beneficial influence on the advance of this industry in California, and may fulfil the hopes of their authors by leading to the establishment of definite and reliable brands of California wines.

The whole report, while dealing largely with questions of local interest, affords at the same time an admirable illustration of the advantage accruing to agriculture from the application of high scientific attainments to the investigation of its problems.

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

ASTRONOMY.

Semi-diameter of the moon. — Professor H. M. Paul, formerly assistant at the U. S. naval observatory, gives the results of two occultations of the *Pleiades* group by the moon, observed by himself to determine the *occultation semi-diameter of the moon*, and also the corrections to the right ascension, declination, and parallax of the moon, these being necessarily involved with the semi-diameter. The occultations occurred on July 6, 1877, and Sept. 6, 1879, and were observed with the 9.6-inch equatorial at the Washington observatory. The relative positions adopted for the stars were those of Wolf with proper motions from comparison with Bessel, and the general proper motion of the group as given by Newcomb. The observations of 1877 were poorly placed for a determination of the correction to the semi-diameter, but those of 1879 give a much more reliable result. From the latter (fourteen in all), the resulting correction to Hansen's mean semi-diameter (15′ 33″. 47) is − 1″. 69 ± 0″. 12; and the resulting value is, therefore, *semi-diameter* = 15′ 1″. 78 ± 0″. 12. He gives also the results of Airy's determination from two hundred and ninty-six scattered observations, from 1830 to 1860. From the immersions and emersions at the dark limb, the resulting values are larger by 0″.9 and 0″.5 than those given by Paul, and, from immersions and emersions at the bright limb, Airy's results are larger by 2″.3 and 4″.4; while the probable error of a single observation and of the final result is in all cases greatly in excess of those obtained by Paul. Mr. Paul concludes that the best way to observe the actual occultation at the bright limb is to use as high a magnifying power as possible, so as to obtain a decided difference of color between the star and the moon's limb. Neither set of occultations observed by Paul gives any evidence of deviation of the moon's limb from a perfect circle. — (*Rep. Wash. obs., 1879, appendix* ii.) M. MCN. [1103

ENGINEERING.

Swelled rifle-barrels. — A board of officers, with Capt. Greer as president, has tested a lot of rifles at the Springfield armory to determine the cause of the bulging of the barrel, which occasionally occurs in practice. They find it due to the fact that the muzzle has been stopped by sand, caused by resting the muzzle in wet sand, or in dry sand after the gun has become foul from firing. This arrests the passage of the ball, so that the pressure is increased at the point of swelling. It is curious that sand produced this result where wooden plugs, driven in tightly and swelled by steam, failed to do so. — (*Ord. notes, U.S.A.*, no. 238, Feb. 1.) C. E. M. [1104

Strength of explosives. — Gen. Abbot has extended his investigations to tonite, California gun-cotton, and rackarock. The first consists of 52.5 parts of gun-cotton and 47.5 parts of barium nitrate. The second is gun-cotton pulverized, and containing 24 per cent of moisture. The dry gun-cotton analyzed 89.6 per cent insoluble trinitrocellulose and 10.4 per cent soluble gun-cotton. This is 7 per cent above the standard required by the British government. The rackarock is composed of potassium chlorate and nitrobenzol. The substances are kept separate until needed for use, when the chlorate is dipped in the liquid until it has absorbed enough of it. Gen. Abbot found the relative efficiency in a horizontal plane for tonite, as compared with dynamite No. 1, to be 0.81 for the dry compressed state, and 0.85 for the damp uncompressed state, or 0.83 as the average value. It thus stands just below gun-cotton (0.87). Rackarock gives 0.86. The California gun-cotton was found equal to the best English. In a note, he calls attention to the spontaneous decomposition of explosive gelatine into cellulose and free nitro-glycerine, with the evolution of nitrous fumes, while in store during the winter and spring. — (*Prof. papers corps eng., U.S.A.*, no. 23, add. i.) C. E. M. [1105

Composition of steel. — Professor Abel has continued his researches on steel; and his experiments with cold-rolled steel of a *particular composition* confirm the view that the carbon exists in it in the form of a carbide which has the formula Fe_3C, or some multiple of that formula. Whether this carbide varies in composition in different descriptions of steel which are in the same condition of preparation remains to be demonstrated; but the preliminary experiments with small specimens of cold-rolled, annealed, or hardened steel, appeared to warrant the belief that the condition of the carbide in the metal is affected to such an extent, by the process of hardening, as more or less completely to counteract its power to resist the decomposing effect of such an oxidizing agent as chromic-acid solution. — (*Proc. inst. mech. eng.*, Jan., 1883.) C. E. M. [1106

CHEMISTRY.

(Analytical.)

