

NOTES ON INDIAN SPECIES OF *COMPERIELLA* (HYMENOPTERA : ENCYRTIDAE)

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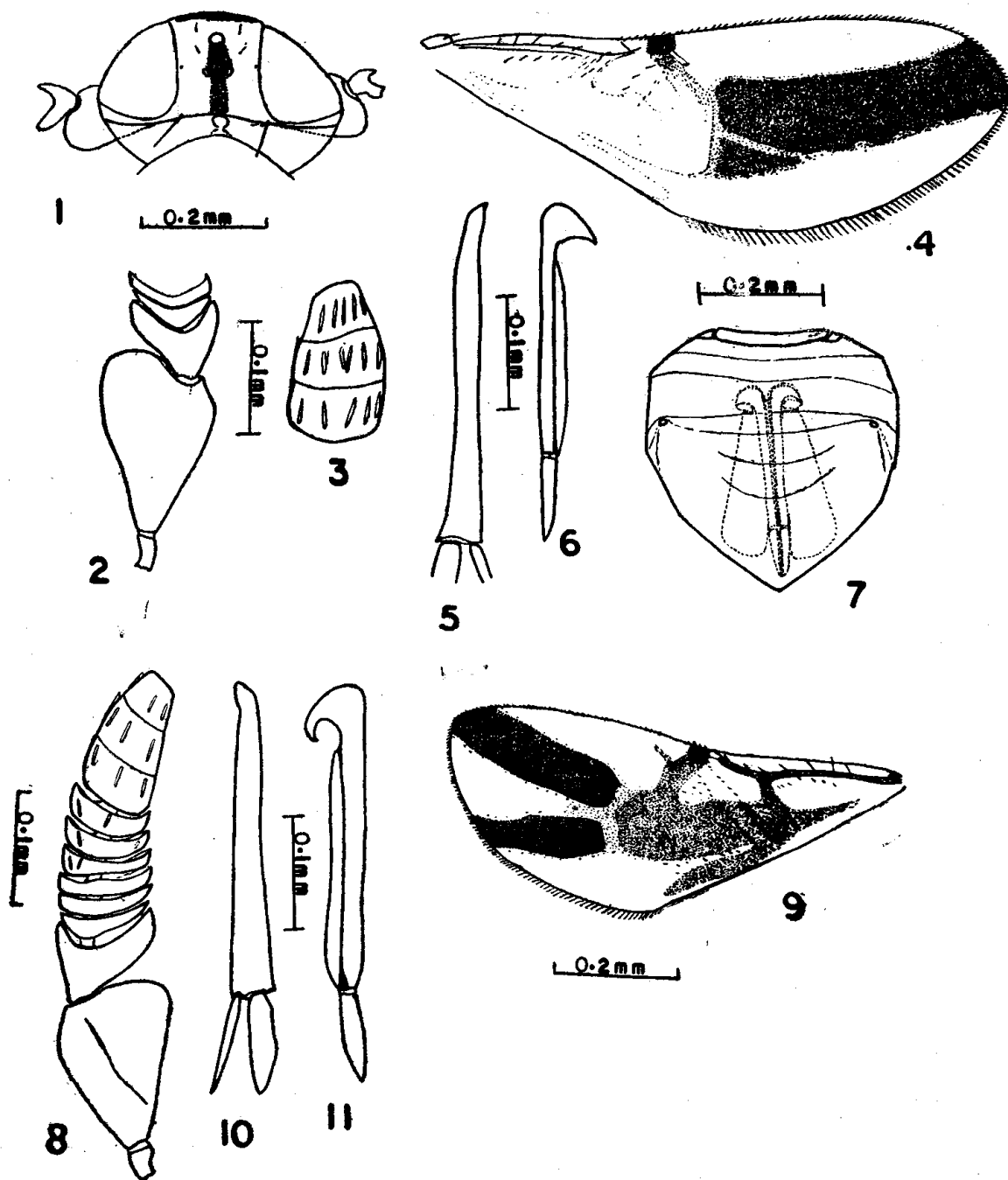
ABSTRACT. Three Indian species of the encyrtid genus *Comperiella* Howard (*C. indica* Ayyar, *C. lemniscata* Compere and Annecke, *C. aspidiotiphaga* Subba Rao) are considered in this paper, Holotype female of *indica* has been examined. It is suspected that the material bred from *Aonidiella orientalis* (Newst.) and referred to *bifasciata* Howard and *unifasciata* Ishii belongs respectively to *lemniscata* and *aspidiotiphaga*. *C. trifasciata* Saraswat is considered out of place in *Comperiella*. A key to the known species of the genus is given.

