

## SOME INDIAN SPECIES OF *ANASTATUS* (HYMENOPTERA : CHALCIDOIDEA, EUPELMIDAE)

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**ABSTRACT.** The paper deals with three Indian species of the eupelmid genus *Anastatus* Mots. : *A. acherontiae*, *A. tenuipes* and *A. ramakrishnai*. The last named was originally described in *Neanastatus* Girault, and is here transferred to *Anastatus* as a new combination and the males of this species recorded. The systematic position of *A. dentatus* is discussed. All the species are illustrated and some hitherto undescribed characters noted. A key and host-parasite list to the known species are also given.

Species of *Anastatus* Motschulsky are parasitic chiefly on the eggs of insects. So far 9 species of this genus have been recorded from India. The author has been collecting parasites on various insects and during these investigations three species of this interesting genus have been collected in Rajasthan, Punjab and Maharashtra. All the three species were reared from the eggs of insects. A key to all the species known from India is given here besides the host-parasite list. The present state of our knowledge on the Indian species of *Anastatus*, which contains a large number of species with world-wide distribution, makes it rather difficult to distinguish some of our species from those recorded from the Central Asian part of the U.S.S.R. In the absence of the facility to examine type-specimens, it is not possible from the literature to differentiate *A. ramakrishnai* from *A. japonicus* Ashmead, and *A. acherontiae* from *A. interruptus* Nikol'skaja. Even among the Indian species it is difficult to distinguish between *A. ramakrishnai* and *A. dentatus*, the reasons for which are explained in the text.

### **Anastatus** Motschulsky

*Anastatus* Motschulsky, 1860, *Études Ent.*, 8 : 116 (1859). Type-species : *Anastatus mantoidae* Mots.; monobasic.

The genus is well-known, and its representatives easily identified; so nothing more need be added here by way of generic characters. However, some new generic characters concerning female genitalia and subgenital plate are being described as under :

Subgenital plate extending a little beyond the middle (but never to apex) of gaster so that distal part of the ovipositor free. Posterior margin of subgenital plate rounded, with an inverted U-shaped notch in the middle,