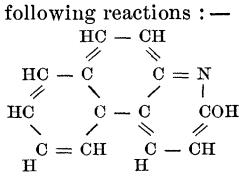
Preparation of hydric sulphide from coal-gas — When coal-gas is passed through boiling sulphur, I. Taylor finds that nearly all the hydrogen (forty to fifty per cent) is converted into hydric sulphide. He states that this is a convenient method for the preparation of hydric sulphide for laboratory use. — (*Chem. news*, xlvii. 145.) C. F. M. [1107

Hydric peroxide as a reagent in chemical analysis. — A. Classen and O. Bauer find that the great oxidizing power of hydric peroxide may be made available in many quantitative determinations which depend upon oxidation. Roth & Co. of Berlin manufacture a three or four per cent solution, acidified with hydrochloric or sulphuric acid, as may be desired. In an ammoniacal solution, hydric peroxide oxidizes hydric sulphide completely. This reaction affords a convenient and extremely accurate means for the determination of hydrochloric, hydrobromic, or hydriodic acid, in presence of hydric sulphide.

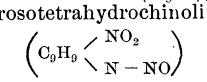
Arsenious sulphide is oxidized completely into arsenic acid and sulphuric acid. A special form of apparatus was devised by the authors for determining sulphur in sulphides. Hydric sulphide was set free by an acid, and carried forward by a current of carbonic dioxide into a tube filled with glass beads. An ammoniacal solution of hydric peroxide was allowed to drop into this tube, thereby oxidizing the hydric sulphide to sulphuric acid, which was drawn out at the bottom of the tube by means of a stop-cock. By this method accurate results were obtained in the analysis of the sulphides of antimony, tin, cadmium, iron, and of baric sulphite and hyposulphite. — (*Berichte deutsch. chem. gesellsch.*, xvi. 1061.) C. F. M. [1108

(*Organic.*)

Derivatives of chinoline. — The study of the derivatives of chinoline and their constitution is continued by several chemists. W. La Coste prepared p-nitrochinoline (1 : 6) from p-nitraniline, p-nitracetanilide, and glycerine, and p-dimethylamidochinoline from dimethylamido-p-phenylendiamine and nitrobenzol. o-nitrochinoline was made from o-nitraniline. m-nitraniline gave m-phenanthroline, identical with the product obtained by Skraup (SCIENCE, i. 283). At the same time there was formed an oxyphenanthroline whose constitution may be represented by the following reactions : —



O. Fischer prepared oxyhydroethyl- and methylchinoline by the action of the corresponding alkyl iodides on *a*-oxyhydrochinoline. In studying the therapeutic properties of the oxychinoline derivatives, it was found that oxychinoline possessed poisonous properties, and that the chlorides of the corresponding hydro-compounds exerted an action similar to that of chinine. *β*-oxychinoline and certain of its derivatives were examined by C. Riemerschmied. L. Hoffman and W. Königs prepared tetrahydrochinoline by reduction of chinoline with tin and hydrochloric acid. By the action of nitrous acid this substance gave a nitroso-amine ($C_9H_{10}N—NO$) which formed nitronitrosotetrahydrochinoline



when treated with nitric acid. The corresponding hydrazine was obtained by reduction. Indol was one of the products of the dry distillation of tetrahydrochinoline. — (*Berichte deutsch. chem. gesellsch.*, xvi. 669, 721, 727.) C. F. M. [1109

AGRICULTURE.

Digestibility of moistened and cooked fodder. — In continuation of earlier researches on this point, G. Kühn has compared the digestibility of three samples of hay and three samples of wheat-bran, when fed dry, to that of the same fodders variously treated. Moistening the hay or bran immediately before feeding with a quantity of cold water insufficient to satisfy the thirst of the animals (steers) had no recognizable effect on the digestibility. Moistening the bran with cold water twenty-four hours before feeding had no effect on its digestibility, provided the quantity of water was so limited that the amount drunk by the animals did not fall below about fifty per cent of that drunk when the ration was given dry. When the amount of water used to moisten the bran largely exceeded the limit just mentioned, indications of a decreased digestibility of the crude proteine of the total ration were observed. Treating the bran with boiling water twenty-four hours before feeding caused an undoubted decrease in the digestibility of its crude proteine, which was greater the higher the initial temperature, and the longer the action of the heat continued. The other constituents of the bran were unaffected. Giving the bran stirred into water as drink, along with dry hay, had no noticeable effect on the digestibility of the total ration, compared with that observed when similarly prepared bran was mixed with the hay. The experiments gave also the interesting and important result, that the extent to which the same fodder is digested by the same animal may vary at different times. A new source of error in digestion experiments is thus brought to light, and one which must receive serious consideration in all future experiments, and lead to new caution in accepting the results of old ones, especially in the case of concentrated fodders, since the calculation of the digestibility of the latter is based on the assumption of unaltered digestibility of a coarse fodder for two consecutive periods. These experiments are worthy of notice also for the care and conscientiousness with which the limits of possible error are taken account of in the discussion of the results. They afford, in this respect, an excellent example of really scientific investigation, and contrast favorably in this particular with many agricultural experiments. — (*Landw. vers.-stat.*, xxix. 1.) H. P. A. [1110

Bottled milk. — Milk preserved by Scherff's process (heating in closed bottles to 100°–120° C. for one or two hours) differs from fresh milk in certain respects. It is not coagulated by rennet, and when acidified, or allowed to become sour, it yields a fine, granular coagulum. These differences have been attributed to chemical changes in the albuminoids of the milk, produced by the heat; but Fleischman and Morgen fail to find in such bottled milk any peptones or other products of the decomposition of proteids, or any evidence of a chemical alteration. It appears to be a trifle less readily acted on by pepsin than fresh milk. The good results obtained by its use for sick children are ascribed to the granular coagulum which it yields in the stomach, and its freedom from all germs. — (*Landw. vers.-stat.*, xxviii. 321.) H. P. A. [1111

Soil-temperatures. — In continuation of previous researches, E. and H. Becquerel have taken the temperature of two soils at different depths twice daily during the year 1882. One soil was naked, and the other covered with turf.

