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ENTOMOLOGY

Apolysis in Arthropod Moulting Cycles

FOR many years comparisons of moulting cycles in the Arthropoda have suffered from lack of a generally accepted terminology. The most ambiguous word, especially for Insecta, has been "moult", which has been used to denote two completely different events in the cycle.

The colloquial meaning of "moult", like that of "la mue" and "der Häutungsakt", has always been the visible shedding of the old shell, or exoskeleton, at ecdysis. When Snodgrass¹ wrote, "Moulting, with arthropods, is the separation of the old cuticle from the new cuticle formed beneath it; *ecdysis* is the emergence of the insect from the moulted skin", he was attempting to wrest the term moult away from its colloquial sense to apply it to an earlier, preparative event in the cycle: an event that had already been sharply distinguished from ecdysis in Crustacea by Drach² and in Insecta by Hinton³.

Unfortunately, although the distinction between the two events was recognized to be of great physiological importance⁴, and the term ecdysis was generally accepted for shell-shedding, the earlier event never received a specific name⁵.

skin. We are indebted to Prof. D. E. Eichholz for suggesting the new term.

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¹ Snodgrass, R. E., Smithson. Misc. Coll., 107 (7), 1 (1947).

- ² Drach, P., Ann. Inst. Océanogr. Monaco (N.S.), 19, 103 (1939).
- ⁹ Hinton, H. E., Nature, 157, 552 (1946).
 ⁴ Passonneau, J. V., and Williams, C. M., J. Exp. Biol., 30, 545 (1953).
 ⁵ Jenkin, P. M., Gen. Comp. Endocrinol., 5, 688 (1965)

Light-on and Light-off Effects on the Circadian Flight Activity in the Mosquito Anopheles gambiae

A PRELIMINARY investigation of the flight activity of female Anopheles (Cellia) gambiae Giles (Lagos strain) fed on sugar has been undertaken using a modification of the recording technique described by Jones¹. Groups of five or ten recently emerged adults were placed in a 'Perspex' walled chamber (c. 1.5 l.). This was placed in a sound-proof box in a constant temperature room, maintained at 24°-26° C. The mosquitoes were supplied with a small quantity of 15 per cent glucose solution with a cotton wool "wick", which also served to maintain a relative



Fig. 1. (A-F) The successive changes in the form of the integument of an arthropod during and after the moulting cycle. endo, endocuticle; epi, epicuticle; exo, exocuticle; m, moulting membrane or ecdysial membrane

We now propose apolysis for the freeing of the epidermal cells from the old exoskeleton in any arthropod. It can be clearly seen in sections (Fig. 1), and is most like D_1 among the stages described by Drach² for Crustacea and "moult-ing" as defined by Snodgrass¹ for Insecta. Together with the secretion of at least some layers of the new cuticle and digestion of the old, apolysis is an essential preparation for the ecdysis which usually, though not necessarily, follows.

Apolysis is derived from the Greek 'aπόλυσις, meaning 'a freeing from" or, more particularly, "the loosing of a bandage"; it stands in contradistinction to ecdysis (Exduois), which means the actual "sloughing" of the

humidity in the chamber of 65-85 per cent. Artificial lighting (150-200 lux) was used during both the rearing and experimental periods, and the light régimes were con-trolled with a simple time switch. Flight activity was recorded acoustically for periods of up to 1 week, and a direct record of the activity was made with a pen marker on a kymograph with a continuous paper roll attachment. A similar recording "channel", without mosquitoes, was used to record any unwanted acoustic or electronic interference which was loud enough to operate the pen markers.

Groups of females subjected to alternating periods of 12 h light and 12 h dark had periods of intense activity