

Observations on *Megaselia persecutrix* (Diptera: Phoridae) in relation to its host *Camponotus gigas* (Hymenoptera: Formicidae)

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ABSTRACT The hitherto unknown male and egg of *Megaselia persecutrix* Schmitz are described. Observations on its oviposition attacks on its host ant *Camponotus gigas* (Latreille) are presented.

ABSTRAK Jantan dan telur *Megaselia persecutrix* Schmitz yang tidak dikenali dahulu adalah diuraikan. Permerhatian serangan pemovipositannya atas hos semut *Camponotus gigas* (Latreille) dikemukakan.

(*Megaselia persecutrix*, *Camponotus gigas*, Phoridae, Formicidae)

INTRODUCTION

The parasitization of the large ant *Camponotus gigas* (Latreille) by the phorid fly *Megaselia persecutrix* Schmitz was reported by Schmitz [1] and confirmed by Disney and Schroth [2]. In this paper we present further observations and describe the hitherto unknown male of *M. persecutrix*.

BIOLOGICAL OBSERVATIONS

Field observations (by UM)

Our observations were made at the Field Studies Centre of the University of Malaya at Ulu Gombak, Selangor, Peninsular Malaysia, in secondary forest.

A large worker of *Camponotus gigas* was observed on a sunny day between 9 and 10.30 hrs at an open shady site. It had lost part of one antenna and was continually attacked by several small flies (Fig. 1) which tried to land on the ant but sometimes also landed on the ground nearby. The ant not only constantly moved about but it also tried to ward off attacks by the flies by raising its body and snapping with its mandibles. Despite this, flies occasionally managed to alight briefly on the ant's head, body or legs. When approaching flies were repeatedly caught with a transparent plastic bag more kept appearing. The ant, however, remained at

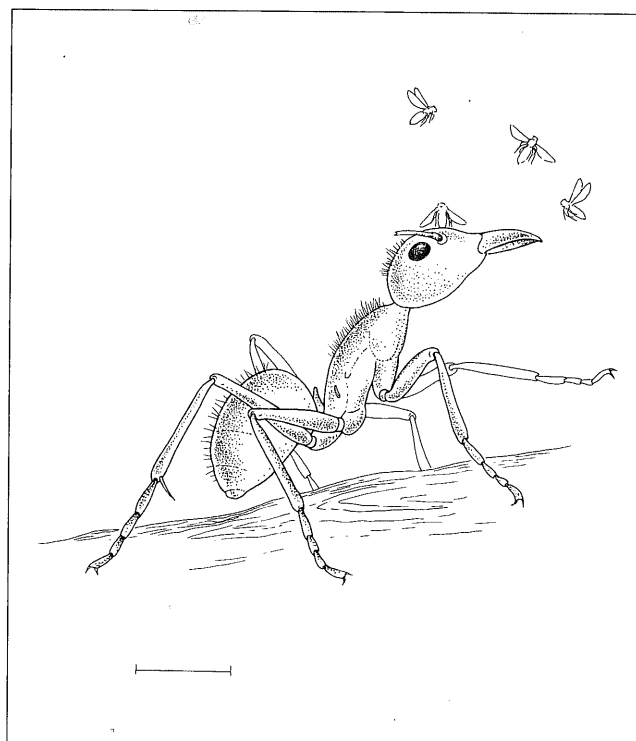


Figure 1. *Camponotus gigas* worker under attack from *Megaselia persecutrix* females (based on photographs and preserved ant specimens). (Bar = 5mm).

the site and continued to defend itself for over an hour. In a sample of 26 of the flies that were caught, which were sent to RHL, there were 15 females and 11 males.

Similar observations have been made at Poring Hot Spring, Kinabalu Park, Sabah and at Taman Negara, Peninsular Malaysia [2]. In both cases one or both antennae of the ants under attack were damaged or partly broken off. The following year, therefore, we tried to release fly attacks by deliberately mutilating a series of ants. Ten large *Camponotus gigas* workers had one middle leg and one and a half antennae removed. These mutilated ants were then exposed for periods of an hour, at the observation site near a nest entrance of *C. gigas*, after 18 hours and again after a further 24 hours. How-

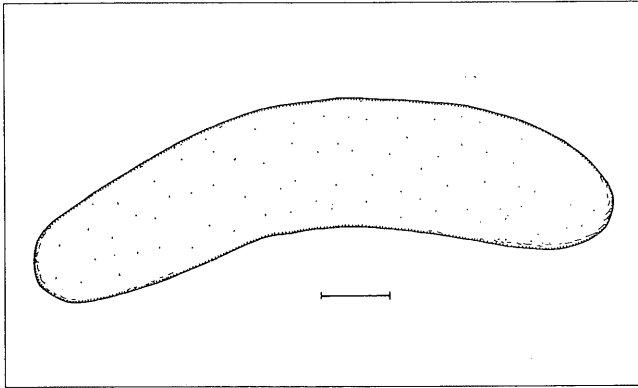


Figure 2. Egg of *Megaselia persecutrix* from head of ant host. (Bar = 0.1 mm).

ever, no flies were attracted to either the mutilated ants or to undamaged control workers during the periods of observation.

Laboratory observations (by RHL D)

A worker of *Camponotus gigas*, which had been observed under attack from ovipositing females of *Megaselia persecutrix*, was carefully dissected. A total of 36 eggs was found, all being located among the muscles inside the head capsule. These eggs (Fig. 2) are unusually elongated compared with those of other species of *Megaselia* that have been described (e.g. Figs. 2.1–2.3 in [3]).

TAXONOMY (BY RHL D)

Megaselia persecutrix Schmitz, 1932

Megasellia persecutrix Schmitz, 1932: 129. Cotype females, PENINSULAR MALAYSIA: Kedah (Museum Koenig, Bonn) [Examined].