At a depth of 0.05 m., the turfed soil was the warmer at 6 A.M. At 3 P.M. the naked (sandy) soil was the warmer during the warm months, while during the cold months the reverse was the case: in other words, the range of temperature was less under the turf. At greater depths this effect became less marked, and on the average the turfed soil was 0.1°–0.7° warmer than the naked one. — (*Comptes rendus*, xcvi. 1107.) H. P. A. [1112

Reduction of nitrates. — The reduction of nitrates by means of an organized ferment, which has been observed by Springer (SCIENCE, i. p. 115), has also been the subject of experiments by Gayon and Dupetit, Dehérain and Maquenne, and de Rodionoff. The action of the ferment is prevented by oxygen and by disinfectants, and heat destroys the ferment. Large quantities of free nitrogen are produced in

the fermentation, and smaller quantities of ammonia, nitrous oxide, nitric oxide, nitrites, and probably amide-like bodies, were obtained. The action has been shown to take place in soils rich in organic matter, when excluded from the air; and a small quantity of active soil may infect a large amount of soil which has been sterilized by heat. — (*Bied. centr.-blatt*, 1883, 82.) H. P. A. [1113

Butt and tip kernels of corn. — In a number of sprouting trials at the Ohio agricultural experiment-station, corn taken from the butts of the ears produced larger and stronger radicles than that from the tips, while that from the middle of the ear was intermediate in this respect. The proportion of seeds which sprouted was: tip kernels, 70.3 %; middle kernels, 58.2 %; butt kernels, 76.1 %. — (*Country gentleman*, May 10.) H. P. A. [1114

GEOLOGY.

The Balkan peninsula. — In the tenth number of *Petermann's mittheilungen* for 1882, Toula published a geological map of this region, which gives us a better idea of the geology of that much-disputed country than any thing yet published. By a mistake, the region between Aiwadschik and Köprüköï, in Bulgaria, was colored as Jurassic instead of eocene. With this exception, this map, in sixteen colors, is fully up to Petermann's usual standard. Toula now publishes a map on the scale of 1: 2,500,000, on which, by means of twenty-five different lines, he shows the routes travelled over by different geological explorers in this region from the days of Herder, Boué, and Viquesnel (1835-37), down to the present time, and in the accompanying ten pages of text gives a brief account of the country visited, and a historical sketch of the work done by each author. — (*Mitth. geogr. gesellsch. Wien*, 1883, 25.) J. B. M. [1115

Origin of the carboniferous limestone of Belgium. — Dupont divides the carboniferous limestone of Belgium into massive and stratified limestones, the latter essentially detrital rocks with a sedimentary appearance. The massive limestones are due to the growth of corals, and are adapted to the special dispositions of coral formations in fringing reefs or islets, according to their distance from the shore. The detrital limestones are subdivided into two marked categories: the crinoidal limestone; and the limestone made up of coralline detritus, with or without interstratified beds of crinoidal limestone.

These three divisions correspond with the three faunas that de Koninck has distinguished, — the fauna of Tournai, belonging to the crinoidal limestone; the fauna of Waulsort, to the coral-reef limestones; and the fauna of Visé, to the detrital limestones. The stratigraphical study of the Belgian carboniferous limestone thus becomes much simplified; and the problems suggested by the mixture of rocks of the same chemical composition, but of different modes of formation, can be solved by studying the mode of formation, and the application of the stratigraphical laws of coral phenomena established by the study of the Devonian limestones. — (*Bull. acad. roy. Belg.*, (3), v. no. 2.) J. B. M. [1116

PHYSICAL GEOGRAPHY.

Causes of the fertility of land in the Canadian north-west territories. — Robert Bell showed, that, with local exceptions, a vast fertile tract stretches from the Red River valley to the Liard River, a distance of some fourteen hundred miles, characterized by a dark loamy soil of varying depth and nearly homogeneous consistency. The primary cause of the fertility of this region may be found in the character of the subsoil, which consists largely of cretaceous marls and the comminuted material of the glacial drift. The speaker ascribed to moles and other burrowing animals the chief agency in the process by which the black loamy soil was formed out of this subsoil. Darwin had proved that in England and some other countries earth-worms played the chief part in the formation of mould. These worms appear to be absent in the north-west, as well as in most cold and sparsely settled countries, perhaps due to the depth to which frost penetrates. But in the north-west he believed the ground squirrels and moles more than made up for the absence of worms. In the fertile area referred to, the old and new mole-hills cover the entire surface, rendering it 'hummocky,' as is easily observed after a prairie fire. These animals are very active in autumn, digging many more burrows than would appear to be of any use to them. Each hummock thus thrown up covers about a square foot, and buries all the grass, etc., on this space. In this manner large quantities of vegetable matter were ultimately incorporated with the soil, which was also refined by the fact that the stones and coarse gravel are left undisturbed below the surface, so that in time they are more deeply buried by the layer of mould produced. By an interesting coincidence at the season when these burrowing animals are most active, the prairie vegetation is mature, and contains the greatest amount of substance. The coldness of the soil during a great part of the year tends to preserve the organic matter in it. While the circumstances given were the direct cause of the fertility, the ultimate reason was perhaps to be looked for in the climate, which fosters the growth of such vegetation as forms both the fertilizing material and the food of the little workers, who mingle it with the mineral portion of the soil. The action of frost in comminuting the soil does not account, by itself, for the introduction of the organic matter upon which its fertility depends, and which is due to the co-operation of the circumstances and agencies described. — (*Royal soc. Canada; meeting* May 23.) [1117

