

**THE INDIAN SPECIES OF *POLYNEMA* WITH
NOTES ON *STEPHANODES REDUVIOLI*
(HYMENOPTERA: MYMARIDAE)**

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ABSTRACT. The Indian species of the mymarid genus *Polynema* Haliday are revised. A new subgenus, *Dorypolynema*, is proposed for *P. mendeli*. Two new species are described and 3 species are placed in synonymy. A key is given to the 10 presently known species of *Polynema*. *Stephanodes reduvioli* is recorded based upon specimens collected in some Indian States.

Key words: Taxonomy, Mymaridae, *Polynema*, *Stephanodes*, India, new species.

Introduction

The *Polynema*-group, as noted earlier by Hayat (1992) is represented by 6 genera from India: *Polynema* Haliday, *Acmopolynema* Ogloblin, *Stephanodes* Enock, *Mymar* Curtis, *Chaetomymar* Ogloblin and *Narayanella* Subba Rao. Hayat (1992) provided some synonymical and other notes on these genera. Recently Hayat & Anis (1999a, in press) added *Himopolynema* Taguchi to the Indian genera of *Polynema*-group, and Hayat & Anis (1999b, this volume) dealt with the Indian species of *Acmopolynema*. In this paper, the Indian species of *Polynema* are revised, and further material of the well known species, *Stephanodes reduvioli* (earlier known as *S. imbricatus*; see Hayat, 1992) is recorded.

Terminology: The terminology followed here is the one which is currently in use. However, as in the first author's publication on chalcids, the term thorax includes propodeum, and petiole is excluded in counting the number of gastral segments. Some authors use the terms "mesosoma" for the clistogastrous hymenopteran thorax, and metasoma for the petiole and gaster.

Measurements: The relative measurements given here are taken directly from the divisions of the linear scale of an eye piece micrometer. These are not converted into millimeters, but one division of the linear scale of the eye piece micrometer for measurements made from slide mounted parts is equal to 0.0079 mm.

Abbreviations: The following abbreviations are used for depositories. BMNH - The Natural History Museum, London, U.K. IARI - Division of Entomology, Indian Agricultural Research Institute, New Delhi, India. PPRI - Plant Protection Research Institute, Pretoria, South Africa. QMB - Queensland Museum, Brisbane, Australia. USNM - U. S. National Museum of Natural History, Washington D.C., U.S.A.

Genus *Polynema* Haliday

For generic synonymies, Schauff (1984) and Yoshimoto (1990) may be consulted.

The genus *Polynema* is very speciose (see Huber, 1986) containing more than 270 described species, the largest number (at least 135) being known from the Palearctic region followed by Australia from where Girault alone described 50 species. Though keys to the Palearctic species were published by Soyka (1956) and Trjapitzin (1978, largely adapted from the keys to *Polynema* and *Maidliella* = *Polynema*, given by Soyka, with later additions), there is no recent study clarifying their validities. The identities of the Australian species placed by Girault in *Polynema* remained at best vague. New's work (1976) on these species at least points us to the fact that Girault's concept of *Polynema* included species which would now be placed in *Acmopolynema*, *Chaetomyrmar*, *Acanthomyrmar* and possibly also one or more other (undescribed) genera. Therefore in placing or accepting the earlier placement of the Indian species in *Polynema* we have followed Schauff's (1984) definition of the genus amplified further by Yoshimoto (1990).

The genus was represented in the Indian fauna by 9 species of which 3 species were described from males. In the present paper we record two species from India, describe two new species and also place 3 species in synonymy, thus bringing the total number of the Indian species to 10. We are also proposing to place *P. mendeli* Girault in a separate subgenus, *Dorypolynema*, nov.

Key to Indian species of *Polynema*, females and males

1. Antenna clavate, 9-segmented (1161) (Fig. 1) Females.2
- Antenna filiform, without a differentiated clava, 13- segmented (Fig. 5)
Males8
2. Ovipositor strongly exerted, exerted part nearly as long as gaster (Fig. 3); marginal plus stigmal veins relatively thin and long, discal setae originate distad of venation, the area behind and adjacent to veins bare (Fig. 4). Subgenus *Dorypolynema* 1. *mendeli* Girault
- Ovipositor either not exerted or the exerted part not more than 0.25x of length of gaster (Fig. 28); venation normal for the genus, short; discal setae originate at least from behind distal end of marginal plus stigmal veins, but more usually from behind proximal end of marginal vein (Fig. 11). Subgenus *Polynema* s. str.3
3. Pronotum entire, not medially divided (Fig. 12); propodeum with a complete median ridge; petiole nearly 0.5x of gaster length (Fig. 12); fore wing slightly more than 3x as long as broad with marginal fringe about 0.3x of wing width 2. *dunense*, sp. nov.
- Pronotum medially completely divided by a longitudinal suture or sulcus (Fig. 13); propodeum at most with a short median ridge at posterior end or without ridge; petiole clearly shorter than 0.5x of gaster length (Fig. 28); marginal fringe at least about 0.5x of wing width (Fig. 26) .4

