, however, to be overlooked, in view of the attention which the perfectly preposterous story of 'Moncatch-Apé' has recently received from a few serious students. It is not necessary to say to any ethnologist who understands the nature of the races of north-west America as they were when discovered, that the story referred to is not less improbable than the wildest vagaries of Jules Verne. — W. H. D. [1160]

Nordenskiöld's programme.—Baron Norden-skiöld's programme for this year's expedition is published in full by the concurrence of Mr. Oscar Dickson, who provides the funds to carry it out. Besides the object of penetrating to the interior of Greenland, it is hoped to fix the limits of the drift-ice between Iceland and Greenland, to sound and dredge in the adjacent seas, to pay especial attention to the flora of the ice and snow, to further investigate the plant-remains in the fossiliferous strata of the region visited, and to collect new data connected with the fall of cosmic dust. The expedition sailed from Gothenburg in the latter part of May, and expects to start on its return in September next. — (*Nature*, May 10.) W. H. D. [1161]

(Asia.)

Corea.—J. C. Hall, British consul at Nagasaki, visited Han-yang or Söul (Seul), the capital of Corea, last October. In approaching the harbor of Nam-yang, the west coast was found hedged in by a thickly clustered fringe of islands, through which the mainland could hardly be seen. The water was very shallow; and the heavy fall of the tides, averaging thirty feet, makes dangerous currents. Thousands of square miles of mud flats are left bare at low water; and, besides all these difficulties, there are the dense fogs of summer, and shore ice of winter. The coast is bold, rising in trap and granite headlands two to six hundred feet high. The interior, as far as seen, was bare and almost treeless. The villages are of miserable mud-hovels, and the people are very poor. The only temples seen were two small huts near a village at the landing-place. Söul is about fifty miles inland; it is a shabby, squalid city of low stone and mud houses, with a population of about 240,000. One long main street one hundred feet wide, running east and west, and another about north and south, divide it into nearly equal portions, and lead to gates in the eastern, southern, and western walls. On the northern side it is enclosed by steep granitic peaks. Below their abrupt slope is the royal enclosure, containing the king's palace and the more important public buildings. Mr. Hall learned from the Japanese consul that the population of the kingdom, according to the government census, was about 6,840,000 souls. The revenue is derived from a tax on the cultivated land, and is payable either in money or in produce: at present it amounts to about 190,000 pounds sterling. — (*Proc. roy. geogr. soc.*, v. 1883, 274.) W. M. D. [1162]

Upper Siam.—Between Nov. 9, 1881, and June 14, 1882, Carl Bock, whose travels in Borneo are already well known, made a journey from Bangkok up the valley of the Menam, and across the Lao states to the Mekong River, and back again by much the same route. The country was found very productive throughout, and well worthy of extended commercial enterprises. As far as Rahang, the river was ascended by poling; the country on either side was low, flat, and fertile; numerous ruins were seen there. A variety of valuable timber is brought from the forests by elephants and oxen, and floated down the river to Bangkok. Other products are cotton, wax, resin, tobacco, hides, and horns. Above Rahang, rapids interrupt the up-stream navigation, and the journey was continued overland on elephants. Lakon is the centre of the elephant trade: Bock found a thousand of these great animals there, where they are brought after capture in the forest; their value varies from five hundred to two thousand rupees. Oxen are sold at sixteen to twenty-five rupees. Tchengmai, at an elevation of seven hundred feet on the Meping (the upper course of the

Menang, above the rapids) is an important and busy city, with a population estimated at a hundred thousand. Teakwood and gum-lac are among its chief commodities. A railroad from the southern coast should be constructed as far as this point, as, in addition to what now goes down the river, it would gain a large share of what is carried northward to Yunnan, and out to Canton. From Tchengmai, Bock turned a little north-east, and crossed a pass of twelve hundred feet elevation into the valley of the Mekok, that flows on to the Mekong at an altitude of eight hundred and seventy feet. The latter is a large river in a superb valley, lined with valuable forests; its lower course should be examined to learn if timber could not be floated down to the sea. Bock was unable to do this, and returned to Tchengmai, whence he descended the Meping, running the rapids into the open lower valley. — (*Peterm. mitth.*, 1883, 161.) W. M. D. [1163]

BOTANY.

