

BEETLES (COL., SCARABAEIDAE)
IN A SOCIAL WASP NEST (HYM., VESPIDAE)
IN INDIA

BY ROBERT L. JEANNE & JAMES H. HUNT

Four live adults of the beetle *Campsiura javanica* (Gory & Percheron) (Scarabaeidae, Cetoniinae, Cremastocheilini) were discovered inside an active nest of the social wasp, *Ropalidia montana* Carl (Hym., Vespidae), in peninsular India. To our knowledge, this is the first record of this genus in association with a social insect. The collection was made in mid-August, 1990, in Mudumalai Wildlife Sanctuary, located in the western-most corner of the state of Tamil Nadu. The sanctuary includes an extensive belt of forest on a plateau at the base of the Nilgiri Hills. Rainfall varies from 200 cm at the western end of the sanctuary to 50 cm in the east. The nest containing the beetles was found near the centre of the sanctuary in open forest dominated by teak (*Tectona grandis*, Verbenaceae), at an elevation of approximately 1100 m.

We collected four wasp colonies but only one contained beetles. This nest was approximately 5 m above the ground on a twig of *Xeromphis spinosa* (Rubiaceae), a low understorey tree with slender, spiny twigs. The nest was 42 cm long x 27 cm in diameter and contained more than 32,000 adult wasps. It was collected by cutting the branch from which it hung and lowering the nest into a plastic bag. The wasps were anaesthetized with ether and shaken from the nest so that the nest could be dissected. The wasps are small for social wasps: body length approximately 6 mm.

The nest, constructed of a fine vegetable fibre, evidently plant hairs, contained 27 horizontal layers of brood comb enclosed in a thin envelope of the same material. The envelope consisted of several overlapping sheets, some of which concealed entrances that gave the wasps access to the interior. We discovered two of the beetles (anaesthetized) among the debris of envelope and comb material as we dismantled the nest for examination. The two remaining beetles were found between layers of comb in the upper portions of the nest. The beetles were 15–16 mm in length and were nearly as large as the space between combs. Comb where the beetles were found was filled with larvae and pupae, but we saw no evidence that any of the comb or wasp brood in the vicinity had been chewed or disturbed. Many of the combs also contained stored droplets of nectar. Details of the nest and its contents will be published elsewhere (Jeanne & Hunt, 1992). Neither of the two earlier published accounts of collections of nests of this wasp, both in peninsular India (Carl, 1934, 2 nests in December; Yamane *et al.*, 1983, 2 nests in December and January), mentions any other insects in the nests.

Larvae of the Cetoniinae feed on organic matter in the soil or in decaying wood; adults feed principally on pollen, nectar, and ripe fruit. These habits may well have been the basis for the frequent occurrence in the subfamily of association with social insects. Species in several genera have been recorded as inhabiting ant and termite nests (reviewed by Kistner 1982). In some cases [e.g. *Euphoriaspis hirtipes* (Horn) (Cetoniini) of the central U.S. (Ratcliffe 1976)] the main attraction is the organic debris, on which the beetle larvae feed, but in others [e.g. *Cremastocheilus* spp. (Cremastocheilini)] the adults appear to be obligate predators on ant larvae (Cazier & Mortenson 1965; Hölldobler & Wilson 1990) or on termites (Brauns 1912). Adults of *Potosia*, *Euphoria*, *Protaetia* (all Cetoniini) and *Hoplostomus fuliginosus* Olivier (Cremastocheilini) enter bee hives, where they feed on honey and pollen (reviewed by Caron 1990). *H. fuliginosus* appears to be predaceous as well; in South Africa adults have been reported to eat the brood of honey bees and the pupae of *Belonogaster petiolata* (Degeer), a social wasp with small colonies and open nests (Johannsmeier 1980; Keeping 1984).

Specimens are deposited in the H. and A. Howden (HAHC) collection, Carleton University, Ottawa, Canada K1S 5B6, the Insect Research Collection, University of Wisconsin, Madison, 53706, and in the Museum of Natural History, Department of Biology, University of Missouri-St Louis.

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R.L.J., Department of Entomology, University of Wisconsin, Madison, WI 53706, U.S.A.

J.H.H., Department of Biology, University of Missouri, St Louis, MO 63121, U.S.A.
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REVIEWS

'HANDBOOK FOR THE IDENTIFICATION OF LEAFHOPPERS AND PLANTHOPPERS OF RICE'. By M.R. WILSON & M.F. CLARIDGE. C.A.B. International, Wallingford, 160 pp., illustrated, paperback. 1991. Price £30.

Leafhoppers and planthoppers are abundant on rice throughout the world but their identification has been impaired by the lack of keys and detailed descriptions. In addition, the taxonomic literature relating to these insects is scattered in many journals and monographs published over many years in various languages. The authors of this book became aware of these problems when working on *Nilaparvata lugens*, one of the major rice pests in S.E. Asia. They have sought to bring together our knowledge of the leafhoppers and planthoppers which have been found on rice (86 are included) together with sufficient details of their morphology to allow for their identification by both field worker and specialist alike. On both counts the book is an undoubted success.

There are three main sections and two appendices, one appendix giving a key to immatures, the other on collection and preservation. The first main section gives information on the rice crop and the viruses which leafhoppers and planthoppers transmit to rice and explains what these insects are, with keys to separate the main groups including a useful pictorial key. The second and third sections deal with the rice leafhopper and planthopper fauna, geographically and taxonomically respectively, with keys to species and, in the latter section, detailed accounts of individual genera and species are also given. This arrangement has meant that some species are referred to and figured in more than one section, but this is probably justified on the basis of user-friendliness. Similarly, to help with identifying at all levels, the book contains many diagrams including useful whole insect drawings and, as a bonus, three excellent colour plates of the commonest species *in situ* are provided.

The book provides a world coverage and probably most records are included, but not all, as under *Balclutha* the reader is referred to Knight (1987, Leafhoppers of the grass-feeding genus *Balclutha* (Homoptera, Cicadellidae) in the Pacific region, *J. Nat. Hist.*, **21**: 1173-1224), in which I found *B. alstoni* and *B. rieki*, recorded on rice, but omitted from the book. Clearly there is a problem in this type of work in knowing which records are important enough to include. Often a taxonomist has access to only a limited number of museum specimens or records in the literature. However, we learn that many of the included species have been collected on rice by the authors themselves.

I found only a few errors in the book. Firstly, the Cicadomorpha subfamily plate is not referred to in the text and is more complete than is necessary, as the included Cicadoidea and Membracoidea are not found on rice. Secondly, the Hecalini are included as a subfamily of cicadellids whereas they are now generally considered as a tribe of the Deltocephalinae. Lastly, the following figure number corrections should be noted: page 8, second column, lines 2-3, for '1.1-1.3' read '1.4-1.6'; ditto, line 7, for '1.7-1.4' read '1.1-1.3'; page 24, first column, line 11, for '17' read '2.17'; page 28, second column, line 11, delete '(Figs 2.47-2.49)'; ditto, line 12, for 'Fig. 2.45', read 'Figs 2.47-2.49'; page 109, second column, line 3, for '3.380' read '3.379'; ditto, line 7, for '3.381' read '3.380';