4. All coxae and at least part of femora and tibiae brown to dark brown.5
 -- Legs, including coxa, pale yellow to orange yellow and at most with very light brownish suffusions6
5. F1 less than 0.5x of F2 (6:17) and distinctly shorter than F5 (6:8.5); fore wing nearly 4x as long as broad with marginal fringe 0.85x of wing width (34:40) 3. *manaliense*, sp. nov.
 -- F1 slightly more than 0.5x of F2 (3.5:6.0) and slightly shorter than F5 (3.5:4.0); fore wing about 3x as long as broad with marginal fringe nearly 0.5x of wing width 4. *anantanagana* Narayanan
6. Scape with distinct transverse striations on inner surface (Fig. 16).....
 5. *brevicarinae* Annecke & Doutt
 -- Scape without transverse striations on inner surface7
7. Body about 1.00 mm in length; clava longer than F2 (22:14.75) and as long as F4-6 combined; ovipositor 1.4x as long as mid tibia.....
6. *dhenkunde* Mani & Saraswat
 -- Body 1.8 mm in length; clava slightly shorter than F2 (22.5: 24) and slightly shorter than F5 and F6 combined; ovipositor 1.64x as long as mid tibia 7. *kamathi* Mani & Saraswat
8. Antennal scape (excluding radicle part) suboval, flattened and expanded beneath, about 1.75x as long as broad and bearing numerous peg-like conical sensilla on inner surface; F1 about 0.5x of F2 (Fig. 5); head robust with swollen temples and cheeks and very small eyes (Fig. 6); petiole distinctly expanded in basal half (Fig. 8). Subgenus *Dorypolynema* 1. *mendeli* Girault
 -- All the above characters different. Subgenus *Polynema* s.str.....9
9. Scape with transverse striations on inner surface10
 -- Scape either without transverse striations or with fine longitudinal striations11
10. F1 not shorter than F2, and flagellar segments each at least slightly less than 2x as long as broad..... 8. *anamalaiense* Mani & Saraswat
 - F1 at least slightly shorter than F2, and flagellar segments each clearly longer than 2x of width..... 5. *brevicarinae* Annecke & Doutt
11. Scape short, clearly less than 2x as long as broad; F1 not more than 2x as long as pedicel; F1-9 subequal in length, each at most 3x as long as broad.....12
 -- Scape longer, nearly 2.7x as long as broad; F1 2.5x as long as pedicel; F1-5 each at least about 4x as long as broad, the segments gradually but conspicuously decreasing in length distad. (Legs yellowish or yellow brown).....6. *dhenkunde* Mani & Saraswat
12. Legs, except tarsal segments 1-3, dark brown; fore wing broad, slightly less than 3.5x as long as broad, with marginal fringe nearly 0.75x of wing width.....9. *crassa* Mani & Saraswat
 -- Legs, except tarsal segment 4 of all legs, pale yellow to brownish yellow; fore wing narrow, 5x as long as broad, with marginal fringe about 1.5x as long as wing width 10. *kalatopense* Mani & Saraswat

Subgenus *Dorypolynema*, nov.

Type species: Polynema mendeli Girault.

Diagnosis: Female: Similar to *Polynema*, but distal veins (marginal and stigmal) long and thin; discal setae of fore wing originate distad of venation so that the disc behind and just distad of venation is bare; mid basitarsus not longer than 0.6x of hind basitarsus.

Male: Head hypercephalous, large with reduced eyes; antennal scape flattened and expanded beneath, with numerous peg-like structures on inner surface; petiole expanded in anterior half.

Comments: The possibility of *P. mendeli* being placed in a separate subgenus was noted by Sveum (1982) on the characters of body colour and male scape ornamentation. Apart from these two characters (i.e., bicolorous body: head dark contrasting with yellow testaceous thorax; and male scape shape and ornamentation), the longer distal vein, type of discal setation, and relative length of mid and hind basitarsus in females and males; and dimorphic hypercephalization (i.e., female with normal heads, males with enlarged heads), are characters which appear to separate *mendeli* from other species of *Polynema*. What appears to be a case of dimorphic hypercephalization was reported in a South American pteromalid by Grissell (1986). This then appears to be a second such case in the Chalcidoidea (see Figs. 5-8).

1. *Polynema mendeli* Girault (Fig. 1-9)

Polynema mendeli Girault, 1913: 219. Holotype ♂, Australia: Queensland: Nelson [=Gordonvale] (Cairns) (QMB), not examined. Subba Rao & Hayat, 1983: 139, catalogue.

Polynema oophaga Subba Rao, 1970: 666. ♂, ♀. Holotype ♀, Malaysia: Kuala Lumpur (BMNH), not examined. Synonymy by Sveum, 1982: 83.

Polynema narendrani Subba Rao, 1989: 159. Holotype ♀, India: Kerala: Kadalundhi near Calicut (BMNH), examined. **Syn. nov.**

As this species was adequately described by Subba Rao (1970, 1989) and additional notes provided by Sveum (1982) it is not redescribed here. We however, notice extreme sexual dimorphism in the males, not only in the usual antennal structure but head appears to be dimorphic being robust, with swollen cheeks and temples and considerably smaller eyes (Figs. 6,7) and the petiole rather distinctly expanded in basal half (Fig. 8). The genitalia are more or less similar to males of *Polynema* species (Fig. 9).

Host: Unknown.

Distribution: India: Assam, Bihar, Kerala, Pondicherry, West Bengal (Malaysia; Australia).

Specimens examined: Type specimens: Paratype ♀ of *Polynema oophaga*, on a slide under a single coverslip, with data as given in the original description (BMNH). Holotype ♀ of *Polynema narendrani*, on slide under 5 small coverslips, with data as given in the original description (BMNH).

Additional specimens: 10 ♀, 9 ♂. INDIA: Bihar: Jamshedpur, 3 ♀, 26.ii.1994 (S.B. Zeya). West Bengal: Calcutta, Botanical Gardens, 1 ♀, 1 ♂, 17.ii.1994; 2 ♀, 2 ♂, 18.ii.1994 (S.B. Zeya). Assam: Haflong, 2 ♀, ix. 1987 (Sudhir Singh). Pondicherry, 1 ♀, 1 ♂, 18.ii.1993 (S.I. Kazmi). Kerala: Calicut University, 1 ♀, 5 ♂, 2.ii.1993 (S.B. Zeya).

Comments: *P. mendeli*: We agree with Dahms (1984) that the additional material (females, males) recorded by Girault after the description of *mendeli* on a single male (holotype) has no type status and thus Sveum's (1982) designation of lectotype for the holotype and paralectotypes for this additional material was erroneous.

If the synonymy of *oophaga* with *mendeli* is correct, then the length (0.051mm) of F2 of male (holotype) given by Sveum was incorrect, because in this species F2 is at least 2x as long as F1 (length of F1 of *mendeli* given by Sveum is 0.076 mm).

P. narendrani: Holotype (BMNH) has been examined. The original description of body colour is wrong. The species is indistinguishable from *mendeli* and the slight differences in relative lengths of funicle segments and of the hypochaeta are variable even in the short series of specimens collected in India (see above). The species is, therefore, placed in synonymy with *mendeli*.

P. oophaga: We have examined a paratype female (BMNH). There are no differences between this species and *narendrani* except that the body colour and colour of antenna darker; head black, thoracic sclerites more extensively infuscate brownish yellow and funicle more brownish than in the cleared holotype of *narendrani*. We have not seen the holotype male or the Girault determined females of *mendeli* from the QMB, but follow Sveum (1982) in regarding *oophaga* as a synonym of *mendeli*.

