RESEARCH ITEMS

Morphology of a Cicada

J. W. EVANS has recently described the structure of the anomalous cicada *Tettigarcta* White. Little has been known of this insect, which betrays certain primitive features and is widely divergent from all other Cicadidæ (*Papers and Proc. Roy. Soc. Tasmania* for 1940; pub. 1941). Most of the specimens of the species *T. tomentosa* were taken at an altitude of 2,500 ft. during the Tasmanian winter (May and June), being attracted to lights at night. During the day the insect shelters beneath bark. Among various features the absence of tympanal organs in both sexes is notable. Tymbals, however, are present with their muscles slightly less developed in the female than in the male. It is conjectured that Tettigarcta is a descendant from an early cicadan stock that possessed well-developed sound-producing organs and sound-detecting organs in both sexes. For some reason, possibly associated with its nocturnal habits and cold environment, for other cicadas are essentially scent-loving insects, it has ceased to produce sound. Among other structural features the nymphs of Tettigarcta have nine segments to the antennæ—a higher number than is found in other cicadas. The venation is exceptionally complete with a separate costal vein in the hind wing. The male genitalia have a true ædeagus, also there is an unusual development of the basal plates, and harpagones are present.

Origins of Girden Roses

THE continuous blooming of garden roses must be a matter of wonder to those who compare it with the limited flowering of wild types. C. C. Hurst shows (*J. Roy. Hort. Soc.*, 66, Pts. 7 and 8, July and August, 1941) that this fortunate gene was introduced early in the nineteenth century from the China rose, *Rosa Chinensis*. It was first crossed with the Tea rose, *R. gigantea*, to form pink, blush and yellow stocks. The Pink China crossed with *R. moschata* gave the Noisette rose and when separately combined with the Pink Autumn Damask, *R. rubra*, it gave the Bourbon Rose. Hybrid Perpetuals were obtained by crossing hybrid China forms with Bourbons, Noisettes, and an English stock named after the Duchess of Portland. Hybrid Tea roses, occupying the throne of garden beauty, resulted from a fusion of Hybrid Perpetuals and Teas. The twentieth century brought the introduction of *R. lutea* from Persia, and with it the Pernet rose (Hybrid Perpetual × Austrian Briar, *R. lutea*). A wealth of historical detail is combined with genetical information in the papers under review.

A New Strain of Potato Virus

SINCE the discovery that interveinal mosaic and crinkle virus diseases of the potato are caused by mixtures of viruses, much work has been devoted to the isolation and identification of the constituents. Phyllis M. Clinch has recently elucidated one of the remaining problems (*Sci. Proc. Roy. Dub. Soc.*, 22, No. 46, 435–45, December, 1941). One source of interveinal mosaic, which is a mixture of viruses *X* and *F*, was found to include also a strain of top-necrosis. Removal of the *X* virus from this complex left a dual virus which is responsible for virulent tuber blotch, and also produces streak symptoms in the foliage. This has been found to be identical with a potato 'streak' the symptoms of which were described earlier by Koch and Johnson, and thus is now shown to be caused by a mixture of top-necrosis and *F* viruses.

A Genus of the Discomycetes

A MONOGRAPH of the Discomycete genus Rutstrœmia has recently been published by W. Lawrence White (*Lloydia*, 4, No. 3, 153, September, 1941). There is no modern handbook to the genera and species of the Discomycetes, and any critical study like the present monograph is a welcome contribution. The genus Rutstrœmia was originally established by Karsten, and has been revived to include many of the inoperculate Discomycetes at present scattered through the current genera Helotium, Phialea, Ciboria, Sclerotinia and Cyathicula. Forty-one species are described critically, and the material has been obtained from as many countries as present world conditions allow. A key to the American species is given, and seventy-five half-tone figures elucidate the text.

Physiological Genetics of Neurospora

G. W. Beadle and E. L. Tatum (*Proc. Nat. Acad. Sci.*, 27, 499–506; 1941) describe useful methods for the analysis of gene action in biochemical phenomena. They irradiate the fungus Neurospora with X-rays and grow the resulting strains from single-spore culture on a medium containing as many of the synthesized products as possible. They also grow these spore strains on media containing only the primary ingredients. A normal strain is able to synthesize vitamin B_6, etc., from this latter medium, but a mutant strain may not survive through its inability to do so. By adding vitamin B_6 to such a medium, they can restore the growth-rate of the mutant strain to that of the normal strains. Out of two thousand single-spore cultures analysed, one was found to be pyridoxinless (unable to synthesize vitamin B_6), another failed to synthesize *p*-amino-benzoic acid, a further one could not synthesize thiazole. All these mutants differ from normal by one gene differences. The physiological methods of analysis which are used will enable the steps in synthesis to be studied in relation to gene changes.

Evolution of Continents

IN the Bruce-Preller lecture for 1941 Sir Thomas Holland discusses the data bearing on the highly controversial subject of continental drift, and makes suggestions towards a possible reconciliation of the conflicting evidence (*Proc. Roy. Soc. Edin.*, B, 61, II (13), 149; 1941). He directs attention to various geological lines of evidence "which cannot, so far as anyone knows, be explained in any way except by continental drift". The most formidable among these is the record of Upper Palæozoic glaciation on each of the now scattered continents of Gondwanaland. On the other hand, there is the geophysical difficulty of finding an adequate motive force for continental drift, if the view that the earth is solid and strong down to about half its radius be accepted as a scientific fact. Holland points to one obvious direction in which we may look hopefully for a clue to the reason for this apparent inconsistency: "the evidences for continental drift all belong to a relatively distant past", whereas "the seismic records . . . indicate the state

of the Earth's interior to-day". He suggests that so long as geophysicists give good reasons for denying the physical possibility of continental drift, there are only two courses open: (i) to reconsider the possibility that some of the geological revolutions in the past were on a scale large enough to put the evidence of present-day conditions out of court; and (ii) to continue with the "prosaic task of accumulating more cold facts". The second of these is the more essential because by no means all geophysicists deny the physical possibility of continental drift. In this connexion reference may be made to the following papers: D. Griggs, *Amer. J. Sci.*, **237**, 611; 1939; and B. Gutenberg, *Trans. Amer. Geophys. Union*, 556–58 (1941).

