

Water Exchange between Insects and Air Moisture

It is well known that the weight of some fasting insects increases when they are exposed to an atmosphere saturated with water vapour. This phenomenon is generally considered to be due to the absorption of moisture from the air, and the insects concerned, such as *Leptinotarsa*¹, *Chortophaga*^{2,3}, *Cimex*⁴ and *Tenebrio* (larvæ)⁵ are often called 'hygroscopic'. The weight change is obviously influenced by a series of factors. In order to isolate the factor of 'hygroscopicity', we have kept the insects in air saturated with water vapour, the vapour being derived from water containing 8 per cent of heavy water; the vapour also contains 8 per cent of heavy water. The concentration of heavy water in the insects was determined after various exposures to this vapour by the method of Linderström-Lang⁶.

Several species of insect were used. Some lose weight while fasting in saturated air: for example, *Tenebrio molitor* (Col.), adult; *Graphosoma lineatum* (Hem. Pentatomidæ), adult. Others gain weight under similar conditions; for example, *Tenebrio molitor* (Col.), larva; *Leptinotarsa decemlineata* (Col.), adult.

We found that, to our surprise, the body water of all these insects, whether or not they are 'hygroscopic', comes into equilibrium with the atmospheric moisture, so that the insects also have 8 per cent of their water in the form of heavy water, in the course of a few days. This equilibrium is reached in thirteen days in the case of *Tenebrio* larvæ, nine days for the adults of the same species and for those of *Leptinotarsa*; five days for the adults of *Graphosoma*.

The only possible conclusion from these observations is that, under the conditions studied above, there is a continuous exchange between the atmospheric water vapour and the body-water of 'hygroscopic' and 'non-hygroscopic' insects. The body-water is, within a few days, completely replaced by water molecules from the atmosphere.

We are indebted to Prof. M. Florkin for suggesting the use of heavy water vapour.

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- ² Bodine, *J. Exp. Zool.*, 32, 137 (1921).
- ³ Ludwig, *Physiol. Zool.*, 10, 342 (1937).
- ⁴ Wigglesworth, *Proc. Ent. Soc. London*, ser. B, C, 25 (1931).
- ⁵ Buxton, *Proc. Roy. Soc. London*, ser. B, 106, 560 (1930).
- ⁶ Linderström-Lang, Jacobsen and Jacobsen, *C.R. Lab. Carlsberg*, 23, 17 (1938).