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Parasitism of *Melanitis leda bankia* (Fabricius)  
(Lepidoptera: Nymphalidae: Satyrinae)

by a tachinid fly (Diptera: Tachinidae) in Queensland, Australia

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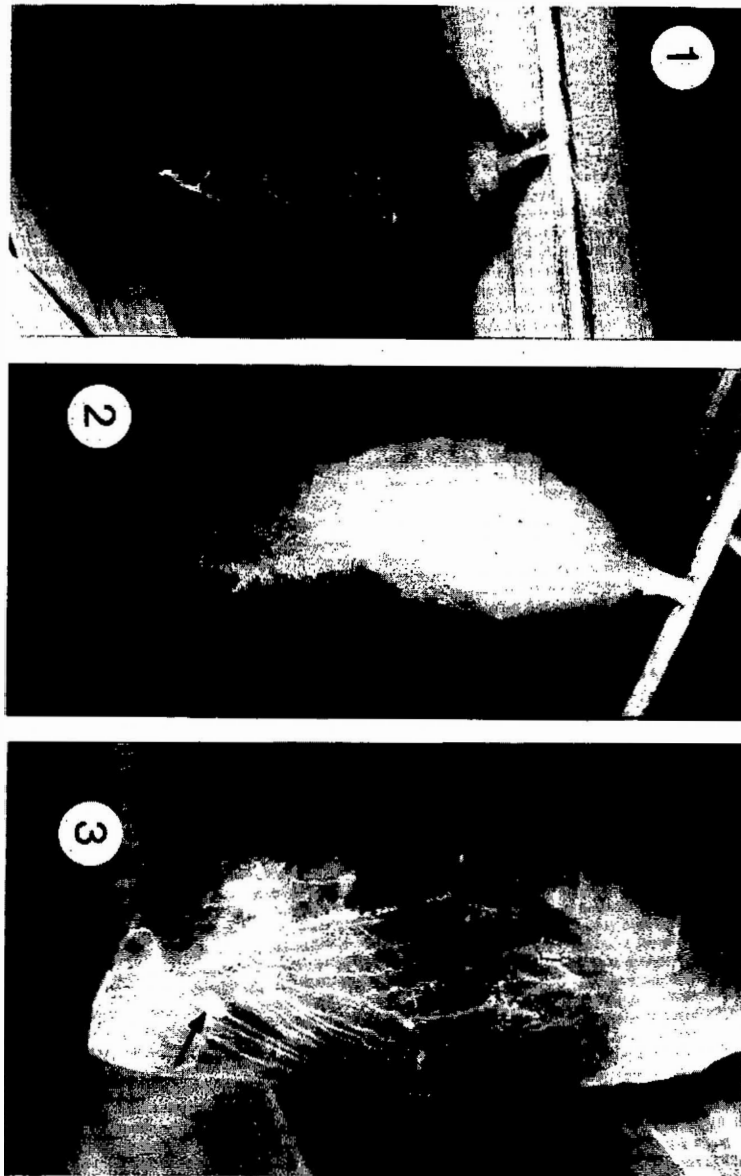
## Abstract

Observations are provided on parasitism of the nymphalid, *Melanitis leda bankia* (FABRICIUS), by the fly *Winthemia neowinthemioides* (TOWNSEND), at Brisbane, southeastern Queensland, during January 1985. A high level of parasitism of larvae and pupae was recorded (i.e. 89.5 %) which compares well with the level of parasitism recorded for *Danaus plexippus plexippus* (LINNAEUS) (Nymphalidae), another butterfly known to be parasitized by *W. neowinthemioides*.

