

TAXONOMIC STUDIES ON *DINARMUS* THOMSON (HYMENOPTERA: CHALCIDOIDEA: PTEROMALIDAE) OF INDIA AND ADJACENT COUNTRIES

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Abstract

Six species of Pteromalidae under the genus *Dinarmus* Thomson from India and adjacent countries are dealt with. *Dinarmus maculatus* (Masi) is redescribed based on the study of the lectotype deposited in MCSN. Diagnosis, biological data and distribution for all species are provided. A key to separate the *Dinarmus* species from India and adjacent countries is also provided.

Keywords

Dinarmus, *Hymenoptera*, *Chalcidoidea*, *Pteromalidae*

Abbreviations

BMNH - Natural History Museum, London	BPBM - Bernice P. Bishop Museum, Honolulu, Hawaii
F1 - First funicular segment	MCSN - Museo Civico di Storia Naturale, Giacomo Doria, Italy
MV - Marginal vein	OOL - Ocell ocular distance
PMV - Postmarginal vein	POL - Post ocellar distance
SMV - Submarginal vein	STV - Stigmal vein
T5 - Fifth tarsal segment	UZIL - Universitetets Zoologiska Institutionen, Lund, Sweden
USNM - United States National Museum, Washington DC.	ZSIC - Zoological Survey of India, Kozhikode

Introduction

The genus *Dinarmus* Thomson (Pteromalidae: Pteromalinae) is distributed in all temperate, subtropical and tropical regions of the world (Boucek, 1988). All species of *Dinarmus* are known to attack bruchid beetles (Coleoptera: Bruchidae), which are serious pests of seeds of important pulse crops.

Rasplus (1989) in his revision of the Afrotropical species of *Dinarmus* treated the species under three species groups viz. *D. acutus*, *D. altifrons* and *D. vagabundus*. From India and adjacent countries six species of *Dinarmus* are currently known (Boucek *et al.*, 1979; Farooqi & Rao, 1986; Rasplus, 1989).

In this paper diagnosis and biological data of all the six species

of *Dinarmus* known from India and adjacent countries are provided. *D. maculatus* (Masi) is redescribed based on the study of the lectotype deposited in MCSN. A key to separate the species dealt with is also provided.

The specimens of the present study are deposited in the collections of Zoological Survey of India, Western Ghats Field Research Station, Kozhikode.

The morphological terminology used in this paper follows that of Boucek (1988).

Genus *Dinarmus* Thomson

Dinarmus Thomson 1878: 50, 56 (as subgenus of *Dimachus* Thomson).

Type species: *Dinarmus acutus* Thomson, designated by Ashmead, 1904.

Bruchobius Ashmead 1904: 314-315.

Type species: *Bruchobius laticeps* Ashmead, by original designation.

Metastenoides Girault 1915: 190.

Type species: *Metastenoides simus* Girault, by original designation. Syn. by Boucek, 1988: 413.

Oedaule Waterston 1922: 31.

Type species: *Oedaule stringifrons* Waterston by monotypy. Syn. by Boucek, 1988: 413.

Sphaerakis Masi 1924: 214.

Type species: *Sphaerakis mayri* Masi, by monotypy.

The genus can be easily distinguished by the following combination of characters:

Head large, not prominent behind eyes; anterior margin of clypeus shallowly emarginate or bidentate; female antenna with three and male with two anelli, third anellus sometimes quadrate; mesosoma stout, convex; pronotum as broad as mesoscutum, collar bluntly ridged or rounded, not sharply carinate, neck hardly visible from above; prepectus small, subquadrate; propodeum constricted into a subglobose nucha; forewing with stigma more or less capitate, sometimes costal cell enlarged; hind tibia with two spurs; gaster short.

