

lipolytic activity in the crystalline style of five species analyzed agreed with earlier studies³⁻⁶.

Payne⁶ also found that lipase of crystalline style was more active than that of digestive glands in a littoral bivalve *Scrobicularia plana* and conversely esterase activity was more pronounced in the digestive gland than in the style. Further, it has been reported that the most prominent carbohydrases detected in the style were amylase, glycogenase, cellulase and laminarinase⁹⁻¹¹ which degraded sugars of high molecular weight. Hence it is evident that crystalline style of bivalve mollusca, in general, is equipped with enzymes that hydrolyze high molecular weight substance (lipids with long chain fatty acids and polysaccharides) and initiates the extracellular digestion in the stomach while the final breakdown and absorption take place intracellularly in the digestive glands^{6,9,12}.

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AN OVIPOSITIONAL ATTRACTANT ISOLATED FROM NATURAL BREEDING WATER OF *MANSONIA UNIFORMIS*

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SEVERAL studies, in recent years, have demonstrated that a number of diverse natural aquatic factors (microorganisms, decomposing organic matter of several types and biophysical parameters) play a prominent role in attracting and stimulating gravid females of mosquitoes to oviposit at a particular site. A scan through the review of Maire¹ reveals that most of these studies have been carried out on different species of mosquitoes belonging to four genera only—*Aedes*, *Anopheles*, *Culex* and *Psorophora*. The most recent reports on oviposition site selection of gravid female mosquitoes are those of Ahmadi and McClelland², Laurence and Pickett³, Maire^{4,5} and Maire and Langis⁶.

Iyengar^{7,8}, Laurence⁹, and Laurence and Samarawickrema¹⁰ emphasized the importance of aquatic vegetation and topographical marker features as factors deciding oviposition site selection by *Mansonia* mosquitoes. Recently, Gass *et al*¹¹ pointed out the significance of homogeneous aquatic plant species coupled with egg cluster densities and visible water bodies in attracting *Mansonia* species towards oviposition site. Ikeshoji¹², however, based on his experiments with *Mansonia annulifera* on forced oviposition in tapwater, suggested the role of some chemical factors present in field water as oviposition stimulant for these mosquitoes.

The present paper reports the results of some laboratory investigations into the isolation of certain chemical attractant(s)/stimulant(s) of *Mansonia uniformis*.

The experimental mosquitoes, *Ma. uniformis*, were held in small cages as described by Sasikumar *et al*¹³. Water samples (100 ml) were offered in small aluminium bowls. As a substratum for ovipositing, 1 mm thick thermocol pieces (expanded polystyrene) of 10 mm² were made to float on water. The room temperature during the study ranged from 26–28°C. The experimental and control colonies were examined once every 24 hr for 3 consecutive days and the egg clusters, as and when laid, were counted and removed.

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Three sets of experiments were conducted during the present study. In experiment I, the water samples tested were, (1) water collected from an area of perennial breeding source for *Ma. uniformis*, (2) tapwater, and (3) distilled water (as control). In experiment II, 1 litre of water from the original source (*Mansonia* breeding site) was subjected to partial distillation to get equal volumes of (ca. 500 ml each) the distillate and the residual fraction. Thus 3 aluminium bowls were filled with 100 ml each of the distillate the residual fraction and distilled water (as control), were kept just before starting the experiment. In experiment III, 250 ml of water collected from the natural breeding source was thoroughly mixed with equal volumes of chloroform-methanol (analar grades). The chloroform-methanol mixture was separated using a separating funnel and evaporated around 66°C. The residue was redissolved in 5 ml of chloroform and the chloroform was then evaporated to dryness, in a small petri dish, at room temperature. Two experimental bowls and a control were kept in the cage. The residue was tested for attraction. The first bowl was provided with thermocol pieces smeared with the residue and allowed to float over distilled water with the residue coated surface facing up. In the second bowl, the residue was added to distilled water. In this case, the thermocol pieces were not

treated as before. The control consisted of distilled water and thermocol pieces without the residue.