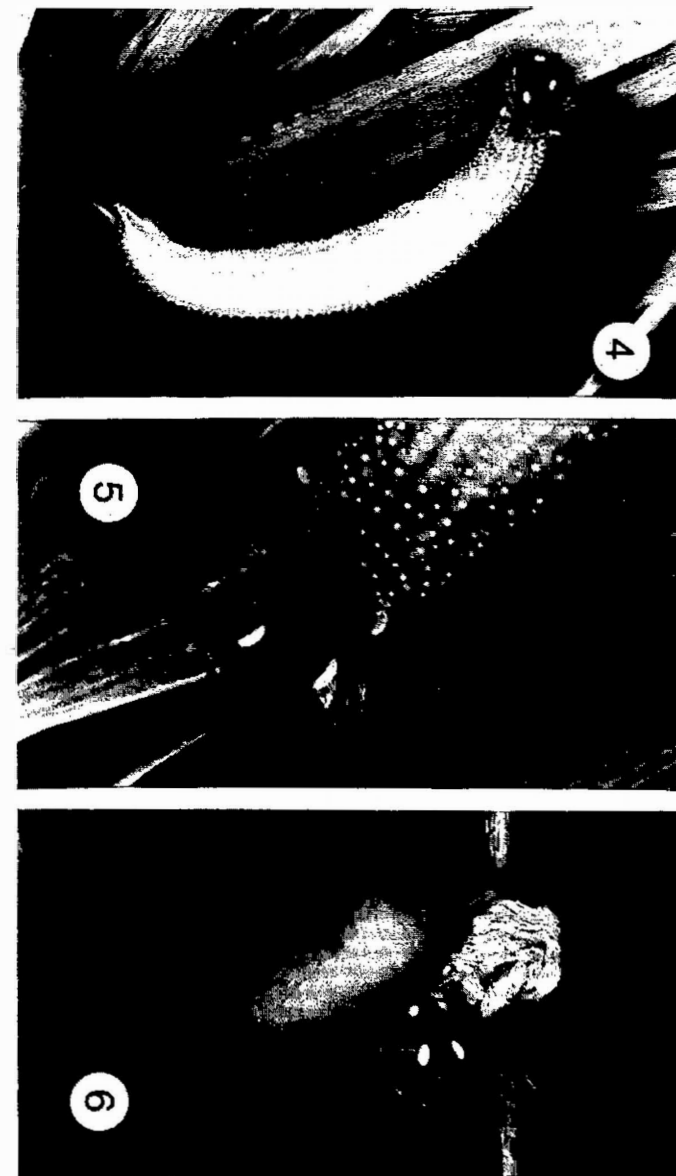
## Introduction

*Melanitis leda bankia* (FABRICIUS) (Evening Brown) is one of two species in the genus recorded from Australia, where it occurs from north-western Australia, the Northern Territory, Cape York Peninsula to coastal north-eastern New South Wales (see e.g. RAINBOW, 1907; WATERHOUSE, 1932; BARRETT and BURNS, 1951; COMMON and WATERHOUSE, 1972, 1981). The butterfly has also been recorded from various islands off the Queensland coast (e.g. Heron Island, CHADWICK, 1963; Moreton Island, FRANZEN, 1924; Stradbroke Island, FRANZEN, 1926; North West Island, REEVES, 1969; and Erskine Island, REEVES, 1971).

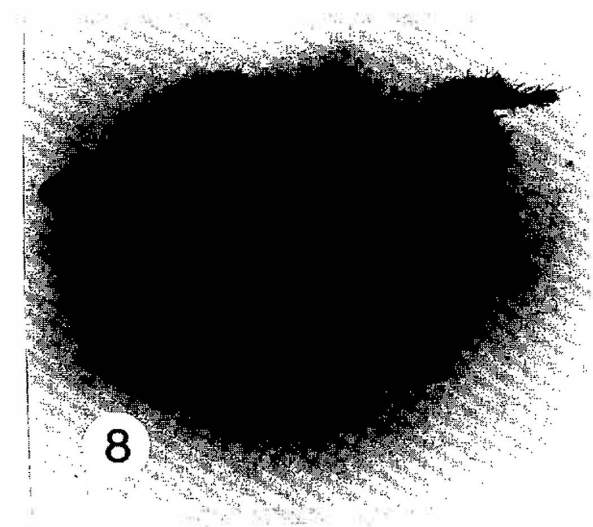
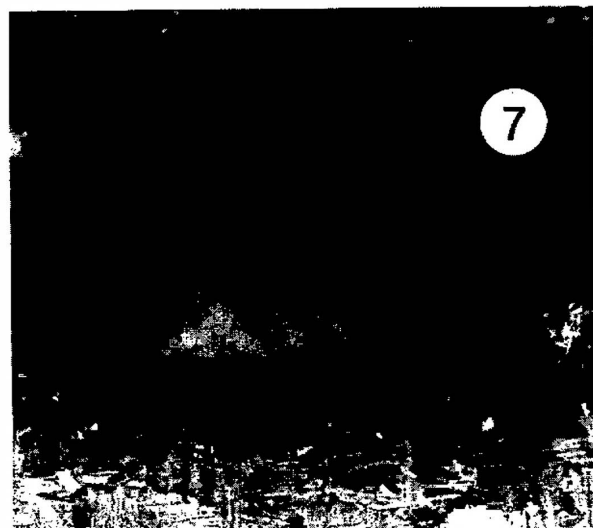
Despite the wide distribution of the species, little is known of its general biology apart from records of larval host/plant relationships. *Melanitis l. bankia* feeds as larvae on various coarse-leaved grasses such as *Imperata*, *Panicum*, *Saccharum* and *Paspalum* (Poaceae) (see e.g. RAINBOW, 1907; JARVIS, 1916, 1917, 1926; BURNS, 1928; WATERHOUSE, 1932; BARRETT and BURNS, 1951; MANSKI, 1960; COMMON and WATERHOUSE, 1972, 1981).