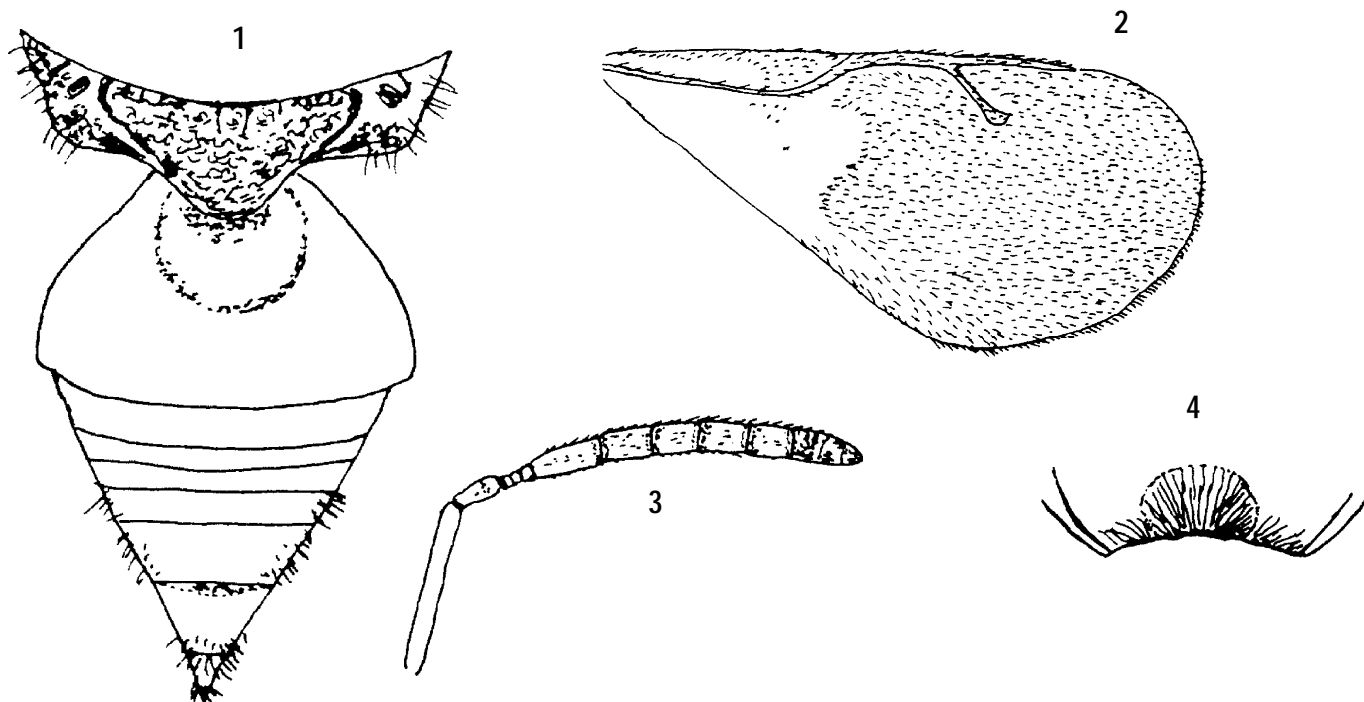
***Dinarmus maculatus* (Masi)**

(Figs. 1-4)

Sphaerakis maculatus Masi 1924: 157, Burma. Lectotype female (MCSN) examined.

Material examined

Lectotype: One female, vii.1886, det. J.Y. Rasplus 1984 (MCSN); 24 females, 22.xii.1985, Parambikulam, Kerala, India; six females, 16.v.1985, Silent Valley, Kerala, Coll. T.C. Narendran and party; two females, 25.v.1987, Kozhikode (Paroppady), Kerala, one male, i.1986, Kerala, Malampuzha, one male, 26.ii.1988, Neeleswaram, Kasaragod, Kerala, Coll. P.M. Sureshan; two females, Calicut University campus, Kerala, iii.1987, Coll. T.C. Narendran and



Figures 1-4. *Dinarmus maculatus* (Masi) (Female)

1 - Dorsal view of propodeum and gaster; 2 - Forewing; 3 - Antenna; 4 - Anterior margin of clypeus

party in ZSIC.

Distribution

Burma; India: Calicut University campus, Paroppady, Kozhikode, Neeleswaram, Kasaragod, Malampuzha, Parambikulam, Silent Valley in Kerala; West Bengal.

Biology

Not known.

The species is redescribed here based on the study of the lectotype.