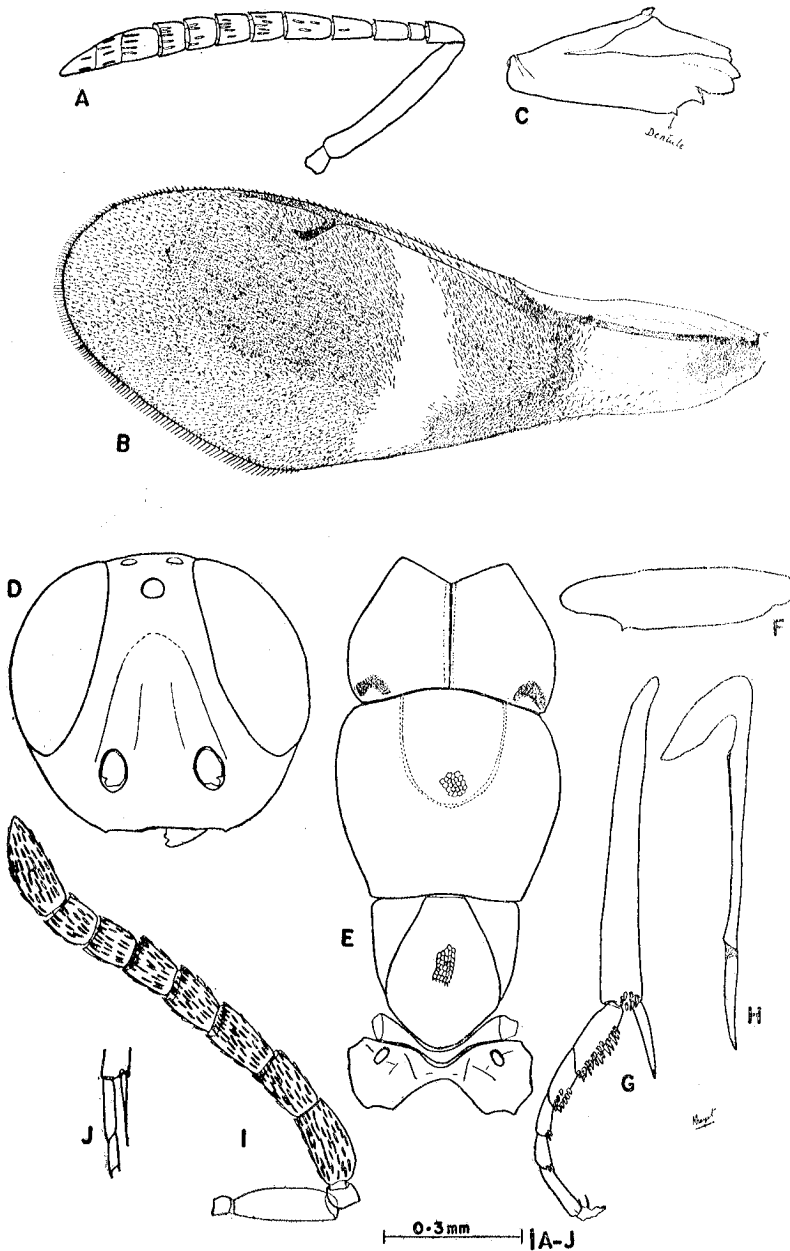


Fig. 1A-J. *Anastatus ramakrishnai* (Mani) (A-C from the type female): A, antenna, ♀; B, fore wing, ♀; C, fore femur, ♀; D, head frontal aspect, ♀; E, thorax dorsum, ♀; F, fore femur, ♀; G, middle tibia and tarsus, ♀; H, second valvifer and third valvula; I, antenna, ♂; J, part of middle leg, ♂.

anteriorly bilobed and each lobe with antero-lateral apodeme. Inner plates of ovipositor with a ridge along outer margin, the third valvulae movably articulated with the plates; outer plates of ovipositor narrow at base, gradually expanded behind and with a ridge along outer margin.

**1. *Anastatus ramakrishnai* (Mani), comb. nov. (Fig. 1 A-J)**

*Neanastatus ramakrishnai* Mani, 1935, *Rec. Indian Mus.*, 37 : 255-6, Fig. 7, ♀, key.

Type ♀, India : Howrah near Calcutta (Z.S.I.); Mani, 1938, *Cat. Indian Ins.*, 23 : 81.

*Material examined*: INDIA : WEST BENGAL : Howrah, 1 ♀ (holotype) 17.iii.1934, No.  $\frac{882}{H3}$  (Z.S.I.).

Additional specimens : MAHARASHTRA : Nasik Road, 7 ♀♀, 19 ♂♂ (No. 146.M), 15.x.1967, ex lepidopterous eggs on *Anona squamosa*, M. Hayat; Shivaji Nagar, Poona, 6 ♀♀ (No. 170.M), 19.x.1967, ex lepidopterous eggs, M. Hayat. Material in Zoological Survey of India, Calcutta, Desert Regional Station, Z.S.I., Jodhpur and in Hayat collection.

*Neanastatus ramakrishnai* : Type female examined by me. It is a dismembered specimen mounted on a single glass slide (not on pin as stated in the original publication). F 7 and club of the right antenna and one middle leg are missing; rest of the parts are present. Mani's description as regards antennae ('Antennae with 10 segments') and fore wings ('... with a long oblique, transparent, white, hairless, moderately broad band running cephalo-distad to the base of the stigmal vein but not quite reaching it for some distance;...') needs correction. The antennae are 12-segmented (Fig. 1A), and the wings without an oblique hairless band (Fig. 1B). The species *ramakrishnai* belongs to *Anastatus* and not to *Neanastatus* which genus is characterised by the presence of 10-segmented antennae, different configuration of the thoracic sclerites, presence of a distinct speculum in the fore wing, and a very long spine-bearing middle tibial spur. Therefore, *ramakrishnai* is here transferred to *Anastatus*. The illustrations given here were drawn from the type female (Fig. 1A-C) and from the material collected from Nasik (Fig. 1D-J).