Figs 1-3: 1. Parasitized *M. l. bankia* pupa, attached to the midrib of a *Panicum maximum* leaf. (Length of pupa = 22 mm). 2. Normal *M. l. bankia* pupa. (Length of pupa = 25 mm). 3. Parasitized pupa of *M. l. bankia* in early stage of decay, with fly egg (arrow) attached near the head.



Figs 4-6: 4. Last instar larva of *M. l. bankia* on *P. maximum* showing position of fly eggs on the head capsule and behind the head. (Length of larva = 35 mm). 5. Close-up of the head of a last instar larva of *M. l. bankia* showing position of eggs. 6. Young pupa of *M. l. bankia* about one day after ecdysis. Areas already infected by the young fly maggots are shown by arrows.



Figs 7-8: 7. Pupa of *Winthemia neowinthemioides*. 8. Malformed pupa of *M. l. bankia* which failed to complete successful ecdysis. Note fly eggs obscured by the head capsule.

### Observations and results

The following notes represent the first detailed observations to be published on fly parasitism of *M. l. bankia*.

On 12 January 1985, the author was examining plants of *Passiflora suberosa* SIMS (Passifloraceae) for larvae of *Acraea andromacha andromacha* (FABRICIUS) (Nymphalidae) and noticed an empty pupal case of *M. l. bankia* attached to the midrib of a leaf of a 1m high healthy plant of *Panicum maximum* JACQ. (Poaceae), growing in an artificial (i.e. largely man-induced) rainforest-like habitat in residential Highgate Hill, a central suburb of Brisbane, Queensland. Further searches in the immediate area revealed another 6 empty pupal cases, 6 parasitized pupae (one shown in Fig. 1) (i.e. the parasitized pupae were variously colored black, brown and dark green; the unparasitized, normal pupa (Fig. 2) being pale leaf green), and one final instar larva with 9 small, whitish, narrow oval eggs (0.7-0.8 mm long) attached to the head capsule and body (Table 1). One fly egg was attached to one of the pupae (Fig. 3). During the following day, a more extensive investigation of the area was undertaken and a further 7 last instar larvae, 2 earlier instar larvae and 5 pupae were collected. The pupae were soft and green (without any evidence of parasitism), indicating that pupation had recently occurred. The number of fly eggs deposited on the head and body of each last instar larva was counted (Table 1). No eggs were observed on the earlier instars. Most of the eggs were deposited on the head capsule and the thoracic region immediately behind the head; only one larva had an egg attached near the apex of the abdomen. One last instar larva is shown with eggs on the head and thoracic regions (Figs. 4, 5). The larvae were enclosed in a plastic bag with fresh leaves of *Paspalum dilatatum* POIR. (Poaceae) (a previously unrecorded food plant) to study their further development. The pupae were enclosed in separate plastic butter containers.

Table 1. Distribution and number of eggs on larvae of *M. l. bankia* collected at Brisbane, Queensland, on 12 and 13 January, 1985.