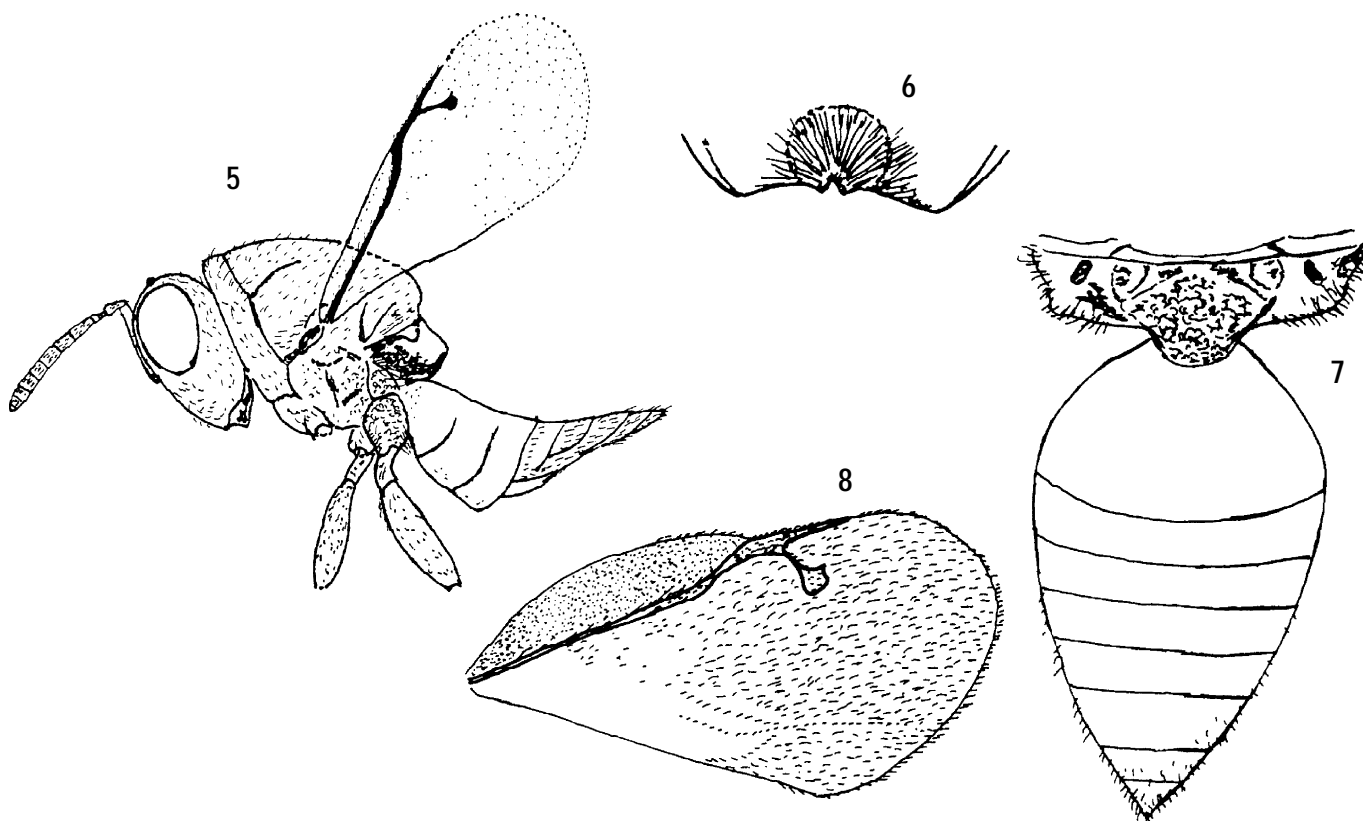
Diagnostic features

Female: Length 2.5mm. Body metallic blue with bronzy patches mainly on vertex and dorsal part of mesosoma except propodeum; gaster brown dorsally. Antennae yellowish brown except anelli and clava brown, similar brown bands on junctions of funicular segments. Coxae concolrous with mesosoma, femora and tibiae medially brown; base and apical 2/3 portion of tibiae and all tarsi yellow. Tegule brown; wings slightly smoky, veins and pubescence pale brown.