*Anastatus dentatus* Narayanan *et al.* : Types not available. Dr. (Miss) Ghai informs me (*in litt.*) that the types are not in the collections of the I.A.R.I., New Delhi, contrary to the fact as stated in literature. From the descriptions and illustrations provided by Narayanan *et al.* (1960 : 173-175, Figs. 4-6) it is indistinguishable from *A. ramakrishnai*.

The following characters may be added to the original description : Apical segment of maxillary palp only slightly expanded at about distal third and not wider than third segment, segments 1-3 subequal in length. Fore femora with a prominent denticle on ventral side at distal third (Fig. 1C,F), a structure seen even in the crushed femora of the type specimen (Fig. 1C), and not found in

the other two species dealt with in this paper. Middle tibia about three and one-third times longer than distance between propodeal spiracles. Ovipositor only slightly longer (about 1/8th) than middle tibia; third valvulae slightly longer than tibial spur of middle leg (Fig. 1G,H). Other characters as given in the key and the illustrations.

*Male* : Head and thorax greenish; gaster dark brown, faintly shining. Legs dark brown with trochanters and tarsi of all legs, and tibiae of fore and middle legs yellowish. Wings hyaline. Antennae dark brown with the scape pale. Frontovortex wider than dorsal eye width; ocelli arranged in a strong obtuse triangle; in frontal aspect head about a fourth wider than high with the antennal sockets separated from facial margin by about twice the major diameter of a socket. Antennae as in Figure II. Thorax normal for the males of the genus : convex, with short, transverse pronotum and well-developed parapsidal furrows. Wings broad, a little over twice longer than wide; submarginal vein twice longer than marginal, the latter about thrice the length of stigmal. Phallobase of genitalia beset with two, rather long, denticles.

*Remarks* : The specimens from Poona (No. 170.M) differ from those of Nasik Road in that the head (dorsal) is somewhat thinner fronto-occipitally, about three times wider than long. The type female of *A. ramakrishnai* is mounted in such a way as to permit no actual determination of the shape (dorsal) and measurements of the head, so it is not possible here to say with any certainty which of the above two samples really belong to *ramakrishnai*. It may, however, be noted that in other respects the two samples are identical.

## 2. *Anastatus tenuipes* Bolivar (Fig. 2A-H)

*Anastatus tenuipes* Bolivar, 1925, *Bull. Soc. R. Ent. Égypte*, 9 : 43. Type ♀, Egypt (Madrid Mus.); Roth and Willis, 1960, *Smithson. Misc. Coll.*, 141 : 246, (syn.); Burks, in Krombein *et al.*, 1967, *Agr. Mon. U.S. Dept. Agric.*, No. 2, suppl. 2 : 247 (bibliog.).

*Anastatus blattidarum* Ferrière, 1930, *Bull. Ent. Res.*, 21 : 33-34, Figs. 1a, b. Type ♀, Sudan : Khartoum (Brit. Mus. Nat. Hist. London); Ferrière, 1935, *Stylops*, 4 : 150, ♂, des.; Mani, 1938, *Cat. Indian Ins.*, 23 : 84; Pruthi and Mani, 1940, *Misc. Bull. I.C.A.R.* No. 30 : 12, Fig. 22; Thompson, 1951, *Cat. Parasites Predators*, 1 (2) : 7; Krishnamurti and Usman, 1954, *Indian J. Ent.*, 16 : 335; Thompson, 1954, *Cat. Parasites Predators*, (2) 3 : 314; Usman and Puttarudriah, 1955, *Dept. Agric. Mysore State Ent. Bull.*, 16 : 130; Narayanan *et al.*, 1960, *Proc. Natl. Inst. Sci. India*, (B) 26 : 175, key.; Peck, 1963, *Canad. Ent. Suppl.*, 30 : 497, bibliog.; Mehra, 1965, *Indian J. Ent.*, 27 : 371. (Syn. by Roth and Willis, *l.c.*).

*Solindenia blattiphagus* Mani, 1936, *Rec. Indian Mus.*, 38 : 131-132, Fig., ♀, ♂. Types, India : Calcutta (Z.S.I., probably lost). (Synonymised by Mani, 1938 : 84).

