FOUR NEW SPECIES OF CHALCIDOIDEA (HYMENOPTERA) FROM INDIA

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Three new species of Torymidae viz., Palachia frontopuncta Narendran sp. nov., Palachia neorobusta Narendra sp. nov., Palmon kottiyooricus Narendran sp. nov. and one new species of Eulophidae viz., Kostjurixia laharaensis Narendran sp. nov. are described from India and the differences from the closely resembling species are provided.

Keywords: Palachia frontopuncta Narendran sp. nov., Palachia neorobusta Narendra sp. nov., Palmon kottiyooricus Narendran sp. nov., Kostjurixia laharaensis Narendran sp. nov.

INTRODUCTION

The genus Palachia Bouček is represented by seven species from the Indian subcontinent. They are Palachia mangalae Narendran, P. punctifronta Narendran and Sureshan, P. punctigastra Narendran and Sureshan, P. hayati Narendran and Sureshan, P. robusta Bouček, P. farooqii Bouček, and P. grisselli Boucek (Boucek, 1976, 1998; Narendran; 1984, 1994; Narendran and Sureshan, 1988). Farooqi et. al., (1990) described a new species of Palachia viz., P. indica which is synonymised with P. hayati by Bouček (1998). Grissell, (1995) gave a world catalogue of Palachia in his work on Toryminae. In the present paper two more new species viz., Palachia frontopuncta Narendran sp. nov., and P. neorobusta Narendran sp. nov. are described. The genus Palmon Dalmon is represented by P. greeni (Crawford), P. orchesticus (Masi), and P. alfredi Sureshan from the Indian subcontinent. Besides these two more species viz., P. ashmeadi (Crawford) and P. megarhopalus (Masi) are known from other regions of the Orient (Narendran, 1994; Grissell; 1995, Sureshan, 2003). A new species P. kottiyooricus is described here from India. A key to the Oriental species of Palmon is also provided. The genus Kostjurixia Narendran (Eulophidae : Tetrastichinae) is so far known only by its type species viz., K. ootiyensis Narendran (Narendran, 2007). Another new species from Himachal Pradesh is described in this paper.
MATERIALS AND METHODS

The holotypes of *Palachia frontopuncta*, *P. neorobusta* and *Kostjurixia laharaensis* are deposited in the NPCI and *Palmon kottiyooricus* is deposited in DZUC (eventually will be transferred to NZSI). The terms and measurements follow Boucek (1998) and Narendran (1994).

**Abbreviations used**: F1-F7 = Funicular segments; MS = Malar sulcus; OOL = Ocellocular distance; PMV = Postmarginal vein; POL = Postocellar distance; SMV = Submarginal vein; STV = Stigmal vein; SMG = Scutellar grooves; MV = Marginal vein; T1 = First tergite; CC = Costal cell.

**Depositories**: DZUC = Department of Zoology, University of Calicut, India; NPCI = National Pusa Collection, Division of Entomology, Indian Agricultural Research Institute, New Delhi; NZSI = National Zoological Collections, Zoological Survey of India, Kolkata; ZDAMU = Zoology Department, Aligarh Muslim University.

Family TORYMIDAE

1. *Palachia frontopuncta* Narendran sp. nov.

(Figs. 1-4)

**Holotype**: Female: Length 2.27 mm. Ovipositor length 2 mm. Black with blue and violet refringence on head, green and blue refringence on mesoscutum, anterior part of propodeum, bronze refringence on pronotum (collum yellow), scutellum and a dark patch on hind coxa and on some parts of metasoma; antenna dark brown except pale yellow F4, F5, F6 and scape. Legs pale brownish yellow with a dark patch on dorsal side of hind coxa; pretarsi dark brown; gastric petiole pale yellow; gaster black with weak bronze refringence on some parts; ovipositor pale brownish yellow.

**Head**: 1.4x as broad as pronotum with large eyes; sculpture finely punctate without smooth part between ocelli and eyes (Fig. 1); vertex not elevated; POL = 17; OOL = 4; scrobe sculptured; MS indistinct, face not protuberant at toruli; scrobe moderately deep, ending vaguely about three ocellar diameters below from ocellus; scrobe reticulate; interantennal ridge narrow, reticulate, lower than slightly raised lateral sides of each torulus which continue downward as cross-striate areas separated by slight median depression; clypeus reticulate, lower margin mostly entire without a distinct median tooth; gena in lower half moderately convex; head length in front view equal to its width, upper face 1.57x as broad as high.