Head: Reticulate punctate; clypeus striate, striae reaching lower margin of eyes. In dorsal view head width 2.4x length and in front view width 1.3x height; temple length 0.5x eye length; POL:OOL= 9:8; anterior margin of clypeus (Fig. 4) almost straight; eyes separated by 1.5x their height; malar space length 0.6x eye height; scrobe deep, reaching median ocellus. Antennae (Fig. 3) inserted distinctly above lower margin of eyes, scape length 0.9x eye height, reaching middle of median ocellus, pedicel plus flagellum length 0.8x head width; third anellus as long as first and second combined; clava little shorter than two preceding segments combined.

Mesosoma: Length 1.2 x width, reticulate punctate; pronotum almost as wide as mesoscutum. Mesoscutum width 2x length. Scutellum medially little shorter than mesoscutum (20:21.5). Propodeum (Fig. 1) medially 0.5x as long as scutellum, nucha moderate; plicae sharp; basal part of propodeum with short vertical rugae. Forewing (Fig. 2) length 2x width; stigma moderately capitate. Relative lengths: SMV 31, MV 14, PMV 14, STV 9.5.

Gaster: (Fig. 1) Short and cordiform, dorsally collapsing, length 1.6x width; hypopygium reaching hind margin of T5.



Figures 5-8. *Dinarmus altifrons* (Walker) (Female)

5 - Body in profile; 6 - Anterior margin of clypeus; 7 - Dorsal view of propodeum and gaster; 8 - Antenna of male

Male: Length 2.1mm. Resembles female but differs in having antenna with two anelli and six funicular segments; gaster compressed with a broad yellowish spot at the base extending to middle; forewing more smoky with few setae on distal part of basal cell.

***Dinarmus altifrons* (Walker)**
(Figs. 5-8)

Pteromalus altifrons Walker, 1862: 388.

Dinarmus stringifrons (Waterston), 1922: 32.

Male, India (Dehradun) (BMNH) syn.by Rasplus, 1989: 149.

Material examined

Five females, ii. 1991, Coimbatore, Tamil Nadu, India, ex. Seeds of *Albizia lebbek*, Coll. Madhavan Pillai & party (ZSIC).

Distribution

Africa; Israel; Pakistan; India: Dehradun in Uttaranchal; Punjab; Delhi; Coimbatore in Tamil Nadu.

Biology

Specimens for the present study were collected as emerged from mature seeds of *Albizia lebbek*. The other recorded biological informations are ex. pods of *Pueraria tuberosa*; ex. Bruchids on *Sesbania acutifolia*; ex. Bruchids (Boucek *et al.*, 1979).

Diagnostic features

Female: Length 2.2-4.2mm. Body metallic green with bronzy reflection; gaster brown with bluish reflection; antennae brown; head reticulate, punctate with dense pubescence; clypeus (Fig. 6) sharply bidentate; POL 2x OOL; antennae (Fig. 5) inserted above lower margin of eyes, scape reaching median ocellus; mesosoma convex, reticulate punctate; notaular grooves reaching just above hind margin of mesoscutum; propodeum coarsely reticulate; basal foveae deep; plicae weakly indicated, almost complete; forewing with discal pubescence almost indistinct.

Gaster: (Fig. 7) elongate, ovate, dorsally collapsing.

Male: Length 2-3.8mm. Resembles female but differs in having antenna with two anelli and six funicular segments; forewing (Fig. 8) with costal cell enlarged with numerous minute bristles and gaster short and compressed.

***Dinarmus basalis* (Rondani)**
(Figs. 9, 10)

Entedon basalis Rondani, 1877: 174.

Male, Italy (Lectotype, Florence Museum).

