

## BOTANY

## Movements of Chlorophyll

ACCORDING to observations recently made by the French botanists, MM. Prillieux and Roze, the grains of chlorophyll in the leaves of plants assume different positions according as they are exposed to light (either natural or artificial) or to darkness. In darkness these grains, together with protoplasmic threads to which they are attached, are in contact with the walls which divide the cells from one another; under the influence of light they gradually change their position from these to the upper or under walls which form the surfaces of the leaf. M. Roze believes that this motion originates in the protoplasmic threads, which are the vital and animating part of the cell. (*Comptes Rendus*.)

## Dependence of the Distribution of Plants on that of Animals

PROF. HILDEBRAND continues in the *Botanische Zeitung* his account of Delpino's investigations on the Dependence of the Geographical Distribution of Plants on that of Animals (see NATURE, No. 9, p. 246). In passing from the tropics to the temperate regions, we observe a general falling off in the number of species of native plants, caused by the disappearance of those animals which are needful for their fertilisation. Thus a large number are lost whose impregnation depends upon humming-birds. Roses and pæonies disappear where the larger Coleoptera are no longer found. The greater number of *Sileneæ*, and especially the night-flowering species of *Silene* and *Lychnis*, find their limits where nocturnal Lepidoptera cease. In the Arctic zone those plants only can be found which are fertilised by the agency of Hymenoptera, Diptera, or the wind. This law is illustrated by the flora of Nova Zembla lying between 71° and 76° N. lat., and Spitzbergen, between 76° and 80° N. lat. Out of 124 species of flowering plants constituting the phænogamous flora of Nova Zembla, six belong to the tribe *Pedicularineæ*, which are neither self-fertilised, nor by the agency of the wind, but entirely by the help of Hymenopterous insects. The inference is drawn that, notwithstanding the severity of the climate (the mean temperature of August, the hottest month in the year, not rising above 5° C. or 41° F.), some insect of this class must find its home there. Accordingly Spören records observing a single beetle and a ground-bee, with a few flies and midges. The insect described as the ground-bee is probably the widely-diffused *Bombus terrestris*, one of the most active of insects in the fertilisation of plants. Prof. Delpino thus classifies the 124 flowering plants of Nova Zembla: 16 dichogamous, fertilised by Hymenoptera; 84 dichogamous or homogamous by Hymenoptera or Diptera; 24 dichogamous by the wind. Out of 91 flowering plants found in Spitzbergen, 2 may be described as fertilised by Hymenoptera, 63 dichogamous or homogamous by Hymenoptera or Diptera, and 26 by the wind. In neither country are there any plants dependent on Lepidoptera for their fertilisation.

A. W. B.

M. JOSE DI CANTO has successfully introduced, on an experimental scale, the cultivation of *Cinchona officinalis* into the Azores.

## SCIENTIFIC SERIALS

The last number of Poggendorff's *Annalen der Physik und Chemie* (vol. cxxxviii. part 4), contains the following papers:—(1.) "Thermo-chemical Investigations, Part iii." by Julius Thomsen (pp. 497 to 514). This communication relates to the calorimetric behaviour of the acids of sulphur and selenium when neutralised with bases. The author's numerical results differ considerably from those of Favre and Silbermann. This difference is ascribed by him to the use, by those investigators, of the mercurial calorimeter, which he considers to be "altogether inapplicable for accurate determinations." (2.) "Mineralogical Communications" (ninth part), by G. vom Rath (pp. 515 to 550). (3.) An addition to a previous communication "On the crystalline forms of salts of certain sulpho-acids derived from phenol," by the same author (pp. 550 to 553). (4.) "Experiments on Irradiation," by Wilhelm von Bezold (pp. 554 to 560). This paper contains a description of experiments whereby the imperfect achromatism of the eye is made strikingly evident, and also of a method of producing analogous effects objectively upon a screen by means of a simple unachromatised convex lens. (5.) "On the vibrations of a plate of air corresponding with those of a solid plate," by E. H.