**Relative measurements**: head width = 11; length = 11; eye height 1.11x its width in side view, 4x length of MS; antennal flagellum plus pedicel 1.5x as long as width of head in front view; pedicel a little over 2.1x as long as broad; anellus subquadrate; funicular segments gradually widening, scape reaching front ocellus; clava as long as combined length of five preceding segments,
with micropilosity beneath, F2 at apex as broad as pedicel; F1 2x F7, 0.73x as long as broad; F4 barely longer than broad (Fig. 2).

**Mesosoma**: > 1.36 x as long as broad; weakly cross striate, remaining part strongly reticulate, pronotum 0.6x as long as its width; mesoscutum 0.67x as long as its width, longer than pronotum; scutellum wider than long, about as long as mesoscutum; mesoscutum and scutellum with strong raised reticulation; propodeum with strong reticulation, a little longer than scutellum, declining 70° to longitudinal axis of mesosoma, anteriorly a little depressed with a few short rugae at sides. Mesopleuron anterolaterally with distinct epicnemial edge, behind it almost flat and reticulate; mesepimeron smooth on upper anterior side, reticulate on lower side; mesopleuron with distinct crenulate groove along half length of metapleural margin. Legs rather strong, though tibiae and tarsi slender; hind coxa < 2.71x hind femur, 3.45x (teeth excluded) as long as broad, coxa with a longitudinal (Fig. 3) row of short white pilosity on dorsal margin in side view; femur with a teeth confined to distal half. Forewing about 3x as long as broad. Relative length of costal cell = 47, MV = 32; PMV = 13.7; STV = 5; stigma knobbed, with slight infumation near parastigma (Fig. 4).

**Metasoma**: Petiole a little longer than broad; gaster strong with faint traces of wide meshed reticulation; hypopygium reaching apex of gaster; ovipositor 2.5x as long as hind tibia; metasoma a little longer than mesosoma (19 : 17).

**Male**: Similar to female except mainly: (1) antenna not clavate, brown with scape paler on ventral part; (2) head metallic green; (3) hind coxa concolourous with dark mesosoma with apex pale; (4) hind tibia black with base and apex pale; (5) colour in general darker than that of female.

**Biology**: Unknown.


**Discussion**: This species comes near *Palachia punctifronta* Narendran and Sureshan in having vertex with dense reticulations but differs from it in having (1) no smooth area between hind ocelli and eyes; (2) PMV shorter than half length of MV; (3) crenulate groove of mesopleuron short and not running full margin of mesonotum and in several other character. This news species comes to *Palachia hayati* Narendran & Sureshan in the key to species by Boucek (1998) and by Narendran and Sureshan (1989) but differs from *P. hayati* in having : (1) T1 black with yellowish brown tinge on sides anteriorly (in *P. hayati* T1 completely metallic green), (2) in female head black with blue and violet refringence (in *P. hayati* head metallic green); (3) colour of other parts darker (not so in *P. hayati*); (4) mesosoma > 1.36x as long as wide (in *P. hayati* mesosoma 1.88x as long as wide); (5) mesepimeron smooth and shiny on upper anterior part (completely reticulate in *P. hayati*); and (6) pronotal ledge, column and petiole pale yellow (not so in *P. hayati*). This new species
comes very close to *Palachia pulchra* Boucek in having column, lateral pronotal ledges as well as petiole and anterior part of T1 pale yellow or pale brownish yellow. However it differs from *P. pulchra* in very many characters and does not fit to the couplet of *pulchra* in the key to species by Boucek (1998).

2. *Palachia neorobusta* Narendran sp. nov.  
(Figs. 5-8)

*Holotype*: Female: Length 1.933 mm plus ovipositor 2.48 mm. Lower frons, face, gena bright metallic green; pronotum with lateral perpendicular panel and collum pale yellow, anterior half of remaining part dark metallic green, posterior half dark with slight bronze refringence; mid lobe of mesoscutum dark violet blue; most of scapulae and scutellum dark with bronze refringence; propodeum bright metallic greenish blue with bright bronze area in middle; antenna with scape, F3 to F7 pale yellow; pedicel, anellus, F1 and F2 brown; clava black; fore and mid legs pale yellowish white; hind coxa pale yellowish white with a small brownish patch on dorsal side, dorsal inner half of femur pale brown with ventral half pale yellowish white; hind tibia brown with base and apex pale; tarsi pale yellowish white; hind tibia brown with base and apex pale; tegula pale yellowish white; petiole pale yellowish white; gaster pale brown with median dorsal part slightly darker brown; ovipositor sheath dark brown; ovipositor brown with apex pale brown. Wings hyaline with very slight infumation attached to parastigma.