Relative size of diclinous flowers.—Fritz Müller mentions *Carica papaya*—which is something of a curiosity in having polypetalous pistillate flowers and gamopetalous staminate flowers, which have been divided into two so-called genera—as forming an exception to Sprengel's rule, that, in entomophilous plants with imperfect flowers, the male are more conspicuous than the female; that they may be first visited by insects, which carry their pollen to the pistils. The greater size of the pistillate flowers in this species is explained by their concealed position among the leaves, while the smaller staminate flowers hang out in conspicuous clusters. In this connection it is shown by Hermann Müller that in monoecious species, which attract a sufficiency of insect visitors, it may be an advantage for the fertile flowers to be the larger, as those of a given stock will then be visited first, and fertilized by foreign pollen, before the insects have been to the sterile flowers of the plant in question. On the other hand, in cases where crossing is uncertain, the larger size of the staminate flowers will insure at least close fertilization, and thus be advantageous. — (*Kosmos*, April.) W. T. [1164]

The purple-leaved barberry.—Mr. Thomas Meehan referred to the fact that seed of the purple-leaved variety of *Berberis vulgaris*, collected from plants growing near Philadelphia, reproduced the purple-leaved peculiarity to an extent which it could not do more perfectly if the variety were a true species. In a bed of seedlings containing on an estimate one thousand plants, there were only two reversions to the original green-leaved condition. — (*Acad. nat. sc. Philad. meeting*; May 15.) [1165]

Influence of stock and scion.—According to the *Tropical agriculturist*, Mr. Moen has obtained some extraordinary and undesirable results from grafting scions of *Cinchona Ledgeriana* upon stocks of Red bark. The grafts have been cultivated under glass, and are now four years old. Examination has shown that the bark of the stock is rendered abnormally rich in quinine 'by its contact with the graft;' but the bark of the graft itself is found to contain less quinine than it should, while it has more cinchonine and cinchonidine. Since the amount of the bark of the stock is, of course, very small when compared with that of the vigorously-growing scion which must ultimately form the bulk of the whole, nothing is gained by the grafting. It diminishes, rather, the value of the plant. It is now proposed to try the reverse experiment. It is very probable that subsequent experiments may show that part, at least, of the un-

favorable results may be explained by the fact that only young plants have been studied. — (*Gard. chronicle*, May 26.) G. L. G. [1166]

ZOOLOGY.

(General physiology and embryology.)

Spermatogenesis. — J. E. Bloomfield gives a *résumé* of the recent papers by Duval, Hermann, Renson, Sabatier, and von Brunn on this subject, and points out that they confirm the old idea that the spermatozoa are developed in mother-cells, a part of which remains behind. (The general hypothetical bearing of this fact was first brought forward by Minot. Bloomfield, in an article on spermatogenesis, advanced this view again, and apparently still regards it as original with himself.) — (*Quart. journ. micr. sc.*, 1883, 320.) c. s. m. [1167]

The coloring-matters of the bile of invertebrates. — C. A. MacMunn communicates to the Royal society the results of a systematic examination of the bile and various extracts of the liver of mollusca and other invertebrates. The universal distribution is proved of a chlorophyll pigment, to which the name of 'enterochlorophyll' is applied. It can be found in the bile of specimens of *Helix* after a six-months fast, and is much more abundant in the liver of mollusca and echinoderms than in crustacea. The presence of reduced haematin is also demonstrated in the bile of several pulmonate mollusks. The bile of the cray-fish and most pulmonate mollusks contains haemochromogen, generally accompanied by enterochlorophyll, and appears in the latter group to be more concerned in aerial than aquatic respiration. He concludes that the so-called liver of invertebrates is a pigment producing and storing organ in addition to its functions connected with the production of digestive ferments. The presence of haemochromogen is apparently connected rather with the mode of life of the invertebrates in which it occurs than distributed according to morphological considerations. A drawing of the microscopical structure of the liver of *Limax*, showing the enterochlorophyll within the liver-cells, and maps of the most important absorption spectra, described with readings reduced to wave-lengths, accompany the paper. — (*Nature*, May 10.) W. H. D. [1168]

Protozoa.