Subgenus *Polynema* s. str.

2. *Polynema dunense*, sp. nov. (Figs. 10-12)

Female: Length, holotype: approx. 1.2 mm. Body dark brown; petiole white; scape and pedicel pallid; funicle segments pallid (F1) becoming brownish distad so that F6 is brown; clava dark brown; wings hyaline; legs with coxae and femora pale yellow, hind coxae light brownish yellow, tibiae and tarsi whitish.

Structural details as in Figures. 10-12.

Relative measurements (holotype, slide): Head, frontal: width, 37; length, 25; frons width at toruli, 23; torulus - transverse trabecular distance, 7.5; torulus mouth margin distance, 12; distance between toruli, 13.5; mouth fossa width, 12.5; eye length, 17; malar space length, 9. Antenna lengths: radicle and scape, 14; pedicel, 8.5; (funicle 64) F1-6: 6, 14, 13.5, 10.5, 8.25, 9; clava, 25.5. Thorax length; 54.5; width, 31; pronotum length, 6; mesoscutum length, 16.5; width, 28; scutellum length, 15; width, 19.5; propodeum length, 11. Fore wing length, 160, width, 52; length of marginal fringe, 16; hind wing

width, 4.5; length of marginal fringe, 15. Lengths: mid tibia, 45; mid basitarsus, 20.5; tarsal segments 2-4, 24; petiole length, 22; gaster (apical terga broken), ca, 46; T1, 18.5.

Male: Unknown.

Holotype: ♀ (on slide under two coverslips with left fore leg beyond femur, right hind leg beyond trochanter and left hind leg beyond distal half of femur, missing), INDIA: Uttar Pradesh: Dehra Dun, 18.iv.1978 (M. Verma). Deposited in BMNH.

Host: Unknown.

Distribution: India: Uttar Pradesh.

Comments: *P. dunense*, sp. nov. is a distinct species. It apparently differs from the Palaearctic and the Australian species (Soyka, 1956; Trjapitzin, 1978; New, 1976) by a combination of characters pertaining to the entire pronotum, presence of a complete ridge on the propodeum, long petiole and dimensions of antennal segments.

3. *Polynema manaliense*, sp. nov. (Figs. 13-15)

Female: Length, holotype: approx. 1.1 mm. Body dark brown; petiole pale yellow to white; scape and pedicel pale yellow, funicle gradually becoming brownish distally, clava dark brown; wings hyaline, legs brownish, with distal ends of femora and bases of tibiae pale.

Structural details as in Figures 13-15.

Relative measurements (Holotype, slide): Head dimensions not possible to measure, see Fig. 13: Antenna, length: radicle and scape, 18.5; pedicel, 8.5; F1-6; 6, 17, 9, 7, 8.5, 9.75; clava, 20. Thorax length, 46.5; width, 27; pronotum length, 3.5; mesoscutum length, 15.5; width, 24.5; scutellum length, 15; width, 16; propodeum length, 7. Fore wing length, 165; width, 42; length of marginal fringe, 35; hind wing length, 128; width, 4.25; length of marginal fringe, 22. Lengths: Mid tibia, 41, mid basitarsus, 20; tarsal segments 2-4, 25.5; hind tibia, 47; hind basitarsus, 22.5; tarsal segments 2-4, 26. Petiole length, ca. 18. Gaster length (from apex of petiole), 58; T1 length, 30; ovipositor length, 61; IIIrd valvula length, 28.

Male: Unknown.

Holotype: ♀ (on slide under two coverslips), INDIA: Himachal Pradesh: Manali, 9.x.1979 (M. Hayat). Deposited in BMNH.

Host: Unknown.

Distribution: India: Himachal Pradesh.

Comments: This species appears close to *anantanagana* but differs by the characters given in the key.

4. *Polynema anantanagana* Narayanan

Polynema anantanagana Narayanan, 1961: 24. Holotype ♀, India: Jammu & Kashmir: Anantnag (IARI). Subba Rao & Hayat, 1983: 139, catalogue. Subba Rao & Hayat, 1986: 189, catalogue. Mani, 1989: 1430, as species *incertae sedis*.

Host: [?] *Quadrastpidiotus perniciosus* (Comstock).

Distribution: India: Jammu & Kashmir.

Comments: The holotype was not available, and is not found in IARI collection. Therefore, this species is included in the key on the basis of the original description and the illustration (Narayanan, 1961: Fig. 11).

5. *Polynema brevicarinae* Annecke & Doutt (Figs. 16-23, 26-30)

Polynema brevicarinae Annecke & Doutt, 1961: 60. ♂, ♀. Holotype ♀, South Africa: Pretoria (PPRI), not examined.

Polynema (Polynema) indica Narayanan & Subba Rao, 1961: 663. Holotype ♀, India: Delhi (IARI), not examined. *Syn. nov.* Subba Rao & Hayat, 1983: 139, catalogue. Subba Rao & Hayat, 1986: 190, catalogue. Mani, 1989: 1429, description.

Polynema (Polynema) truncata Narayanan & Subba Rao, 1961: 664. Holotype ♀, India: Delhi (IARI), not examined. *Syn. nov.* Subba Rao & Hayat, 1983: 140, catalogue. Subba Rao & Hayat, 1986: 190, catalogue. Mani, 1989: 1428, description.

We have not seen the types of *brevicarinae*, but the original description and figures given by Annecke and Doutt (1961) leave no doubt that the Indian specimens must belong to this species.

Female: Length, 0.62-1.00 mm. Body dark brown to black, with petiole pale yellow to white; antennal scape and pedicel mainly yellow, funicle yellow becoming brownish distally, clava dark brown; wings hyaline; legs pale yellow to very light yellow brown especially on femora and tibiae, last tarsal segments of mid and hind tarsi brown, fore tarsi usually brown.

