

RESEARCH ITEMS

Inheritance of Infantile Paralysis

J. Addair and L. H. Snyder (*J. Heredity*, 33, 307-309; 1942) have studied the genealogical histories of 29 individuals showing paralytic poliomyelitis. These 29 cases are definitely genetically interrelated. The authors consider that the facts suggest the existence of an autosomal recessive gene for susceptibility. In place of finding one quarter of the children affected, only one in 5.5 has shown the disease. Unaffected children have shown no sub-clinical signs which could be interpreted as milder expressions of the same disease. It would therefore seem that the expression of the gene for susceptibility does not always occur; the penetrance appears to be 70 per cent.

Alcohol and Tuberculosis

In a recent paper (*Quart. J. Stud. Alcohol*, 3, 176; 1942) Dr. Emil Bogen, director of research at the Olive View Sanatorium, California, maintains that the intake of alcoholic liquor is only indirectly affected by tuberculosis, while the pharmacological effects of alcohol are not diminished by the disease and the lethal action may be enhanced. Alcohol in sufficient concentration can kill the tubercle bacillus *in vitro*, but such concentration cannot be produced within the tissues. While the immoderate use of alcohol is associated with more advanced disease and a higher fatality-rate for tuberculosis, its moderate use may not greatly affect the incidence and course of the disease. The therapeutic administration of alcohol has no significant influence on tuberculous lesions. While admitting that the external use of alcohol may be of value in several phases of the fight against tuberculosis, Dr. Bogen concludes that the arguments for and against its internal use by a tuberculous patient are the same as those for and against its use among the general population, and the existence of the disease offers little additional support to either its supporters or opponents.

Wing Development in Aphids

A. F. SHULL (*J. Exp. Zoo.*, 89, 183-195; 1942) has shown that heat and light influence the production of winged or wingless individuals in the aphid *Macrosiphum solanifolii*. Continuous light applied to aphids, the previous offspring of which were all winged (produced in intermittent light), suppressed the wings in 50 per cent of the progeny in three days. High temperature (30°) caused the same effect in one day, while intermediate temperatures (29-26°) took a longer time to produce the same effect. It was found that if aphids have been treated for a long time with intermittent light, their reaction to continuous light was slower than those treated for a short time by intermittent light. Heat and light treatment together augment each other in effect. It is suggested that the product of some substance which inhibits wing development is influenced by both heat and light.

Effects of Leafhoppers on the Functions of Apple Foliage

In their paper entitled "The Effects of Leafhopper Feeding Injury on apparent Photosynthesis and Transpiration of Apple Leaves", G. E. Marshall, N. F. Childers and H. W. Brody point out that the object of their investigations is to study the effects

of various degrees of injury of this kind (*J. Agric. Res.*, 65, 265; 1942). They conclude that injury to apple leaves caused by several species of apple leafhoppers of the genus *Typhlocyba*, grape leafhoppers (*Erythroneura*) and the potato leafhopper (*Empoasca fabae*) was accompanied by a more or less marked reduction in apparent photosynthesis and transpiration, especially the former. A given number of the *Empoasca* had a more detrimental effect on leaf metabolism than an equal number of the other leafhoppers mentioned. Cross-sections of infested leaves showed that the mesophyll-feeding types of leafhopper (that is, *Erythroneura* and *Typhlocyba*) removed the contents of the cells of the palisade parenchyma, while the spongy mesophyll cells were not significantly affected unless the leaf had been severely injured. The authors conclude that the metabolism of apple leaves may be reduced early in the growing season when the leafhopper population is moderately low. When this occurs, the capacity of the injured leaves to function in a normal way is permanently affected. It appears, therefore, that early control of these insects is an important procedure.

Heat Treatment of Potato Witches' Broom

At the annual general meeting of the American Philosophical Society during November 20-21, L. O. Kunkel read a paper on "Potato Witches' Broom Transmission by Dodder and Cure by Heat". The virus disease known as witches' broom of potato was taken to the periwinkle, *Vinca rosea*, by means of the parasite, *Cuscuta campestris*. Diseased periwinkles became stunted, assumed an upright habit of growth, and produced large numbers of secondary shoots bearing small chlorotic leaves and virescent flowers. They did not recover from the disease, but were readily cured by suitable exposures to high temperatures. The new growth produced by cured periwinkles was normal in every respect. Diseased potato plants were not cured by similar applications of heat, because they were unable to endure the treatments required to inactivate the virus; but diseased tubers endured virus-inactivating temperatures and were easily cured. When planted, they produced satisfactory yields. Recently a number of different viruses have been inactivated *in vivo* by subjecting plants to moderately high temperatures. Witches' broom is the first potato virus disease for which heat is a satisfactory curative measure.

Physiology of the Grass Seedling

THE degree of the inhibition of the mesocotyl of *Avena sativa* by continuous exposure to light of low intensities in narrow bands in seven different parts of the spectrum is examined by R. L. Weintraub and E. D. McAlister (*Smithsonian Misc. Coll.*, 101, No. 17; 1942). The inhibitory effect is produced over a relatively great range, from 4,305 Å. to 7,700 Å., and in all the effective bands the inhibition is proportional to the logarithm of the light intensity. For each wave-length there appears to be a definite threshold value, suggesting that cell multiplication is inhibited at low intensities but that the inhibition of cell elongation is also involved at higher intensities. Whether expressed on an energy or a quantum basis, inhibition is greatest at about 6,600 Å., with the indication of a second peak at about 6,200 Å. The authors suggest that these maxima may be correlated with the absorption bands with maxima at about