The French 'Landes.' — E. Blanc describes the great improvement effected in the formerly desert region of south-western France by planting its sandy surface with the maritime pine (Pinus pinaster). The region is divided according to its surface-features into five districts, locally named the Grande-Lande, the Dunes, the Marensin, the Maremme, and the Chalosse. The first includes half the entire area, and, before the tree-planting, was an open plain of loose sandy soil about two feet deep, lying on an impermeable layer (*alios*) of sandstone cemented by organic and ferruginous material. During winter it was a great marsh; in summer, a dry, sandy desert, barely supporting its flocks of sheep. The absence of stone for building and road-making was another cause of its poverty. Since 1857, nearly the whole surface has been covered with a continuous pine forest, from which the resin is a valuable product. The stilts of the old shepherds are no longer the fashion. The Dunes, extending along the coast of Gascony from the Adour to the Gironde, form a belt four to eight kilometres wide. Their sand does not come from the coasts of Spain and Brittany, as has been supposed, but from a submerged continuation of the Landes. Their height sometimes reaches eighty metres. These, also, were formerly barren: they are now almost entirely wooded over. Their area of 88,096 hectares (nearly 350 □ miles) contained 15,82

hectares of forest in 1840, and 55,584 in 1862, the unplanted part being chiefly the little valleys (lettes) between the Dunes. From 1861 to 1865 the greater part of the forests on the Dunes was sold by the government for a total of 13,000,000 francs; but, as the supply of resin from our southern states was just then diminished by the war of the rebellion, the pines were much injured by bad treatment from their private owners. The Marensin is a region of old forests included in the district of lagoons between the southern quarter of the Dunes and the Grandes-Landes as far south as Dax. It has long produced a valuable yield of resin, and is thought to have had harbors and ports in Roman times; but these have long since been destroyed by the drifting sands. The Maremme comes next farther south along the coast. It is a region of large dunes of irregular form, independent of the present coast, and probably much older than the sand-hills farther north, occupied by an old forest of cork-oaks and resin-pines. The Chalosse is the only agricultural part of the Landes. It extends southward of the Adour to the department of Basses Pyrénées, — a rolling, well-watered, fertile country. After this introductory description, M. Blanc discusses the future of the region, and its improvement by further tree-planting, and by opening a canal to connect all its lagoons behind the Dunes. — (*Rev. scient.*, 1883, 391.) W. M. D. [1118

METEOROLOGY.

Rainfall in South Australia. — The tropical rains on the north coast prevail during the summer months, commencing generally towards the end of October or beginning of November, and lasting until April, little or none falling during the intermediate months. These tropical rains extend more or less across the interior, down to, or even south of the Peake (lat. 28°), but fall off considerably south of the Daly Waters (lat. 16° 15′). This, however, varies greatly in different years, according to the force and southerly dip of the north-west monsoon. In some cases, heavy thunder-storms and torrential rain extend over nearly the whole of the interior, and in other years the rainfall is heavy for only a few hundred miles from the north coast; and the country, especially south of the tropics, down even to the head of Spencer's Gulf, is exposed to long and severe drought. On the other hand, the winter rains occasionally extend well up into the interior, sometimes reaching or passing the centre of the continent. This, perhaps, is more especially the case when the centre of a cyclonic disturbance passes to the north of Adelaide, from west to east, and also when cyclonic disturbances in Queensland, or on the east coast, have their western quadrant extending well into the central regions of the continent and the northern pastoral districts of South Australia. But most of our disturbances have their centre south of the continent, their path being roughly parallel to the coast-line, so that as a rule our winter rains thin off, and become uncertain about a hundred miles north of the head of Spencer's Gulf, and are heavy north of the Gulf only along or near the Flinders Range. The area of minimum rainfall extends from the Great Australian Bight to Port Augusta, at the head of Spencer's Gulf; northwards up Lake Torrens and Lake Eyre; and again over the plains to the east of the Flinders Range, up to about lat. 25°, reaching on either side to within, perhaps, a few hundred miles of the east and west coasts (especially the latter). All south of this, and for some distance northwards, along and in the immediate neighborhood of the Flinders Range, we usually have good winter rains, but uncertain summer rains; the latter being heavier and more frequent over the northern limits of this region, where they bear a large ratio to the total fall during the year. — (*Met. obs. Adelaide observ.*, 1880.) [1119

Rainfall in France. — At the last meeting of the Meteorological society of France, a paper was read by Mr. Moureaux, showing that the law of the rains south of the central plateau of France is independent of the meteorological conditions on the oceanic side. This shows the importance of being in direct connection with Algiers. — (*Nature*, March 22.) H. A. H. [1120

GEOGRAPHY.