Structural details as in figures, but the following may be noted: Head (Carded specimen from Mysore: Brindavan Gardens) dorsum transverse; vertex at level of transverse trabecula, 0.66x of head width (10:15); ocellar triangle with apical angle strongly obtuse; posterior ocelli nearly in line with posterior corners of eyes, on the sloping side of the occipital region; anterior ocellus slightly more than two ocellar diameters to transverse trabecula; distance between the two posterior ocelli, 5.5; distance between a posterior ocellus and eye margin, 1.5; distance between a posterior ocellus and anterior ocellus, 3. Antennae as in Figs. 16-18; note, the variations (antennae drawn on same scale). Thorax normal for the genus. Fore wing (Figs. 26,27) 3.80x-4.34x as long as broad; marginal fringe 0.76x to 0.90x of wing width. Petiole varies in length, 0.21x to 0.25x of gaster length. Gaster 1.28x-1.54x as long as thorax, with the ovipositor very slightly to rather distinctly exerted.

Relative measurements (from slide, in two specimens, one from Aligarh specimen [slide no. 1] the second given in parenthesis from Dehra Dun specimen slide no. 12): Head frontal width, 30 (25.5), length, 24(19); frons width at toruli; 17.5(13.5); mouth fossa width, 11.75(9.5); distance between toruli, 10(8); distance from a torulus to transverse trabecula, 6(5); distance

from torulus to mouth margin, 11.5(9.5); eye length, 15(12); malar space length, 10(7). For other measurements, see table 1.

Male: The males assigned to this species differ especially in the relative dimensions of flagellar segments and the relative dimensions of the scape, but all these have transverse, fine to distinct, striations on the inner surface of scape, and in all F1 is at least slightly shorter than F2. [The genitalia are about as in Fig. 25 (drawn from a undetermined species)]

Host: Unknown.

Distribution: India: Bihar, Delhi, Karnataka, Kerala, Maharashtra, Orissa, Pondicherry, Tamil Nadu, Uttar Pradesh.

Specimens examined. 30 ♀, 10 ♂. Specimens on slides): INDIA: Uttar Pradesh: Aligarh, 1 ♂, 1.v.1977 (M. Hayat) (slide no. 9); 2 ♀, 1 ♂, 4.vii.1977; (M. Hayat) (slide no. 8,19); 1 ♀, 16.iii.1978 (M. Verma) (slide no.9); 3 ♀, 2.iv.1978 (M. Verma) (slide no.2); 1 ♀, 30.vi.1978 (M. Hayat & M. Verma) (no. 13); 1 ♀, 1 ♂, 30.viii.1978 (M. Verma) (no.14); 1 ♂, 9.x.1978 (M. Hayat & Verma) (no. 16); 1 ♀, 3.iv.1979 (M. Verma) (no. 6); 2 ♀, 9.iv.1980 (Musharraf A. Khan) (no.1); 1 ♀, iv.1981 (M. Hayat) (no. 5); 1 ♀, 23.vi.1984 (M. Hayat & S. Islam) (no. 3); 2 ♀, 2 ♂, 24.vi.1984 (M. Hayat) (no.11); 2 ♀, iv.1985, (M. Hayat) (no. 4); Mussoorie, 1 ♀, 13.iv.1978 (M. Verma) (no. 10); Dehra Dun, 2 ♀, 17.xii.1991 (S.B. Zeya) (no.12). (Specimens on Cards): INDIA: Uttar Pradesh: Aligarh, 1 ♀, 22.vi.1984 (M. Hayat); 1 ♂, 23.iv.1991, (S.B. Zeya). Bihar: Gaya, 1 ♀, 7.iv.1991 (S.B.Zeya); 1 ♂, 4.1.1992, (S.B. Zeya); Gaya Division, 1 ♂, 7.iv.1992, (S.B. Zeya). Orissa: Bhubaneswar, 1 ♀, 22.ii.1994, (S.B. Zeya). Pondicherry, 1 ♀, 18.ii.1993 (S.B. Zeya). Tamil Nadu: Kodaikanal, 1 ♀, 21.ii.1993 (S.B. Zeya & S.I. Kazmi). Karnataka: Mysore: Brindavan Garden, 1 ♀, 7.iii.1993 (S.B. Zeya). Kerala: near Mamallapuram, 1 ♀, 16.ii.1993, (S.B. Zeya). Trichur: Peechi, 1 ♀, 28.ii.1993 (S.B. Zeya & S.I. Kazmi). Maharashtra: Mansar, 1 ♀, 11.x.1989 (M.C. Basha).

Comments: Seen in isolation, *indica* and *truncata* appear distinctive on characters pertaining mainly to the relative dimensions of the flagellar segments, length of the marginal fringe of the fore wings, and shape of gaster. But with larger series of specimens, collected from several places in India, and with specimens falling between the two extremes, as illustrated in figures 4a and 5a given by Narayanan & Subba Rao (1961) [in spite of some discrepancies between the figures and the measurements given by these authors] (see also figures given here), it is clear that only a single and very variable species is involved. Although Narayanan & Subba Rao (1961) did not mention the presence or absence of transverse striations on the inner surface of the scape, we are confident that the given nature of these striations (very fine and visible at higher magnification) they might have overlooked these in *indica* and *truncata*. [Descriptions of *indica* and *truncata* were published in September 1961, whereas that of *brevicarinae* (from a noting by

Annecke on his personal copy of Annecke and Douitt's paper and about which Dr. Prinsloo informed one of us (M.H.)), was 22 August 1961].

6. *Polynema dhenkunde* Mani & Saraswat

Polynema dhenkunda Mani & Saraswat, 1973: 116. ♂, ♀. Holotype ♀, India: Dalhousie: Dhenkund near Khajjar (USNM), examined. Subba Rao & Hayat, 1983: 139, catalogue. Subba Rao & Hayat, 1986: 190, catalogue. Mani, 1989: 1417, description.

The holotype is on a slide under a circular coverslip. The body is partly crushed due to pressure of the coverslip, hence it is not possible to measure all structures. Therefore relative measurements of some parts are given, which may prove to be useful in separating this species from other Indian species. Otherwise, the original description and illustrations are adequate for recognition of this species.

Female: Body dark brown; petiole and legs yellowish, tibiae infuscate brown, tarsal segments 4 or 3 and 4 brownish, scape and pedicel largely yellow brown, flagellum dark brown.

