FACTORS AFFECTING OVARIAN MATURATION IN TWO AEDES MOSQUITOES

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ABSTRACT

Ovarian maturation in the mosquito involves juvenile hormone (Lea, 1963, Gwadz and Spielman, 1973) and ecdysteroid (Hagedorn et al, 1975, Masler et al, 1980, 1981). The precise nature of this involvement remains an important and active area of study. Both juvenile hormone and ecdysteroid seem to owe their appearance to factors residing in the head (Larsen and Bodenstein, 1959, Gwadz and Spielman, 1973, Hagedorn et al, 1977, Masler et al, 1980). Our present work is directed at the isolation and characterization - chemical and physiological - of such head factors, neuropeptides, involved with regulating insect ovarian development and reproduction. As a primary effort, we are isolating the egg development neurosecretory hormone (EDNH, Lea, 1972) from the heads of non-blood fed Aedes aegypti. Head extracts which contain EDNH stimulated Aedes aegypti ovaries to produce ecdysteroid in vitro (Hagedorn et al, 1979) and restored ovarian maturation to decapitated Aedes atropalpus in vivo (Fuchs et al, 1980).

Using low and high pressure reverse phase liquid chromatography (HPLC) to fractionate head extracts and the in vitro assay to monitor fractions we obtained a highly purified component containing EDNH activity (Masler and Hagedorn, 1981). Aedes aegypti ovaries, incubated in the presence of increasing concentrations of head equivalents, produced ecdysteroid in a dose dependent manner (Hagedorn et al, 1979). At high concentrations (1 head equivalent/1µl) there was an apparent inhibition of steroidgenesis. Inhibition was more pronounced at higher concentrations obtained through the use of low pressure reverse phase chromatography. At 2 head equivalents/1µl there was a 30% inhibition and at 4 head equivalents/1µl a 100% inhibition of ecdysteroid production. No such inhibition was observed with the highly purified HPLC fraction. The HPLC fractions which tested positive for EDNH activity in the A. aegypti in vitro bioassay also were positive when the A. atropalpus in vivo bioassay was used. However, the in vitro assay was found to be 10 to 100 times more sensitive than the in vivo assay. This difference in sensitivity was not evident when crude extract was tested. We are now involved in determining (1) the nature of the inhibition at high concentrations of head extract and (2) the factors which contribute to differences in sensitivity between the two bioassays (i.e., degradation of injected EDNH; fractionation of synergists during chromatography).

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