lipolytic activity in the crystalline style of five species analyzed agreed with earlier studies.\textsuperscript{3-6}

Payne\textsuperscript{6} 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 carbohydrates detected in the style were amylase, glycogenase, cellulase and laminarinase\textsuperscript{5-11} 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.\textsuperscript{6,9,12}

The author is thankful to Dr A. L. Paulpandian for guidance and UGC, New Delhi for a fellowship.

10 October 1986


AN OVIPOSITIONAL ATTRACTANT ISOLATED FROM NATURAL BREEDING WATER OF MANSONIA UNIFORMIS

B. AYYACHAMY DANIEL, CHERIYAN THOMAS and R. S. PRASAD

Department of Zoology, University of Kerala, Kariavattom, Trivandrum 695 581, India.

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 Maire\textsuperscript{1} 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 Ahmad and McClelland\textsuperscript{2}, Laurence and Picket\textsuperscript{3}, Maire\textsuperscript{4,5} and Maire and Langis\textsuperscript{6}.

Iyengar\textsuperscript{7,8}, Laurence\textsuperscript{9}, and Laurence and Samarawickrema\textsuperscript{10} emphasized the importance of aquatic vegetation and topographical marker features as factors deciding oviposition site selection by Mansonia mosquitoes. Recently, Gass et al\textsuperscript{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. Ikeshoji\textsuperscript{12}, 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\textsuperscript{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 mm\textsuperscript{2} 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.
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 aluminum 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 (analytical 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 thermocel 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 thermocel pieces were not treated as before. The control consisted of distilled water and thermocel pieces without the residue.

The data presented in table 1 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 thermocel 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 thermocel 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>
<thead>
<tr>
<th>Experiment</th>
<th>Water samples tested</th>
<th>Total number of blood-fed mosquitoes released</th>
<th>Number of egg clusters oviposited</th>
<th>Mean-number of egg clusters oviposited</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Water from the natural breeding source of <em>Mansonia</em></td>
<td>250</td>
<td>Experiment number</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>Tapwater</td>
<td>—</td>
<td>I</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Distilled water</td>
<td>—</td>
<td>II</td>
<td>—</td>
</tr>
<tr>
<td>II</td>
<td>Distillate</td>
<td>7</td>
<td>III</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Residual fraction</td>
<td>7</td>
<td>IV</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Distilled water</td>
<td>—</td>
<td>V</td>
<td>—</td>
</tr>
<tr>
<td>III</td>
<td>Residue coated thermocel</td>
<td>8</td>
<td>Experiment number</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>Residue added in distilled water</td>
<td>6</td>
<td>II</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Distilled water</td>
<td>425</td>
<td>III</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Distilled water</td>
<td>1</td>
<td>IV</td>
<td>1</td>
</tr>
</tbody>
</table>

* 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, Ikeshoji\textsuperscript{12} suggested the probable role of some chemical factors in field water which can stimulate/attract mosquitoes for oviposition as demonstrated in Culex pipiens fani\textsuperscript{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 authors\textsuperscript{2-11}; 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 authors\textsuperscript{14-17} in Culex and Aedes species, is now being studied.

The authors thank ICMR, New Delhi for financial support.

20 December 1986; Revised 5 January 1987


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

N. MOHANTY and G. B. N. CHAINY
Department of Zoology, Utkal University,
Bhubaneswar 751 004, India.

The musk shrew belongs to the order Insectivora and is considered to be a primitive eutherian mammal.\textsuperscript{1} Recently, much attention has been paid to understand its biology. Most of the above studies are confined to its husbandry and reproduction\textsuperscript{2-10}. It has been reported that the species is resistant to many antispermatogenic drugs which are effective on the rodents\textsuperscript{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 mice\textsuperscript{13}. Thus the species exhibits many characters which deviate from the normal laboratory rodent. Though the seasonal and age-related variations in the weight\textsuperscript{14}, and histology and histochemistry\textsuperscript{15} 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\textsuperscript{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)