*Material examined* : INDIA : RAJASTHAN : Jodhpur, 3 ♀♀, 1 ♂ (D.R.S. Reg. No. A/445), 22.x.1973; and 3 ♀♀, 1 ♂ (D.R.S. Reg. No. A/446), 26.iii.1974, ex oothecae of *Phyllodromia* sp. (det. S.K. Tandon), from house kitchens, M. Hayat. Material in Z.S.I. and D.R.S.

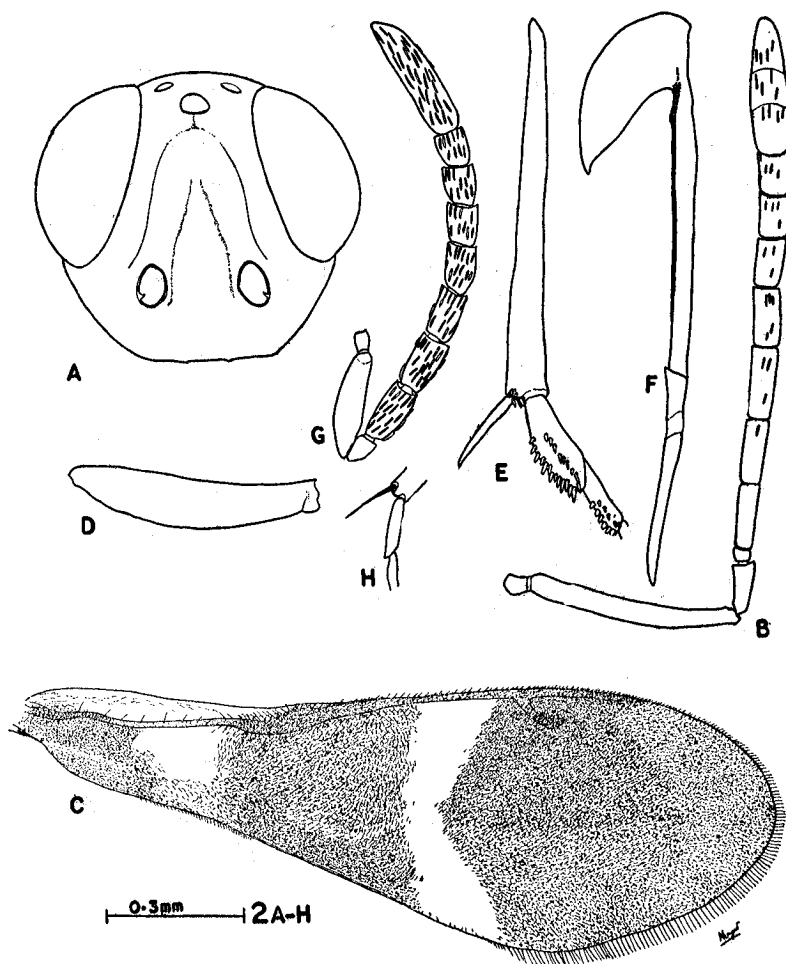


Fig. 2A-H. *Anastatus tenuipes* Bolivar: A, head frontal aspect, ♀; B, antenna, ♀; C, fore wing, ♀; D, fore femur, ♀; E, middle tibia and part of tarsus, ♀; F, second valvifer and third valvula; G, antenna, ♂; H, part of middle leg, ♂.

The type specimens of *Solindenia blattiphaga* are probably lost during the Varuna floods (Shri K.S. Pradhan, personal communication). The illustration given by Mani on page 132 is clearly that of a female, not male as printed.

The following characters may be added to the species based on the above material: *Female*: Apical segment of maxillary palp gradually expanded to about three-fourths its length and then abruptly narrowed to apex, about twice longer than third segment, the latter longer than second segment. Middle tibia

about three and one-fourth times longer than distance between propodeal spiracles. Ovipositor one and a half times longer than middle tibia; third valvulae nearly twice longer than middle tibial spur (Fig. 2E, F). *Male* antennae as given in figure 2G. Wings hyaline. Phallobase of genitalia beset with two, rather long, denticles.