Ayyar (1934) recorded *Comperiella* Howard from India and described *C. indica* Ayyar based on material reared from the tamarind scale, *Aspidiotus tamarindi* Green. Glover (1935) reported *C. bifasciata* Howard as a parasite of *Aonidiella orientalis* (Newst.). Compere and Annecke (1961) considered *Comperiella* species bred from *A. orientalis* as distinct from *bifasciata* both on biological and morphological grounds, and described *C. lemniscata* for material bred from this diaspid. Agarwal (1965) gave detailed redescriptions of what he considered to be *bifasciata* and *unifasciata*, both of which reared from *A. orientalis*. Subba Rao (1966) described *C. aspidiotiphaga* for specimens reared from *Aspidiotus* sp.

Comperiella indica has not been collected since its description in 1934 and its taxonomic position remained uncertain. The holotype female of this species has been examined and compared with specimens of *C. lemniscata* and *C. aspidiotiphaga*. This comparison has revealed interesting characters pertaining to the antennae and the female external genitalia. On the basis of these characters a revised key to the species is given incorporating some of the characters used by Compere (1926), Tachikawa (1963), Agarwal (1965) and Subba Rao (1966).

The recently described species *C. trifasciata* Saraswat (in Saraswat and Mukerjee, 1975 : 51-53, ♀, fig. 10. A-K; Marcara, Karnataka; host unknown) perhaps does not belong to *Comperiella*. The fore wings are more or less similar to those of that genus, but the stigmal vein is swollen. The shape of the head, position of the antennal sockets (near facial margin) and shape of the antennal components suggest a new genus near *Eusemion* Dahlbom.

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Figs. 1-7. *Comperiella indica* Ayyar, Holotype ♀ : 1, Head dorsal; 2, Scape, pedicel, F1 and F2 of right antenna; 3, Club of left antenna; 4, Fore wing, infuscation in basal part not clear in the type as the wings are folded backwards over the body; 5, Middle tibia; 6, Second valvifer and third valvula; 7, Gaster dorsal showing position of the ovipositor.

Figs. 8-11. *Comperiella lemniscata* Compere and Annecke, ♀ : 8, Antenna; 9, Fore wing; 10, Middle tibia and part of tarsus; 11, Second valvifer and third valvula.

1. *Comperiella indica* Ayyar (Figs. 1-7)

Comperiella indica Ayyar, 1934, *Rec. Indian Mus.*, 36 : 219-221. ♀, ♂, figs., key; Glover, 1935, *J. Bombay Nat. Hist. Soc.*, 38 : 153; Mani, 1938, *Cat. Indian Ins., Chalcidoidea*, 23 : 87; Pruthi and Mani, 1940, *Misc. Bull. I.C.A.R.*, No. 30 : 14. fig., host; Agarwal, 1965, *Acta Hymenopt.*, 2 (2) : 77. key; Subba Rao, 1966, *Mushi*, 39 : 36. key.

Material examined : Holotype female on slide labelled "TYPE ♀, *Comperiella indica* Ramk." and "S. INDIA, COIMBATORE, *Comperiella indica* par. on *Aspidiotus tamarindi*, RAMAKRISHNA COLL." Z.S.I. collection No. 869/H3.

The original description is sufficient to recognise this species. However, the following notes and accompanying illustrations drawn from the type specimen would be useful in distinguishing this species from the other species from India. The males were described and figured by Ayyar, but these are not present in Z.S.I. collections (Kuldip Rai, *per comm.*).