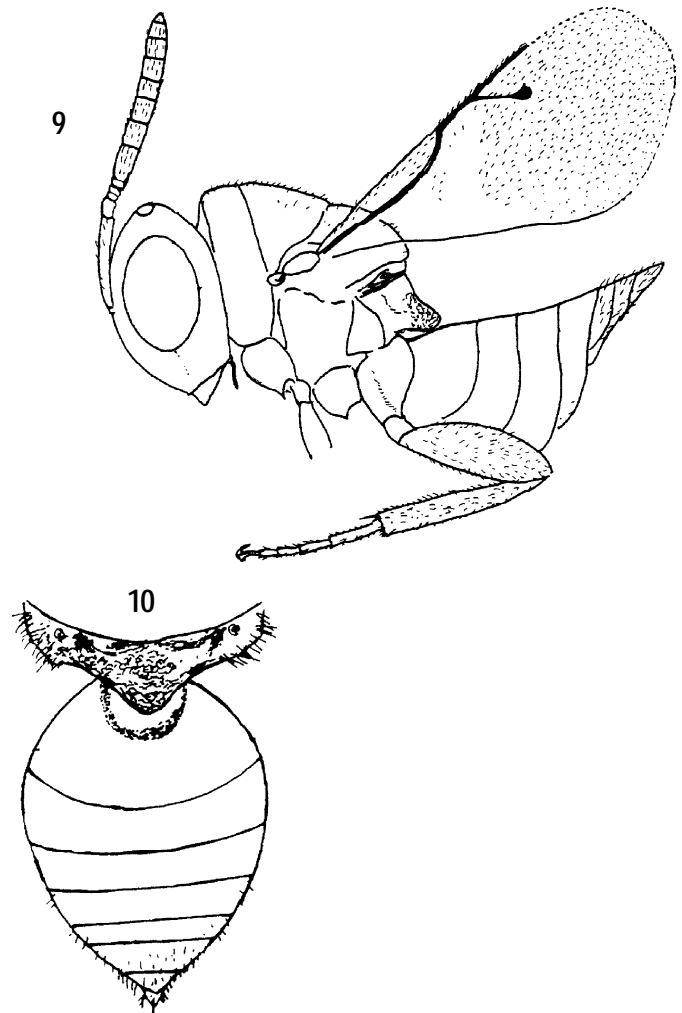
For various synonyms see Rasplus, 1989: 135-162.

Material examined

Two females, 1997, Calicut University campus, Kerala, India, Coll. T.C. Narendran and party (ZSIC).

Distribution

America; Pakistan; India: Calicut University campus in Kerala; Delhi; Andhra Pradesh; Bihar; Haryana; Rajasthan; Karnataka.



Figures 9-10. *Dinarmus basalis* (Rondani) (Female)
9 - Body in profile; 10 - Dorsal view of propodeum and gaster

Biology

Ex. *Trogoderma granarium* (Coleoptera: Dermestidae), *Callosobruchus chinensis*, *Callosobruchus maculatus*, *Callosobruchus analis*, indet. Bruchids (Coleoptera: Bruchidae) (Boucek *et al.*, 1979; Farooqi & Rao, 1986).

Diagnostic features

Female: Length 2.2-2.7mm. Dark green with brassy reflection; antennae with scape, pedicel and anelli testaceous, remainder brown; coxae concolorous with mesosoma, femora brown; remainder of legs testaceous.

Head: 1.2x as broad as mesosoma; moderately reticulate; POL 1.3x OOL; anterior margin of clypeus weakly emarginate; antennae (Fig.9) inserted little above lower margin of eyes, scape hardly reaching median ocellus; pedicel shorter than FI (0.6x); third anellus longest.

Mesosoma: Reticulate punctate; scutellum medially little shorter than mesoscutum (17:18); propodeum with nucha highly constricted; forewing with few hairs on basal hairline; pubescence sparse; marginal fringe absent; PMV longer than MV.

Gaster: (Fig. 10) ovate, length 1.4x width in dorsal view; dorsally flat, slightly collapsing.

***Dinarmus vagabundus* (Timberlake)**

(Fig. 11)

Bruchobius vagabundus Timberlake, 1926: 305. Female. USA (Hawaii), Honolulu (BPBM).

For various synonyms see Rasplus 1989: 135-162.

Material examined

Three females, 24.ii.1995, Calicut University campus, Kerala, India, Coll. S. Sheela from stored pulses infested with Bruchids.