(*Arctic.*)

Arctic notes. — In the year-book of the Verein für vaterländishe naturkunde in Württemberg, Zeller has an article on the Algae and zoophytes of the Nordenskiöld Sea, collected by Graf Waldburg-Zeil. —— *Nature* (vol. xxviii. no. 3) gives a woodcut of the Russian meteorological station at the Lena mouth. —— The Leo is announced to sail for Point Barrow, June 12, from San Francisco. —— The steamer Proteus is to go to the relief of the Lady Franklin Bay party, and is expected to sail about the 20th inst., or as soon as she can be joined by U.S.S. Yantic, which is to act as tender, and to utilize as far as possible the scientific opportunities of the voyage. — W. H. D. [1121

(*Africa.*)

African notes. — In spite of the disastrous ending of the Flatter's expedition, two more parties are planned by the French for Saharan exploration, under Col. Bernard and F. Foureau. According to a recent despatch from Wargla, four members of Flatter's party are still alive as prisoners among the Tuaregs. —— In western Africa the active French advance has met with opposition. Dr. Bayol was refused permission to continue on his way to Kaarta, and has returned to Bafulabe on the Senegal. Col. Berguis-Desbordes writes from the upper Niger, that, after his losses on the way there, he must at once return to the coast unless immediately re-enforced. A sketch of the rapid progress of the French in this region is given by J. Ancelle in *Rev. de géogr.*, 1883, 161–183. —— R. Flegel writes from Lagos under date of March 20, 1883, of his safe return from Adamaua and the source of the Benue; his farther journey was cut short by lack of means. —— The International Kongo association has despatched Lieut. v. Kerkhoven from England with supplies for the parties in the field. It is stated that he takes a number of carrier-pigeons with which to keep up communication from the interior with Zanzibar; but this must be a mistake. A general review and map of the later explorations in the Kongo basin is given in *Peterm. mitth.*, 1883, 177. —— News has been received from Dr. Pogge at Mukenge, on his way to the west coast, after parting from Lieut. Wissmann in the farther interior. —— Dr. Holub is about to start for southern Africa after a course of special geographic study; he proposes to go northward from the Cape to the lake district. —— Giraud and Thomson, recently entering Africa from Zanzibar, have been heard from in good condition, a short way on their respective journeys. —— Revoil has left Somali-land for the Zanzibar region. —— The French and Italian exploration about Shoa and Assab is still very active in spite of the unattractive climate of these districts. At Assab nearly all the drinking-water has to be distilled from the sea. —— Schuver, the Dutch explorer, arrived in Kartum last December, and Dr. Junker is expected there shortly from his journeys in the far

interior. —— Dr. Colin of the French navy has been charged with a mission to the Senegal; his instructions are to search for gold, to obtain concessions of the auriferous regions from the local chiefs, or at least protection for those who may go there, and to make geographic and scientific observations as far as possible. He expects to return to France next April. — W. M. D. [1122

(*Indian Ocean.*)

Heard Island. — The U.S. S. Marion, Commander Terry, last year went to this seldom-visited island in the southern Indian Ocean (lat. 53° 20′ S., long. 73° 10′ E.) to search for the crew of the whaler Trinity, not heard from for eighteen months. The rescue was successful; and on Jan. 13, 1882, the men were taken from the island after over a year's endurance of excessive hardships. Ensign Chambers gives an interesting account of the expedition. The island was discovered in 1853 by an American, Capt. Heard, who believed it to be afloat, as he 'had sailed over its position repeatedly on former voyages;' but its firm anchorage is pretty well established by the presence of an active volcano, about six thousand feet high, seen in moderate eruption by the crew of the Trinity; and its antiquity is proved by marks of former glacial action which date somewhat before Capt. Heard's voyages. The climate of the island is extremely severe. Snow-squalls were of daily occurrence even in midsummer, and the air was seldom clear enough to show the mountain summit. Sea-currents pass the island from north to south. It is supposed from the appearance of clouds, and from the flight of birds and departure of sea-elephants, that an uncharted island must lie sixty or one hundred miles south of Heard; and it is even said that a certain sealing-captain has discovered an island in that direction, the position of which he keeps a secret in the interest of his trade. — (*Proc. U. S. naval inst.*, ix. 1883, 121.) W. M. D. [1123

Indian Ocean. — On his return from Japan in April–May, 1881, G. Liebscher took samples of the water in the Bay of Bengal (about lat. 5° N.) and Arabian Sea (near lat. 15° N.), finding the specific gravity of the former at 60° F., 1.0255 to 1.0258, and its percentage of salt 3.29 to 3.34; for the latter, 1.0264 to 1.0276, and 3.40 to 3.52. — (*Mitth. erdk. Halle*, 1882, 139.) W. M. D. [1124

BOTANY.

