

Andrew Knight, and especially Dean Herbert, took up the work, with what splendid results you all know.

It is curious, however, to note that objections and prejudices arose from two sources. Many worthy people objected to the production of hybrids, on the ground that it was an impious interference with the laws of nature. To such an extent was this prejudice carried, that a former firm of nurserymen at Tooting, celebrated in their day for the culture, amongst other things, of heaths, in order to avoid wounding sensitive susceptibilities, exhibited as new species introduced from the Cape of Good Hope forms which had really been originated by cross-breeding in their own nurseries.

The best answer to this prejudice was supplied by Dean Herbert, whose orthodoxy was beyond suspicion. He, like Linnæus before him, had observed the existence of natural hybrids, and he set to work experimentally to prove the justness of his opinion. He succeeded in raising, as Engleheart has done since, many hybrid narcissi, such as he had seen wild in the Pyrenees, by means of artificial cross-breeding. If such forms exist in nature, there can be no impropriety in producing them by the art of the gardener.

In our own time, Reichenbach, judging from appearances, described as natural hybrids numerous orchids. Veitch and others have confirmed the conjecture by producing by artificial fertilisation the very same forms which the botanist described.

It remains only to speak of another respectable but mistaken prejudice that has existed against the extension of hybridisation. I am sorry to say this has been on the part of the botanists. It is not indeed altogether surprising that the botanists should have objected to the inconvenience and confusion introduced into their systems of classification by the introduction of hybrids and mongrels, and that they should object to hybrid species, and much more to hybrid genera; but it would be very unscientific to prefer the interests of our systems to the discovery of the truth.

I may mention two cases where scepticism still exists as to the real nature of certain plants: *Clematis jackmani* of our gardens, raised, as is alleged, by Mr. Jackman, of Woking (*Gardeners' Chronicle*, 1864, p. 825), was considered by M. Decaisne and M. Lavallée¹ to be a real Japanese species, and not a hybrid. This may be so, but there is no absolute impossibility in the conjecture that the Japanese plant and the cultivated plant originated in the same way. Again, Mr. Culverwell's supposed hybrid between the strawberry and the raspberry has been pronounced to be no hybrid, but to be *Rubus leesii*. But what, we may ask, is *Rubus leesii*? It appears to be a sterile form more closely allied to the raspberry than to the strawberry. Is it not at least possible that Mr. Culverwell has produced it artificially?

The days when "species" were deemed sacrosanct, and "systems" were considered "natural" have passed, and Darwin, just as Herbert did in another way, has taught us to welcome hybridisation as one means of ascertaining the true relationships of plants and the limitations of species and genera.

Darwin's researches and experiments on cross-fertilisation came as a revelation to many practical experimenters, and we recall with something akin to humiliation the fact that we had been for years exercising ourselves about the relative merits of "pin eyes" and "thrum eyes" in primroses, without ever perceiving the vast significance of these apparently trifling details of structure.

It would occupy too much time were I to dilate upon the labours of Gaertner, of Godron, of Naudin, of Naegeli, of Millardet, of Lord Penzance, of Engleheart, and many others. Nor need I do more than make a passing reference to the wonderful morphological results obtained by the successive crossings and inter-crossings of the tuberous begonias, changes so remarkable that a French botanist was even constrained to found a new genus, Lemoinea, so widely have they deviated from the typical begonias.

For scientific reasons, then, no less than for practical purposes, the study of cross-breeding is most important, and we welcome the opportunity that this conference affords of extending our knowledge of the life-history of plants, in full confidence that it will not only increase our stock of knowledge, but also enable us still further to apply it to the benefit of mankind.

¹ Lavallée, "Les Clematites à Grandes Fleurs," p. 6 and p. 9, tab. iv.: *Clematis hakonenensis*.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

DR. A. C. HOUSTON has been appointed Lecturer in Bacteriology at Bedford College, London, for Women.

DR. W. WACE CARLIER, at present Lecturer on Experimental Physiology and Histology in the University of Edinburgh, has been appointed Professor of Physiology in Mason University College, Birmingham.

THE Royal Commissioners for the Exhibition of 1851 have approved the nomination by the University College of North Wales of Mr. Robert Duncombe Abell to a Science Research Scholarship of the value of 150*l.* a year. Mr. Abell is about to enter the University of Leipzig, where he proposes to engage in a special research under the direction of Prof. Wislicenus.

