sulphate. 1 mgm. of glucose tetrasulphate had no significant inhibitory effect.

Lysozyme activity on a bacterial substrate was measured turbidimetrically[5]; 0·03 mgm. macro-anion inhibited 0·06 mgm. lysozyme. Addition of 0·06 mgm. of protamine or 2 mgm. of sodium chloride reversed the inhibition. 0·2 mgm. of glucose tetra-sulphate had no effect.

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[1] Mora, P. T., *et al.*, *J. Amer. Chem. Soc.*, **80**, 685, 693 (1958); *J. Polymer Sci.*, **23**, 345 (1957).
[2] Cf. Morawetz, H., and Hughes, jun., W. L., *J. Phys. Chem.*, **56**, 64 (1952). Oncley, J. L., Walton, K. W., and Cornwell, D. G., *J. Amer. Chem. Soc.*, **79**, 4666 (1957).
[3] Cf. Spensley, P. C., and Rogers, H. J., *Nature*, **173**, 1190 (1954).
[4] Vandendriessche, L., *Arch. Biochem. Biophys.*, **65**, 347 (1956).
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Water Content and Insect Metabolism

It is well known that substantial changes in water content may occur in some insects. The hæmolymph, for example, which may be copious and watery in a recently fed individual, may become scanty and treacly in a starved and desiccated specimen[1]. Reversible desiccation may slow down metabolism; it may be important in promoting survival in species exposed to very low (sub-zero centigrade) temperatures, but it may have remarkably little effect on many vital processes.

The larva of the mealworm beetle (*Tenebrio molitor* L.) may have a low or a high water content. Larvæ from a culture in bran have approximately 42 per cent of dry matter and 58 per cent of water. If these insects are given an opportunity to drink, they take up a quantity of water equivalent to about half their body-weight. As there is no corresponding increase in dry matter, this results in their having now approximately only 25 per cent of dry matter and 75 per cent of water in their bodies. The water enters the gut, but soon is found in the hæmolymph, the volume of which increases greatly after drinking. Larvæ which have drunk are easily distinguished from those which have not; they are inflated, the cross-section of the body is more nearly circular, and the intersegmental membrane is extended and visible between the segmental sclerites. Both 'dry' and 'wet' larvæ can, under favourable conditions, complete their development and produce normal adults (which still show comparable differences in water content).

Mealworms lose water slowly in dry air. Those which have recently drunk, and have a high water content, lose that water as slowly as do more desiccated individuals. There are considerable variations between individuals, but when a batch of individuals with 42 per cent of dry matter was exposed to 30° C. and 0 per cent relative humidity for 25 days, it lost 20·25 per cent (S.D. ± 2·3) of its initial weight; the loss under the same conditions by a group which had all drunk water, and contained only 25 per cent dry matter, was very similar (20·6 per cent, S.D. ± 2·0). This loss of weight is almost entirely due to water evaporated from the insects. The water, newly taken in by drinking, was therefore conserved as carefully as the much smaller amount present in the less-hydrated individuals.

Mealworm larvæ from these two groups, with high- and low-water contents, behaved very similarly to high and low temperatures. When they had been kept at 18° C. for 24 hr. or longer, both lots had the same thermal death-point[2] for an exposure of 1 hr., namely, 42° C. When transferred to 35° C., both groups were equally rapidly acclimatized, and had a thermal death-point (again for an exposure of 1 hr.) of 44° C. Recovery from heat coma by larvæ given sublethal exposures to high temperatures was similar in individuals with high- and low-water contents.

The chill coma temperature, the speed of acclimatization to low temperatures, and the rate of recovery from chill coma were also similar in both groups of larvæ. Thus I took larvæ acclimatized to 18° C. and chilled them to 0° C., when they were completely immobilized; when returned to 18° C., those with 42 per cent of dry matter recovered in 35–55 min. (mean 43 min.), those with 25 per cent dry matter recovered in 30–50 min. (mean 40 min.). These differences are not statistically significant, and the behaviour of the two groups was generally indistinguishable.

The similarity in the behaviour of these two groups of the same species of insect with such different water contents does not make it any easier to explain the cause of heat death, of chill coma or of acclimatization to high and low temperatures; but it does perhaps restrict the number of tenable hypotheses to explain these phenomena.

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An Apparent Beneficial Effect of Gamma-Radiation on the Flour Mite

Insect pests of cereal products have been found to differ markedly in their tolerance to γ-radiation, but of 17 species examined by Cornwell *et al.*[1] 13 were sterilized at about 6 × 10³ rep. Recently, however, Cork[2] has suggested that the life-span of the flour beetle *Tribolium confusum* may be extended by a single dose of 3 × 10³ r. A comparable beneficial effect on the flour mite *Tyroglyphus farinae* (Deg.) was also suggested by the following work.

Replicate cultures of *T. farinae* in wheat flour were exposed to γ-radiation from a cobalt-60 source. These and untreated controls were incubated at 22·5° C. and 85 per cent relative humidity for 42 days. It was observed that living mites were present in all the cultures at the end of this period. At weekly intervals the hatched and unhatched eggs were counted by a technique described elsewhere[3]. An increase in density of hatched eggs represented an addition of new individuals to the population and measured the natality rate per unit time[4]. The total egg density indicated the ability of the population to survive.

From the results in Fig. 1 it appeared that a single irradiation at 5 × 10³ and also at 10⁴ rad resulted in a significant increase in the numbers of eggs laid and hatched when compared with the control. Oviposition continued throughout the period, whereas in the control both oviposition and hatching were