

Crystals and Green Mountain Gneisses of the Silurian Age, by Prof. Dana.—The Rev. D. T. Hill gives instances of intelligence in *Bufo americanus*.—Mr. G. W. Morehouse analyses the structure of the scales of *Lepisma saccharina*.—Mr. D. Scott gives a popular explanation of the differences between the two genera of North American Goatsuckers, the Whippoorwills (*Anrostomus*), and the Nighthawks (*Chordeiles*), which is followed by a short note from Mr. Packard, jun., on the Embryology of *Lilulus*, with remarks on its affinities. His results are confirmatory of those of M. Alphonse Milne-Edwards.

The fourth and concluding part of vol. xxviii. of the *Transactions of the Linnean Society*, is chiefly occupied by a supplementary paper by the Rev. O. P. Cambridge, on New and Rare British Spiders; but also contains some short papers of importance.—Prof. Oliver describes a new genus of Begoniaceae from New Granada, under the name of *Begoniella*, a monotypic genus of great interest as respects the geographical distribution of the order; and three new genera of Malayan plants from the herbarium of Dr. Maingay—*Pteleocarpa* and *Clenolophon* (Olacineae), and *Maingaya* (Hamamelidæ).—Dr. M'Nab publishes his important paper on the Development of the flowers of *Welwitschia mirabilis*. Dr. M'Nab considers that in the male flowers of this very remarkable plant we have a very close approach to the Angiosperms, the axis of the flower ending in a mass of tissue which, in the female flower, is the terminal ovule; while, in the female flower, we have the truly gymnospermous condition, there being no carpels, but a terminal ovule, the modified end of the axis of the flower, with a single ovular integument, the pollen grains being applied directly to the naked nucleus.

SOCIETIES AND ACADEMIES

Royal Society, Nov. 20.—“Note on the Electrical Phenomena which accompany irritation of the leaf of *Dionaea muscipula*,” by Dr. J. Burdon Sanderson, F.R.S.

1. When the opposite ends of a living leaf of *Dionaea* are placed on non-polarisable electrodes in metallic connection with each other, and a Thomson's reflecting galvanometer of high resistance is introduced into the circuit thus formed, a deflection is observed which indicates the existence of a current from the proximal to the distal end of the leaf. This current I call the *normal leaf-current*. If, instead of the leaf, the leaf-stalk is placed on the electrodes (the leaf remaining united to it) in such a way that the extreme end of the stalk rests on one electrode and a part of the stalk at a certain distance from the leaf on the other, a current is indicated which is opposed to that in the leaf. This I call the *stalk-current*. To demonstrate these two currents, it is not necessary to expose any cut surface to the electrodes.

2. In a leaf with the petiole attached, the strength of the current is determined by the length of the petiole cut off with the leaf, in such a way that the shorter the petiole the greater is the deflection. Thus in a leaf with a petiole an inch long I observed a deflection of 40. I then cut off half, then half the remainder, and so on. After these successive amputations, the deflections were respectively 50, 65, 90, 120. If in this experiment, instead of completely severing the leaf at each time, it is merely all but divided with a sharp knife, the cut surfaces remaining in accurate apposition, the result is exactly the same as if the severance were complete; no further effect is obtained on separating the parts.

3. *Effect of constant current directed through the petiole on the leaf-current*.—If the leaf is placed on the galvanometer electrodes as before, and the petiole introduced into the circuit of a small Daniell, a commutator being interposed, it is found that on directing the battery-current down the petiole (*i.e.*, from the leaf), the normal deflection is increased; on directing the current towards the leaf, the deflection is diminished.