625 m μ and 660 m μ observed in extracts of etiolated oat seedlings. The reaction to light of both mesocotyl and 'top' is actually and relatively greater in maize seedlings grown in a nutrient solution than in seedlings grown in distilled water (J. H. Kempton, *J. Washington Acad. Sci.*, 32, No. 11; 1942). The roots do not appear to be appreciably affected by the culture solution, or by the light exposure given to the tops. The quantity of dry matter translocated is greater in the seedlings in the nutrient solution and, in conformity with this, at the end of about five days there is less residual material in their grains. Exposure to 100 foot-candle-hours of Mazda light does not affect the total amount of dry matter translocated, but even this brief period of illumination increases the dry matter in the coleoptile and enclosed leaves and reduces that in the mesocotyl, suggesting that the light initiates or speeds up the development of the leaves. The loss in dry weight of the germinating seedling is about equal to the dry weight translocated.

Freezing-Points of Solutions of Typical Colloidal Electrolytes

CONDUCTIVITY alone is an untrustworthy guide in many cases as to whether or not a particular solution is that of a colloidal electrolyte. In all such cases it is essential to adduce other physical chemical evidence. As the most conclusive is the direct comparison of thermodynamic with electrical properties, S. A. Johnston and J. W. McBain have made careful freezing-point determinations for a number of colloidal electrolytes (*Proc. Roy. Soc., A*, 181, 119; 1942). It is shown that the behaviour of different groups in solution falls into several different types, although all have in common the replacement of ions by colloidal particles with increase in concentration. For example, in the family of bile salts, as in those of certain wetting agents, the conductivity almost approaches the behaviour of an ordinary electrolyte, whereas the lowering of freezing-point falls off strongly and rather abruptly. It is pointed out that the term 'critical concentration' of micelles, as often used, is either an over-simplification or a misconception. Micelles are actually formed over a fairly wide range of concentration, amounting to at least tenfold. It is found, in accordance with previous measurements of vapour pressure, that leading potassium oleate solutions with solubilized *iso*-octane scarcely affects the lowering of freezing-point, showing that it is not solubilized as independent molecules, but that it is taken up in or upon existing colloidal particles.

Nature of the Liquid State

In an article in *Current Science* (11, 303; 1942) Sir C. V. Raman summarizes some recent work on the scattering of radiation by liquids, from which it is concluded that the basic structure of a liquid is the same as that of the corresponding amorphous solid, though disturbed and enlarged by thermal agitation. The same conclusion is indicated by the study of the X-ray diffraction haloes in liquids and glass. It is the same orderliness of molecular spacing which explains the diminished light-scattering and is also responsible for the diminished intensity of diffraction, at small angles, as compared with the vapour, which is the most characteristic feature of the X-ray haloes of both liquids and amorphous solids. The article is illustrated by a number of typical light-scattering photographs.

Colour Temperature of Convective Stars

FROM the lists of stellar colour temperatures published by a number of observatories in the last ten years, it is known that the relative gradients or the absolute gradients scatter widely for most spectral types. The cause of this colour temperature spread has been investigated by W. S. Tai and A. D. Thackeray (*Mon. Not. Roy. Astro. Soc.*, 102, 6; 1942), and they suggest that convection, in a limited number of cases, may be the factor. Their investigation indicates that, on the assumption of convection currents existing to an appreciable extent in the photospheres of stars of type G and later, such currents may have an important influence on the distribution of energy in the continuous spectrum. The appreciable colour effects due to convection should, it is shown, be expected primarily in a slight reddening of stars of late type. It is admitted that certain results are obtained by assumptions which, while probably true in the solar atmosphere, may not hold for stars of other types, and hence numerical results may be more or less provisional. In addition, the comparison has been restricted to that of a convective and a radiative star identical in other respects—implying an idealized problem. The influence of convection upon colour temperature, although capable of affecting stars of late type in the way suggested, is too small to contribute appreciably to the spread in the case of early type stars.

Orbital Motion and Measurements for Parallax

J. JACKSON has published a paper with this title (*Mon. Not. Roy. Astro. Soc.*, 102, 6; 1942), which deals with the effect of orbital motion in invalidating parallax measurements. In the case of visual binaries, where the orbital motion is known, it is a simple matter to allow for this, but in other cases—by far the more numerous—the problem is not so simple. The analysis of the measures of parallax plates requires three unknowns in the equations of condition—proper motion, parallax and a constant; and observations made at five epochs for these three unknowns frequently show systematic residuals. Although these are not greater than might be expected from accidental error, it is just possible that the residuals arise from orbital motion. An examination of the problem leads to the interesting conclusion that in various cases the residuals can be fitted into a curve with periods of about two years, but these periods are entirely spurious. The investigations of other workers on parallax observations are considered, especially those of Holmberg and Miss Vinter Hansen, whose opinion that parallax determinations may be seriously affected by orbital motion is examined. Her list of 61 spectroscopic binaries in which $a \sin i$ exceeds 0.4 of an astronomical unit (*Pub. Astro. Soc. Pacific*, 54, 137; 1942) shows that a displacement comparable with at least half the parallax may be expected. Jackson points out that 38 of these stars have periods greater than two years and that in only five of these is the error likely to exceed 0.005", and in only two might it reach 0.01". His conclusion is that orbital motions with a period of about one year may make parallax determinations unreliable, but if the period exceeds one and a half years the parallax will not be seriously affected. He suggests that extended series of parallax observations should be made of the nearest stars and also of stars with large values of $a \sin i$ and reasonably large parallaxes.