THE following appointments abroad may be noticed:—Dr. James Ewing to be professor of pathology in the Cornell University Medical College; Dr. Charles W. Wardner to be professor of physics in Williams College; Dr. H. G. Byers to be professor of chemistry in the State University of Washington; Dr. Alfred H. Seal to be professor of chemistry in Girard College, Philadelphia.

THE new buildings of the London Hospital Medical College were opened on Tuesday last. They occupy the site of the old chemical theatre and laboratory, and comprise the following rooms and departments. On the basement is the department of public health, containing a large museum, professors' room, class rooms, &c.; on the ground floor, the biological laboratory, class rooms, and the materia medica museum; on the first floor, the chemical theatre and laboratories, and the balance room; on the second floor, the physics laboratory, the chemical laboratory for the diploma in public health classes, the operative surgery room, and a large anatomy class room leading from the dissecting room. On the third floor is the bacteriological department, with general laboratory, research laboratories, class rooms for public health work, sterilising room, &c. Other portions of the building have thus been left for additional development, and advantage has been taken of this to provide special class rooms for students studying for the preliminary scientific, the intermediate M.B., London, and other examinations. Additions have also been made to the present physiological department, giving rooms for original research and for special class work for the higher examinations. For all these departments special teachers have already been appointed, who are devoting their entire time to the particular subjects that they have undertaken. The new buildings, with their fittings, will cost altogether not less than 10,000*l.*

SCIENTIFIC SERIAL.

Bollettino della Società Sismologica Italiana, vol. v. No. 1, 1899-1900.—The rules of the Society and list of Fellows (forty-three national and ten foreign) are given.—Determination of the epicentre and time at the origin of earthquakes of unknown origin propagated along the earth's surface by means of four or five time-observations, by G. Costanzi. Equations for the above purposes are obtained on the supposition that the surface-velocity is constant.—Vesuvian notices (July-December 1898), by G. Mercalli. A monthly chronicle, with notes on the paroxysm of September, the central crater, and the excentric eruptive apparatus; illustrated by reproductions of two photographs.—Notices of the earthquakes observed in Italy (January 1-February 3, 1898), by G. Agamennone, the most important being the Ferrara earthquake of January 16, a distant earthquake on January 25, and the Asia Minor earthquake of January 29.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 15.—"On the Application of Fourier's Double Integrals to Optical Problems." By Charles Godfrey, B.A.

The disturbance received at any point from a luminous body is a vector, varying with the time. It may be defined by its resolved parts along three rectangular axes; let $f(t)$ be one of these resolute. In general $f(t)$ will not be a periodic function,

even when the light is approximately monochromatic. By Fourier's theorem of double integrals

$$f(t) = \int_0^{\infty} (C \cos ut + S \sin ut) tu,$$

where

$$C = \frac{1}{\pi} \int_{-\infty}^{+\infty} f(v) \cos uv dv, \quad S = \frac{1}{\pi} \int_{-\infty}^{+\infty} f(v) \sin uv dv.$$

This is true provided $f(t)$ is subject to certain conditions, which are proved to be present in any physical problem. The object of the paper is to inquire whether the above theorem justifies us in regarding any plane-polarised plane light motion as equivalent to a combination of simple harmonic vibrations, with periods varying from 0 to ∞ . The element of the integral suggests a

vibration of amplitude $du \sqrt{C^2 + S^2}$, phase $\tan^{-1} \frac{S}{C}$, and period

$\frac{2\pi}{u}$. It is proved that in certain very general cases such an interpretation is possible, notably in the case of "constant" light, such as presents a steady appearance.

This calculus enables us to discuss the width of the lines in the spectrum of an incandescent gas, taking into account not only the velocities of the molecules, but also the effect of collisions, and of radiative damping in the molecular vibrations. The connection between Röntgen rays and ordinary light is examined, J. J. Thomson's theory of the former being assumed. It is shown that perhaps $\frac{1}{10000}$ of the energy of the rays will be in the visible spectrum. The theory of dispersion is considered with reference to natural light as opposed to a simple harmonic train of waves.

PARIS.