Cryptogams.

Diseases of the vine. — The Observations sur le Phylloxera et sur les parasitaires de la vigne, published under the direction of the French academy, contains a long and valuable paper by Cornu on Peronospora viticola B. and C., which has within a few years been introduced into the vineyards of Europe from this country. After an elaborate statement of the history of the discovery of the Peronospora and its spread to Europe, there follows a full account of the development and pathological action of the fungus, beautifully illustrated. The work concludes with an account of the treatment and prevention of the disease, and a comparison of the grape-mould with those of the potato and lettuce plants. — W. G. F. [1125

Glycogen in fungi. — In a thesis entitled 'l'Épiplasme des Ascomycetes,' Dr. Léo Errera demonstrates, that apart from the Myxomycetes, whose vegetable nature is not beyond question, glycogen occurs in undoubted plants, especially in the Ascomycetes, an order of fungi. It also appears to exist in the yeast-plant and Pilobolus, a small mould. The glycogen of Peziza vesiculosa is identical with that found in the livers of mammalia. In the Ascomycetes, it is at first diffused throughout the whole young plant, but afterwards accumulates in the asci, and is apparently transformed during the maturing of the spores. When not in too small quantities, glycogen may be recognized microchemically by its semi-fluid consistency, the absence of any reaction with osmic acid, Millon's reagent, and iron salts, and by the reddish-brown or mahogany color on the application of iodine, which color disappears on heating, and reappears on cooling. — W. G. F. [1126

Spores and spore-cases in Erian rocks. — Dr. J. W. Dawson spoke of the discovery many years since, by the geological survey of Canada, in a pyroschist or bituminous shale at Kettle Point on Lake Huron, — referred to the horizon of the Marcellus beds of the New-York series, — of vast numbers of minute disks, which were recognized as the spore-cases of some cryptogamous plant, and were by him named Sporangites huronensis. More recently Profs. Orton of Columbus, O., Williams of Cornell university, and Clarke of Northampton, Mass., have found, in the Erian (Devonian) and lower carboniferous shales of Ohio and New York, beds replete with these organisms; and Prof. Orton has shown reasons for believing that they are connected with filamentous stems found in the same layers, and, moreover, that they have contributed largely to the bituminous matter present in the shales in which they occur. Similar bodies have also been found associated with the curious plants known as Psilophyton and Trochophyllum. Still more recently specimens from the Erian of Brazil have been sent to the author by Mr. Derby of the Brazilian geological survey, which seem to throw additional light on the bodies in question. These specimens present oval or rounded bodies in the form of flattened sacs, containing numbers of rounded disks similar to those above referred to, and so closely resembling the utricles, or spore-sacs, of the rhizocarps as to make it extremely probable that they belonged to plants of this class. Should this conjecture be sustained by subsequent inquiries, it would show that this peculiar group is of much greater antiquity than hitherto supposed, and that these plants were extremely abundant in the shallow waters of the Erian period. Dr. Dawson further suggested probable relations of these singular fruits not only with Psilophyton, but also with other Erian and Silurian plants. — (*Royal soc. Canada: meeting* May 23.) [1127

ZOÖLOGY.

Mollusks.

Land-snails from Bering Strait and Alaska. — Drs. Aurel Krause and Reinhardt enumerate and describe the land-snails obtained by the Krause brothers in the Chukchi peninsula and in south-eastern Alaska. Seven species were obtained from the former locality, and nineteen in the latter. Most of them are common to both shores. As a matter of much interest to American conchologists, the species new to the fauna of the United States, as determined by them, may be mentioned. Omitting mere varieties, these are: Limax hyperboreus West., Conulus pupula Gould (originally described from Japan), Pupa Gredleri Cless., P. Krausiana Reinh., P. arctica Wall., Succinea chrysis West., Vallonia asiatica Neville (Yarkand, described by Neville as a variety of V. costata), and Pupa edentula Drap. (probably). Dr. Reinhardt also describes, under the name of Vallonia gracilicosta, a small shell obtained by Krause on the Little Missouri River, while

returning home by the route of the Northern Pacific railway (*Sitz. Berl. ges. naturf. fr.*, 3, 1883). In the same connection, the following species of the Vega expedition are of interest for American students. Westerlund, in advance of the final publication, describes as new, from the same region, Helix ruderata var. opulens, collected at Bering Island; Succinea annexa and chrysis; and Pisidium arcticum, nivale, and glaciale, from Port Clarence, Alaska. — (*Nachr. deutsch. mal. ges.*, April, 1883.) W. H. D. [1128

A man-eating mollusk. — A minute pulmonate, Cionella acicula, was not long since reported as occurring in myriads in the cavities of cancellate bones in a prehistoric British cemetery at Chichester. It has now been found of unusual size, by Director Fischer, in human skulls from comparatively recent interments at Bernberg. — (*Nachr. deutsch. mal. ges.*, April, 1883.) W. H. D. [1129

Monograph of Onchidium. — The last-received part of Semper's land-mollusks of the Philippines contains the continuation of an extremely thorough monograph of Onchidium, — the genus of slugs in which that author made the discovery of the extraordinary 'dorsal eyes,' and which seems to be prolific in species in the east. The new genus Onchidina is established for O. australis Gray, which exhibits marked anomalies in the genitalia. — (*Semper's reisen.*, heft iv.) W. H. D. [1130

VERTEBRATES.

