Uttar Pradesh J. Zool. 7(1) : 14-19, 1987

ANATOMICAL DERANGEMENTS IN FEMALE ACCESSORY REPRODUCTIVE ORGANS INDUCED BY BENZYLOXY COMPOUNDS DURING DEVELOPMENTS AND METAMORPHOSIS OF *CORCYRA CEPHALONICA* (STAINTON) (LEPIDOPTERA : PYRALIDAE)

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Treatment of newly synthesized benzyloxy compounds AI3-63604 (2, 6-difluoro-*N* [[4-[(3-fluorophenyl) methoxy] phenyl] methyl] benzenamine), AI3-63629 (1-(4-chlorophenyl)-2-methyl-3-[4-(phenylmethoxy) phenyl]-2-propene-1-one) and AI3-63701 (1-[(4-methylphenyl) methoxy]-4-pentylbenzene) to 0-24 hr old last instar larvae, prepupae and pupae of the rice moth *Corcyra cephalonica* (Stainton) induced different types of structural deformities of female accessory reproductive organs in developmentally intermediate forms. The remarkable derangements were recorded in the bursa copulatrix and accessory glands. The effect was maximum in case of larval treatment.

INTRODUCTION

Benzyloxy compounds which are considered as potent insect juvenile hormone (JH) mimics (De Milo *et al.*, 1980) when applied to 0-24 hr old last instar larvae, prepupae and pupae of the rice moth *Corcyra cephalonica* (Stainton) (Lepidoptera : Pyralidae) inhibits development and metamorphosis and thereby produces different types of developmentally intermediate forms, *e. g.*, larvoid adults, extra pupal instars, defective pupae or non-emerged adultoids and adultoids (Roychoudhury & Chakravorty, 1985a). The present work is, therefore, an attempt to investigate the effects of three benzyloxy compounds AI3-63604, AI3-63629 and AI3-63701 on the female accessory reproductive organs during devel-

opment and metamorphosis of *C. cephalonica*, a major pest of stored commodities (Ayyar, 1919; Piltz, 1977).

MATERIAL AND METHODS

The rearing conditions of *C. cephalonica*, method of application of compounds (Table I) and doses were same as described earlier (Roychoudhury & Chakravorty, 1985a). For evaluation of the effects caused by the benzyloxy compounds, the female accessory reproductive organs from each experimental

Table I. Names of three benzyloxy compounds.

Code No.	Chemical name
AI3-63604	2, 6-difluoro-*N*-[[4-[(3-fluorophenyl) methoxy] phenyl] methyl] benzenamine
AI3-63629	1-(4-chlorophenyl)-2-methyl-3-[4-(phenylmethoxy) phenyl]-2-propene-1-one
AI3-63701	1-[(4-methylphenyl) methoxy]-4-pentylbenzene

category were dissected out in insect Ringer's solution and processed for microscopic examination and compared with those or normal moth.

OBSERVATIONS

Female accessory reproductive organs in normal moth

In *C. cephalonica*, the female accessory reproductive organs were spermatheca, bursa copulatrix and accessory glands (Fig. in Deb & Chakravorty, 1982).

Spermatheca was a short and uncoiled tubular structure, opened into the vagina through a small bulla. The spermathecal gland was an elongated and slightly coiled tube. At the junction of its glandular part and duct there was a