### 3. *Anastatus acherontiae* Narayanan *et al.* (Fig. 3A-F)

*Anastatus acherontiae* Narayanan, Subba Rao and Ramachandra Rao, 1960, *Proc. Natl. Inst. Sci. India.*, (B) 26 : 171-173, 175, Figs. 7-9. ♀. key. Type ♀, Delhi (Nat. Pusa Coll., I.A.R.I. New Delhi); Mehra, 1965, *Indian J. Ent.*, 27 : 370; Narayanan, Rao and Subba Rao, 1967, in 'Agricultural Entomology', *I.C.A.R. Publ.*, p. 218.

*Material examined*: INDIA : PUNJAB : Nabha, 2 ♀♀ (No. 310.MH), 17.ix.1968, ex eggs on *Acacia* sp., M. Hayat, Material in Z.S.I. and D.R.S.

The following characters may be added based on the above material: Apical segment of maxillary palp gradually expanded to about two-thirds its length, then gradually tapering to apex, wider than third segment, the latter longer than second segment. Middle tibia four times longer than distance between propodeal spiracles. Ovipositor about one and one-fourth times longer than middle tibia; third valvulae one and a half times longer than middle tibial spur (Fig. 3D, E). Other characters as given in the key and the illustrations.

*Male*: Unknown.

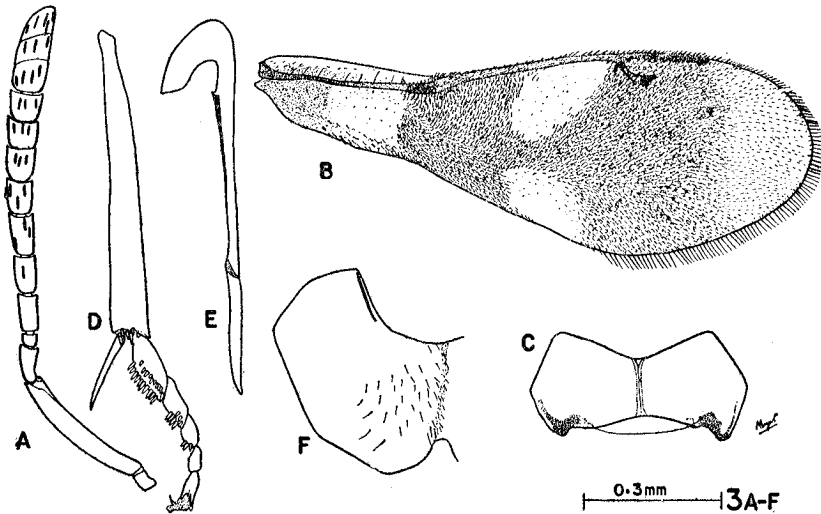


Fig. 3A-F. *Anastatus acherontiae* Narayanan *et al.* ♀: A, antenna; B, fore wing; C, pronotum; D, middle tibia and tarsus; E, second valvifer and third valvula; F, right half of subgenital plate.