*Head*: 1.53x as broad as mesosoma; vertex smooth with reticulate area behind on the sloping posterior part above occipital carina (Fig. 5); hind ocellus distinctly nearer to front ocellus than to occipital carina; mid and lower frons with distinct (not very shallow as in *P. robusta*) reticulations which merges with dense reticulation in scrobe; latter reaching fron ocellus but its sides vague; in side view face slightly protuberant at toruli; temple in dorsal view short; eye broadest in lower third; clypeus small, middle of its lower margin hardly produced; no paraclypeal tooth.

*Relative measurements*: Head width (anteriorly) 11 = 13; length = 12; POL = 19; OOL = 4; eye length : width in lateral view = 8.5 : 6; MS = 2.4; scape = 6; flagellum plus pedicel = 19; antenna as in figure 6.

*Mesosoma*: > 1.64x as long as broad; pronotum convex, anteriorly rounded, column weakly cross reticulate, remaining part with strong raised reticulations; pronotum 0.45x as long as its width; mesoscutum 0.46x as long as its width, 1.4x as long as pronotum; scutellum a little wider than long, subequal in length to mesoscutum; reticulation on mesoscutum and scutellum strong as that of pronotum; propodeum as long as scutellum, with strong raised reticulation, declining 60° to longitudinal axis of mesosoma, anteriorly a little depressed with short rugae on anterior margin. Mesopleuron anterolaterally with distinct epicnemial edge, behind it almost flat and reticulate; mesepimeron almost completely reticulate; mesopleuron with distinct crenulate groove
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along metapleural margin. Legs not very strong; hind coxa 1.8x hind femur, 3.25x (teeth excluded) as long as broad, coxa dorsally with 2 longitudinal irregular row and a ventral irregular row of short white pilosity in side view; femur (Fig. 7) with teeth confined to distal half, with 6 minute teeth between distal large tooth and apex of femur. Forewing 3.2x as long as broad.

Relative length: costal cell = 47, MV = 26; PMV = 13; STV = 5; stigma hardly knobbed, with a strip of slight infumation near parastigma (Fig. 8).

Metasoma: Petiole a little longer than wide in side view; gaster smooth and shiny without distinct reticulations; hypopygium reaching apex of gaster, gaster subequal in length to mesosoma; ovipositor 3.5x as long as hind tibia.

Male: Similar to female except in having antenna without distinct clava, and gaster a little shorter than mesosoma (7 : 8).

Biology: Unknown.


Discussion: This species comes to Palachia mangalae Narendran in the key to species by Boucek (1998) but differs from it in having: (1) pronotum, mesoscutum and scutellum not dark cupreous (dark cupreous in P. mangalae), (2) F3 and F4 pale yellow (F3 and F4 black or dark brown in P. mangalae); (3) Gaster pale brown with median dorsal part without any metallic refringence (in P. mangalae gaster blackish brown with slight metallic refringence); (4) ovipositor sheath dark brown (in P. mangalae ovipositor sheath white with tip shortly blackish); (5) antennal flagellum plus pedicel as long as 1.67x width of head (in P. mangalae 1.56x width of head); (6) lateral ledge of pronotum pale yellow (lateral ledge of pronotum not so in P. mangalae); and (7) eye height in profile 3.3x as long as MS (in P. mangalae eye height in profile 5.4x as long as MS).

This new species resembles Palachia robusta Boucek in the colour of antenna, pronotal ledge and legs but differs from P. robusta in having: (1) ovipositor sheath dark brown (whitish in P. robusta); (2) hind ocellus distinctly nearer to front ocellus than to occipital margin (hind ocellus equidistant to front ocellus and occipital margin in P. robusta); (3) Scrobe reaching front ocellus (in P. robusta scrobe not reaching front ocellus); (4) hind femur with 6 minute black teeth between distal large tooth and apex of femur (in P. robusta hind femur with one relatively large tooth followed by irregular serration between large tooth and apex of femur as in Figure 31, Boucek 1998); (5) mesopleuron with complete crenulate groove at metapleural margin (in P. robusta crenulate groove short and weak); and (6) mid lobe of mesoscutum with raised reticulation (with weak wide meshed reticulation and shiny on the mid lobe of mesoscutum in P. robusta).
3. *Palmon kottiyooricus* Narendran sp. nov.