Academy of Sciences, July 10.—M. van Tieghem in the chair.—The Perpetual Secretary announced to the Academy the loss it had sustained by the death of Sir William Flower, Correspondent in the Section of Anatomy and Zoology.—Remarks by M. Ed. Perrier on his *Traité de Zoologie*.—New researches on argon and its combinations, by M. Berthelot. Having a larger quantity of argon placed at his disposal, the author has repeated his earlier observations on the reactions between argon and certain organic compounds. Entirely negative results were obtained when mixtures of argon with ethylene, glycollic ether, aldehyde, acetone, amylene, petroleum ether, propionitrile, allyl sulphocyanide, or amylamine were submitted to the prolonged action of the silent discharge, the original volume of argon being recovered unchanged. With benzene, toluene, cymol, turpentine, anisol, phenol, benzaldehyde, aniline, phenyl sulphocyanide, and benzonitrile, on the other hand, an absorption of argon took place in amounts varying from one to six per cent. At the same time a greenish fluorescence appeared, giving a characteristic spectrum.—On the geographical and cartographical work carried out in Madagascar by order of General Gallieni between 1897 and 1899, by M. Alfred Grandidier. The values previously assumed for the latitude and longitude of Tamatave, Andévorante, Fort Dauphin, and other towns in Madagascar are here revised, and the differences tabulated.—On the dialkylbenzoylbenzoic acids and their tetra-chlor-derivatives, by MM. A. Haller and H. Umbgrove. Details are given of the preparation and properties of tetrachlorodimethylamidobenzoylbenzoic acid, acetyldimethylamidobenzoyltetrachlorbenzoic anhydride and the corresponding ethyl and methyl ethers, dimethylamidobenzoyltetrachlorbenzoic acid and the anhydride of acetyldiethylamidobenzoyltetrachlorbenzoic acid, together with its ethyl and methyl ethers.—On the development of analytical functions of several variables, by M. Paul Painlevé.—Contribution to the theory of musical instruments, by M. Firmin Larroque.—Remarks on the use of cryohydrates, by M. A. Ponsot.—Action of nitric oxide upon chromous salts, by M. Chesnau. Chromous salts in solution dissolve nitric oxide like ferrous salts, giving only one compound. On heating, or placing in a vacuum, this compound gives off no gas, thus differing from the corresponding ferrous compound.—On metallic sulphantimonites, by M. Pouget. Solutions of potassium sulphantimonites by double decomposition with salts of metals may give salts of the types SbS_3M_3 , or SbS_3M_2K , but in no case of the type SbS_3MK_3 .—Action of phenylhydrazine upon alcoholic bromides, chlorides, and iodides, by M. J. Allain Le Canu. The iodides behave differently to the cor-

responding bromides and chlorides in respect to their reaction with phenylhydrazine.—On the aminocampholones, by MM. E. E. Blaise and G. Blanc.—Contribution to the study of an oxyptomaine, by M. Gchsner de Coninck. The oxyptomaine $C_8H_{11}NO$ was prepared by the action of hydrogen peroxide upon the pyridic ptomaine, $C_8H_{11}N$. In the present paper details are given of its bromohydrate, chloroaurate, and chloromercurate.—New method for the acidimetric estimation of alkaloids, by M. Elie Falières. The titration is conducted with an ammoniacal copper solution instead of litmus or one of the ordinary indicators. The experimental results were very satisfactory.—On benzoyl-furfurane, by M. R. Marquis. Benzoyl-furfurane is readily obtained by the interaction of pyromucyl chloride and benzene in presence of aluminium chloride.—The egols, new general antiseptics, by M. E. Gautrelet. Parasulphones derived from phenols are nitrated, and the ortho-nitro-phenol-parasulphonate of mercury and potassium prepared from this. The compounds thus obtained are termed egols, phenegol from phenol, cresegol from cresol, and so on, and possess certain advantages as antiseptic agents.—The rôle of heat in muscle action, by M. Raphael Dubois.—New observations on echidnase, by M. C. Phisalix. This ferment is present in snake poison, and is found to exert a diastatic action not only upon animal tissues, but even upon the active principle of snake poison, echidnotoxin.—Analogies between cultures of the vegetable fungus *Nectria* and the parasitic fungus in human cancer, by M. Bra.—On the absence of regeneration of the posterior members of the leaping Orthoptera and its probable causes, by M. Edmond Bordage.—On the affinities of *Microsporium*, by MM. L. Matruchot and Ch. Dassonville.—On the cicatrization of the fascicular system, and of the secretory apparatus on the falling of the leaf, by M. A. Tison.—Barometric deviations on the meridian of the sun at successive days of the synodic revolution, by M. A. Poincaré.—On the use of self-recording meteorological apparatus in captive balloon ascents, by M. Léon Teisserenc de Bort.

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