Plastophora persecutrix (Schmitz). Colyer, 1957: 85 [4]. Disney, 1978: 318, returned to *Megaselia*.

This species was described from a series of females only; the description of this sex being amplified by Disney and Schroth [2]. These females were included in keys by Borgmeier [5] and Colyer and Elberg [6] as a species of *Plastophora* Brues. However, this genus has since been synonymised with *Megaselia* Rondani [7,8]. Borgmeier's key treated the halteres as being dark; but Colyer and Elberg treated them as being yellow, fol-

lowing Borgmeier's [9] comment "in key wrongly placed among species with black halteres". However, the haltere knobs have the basal third to half brown and the apical half or less pale whitish yellow.

In Borgmeier's [10] keys to Oriental *Megaselia* the females will run to couplets 43 and 46 of Group II (on page 204), to either "*M. quartobrevis*" Borgmeier (subsequently renamed *M. quartocurta* Borgmeier [11] and *M. mainitensis* Brues. However, unlike *M. persecutrix*, both these species have abdominal tergite 4 abbreviated. The males of *M. persecutrix* run to the same couplets. The two species running out at couplet 43 are both only known in the female sex. Males that key out at couplet 46 run to *M. mainitensis*, which is likewise only known in the female sex. The subsequently described *M. bowlesi* Disney [12], only known in the male sex, runs out as *M. mainitensis* also. It is immediately distinguished from *M. persecutrix* by the distinctive oval patch of greatly reduced hairs on the anterior face of the basal half of the front femur. Furthermore, the left side of its epandrium has a distinct pre-apical notch.

The male of *M. persecutrix* closely resembles the female but with the following principal differences. The third antennal segment is larger, the frons a little broader, the labrum is much smaller (being both shorter and narrower than greatest breadth of third antennal segment), but the labella are a little larger. The eyes have the lower ommatidia a little larger than the upper ones, as in the female. Legs similar to female, but hind femur not so

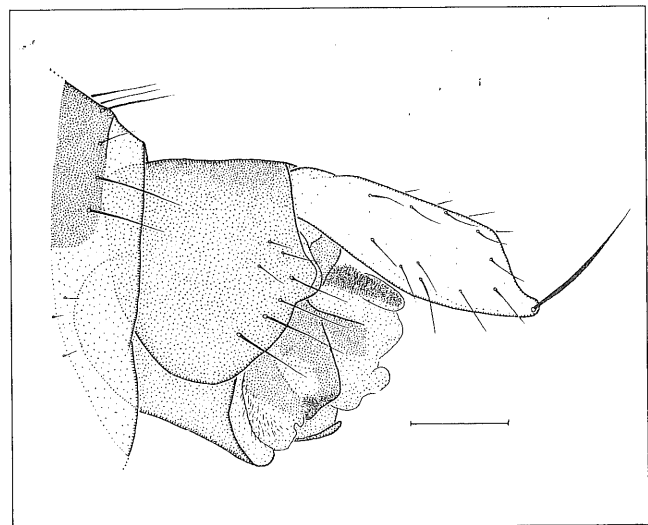


Figure 3. Left face of male hypopygium of *Megaselia persecutrix*. (Bar = 0.1 mm).

slender and with stronger hairs below basal half. Wing a little shorter. Hypopygium (Fig. 3): the epandrium being brown but paler than abdominal tergite 6, and the anal tube being almost white. Right side of epandrium emarginate in anterior two thirds and right lobe of hypandrium smaller than that of left side. The short pair of hypandral bristles well developed.

DISCUSSION

The larvae of the different phorid species parasitizing *Camponotus* ants have been reported to exhibit preferences with regard to caste and the part of the ant host attacked [3]. Some species prefer queens, but most records are for worker ants as the reported hosts. Larvae tend to be restricted to the host's head, as appears to be the case with *M. persecutrix*, or to the host's gaster. In the case of those preferring the gaster there may be secondary invasion of the thorax and even the head. The larvae of one species is an ectoparasite attached to the host's neck. In the case of *Trucidophora camponoti* (Brown) larvae infesting the gasters of the queens of *Camponotus pennsylvanicus* (De Geer) 26–120 larvae per ant have been reported [13].

Our observations indicate that *Camponotus gigas* mainly forages at night. However, small numbers of, mainly single small workers, also forage by day. We have never observed these ants being attacked by *Megaselia persecutrix*. Only ants with damaged antennae have been observed being attacked. The failure to attract flies to experimentally injured ants does not preclude the hypothesis that odour from wounded ants is the releaser for fly attacks, as no flies were attracted to our control ants either. This negative result might have been due to a lack of flies at the time or else to the attractive odour being restricted to a certain period following a wound to an ant.

Most phorids that parasitise ants attack uninjured hosts. Many that oviposit into the heads of their ant hosts either insert the eggs between the bases of the mandibles or else at the back of the head at the junction with the neck [3]. It seems improbable, therefore, that head wounds are necessary for oviposition by *M. persecutrix*. Furthermore *Apocephalus paraponerae* Borgmeier ovipositing into the heads, thorax and gaster of its ant host is attracted to them by the odours from wounds that result from the frequent aggressive encounters be-

tween the ant workers [14,15]. The slender form of the eggs in *M. persecutrix* is probably related to the narrow punctures through which the eggs have to be inserted.

The relatively high frequency of males caught in the vicinity of ants subject to oviposition attacks by the female flies recalls the similar attraction for males of the ant-parasitising species *M. kodongi* Disney and *M. sembeli* Disney [8]. It would seem that the vicinity of a vulnerable host functions as a mating site for these species of *Megaselia*.

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