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Action of ecdysterone on the moulting of amphipod females: Gammarus pulex (L.) and G. fossarum Koch. Early results.

DUCRUET, J. (1975). Crustaceana, 28, 86-88.

Translated by J.E.M.Horne.

In studying sexual attraction in gammarids of the group pulex, it has seemed to me necessary to dissociate the processes of moulting and ovogenesis in order to recognize their respective effects on this phenomenon. For this purpose I have utilized a synthetic hormone, ecdysterone. In the first instance I have followed the action of the hormone on isolated females in vitellogenesis.

The action of ecdysones on amphipod females is well-known only for Orchestia gammarellus (Pallas) (see Blanchet & Charniaux Cotton, 1971; Blanchet, 1972). In this terrestrial crustacean, when ecdysterone is administered at the end of period B or in period C of the intermoult cycle the authors have established that although the phenomena of moulting are accelerated by the hormone, vitellogenesis on the other hand interferes in the control of moulting and causes lengthening of period D in such a way as to dispose of the normal time. On the other hand in certain isopods this antagonism does not exist; injections of ecdysone provoke a shortening of the intermoult of females in vitellogenesis (Reidenbach, 1971; Balesdent, 1971; Maissiat & Legrand, 1970; Mocquard et al., 1971.) In the cases of Idotea balthica (Pallas) (see Reidenbach, 1971) and Asellus aquaticus (L.) the hormone induces the beginning of vitellogenesis.

Method The ecdysterone is diluted in a saline alcoholised solution at the rate of 1µg/µl. The solution is injected with the aid of a glass micropipette, and the volume administered is about 1µl. The treated animals are females of which the fresh weight varied from 15 to 44 mg, which represents doses of 22 to 66 µg/g. The time which passes between the moment of exuviation and that of the injection of the hormone varies

from several hours to 11 days. The animals are kept isolated and from time to time I determine the intermoult stage (2 by examination of a pereiopod (it seems to me difficult to proceed to a daily removal of appendages without traumatising the animals). Two lots of gammarid controls are maintained in the same conditions of light and temperature as those treated (13 hour of day per 24 hrs and t = 14°C), one composed of unscathed animals, the other of animals which have received an injection of 1µl of saline solution.

Results Out of 40 animals treated, belonging to two species G. pulex and G. fossarum, 15 died on the days following the injection. When the injection of hormone is practised some hours after exuviation, its action is feeble, the intermoult has a duration very close to that of the controls : 22 days for treated animals, 19 to 29 days for the controls. By contrast, if the injection is practised on animals which have reached stage C, after a latent period of about 5 days, there is an acceleration of the process of moulting and ecdysis is situated 11 or 12 days after the preceding moult. The injection practised on females at the end of stage C provokes equally an acceleration of the process, and ecdysis is produced 7 to 9 days after the treatment. In these conditions the duration of the intermoult is between 15 and 19 days. Figure 1 allows one to follow the evolution of the intermoult in several cases.

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(2 The data which served for identification of the intermoult stages are : Charniaux-Legrand (1952), Drach & Tchernigovtseff (1967), Graf (1968) and Vidal (1947).

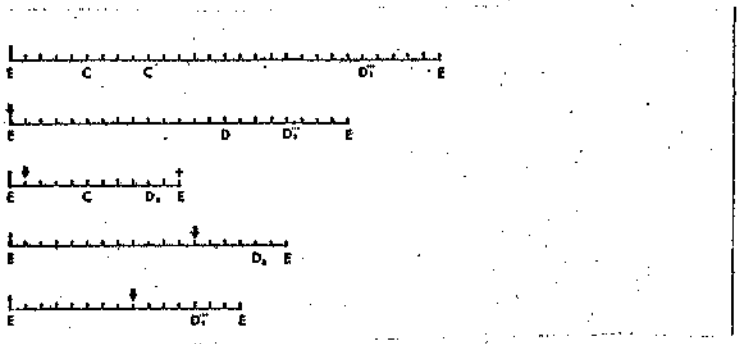


Fig. 1. Action of ecdysterone on the females of Gammarus pulex (L.). The arrows indicate the injections of hormone, the letter E marks the moment of ecdysis, ┼ symbolizes the death of animals.

When the duration of the intermoult is very reduced, the animals do not survive to ecdysis; this may not be completed; in the best of cases the animals succeed in freeing the head and abdominal region from the old cuticle, but die thus. Animals succeed in moulting when the injection is very late.

Conclusions The behaviour of Gammarus pulex and G. fossarum vis-a-vis the ecdysterone used is shown to be very close to that of isopods as that was observed in Orchestia gammarellus (Blanchet & Charniaux-Cotton, 1971; Blanchet, 1972) : although they were in vitellogenesis, the females saw their intermoult cycle shortened. There exists a latent period between the moment of injection and that of the reaction to the product, such a phenomenon observed in Niphargus (Graf, 1972b) has been interpreted as a consequence of retarded metabolism, which would not be the case for the gammarids studied; this reaction will be therefore more general in freshwater amphipods. The limited effect of the hormone injected just after the moult suggests that as in Ligia oceanica (L.) (see Maissiat & Legrand, 1970),

it is destroyed or rapidly eliminated. This reinforces the hypothesis of Graf (1972a) according to which the moulting hormone will be inhibited on the approach of the moult. In the present case, the inhibiting factor will persist after the moult.

If it is established that vitellogenesis is not opposed to the action of the hormone on the moult, it remains to study the action of this last on vitellogenesis; this will be the object of a later work as well as the study of the sexual behaviour of treated females.

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**Notice**

Please note that these translations were produced to assist the scientific staff of the FBA (Freshwater Biological Association) in their research. These translations were done by scientific staff with relevant language skills and not by professional translators.