The data presented in table I show that the gravid female *Ma. uniformis* when offered a choice of oviposition sites showed a pronounced response towards water containing oviposition factor(s) and almost avoided the control containers. Moreover, a comparison of tests under experiment III revealed that the gravid females were more attracted towards the residue smeared thermocol pieces than to the residue added in water. We can offer no explanation at the moment, as to why some of these mosquitoes oviposited in control containers (vide experiment III). During the investigation, it was found that the residue fractionated from 1 litre of water (as against 250 ml of water), when coated over the thermocol pieces caused egg-laying arrestation. Perhaps, there is an optimum concentration of the factor(s) which can stimulate the mosquitoes to oviposit, above which it acts as an arrestant.

In experiment II, the mosquitoes preferred distillate to the residual fraction. This is probably because the ovipositional factor(s) present in the water sample collected from the breeding source of *Mansonia* mosquitoes, on distillation, being of lower boiling point than water, moved to the distillate rather than to remain in the residue.

Table I Oviposition response of blood-fed *Ma. uniformis* to several types of water samples

Experiment	Water samples tested	Total number of blood-fed mosquitoes released*	Number of egg clusters oviposited					Total	Mean-number of egg clusters oviposited
			I	II	III	IV	V		
I	Water from the natural breeding source of <i>Mansonia</i>	250	7	4	5	4	3	23	4.6 ± 0.7
	Tapwater		—	—	1	—	1	2	0.4 ± 0.3
	Distilled water		—	—	—	—	—	—	—
II	Distillate	350	7	4	6	4	3	24	4.8 ± 0.7
	Residual fraction		1	2	—	—	—	3	0.6 ± 0.4
	Distilled water		—	—	—	—	—	—	—
III	Residue coated thermocol	425	8	6	6	7	4	31	6.2 ± 0.7
	Residue added in distilled water		3	2	2	1	1	9	1.8 ± 0.4
	Distilled water		1	—	1	2	—	4	0.8 ± 0.4

* Repeated 5 times.

These experiments establish that the ovipositional factor(s) isolated (by fractionation tests) in the present investigation is heat-stable and soluble in organic solvents, indicating lipid nature. Chemical characterization of the isolated attractant(s) is pursued.

From experiments with *Ma. annulifera* on forced oviposition in tapwater, Ikeshoji¹² suggested the probable role of some chemical factors in field water which can stimulate/attract mosquitoes for oviposition as demonstrated in *Culex pipiens fatigans*¹⁶. Our report also shows that some chemical factor(s) in the natural breeding source attract *Ma. uniformis* to their oviposition site. This study also shows that selection of oviposition site by *Mansonia* mosquitoes is not a function of the type of aquatic vegetation, egg cluster densities or topographical markers alone, as described by some authors⁷⁻¹¹; but organic matter (putrefying) has also an important role to play. The possibility of microbial activity in the production of an attractant/stimulant for *Ma. uniformis*, as shown by some authors¹⁴⁻¹⁷ in *Culex* and *Aedes* species, is now being studied.

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EFFECT OF AMINOGLUTETHIMIDE PHOSPHATE ON ADRENAL GLANDS OF THE MUSK SHREW, *SUNCUS MURINUS* L

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THE musk shrew belongs to the order Insectivora and is considered to be a primitive eutherian mammal¹. Recently, much attention has been paid to understand its biology. Most of the above studies are confined to its husbandry and reproduction²⁻¹⁰. It has been reported that the species is resistant to many antispermatogenic drugs which are effective on the rodents^{11,12}. Besides this, the corticosterone and cortisol levels and the corticosterone/cortisol ratio of the plasma of *Suncus* are nearer to the human value than to that of rats or mice¹³. Thus the species exhibits many characters which deviate from the normal laboratory rodent. Though the seasonal and age-related variations in the weight¹⁴, and histology and histochemistry¹⁵ of the adrenal gland have been studied, the information on biochemical aspects of the gland is inadequate. In this investigation, we have compared some basic biochemical constituents of the adrenal glands of both the sexes of the musk shrew. Aminoglutethimide phosphate is a drug which inhibits steroidogenesis of the adrenal glands of the rodents by blocking the conversion of cholesterol into pregnenolone^{16,17}. The ability of this drug in inhibiting steroidogenesis of the adrenal glands of the shrew is also evaluated.

Adult and sexually mature male and female shrews were trapped and kept in wooden cages individually for one month prior to experimentation. They were fed with minced goat meat twice and milk and rice once daily. Tapwater was supplied *ad libitum*. Three males and three females were injected subcutaneously with 0.05 ml solution of aminoglutethimide phosphate (8 mg/100 g body wt/