KEY TO INDIAN SPECIES OF *ANASTATUS*\*

1. Males . . . . . 8  
Females . . . . . 2
2. Fore wings with two hyaline areas in middle bearing transparent setae . . . . . 3  
Fore wings with a transverse hyaline band bearing transparent setae . . . . . 4
3. F 1 a little longer than pedicel . . . . . *acherontiae* Narayanan *et al.*  
F 1 shorter than pedicel . . . . . *amarus* (Subba Rao)
4. F 1 shorter than or subequal in length to pedicel . . . . . 5  
F 1 clearly longer than pedicel . . . . . 7
5. F 1 subequal to pedicel; fore wing comparatively narrower than in the following species,  
about two and two-thirds times as long as wide; hyaline band of fore wing commencing  
from marginal vein, well interior to the junction of stigmal and marginal veins; width  
of hyaline band below marginal vein about equal to length of stigmal vein; tibial spur  
of middle leg about as long as or only slightly longer than basitarsus . . . . . 6  
F 1 shorter than pedicel; fore wings broad, about two and a half times as long as wide;  
curved hyaline band of fore wing commencing from the junction of marginal and  
stigmal veins; width of hyaline band below marginal vein about twice length of stigmal  
vein; tibial spur of middle leg distinctly longer than basitarsus . . . . .  
. . . . . *kashmirensis* Mathur
6. Hyaline band of fore wing nearly straight . . . . . *bangalorensis* Mani & Kurian  
Hyaline band of fore wing curved; (fore femora with a denticle at distal third of  
ventral margin) . . . . . *dentatus* Narayanan *et al.*; *ramakrishnai* (Mani)
7. F 1 about twice longer than pedicel; club about as long as F 1; hyaline band of fore  
wing slightly angulated in middle of outer margin; width of hyaline band below marginal  
vein about length of stigmal vein . . . . . *colemani* Crawford  
F 1 a fourth longer than pedicel; club slightly longer than F 1 and F 2 combined; outer  
margin of hyaline band of fore wing strongly angulated in middle; width of hyaline  
band below marginal vein about one and a half times length of stigmal vein . . . . .  
. . . . . *tenuipes* Bolivar
8. Antennal club at most as long as preceding four funicle segments combined; distal  
funicle segments longer or about as long as wide; middle tibial spur shorter than basal  
two tarsal segments combined . . . . . 9  
Antennal club longer than rest of antenna; F 1 about twice longer than pedicel; distal  
four funicle segments wider than long; middle tibial spur as long as basal two tarsal  
segments combined . . . . . *kashmirensis* Mathur
9. Club slightly longer than preceding two funicles; F 1 about three times longer than  
pedicel and distinctly longer than F 2; middle tibial spur longer than basitarsus but  
shorter than basal two tarsal segments combined . . . . .  
. . . . . *dentatus* Narayanan *et al.*; *ramakrishnai* (Mani)  
Club slightly shorter than preceding four funicle segments; F 1 a trifle more than two  
times longer than pedicel and slightly longer than F 2; middle tibial spur equal in  
length to basitarsus . . . . . *tenuipes* Bolivar

*Anastatus bifasciatus* Geoffroy and *A. coimbatorensis* Girault(?) are not included in the above key.

\*Males have been described only for a few species. In *amarus* this sex has been reported, but not described.

*A. bifasciatus* was recorded as a parasite of the eggs of *Porthetria dispar* L. in Kulu valley by Narayanan *et al.* (1967). In literature only *japonicus* has been recorded as a parasite of *P. dispar*. The Indian record of *bifasciatus*, therefore, needs confirmation. Further, Dr. Bouček informs me (*in litt.*) that it is now known that true *bifasciatus* does not develop in the eggs of *P. dispar* and it is the species earlier known as *disparis*, now *A. japonicus* Ashm. (synonymy by Tachikawa, 1965, *Iconographia Insect Japon. colore naturali*, 3 : 141) which parasitises the eggs of this pest. I am grateful to Dr. Bouček for this useful information.

*A. coimbatorensis*, credited to Girault, was recorded by Ramachandra Rao (1921, *Rept. Proc. 4th. Ent. Meet. Pusa*, Feb. 1920, 4 : 41-42). As already noted by Mani (1938) and later by Mathur (1956) and Narayanan *et al.* (1960), it appears that the description of this species has never been published. In reply to a query, Mr. E.C. Dahms of the Queensland Museum, Brisbane, informed me that there is no specimen under that name in the Queensland Museum, and that it was not mentioned in any of the 63 private publications of Dr. Arsene A. Girault. It is very likely that *coimbatorensis* is a *nomen nudum*.