Polemical about protozoa. — In reply to the criticism of Bütschli (ante, 273) concerning the view maintained by Balbiani in regard to the conjugation of Infusoria, the latter points out that he accepts and has in part confirmed Bütschli's observations, but differs from him as to the conclusions to be drawn from them. From Balbiani's own statement, however, it appears that he has entirely changed his former theories, and essentially adopted Bütschli's; and in stating that his old views could still be essentially preserved he seems not ingenuous. — (*Zool. anz.*, vi. 192.)

Künstler also replies to Bütschli's assertion (ante, 269) that *Künckelia gyranis* is a *Cercaria*: it has no ventral sucker, it swims with the tail forward, and shows no trace of cellular organization. K., however, now admits that it is probably a metazoon larva, and not related to the Flagellata. — (*Zool. anz.*, vi. 168.) c. s. m. [1169]

Dimorphism of Foraminifera. — It is stated by Munier-Chalmas and Schlumberger that in many genera of Miliolidae there are two forms of the species. Although the individuals are often alike exter-

nally, they may be divided into two sets, according to the arrangement of the central chambers. Thus in *Biloculina depressa*, in form *A* the central round chamber is large, and the other chambers next it follow the bilocular arrangement; in form *B*, the central round chamber is very small, and those next it present the quinquelocular order, which, however, is soon suddenly replaced by the usual bilocular arrangement. This dimorphism is probably general in the group. The authors' first note on this subject is contained in the *Bull. soc. géol. France* (3), viii. 300; their second, in the *Comptes rendus*, March 26, 1883. — (*Ann. mag. nat. hist.*, ii. 336.) c. s. m. [1170]

Coelenterates.

Phylogeny of the Siphonophorae. — Fewkes points out the resemblance between the *primitive scale* of *Agalma* and the *nectocalyx* of Monophyes, as well as the close resemblance of the embryonic knobs of *Agalma* and *Halistemma* to the tentacular knobs of the Calycophores.

He believes that these resemblances are an indication of the point in the development of the Siphonophora where the separation of the Physophorae from the Calycophorae, or the separation of both groups from a *stem form*, took place. — (*Amer. nat.*, June.) W. K. B. [1171]

New Brazilian medusa. — In his work on the deep-sea Medusae collected by the Challenger expedition, Haeckel describes an interesting genus, *Drymoneura*, represented by a single species from Gibraltar. Fr. Müller records the occurrence of a second species, *Drymoneura Gorge*, which he has found in 1857, 1860, and 1861, on the coast of Brazil. The Brazilian form was found in a very shallow inlet, and the genus cannot be regarded as a deep-sea form. — (*Zool. anz.*, no. 137.) W. K. B. [1172]

Insects.

Odonata of the Philippines. — Baron de Sélys gives a list of seventy-seven species, with descriptions of new species, and notes on those previously known. Twenty years ago hardly one was known from the region. The present paper is due to the collections of Semper; and, with the exception of *Hypocnemus*, which is figured, all the genera and even sub-genera are represented in other oriental countries. But forty-one of the species are peculiar to the Philippines. A single species of the otherwise wholly African genus *Libellago* occurs. — (*Anal. soc. esp. hist. nat.*, xi.) [1173]

Scolopendrella. — In a new species described and figured from Massachusetts, peculiar for the robustness of the legs, Scudder finds the openings considered by Ryder as stigmata next the bases of the legs, but believes he has also found stigmata in the head, as in some *Thysanura*. He also compares the conical protrusion of the mouth-parts to those of *Podura*. — (*Proc. Bost. soc. nat. hist.*, xxii. 64.) [1174]

Growth of the ova in Chironomus. — Jaworski advances some singular notions on this subject. The eggs grow directly from the blood, not at the expense of other cells, or by the intermediation of the follicular epithelium. In pupal life the amount of the blood is reduced to a minimum; when the eggs are discharged by the imago, they leave a large space; the blood flows in and partly fills it, so that there is less blood left in circulation than can sustain life; hence the insect dies. (It does not appear that the author's startling assertions rest upon any observed facts.) — (*Zool. anz.*, vi. 211.) c. s. m. [1175]

VERTEBRATES.