Centripetal stimulation of the vagus. — In a previous paper (*Wiener sitzungsb.*, lxxxv., 282), Knoll had pointed out that the vagus nerve may be stimulated by the making or breaking of its own current, when the nerve, for instance, is raised from the moist tissue upon which it lies, or, after being raised, is again lowered into the wound. This is especially the case after exposure, or section, or other mechanical injury. The effect of such a stimulation is, in the great majority of cases, the production of an expiratory standstill, or a flattening of the respiratory curve toward the expiratory position. In many cases the action is not confined to a mere inhibition of the inspiratory discharge, but causes an active expiratory effort. In this, his second contribution to the theory of the innervation of the breathing movements, he submits the action of electrical, mechanical, chemical, and thermal stimuli upon the central end of the vagus to a new investigation, taking care to avoid any secondary effects arising from stimulation of the nerve by its own current. The experiments were made upon rabbits, to some of which a minimal dose of chloral was given. The effect of induction shocks was found to vary with the strength of current used, minimal currents causing a short expiratory pause, or a displacement of the curve toward the expiratory position; stronger currents giving inspiratory effects. During the period of vagus stimulation, although there is always a certain amount of dyspnoea, nevertheless the accessory respiratory muscles do not come into action, and, if previously in action, become relaxed during the stimulation. Neither anaemia of the brain, caused by blocking off the blood-current, nor respiratory reflexes from other afferent nerves, stimulation of the nasal mucous membrane, for instance, produce any breathing movements during the inspiratory standstill which follows strong electrical stimulation of the vagus. From these facts he concludes, that, during such stimulation of the vagus, the irritability of the respiratory centre toward other stimuli, especially natural stimuli, is greatly depressed. He finds that the effects obtained may differ according to the direction of the current, the portion of the nerve stimulated, the condition of the nerve and of the respiratory centre, — conditions which may explain the contradictory results obtained by those who have worked at the subject. Mechanical stimuli produced in various ways gave always, as the primary effect, either complete standstill in inspiration, or strong displacement of the curve toward the inspiratory position. Chemical stimuli inhibited respiration in the expiratory phase. Thermal stimuli had apparently no effect. Warming the vagus in 0.6 % salt solution or oil from 1½°–2° to 45°–60° C. had no action on the respiration. — (*Wiener sitzungsb.*, lxxxvi., iii. 48.) W. H. H. [1131

Activity of the yolk during impregnation. — Kupffer recalls the active movement of a protoplasmatic hillock on the surface of the ovum of Petromyzon, observed by August Müller, Calberla, and himself, immediately after the spermatozoon entered the yolk. He now reports a similar observation on Bufo. In this animal several spermatozoa enter the ovum; but those that reach the egg a few minutes after spawning are not able to pierce the egg-membrane. One then sees little protuberances arise on the surface of the yolk, and stretch up the membrane. Opposite each protuberance are one or two spermatozoa, their heads towards the yolk. It appears as if the yolk were actively striving to reach the spermatozoa. In a few minutes the protuberances sink back. In both Bufo and Petromyzon there appears this secondary act of impregnation after the male elements (or element) have penetrated the yolk. — (*Sitzungsb. akad. wiss. München*, 1882, 608.) C. S. M. [1132

ANTHROPOLOGY.

Growth of the skull in dogs. — M. Lacassagne having communicated to the biological society of Lyons a paper on the cranial dimensions in man in their relation to social condition and intellectual culture, Dr. Arloing has followed up the subject upon dogs. Discarding the merely instinctive faculty, attention was paid only to the intellectual. The subject of weight and race was so far considered as to render it easy to make allowance for these, since the average weight of the well-known breeds is known everywhere. The following table tells its own story: —

	Weight of the skull.	Weight of brain.
	Grams.	Grams.
St. Bernard	100.39	387
Large spaniel (Grand epagneul)	85.5	695
Bull, medium size	81.14	205
Bull, small size	53.2	110
Little spaniel	50.7	67
Loulou	53.9	62
Havana	73.6	60
King Charles	50.7	45

The brain of a small ape weighs from seventy to seventy-five grams. We see from the table that the weight of the head is doubled, while the weight of the brain is eight times greater, between the extremities of the table. The difference would be much greater if we could compare the weight of the brain with that of the body. The conclusion reached is, that education increases the dimensions of the skull in animals as in man. — (*Bull. soc. anthrop. Lyon*, i. 44.) J. W. P. [1133

Criminality in France. — "Society, in its moral and social aspect," says M. Lacassagne, "is divided into three strata, — the frontal, the parietal, and the occipital; the latter including the most of our race." The causes which operate upon the human organism are cosmic and social; or, as M. Lacassagne has it, physico-chemic, biologic, and social. The first includes temperature, physical forces, aliment, etc., acting, first, upon the posterior part of the brain, thence forward, influencing the instinct to control the intelligence. The second includes sex, age, heredity, temperament, acting equally on all parts of the brain, and giving to the sentiments, thoughts, and acts a characteristic peculiarity. The last, acting from the front brain backwards, modifies the ideas before changing the sentiments.

