Table 1. The fate of eggs of *Pareuchaetes pseudoinsulata* released at four sites during February 1988.

<table>
<thead>
<tr>
<th></th>
<th>Virginia Bush (89)</th>
<th>Umkumaban (88)</th>
<th>Paradise Valley (46)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eaten by ants</td>
<td>65.5 (%)</td>
<td>65.0 (%)</td>
<td>52.0 (%)</td>
</tr>
<tr>
<td>Eaten by Chrysopidae</td>
<td>11.0 (%)</td>
<td>6.5 (%)</td>
<td>5.0 (%)</td>
</tr>
<tr>
<td>Missing</td>
<td>2.0 (%)</td>
<td>6.5 (%)</td>
<td>8.0 (%)</td>
</tr>
<tr>
<td>Inviable(^b)</td>
<td>2.5 (%)</td>
<td>12.0 (%)</td>
<td>1.0 (%)</td>
</tr>
<tr>
<td>Hatched</td>
<td>19.0 (%)</td>
<td>10.0 (%)</td>
<td>34.0 (%)</td>
</tr>
</tbody>
</table>

\(^a\) number of egg packets indicated in brackets.
\(^b\) larvae did not develop.

The results of this study strongly suggest that egg and larval predation by ants was largely responsible for the failure of *P. pseudoinsulata* to establish. Goeden & Louda (1976) listed numerous cases where native predators and parasitoids have interfered with insects released for weed biocontrol. The case of *P. pseudoinsulata* supports their contention that predators are mainly responsible for preventing agents from establishing.

REFERENCES


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The eggs of two anopheline mosquitoes (Diptera: Culicidae) endemic to Madagascar

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The taxonomy of the mosquitoes of Madagascar is, for the most part, well documented in a monograph by Griebine (1966). In it he lists 13 species of *Anopheles* Meigen subgenus *Cellia* Theobald as being endemic to Madagascar, 10 of them described by himself. Four of these were described
from only one stage of the life cycle, i.e. three from larvae and one from a single female. The remaining six species are known from both adult and immature stages. However, descriptions of the eggs were not provided for any of these species. Egg morphology has, in the past, played an important role in elucidating species complexes within the genus *Anopheles*. One well-known example is the European *An. maculipennis* Meigen complex in which two of the species show distinct differences only in egg morphology (Falleroni 1926).

A consignment of mosquitoes was received recently from the forest station of Ampijoroa (16.15°S, 46.50°E) in the Ankafantsika range of mountains, 300 km north-northwest of Antananarivo, Madagascar. Among the anopheline species was one specimen of *An. mascarensis* De Meillon and four *An. pauliani* Grjebine. Egg batches were obtained from these wild females and descriptions of the eggs are given here. Link-reared progeny, i.e. adults correlated with larval and pupal pelts, of both species are deposited in the collections of the South African Institute for Medical Research.

*Anopheles mascarensis* De Meillon, 1947, Fig. 1a.

Description of egg. Length 0.425 mm, width 0.125 mm. The floats are widely separated, occupying 58.8% of the length of egg; frill well developed, encircling two distinct polar areas; bosses on the dorsal and ventral surfaces small and finely dispersed.

These eggs bear a marked resemblance to those of *An. letabensis* Lambert & Coetzee (1982), a member of the *An. marshallii* Theobald group of species. However, the frill in *An. mascarensis* is more prominent than in *An. letabensis*. As noted by De Meillon (1947), the adults are similar to and were initially mistaken for *An. marshallii*. Larval and pupal descriptions (Grjebine 1966) and personal observation show *An. mascarensis* to be indistinguishable from *An. letabensis*. The only distinguishing feature, and the one responsible for *An. mascarensis* being placed in the Series Neomyzomyia (as opposed to Series Myzomyia which contains the *An. marshallii* group) is the ornamentation of the pharyngeal armature (De Meillon 1947). Comparison of the giant polytene chromosomes found in the female ovarian nurse cells would provide an insight into the relationship between *An. mascarensis* and species of the Myzomyia and Neomyzomyia series.