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TABLE I. HOST-PARASITE LIST OF INDIAN SPECIES OF *ANASTATUS*

<i>Species</i>	<i>Host</i>	<i>Distribution</i>	<i>References</i>
<i>acherontiae</i>	<i>Acherontia styx</i> Westw. Eggs on <i>Acacia</i> sp.	Delhi Nabha (Punjab)	Narayanan <i>et al.</i> , 1960. New record.
<i>amarus</i>	<i>Apanteles delhiensis</i> through <i>Hymenia recurvalis</i> L. <i>Tessaratomya javanica</i> Thunb.	New Delhi Ranchi	Subba Rao, 1957. Mehra, 1965, 1966a.
<i>bangalorensis</i>	Pentatomid eggs on <i>Pongamia</i> <i>glabra</i> Kont.	Bangalore	Mani and Kurian, 1953; Krishnamurti and Usman, 1954.
<i>bifasciatus</i> (?) <i>coimbatorensis</i>	<i>Porthetria dispar</i> L. <i>Oxya velox</i> F.	Kulu Valley Coimbatore	Narayanan <i>et al.</i> , 1967. Ramachandra Rao, 1921; Mani, 1938; Pruthi and Mani, 1940; Greathead, 1963.
	<i>Polyptychus dentatus</i>	Coimbatore	Ayyar, 1920.



<i>Species</i>	<i>Host</i>	<i>Distribution</i>	<i>References</i>
<i>colemani</i>	<i>Degonetus serratus</i> Dist.	Bangalore	Crawford, 1912; Ayyar, 1925, 1927; Pruthi and Mani, 1940; Krishnamurti and Usman, 1954; Usman and Puttarudriah, 1955.
	<i>Tessaratomia javanica</i> Thunb. associated with <i>Kerria lacca</i>	Ranchi	Mehra and Kapur, 1955; Mehra and Purakayastha, 1957; Beeson, 1961; Narayanan, 1962; Mehra, 1966.
	<i>Tetroda histeroidea</i> F.	Bangalore	Mani, 1938; Pruthi and Mani, 1940; Thompson, 1944.
	pentatomid species.	Bangalore Dehra Dun	Ayyar and Margabandhu, 1934. Ferrière, 1931.
<i>dentatus</i>	<i>Halis dentata</i> Fb.	Delhi	Narayanan, <i>et al.</i> , 1960.
	<i>Tessaratomia javanica</i> Thunb.	Ranchi	Mehra, 1965, 1966a.
<i>kashmirensis</i> (?) <i>kashmirensis</i>	<i>Lymantria oajuscata</i> Walker	Srinagar	Mathur, 1956.
	<i>Porthetria dispar</i> L.	Kashmir Valley	Narayanan, <i>et al.</i> , 1967.
<i>ramakrishnai</i>	Host unknown	Howrah	Mani, 1935, 1938.
	Lepidopterous eggs Lepidopterous eggs on <i>Anona squamosa</i>	Poona Nasik Road	New record. New record.
<i>tenuipes</i>	<i>Periplaneta americana</i> L.	Bangalore	Krishnamurti and Usman, 1954; Usman and Puttarudriah, 1955.
	<i>Phyllodromia</i> sp.	Jodhpur	New record.
	<i>Supella supellectilium</i> (Serville)	Egypt Sudan U.S.A.	Bolivar, 1925. Ferrière, 1930, 1935. Peck, 1963
	Blattid oothecae	Calcutta	Mani, 1936, 1938.
sp. near <i>coleopterorum</i>	<i>Lixus truncatulus</i> Fb.	Pusa	Pruthi and Mani, 1940
<i>Anastatus</i> spp.	<i>Chloropulvinaria psidii</i> (Mask.)	Not known	Narayanan <i>et al.</i> , 1967.
	<i>Degonetus</i> sp.	Coimbatore	Ayyar, 1925.
	<i>Nipaeococcus viridis</i> (Green)	Delhi	Abbasi and Singh, 1966.
	<i>Oxya velox</i> F.	Coimbatore	Ayyar, 1925, 1927; Pruthi and Mani, 1940.

<i>Species</i>	<i>Host</i>	<i>Distribution</i>	<i>References</i>
	<i>Periplaneta americana</i> L.	Bangalore	Krishnamurti and Usman, 1954; Usman and Puttarudriah, 1955.
	<i>Polyptychus dentatus</i>	Coimbatore	Ayyar, 1925, 1927.
	<i>Porthetria dispar</i> L.	Kashmir Valley	Narayanan <i>et al.</i> , 1967.
	<i>Supella supellectilium</i>	Madras	Ananthasubramanian and Ananthkrishnan, 1961.

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