4. *Negative variation*.—*a.* If, the leaf being so placed on the electrodes that the normal leaf-current is indicated by a deflection leftwards, a fly is allowed to creep into it, it is observed that the moment the fly reaches the interior (so as to touch the sensitive hairs on the upper surface of the lamina), the needle swings to the right, the leaf at the same time closing on the fly.

b. The fly having been caught does not remain quiet in the leaf; each time it moves the needle again swings to the right, always coming to rest in a position somewhat farther to the left than before, and then slowly resuming its previous position.

c. The same series of phenomena present themselves if the

sensitive hairs of a still expanded leaf are touched with a camel-hair pencil.

d. If the closed leaf is gently pinched with a pair of forceps with cork points, the effect is the same.

e. If the leaf-stalk is placed on the electrodes, as before, with the leaf attached to it, the deflection of the needle due to the stalk-current is increased whenever the leaf is irritated in any of the ways above described.

f. If half the lamina is cut off and the remainder placed on the electrodes, and that part of the concave surface at which the sensitive hairs are situated is touched with a camel-hair pencil, the needle swings to the right as before.

g. If the open leaf having been placed on the galvanometer electrodes as in *a.*, one of the concave surfaces is pierced with a pair of pointed platinum electrodes in connection with the opposite ends of the secondary coil of a Du Bois-Reymond's induction apparatus, it is observed that each time that the secondary circuit is closed, the needle swings to the right, at once resuming its former position in the same manner as after mechanical irritation. No difference in the effect is observable when the direction of the induced current is reversed. The observation may be repeated any number of times, but no effect is produced unless an interval of from ten to twenty seconds has elapsed since the preceding irritation.

h. If the part of the concave surface of the leaf which is nearest the petiole is excited, whether electrically or mechanically, the swing to the right (negative variation) is always preceded by a momentary jerk of the needle to the left, *i.e.* in the direction of the deflection due to the normal leaf-current; if any other part of the concave surface is irritated, this does not take place.

i. Whether the leaf is excited mechanically or electrically, an interval of from a quarter to a third of a second intervenes between the act of irritation and the negative variation.

“On the Algebraical Analogues of Logical Relations,” by Alexander J. Ellis, F.R.S.

The object of this paper is to examine the “mathematical theory of logic,” thus laid down by Dr. George Boole in his “Laws of Thought,” p. 37:—“Let us conceive of an Algebra in which the symbols x, y, z , &c. admit indifferently of the values 0 and 1, and of these values alone. The laws, the axioms, and the processes of such an algebra will be identical in their whole extent with the laws, the axioms, and the processes of an Algebra or Logic. Difference of interpretation will alone divide them.” For this purpose, first the laws of such an algebra have been investigated independently of logic, and secondly the laws of primary and secondary logical propositions as laid down by Dr. Boole, have been developed in an algebraical form, and compared with the former. The main results presumed to be established are:—

1. That there is a fundamental difference between such an algebra and logic, inasmuch as the algebra admits of only two phases, 0 and 1, and logic admits of three phases, namely, not only *none* and *all*, corresponding to 0 and 1, but also *some*, “which, though it may include in its meaning *all*, does not include *none*” (*ibid.*, p. 124), and hence has no analogue in such an algebra; that is, an algebra of 0 and 1 can correspond only to a logic of *none* and *all*.

2. That, notwithstanding this difference, there are certain formal relations of equations which allow the algebra of 0 and 1 to be used as an *algorithm* for the purpose of arriving at certain logical forms, which, however, have then to be interpreted on a basis which has not even any analogy to the algebraical.

3. That the introduction of this algorithm introduces theoretical difficulties, adds to the amount of work, and is entirely unnecessary even for the purposes of the theory of probabilities founded upon it by Dr. Boole.

Mathematical Society, Nov. 13.—Prof. Cayley, and subsequently Prof. Sylvester, in the chair.—The following gentlemen have been elected officers of the new council:—President, Dr. Hirst; Vice-Presidents, Prof. Cayley, and Messrs. Spottiswoode and Sylvester. The retiring members were Prof. Crofton and Mr. J. Stirling, in whose room Mr. Sylvester and Lord Rayleigh were elected.—Mr. Sylvester then gave a description of a new instrument for converting circular into general rectilinear motion, and into motion in conics and other plane curves. (A brief sketch of the historical aspect of the communication, from the pen of Mr. Sylvester, forms the subject of a paragraph in NATURE of Nov. 13.) Several instruments were placed on the table for inspection.—Mr. W. Marsham Adams