Female : The distinguishing character, as already mentioned by Ayyar (1934) is the single fascia of the fore wing. There is a small triangular patch posterior to and at base of this fascia (Fig. 4). In the type the antennae beyond the pedicel are mounted in such a way as to prevent actual measurements of the segments, but so far as can be judged from the type and the figure given by Ayyar, differ from the other species in several respects : Scape nearly triangular with the antero-dorsal more or less flattened margin about one-fourth of the rest of dorsal margin and about one-half of dorsal length of pedicel; F1 as wide as F2; club about as wide as F1 and only slightly narrowed to apex. Ovipositor subequal in length to middle tibia (Figs. 5 and 6), and not exerted at apex (Fig. 7).

Host : *Aspidiotus tamarindi* Green.

Distribution : India : Tamil Nadu.

2. *Comperiella lemniscata* Compere and Annecke (Figs. 8-11)

Comperiella lemniscata Compere and Annecke, 1961, *J. Ent. Soc. S. Afr.*, 24 : 32-33. ♀; Compere, 1961, *Hilgardia*, 31 : 229, 267. biology.

Comperiella bifasciata Howard : Glover, 1935, *J. Bombay Nat. Hist. Soc.*, 38 : 153; Pruthi and Mani, 1940, *Misc. Bull. I.C.A.R.*, No. 30 : 14 fig.; Agarwal, 1965, *Acta Hymenopt.*, 2 (2) : 80-82. ♀, ♂. figs., key; Agarwal, 1969, *Indian J. Ent.*, 31 : 48-52. biology; Hayat, Alam and Agarwal, 1975, *Alig. Musl. Univ. Publ. (Zool. Ser.) Ind. Ins. Type*, 9 : 29 (misdet).

Material examined : INDIA : RAJASTHAN : Bisalpur (District Jodhpur), 36 ♀♀, 26 ♂♂, vii.1974 (DRS. Reg. No. A/625), ex *Aonidiella orientalis* (Newst.), Coll. M. Hayat.

Remarks : In the above specimens (females) the distance between the lateral ocelli varies from one to nearly two diameters of an ocellus, and in some specimens the median brown patch on the pronotal collar is very faint so that in certain lights a single broad white patch is seen.

Biologically *lemniscata* is distinguished being exclusively parasitic upon *Aonidiella orientalis*. Compere (1961: 229) states that colonies of this species of *Comperiella* were repeatedly released in the cages housing the California red scale (*Aonidiella aurantii* Mask.), but the parasites never reproduced in these scales.

The specimens bred from *A. orientalis* and recorded under the name *bifasciata* by Glover (1935), Agarwal (1965) and Hayat *et al.* (1975) without any doubt belong to *lemniscata*. Attention is also drawn to the figure of *bifasciata* given by Pruthi and Mani (1940 : fig. 27) which appears to be that of *lemniscata* as the species is understood here.

Male : Similar to males of *bifasciata* (as illustrated and described by Tachikawa, 1963. See also Agarwal, 1965), so nothing can be added here that does not apply equally well to males of that species.

Host : *Aonidiella orientalis* (Newst).

Distribution : India : Bihar, Maharashtra, Rajasthan, Uttar Pradesh. Pakistan : Peshawar. China : Macao, Canton, Hainan Island.

3. *Comperiella bifasciata* Howard

Comperiella bifasciata Howard, 1906, *Ent. News*, 17 : 121-122. ♀; Mani, 1938, *Cat. Indian Ins.*, Chalcidoidea, 23 : 86. catalogue, host *Chrysomphalus* sp.; Subba Rao, 1966, *Mushi*, 39 : 135. key, host *Aonidiella aurantii*. (Annecke and Insley, 1971; Peck, 1963 and Tachikawa, 1963, for detailed bibliography).

The literature on this species is very extensive, but the following observations be made : Under the name *C. bifasciata* are recorded specimens bred from several diaspid hosts such as, *Aonidiella aurantii* Maskell (China, Japan, India, U.S.A.), *A. citrina* Coquillett (U.S.A.), *A. orientalis* (Newstead) (India), *A. taxus* Leonardi (Japan), *Aspidiotus cryptomeriae* Kuwana (Japan), *A. destructor* Signoret (Fiji, Japan), *Chrysomphalus bifasciculatus* Ferris (Japan, U.S.A.), *C. dictyospermi* Morgan (China), *C. ficus* Ashmead (China, Taiwan, U.S.A., Java, Mauritius, South Africa), *Nuculaspis abietis* Schrank (U.S.S.R.), *Quadraspidotus gigas* Thiem and Gerneck (U.S.S.R.), *Hemiberlesia rapax* Comstock (Hawaii), *Aspidiotus* sp. (Hawaii), *Chrysomphalus* sp. (India).

