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A NEW SPECIES OF THE *INORNATA* GROUP, GENUS *DROSOPHILA* FALLÉN (DIPTERA: DROSOPHILIDAE)

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Abstract

Drosophila garnetensis sp. n., described from north Queensland, is the eighth Australian member of the *inornata* group (subgenus *Scaptodrosophila* Duda).

Introduction

The *Drosophila inornata* group (Bock and Parsons 1978, Parsons and Bock 1978) was established within the subgenus *Scaptodrosophila* Duda for 7 Australian species showing considerable colour and pattern variation, but distinguished by lacking the typical facial carina and propleural bristles, and showing reduced aristae and prescutellar bristles. Material collected in north Queensland by the Division of Entomology, CSIRO, Canberra, includes an eighth, undescribed species of the group; it is described below.

Drosophila garnetensis sp. n. (Figs 1-2)

Types—QUEENSLAND: *Holotype* ♂, Forty Mile Scrub National Park, 59 km SW by S of Mt Garnet, 12.xi.1981, D. H. Colless. *Paratypes:* same data as holotype, 6 ♂♂, 1 ♀; 7 km WSW of Ravenshoe, 12.xi.1981, D. H. Colless, 1 ♀ (at light).

Body length 2.7 mm (holotype), 2.2-3.2 mm (paratype range).

Head—Arista with 3-4 rays above and 2 rays below plus terminal fork; all rays rather short, straight. Breadth of front 1.1 times length. Front tan with velvety very dark brown spots in front of first 2 orbital bristles, and between ocellar triangle and posterior reclinate orbitals; periorbits silvery; ocellar triangle elevated, with silvery bloom; central part of front with some silvery bloom. Ocellar bristles large. Antennal segment 2 tan, 3 dusky tan. Carina rudimentary between antennal bases only. Face pale. Palp dusky, with a few large bristles. Cheek pale, slightly curved, moderately broad. Eye with sparse very fine pile. Orbital bristles in ratio *ca* 3:2:4; proclinate orbital anterolateral to anterior reclinate orbital. Vertical bristles very large. Postverticals only slightly convergent.

Thorax—Mesonotum with greyish bloom, bristles and hairs arising from dark brown spots. Acrostichal hairs in 8 rows in front of dorsocentral bristles, 2-4 rows between dorsocentrals. Ratio anterior: posterior dorsocentrals 0.7. Scutellum dark tan. Pleura dark brown with superimposed pollinosity. Propleural bristle absent. Haltere pale tan. Legs tan, all tibiae with trace only of dark annulus; preapical bristles on all tibiae, apical on mid tibia only.

Wing—Hyaline. C-index 2.3, 4V-index 4.8, 5X-index 6.3, M-index 2.3. Third costal section with heavy setation on basal 0.35. Anal vein weak. Length 2.4 mm (holotype).

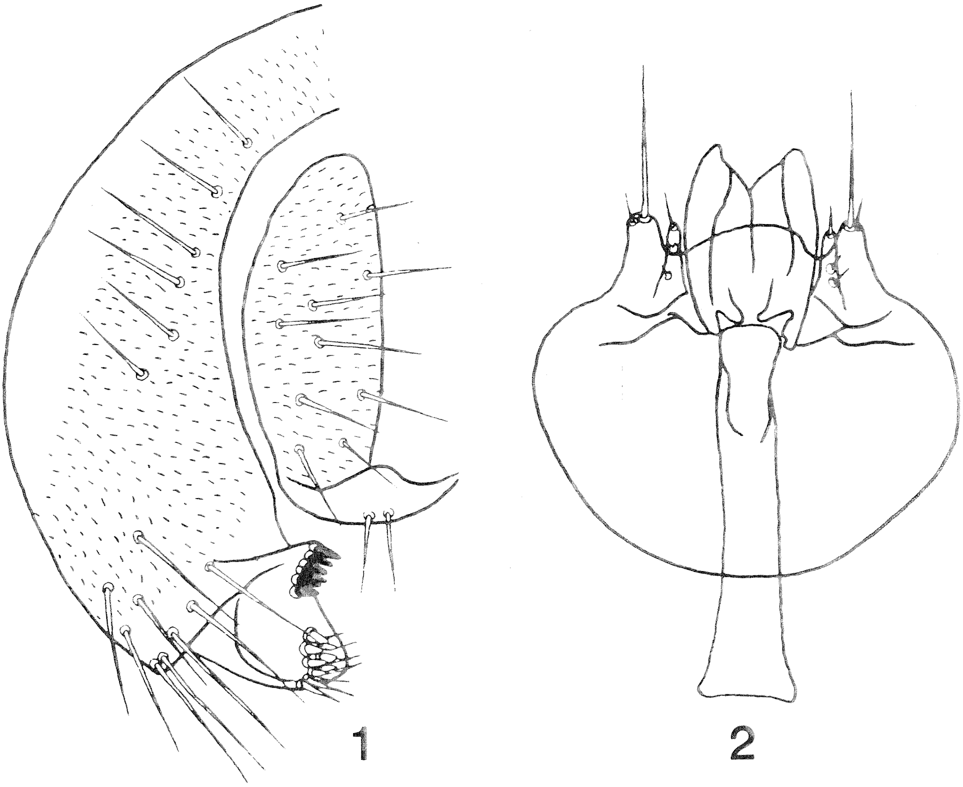
Abdomen—Tergites 1-2 weakly infuscated. Tergite 3 weakly infuscated centrally, darker laterally. Tergite 4 infuscated anteriorly, darker posteriorly. Tergites 5-6 blackish. Incurved portions of all tergites blackish.