Development of the pulmonary epithelium. — The lungs of the human adult have been minutely studied by Kölliker, whose memoir, which appeared in 1881, still left the development of the lung to be worked out. This gap has now been partially filled by Nicolai Jalan de la Croix, who, however, has relied on the chick and mammalian embryos for the earliest stages. In a human embryo of the third month (6.5 cm.) the bronchi are nearly straight tubes branching at acute angles; the alveoli have begun to form at their ends, but are developed in the inner part of the lung only later; the connective tissue is in process of differentiation; the whole system of respiratory cavities is lined by a continuous epithelium, which is thickest in the trachea, where it has several layers of cells, and which gradually thins out, until, in the alveoli, it consists only of two layers of cells, the deeper cells being somewhat smaller, the upper ones irregular in shape, and approaching the cylindrical form. The alveoli are already grouped into lobules; and it is these which Kölliker has described in his embryology as the primitive alveoli. By the end of the fourth month the bronchi branch off at much greater angles; the epithelium in the terminal vesicles is only 15μ thick, and consists of a single row of cylinder cells. In the fifth month the connective tissue around the bronchi is quite advanced in development; it is, between the lobules, largely fibrous; between the alveoli, still rich in cells. The alveoli themselves measure about 0.05 mm. in diameter; their epithelium, only 11μ in thickness. The blood-vessels have attained an enormous development, but are not yet close to the respiratory surfaces. Comparison of the different stages shows that the alveoli gradually increase in number, and at the same time diminish in size (author's *résumé*, *vide* p. 109). The conversion of the many-layered original epithelium into the single layer of the alveoli, the author asserts (apparently without definite reason) to be effected by the passage of the deeper-lying cells into the upper layer. By this process, as well as by the multiplication of the cells, is the rapid expansion of the epithelium to be explained. For the history during the fifth to ninth month, de la Croix collates the previous literature.

In the mature foetus (still-born) alveoli are still forming along the alveolar canals. The epithelium of the canals and all alveoli is still cylindrical, the cells with oval nucleus being about twice as high as broad. The alveoli do not yet extend down into the meshes of the capillary net-work. In a child that lived for seven days the flattening-out of the alveolar epithelium had already made considerable progress (Stieda found that this flattening took place much earlier in sheep embryos). The very rapid development of the pavement out of the cylinder epithelium, the author says, must be necessarily produced by the expansion of the lungs after birth. (There are two objections to this view, — first, it is not shown that the change accompanies an expansion; second, it fails to account for the development of the flat cells during foetal life, as in sheep. *Rep.* — (*Arch. mikr. anat.*, xxii. 93.) C. S. M. [176]

The nature of inhibition. — Professor T. Lauder Brunton has lately offered a theory of inhibition founded on its analogy to the interference which occurs when waves of light or sound meet in opposite phases. According to his hypothesis, there are, in the cord and brain, successive layers of sensory and motor cells, so arranged that each motor cell is connected, not only with its corresponding sensory

cell, through which the afferent impulse causing a simple reflex first passes, but also with other sensory cells higher or lower in the cord. When the afferent nerve leading to a sensory cell is slightly stimulated, a simple reflex occurs through the corresponding motor cell. So when several afferent fibres are gently stimulated, as in tickling the sole of the foot, the impulse from each sensory cell passes to a motor cell, and calls forth a reflex contraction. If the afferent fibre leading to any sensory cell is more strongly stimulated, the impulse on reaching the sensory cell will divide, part going directly to the motor cell, part passing to a neighboring sensory cell and thence indirectly to the motor cell. The consequence is, that the two waves of impulse, having travelled paths of unequal length, meet in opposite phases, and an interference or inhibition results. A firm pressure applied to the sole of the foot arouses no reflex contraction. No place is given in the theory to special inhibitory cells. Any cell may exercise an inhibitory action on the sensory or motor cells with which it is connected. Whether its action on any other cell shall augment or inhibit the activity of the latter, depends on the phase in which the wave of impulse travelling from it meets the wave of impulse that has reached the same cell from another source. In the case of inhibition by the will, the impulse sent down from the brain is supposed to interfere with that originating in the cord from the stimulation of sensory nerves. Besides inhibition by interference, apparent inhibition by the diversion of the stimulus into other than its customary path may occur.

Brunton attempts to explain many of the well-known phenomena of inhibition on this hypothesis. His explanation of the action of drugs — such as atropia, morphia, strychnia — on the theory of interference is particularly weak and unsatisfactory. — (*Nature*, nos. 696–699.) W. H. H. [177]

Man.