Biological observations of Flanders (1953) and others (noted in Peck; 1963 and Tachikawa, 1963) have shown that there are at least three host-determined races (sibling species!) of *C. bifasciata* : one from Taiwan which does not develop in the California red scale (*Aonidiella aurantii*); one from Japan, which rarely develops in California red scale; and one from China, which does so very readily. Annecke (1962) recorded the Durban strain (Host *C. ficus*) which also fails to develop on *A. aurantii*. One such host-determined 'race' (host, *Aonidiella orientalis*) has since been described as a distinct species, *C. lemniscata* by Compere and Annecke (1961). Compere (1961) states that this species was not recognised until *Comperiella* specimens bred from *A. orientalis* were compared with *bifasciata* specimens, and then the characters earlier considered as of no

taxonomic value were found to be of diagnostic value for *lemniscata*. That more than one species exists under the name *bifasciata* is evident from the published descriptions and illustrations. For example, compare the figure given by Compere (1961 : Fig. 19) with that given by Tachikawa (1963 : Fig. 49), especially the arrangement of the ocelli and the width of the band on the fronto-vertex. In view of these, a thorough study on a world basis is urgently required to solve the problem of host-determined races, strains, or sibling species in *bifasciata*, and to find out a sound morphological basis for recognising these races etc. as revealed by the work of Compere (1961). Since no material of *bifasciata* is available to me I can not give a definite opinion on this species.

As mentioned elsewhere in this article, specimens bred from *A. orientalis* and recorded under the name *bifasciata* should be placed in *lemniscata*. Those recorded by Mani (1938) and Subba Rao (1966) respectively from *Chrysomphalus* sp. and *A. aurantii* are taken as correctly determined.

Hosts : *Aonidiella aurantii* Maskell, *Chrysomphalus* sp. (India).

Distribution : India : Delhi, Karnataka.

4. *Comperiella aspidiotiphaga* Subba Rao (Figs. 12-15)

Comperiella aspidiotiphaga Subba Rao, 1966, *Mushi*, **39** : 136-137. ♀, figs, key.

Comperiella unifasciata Ishii : Agarwal, 1965, *Acta Hymenopt*, Tokyo, **2** (2) : 78-80. ♀, figs, key; Hayat, Alam and Agarwal, 1975, *Alig. Musl. Univ. Publ. (Zool. Ser.) Ind. Ins. Type*, **9** : 29 (misdet.)

Material examined : INDIA : UTTAR PRADESH : Hardoi, 27 ♀♀, No. 391. MB, x-xi.1969, ex *Aonidiella orientalis* (Newst.) on *Dalbergia sissoo*, Coll. M. Hayat. RAJASTHAN, Bisalpur, 1 ♀, DRS. Reg. No. A/624, vii.1974, ex *A. orientalis*, Coll. M. Hayat.

