Grimshaw, **P**.**H**. 1902. Diptera (Supplement). *Fauna Hawaiiensis* **3**: 79–86.
Zimmerman, **E**.**C**. 1948. Introduction. *Insects of Hawaii* **1**: xvii + 206 p.

Status of *Rhynchopalpus brunellus* in the Hawaiian Islands, With Comments on the Systematics of the Nolinae (Lepidoptera: Noctuidae)

JEREMY D. HOLLOWAY[1] (International Institute of Entomology, 56 Queen's Gate, London SW7 5JR, England, UK) and SCOTT E. MILLER (Department of Natural Sciences, Bishop Museum, P.O. Box 19000A, Honolulu, Hawaii 96817, USA)

Rhynchopalpus brunellus Hampson (1893) **Resurrected combination**, **new island record**

During a Bishop Museum field trip on 30 September 1989, the species referred to in Hawaiian literature as *Selca brunella* (Hampson 1893) was found at Schofield-Waikane Trail on Schofield Military Reservation, Oahu, at ultraviolet lights at both 370 m and 440 m elevation.

The species was introduced from Kuala Lumpur, Malaysia, and Singapore, for the control of *Melastoma candidum* (previously known as *M. malabathricum*; Almeida in Wagner *et al.* 1990: 910). It was released at Panaewa Forest, Hawaii, in 1965 (*Proc. Hawaii. Entomol. Soc*. 19: 202, 205) and Huleia, Kauai, in 1966 (*Proc. Hawaii. Entomol. Soc*. 19: 376, 378), and is considered to be well established on those islands (*Proc. Hawaii. Entomol. Soc*. 20: 27, 522). This species is considered successful in providing partial control of *Melastoma* (Clausen 1978: 398–99, Julien 1987: 53, Funasaki *et al.* 1988: 147).

Considerable variation among Hawaiian specimens in both size and wing maculation prompted us to verify the identification by comparison of male genitalia against the male syntype from Sri Lanka in The Natural History Museum, London (BMNH arctiid slide 450). The wings and male genitalia are illustrated in Figs. 1 and 2.

The species was described and illustrated as *Rhynchopalpus brunellus* by Hampson (1893: 89, pl. 158, fig. 31), but its taxonomic placement has been problematic. In Hawaiian literature it has been included in Arctiidae or Nolidae. It is currently placed in the subfamily Nolinae of the Noctuidae (Poole 1989). Poole (1989: 693) transferred *brunellus* to *Nola* Leach, but the male genitalia are atypical of this genus. This problem prompted a search for a better generic placement for *brunellus*, via an extensive program of dissection throughout the Nolinae, including the type specimens of type species of genera held at the BMNH and University Museum, Oxford (UMO). The results of these studies will be reported in detail elsewhere. The Nolinae are in great need of a comprehensive revision; we hope these notes will help fill the gap until such a revision can be undertaken.

Notes on the Generic Classification of Nolinae

In his catalog of the Noctuidae, Poole (1989) retained the accepted synonymy (e.g., in Hampson 1900: 31, 46) for *Nola* and transferred all species under the generic concept of "Roeselia" (*Roeselia* Hübner is an isogenotypic synonym of *Nola*) to *Meganola* except

1. Research Associate, Department of Natural Sciences, Bishop Museum, Honolulu, Hawaii.

those that were themselves type species of genera that had been placed as synonyms with *Roeselia*. These he treated as distinct, usually monobasic, genera. The majority of Nolinae were placed by Poole into 2 large genera: *Nola* Leach and *Meganola* Dyar. These can be diagnosed most reliably on characters of the male abdomen (Franclemont 1960: 53): *Nola* species have divided valvae, the uncus reduced or absent, and the eighth abdominal segment modified with apodemelike structures (see Holloway 1979: fig. 89.4). *Meganola* species have entire valvae, the uncus strong, and the eighth abdominal segment weakly modified if at all. A feature of *Meganola*, absent from *Nola*, is a pair of setose lobes associated with the anal tube (see Holloway 1979: fig. 94.1). Under these characters, *brunellus* should be placed in *Meganola*. However, genitalic and other characters show that the species and generic synonyms grouped under each of these genera in Poole are not monophyletic.

Generic synonyms attributed to *Nola* by Poole that are correctly placed, the type species having the apomorphic features mentioned above, or sharing the same type species, are: *Lira* Billberg, *Chlamifera* Hübner, *Roeselia* Hübner, *Celama* Walker, *Aradrapha* Walker, *Lebena* Walker, *Minnagara* Walker, *Argyrophyes* Grote, and *Epizeuctis* Meyrick. Five **new synonyms** of *Nola* have been located: *Pisara* Walker, *Necla* Walker, *Automala* Walker, *Neonola* Hampson, and *Idiocyttara* Turner.