Date	Larva n°	Number of eggs		Total
		Head capsule	Rest of body	
12 Jan.	1	3	6	9
13 Jan.	2	0	1	1
"	3	9	6	15
"	4	1	3	4
"	5	6	4	10
"	6	2	3	5
"	7	1	1	2
"	8	3	0	3
Total		25	24	49
Mean ± S.D.		3.1 ± 3.0	3.0 ± 2.3	6.1 ± 4.8

During the night of 14 Jan. (c. 2000 hrs, Eastern Standard Time) the fly maggots emerged from the butterfly pupae collected on 12 Jan. and most had pupated by the following morning (i.e. about 12 hours later). After bursting through the pupa, usually in the region of the lower abdomen, the active maggots dropped to the bottom of their containers and moved about for about 30-60 minutes before settling down to pupate. Of the 6 butterfly pupae collected on 12 Jan., 3 produced 2 maggots each and the remaining 3 produced 1 each (mean=1.5). The fly pupa (Fig. 7) is initially orange in colour, usually changing to brown-black within 2 hours. During the morning and early afternoon of 26 Jan., the flies emerged, the pupal duration being 11-11.5 days. A total of 6 females and 3 males emerged (Table 2). The females were larger ( $\bar{X}=10.4 \pm 0.4$  mm long,  $N=5$ ) than males ( $\bar{X}=8.7 \pm 0.3$  mm long,  $N=3$ ), and size differences were also observed in their pupae (i.e. female pupae 8.0-8.5 mm long,  $\bar{X}=8.2 \pm 0.3$ , 3.7-4.0 mm wide,  $\bar{X}=3.9 \pm 0.1$ ,  $N=6$ ; male pupae 7.5-8.0 mm long,  $\bar{X}=7.8 \pm 0.3$ , 3.0-3.5 mm wide,  $\bar{X}=3.2 \pm 0.3$ ,  $N=3$ ). The flies were later identified as *Winthemia neowinthemioides* (TOWNSEND) (Tachinidae: Goniinae: Winthemiini).

Table 2. Distribution of sex of *W. neowinthemioides* from pupae of *M. l. bankia* collected at Brisbane, Queensland, on 12, 13 & 18 January, 1985.

Date	Host Pupa n°	Fly sex	Date	Host Pupa n°	Fly sex
12 Jan.	1	2 ♀♀	13 Jan.	1	♀
	2	♂, ♀		2	*
	3	♂, ♀		3	*
	4	♀	18 Jan.	1	♂,*
	5	♀			
	6	♂			

\* Flies failed to develop or emerge

Of the 5 butterfly pupae collected on 13 Jan., 2 produced healthy *M. l. bankia* adults (2 males) on 18 and 19 Jan. respectively. The remaining 3 produced one maggot each; these pupated on 17 Jan. On 28 Jan. one female *W. neowinthemioides* emerged but flies failed to emerge by 2 Feb. from the other two (Table 2). Dissection of these two pupae revealed that one contained a fly which had failed to develop and the other contained a dead, pale-coloured female fly.

Only one last instar larva of *M. l. bankia* completed pupation successfully (on 18 Jan.) (Fig. 6), while another one (Fig. 8) failed to shed completely the larval cuticle becoming malformed and died within 24 hours. (The cause of death of the remaining larvae was not apparent, but were probably due to bacterial and fungal attack). No flies developed in the malformed pupa. Both larvae shed all the eggs on the head capsule during ecdysis (Fig. 6, 8). Two fly maggots emerged from the first butterfly pupa 6 days later (24 Jan.) and they pupated the following day. On 5 Feb. one male *W. neowinthemioides* (7.8 mm long) emerged from the largest pupa (7.2 mm long, 3.0 mm wide) while the fly in the smaller pupa (5.6 mm long, 1.8 mm wide) apparently died during maturation from unknown causes.

A violent hailstorm passed through Brisbane on 18 Jan. and severely damaged

many of the plants at the Highgate Hill site. Examination of the site on 20 Jan. and on subsequent days failed to find further larvae or pupae of *M. l. bankia*.

### Discussion

Little has been written on the parasites of Australian butterflies (COMMON and WATERHOUSE, 1972, 1981; HAWKESWOOD, 1980). The earliest report of parasitism of *M. l. bankia* was by BURNS (1928) who noted that the butterfly was "... controlled naturally by both Dipterous and Hymenopterous parasites which affect the larval stages; ...". BURNS failed to provide identifications for these parasites, but mentioned that about 75 % of *Melanitis* larvae were parasitized. There appear to be no other published observations on the parasites of this butterfly in Australia and I am unaware of any records from Papua New Guinea, where the species has also been recorded.