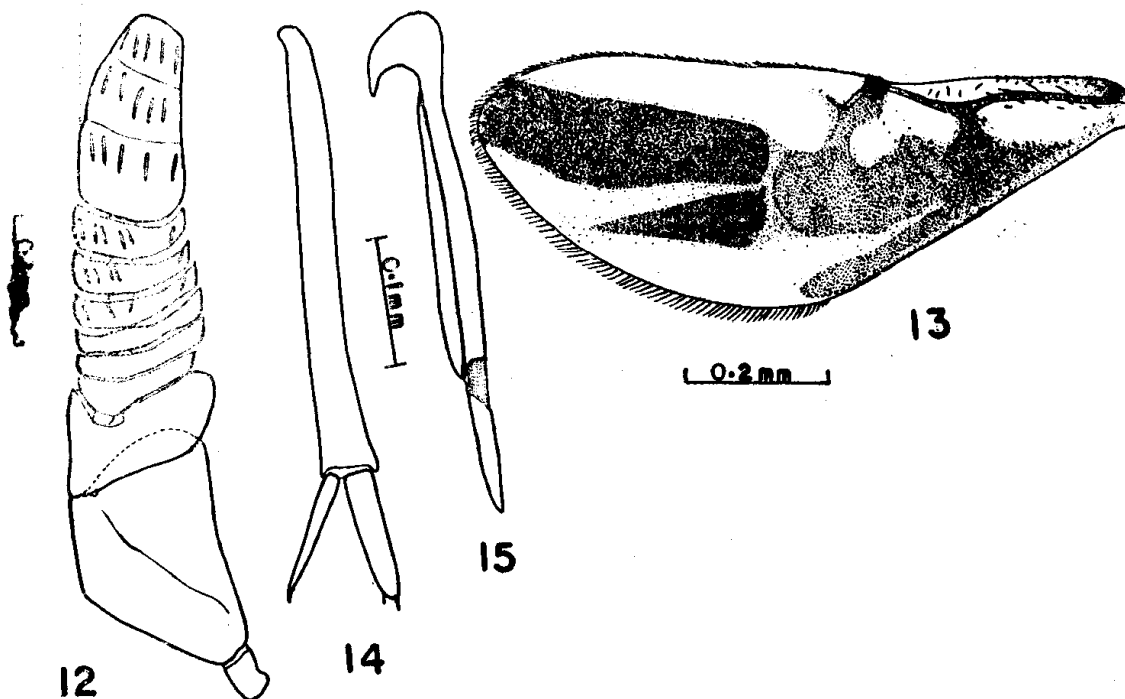
The species has been adequately described by Subba Rao (1966), in spite of some discrepancies in his key, description and figures. Illustrations of the antenna, fore wing, middle tibia and ovipositor together with some additional characters in the key are given here to remedy his discrepancies. Antenna, wing venation and genitalia of male are illustrated by Subba Rao (1966 : Figs. 11-13), but not described.

The species is stated to have been bred from '*Aspidiotus* sp. on *Dalbergia sissoo*' by Subba Rao. So far as I know the diaspid found on *D. sissoo* in Uttar Pradesh (Aligarh, Hardoi) and Rajasthan (Jaipur) is *Aonidiella orientalis* (see Hayat *et al.*, 1975).

C. aspidiotiphaga, like *lemniscata*, appears to be exclusively parasitic up on *A. orientalis*. The specimens bred from this diaspid and referred to *unifasciata* by Agarwal (1965) and Hayat *et al.* (1975) should be placed under this species.

Hosts : *Aonidiella orientalis* (Newst.), (?) *Aspidiotus* sp. on *Dalbergia sissoo*.

Distribution : India : Delhi, Rajasthan, Uttar Pradesh.



Figs. 12-15. *Comperiella aspidiotiphaga* Subba Rao, ♀ : 12, Antenna; 13, Fore wing; 14, Middle tibia and part of tarsus; 15, Second valvifer and third valvula.

5. *Comperiella unifasciata* Ishii

Comperiella unifasciata Ishii, 1925, *Dept. Finance Japan Imp. Plant Quar. Serv., Tech. Bull.*, 3 : 25-26. ♀, fig; Saraswat and Mukerjee, 1975, *Mem. School Ent. St. John's College, Agra*, 4 : 54. figs (See Tachikawa, 1963, for detailed bibliography).

The species is known to parasitise *Pseudaonidia duplex* Cockerell in Japan and *Aspidiotus destructor* Signoret in Fiji, Indonesia and Java. Both these diaspids are known to occur in India, but so far there is no report of any *Comperiella* species from these scales. However, the illustrations given for *unifasciata* (Loc. : Agra; host, unknown) by Saraswat and Mukerjee (1975) agree with that species, and this appears to be the only record of this species from India. Earlier record of *unifasciata* from India (Host : *A. orientalis*) undoubtedly refer to *aspidiotiphaga*. I have not seen specimens of *unifasciata*, and the species is placed in the key on the basis of the published literature (Tachikawa, 1963).

Hosts : *Pseudaonidia duplex* Cockerell, *Aspidiotus destructor* Signoret.

