THE FIRST RECORD OF THE EULOPHID GENUS *AZOTUS* FROM INDIA (CHALCIDOIDEA: HYMENOPTERA).

By K. B. LAL, *M.Sc. (Alld.), Ph.D. (Edin.), F.R.E.S., Second Assistant Entomologist, Imperial Agricultural Research Institute, New Delhi.*

(Contribution from the Laboratory of the Imperial Entomologist.)

INTRODUCTION.

The genus *Azotus* was created by Howard (1898), who described the type-species, *A. marchali*, from two specimens, one reared by Prof. P. Marchal of Paris from *Diaspis ostreaeformis* on pear and another from *Aspidiotus nerii* on *Baloghia lucida* in Sydney, N. S. W Since then a dozen more species have been known from China, Africa, Southern Europe, Australia, North America, Java and Japan. So far no species has been recorded from India.

The species of *Azotus* are pre-eminently parasites of scale insects, and there is no record of their having been bred from a host other than the Coccidae. The present example, which is specifically new, is, therefore, interesting also from the fact that it provides the first record of a species of *Azotus* reared from an Aleurodid host. The females of Coccidae, which are the forms usually met with, are often not very different in appearance and habits from the full grown nymphs of Aleurodidae and, as such, an insect that is used to parasitising the former should not have much difficulty in attacking the latter, provided other circumstances are favourable.

The whitefly, *Aleurolobus barodensis*, the parasite of which is described hereafter, is distributed all over India and has been reported to do serious damage to sugarcane in the Central Provinces, Bihar, Orissa, Bengal and the United Provinces, being specially destructive to ratoon crop. The nymphs, which are responsible for most of the damage, fix themselves to the undersurface of the leaves and injure the plant by desapping. As they grow they become covered with a white waxy meal which helps to protect them from the action of insecticides. Spraying, under the best of circumstances, is not very satisfactory against a sugarcane pest and, therefore, the discovery of an efficient parasite of the whitefly of sugarcane is a distinct need. So far, two more species of Eulophidae are known to parasitise this insect; these are still unidentified. According to Karam Singh (1931) puparia and nymphs of whitefly are also liable to be attacked by a fungus, and it seems that two species of fungi are involved: 1. *Pythuim* sp., which kills the insect, and 2. *Cladosporium* sp., which secondarily grows on it after death.

SYSTEMATIC DESCRIPTION.

Two descriptions of the genus are available. The original one by Howard (*op. cit.* p. 138) is of the male and in this the antennae are said to be 8-jointed with a 2-jointed club. In the other description, by Schmiedeknecht (1909), the antennae are described as 7-jointed

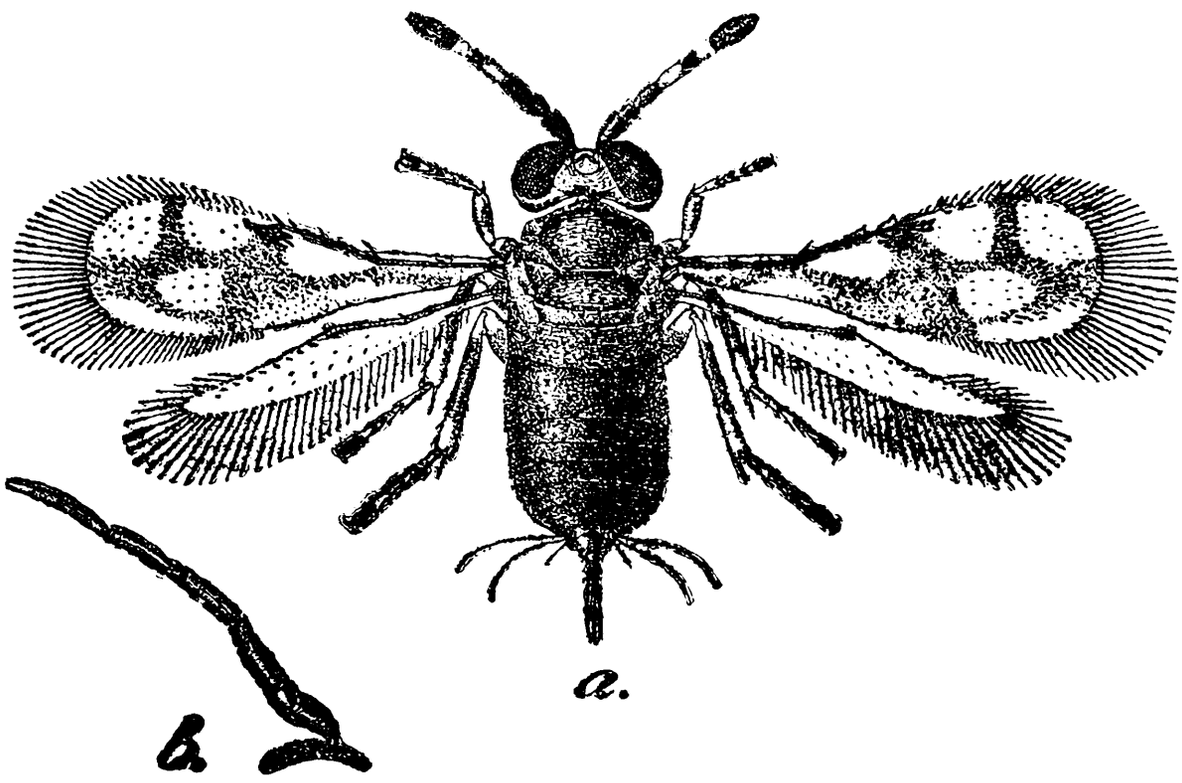
with the club 1-jointed. This discrepancy in an important diagnostic character results from the fact that in some species (or possibly specimens only) the suture between the two joints of the club is obscure (as in the new species to be described below) or even absent (as in *A. silvestrii* Compere). Schmiedeknecht also mentions the ' Endsporn der Mittelschienen halb so lang als der Metatarsus ; der Metatarsus nicht viel kurzer als die folgenden Glieder zusammen' This, judging by the specimens in front of me, does not seem to be correct. There is also a slight discrepancy about the knob of the stigmal vein. Howard describes it ' not large ' and Schmiedeknecht ' grossem runden knopf ' The following description of the genus is based on the descriptions given by Howard (*loc. cit.*) and by Schmiedeknecht (*op. cit.*) :—

