assertion of his authority must depend upon the extent of his experience and his unquestionable integrity, of which he himself is the only competent judge. He must therefore aim at providing a high level of significance, even though he may upon occasion be justified in not requiring it for his own satisfaction.

It is not obvious why we should suppose that Galileo meant anything more profound than this. He merely expressed confidence in his own judgment, yet he made no assertion of authority but carried out the experiments which he would undoubtedly have demanded of others. It may be pointed out, in conclusion, that to accept one's own theories without adequate test and without a long record of sound judgment is to plead guilty of a very human weakness.

E. C. CHILDS.

School of Agriculture,
Cambridge.

[1] NATURE, **139**, 1008 (1937).
[2] NATURE, **139**, 997 (1937).
[3] NATURE, **140**, 646 (1937).
[4] Fahie, W. C., NATURE, **140**, 646 (1937).
[5] Fisher, R. A., "The Design of Experiments", p. 39 (Oliver and Boyd).

Relation between Body Size and Metabolism

SINCE 1935, work has been proceeding on the respiration of different genotypes of *Drosophila melanogaster* during the first hours of the puparial period. The work has now been completed, and a full account will shortly be ready for publication. For the moment, however, it may be said that differences in oxygen uptake per mgm. body weight originally found between the sexes and between the *wild-type* and its mutant *vestigial* were later shown to be due to slight differences in the sizes of these animals; when these were eliminated by alteration of the culture conditions the metabolic differences also disappeared. By actual measurement of the surface area of puparia it was further shown that the surface area per mgm. decreased, with increasing body size, at the same rate as did the oxygen consumption per mgm., and that the oxygen consumption was therefore related to the surface area.

Further work is in preparation which will indicate whether this relationship can be extended to other groups of animals, and will also help, it is hoped, to establish the causal nature of the connexion between body size and metabolism. Results already obtained clearly show the necessity, in metabolism experiments on cold-blooded animals, of paying much more attention to body size than hitherto; it is possible that the latter may prove to have considerable importance in problems of an ecological nature.

Using surface area as a standard, it is intended to investigate possible metabolic differences between the various species and races of *Drosophila*.

C. ELLENBY.

Department of Zoology and
Comparative Anatomy,
University College,
Gower Street, W.C.1.

Points from Foregoing Letters

IRREGULAR echoes of radio waves reflected from heights between 100 km. and 300 km. indicate, according to T. L. Eckersley, the presence of ionic clouds or irregularities in the ionosphere. Since the effect is noticeable both day and night, the sun cannot be responsible for this ionization, and it is suggested that the responsible agents might be small meteorites or high-speed particles from the stars.

A. Tiselius, K. O. Pedersen and Prof. T. Svedberg describe a new procedure for the quantitative study of ultracentrifugal sedimentation. With a specially modified cell, the centrifuged solution is separated into two portions, each of which can be readily pipetted out and analysed. From the change in the amount of the sedimenting component in one of the layers the sedimentation constant can be calculated. The method is of special importance in the study of substances like enzymes and antibodies, and may also be useful for measu ements on very slow sedimenting molecules.

Dr. D. I. Macht finds that tri-brom ethanol in ethyl alcohol solution is rapidly absorbed when applied to the skin of mice, and produces its characteristic anæsthetic effect. The presence of amylene hydrate in the solution helps to produce the narcosis more rapidly.

Prof. R. A. Waud reports that he has been able to carry on artificial respiration in the rabbit by rhythmic stimulation of the phrenic nerves.

The appearance of a transient greenish-yellow colour on reduction of vitamin B_1 has been observed by F. Lipmann, who assumes that it is due to the formation of a semiquinone-like product.

From considerations of atomic radii, Dr. J. S. Anderson arrives at a possible structure for 6-poly-acids (such as the 6-molybdo-periodates). To account for discrepancies between the evidence obtained from X-ray investigations and from physico-chemical evidence he suggests that the 6-poly-acids may be hydrolysed in solution.

The absorption of sound in purified carbon dioxide gas at various pressures up to 1 atmosphere, and at temperatures of 16·6° and −31° C., has been determined by Prof. A. van Itterbeek and P. Mariëns. The authors calculate the relaxation time for the vibrational energy (of importance in connexion with the collision mechanism between molecules) and compare the values obtained with those calculated from measurements of sound dispersion. Small amounts of impurities exert considerable influence.

C. R. Bailey reports that the infra-red absorption bands of carbon disulphide at 11·4 and 4·6 μ have three components. Although carbon disulphide is a non-polar substance, shifts in some of the absorption bands have been observed on passing from the gaseous to the liquid state.

Drs. L. H. Kleinholz and J. H. Welsh confirm the fact that extracts of eye-stalks from the Crustacean *Hyppolyte varians* when injected into living specimens (which show diurnal change of colour) produce darkening due to diffusion of blue pigment. They find, however, that specimens which had their eye-stalks removed and were kept in darkness, responded to light at all hours; hence they consider that light acts directly upon the colour-producing mechanism and not necessarily by a hormone.