Relative measurements (from holotype). Distance between toruli, 11; torulus mouth margin distance, 11; frontovertex width, 21. Antennal segments, length (width): scape, 13(6); pedicel, 8.5(6); F1, 6; F2, 14.75; F3, 9; F4, 6; F5, 7.5; F6, 9; clava, 22(9). Fore wing length (width), 153(39); marginal fringe length, 32; hind wing length (width); 109(3.5); marginal fringe length, 20. Lengths: Mid tibia, 39; mid basitarsus, 15; mid tarsal segments 2-4, 24; hind tibia, 46; hind basitarsus, 17; hind tarsal segments 2-4, 23. Ovipositor length, 57.

Male: Described by Mani & Saraswat (1973).

Specimen examined: Holotype female on slide (USNM).

Host: Unknown.

Distribution: India: Himachal Pradesh.

Comments: *P. dhenkunde* is extremely close to the material referred to *P. brevicarinae* in this paper, and was initially confused with it. But it differs from *brevicarinae* mainly in the absence of transverse striations on the inner surface of the scape (see under *P. kamathi* for further comments).

7. *Polynema kamathi* Mani & Saraswat

Polynema kamathi Mani & Saraswat, 1973: 123. Holotype ♀, India: Dalhousie, Ahla Catchment Area (USNM), examined. Subba Rao & Hayat, 1983: 139, catalogue. Subba Rao & Hayat, 1986: 190, catalogue. Mani, 1989: 1426; description.

The holotype is on a slide under a circular coverslip. The head is detached, and rest of body laterally mounted and partly crushed. It is, therefore, not possible to measure all the structures. However, relative measurements of some structures are given, otherwise the original description and illustrations are sufficient for the recognition of this species.

Female: Body dark brown to nearly black; petiole pale orange yellow; legs pale orange yellow with faint brown suffusions; last tarsal segments of all legs dark brown; scape, pedicel, F1 & F2 yellow brown, F3 brownish yellow, bases of F2 and F3 and whole of F4-6 and clava dark brown..

Relative measurements: Antennal segments, length (width): scape 17(7); pedicel, 10.5(6); F1,10; F2,24; F3,15; F4,10; F5,12; F6,12.5; clava, 22.5 (8.75). Fore wing length (width), 215(56); marginal fringe length, 38; hind wing length(width), ca 160(5); marginal fringe length 25. Lengths: mid tibia, 55.5; mid basitarsus, 27; mid tarsal segments 2-4, ca 33; hind tibia, 67; hind basitarsus, 35; hind tarsal segments 2-4, 34. Gaster length, 90; ovipositor length, 91.5.

Male: Unknown.

Specimen examined: Holotype female (USNM).

Host: Unknown.

Distribution: India: Himachal Pradesh.

Comments: *P. kamathi* is very close to *dhenkunde* and both may eventually prove to be synonymous. The differences noticed in the relative dimensions of wing and antennal segments and in colour of antennal segments may be nothing more than size-related characters: *P. kamathi* holotype is larger (1.8 mm) compared to that of *dhenkunde* which is smaller in size, about 1.00 mm. However, in the absence of conspecific material, these two species are not synonymized.

8. *Polynema anamalaiense* Mani & Saraswat

Polynema anamalaiensis Mani & Saraswat, 1973: 113. Holotype ♂, India: Palghat (USNM), examined. Subba Rao & Hayat, 1983: 139, catalogue. Subba Rao & Hayat, 1986: 189, catalogue. Mani, 1989: 1423, description.

This species was described in details by Mani & Saraswat (1973). However, the validity of this species cannot be determined until females are collected.

9. *Polynema crassa* Mani & Saraswat (Fig. 24)

Polynema crassa Mani & Saraswat, 1973: 114. Holotype male, India: Dalhousie (USNM), examined. Subba Rao & Hayat, 1983: 139, catalogue. Subba Rao & Hayat, 1986: 190, catalogue. Mani, 1989: 1424, description.

10. *Polynema kalatopense* Mani & Saraswat

Polynema kalatopense Mani & Saraswat, 1973: 122, Holotype ♂, India: Dalhousie, Kalatop (USNM), examined. Subba Rao & Hayat, 1983: 139, catalogue. Subba Rao & Hayat, 1986: 190, catalogue. Mani, 1989: 1416, description.

Mani & Saraswat (1973) described and illustrated this species. However, the validity of this species should remain obscure until the females could be collected.

***Stephanodes reduvioli* (Perkins)**

Hayat (1992) recorded this species under the name *imbricatus* on specimens collected from Uttar Pradesh, and also placed *Polynema ahlaensis* Mani and Saraswat (1973) in synonymy with this species. Huber & Fidalgo (1997) have shown *reduvioli* to be a senior synonym of both *imbricatus* (Narayanan & Subba Rao) and *ahlaensis*. We record this species from material collected recently from some other Indian States.

Specimens examined: 11 ♀, 1 ♂. INDIA: Bihar: Ramgarh, 1 ♀, 1.iii.1994, (S.B. Zeya & S.I. Kazmi); Gaya, 1 ♀, 4.1.1992, (S.B. Zeya); Gaya: Divizen, 1 ♂, 7.iv.1992 (S.B. Zeya). Uttar Pradesh: Aligarh, 1 ♀, 25.v.1991, (S.B. Zeya). Kerala: Kottayam, 1 ♀, 25.ii.1993, (S.B. Zeya & S.I. Kazmi); 1 ♀, 26.ii.1993 (S.B. Zeya); Munnar, 1 ♀, 24.ii.1993, (S.B. Zeya). Karnataka: Sri Rangapatnam, 1 ♀, 7.iii.1993 (S.I. Kazmi). Tamil Nadu: Villupuram, 1 ♀, 19.ii.1993 (S.I. Kazmi); Kodaikanal, 2 ♀, 21.ii.1993 (S.B. Zeya & S.I. Kazmi); Ooty (=Udhagamandalam), 1 ♀, 6.iii.1993 (S.B. Zeya).