Electrotonus of the motor nerves of man. — Since the discovery by Pflüger of the general laws of electrotonic changes in a nerve during the passage of a galvanic current, from investigations made upon the dissected nerves of frogs, numerous attempts have been made to verify his conclusions for the uninjured nerve of man. The general outcome of this work has not been satisfactory, as far as a confirmation of Pflüger's generalizations is concerned. Perhaps the chief cause of the discrepancy amongst the results of different observers has been the neglect to fully appreciate the fact pointed out by Helmholtz, that when the uninjured nerve, in its natural position in the body, is exposed to an electrical current, there exist in the region of each electrode, owing to rapid current diffusion, areas of different electrical density, which must, therefore, be considered as electrodes of opposite signs. Waller and de Watteville have investigated the subject anew upon the motor nerves of man, and obtained results which are in accord with the laws established by Pflüger. Their experiments were made in most cases upon the peroneal nerve, and the contractions of the corresponding muscles were registered by appropriate means upon a smoked drum. They employed three methods of stimulation, — induction currents, constant currents, and mechanical stimuli. The unipolar method was used in all cases, and the polarizing and stimulating currents were combined in one circuit. By this means the points of stimulation and polarization were made co-extensive, and the electrotonic changes in the polar region obtained. In mechanical excitation the same result was reached by using the polarizing electrode itself to give the stimulating blow. The authors have

adopted the theory of a 'mixed polar action for both polarizing and testing currents;' that is, at the electrode applied to the nerve, there exist for each current, stimulating as well as polarizing, a 'polar' region of the same sign as the electrode, and a 'peripolar' region of the opposite sign, the electrical density of the latter being less than that of the former, but still sufficient to act as a physiological stimulus. When an induction current was used to test the 'polar alteration of excitability' produced by the polarizing current, the results were found to differ according as the 'exploring' electrode represented the kathode or anode of both currents, or the kathode of one and the anode of the other. In the first case the effect of the induction shocks are increased; in the second case, diminished. They explain their results in this way. When the electrode is kathode of the induction current, the excitation proceeds from the cathodic polar region. If the electrode is at the same time the kathode of the polarizing current, the polar region is cathodic, and possesses increased irritability. If the electrode is anode of the polarizing current, the polar region is anodic, and its irritability is diminished. When, on the other hand, the electrode is anode of the induction current, the excitation proceeds from the peripolar cathodic region; since all contractions with induction currents are make-contractions. If the electrode is at the same time the anode of the polarizing current, the peripolar region is cathodic, and therefore of increased excitability. If the electrode is kathode of the polarizing current, the peripolar region is anodic, and therefore of diminished excitability. When the testing current is a galvanic current, and both polarizing and testing currents are in the same direction, it is found that the effect of the cathodic make is increased during the flow of a cathodic current, and of an anodic make during the flow of an anodic current. The excitation proceeds from a cathodic region of increased irritability, in one case polar, in the other peripolar. So the effect of a cathodic break is diminished during the flow of a cathodic current, and of an anodic break during the flow of an anodic current. The excitation arises from the disappearance of an electrotonus in an anelectrotonic region of depressed irritability, in one case peripolar, in the other polar. With regard to mechanical stimulation, it was observed that the effect is increased when the polar region is cathodic, and diminished when it is anodic. They made some experiments upon the after-effects of the polarizing current, the results of which show that there is an after-kathodic diminution and an after-anodic increase of excitability, which are more marked in the polar than in the peripolar region. — (*Phil. trans.*, 1882, 961.) W. H. H. [1178]

Electrotonus of the sensory nerves of man. — Waller and de Watteville have carried out a series of experiments on the alterations of excitability of the sensory nerves during the passage of a galvanic current, similar to those made upon the motor nerves. Their method of work was essentially the same as in the preceding investigation. In order to measure the increase or diminution of sensation after polarization, they ascertained the least strength of current which would produce a 'reaction in consciousness,' and then noted the changes necessary to be made after polarization to obtain the same effect. Their general result is, that, "after the passage of a galvanic current, the alterations in the excitability of the sensory nerves of man follow a course essentially similar to that observed in the motor nerves." — (*Proc. roy. soc.*, 1882, 222.) W. H. H. [1179]

ANTHROPOLOGY.

