



Figure 2. Male and female pupae of *O. arenosella*-ventral view of VII-X abdominal segments; GO, genital opening; AO, anal opening.

females ( $10.15 \pm 0.91$  mm) and this criterion gives a fair degree of accuracy in sexing laboratory reared insects. However, in a heterogeneous population of pupae collected from the field, especially when those from different localities are pooled together, this criterion is not useful in correctly distinguishing pupal sex.

The genital opening was found to be a reliable criterion (figure 2). In pupae of both sexes, the genital opening is mid-ventral in position. In the female, it occupies a position just behind the anterior margin of the VIII sternite. The posterior margin of the IX sternite is pushed anteriorly and ends in the VIII sternite close behind the genital opening. In the male, the genital opening occurs just behind the anterior margin of the IX sternite and there are weak pads, one on either side. The IX sternite is not pushed forward.

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## OCCURRENCE OF *Aedes* (*Stegomyia*) *Krombeini* HUANG (DIPTERA : CULICIDAE) IN INDIA

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This communication seeks to place on record the occurrence of *Aedes* (*Stegomyia*) *krombeini* Huang, 1975, in the hill ranges of Tamil Nadu. This species, previously known only from Sri Lanka<sup>1</sup>, belongs to the *Aedes scutellaris* group of the subgenus *Stegomyia*. This group was recently revised by Huang<sup>2</sup> who divided it into two subgroups, viz. (1) *albopictus* (2) *scutellaris*. The first has a wide distribution, the nominate species *Ae* (*Stg*) *albopictus* being one of the common species of the Indian subcontinent. The second subgroup is of considerable medical importance, since it contains species such as *Ae* (*Stg*) *polynesiensis* and *Ae* (*Stg*) *pseudoscutellaris* which are major vectors of sub-periodic filariasis in the Pacific region<sup>3,4</sup>. *Ae* (*Stg*) *scutellaris* from New Guinea has been incriminated as a vector of dengue virus<sup>5</sup>. Barraud<sup>6</sup> reported *Ae* (*Stg*) *scutellaris* s.l. from the Andaman Islands but not from elsewhere in the Indian area. Kalra<sup>7</sup> suggested that this species might play a role in the natural transmission of non-periodic *Wuchereria bancrofti* in the Nicobar Islands, but could not prove this due to the declining population during his visit. Barraud<sup>6</sup> noted some variations in adult characters between the type form of *Ae* (*Stg*) *scutellaris* and the Andamans specimens, but the true identity of the latter is yet to be established in the light of Huang's revision of the group<sup>2</sup>. The discovery of a member of this important subgroup on the mainland of India is notable, and deserves to be brought to the attention of medical entomologists elsewhere in the country.

We have collected 168 ♂♂ and 130 ♀♀ of *Ae* (*Stg*) *krombeini* from Kunjapanai (Nilgiri hills), Nilgiri District; 78 ♂♂ and 95 ♀♀ from Kannikatti (Agastya hills), Tirunelveli District, 1 ♂ and 1 ♀ from Kolli hills, Salem District; 34 ♂♂ and 48 ♀♀ from Alagar hills, Madurai District. All were reared from immature collections in tree holes, fallen log holes and dried mud samples from tree holes at altitudes ranging from 300 to 1150 m.s.l. This appears to be a common species, as is the case in Sri Lanka, and has probably escaped detection for so long because of its superficial resemblance to *Ae* (*Stg*) *albopictus*. It can easily be distinguished from the latter by having a complete, well-developed, sup-

raalar white line of broad flat scales over the wing root which is continued almost up to the scutellum. The abdominal lateral white markings are connected with the tergal bands, which is not so in *albopictus*. However the diagnostic feature of *Ae (Stg) krombeini* is the form of the claspette in the male terminalia, which when dissected has the distal part expanded and square in shape in lateral aspect<sup>1</sup>. Our material has kindly been compared with the type in US National Museum by Dr. Yiau-Min Huang, who has confirmed the determination.

*Ae (Stg) krombeini* was invariably found breeding in association with *Ae (Stg) albopictus*, and sometimes also with *Ae (Stg) subalbopictus*, *Ae (Fin) aureostriatus* var. *kanaranus*, *An (Cel) culicifacies*, *Cx (Lop) uniformis*, *Cx (Cul) pallidothorax*, *Or anopheloides*, and *Tx (Tox) splendens*. It is easily colonised in the laboratory, where it has accepted human and chicken blood. Huang<sup>1</sup> recorded this species feeding on humans in nature. Its distribution in India and the disease potential of this species needs further study.

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#### ON THE TRANSFER CELL-LIKE NUTRITIVE CELLS OF THE GALLS INDUCED BY THRIPS (THYSANOPTERA: INSECTA)

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DURING development, the host tissues of the galls of thrips undergo profound physical stress as a result of feeding injury<sup>1</sup> and physiological stress as a consequence of the discharge of salivary chemicals<sup>2</sup>. Either to overcome this stress or to achieve the

'gall-form', plant tissues show different kinds of morphogenetic adjustments. Among the various developmental events, the behaviour of the nutritive cell walls appears interesting. We have earlier reported abnormally large, callosic wall thickenings in the galls of *Pavetta hispidula* Hiern. induced by *Teuchothrips longus* (Schmutz)<sup>3</sup>. While these thickenings are massive and localized to specific areas of the host cells, observations on the morphology of the walls of the nutritive cells of the epiphyllous galls of *Memecylon edule* Roxb. and *M. lushingtonii* Gamble induced by *Crotonothrips dantahasta* (Ramk.) and *C. memecylonicus* Anan. respectively suggest that these cells appear very similar to the 'transfer cells', also known from the cecidial systems of ectoparasitic<sup>4,5</sup> and endoparasitic<sup>6</sup> nematodes.

The nutritive cells of *Memecylon* galls (upper epidermal and a few layers of subjacent mesophyll cells) show numerous warty, peg-like ingrowths along the inner sides of the walls, extending into the cytoplasm (figure 1). Each ingrowth appears to be a stubby protuberance (5–20  $\mu$ m across). With the ageing of cells these wall ingrowths grow larger in width, though not appreciably in height and finally coalesce among themselves. The intensity of their development and distribution more or less remains uniform in the gall-mesophyll cells (figure 2) till reaching the vascular trace that includes hyperplasiated elements. Interestingly, these wall ingrowths are almost absent in the mesophyll cells that occur beneath the vascular strand (as in transverse sections).

In a system such as a gall, the insect imposes upon the host tissue a demand for a continuous supply of nutrients and the polarized distributional pattern of these specialized cells along the upper sides of the gall-leaf establishes a functional connection with the vascular strand, indicating clearly that the thrips are able to elicit a specific subcellular response in the host cell machinery increasing the surface area of the wall and eventually that of the plasmalemma. The restriction of warty ingrowths to the nutritive area of the gall indicates their potential role in the possible apoplastic movement of the solutes from the vascular region to the nutritive area; further, the nature of development involving the loss of shape and fusion among themselves with ageing appears very similar to the nature of functioning<sup>7</sup> of the syncytial transfer cells.

Since the transfer cells are known to possess wall ingrowths that are slender, cylindrical, and invariably branched<sup>8</sup>, it appears problematic to consider the nutritive cells of *Memecylon* as transfer cells. The