

RESEARCH ITEMS

Mould Inhibition of the Tubercle Bacillus

It is well known that Sir Alexander Fleming discovered penicillin because a mould accidentally contaminated one of his plate cultures. Reference is made in the *Lancet* (632, Nov. 11, 1944) to the work of D. K. Miller and A. C. Rekate (*Science*, 100, 172; 1944), who found that the growth of a strain of the tubercle bacillus, *Mycobacterium tuberculosis*, was inhibited by a green mould of the *Penicillium* group, which accidentally grew on a culture of the tubercle bacillus stored in an icebox. The mould grew rapidly and well in other cultures of tubercle bacilli at room temperature, but it did not grow at all at 37° C. It grew faster and sporulated earlier on cultures of tubercle bacilli than on sterile media. It also grew in suspensions of human tubercle bacilli in saline at room temperature, and the authors failed to recover the tubercle bacilli from these suspensions later on. Experiments done by inoculation of guinea pigs suggested that some inhibition of growth had occurred, but were less definite. The mould grew well on tuberculin diluted as much as 1 in 10,000, and these dilutions of tuberculin thereafter failed to give positive skin tests in tuberculous guinea pigs. Suspensions of the mould inactivated 1 in 100 tuberculin in 2 hours, and the supernatant fluid obtained by centrifuging such suspensions also did this. When, however, the suspensions were passed through a Seitz filter, they did not inactivate the tuberculin. On the other hand, fluid media on which the mould had grown for 8-15 days had no effect on tuberculin or tubercle bacilli. *Staphylococcus aureus* grew on media on which the mould had grown and from which it had been removed, so that it was concluded that the substance produced by the mould which inhibits tubercle bacilli is not similar to penicillin.

South American Water Mites

An extensive memoir on the water mites (*Hydrachina*) of South Brazil and Paraguay by O. Lundblad is brought to a conclusion by the appearance of the fifth part (*Kungl. Svenska Vetensk. Akad.*, 20; 1944). This consists of 182 pages with 58 text-figures and 10 plates and is of approximately the same size as the other parts which, however, contain more text-figures. The richness of this fauna can be judged from the fact that the present memoir treats of 340 species, sub-species and varieties, and its contribution to our knowledge from the fact that, included in this total, are 282 new species. In spite of this, however, the author considers that the list is by no means complete, for the country has not been so exhaustively covered as some parts of Europe. The summary and conclusions occupy nearly half the present part, with twelve comparative and distributional tables. These include one on all the members of the group that have so far been recorded from South America. The seasonal distribution of the various forms is given, as is also their distribution among three different habitats, standing water, streams and brooks and springs. For the purposes of comparison with other southern hemisphere forms the author takes into consideration the previous work of K. Viets on the *Hydracharina* from the Sunda expedition. There is no doubt that this will form the classical work on South American *Hydracharina* for many years to come.

Lizard Heart

A VERY full account of the lizard heart, as illustrated by that of *Varanus monitor*, the Indian monitor, is given by P. N. Mathur (*Proc. Indian Acad. Sci.*, 20; 1944). A number of new points have been noticed. A suspensory ligament and a sinu-atrial channel are described: both atria project for some distance into their respective ventricles and the author terms these the intraventricular portions: the apical region of the ventricle is divided internally into two cavities by a horizontal septum, and these are termed the *cavum apicis dorsale et ventrale*: the author suggests that the septum is not in its entirety the equivalent of the septum ventriculorum of higher forms as assumed by previous writers: it is further suggested that the names *cavum arteriosum* and *cavum venosum*, since they have a functional significance, should be replaced by *cavum dextrum* and *cavum sinistrum*. The bibliography, which is very full, is marred by certain slips that have not been corrected in the proof reading.