Smithsonian anthropological papers. — The great delay in bringing out the annual report for 1881 has induced Prof. Baird to publish the scientific summaries and the anthropological papers in separate pamphlets. The summary, as usual, is by Prof. Mason, and the papers were all prepared under his editorial care. The summary is divided into two parts, the discussion and the bibliography. In order to show just where each contribution for the year stands with reference to the whole, he divides anthropology into eleven parts, — anthropogeny, archeology, biology of man, psychology, glossology, ethnology, technology, sociology, mythology, hexiology, and bibliography; the latter term including all aids to the study of man. By the use of the Greek words *γράφη*, *λόγος*, *νόμος*, and *γενεά*, the suffixes -ography, -ology, -onomy, and -ogeny, may be applied to each of the foregoing terms, in order to indicate the observing, the classifying, the discursive, and the philosophic phases of each branch of inquiry. Separate chapters are devoted to each of the leading topics.

The miscellaneous papers are unusually numerous. Explorations of mounds in Kansas are reported by Mr. Serviss; in Iowa, by Banta and Garretson; in Missouri, by Hardy, Scheetz, and Watkins; in Wisconsin and Illinois, by Moody, Shallenberger, and Adams; in Ohio, by Luther; in Kentucky, by Linney and Evans; in Tennessee, by Haite; in Alabama, by Gesner; in Georgia, by Whittlesey; in Florida, by Bell. Other aboriginal works are treated by Whitcomb for Washington Territory; by Stinson for Indiana, and by Case and MacLean for Ohio. Miscellaneous antiquities are reported from Iowa by Dean; from Illinois, by Gale, McClelland, French, Farrell, and Sibley; in Texas, by Roessler; in Arkansas, by Jones; in Pennsylvania, by Hayden; in New York, by Sheward; in Connecticut, by Ellsworth; and in Nova Scotia, by Patterson. Besides these are papers on shell-heaps in Alabama, West Virginia, and Massachusetts, by Mohr, Hubbard, and Wing; on inscriptions in Arkansas, by Green; on buried flints in Illinois, by Snyder; on silver crosses from a Georgia mound, by Jones; on ancient canals in Florida, by Kenworthy; on rock-carvings on the Susquehanna, by Galbraith; on a sculptured stone from New Brunswick, by Jack; on a perforated tablet from New York, by Tooker; a specimen of aboriginal art, by Matthew; and on the aborigines of Florida, by Walker. — J. W. P. [1180]

Egyptian boomerangs. — Gen. Pitt-Rivers takes the occasion of receiving an Egyptian boomerang as a text for the review of the subject of the spread of that interesting weapon. His description is accompanied by a plate, giving figures of twelve boomerangs from the same quarter, which he had seen in different museums. There are four phases in the evolution of the boomerang worthy of notice. 1. All weapons which are thrown by the hand, and which are not specially adapted for rotation. 2. A round, curved stick, which would rotate more freely than a straight one. 3. The same weapon made from a split stick, opposing to the atmosphere a thinner edge, whereby the rotation and range would be greatly increased. This is the most important stage in the development of the boomerang. In this state it was used by the Australians for purposes of war, after they had further acquired a knowledge of the returning or screw boomerang. It was in this stage that Gen. Pitt-Rivers supposes it was carried by the black races into those distant regions where it is now used. 4. Those weapons to which is imparted by

peculiar twists a screw movement tending upwards, or at any rate in a direction that is perpendicular to the plane of rotation. This last stage of improvement, so far as we at present know, was effected in Australia only, and not in those countries into which, in its simpler form, it had been previously distributed by the migration of tribes. The Egyptian, African, and Dravidian boomerangs may not have been independent inventions, therefore. The boomerang being a weapon of very primitive construction, and its present distribution being coincident with the distribution of some of the black races of man, it may with great probability be regarded as one of those weapons which primeval men carried with them into distant parts from the home of their ancestors, wherever it was. In speaking of the distribution of this weapon, writers should be careful to note that the Egyptian boomerang, the trom-bush of the blacks of Abyssinia, and that of the blacks of Hindostan, correspond only to one class of the Australian boomerang, — viz., that used by them for war, and considered to be the most useful weapon they employ, — and that this differs from the returning boomerang, which has a lateral twist by means of which it is caused to rise in the air, screwing itself up precisely in the same manner as a boy's flying-top, which rises and spins against the ceiling, — (*Journ. anthrop. inst.*, xii. 454.) J. W. P. [1181]

