phase of synthetic activity. The occurrence of an additional phase of synthetic activity leading to replenishment and storage of lipids and proteins may be considered a physiological adaptation for ensuring successful completion of development. While the 1st could be considered a preparatory phase, the second can be referred to as a "booster' phase.

It is also possible that this pattern of biochemical changes incorporates a seasonal effect as well. The developmental stages 4 and 5 appear during the monsoon months November, December and January. The period corresponding to these stages is marked by low synthetic abilities of the maternal animal. The onset of warmer climate in February, when the 6th stage appears probably, triggers off another phase of synthetic activity leading to replenishment of the reserves to be used during the gestation period as a supplement to the dietary sources.

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EFFECT OF TEPA ON THE FREE AMINO ACIDS OF OVARY IN *DYSDERCUS CINGULATUS* FABR.

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ABSTRACT

Free amino acid composition of ovary in *Dysdercus cingulatus* has been studied by two dimensional paper chromatography in normal condition and when treated with tepa (chemosterilant). In normal insect, fifteen identified and three unidentified ninhydrin positive spots (NPS) have been observed. The concentration of glutamic acid is maximum while alanine, tyrosine come next.

In insect treated with tepa, the colour intensities of alanine, aspartic acid, glutamic acid, isoleucine, leucine, methionine, phenylalanine, serine, tyrosine, and NPS[3] have been depleted while the opposite is true in the case of arginine, histidine, lysine, proline, NPS[1], NPS[3] and NPS[4]. It has been inferred that tepa, which affected the amino acid pool of the ovary in *D. cingulatus*, may affect normal oocyte development and other reproductive physiology of the insect.

INTRODUCTION

DYSDERCUS cingulatus is considered to be one of the important pests of cotton and is known to attack many other malvaceous food plants. Control of this pest with insecticides in the field has been reported but with limited success and has resulted insecticide resistance as well as contamination of the environment. The encouraging results of the use of chemosterilants in different groups of insects have created an interest in using such chemicals as a possible means of control. Sehgal *et al.*[10] obtained cent per

tent sterility in *Dysdercus koenigii* F. after 1·0% of tepa treatment. Economopoulos *et al.*[5] observed sterility in *Oncopeltus fasciatus* with tepa treatment. Sukumar *et al.*[13] reported the degeneration of oocyte and inhibition of ovarian growth in the adult female *D. cingulatus* with tepa injection.

Inhibition of the development of ovaries was also observed by Meltolin[6] and atrophy of follicular epithelium was seen by Morgan *et al.*[8] in *Musca domestica.* The reduction in size of ovaries and clumping of chromatin was observed in *Drosophila* (Cantwell *et al.*[3]). In some cases disintegration of ovaries was noted by the action of chemosterilant (Bulgynskaya *et al.*[2]). Economopoulos *et al.*[4] observed cessation of mitosis after 2nd and 3rd cleavage division of the egg. Borkovec[1] suggested that the decrease in the fecundity was perhaps due to the effect of chemo terlilant on hormonal and nutritional level. Rai[9] suggested that the production of sterility by chemosterilants might be due to induction of gross chromosomal aberrations in sperms and ova. Sakurai[11] has suggested that the sterility effect of chemosterilant is due to disturbances in vitellogenic process. The role of amino acids through amination or transamination in vitellogenesis and in the formation of yolk and oothecal cuticle is well established. Yet no significant contribution as to the effect of chemosterilants on the amino acids in ovary has been made. The present work has therefore, been undertaken to find out the effeet of tepa on free amino acid of ovary in *Dysdercus cingulatus* Fabr.

Materials and Methods

The stock culture of *Dysdercus* was maintained in the laboratory at 27 ± 2° C in 30 × 18 × 18 cm. glass jar covered with muslin cloth. The jar contained food, *i.e.*, dry cotton seeds and water (dampened cotton wool in distilled water). A stock solution of tepa, Tris (1-aziridinyl) phosphine oxide, was made in acetone. The adult female insects of the same age were topically treated with a dose of 1·0 µl per insect of 1·0% tepa solution on the pleural region of the last thoracic segment. After 12 hrs of treatment, the ovary of insects were dissected out. Homogenates of 100 mg of ovary in 5 ml of 80% ethanol were prepared from normal and those under treatment. Homogenates were centrifuged at 3000 r.p.m. for 10 minutes and then clear supernatant was decanted. The supernatant thus collected was evaporated to dryness on a water bath. Lipids were removed from the resulting residue by two successive extractions with ether (1 ml) and the residue was redissolved in isopropanol solution (1·5 ml, 10% v/v). The ethanolic extracts of ovaries of treated and normal insects were analysed separately by means of two dimensional paper chromatography using *n*-butanol : acetic acid : water (4 : 1 : 1) and phenol : water (4 : 1) as solvents and 0·2% ninhydrin in *n*-butanol as the locating agent. The concentration of spots of different types of amino acids on chromatograms were analysed by densitometer.

Results and Discussion

The ethanolic extracts of ovary in normal insect denotes the presence of eighteen ninhydrin positive spots out of which fifteen are known and three are unknown amino acids (Table I). The colour intensities of ten amino acids decrease and seven amino acids increase after tepa treatment in comparison to normal insect. However, two amino acids remain unaffected (Table I). From the table it appears that tepa some how affects the free amino acid pool in the ovary of *D. cingulatus.* The increased concentration of lysine and arginine in ovary after tepa treatment denotes that chemosterilant blocks the utilization of lysine and arginine in the formation of yolk and other protein in *D. cingulatus* which may cause degeneration of the oocyte and inhibition of ovarian growth as reported by Sukumar *et al.*[12].

Table I

Free amino acids of ovary in normal and treated D. cingulatus

Amino acid	Normal	Treated
Alanine	3+	+
Arginine	t	2+
Aspartic acid	2+	+
Cysteine	+	+
Glutamic acid	4+	3+
Glycine	2+	+
Histidine	+	2+
Isoleucine	2+	+
Leucine	2+	+
Lysine	+	2+
Methionine	+	t
Phenylalanine	2+	+
Proline	t	+
Serine	2+	+
Tyrosine	3+	2+
NPS[1]	+	2+
NPS[2]	2+	+
NPS[3]	+	2+
NPS[4]	—	+

* —, absence, t, trace, +, presence: weak, 2 + moderate, 3+ strong and 4+ max.m.m.

The depletion of ten amino acids in the present insect after tepa treatment denotes that this chemosterilant at least partially blocks the synthesis of these amino acids. The appearance of new NPS[4] after treatment shows that it is probably due to transamination of some of depleted identified amino acids. Mishra[7] suggested that the chemosterilant which affected the free amino acid pool of ovary might affect the normal oocyte development and other reproductive physiological process in insect. This may be the case with *D. cingulatus*.

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ALL INDIA SYMPOSIUM ON FRESH WATER BIOLOGY AT SALEM

The Symposium is organized by the Salem Institute of Experimental Biology, Salem, during January 17–18, 1981 at the Indian Medical Association Hall, Salem. The scope of the Symposium consists of (*a*) Chemistry and Biology of different types of organisms; (*b*) Its applied aspects such as Fisheries, Water supply, Waste water disposal, Pollution problems in tropical water situations. The last date for registration along with the abstract of the paper to be presented is 30th September 1980. For details please contact Dr. D. Sultan Sheriff, The Salem Institute of Experimental Biology, 49, Paul Pillai Street, Fort, Salem 636 001.