Strains of the European Corn Borer in the United States

UNDER the above title, K. D. Arbuthnot, of the U.S. Bureau of Entomology and Plant Quarantine, describes experiments conducted during 1937-40 on the possible occurrence of strains of this insect and their physiological relationships (*Tech. Bull. U.S. Dept. of Agric.*, No. 869; March 1944). It appears that material collected from New Haven, Conn., was found to be of a homozygous multiple-generation strain, and no evidence was obtained to indicate the occurrence of a single-generation strain in that locality. Material from Toledo, Ohio, was heterozygous, a complex of single- and multiple-generation strains occurring together. A homozygous single-generation strain was isolated from Toledo material but it was not found possible to obtain a homozygous multiple-generation strain. Larvæ of the single-generation Toledo strain grew more slowly than those of the multiple-generation strain from New Haven. Moths from the Toledo and New Haven field-stocks each showed a preference for mating among individuals from their own locality rather than crossing between the stocks. Mating of New Haven females with Toledo males was obtained in only a few cases, because of a racial inhibition to such mating. From these and other grounds, which are stated in detail, the author concludes that distinct biological strains of the insect in question have been demonstrated by his experiments.

External Factors and Growth of Wheat

AN attempt to assess the precise effects of differences in date and depth of sowing, conditions of spacing and kind of soil has been made by S. S. Labh Singh and Nek Alam (*Proc. Ind. Acad. Sci.*, B, 19, 29; 1944) in a study of one or two varieties of wheat grown in a series of randomized replicated blocks at two different localities. Irrespective of date, time or depth of planting, rate of germination was most rapid from midnight to 8 a.m. and slowest from noon to midnight. The optimum range for depth of sowing was large ($\frac{1}{2}$ - $3\frac{1}{2}$ in.), deeper sowing being best for earlier planting and light soils needing deeper sowing than heavy ones. Shallow sowing at early dates gave a high seedling mortality. Spacing had no effect on the mortality and was the only factor which did not affect the rate of production of the first four foliage leaves. The main stems grew fastest but reached the shortest final height in late (January)

sown material, and such plants had a lower number (7.8) of fertile spikelets than the October sown plants (20.8). Wider spacing always gave more fertile spikelets. Head development in December material appears to have been at a critical threshold since the ears were long and lax in the more widely spaced material while under closer spacing they were very dense. It is concluded that in order to avoid discarding types which would be valuable introductions when grown under their optimum conditions, new varieties should always be given a very thorough trial under a wide range of conditions.

Root Stock and Scion Relationship

THE problem of root stock and scion relationship in grafted trees is one of interest and economic importance. Optimum growth and development of the grafted tree result only when scion and stock are compatible. Incompatibility generally results either in a failure of the graft to take, or else in reduced growth followed by an early death. E. L. Proebsting and C. J. Hauser (*Proc. Amer. Soc. Hort. Sci.*, 42, 270; 1943) describe what may be a case of partial incompatibility between apricot scions and Myrobalan plum root stock. Apricots grafted on to this stock show a leaf scorch consisting of a cupping of the leaves, which are reduced in size and develop a marginal scorch. Excision of the dead tissue follows. The condition is neither cured nor prevented by injection of copper sulphate, boric acid, manganese sulphate, ammonium molybdate, zinc sulphate, thorium nitrate, potassium dichromate, barium chloride, sodium tungstate, cadmium sulphate or cobaltous acetate either alone or in various mixtures and is unlikely therefore to be a deficiency disease. On the other hand, scion rooting reduces the severity of the symptoms and diseased trees inarched with apricot seedlings show a recovery.

Kalsilite-bearing Lavas of South-west Uganda

At a meeting of the Royal Society of Edinburgh on December 4, A. D. Combe and Arthur Holmes presented a paper on "The Kalsilite-bearing Lavas of Kabiringe and Lyakauli, South-west Uganda". It has been known for half a century that Ruwenzori is flanked by a series of recently extinct volcanic areas, each of which consists of tuffs, explosion craters and rare lava flows. The first systematic survey of these volcanic fields was carried out by Mr. Combe during 1933-39, and representative collections, amounting to nearly 1,000 specimens, were sent to Prof. Holmes for petrological study. The rocks of this unique petrographic province are highly potassic ultrabasic types of which the chief members are the following:

Ugandite	=augite+leucite	} with abundant olivine, perovskite and iron ore ± biotite ± glass
Mafurite	=augite+kalsilite (KAlSi ₃ O ₈)	
Katungite	=mellilite+leucitic glass	
Kalsilite-katungite	=mellilite+kalsilite	

The lavas described in the present contribution lie near the eastern edge of the Western Rift Valley, south-east of Kazinga Channel. They are kalsilite-bearing throughout and consist of mafurite and various transitional varieties containing leucite and/or mellilite. The tuffs that preceded and followed the lavas are typical of those of the province as a whole and contain (a) fragments of quartzite, phyllite and granite derived from the underlying bedrocks; (b) fragments of cognate sub-volcanic biotite-pyroxenite and -peridotite; and (c) lapilli of katungite. The lavas contain xenoliths of (a) and (b) in all stages of transfusion by magmatic emana-

tions, the most significant change being the transformation of the minerals of granite into leucite and eventually into an assemblage of minerals equivalent to leucitite. This discovery throws much new light on the genetic relationships between the various volcanic rocks, all of which can be traced back to the magmas responsible for kalsilite-katungite and mafurite. Twelve new chemical analyses have been contributed by Dr. H. F. Harwood and others.

Dielectric Constant and Energy Loss in Solids and Liquids

IN a published paper (*J. Inst. Elec. Eng.*, 91, Part 1, No. 48; Dec. 1944), H. Fröhlich discusses the theory of the dielectric properties of a large group of solid and liquid organic substances built up of long-chain molecules, from the point of view of modern atomic and molecular structure. It is shown that in such substances dipoles have two equilibrium positions with opposite dipole direction. The static dielectric constant should increase with temperature below a critical temperature and decrease above it. The dielectric power loss for crystalline solids should be approximately described by the Debye equations, but for amorphous substances a flattening-out of the Debye loss curve is expected. For long-chain molecules the dependence of the time of relaxation on chain-length has been calculated, and the relevant equations are given in the paper.

Spectrophotometry of a Wolf-Rayet Binary Star

C. S. BEALS, Dominion Astrophysical Observatory, Victoria, B.C., has discussed the Wolf-Rayet Binary HD 193576, noticed first as a variable by Martin and Plummer in 1917 (*Mon. Not. Roy. Astro. Soc.*, 104, 4; 1944). Its range of variation at that time was believed to be small, and in 1939 O. C. Wilson announced that it was a spectroscopic binary. Beals undertook a series of spectrographic observations in the summer of 1942. The data consisted of 61 spectra, 39 of which cover the region λ 3900-5000, while 22 are in the region λ 5300-6700. Comparison of line and band intensities with those of typical stars of the same spectral classes led to apparent visual magnitudes of 8.30 for the O-type star and 10.5 for the W companion. The distance of the binary is estimated from the strengths of the interstellar lines, and the value adopted is 1,180 parsecs. On the assumption of an effective temperature of 80,000° for the W-star and 40,000° for the O-star, the radii are 1.3 and 4.2 respectively, the radius of the sun being the unit. A discrepancy between the diameter of the O-star as determined from the light curve and as determined from the absolute magnitude and temperature is explicable on the assumption that the W-star may have a very small radiating core and also an extensive envelope capable of absorbing light from the O-star. Beals's results differ considerably from those of Wilson, who suggested that the origin of the Wolf-Rayet emission bands takes place close to the photosphere, a view which was based on the absence of a transit-time effect. This assumed complete spherical symmetry in the expanding envelope. Beals's interpretation of the spectrum of the binary suggests that tidal effects prevent this condition from being realized even approximately in the envelope of the system. He pictures a shell of ionized helium surrounding the W-star only, the pair being surrounded by a larger shell of neutral helium; the ionized helium shell is distorted by the tidal action of the O-star, the mass of which is $2\frac{1}{2}$ times that of the W-star.