exhibited his Mensurator and Cælometer, and gave a short account of the objects to which they could be applied. The Mensurator is an instrument designed primarily for the instantaneous solution of triangles, but capable, from its construction, of many other uses; such as illustrating most of Euclid's theorems with regard to the triangle, of performing addition, subtraction, rule of three, and extraction of square roots, of solving quadratics and simple binomial equations, and of reducing to mechanism some part of analytical geometry. The Cælometer is an apparatus consisting of a stand carrying a globe mounted somewhat like a sea compass, and illustrates celestial longitude and latitude, the phenomena of the seasons, the correspondence of the calendar with the solar year, the precession of the equinoxes, the times of sunrise at any place on any day, the position of the principal stars during the night, and the general relations between the conceptions necessary for nautical astronomy. Medals were awarded for both instruments at the Vienna Exhibition.—Mr. S. Roberts (treasurer) read a short note "On the expression of the arc of a Cartesian by elliptic functions." The author showed that the hyper-elliptic part of the integral which gives the value of an arc of a Cartesian, is reducible to the form which Jacobi has shown to depend on elliptic functions.

Zoological Society, Nov. 19.—Dr. A. Günther, F.R.S., vice-president, in the chair. Mr. Sclater exhibited and pointed out the characters of two new species of birds obtained by Mr. Salmon during his expedition to the State of Antioquia, Columbia. These were named *Chlorochrysa nitidissima* and *Grallaria ruficeps*.—A letter was read from Mr. R. Swinhoe, H.B.M. Consul at Chefoo, containing a note on the White Stork of China, and stating that he had recently obtained a live Pitta in China, which appeared to be *Pitta nymphe* of the Fauna Japonica.—Mr. A. H. Garrod exhibited and pointed out certain peculiarities in the cæcum of a Crab-eating Fox (*Canis cancrivorus*).—Mr. Sclater exhibited and made remarks on a pair of horns of the new Bubaline Antelope from the Bogos country, lately named *Alcelaphus tora* by Dr. Gray.—A paper was sent by Dr. Edward L. Moss, Surgeon in charge R.N. Hospital at Esquimalt, on a singular Virgularian Actinozoon taken at Burard's Inlet, close to the northern mouth of the Fraser River.—A communication was read from Dr. O. Finsch, containing the description of a most remarkable and interesting new Passerine Bird which he had received from Mr. T. Klinesmith of Levuka, Ovalou, Feejee Islands. This little bird, which was not only new as a species, but also the type of a new genus, he proposed to call *Lamprolva Victoria*.—A communication was read from Mr. W. S. Atkinson, of Darjeeling, containing the descriptions of two new species of Butterflies from the Andaman Islands, which were named respectively *Papilio mayo* and *Euplaea andamanensis*.—Dr. Cobbold communicated the first of a series of papers entitled "Notes on the Entozoa;" being observations based on the examination of rare or otherwise valuable specimens contributed at intervals by Messrs. Charles Darwin, Robert Swinhoe, Charles W. Devis, the late Dr. W. C. Pechey, Dr. Murie, and others.—Mr. Edwin Ward exhibited and gave the description of a new Bird of Paradise, of the genus *Epimachus*, which he proposed to call *E. ellioti*.—A communication was read from Surgeon-Major Francis Day, containing remarks on Indian Fishes, mostly copied from the original manuscripts of the late Dr. Hamilton Buchanan.—Mr. J. W. Clark read a memoir on the Eared Seals of the Auckland Islands, one of which he recognised as *Otaria hookeri*, thus fixing the locality of this species.