Distribution

Pakistan; Sri Lanka; India: Calicut University campus in Kerala; Karnataka; Punjab; Tamil Nadu.

Biology

Common parasites of various Bruchid beetles.

Diagnosis

Female: Length 1.8-2.6mm. Head and mesosoma black without metallic reflection; gaster brownish black; head finely and closely reticulate with short white pubescence, 1.1x as broad as mesosoma and width 2x length in dorsal view; anterior margin of clypeus weakly emarginate; POL:OOL=6:5; scape reaching median ocellus; little shorter than eye; pedicel as long as F1,

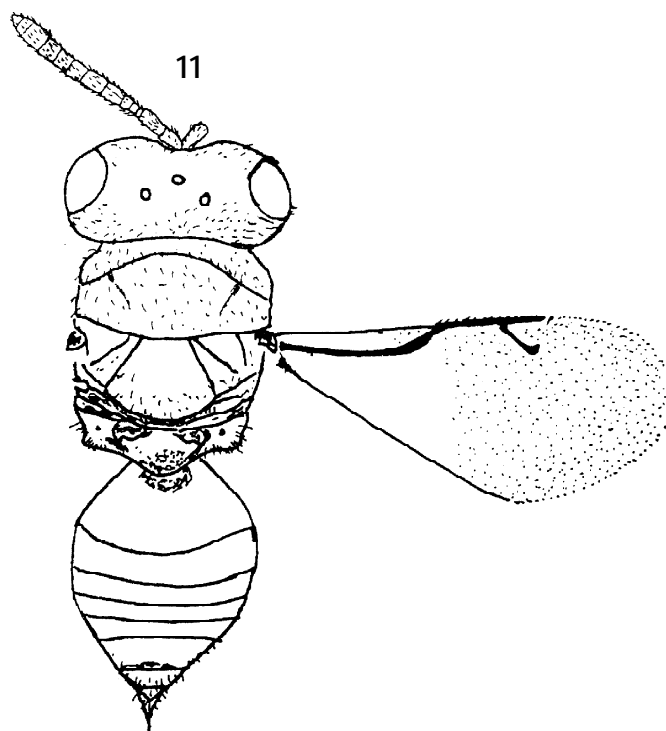
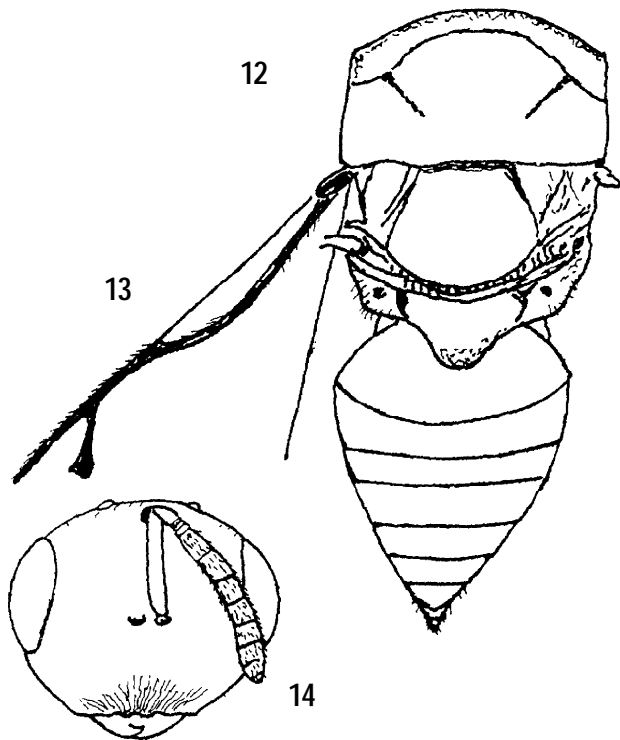


Figure 11. *Dinarmus vagabundus*(Timberlake) (Female)
11 - Body in dorsal view

third anellus quadrate, clava little longer than two preceding segments combined.

Mesosoma: Convex, reticulate punctate; mesoscutum width 2.3x length; scutellum medially as long as mesoscutum; propodeum with nucha short; forewing with discal pubescence very short and indistinct; marginal fringe absent, PMV as long as STV.

