Effects of Diflubenzuron on the Stabilisation of Protein Within the Cuticular Matrix of the Locust (Ensifera: Locustidae)

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In the cuticula of adult Locusta migratoria migratorioides (Reiche & Fairmaire 1895) there are strong correlations between the amounts of chitin and protein. Pharate cuticula holds more protein per unit weight of chitin than does cuticula of the mature adult. Reduction in the chitin content with Diflubenzuron results in a reduction of the amount of protein stabilised within the cuticula. In general the heavily sclerotised regions are less affected: arthrodial membrane will not grow in the absence of chitin. It seems, from measurements on ketocatechol content, that it is not the degree of sclerotisation which is important in stabilising the protein, but some inherent property of the protein, possibly its hydrophobicity. – These findings support the view that cuticula is formed upon a scaffold of chitin which is saturated with the matrix proteins.

Key words: diflubenzuron, cuticula, Locusta migratoria migratorioides, chitin.

1 Introduction

The interrelationships between chitin [Ch]1, protein [Pr]2 and sclerotising agents of insect cuticula [Cu]3 and their relative contributions to the stability of the resulting Cu have not been very much studied simply because these components are so closely interrelated. However, the insecticide Dimilin [diflubenzuron or DFB]4, by inhibiting to a high degree the deposition of Ch within the Cu, offers some promise of decoupling the various components and assessing their individual effects. It is already known that sclerotised Cu can grow in the presence of DFB whilst unsclerotised Cu cannot [Hunter & Vincent 1974, Grosscurt 1978a, b, Ker 1978] but more detailed information is not available. In this paper we compare Cu from several different parts of the locust, reporting on growth of the Cu and the stability (insolubility) of the Pr in the presence of DFB.

2 Materials and Methods

African migratory locusts, Locusta migratoria migratorioides (Reiche & Fairmaire 1895), were reared in a 12 h light: 12 h dark regime and fed daily on freshly picked grass and bran (ad lib). Cuticula termed “pharate” was taken from newly emerged adults which had just

1 chitin, in further text: Ch
2 protein, in further text: Pr
3 cuticula(e), in further text: Cu
4 diflubenzuron, in further text: DFB