Activation of Nitrogen in the Silent Electric Discharge

S. S. Joshi and A. Purushotham, of Benares Hindu University, describe, in a communication to NATURE, dated November 17, 1941, some work on the formation of active nitrogen in a Siemens' ozonizer. Both alternating and unidirectional potentials were used. The walls of the ozonizer were suitably coated, and an idle volume was connected in series with the exhaust end of the ozonizer and the pump to act as a gas reservoir. With careful adjustment of the applied field and gas flow to suit the gas pressure, activation of nitrogen in the *silent discharge* was observed up to a pressure of 150 mm. mercury, using soft and pyrex glass tubes. By raising the frequency of the A.C. supply, both the yield and the maximum pressure could be increased appreciably; to do this it was necessary to use ozonizer tubes made of materials, such as silica, of high dielectric strength in order to withstand more intense fields; the walls were silvered. Apart, perhaps, from 'controlled electron' sources (Caress and Rideal, *Proc. Roy. Soc.*, A, **115**, 684; 1927), with which the yield of active nitrogen was limited by the low pressure, the *silent discharge* was found to be the simplest in technique and most suitable for determining the electrical quantities characteristic of the reaction under given conditions. With the frequency n, the gas pressure p, and the temperature T kept constant, it was found (Joshi, *Current Science*, **8**, 548; 1939) that as the applied potential was progressively increased, activation of the gas to produce a just perceptible afterglow set in at a critical potential V_m characterized by a sudden increase in both the electric current and the energy dissipated in the system. With constant n and T the critical potential increased sensibly linearly with p, the increase being pronounced at lower frequencies; at constant p and T the critical potential diminished with increasing n in the range 50–500 cycles per sec. Changes in V_m produced by admixture of a foreign gas or 'impurity' serve markedly to reveal its influence as a catalyst or otherwise in the activation of nitrogen. V_m resembles the corresponding Paschen potential. It is considered that ionization of nitrogen in one or more stages is a chief determinant of changes that precede its activation.

Laboratory Test for Preservation of Iron by Paint

To determine how well a paint protects a metal surface against corrosion, plaques covered with it are usually exposed outdoors. A laboratory test has recently been developed which shortens the weathering time to hours and does not destroy the film. The test, the technique of which is described by R. B. Gibney (*Bell Lab. Rec.*, **20**, No. 2, Oct., 1941), gives evidence as to how well a paint protects metal, but little information on the weathering of the paint itself. In the presence of water, metallic corrosion results from the electrochemical action between small adjacent surface areas, potential differences being set up between them. The potential of the whole surface is that of all the small areas involved, and can be measured with reference to a standard electrode. The extent of corrosion can be determined by recording continuously the potential changes of the metal over a few hours. Surface areas of a corroding metal are of two kinds: anodic (or electronegative), where the metal goes into solution, and cathodic (or electropositive) where hydrogen is evolved. If the metal corrodes freely the cathodic areas tend to become 'clogged' with hydrogen and the resultant potential of the plate becomes more electronegative. This effect is strongly accentuated when oxygen is excluded. If the metal does not corrode it is because the anodic areas become insulated with an extremely thin film of corrosion products, the potential of the plate being nearly that of the cathodic areas. Thus the potential of a corroding metal becomes more electronegative with time, while that of a non-corroding metal becomes and remains electropositive, and this is the basis for the rapid determination of the behaviour of painted iron.

Components of Fehling's Solution

IN a paper read before the Society of Public Analysts and Other Analytical Chemists on February 4, J. G. N. Gaskin described the curves obtained when the optical rotatory power (polarization) of mixtures of copper sulphate, alkali tartrate and caustic soda are plotted against increasing alkali contents of the solutions. Interpretation of these curves suggests the existence of copper complexes stabilized by alkali tartrate, and the isolation of one of these, having some unusual properties, is described. Some analytical data were given for compounds formed when copper sulphate is dissolved with excess of either Rochelle salt or potassium tartrate. The bearing of this work upon the constitution and possible modification of Fehling's solution is discussed.

Lithium Alum

THE existence of a lithium alum, $LiAl(SO_4)_2, 12H_2O$, has been the subject of some discussion, and the preparation of the compound is evidently a matter of some difficulty. J. F. Spencer and Caddie (NATURE, **138**, 169; 1936) prepared it by working at low temperature, but H. A. Horan and Skarulis (*J. Amer. Chem. Soc.*, **61**, 2689; 1939) failed to obtain it at 0°. H. A. Horan and J. J. Duane (*J. Amer. Chem. Soc.*, **63**, 3533; 1941), however, now report that in equilibrium with saturated solutions an invariant point with solution composition differing from that previously reported by Horan and Skarulis has been found, and more careful investigation of the region between these invariant points clearly shows the existence of a third phase. The results indicate the formation of a double salt of composition $LiAl(SO_4)_2, 12H_2O$. Apparently the use of concentrated solutions of purified aluminium sulphate was the only difference in technique. The existence of lithium alum, with a limited region of existence, thus seems to be established, but some care is evidently necessary in its preparation.