The penal code of France divides infractions of the laws against persons and property into contraventions, délits, and crimes; and, for seeking out and punishing these, an army of two hundred thousand individuals is engaged, costing 41,694,720 francs, against 26,034,016 for primary public instruction.

M. Lacassagne, after reviewing the works of Quetelet, Guerry, Maury, and Ferri, on the statistics and philosophy of crime, proceeds to furnish, in a series of curves, the results of his own researches. It is well observed, that, in studying a series of years, notice must be taken of the changes in the law and the multiplication of recognized infractions. Crimes against property vary with the price of breadstuffs, the operation of tariff, warm summers, rigorous winters. Crimes against persons are shown to be influenced by revolutions, elections, the wine-crop, etc.

The relation of crime to the season of the year presents some interesting facts, the table showing a criminal calendar in which the maxima of crimes against property are placed opposite to the minima of crimes against persons. The former have their maximum in December, their minimum in April and June. The latter have their minimum in November, and their maximum in June. Each crime is then scrutinized by months, according to the causes affecting it, such as heat and cold, wine-production, harvests, forced indoor life in winter, wandering life in summer, the length of the day and night, fêtes, holy days, pay-days, reaping-time, vintage-time, salaries to domestics, etc. For instance, infanticide is large in January, February, March, and April, as the effect of the aphrodisiac months, while abortions, usually at the fifth month, are numerous in January; conceptions of harvest-time, at their maximum in March; conceptions of the new-wine season, high in May; conceptions of Christmas holidays, high in June; conceptions of the carnival, ascending in September, October, November, and December, owing to the aphrodisiac months.

Assassination, murder, parricide, poisoning, theft, are similarly treated, and the relation of crime to sex and illiteracy examined. M. Lacassagne closes his discussion with observations on the prevention of crime. — (*Bull. soc. anthrop. Lyon*, i. 48–71.) J. W. P. [1134

EARLY INSTITUTIONS.

Writing among the Romans. — M. Havet points out the curious fact, that Greece had a literature before she had the means of recording it, while Rome had the means before she had the literature. It is certain that in Greece literature existed at first independently of writing; but in Rome writing was in use during the period of the kings, when there was no literature. This fact being established, M. Havet asks whether writing was introduced during the time of the kings, or before that time, i.e., before the foundation of Rome. He then goes on to show how the Romans must have used writing before they came into contact with the Etruscans, because they did not adopt the Etruscan alphabet. Writing must have been in use, he concludes, in the earliest period of the history of Rome, if not before the foundation of the city. Then he argues, if this is the case, what right have we to suppose that the early kings are fabulous? If they knew how to write, it is probable that they put their names in writing. The question is raised, What did the Romans do with their writing, if they did not use it to record events which actually happened? They had no literature to give it a *raison d'être*. The argument is an interesting one. — (*Rev. polit. et lit.*, 24 Mars, 1883.) D. W. R. [1135

Beginnings of taxation in France. — M. Vuitry continues his studies in the financial history of France, and describes the origin and establishment of state taxes as distinguished from the revenues of a feudal sovereign. These, he tells us, must not be regarded as state taxes. He defines state taxes as taxes levied upon all citizens for the purpose of defraying public expenses. During the early feudal period there were no public expenses: therefore there were no state taxes. The expenditures of the feudal sovereign were private expenditures; his revenues were private revenues, derived chiefly from his estates, or from privileges attached to his person. It was not until the fourteenth century (1328–55) that state taxes, properly so called, were instituted. M. Vuitry explains how this came to pass. — (*Séan. trav. de l'acad.*, Avril–Mai, 1883.) D. W. R. [1136

INTELLIGENCE FROM AMERICAN SCIENTIFIC STATIONS.

GOVERNMENT ORGANIZATIONS.

Bureau of ethnology.

Note on certain Maya and Mexican manuscripts. — Professor Cyrus Thomas has recently prepared a paper for the bureau, on a plate of the *Codex Cortesianus*, reproduced in plates 9 and 10 of Rosny's *Les documents de l'antiquité Américaine*, and plate 44 of the *Fejervary Codex* (Kingsborough, vol. iii.). For the benefit of scholars devoting attention to these manuscripts, a brief *résumé* of his explanation of one discovery that he has made in regard to them is here given. As facsimile plates cannot be introduced here, plans of the portions referred to are figured on the assumption that those particularly interested have access to the works in which the plates are to be found.

Mr. Thomas maintains, with a strong array of evidence, that these plates are simply a kind of condensed calendar, and that the outer looped line of dots and day-symbols in each is a mere table by which to tell the days on which the weeks (of thirteen days) for the entire year begin.

If we examine carefully the rows of large dots, and the day-symbols in the large outer space of the Cortesian plate, as given by Rosny, we shall find, that, taken together, they form but *one continuous line*,