

THE LABORATORY COLONIZATION OF *PHLEBOTOMUS ARIASI* (DIPTERA: PSYCHODIDAE)

R. KILLICK-KENDRICK*, Mireille KILLICK-KENDRICK

Élevage en laboratoire de *Phlebotomus ariasi* (Diptera : Psychodidae).

RÉSUMÉ. Les auteurs décrivent les méthodes d'adaptation et d'entretien au laboratoire d'un élevage de *Phlebotomus ariasi* originaire des Cévennes. Le problème de la faible fertilité a été évité en offrant aux femelles un repas sanguin en présence des mâles dans une moustiquaire. Les larves en diapause ont été conservées en parfaites conditions durant l'hiver à une température de 10° C. Ces méthodes peuvent être utiles pour d'autres espèces réputées difficiles à élever.

Mots-clés : *Phlebotomus ariasi*. France. Colonisation. Copulation. Diapause.

Since 1972, we have reared sandflies from the eggs of wild-caught females on 15 occasions. Of these, we have successfully established laboratory colonies 10 times. The methods for primary establishment were basically those published by Killick-Kendrick *et al.* (1979) except that, since 1981, we have abandoned desiccated liver powder as larval food and have replaced it with a matured mixture (1 : 1 w/w) of rabbit faeces and commercially available rabbit pellets (Grain Harvesters Special Rabbit Pellets, Plain; W. M. Lillico and Sons Ltd., Wonham Mill, Betchworth, Surrey RH3 7AD, England) (see Young *et al.*, 1981).

From 1975 to 1978, however, our attempts to establish a colony of *Phlebotomus ariasi* Tonnoir, 1921 were unsuccessful because of low hatch rates of eggs of females caught as they fed on man or dogs. This suggested that copulation follows engorgement. There is, moreover, evidence that the females of this species copulate each gonotrophic cycle (Guilvard *et al.*, 1986). As with our own trials, Ready and Croset (1980) found low fertility to be one of the major impediments to the colonization of this species. From females reared in the laboratory, these workers had only one batch of eggs which hatched in 1976 and only two in 1977.

Following observations on the copulation of *P. ariasi* in a mosquito net after engorgement by M. W. Guy (1983, personal communication), we finally succeeded

Department of Pure and Applied Biology, Imperial College at Silwood Park, Ascot, Berks SL5 7DE, England.

* External Scientific Staff, Medical Research Council, London, England.

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in colonizing *P. ariasi* in 1984 and, again, in 1985. Flies were caught in CDC miniature light traps in peridomestic stations in the commune of Roquedur, Sumène, Gard, France (see Rioux *et al.*, 1979). The females were permitted to engorge in the presence of males on a rabbit in a large mosquito net (68 × 68 × 185 cm). They were then left for 24 h after engorgement during which time many pairs were seen *in copula*. Engorged females were individually tubed and kept at ambient temperatures (17-24° C) for oviposition (see Killick-Kendrick *et al.*, 1979). High proportions of the eggs hatched and the colonies were established without problems of infertility. Females of subsequent generations were again fed on rabbits in a mosquito net and given time for post-engorgement copulation. Currently, the colonies are maintained by feeding the females in a large, suspended, gauze cage (45 × 45 × 45 cm) on the head of a rabbit inserted through the sleeve of the cage; the rabbit is restrained in a box. The females are fed in the presence of males and are left with them for 24 h after engorgement. There have been no problems with the hatching of the eggs.

The second difficulty in colonizing *P. ariasi* from the Cévennes is diapause of 4th instar larvae which cannot, apparently, be totally avoided even by the control of temperature and light regimes (Ready and Croset, 1980). At the suggestion of P. D. Ready, we overwinter the diapausing larvae at 10° C. In the spring, we raise the temperature to 24° C over 10-12 days which is rapidly followed by pupation and, 2-3 weeks later, by the emergence of flies over a short period.

The larvae are surface feeders, and do not burrow. While in diapause, they continue to feed but are sessile. In contrast, when not in diapause, larvae of all instars are remarkably motile especially in pots which are too wet. To prevent the escape of larvae round the thread of the larval pots, we now rear them in rectangular, plastic boxes (11.0 × 7.5 × 5.5 cm) with metal clips holding the lid tightly in place (Resinart Plastics Ltd., P. O. Box 22,256, 54 Byron St., Christchurch 2, New Zealand). Two holes (3 cm) are drilled in the base of the boxes and they are lined with plaster of Paris. Another hole (3 cm) is cut in the lid and covered with fine stainless steel gauze. The water requirements of the larvae are less than those of other species which we have bred, and care is taken to ensure that the boxes are not too wet.

The only other report of the successful colonization of *P. ariasi* is by Najera-Angulo (1951) who reared flies caught in Spain for 3 generations, apparently with no problems of fertility of eggs. Najera-Angulo bred his flies in a novel apparatus in which the whole life-cycle took place, and males were present with the females during and after engorgement.

In December, 1986, our colony of 1984 was in the 8th generation and that of 1985 in the 5th. The use of large cages for engorgement and copulation, and the maintenance of diapausing larvae at 10° C may be suitable techniques for other species of sandflies which have proved difficult to colonize in the laboratory.

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