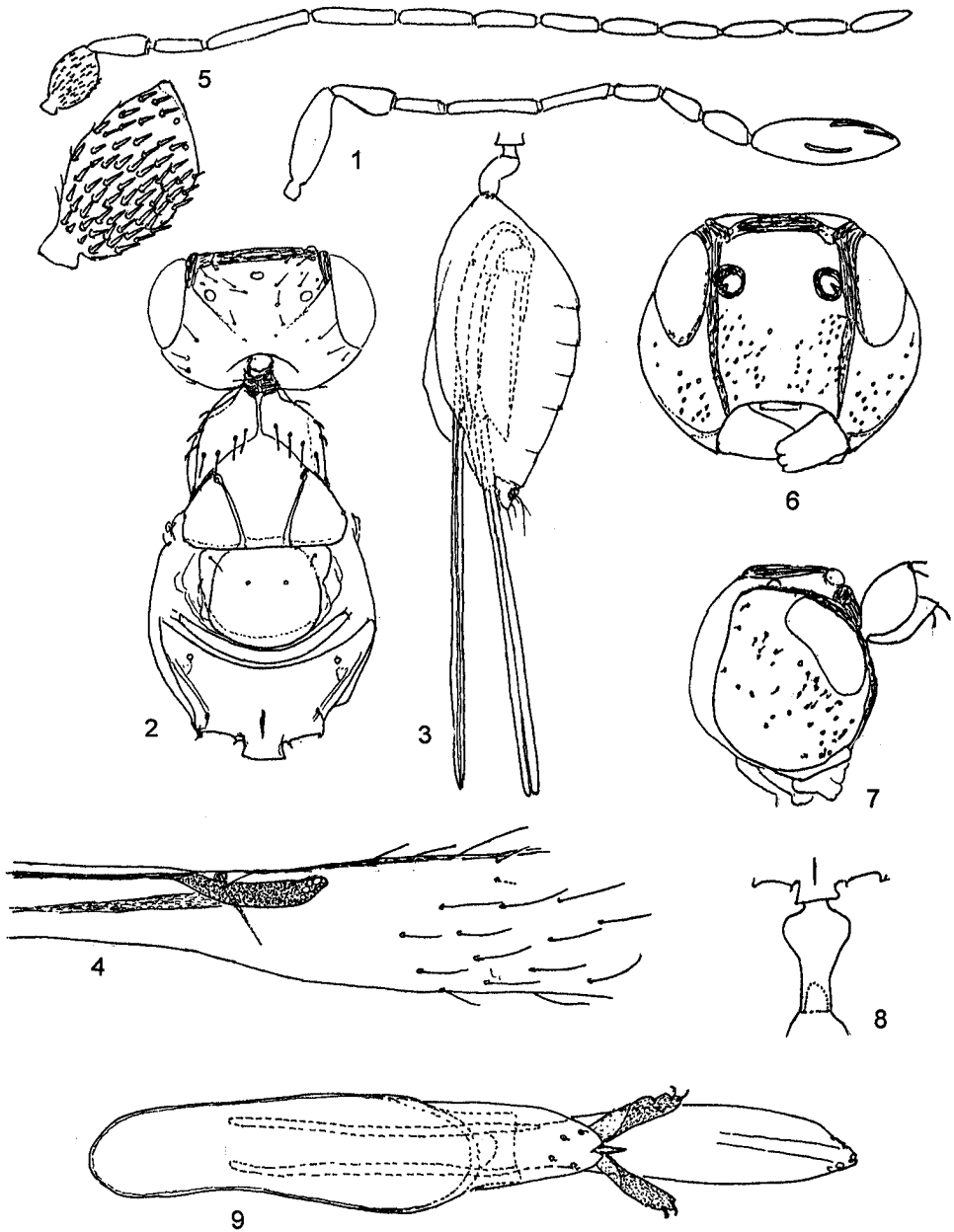
Acknowledgments

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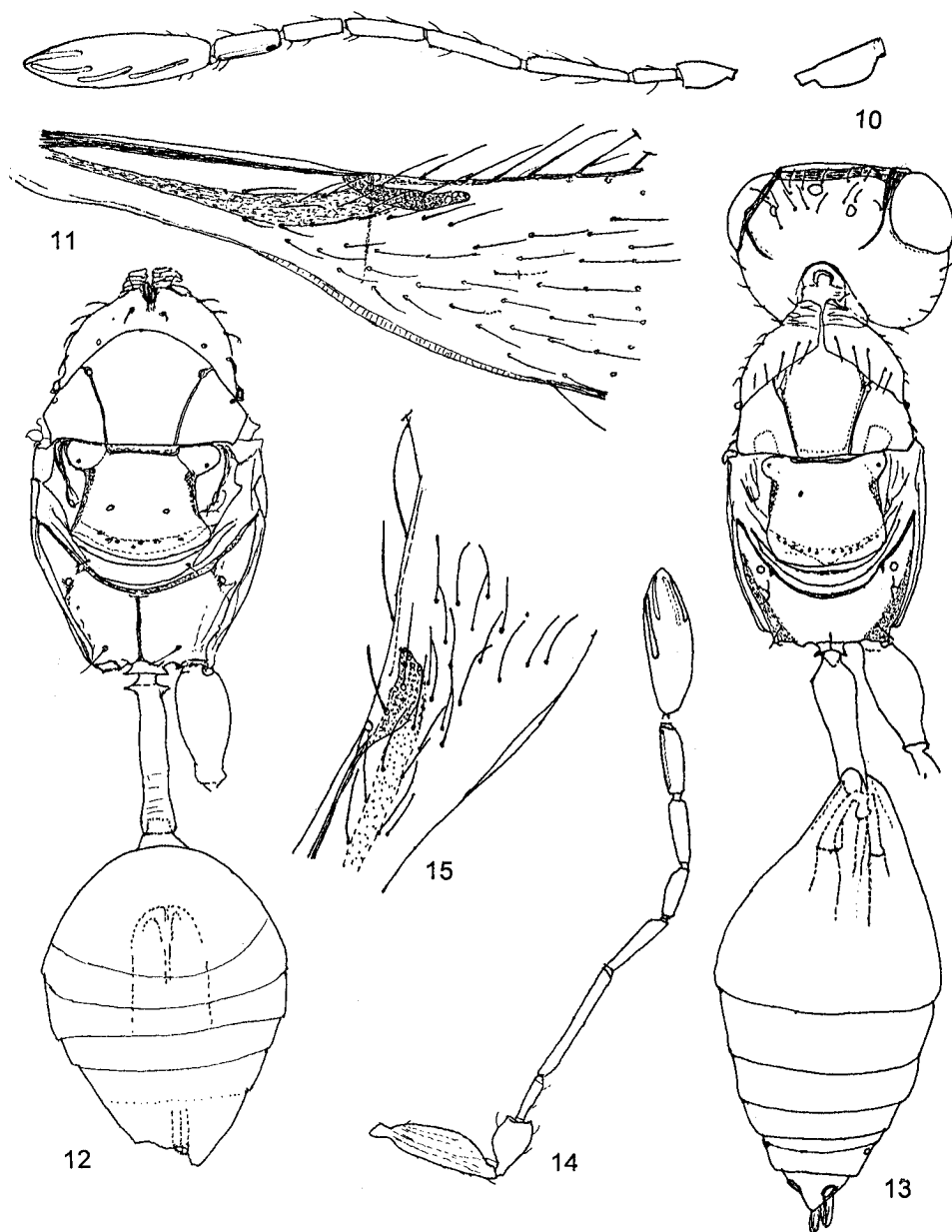
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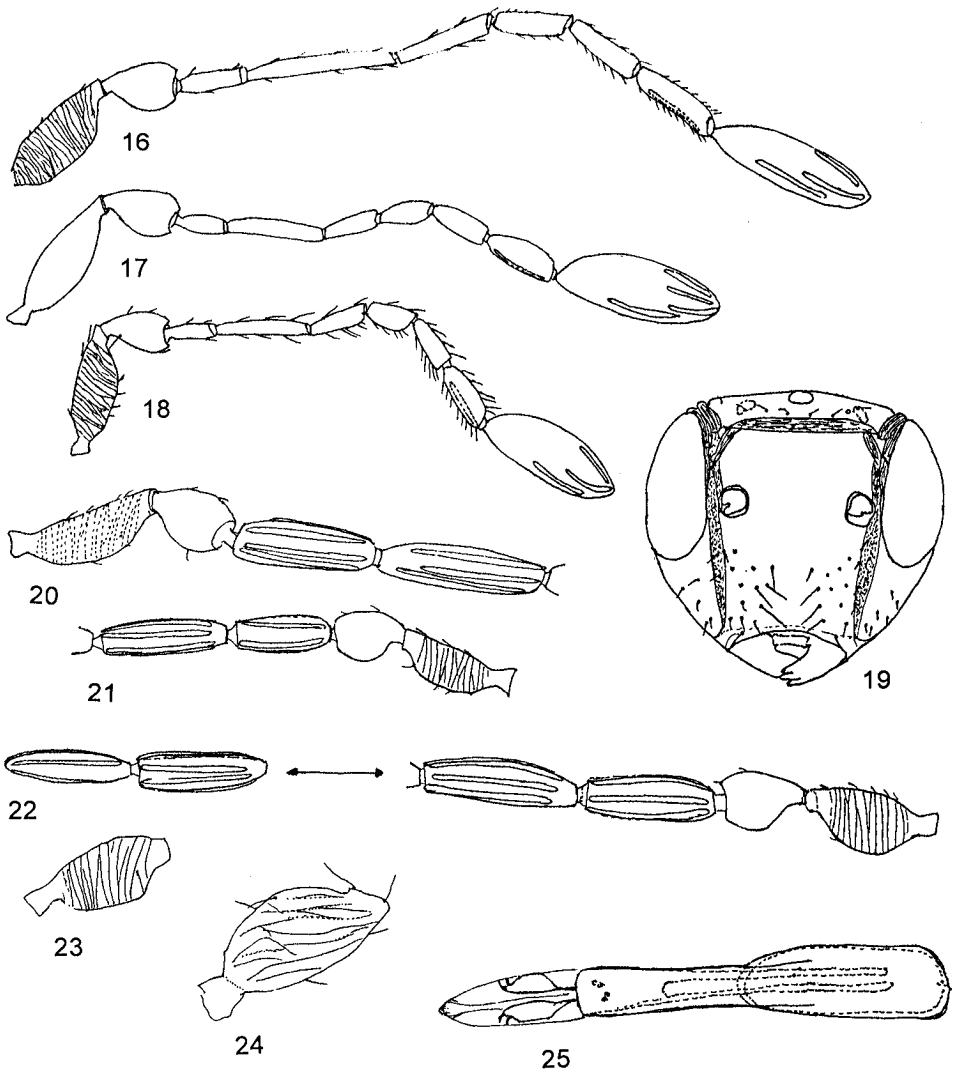
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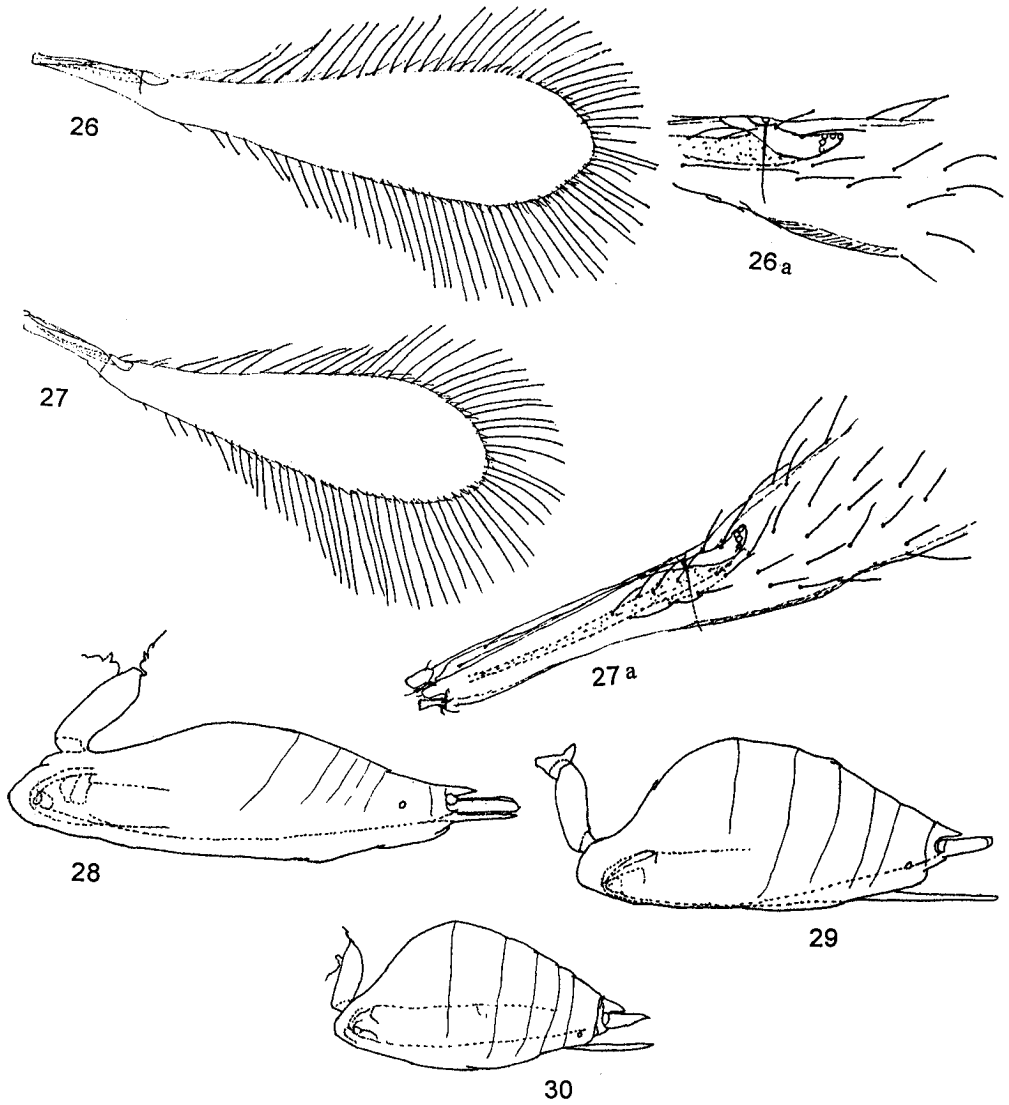
Figs. 1-9. *Polynema mendeli* Girault, female except figs. 5- 9:1, antenna; 2, head and thorax, dorsal; 3, gaster; 4, fore wing venation enlarged; 5, male antenna with scape enlarged; 6, head frontal; 7, head lateral; 8, part of propodeum and petiole; 9, male genitalia.