Hittite inscriptions.—So many attempts to decipher the Maya hieroglyphs have been based upon the processes that have led to brilliant results in Egyptian and Mesopotamian inscriptions, that we are not surprised to find an author deciphering Hittite by means of Aztec phonetic values. Prof. John Campbell of Montreal has in press a volume on the history of the Hittites, their migrations, antiquities, and language, in which will appear translations of some of the inscriptions first discovered by Mr. Drake in 1871. A pamphlet of sixteen pages, however, precedes the volume, giving the translations. Briefly, the author believes that the Hittite empire, overthrown in 717 B.C., was re-established successively in India, north of the Altai, north-east of China, in Khitan, Manchuria, Saghalin, Corea, and Japan, and finally as Aztec, Peruvian, and Chibcha, on the American continent. Mr. Campbell, therefore, has only to give to the characters of Hamath resembling those of Mexico their Aztec phonetic values, and the thing is done. — J. W. P. [1182]

EGYPTOLOGY.

Geography.—The vast field of ancient geography yet to be explored is indicated by the fact that two thousand names of places outside of Egypt, mentioned in the geographical lists, still await identification. Brugsch points out some necessary cautions. 1°. The different systems of orientation. The Egyptian always imagined himself as standing face to the south: the east was on the left hand, the west on the right hand, and the north behind him. The African made a point, between the Nile and the Red Sea, east of Ethiopia, the place from which he judged of the relations of countries: hence to him Ethiopia was in the west, etc. The Asiatic faced the east, and spoke of it as before him, the west as behind him. And the Egyptian monuments represent, sometimes one, sometimes another, of the systems in giving the relations of the same place. 2°. The Egyptians very frequently translated and did not transcribe foreign names. It has often been remarked that the names of nations well known in pre-classic antiquity, and with whom the Egyptians were well acquainted, are not found on the monuments. These names must

be sought in the Egyptian translations. 3°. The Egyptian geographical lists, in their enumeration of African peoples, proceed from south to north: among Asiatic nations they proceed from north to south; i.e., in both cases they follow the downward course of the great rivers.

Brugsch believes that Punt was a southern land, not in Arabia (where most place it), but in Africa, and that the Egyptians sent expeditions thither at a very early period in their history. Hommel (*Vorsemitischen kulturen*, 1883, p. 108, 421) thinks these expeditions began about 2450 B.C. — (*Revue égyptol.*, iv.) H. O. [1183]

NOTES AND NEWS.

The remains of the late Professor Charles Frederic Hartt, who is well remembered for his extensive scientific researches in Brazil, arrived at New York from Rio de Janeiro on June 7 last, by the steamer Finance. They will be carried to Buffalo, N.Y., the home of Mrs. Hartt, for interment. Over five years have now elapsed since the death of this distinguished naturalist and linguist, whose life was so faithfully dedicated to the cause of Brazilian science. Completely worn out by the drudgery of official cares in trying to perfect the organization of which he was the chief, against the jealousies of a foreign and unappreciative people, he fell an easy victim to that most dreaded of all Brazilian scourges, yellow-fever, which afflicted so many Americans during the early spring of 1878. His grave in the protestant section of one of the larger Rio cemeteries has borne no other mark than the customary number by which it could be identified. While Brazil has neglected the memory of one who more than any other gave character and purity of purpose to its scientific undertakings, his own country will not fail to do him homage.

—The Report of the chief of ordnance, U.S.A., 1882, contains some important matter relating to the science and practice of gunnery. Col. Crispin makes a long and valuable report on European ordnance. The methods of construction of British and French ordnance are described, and the advantages of malleable over cast irons are exhibited. The now familiar effects of tempering in oil, as practised in British gun-making establishments, are described. Soft steels having a tenacity, untempered, of thirty-one tons per square inch are given a strength of forty-seven tons by oil-tempering, their elongation being, meantime, reduced somewhat by the process. The reporting officer concludes that the direction of change is toward the introduction of built-up forged guns, or built guns of cast steel, and that the future is to see the introduction of this principle carried to its limit in guns made of coiled wire, as proposed by Treadwell of Cambridge, and recently by Woodbridge, — a conclusion manifestly at variance with the results described in his report as attained by Whitworth with solid guns of compressed steel. The principles upon which Whitworth is working