Gaster: Broadly ovate, shorter than head plus mesosoma combined (0.8x), dorsally collapsing.



Figures 12-14. *Dinarmus acutus* (Thomson) (Female)
12 - Dorsal view of mesosoma and gaster; 13 - Forewing;
14 - Head in front view

***Dinarmus acutus* (Thomson)**
(Figs. 12-14)

Dimachus (*Dinarmus acutus*) Thomson, 1878: 56. Female, Boheman (UZIL).

For various synonyms see Rasplus 1989: 135-162.

Material examined

Two females, 14.i.1986, Malampuzha, Kerala, India; 15 females, 20 males, 1985-1988, Calicut University campus, Kerala, India, Coll. T.C. Narendran and party; two females, one male, 25.ii.1988 Kasaragod (Periya), Kerala, India; three females, Kozhikode, Kerala, 24.vi.1987, Coll. P.M. Sureshan (ZSIC).

Distribution

Europe; India: Malampuzha, Calicut University campus, Kozhikode, Periya, Kasaragod in Kerala.

Biology

Common parasites of Bruchid beetles.

Diagnostic features

Female: Length: 1.5-2.4mm. Body dark metallic blue; gaster darker;

antennae with scape testaceous, remainder brown; coxae concolorous with mesosoma, femora and tibiae brown.

Head: (Fig. 14) moderately reticulate punctate with small white pubescence; anterior margin of clypeus emarginate, weakly bidentate; POL 1.6x OOL; scape almost reaching upper margin of median ocellus, length 0.9x eye height; pedicel as long as FI; anelli transverse; clava almost as long as two preceding segments combined.

Mesosoma: (Fig. 12) reticulate punctate; pronotum as broad as mesoscutum; mesoscutum width 1.8x length; scutellum medially 0.8x mesoscutum; propodeum with nucha distinct; forewing (Fig. 13) with PMV as long as MV.

Gaster: Ovate, acuminate, not collapsing. In dorsal view length 1.4x width and 0.7x as long as head plus mesosoma combined.

Male: Length 1.3-1.5mm, resembles female but differs in having antennae with two anelli and six funicular segments; gaster shorter and oval with a broad yellow spot at base extending more than half length dorsally.

***Dinarmus colemani* (Crawford)**
(Figs. 15, 16)

Bruchobius colemani Crawford, 1913: 250. Female, India (Bangalore) (USNM).

Material examined

One female, 1982, Changaramkulam, Thrissur District, Kerala, India, Coll. T.C. Narendran (ZSIC).

Distribution

Bangladesh; India: Changaramkulam, Thrissur in Kerala; Bihar; Delhi; Karnataka; Tamil Nadu.

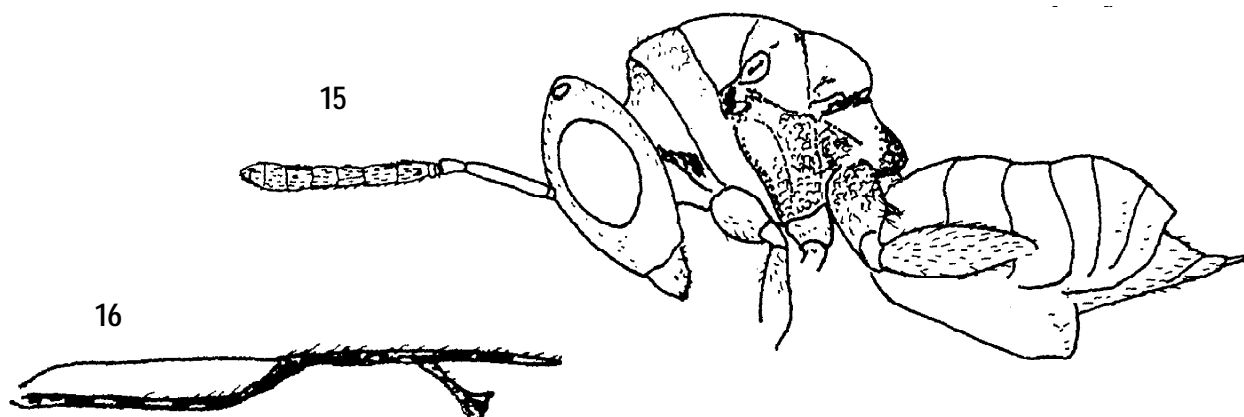
Biology

Ex. *Callosobruchus chinensis* on grass and wild chillies (Boucek *et al.*, 1979).