Figs. 10-15. (10-12) *Polynema dunense*, sp. nov. Holotype, female: 10, antenna; 11, fore wing, basal part enlarged; 12, thorax, petiole and gaster, dorsal (apex of gaster missing). (13-15) *Polynema manaliense*, sp. nov. Holotype, female: 13, habitus, dorsal; 14, antenna; 15, fore wing, basal part enlarged.



Figs. 16-25. (16-23) *Polynema brevicarinae* Annecke & Doutt: 16-18, antennae, female; 19, head frontal female; 20- 22, antennae, male; 23, scape, male. 24, *Polynema crassa* Mani & Saraswat, male, scape; 25, *Polynema* sp. male genitalia. Figs. 16-18 on same scale.



Figs. 26-30. *Polynema brevicarinae* Annecke & Doutt, female: 26,27, fore wings and part of fore wing enlarged; 28- 30, petiole and gaster, lateral; on same scale.

Table 1. Relative measurements of the structures in *Polynema brevicarinae*, females. All measurements from slide-mounted specimens. These measurements can be converted to millimeters by multiplying by 0.0079.

Explanation of abbreviations: PL-pedicle length; F1-6, length of funicle segments 1-6; CL, length of clava; TL, Thorax length, FWL, fore wing length; FWW, fore wing width, MFR, marginal fringe length; MT, mid tibia length, HT, hind tibia length; MB, mid basitarsus length, HB, hind basitarsus length, MT2+3, combined length of tarsal segment 2 and 3 of mid tarsus; HT2+3, combined length of tarsal segments 2 and 3 of hind tarsus; PT, petiole length; GL, gaster length, EXOV, length of exerted part of ovipositor; OVL, ovipositor (=2nd valvifer+3rd valvula) length; IIIVAL, 3rd valvula length.

Slide No	1 ₍₁₎	1 ₍₂₎	2	3	4	5	6	9	10	11	12 ₍₁₎	12 ₍₂₎	14
PL	7.5	7.5	5.5	7	7.5	7.5	6	7.5	6	6	6	6.5	6
F1	6.5	6	3.5	6	4.5	5	5	5	4.5	4	3.75	4	4.5
F2	14.5	14.5	10	12.5	14.5	14	11	9.5	10.5	7	9	9	9
F3	10	10	7.5	8	9.5	9.5	8	5.5	7	5.5	6	5.5	5
F4	7	7	4.75	6.5	7	7	6	4.5	5	4.75	4.5	4.5	5
F5	7.5	7.5	6.5	7.5	7.5	8	6	5.5	6	5	4.5	5	5
F5+6	17	16.5	15	16.5	16.5	17.5	13.5	13.5	13	10.5	11.5	12	12
CL	16.5	16	15	15.5	16	17	13.5	16	13.5	13	14	14	13.5
TL	39	41	33	40	41	41	33	35	30	32	30	30.5	31
FWL				124				114	98	99	101	102	95
FWW			29	30				30	25	25	25.5	26.5	23
MFR			21	23				27	19	22	24	23	18
MT	38	38	31.5	35	36	37	30	30	28	24	27	28.5	26
MB	19	18	12.5	17	17.5	17.5	12	12.5	12.5	10	11.5	13.5	11.5
MT2+3	17	18	13.5	16	17	16	13	13.5	12.5	11	11	10.5	10
HT	42.5	42	35	41.5	43	43	34	36	32	28	30	32	30
HB	22	20	16.5	21.5	22.5	22.5	15	16	14.5	12.5	14.5	15.5	14
HT2+3	18	17.5	14.5	17	17	17.5	14	14.5	13.5	12	11.5	11.5	10.5
PT	14		10	13	13	10.5	10	11	10	10	12	10	10.75
GL	60	55	51	57	62	57	51	45	47	38	40	47	38
EXOV	8	6	4	5	7	8	5.5	2	6	3	3	5	2
OVL	69	68	54.5	64	74	69	54.5	49	51	42	41.5	50	38.5
IIIVAL	26	24.5	24.5		31.0	33	25			18.5	17.5	22	20

* See 'specimens examined' section for collection data of the specimens for the slide numbers given above.