Distribution : India : Uttar Pradesh. Japan. Fiji. Java. Indonesia.

KEY TO THE SPECIES OF *COMPERIELLA*^{1,2} HOWARD, ♀♀

1. Fore wing with one fascia, the second fascia indicated by a small, triangular patch placed at base of the first fascia; pronotal collar with a solid white patch in middle; mesoscutum with a median longitudinal bluish-green band; antennal scape nearly triangular with the more or less flattened antero-dorsal margin about 0.25 the rest of dorsal margin, and one-half of dorsal length of pedicel; ventral margin of pedicel convex, F1 about as wide as F2; club, at widest, as wide as F1 and only slightly narrowed to apex; ovipositor subequal in length to middle tibia and not exerted at apex. India : Coimbatore 1. *C. indica* Ayyar
Fore wing with two fasciae, the lower fascia variable in extent; ovipositor, at least in *lemniscata* and *aspidiotiphaga* longer than middle tibia and slightly exerted at apex; other characters disagreeing 2
2. Fore wing with the two fasciae strongly divergent, the lower fascia extending to wing margin; collar of pronotum with two submedian white patches, occasionally the brownish patch separating the two white patches faint or even absent so that a single white patch is seen; scape subtriangular with the antero-dorsal more or less flattened margin short, less than 0.50 the rest of dorsal margin and distinctly shorter than dorsal length of pedicel; ventral margin of pedicel convex 3
Fore wing with the two fasciae more or less parallel, or only slightly divergent, the lower fascia not extending to wing margin; collar of pronotum with a solid, broad, white patch in middle; scape tending to subtrapezoidal, with the antero-dorsal more or less flattened margin more than 0.50 the rest of dorsal margin and as long as dorsal length of pedicel; pedicel broad, nearly rectangular 4
3. Lateral ocelli two ocellar diameters apart and the ocellar space equal to ocellular space (but see Tachikawa, 1963 : Fig. 49); dark band on frontovertex wider; mesoscutum with the median longitudinal greenish band broadly interrupted by cupreous band along the midline; antennal club as wide as F1 and only slightly narrowed to apex; tibial spur of middle leg distinctly longer than basitarsus (Compere, 1961 : Fig. 19). China; Fiji; Taiwan; Hawaii Islands; India; Japan; Java; Mauritius; South Africa; U.S.A.; U.S.S.R. 3. *C. bifasciata* Howard
Lateral ocelli about one ocellus diameter apart (more than one but decidedly less than two, diameters in some specimens), much closer together than to eye margins; dark band on frontovertex narrow; mesoscutum with the median longitudinal bluish-green band not interrupted by cupreous along the mid-line; club slightly narrower than F1 and strongly narrowed to apex; tibial spur of middle leg subequal to basitarsus. India : Bihar, Maharashtra, Rajasthan, Uttar Pradesh; Pakistan : Peshawar; China : Macao, Canton, Hainan Island 2. *C. lemniscata* Compere and Annecke
4. Fore wing narrow, not less than three times as long as wide, with the lower fascia short, stopping far mesad of wing margin; the hyaline space between the basal infuscation and the fasciae strongly angulated in the middle; F1 about as wide as F2; club appreciably narrower than F1. Japan; Fiji; Indonesia; Java; India : Uttar Pradesh 5. *C. unifasciata* Ishii
Fore wing comparatively broad, about 2 2/3 times as long as wide, with the lower fascia long, stopping only a little mesad of wing margin; the hyaline space between the basal infuscation and the fasciae straight; F1 distinctly narrower than F2; club only slightly narrower than F1. India: Delhi, Rajasthan, Uttar Pradesh 4. *C. aspidiotiphaga* Subba Rao

¹ *C. eugeniae* Risbec and *C. pia* (Girault) are not included in the key. These are probably synonyms of *bifasciata* (see Annecke and Insley, 1971; Tachikawa, 1963).

² The recently published paper by Prinsloo and Annecke (1976, *J. Ent. Soc. S. Afr.* 39 : 185-187) was available to me when the present paper was in press. The authors described a new species *C. ponticula* in that paper. However, that species is quite distinct by the shape and infuscation of fore wings and presence of lamelliform setae at apex of the scutellum.

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