Male genitalia—External genitalia blackish. Clasper with row of short contiguous black teeth above and separated group of bristles below. Hypandrium with pair of large dorsal spines on elevated processes (Figs 1-2).

Female genitalia—Egg guide strongly sclerotised, apically pointed, with very small marginal teeth.

Comments

This species closely resembles *D. obsoleta* Malloch in its pattern of dark mesonotal spots, arrangement of orbital bristles and possession of a dark spot at the first 2 orbital bristles, and keys to that species in Bock (1982). It is distinguished from *D. obsoleta* by its quite different arista (short straight rays *vs* fewer longer curved rays in *D. obsoleta*), its additional posterior frontal darkening, different wing indices and different male genitalia. The 2 species are members of the *inornata* group and it is tempting to speculate that the strong similarity between them in mesonotal pattern suggests close phylogenetic affinity (i.e., that they are sister species in the sense of the phylogenetic systematists). This conclusion is not, however, necessarily justified since various other species of the genus (in other subgenera) also possess a mesonotal pattern of dark spots about the bases of the bristles/hairs, and the same pattern occurs in isolated species of



FIGS **1-2**—*D. garnetensis*, male: (**1**) external genitalia; (**2**) internal genitalia.

other genera; it has clearly evolved in a number of independent lines within the Drosophilidae. The closest relative of *D. garnetensis* within its group may, however, be *D. obsoleta* as both species occur in north Queensland (distributions are further discussed below).

Discussion

The *inornata* group contains 8 species of a predominantly southern Australian distribution. Since *Scaptodrosophila* is by far the largest and most widespread taxon and thus probably the oldest drosophilid radiation in Australia (Bock 1982), the *inornata* group may be an ancient element of the fauna. However, *D. inornata* Malloch, *D. collessi* Bock and *D. obsoleta* also occur in north Queensland. It appears most probable that the group originated in southern Australia, and that these species have subsequently been able to extend their ranges northwards while still maintaining their adaptation to temperate conditions by occupying successively higher altitudes. Of these 3 species, the most successful in extending its range northwards appears to have been *D. obsoleta*. This species may be collected in some numbers in southern Queensland open forests at mercury-vapour lamps; numerous specimens were also collected in a vertical transect at Mt Bellenden Ker, north Queensland, by a Queensland Museum group in 1981, although no specimens were recovered below 500 m. The new species described above is exceptional within the group in possessing no known populations of a more southerly distribution, although all specimens of the new species were collected at a high elevation. It is possible that *D. garnetensis* represents a northern speciation within the group, in which case its closest relative may indeed be *D. obsoleta*.