Diagnostic features

Female: Length 2.4mm. Body bluish black with metallic reflection laterally; gaster brownish black with metallic blue reflection basally; antennae testaceous; anelli brown and narrow brown rings at the junctions of funicular segments.

Head: (Fig. 15) narrow in profile, reticulation and pubescence as in *D. basalis*; POL 1.5x OOL; temple length 0.4x eye length; anterior margin of clypeus slightly projecting medially. Antennae inserted distinctly above lower margin of eyes, scape reaching up to 3/4 length of median ocellus, little shorter than eye; pedicel



Figures 15-16. *Dinarmus colemani* (Crawford) (Female)
15 - Body in profile; 16 - Forewing venation

plus flagellum length almost equal to head width; pedicel little shorter than Fl; anelli, transverse, third longest; clava as long as two preceding segments combined.

Mesosoma: (Fig. 15) reticulate punctate; mesoscutum medially little longer than scutellum (16.5:15.5); propodeum with nucha distinctly projecting. Forewing (Fig. 16) with stigma moderately capitate, PMV little shorter than MV.

Gaster: Ovate, dorsally slightly collapsing, sub-equal to head and mesosoma combined.

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Key to the *Dinarmus* species of India and adjacent countries.

1. Anterior margin of clypeus (Fig. 6) with distinct median indent; forewing (Fig. 5) with discal pubescence very sparse, almost indistinct; stigmata strongly capitate; costal cell enlarged in male (Fig. 8); POL 2x OOL; propodeal nucha short (Fig. 7) *D. altifrons*
- 1A. Anterior margin of clypeus almost straight, shallowly emarginate or very weakly bidentate (Figs. 4, 14), not as above; forewing with discal pubescence not reduced as above; stigma normal or moderately capitate, costal cell not enlarged; nucha moderately or distinctly projecting; POL less than 2x OOL 2
2. Forewing (Fig. 11) with PMV distinctly shorter than MV (0.6x) and only as long as STV; discal pubescence very short and less distinct. POL only slightly longer than OOL (6:5) *D. vagabundus*
- 2A. PMV as long as, little longer or shorter than MV, but distinctly longer than STV; discal pubescence distinct; POL, distinctly longer than OOL 3
3. Anelli transverse, third anellus not longer than second (Figs. 14, 15) 4
- 3A. Third anellus distinctly longer than second and as long as first and second combined (Figs. 3, 9) 5
4. Anterior margin of clypeus weakly sinuate (Fig. 14); antennae with pedicel as long as F1; forewing (Fig. 13) with PMV as long as MV; gaster short, not collapsing, 0.7x as long as head plus mesosoma combined *D. acutus*
- 4A. Anterior margin of clypeus almost straight - pedicel little shorter than F1 (Fig. 15); PMV 0.8x as long as MV (Fig. 16); gaster long, dorsally slightly collapsing, sub-equal to head plus mesosoma combined
..... *D. colemani*
5. Anterior margin of clypeus almost straight (Fig. 4), not projecting. PMV as long as or slightly longer than MV (Fig. 2); antennae slender (Fig. 3) with scape reaching middle of median ocellus, yellowish-brown except anelli and clava brown; similar brown bands at junctions of funicular segments; POL, sub-equal to OOL, gaster (Fig. 1) highly cordiform *D. maculatus*
- 5A. Anterior margin of clypeus shallowly emarginate, slightly projecting; PMV 1.3x OOL; antennae (Fig. 9) not slender; scape hardly reaching median ocellus, uniformly yellowish-brown or brown; funicular segments without brown rings. POL 0.3x OOL; gaster not cordiform (Fig. 10) *D. basalis*