Genus **Azotus** Howard.

Antennae 7-8 jointed, club 1-2 jointed, pedicel smaller than first funicle joint, third funicle joint much shorter than other funicle joints. Wings without oblique hairless line, marginal vein a trifle shorter than sub-marginal, stigmal vein well marked, with a fairly large knob, descending at an angle of about 30° into disc of wing, post-marginal vein absent, forewings with long marginal cilia regularly increasing in length from point just beyond stigmal vein to anal angle. Middle and hind tibiae each with a rather long apical spur, that on middle tibiae longer, tarsi 5-jointed.

Azotus delhiensis, sp. nov.

Female.—Length without ovipositor 0·76 mm. ; exerted ovipositor 0·14 mm. ; width across mesothorax 0·26 mm. *Body* dark brown ;



Azotus delhiensis, sp. nov. × 60.
a. Adult female ; *b*. Antenna of male.

eyes deep salmon-red, dorsum of thorax sub-opaque, second and fourth funicle joints of antennae, tegulae, parts of femora and tibiae and first four tarsal joints whitish to pale yellowish, ovipositor yellow, ovipositor sheath brown.

Head transverse, slightly narrower than thorax, eyes completely encircling head and converging at vertex; antennae 8-jointed, scape at least twice as long as broad at apex, broadening evenly but markedly from base to apex, pedicel not much longer than wide, third funicle joint about one third the length of fourth, club 2-jointed, suture between two joints not distinct, each joint longer than fourth funicle joint. *Forewings* about three times as long as broad, submarginal vein slightly longer than marginal, with a solitary bristle near its junction with latter, stigmal vein making an angle of about 25° with wing margin and with a prominent knob, marginal cilia longest near anal angle, forewing traversed by narrow infuscated bands running lengthwise and transversely; infuscated area beset with strong black bristles, a number of similar bristles converging towards knob of stigmal vein. Middle tibial spur almost equal to first tarsal joint, which is much shorter than the last four tarsal joints taken together. *Abdomen* broader than thorax, boat-shaped behind, ovipositor exerted at least half the length of abdomen.

Male.—Length 0·62 mm.; width across mesothorax 0·24 mm. Antennae uniformly light brown. Smaller than female. Eyes not encircling head, antennae 8-jointed, scape thrice the length of pedicel, first and second funicle joints slightly longer than scape, third funicle joint very small, about one sixth the length of fourth, club 2-jointed. Infuscated bands on forewings faint, knob of stigmal vein not very prominent. Other characters as in female.

Described from three female and two male specimens reared from nymphs of *Aleurolobus barodensis* Mask., infesting sugarcane at Buldi-Karnal, Delhi.

Types deposited in the Pusa Collection in the laboratory of the Imperial Entomologist, New Delhi.

ECONOMIC STATUS.

The economic status of the species of *Azotus* is not quite settled. Although they are known to parasitise scale insects, there are two cases in which it was doubted if they did not develop at the expense of other primary parasites also present with them and thus deserve the status of a secondary parasite. Compere (1926) in describing a new species, *A. silvestrii* reared from the Florida Red Scale, *Chrysomphalus aonidum* Linn., at Shanghai, remarks that the specimens appeared in a cage in which *Aphelinus diaspidis* How., was also present. He thinks it possible, therefore, that *A. silvestrii* reproduced in this cage at the expense of the primary parasites. The second case is of *A. americanus*, a new species from Delaware, described by Dozier (1928), who reports that his specimens were reared from branches of *Sorbaria stellipila* heavily infested with the San Jose Scale, *Aspidiotus perniciosus* Comst., which produced numbers of its primary parasite, *Prospaltella perniciosi* Tower. He,

therefore, suggests the possibility that the *Azotus* may have been the secondary parasite upon the beneficial *P. perniciosi.*

If these suspicions prove well founded, at least some members of the genus *Azotus* will have to rank as injurious insects, parasitising beneficial primary parasites of pests, instead of their being themselves primary parasites, and thus useful. Further elucidation of this point, specially from regions where *Azotus* spp. occur and are likely to be of some value in controlling pests, will be awaited with interest.

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