*Anopheles pauliani* Grjebine, 1966, Fig. 1b.

Description of egg. Length 0.475 mm, width 0.100 mm. Floats well separated, occupying 68.5% of the length of the egg; frill rudimentary; dorsal deck opening continuous, broadening at the poles; tubercles at each pole distinguishable under x40 magnification. There are no polygonal markings on the ventral surface of the exochorion.

These eggs are similar to some mainland African species of Neomyzyomia (*An. caroni* Adams, *An. smithii* Theobald and *An. wilsoni* Evans) that have a deck opening continuous between the poles but not touching the floats (Gillies & De Meillon 1968). However, the deck of *An. pauliani* being narrow in the middle and widening at the poles is more typical of the *An. coustani* Laveran group (Gillies & De Meillon 1968), species that are classified in a different subgenus (*Anopheles*). There is no doubt, however, that *An. pauliani* belongs in the subgenus *Cellia*.

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REFERENCES


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Rearing the false wireworm, *Somaticus terricola* (Fâhraeus) (Coleoptera: Tenebrionidae) on an artificial diet

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Drinkwater & Giliomee (1991) described a rearing technique for *Somaticus* species whereby the larvae are reared in test tubes on sections of maize stem covered with clean sand. The rearing of larvae by this method is, however, too labour-intensive to facilitate rearing of large numbers over an extended period for use in insecticide bioassays, where at least 30 larvae per treatment are required. This technique may also have certain deleterious effects on the larvae, such as dehydration due to desiccation of the sand. Trials were consequently conducted with *S. terricola* (Fâhraeus) to compare survival and mean mass of the larvae reared by the conventional method (Drinkwater & Giliomee 1991) with those reared on two artificial diets, and to determine the optimum population density of larvae per container.

The first artificial diet (‘white diet’) was used by Drinkwater (in press) for rearing false wireworm larvae (*Somaticus* species). The second (‘green diet’) was developed by Taneja & Leuschner (1985) for mass-rearing of the sorghum stem borer, *Chilo partellus* (Swinhoe) (Lepidoptera: Pyralidae).

The containers used for rearing were multicellular plastic trays designed for rearing *Eldana saccharina* Walker (Lepidoptera: Pyralidae) (Graham & Conlong 1988). Approximately 4 ml of medium was poured into each cell which had a volume of approximately 12 ml. The larvae were obtained from eggs laid by field-collected adults. Since first instar larvae of *Somaticus* do not feed (Drinkwater & Giliomee 1991), second instar larvae were placed in the trays. The larvae and the medium in each cell were covered with a 2.5-3.0 mm layer of sterilized washed sand which improved survival (Drinkwater, unpubl.). The sand was prepared as described by Drinkwater & Giliomee (1991) and was sterilized by heating to 105 °C. The trays were covered with plastic film and placed in an incubator at 25 °C in the dark.

In the first trial, 64 larvae were reared singly in test tubes using the conventional method and 468 and 384 larvae were placed singly in cells filled with the green and white diets respectively. Since most of the cells of green diet had dried out 20 days after inoculation with larvae, the medium in all the cells was replaced after 21 days. To obtain a comparable treatment with the white diet, two trays (64 cells) of white diet were also replaced at the same time. The rest of the white diet was replaced for the first time after 30 days. The larvae reared according to the conventional method received fresh food every third day. The number of surviving larvae and their individual masses were determined after 30, 45, 60, 75, 90 and 105 days, at which time all diets were replaced.

The number of surviving larvae was expressed as a percentage of the initial number of larvae used in each treatment and pairs were compared according to the method of Cox (1970) for binary data. Data on larval mass were subjected to analysis of variance for a complete randomized design.

In the second trial only the white diet was used.