Of the other synonyms of *Nola* listed by Poole, several names representing taxa lacking *Nola* features were described earlier than *Meganola* and should therefore be regarded as **revived genera**. The oldest is *Manoba* Walker (1863: 62), type species *implens* Walker. The holotype (UMO) is a female lacking head and abdomen (illustrated by Hampson 1900: pl. 19, fig. 22). A male and female collected by J.D.H. in the Gunung Mulu National Park, Sarawak, in 1978 have been matched with the type and dissected (BMNH noctuid slides 14460, 14568). *Rhynchopalpus* Hampson, **revived genus**, is allied to *Meganola* and *Manoba*. Holloway (1976: 1–2, fig. 727) referred to the type species, *argentalis* Moore, and described the closely related species *harthani* Holloway, which must therefore be transferred to *Rhynchopalpus* as a **new combination**. *Rhynchopalpus* (1893) is an older name than *Meganola* (1898) and resembles the type species of that genus more closely in facies than does *Manoba*. It may therefore have to take precedence over *Meganola* and is, of course, the genus of original description for *brunellus*. Thus *brunellus*, with "*Meganola*" features of male genitalia (valvae undivided), the derived state of the signa (strongly invaginated to form a ridge-, thorn- or bladelike process within the bursa; usually 2, sometimes reduced to 1), trifine hindwing venation, and no larval modifications (see below), belongs to the suite of genera paraphyletic in relation to *Nola* that includes *Manoba. Rhynchopalpus*, and *Meganola*. The ultimate placement for *brunellus* must await revision of the subfamily, but we feel the most conservative alternative is to associate *brunellus* with its original genus, *Rhynchopalpus.*

A feature of potential relevance to the higher classification of the group is the tendency in some taxa for the larva to stack its old head capsules in a hornlike structure attached to the thoracic hairs. This feature is usually accompanied by the presence of mats of flocculent white fluff among the verrucae. McFarland (1980) reviewed instances of head capsule stacking by Nolinae in conjunction with a detailed description of the feature in the Australian noline *Uraba lugens* Walker (also illustrated by Campbell 1963: pl. 10, fig. 9; Scott & Scott 1988: 111; Common 1990: fig. 54.8). The head capsule stack is usually found subsequently attached to the outside of the cocoon. Rearing of *brunellus* in

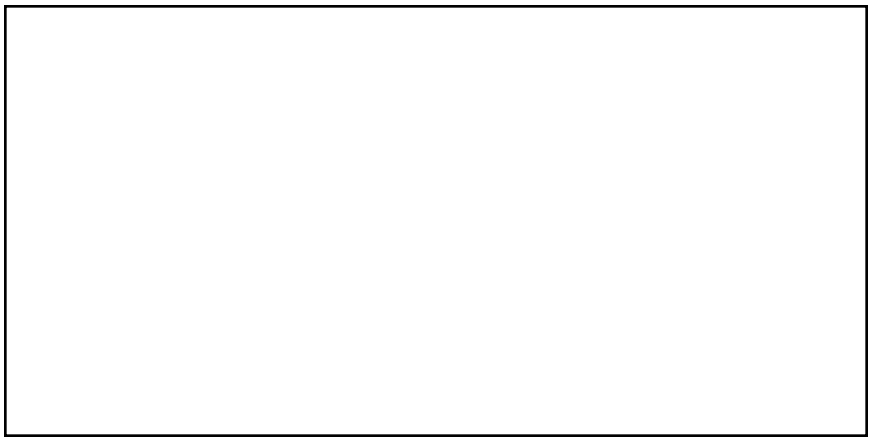

Fig. **1**. *Rhynchopalpus brunellus*, wing pattern, Hawaii I (Bishop Museum).