(Figs. 9-11)

**Holotype**: Female: Length 2.18 mm. Ovipositor length 2.42 mm. Head and mesosoma dark metallic green; eyes reddish brown; ocelli dark brown; scape and pedicel pale yellow; anellus and funicle pale brownish yellow with anterior margin slightly darker, mandible brown; fore and mid legs pale yellow; hind coxa pale yellow with a small dark patch dorsobasally; hind femur pale yellow with apical one-fourth brown, teeth black; hind tibia pale brownish yellow; hind tarsus pale yellow. Wings hyaline with veins pale brown; metasoma pale brown with dark circular parts basally and subapically as in figure 9, basal dark part with slight metallic green refringence; ovipositor sheath dark brown.

**Head**: 1.35x as broad as pronotum with large eyes; vertex and frons moderately reticulate; head width in dorsal view 2.25x its length; width in anterior view 1.08x its length; POL 3.33x OOL; distance between hind ocellus and front ocellus half of POL; occiput with a fine carina; scrobe reticulate reaching front ocellus; margin ecarinate; MS about 0.2x diameter of eye in profile; gena with fine posterior carina; eye separated from each other by 1.1x length of eye; antennal flagellum plus pedicel 1.57x as long as width of head in front view; scape almost reaching front ocellus; clava a little longer than flagellum (52 : 49); antennal segments as in figure 10.

**Mesosoma**: 1.8x as long as broad; uniformly provided with setigerous pits; pronotum 0.33x as long as its width; mesoscutum 0.59x as long as its width, 2x as long as pronotum; scutellum length subequal to its width, subequal in length to mesoscutum; propodeum a little shorter than scutellum, with strong raised pits and a strong cross carina slightly behind its middle, declining 50° to longitudinal axis of mesosoma; episternum weakly cross reticulate; epimeron with a deep pit between upper and lower halves; front margin of metapleuron straight; hind coxa with a moderately spaced somewhat long setae on dorsal margin in side view, hind femur length 2.27x its width (including teeth), ventral margin with 9 teeth (1 + a + b + c + 2 + d + 3 + 4 + 5 where 1-5 represent primaries and a-d represents secondaries) as in figure 11. Forewing 3.52x as long as broad; relative length of costal cell = 24, MV = 19; PMV = 7; STV = 3 (Fig. 9).

**Metasoma**: Excluding ovipositor longer than mesosoma (41 : 35), subequal in length to combined length of head plus mesosoma; hypopygium reaching apex of gaster; ovipositor sheath longer than head plus mesosoma plus metasoma (excluding ovipositor sheath) (83 : 91), 2.2x as long as gaster, 3.4x as long as hind tibia.

**Male**: Unknown.

**Biology**: Unknown.
Coll. Sabu. K.T. (Deposited in DZUC pending transfer to NZSI).

Discussion: This new species can be separated from all other Oriental species of *Palmon* by the following key:

**KEY TO ORIENTAL SPECIES OF PALMON DALMAN**

1. Ovipositor much shorter than 2x (less than 1.6x) length of rest of body ......................... 2
   = Ovipositor 2x as long as rest of body ............................................................................. 5

2. Propodeum with a strong cross carina a little behind middle ........................................ 3
   = Propodeum without a strong cross carina [ovipositor 2.92x as long as gaster and 1.4x as long as rest of body, length of antennal clava 1.3x preceding funicular segments and anellus together] .......................................................... P. alfredi Sureshan

3. Ovipositor 1.45x as long as rest of body; head and mesosoma dull green; metasoma yellowish with base metallic and apical half brown; antennae yellowish with clava dark; hind coxa at base metallic, rest yellowish; hind femur and tibia more or less obscured with dusky colour .................................................................................................................. P. ashmeadi (Crawford)

4. Clava with apex broad and oblique (Fig. 17a, Masi 1926), as long as combined length of funicle segments and anellus; pedicel 0.45x length of scape; ovipositor 1.15x length of rest of body; PMV 3x as long as STY ..................................................... P. megarhopalus (Masi)

   = Clava (Fig. 10) with apex pointed, longer than combined length of funicle segments and anellus; pedicel 0.52x length of scape; ovipositor 1.11x length of rest of body; PMV shorter than 3x STV ....................................................................................... P. kottiyoaricus sp. nov.