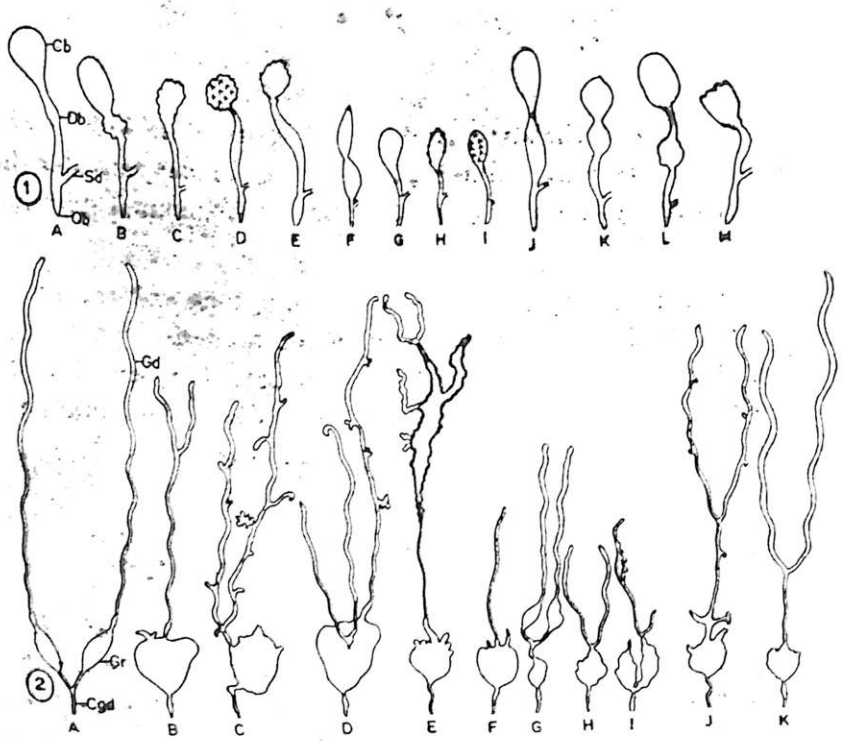

Fig. 1. Bursa copulatrix showing different types of structural abnormalities produced after the application of benzyloxy compounds on 0 24 hr old last instar larvae and pupae of *C. cephalonica*. A. Normal. B. In larvoid adult due to 50 μg of AI3-63604 on last instar larva. C. In larvoid adult due to 10 μg of AI3-63629 on last instar larva. D. In adultoid due to 100 μg of AI3-63629 on last instar larva. E. In larvoid adult due to 10 μg of AI3-63701 on last instar larva. F. In defective pupa due to μg of AI3-63604 on pupa. G. In defective pupa due to 100 μg of AI3-63604 on pupa. H. In defective pupa due 10 μg of 63701 on pupa. I. In defective pupa due to 100 μg of AI3-63701 on pupa. J. In adultoid due to 50 μg of AI3-63604 on pupa K. In adultoid due to 100 μg of AI3-63629 on pupa. L. In adultoid due to 50 μg of AI3-63701 on pupa. M. In adultoid due to 100 μg of AI3-63701 on Pupa. (Cb=Corpus bursae, Db=Ductus bursae, Sd=Seminal duct, Ob=Ostium bursae).

Fig. 2. Accessory glands showing different types of structural abnormalities produced after the application of benzloxy compounds an 0-24 hr old last instar larvae, prepupae and pupae of *C. cephalonica*. A. Normal. B. In larvoid adult due to 100 μg of AI3-63604 on last instar larva. C. In larvoid adult due to 50 μg of AI3-63629 on last instar larva. D. In larvoid adult due to 10 μg of AI3-63701 on last instar larva. E. In adultoid due to 10 μg of AI3-63629 on prepupa. F. In defective pupa due to 10 μg of AI3-63604 on pupa. G. In defective pupa due to 100 μg of AI3-63604 on pupa. H. In defective pupa due to 100 μg of AI3-63701 on pupa. I In defective pupa due to 100 μg of AI3-63701 on pupa. J. In adultoid due to 100 μg of AI3-63629 on pupa. K. In adultoid due to 50 μg of AI3-63701 on pupa. (Gd=Gland duct, Gr=Gland reservoir, Cgd=Common gland duct).

small spermathecal chamber.

The bursa copulatrix was a round sac-like structure with inner cuticular lining The ductus bursae was tubular, long and had inner cuticular lining. It opened externally through a pore situated on the 8th abdominal sternum.

The paired accessory glands were slender, long and transparent tubes. Through a comparatively narrow duct each gland opened into a reservoir. The reservoirs were elongated, wide and light brown sacs, filled up with secretion of the glands and had smooth outline. The two reservoirs united into an extremely slender and long common duct that opened into the vagina.

Effects of benzyloxy compounds

Due to the treatments of benzyloxy compounds AI3-63604, AI3-63629 and AI3-63701 on larvae, prepupae and pupae, the female accessory reproductive organs showed noteworthy structural abnormalities. The derangements were more or less similar for all the compounds.

The spermatheca became short and thin. Remarkable abnormalities were recorded in the bursa copulatrix and accessory glands. The bursa copulatrix became wrinkled, slender, short and delicate (Fig. 1), especially when applied to the larvae. The effect was minimum in case of pupal treatment. Abnormalities of accessory glands were the branched or numerically increased unequal-sized accessory gland with single, asymmetric or shrinked reservoirs devoid of content. Sometimes the accessory glands were flattened at the point of branching (Fig. 2).

DISCUSSION

The present findings demonstrate that the tested compounds have the capacity to interrupt normal development of female accessory reproductive organs of *C. cephalonica* and thereby induce remarkable structural derangements in spermatheca, bursa copulatrix and accessory glands. This is possible because these compounds are JH mimics (De Milo *et al*, 1980) and their functional principle has similarity with terpenoid or sesquiterpenoid JH analogues (Roychoudhury & Chakravorty, 1985a, b).

In a very general way the structural deformities observed in the present

investigation have some parallelism with the findings of Deb & Chakravorty (1982) in *C. cephalonica* recorded after precocene II treatment, applied independently or subsequently to hydroprene treatment. Similar findings have also been reported by Chakravorty & Roychoudhury (1986) after juvenoid treatment in pupae of *Scirpophaga incertulas*.

These structural derangements are in conformity to the general inhibition of metamorphosis caused possibly due to the changed internal milieu in the body of the insect. De Wilde & De Loof (1973) have suggested that the development and secretory activity of the female accessory glands are stimulated by the corpora allata. Szopa (1981) is also of the opinion that the development of female accessory reproductive organs in *Schistocerca gregaria* can be influenced by the application of juvenoid.

ACKNOWLEDGEMENTS

The authors are indebted to Dr. A. B. Borkovec, Agricultural Environmental Quality Institute, United States Department of Agriculture, Maryland, USA for generous gift of benzyloxy compounds. The partial financial assistance given by the University of Kalyani is gratefully acknowledged and to the Head, Department of Zoology, University of Kalyani for providing laboratory facilities.

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