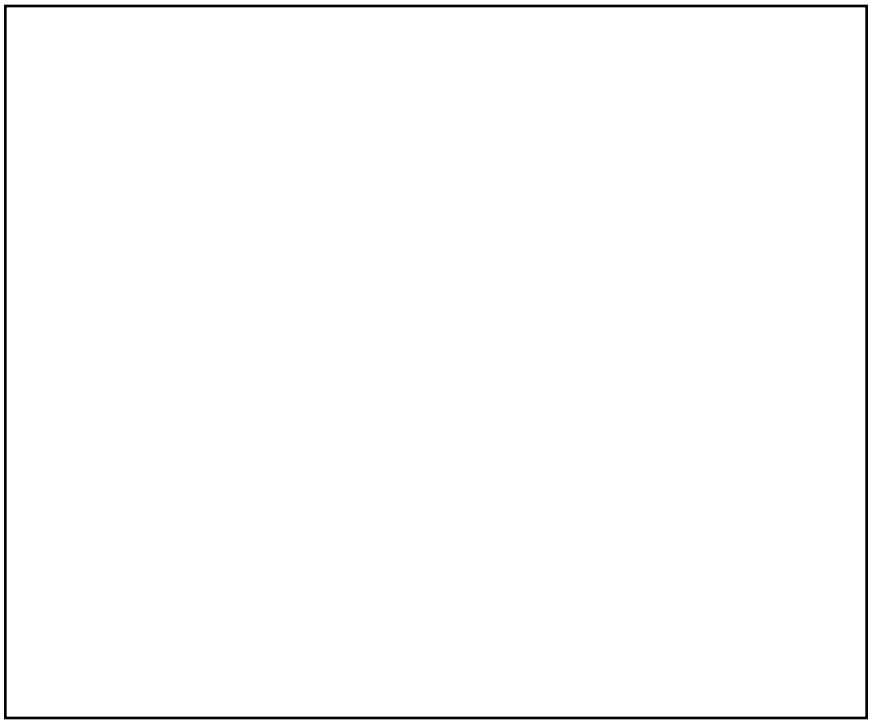

Fig. **2**. *Rhynchopalpus brunellus*, male genitalia, Oahu (Bishop Museum). Line is 0.5 mm.

Hawaii has revealed that the larvae lack flocculent downy hairs and do not stack head capsules. Almost all taxa in which head capsule stacking has been recorded have the pleisiomorphic, quadrifine hindwing venation. The trifine exception is the eastern Palaearctic *Evonima mandschuriana* (Oberthür).

Acknowledgments

Early drafts of this note were reviewed by I. Kitching and R.W. Poole. The Hawaii Department of Agriculture provided live specimens of *brunellus* and D. Preston cared for them. M. Filbert prepared the genitalic illustration.

References

Campbell, **K**.**G**. 1963. The biology of *Roeselia lugens* (Walk.), the gum-leaf skeletonizer moth, with particular reference to the *Eucalyptus camaldulensis* Dehn. (river red gum) forests of the Murray Valley Region. *Proc. Linn. Soc. N.S.W.* **87**: 316–38, pl. 10.

Clausen, **C**.**P**., **ed**. 1978. Introduced parasites and predators of arthropod pests and weeds: A world review. *U.S. Dep. Agric., Agric. Handb*. **480**, 545 p.

Common, **I**.**F**.**B**. 1990. *Moths of Australia*. Melbourne University Press, Melbourne. vi + 535 p.

Franclemont, **J**.**G**. 1960. Nolidae, p. 50–55. *In*: Forbes, W.T.M., Lepidoptera of New York and neighboring states. Part IV. *Cornell Univ. Agric. Exp. Sta. Mem*. **371**, 188 p.

Funasaki, **G**.**Y**., **P**.-**Y**. **Lai**, **L**.**M**. **Nakahara**, **J**.**W**. **Beardsley & A**.**K**. **Ota**. 1988. A review of biological control introductions in Hawaii: 1890 to 1985. *Proc. Hawaii. Entomol. Soc*. **28**: 105–60.

Hampson, **G**.**F**. 1893. *Illustrations of typical specimens of Lepidoptera Heterocera in the collection of the British Museum. Part IX.—The Macrolepidoptera Heterocera of Ceylon*. Taylor & Francis, London. 182 p., 20 pls.

———. 1900. *Catalogue of the Lepidoptera Phalaenae in the British Museum. Volume 2.* Taylor & Francis, London. 589 p., pls. 18–35.

Holloway, **J**.**D**. 1976. *Moths of Borneo with special reference to Mount Kinabalu*. Malayan Nature Society, Kuala Lumpur. 264 p.

———. 1979. *A survey of the Lepidoptera, biogeography and ecology of New Caledonia*. W. Junk, The Hague. xii + 588 p.

Julien, **M**.**H**., **ed**. 1987. *Biological control of weeds: A world catalogue of agents and their target weeds. Second Edition.* CAB International, Wallingford. x + 150 p.

McFarland, **N**. 1980. Retention of cast head capsules by some nolid immatures in four Old World countries. *J. Res. Lepid*. **17** [1978]: 209–17.

Poole, **R**.**W**. 1989. Noctuidae. *Lepid. Cat.* (n.s.) **118:** 1–1314.

Scott, **H**. **& H**. **Scott**. 1988. *Historical drawings of moths and butterflies*. Craftsman House, Roseville, N.S.W. 147 p. Introduced and selected by M. Ord.

Wagner, **W**.**L**., **D**.**R**. **Herbst & S**.**H**. **Sohmer**. 1990. *Manual of the flowering plants of Hawai'i.* University of Hawaii Press & Bishop Museum Press, Honolulu. 1853 p.

Walker, **F**. 1863. Catalogue of the heterocerous lepidopterous insects collected at Sarawak, in Borneo, by Mr. A.R. Wallace, with descriptions of new species. *J. Proc. Linn. Soc.* (Zool.) **7**: 49–84, 160–80.