Vierth (pp. 560 to 563). Two Chladni plates were fixed by means of a clamp parallel to each other, and one about a millimeter above the other, a disk of cork being placed at the centre to prevent them touching. The upper plate being thrown into vibration by means of a fiddle bow, the distribution of nodes and loops in it and in the stratum of air between the plates, was ascertained by strewing sand upon each plate. The sand figures formed, respectively, upon the upper plate by its own vibrations and upon the lower plate by the vibration of the stratum of air, were markedly different, but, nevertheless showed a distinct correspondence. (6.) "On the corrosion-figures and asterism of Iceland spar," by Heinrich Baumhauer (pp. 563 to 565). (7.) "Reply to the critical remarks of Mr. L. Boltzmann," by R. Most (pp. 566 to 570). In this paper, which is entirely mathematical, the author maintains the accuracy of a demonstration of the second fundamental theorem of the mechanical theory of heat communicated by him to a previous number of the *Annalen*. (8.) Experimental investigation into the influence of temperature on electromotive force," by L. Bleekrode (pp. 571 to 604). Solutions of salts of various metals were placed between precisely similar electrodes of the same metal in each case as that contained in the salt employed, and the electrodes were connected by a metallic circuit of great resistance, containing a delicate reflecting galvanometer. When the liquid in contact with one of the electrodes was heated, a current was obtained in most cases of such a strength as to indicate a change of electromotive force between the metal and liquid approximately proportioned to the change of temperature. The experiments seem to show that the currents observed were of the nature of thermo-currents, but they are not quite conclusive on this point. (9.) "On new Sulpho-salts" (third communication), by R. Schneider (pp. 604 to 628). (10.) "Experiments on combinations of Mica" (from the Proceedings of the Berlin Academy, July 1869), by E. Reusch (pp. 628 to 638). If a number of thin plates of biaxial mica are superposed, so that the principal section of each makes an angle of 60° with that of the preceding one, the combination has the optical properties of a uniaxial crystal causing rotation of the plane of polarisation to the right or left, according to the direction in which each plate of mica is turned relatively to the preceding one. (11.) "On the separate perception of an Over-tone simultaneously with the Fundamental tone," by C. B. Greiss (pp. 638 to 640). This paper contains nothing new, except that it ascribes to Prof. Tyndall a well-known experiment of Helmholtz's. (12.) "Reply to Dr. Mohr," by A. Von Lasaulx (pp. 640 to 642), respecting the formation of basalt. (13.) "On the motion of the light of the negative inductive discharge in rarefied air," by J. C. Poggendorff (pp. 642 to 644). When the discharge of an induction coil is allowed to pass between two fine platinum wires, the ends of which are within one millimetre of each other, the well-known negative glow recedes from the end of the negative wire, in proportion as the air in which the discharge is taken is more and more rarefied; and at the same time the position of the greatest evolution of heat by the negative discharge recedes similarly.

*The Ibis*, a quarterly journal of Ornithology, New Series, No. 21, January 1870. (Van Voorst.) The papers contained in this number are—(1.) "Notes on the Birds of the Peninsula of Sinai," by C. W. Wyatt. (2.) "On the Sun-birds of the Indian and Australian regions," by Lord Walden—an article showing an extraordinary acquaintance with the literature of the subject. (3.) "On a fourth collection of birds from the Fantee country," by R. B. Sharpe. (4.) "A list of the birds of Turkey," by Captain Elwes and Mr. T. E. Buckley—the first attempt at a compilation of all the available information respecting the ornithology of one of the least known European countries, including that acquired by the authors during a tour through various parts of the Turkish dominions. (5.) "On the Ornithology of Hainan," by Consul Swinhoe, hitherto well known by his successful researches in the sister island of Formosa—an article containing results quite as remarkable as those furnished by the writer's former explorations. (6.) "Notes on the birds of the Island of St. Helena," by J. C. Melliss. (7.) "Additional notes on Mr. Lawrence's list of Costa-Rican birds," by O. Salvin. (8.) "Notices of recent Ornithological publications," English, German, Finnish, Italian, Portuguese, and Australasian, wherein more than thirty works are briefly reviewed; and (9.) "Letters from Mr. Allen Hume, Drs. Jerdon and Malmgren, Captain Shelley, Messrs. Gurney, Harting, and Sharpe, Dr. Salvadori and Mr. Swinhoe." The number also contains four well-drawn and coloured lithographic plates, by Mr. Keulemans, representing seven species of birds, all but one hitherto unfigured.