The genus *Winthemia* ROB.-DESV. are exclusively parasitic on Lepidoptera (CROSSKEY, 1973). *Winthemia neowinthemioides* has been recorded from *Brithys crini* (FABRICIUS) (Noctuidae), *Euploea core corinna* (MACLEAY) and *Danaus plexippus plexippus* (LINNAEUS) (Nymphalidae) and *Catopsilia pyranthe crockera* (MACLEAY) (Pieridae) (CROSSKEY, 1973). More recently, CHADWICK and NIKITIN (1985) recorded *W. neowinthemioides* from pupae of *Leptocneria reducta* (WALKER) (Lepidoptera: Lymantridae), *Mythimna convecta* (WALKER) (Lepidoptera: Noctuidae) as well as the butterflies *Euploea core corinna* (MACLEAY), *Danaus plexippus plexippus* (LINNAEUS) and *Delias arganippe* DONOVAN (Pieridae). SMITHERS (1973) recorded *Winthemia diversa* Malloch (a synonym of *W. neowinthemioides* according to CROSSKEY, 1973) as a parasite of *D. p. plexippus*. SMITHERS (1973) recorded high levels of parasitism by this fly (i.e. 82-100 %) which compares well with the 89.5 % parasitism in the *Melanitis* sample. The life-cycle of *W. neowinthemioides* in association with *D. p. plexippus* is similar to the association with *M. leda*. SMITHERS (1973) noted that 1-19 eggs were found on *D. plexippus* larvae in the field, while in the laboratory, up to 37 eggs were laid on a host exposed to several female flies. SMITHERS (1973) noted that eggs were laid randomly over the bodies of *D. plexippus*, but in the field collected *M. leda* larvae, the eggs appeared to be restricted to the head capsule and the thoracic areas. A student's t-test of significance (two-tailed) was undertaken to statistically compare the mean number of eggs on the head and on the body (means from Table 1). The result was not significant ( $t=0.075$ ; critical value = 2.145,  $p > 0.05$ ,  $n=14$ ), indicating that flies were laying eggs randomly. It is also interesting to note that a maximum of 7 maggots were found by SMITHERS in *D. plexippus* pupae but only 1 or 2 were observed in *M. leda* pupae at Brisbane. However, the duration of the fly pupal stage was similar; SMITHERS recorded 11-13 days, while 11-11.5 days was noted here.

The limited data available suggest that *W. neowinthemioides* is an important regulator of butterfly populations due to high levels of parasitism. Further research should reveal other butterfly hosts and provide more information on *Winthemia* general biology and behaviour.

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**Agenioideus fascinubecula Wolf, 1986**  
**Pompilide nouveau pour la faune française**  
**(Hymenoptera: Pompilidae, Pompilinae)**

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**Résumé**

*Agenioideus fascinubecula* WOLF, décrit d'Algérie et de Sardaigne, est capturé en France pour la première fois. La figure de la plaque génitale du mâle est corrigée et redessinée. Cette espèce est distincte de *Pseudevaetes ichnus* WOLF dont le statut ne peut toutefois pas être précisé actuellement.

**Summary**

*Agenioideus fascinubecula* WOLF, described from Algeria and Sardinia, is reported for the first time from France. An improved drawing of the male genital plate is given. This species differs from *Pseudevaetes ichnus* WOLF, but the status of the latter is still unclear.

Dans un travail récent sur certaines espèces du genre *Agenioideus* ASHMEAD, WOLF (1986) décrit et figure les 2 sexes d'une espèce nouvelle qu'il nomme *fascinubecula*, le matériel original provenant de Sardaigne et d'Algérie. Au début de la description, l'auteur indique avoir déjà signalé le mâle (1970: 67) sous le nom de *Pseudevaetes ichnus* sp. nov., lequel nom serait un nomen nudum par manque de désignation d'un type et de la localisation de dépôt du type.

Cependant, d'après les dispositions du Code de nomenclature (1985, article 13.a.i), le nom *Pseudevaetes ichnus* gen. et sp. nov., paru dans une clé dichotomique avec des caractères permettant d'identifier le taxon, est parfaitement valable et dès lors, le nom *ichnus* devrait remplacer *fascinubecula* et le genre *Pseudevaetes* WOLF deviendrait synonyme junior d'*Agenioideus* ASHMEAD.

La lecture attentive des textes originaux ainsi que l'examen des figures présentées dans les 2 travaux font néanmoins apparaître une série d'inexactitudes et d'invéraisemblances qui font que le cas de ces espèces nécessite quelques commentaires.

1) Si l'exemplaire mâle "Cagliari 11.VII.1959, H. Wolf, Gésico, Carlina" indiqué