Linnean Society, Nov. 20.—Mr. G. Bentham, president, in the chair.—Prof. Dyer exhibited a specimen of the fruit of *Luffa aegyptiaca*, a gigantic species of gourd, grown in this country.—An account of the flora of Monte Argentaro, on the borders of Tuscany, by Mr. Henry Groves, of Florence, was read.—On the Algae of Mauritius, by Dr. Dickie. The total number of species recorded is 155. These include 17 well-known European species, most of which are cosmopolitan; 23 South African species; 12 Australian; 15 East Indian; 14 species found in the Red Sea; 12 being peculiar to the island.—On a peculiar embryo of Delphinium, by the Rev. C. A. Johns. The interesting point in the structure was the non-separation of the two cotyledons, the plumule forcing itself through a chink in the undivided cotyledon. Dr. Masters stated that this peculiarity is well known to occur occasionally in Ranunculaceæ, as well as in some other plants.—On the buds of Malaxis, by Dr. Dickie. This is supplementary to the paper already published in the "Journal" of the Society.—On the Algae of St. Thomas and Bermuda, by Mr. H. N.

Moseley. These were the results of the explorations on board the *Challenger*, one marine flowering plant being also found in flower for the first time.

Chemical Society, Nov. 20.—Dr. Odling, F.R.S., president, in the chair.—A paper on "the coefficient of expansion of carbon disulphide," by J. B. Hannay, was read by the secretary.—Dr. Russell then communicated his researches on the action of hydrogen on silver nitrate, giving an account of the precipitation of metallic silver in the crystalline state by means of hydrogen.—There were also a note on the action of zinc chloride on codeine, by Dr. C. R. A. Wright; on the chemical properties of ammoniated ammonia nitrate, by E. Divers, M.D.; and on the analysis of a meteoric stone and the detection of vanadium in it, by R. Apjohn.

PARIS

Academy of Sciences, Nov. 17.—M. de Quatrefages, president, in the chair.—The following papers were read:—An answer to M. Tarry's remarks on the theory of the sun's spots, by M. Faye. M. Tarry's objection to M. Faye's theory was that, instead of a down-rush, he ought to have employed an up-rush as the cause of the spots, as a terrestrial cyclone rushes up, and not down. M. Faye answered the objections in detail.—Second memoir on the way in which water intervenes in chemical reactions, and on the connection between electro-motive force and affinity, by M. Becquerel.—Studies on beer; a new method of brewing it and rendering it unchangeable, by M. L. Pasteur. The author considers the spoiling and souring of beer to be due to germs, and suggests methods for preventing their access or destroying them during the processes of brewing.—An answer to M. Oudemans' observations on the influence of refraction, &c., during the transit of Venus, by M. E. Dubois.—On the use of the prism for the verification of the law of double refraction, by Prof. G. G. Stokes.—On certain metallic spectra (lead, chloride of gold, thallium, and lithium) by M. Lecocq de Boisbaudran. The author found that the combination of a metal was attended with the loss of some of the lines it exhibited when in the free state.—On the maximum density of water, by M. Piarron de Mondesir.—On the cooling effects of the joint actions of capillarity and evaporation, by M. C. Decharme.—On the quantity of ammonia contained in atmospheric air at different altitudes, by M. Truchot. The author stated that the ammonia increases as the cloud region is approached, and gave tables of determinations in support of his views.—Remarks on the paper of Pelouze and Audouin on the condensation of liquifiable matters held in suspension by gases, by M. D. Colladon.—Remarks on the paper of M. Derbès on the *Pemphigus* of *Pistacia terebinthus* compared with the *Phylloxera quercus*, by M. Balbiani.—On the swellings produced on vine rootlets by the *Phylloxera*, by M. Max. Cornu.—On triple planes tangent to a surface, by Mr. W. Spottiswoode.—On the direction of the propagation of electricity, by M. Meyreneuf.—An answer to M. Mercadier's last note on the study of the vibratory movements of an elastic wire, by M. H. Valerius.—Observations on the molecular structure of meteoric iron and on solid ferrous chloride in meteorites, by Mr. J. Laurence Smith.—On the tertiary supra-nammulitic formations of the department of Hérault, by M. Rouville.—The death of M. Cl. Burdin, correspondent of the mechanical section, was announced.

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