5. Hind coxa greenish black or bluish black with apex pale; forewing with an infuscated area attached to STV; gaster with T1 joining petiole at condyle away from its insertion at foramen ........................................................................................................................................ P. greeni (Crawford)

   = Hind coxa yellow with a blackish patch on dorsal side of basal half; forewing without an infuscation attached to STV; gaster with T1 joining petiole at condyle near its insertion at foramen ........................................................................................................ P. orchesticus (Masi)
Family EULOPHIDAE

4. Kostjurixia laharaensis Narendran sp. nov. (Figs. 12-15)

Holotype: Female: Length 0.9 mm black; eye brown; ocelli dark brown; antenna brown with scape pale brown; tips of femora, tibiae and tarsi pale yellow; pretarsi brown; coxae concolourous with mesosoma. Wings hyaline, veins pale yellow; pilosity brown; tegula brown. Pubescence dirty white.

Head: Anteroposteriorly compressed; width in anterior view subequal to its anterior length; POL 1.33x OOL; occiput subvertical; frontofacial sutures as in figure 12, separated from each other and running to sides of front ocellus; lower margin of clypeus entire but with two minute lobes; mandibles bidentate; eyes sparsely pilose, 2x as long as MS, a little over 2x as long as wide in anterior view; MS straight, without a basal fovea; antennal formula 11233 (Fig. 13); scape not reaching front ocellus, a little shorter than eye height in profile, 2.63x as long as wide; pedicellus 1.4x as long as wide, longer than F1 (11 : 8); F1 a little wider than long (10 : 8); F2 a little longer than F1 (9 : 8), as long as its width; F3 subequal in length to F2, subequal in length to its width; clava 2.33x as long as wide (21 : 9), subequal in length to scape.

Mesosoma (Fig. 14): Flat, with 3 depressed setae (posterior most pair worn but setal pits can be seen on careful observation under proper illumination) on either side; pronotum a little shorter than (15 : 17) mesoscutum, weakly reticulate; mesoscutum 1.53x as broad as long (22 : 17); scutellum 0.65x (11 : 17) as long as mesoscutum, 1.45x as broad as long, surface weakly reticulate; SMG distinct but weak, two pairs of setae present on posterior half; dorsellum lying over metanotum medially, touching propodeum; propodeum with a median carina and surface as in Aceratoneuromyia, as long as scutellum; propodeal spiracle separated from metanotum by about its own diameter; hind coxa mostly smooth with weak reticulation; hind femur 2.4x as long as wide; spur of mid tibia about as long as mid metatarsus; forewing (excluding marginal fringe) 3x as long as broad; CC a little shorter than MV; MV 3.46x as long as STY, marginal fringe 0.77x length of STY; speculum very small, closed behind by setae, not extending forward below MV (Fig. 15).

Metasoma: Longer than mesosoma, subequal to combined length of head plus mesosoma; hypopygium exceeding a little beyond middle of gaster.

Male: Similar to female except the funicular segments more transverse.

Biology: Unknown.


Paratypes: 1 Female and 2 males of same data of Holotype (ZDAMU).

Discussion: This new species differs from K. ootyensis Narendra in having: (1) MS straight (in K. ootyensis MS curved), (2) pedicel 1.4x as long as wide (in K. ootyensis pedicel length subequal to its width); (3) F2 a little longer than F1 (F2 shorter than F1 in K. ootyensis); (4) F3 width subequal to its length (in K. ootyensis F3 wider than long); (5) clava 2.33x as long as wide (clava 1.7x as long as wide in K. ootyensis); (6) claval length subequal to length of scape (not so in K. ootyensis); (7) mesoscutum 1.53x as broad as long (in K. ootyensis mesoscutum 2.1x as broad as long); (8) mesosoma black (in K. ootyensis mesosoma pale brown); (9) gaster black (gaster dark brown in K. ootyensis); (10) hind femur 2.4x as long as wide (in K. ootyensis hind femur about 3x as long as wide); (11) forewing 3x as long as broad (forewing shorter than 3x its width in K. ootyensis); (12) pronotum a little shorter than mesoscutum (pronotum as long as mesoscutum in K. ootyensis); and (13) General body colour black (in K. ootyensis head and mesosoma light brown and gaster dark brown).

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