Ecologically, almost nothing is known of the *inornata* group species. *D. inornata* may be swept from tree-fern fronds in Victoria in considerable numbers, although searches have failed to produce any evidence that the larvae are associated with the tree ferns. Several specimens in the collection of the University of Queensland bear labels stating "emerged from fungi" in Lamington National Park rain forest; but there do not appear to be fungi in Victorian tree-fern forests sufficient to breed the large numbers of flies observed. It is possible that what is classified as "*D. inornata*" is a complex of 2 (or more) sibling species, but the various populations are morphologically uniform. The other species of the group have also been collected by sweeping or by other generalised methods which yield no indication of the flies' specific habitats. Attempts to culture the species have also proved almost entirely unsuccessful. Adult flies remain alive on standard laboratory media for a short time only and lay few, if any, eggs, although Grossfield (pers. comm.) has succeeded in obtaining a few short-lived F_1 adults in the case of *D. inornata*. The difficulty in culturing these species precludes genetic testing of such questions as the degrees of reproductive isolation among the various *D. inornata* populations.

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BOOK REVIEW

Integrated mosquito control methodologies, Vol. I: Experience and components from conventional chemical control. Marshall Laird and James W. Miles (Eds). Academic Press: London, 1983. Pp. 369. $65.

This volume of 15 chapters reviews an era of 40 years in the development and usage of synthetic organic chemical pesticides and the inherent resistance that appeared subsequently. The second volume to be published later will cover innovative approaches (e.g. biological, environmental) but will exclude genetical control which, in the editors' words, "have yet to yield practical contributions to mosquito suppression".

Section 1 on control technology contains 3 most competent chapters on principles of dispersal of insecticides, space sprays and the use of residual insecticides by Akesson (U.C., Davis), Pant (WHO, Geneva) and Fontaine (U.C., Davis) respectively. Consideration of nozzles and atomizers, collection and measurement of droplets, organisation and operation of programmes, safety precautions, the products used in various programmes plus assessment methods make this section most useful to both student and entomologist.

Section 2 (Control viewpoints) presents accounts of control in the People's Republic of China (Luh and Zhu, Inst. Microbiology and Epidemiology, Beijing), Japan (Kurihara, Teikyo Univ., Tokyo; K. Hattori, Hokkaido Inst. Publ. Hlth, Sapporo) and in the south-west Pacific (Sweeney, Army Malaria Research Unit, Ingleburn). Although residential spraying for malaria control provides a central theme, discussion of the development of "Community-based People's Organizations" in Japan is pertinent to the current World Health Organization promotion of voluntary participation in mosquito control.

Chapters 8 on insecticide resistance (Brown, Michigan State University) and 9 on DDT (Jukes, U.C., Berkeley) probably are the best in the book. Professor A. W. A. Brown's 75 p tome systematically reviews all aspects of insecticide resistance and undoubtedly will become a well-used reference source. I found the concise chapter in the "hanging" of DDT to be a gem, gleaned from everything from the popular press to scientific literature which provides an objective balance to Carson's "Silent Spring".

Section 4, "Problem solving under WHO leadership" proved disappointing as it lacked an all-embracing account of WHO methodologies, idealogies, problems and future aspirations. Rather, the 4 chapters under this heading provided, albeit most competently, esoteric and somewhat repetitive accounts of *Ae aegypti* control in Bangkok, *Cx quinquefasciatus* control in Burma (Mathis, WHO, Nigeria), *An aconitus* spraying in Indonesia (Shaw, WHO, Semerang) and of village-scale insecticide trials in Nigeria (Rishikesh, WHO, Geneva). Nevertheless, these will provide a useful reference base for these countries and they do provide an insight into the considerable investment that WHO made towards searching for candidate public health pesticides.

From the industrial viewpoint, the development of new insecticides, particularly for public health purposes, is becoming more difficult (Section 5). Chapters 14 and 15 detail research, development and marketing problems faced by Sumitomo (J. Hattori) and FBC (J. Goose) with respect to fenitrothion and bendiocarb respectively.

The volume is finalised with a useful appendix on the WHO pesticides evaluation scheme, a glossary of dubious value and a comprehensive index. I agree with Dr N. Gratz, Director, Division of Vector Biology and Control, WHO, Geneva who praised the book in the foreword. It provides a fine reference source for the researcher while it also contains chapters of value to students. I am continually amazed by Marshall Laird's versatility and was most impressed with his fine introduction and interesting illustrations that he dredged from the past.

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