



Descriptions of two new species of *Dipara* Walker from India with a revised key to the Indian Species (Hymenoptera: Chalcidoidea: Pteromalidae)

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ABSTRACT: Two new species of *Dipara* Walker (Hymenoptera: Pteromalidae) are described based on the specimens from the Indian states of Tamil Nadu, Kerala and Nagaland. The key to the Indian species of *Dipara* is revised. © 2018 Association for Advancement of Entomology

KEY WORDS: Hymenoptera, Pteromalidae, *Dipara*, new species

INTRODUCTION

The genus *Dipara* Walker belongs to the subfamily Diparinae of Pteromalidae (Hymenoptera: Chalcidoidea) which is currently known by 54 species described worldwide, with 23 species known from the Oriental Region (Sureshan et al., 2014; Sureshan & Farsana, 2015; Sureshan et al., 2017; Noyes, 2017). Studies on further specimens of *Dipara* from the Indian states of Tamil Nadu, Kerala and Nagaland yielded two undescribed species which are described here. The key to the Indian species of *Dipara* published by Sureshan et al., 2017 is modified to accommodate the new species described here.

MATERIAL AND METHODS

The specimens were collected with sweep net and examined under Leica M 205C stereozoom microscope and images captured with the camera

model Leica MC170 HD. Terminology used in the paper generally follows Gibson (1997) and the type specimens are deposited in the National Zoological Collections of Zoological Survey of India, Western Ghat Regional Centre, Calicut (ZSIK).

The following abbreviations are used in the text: fu₁-fu₇ = funicle segments 1 to 7; mv = marginal vein; OOL = ocellocular distance; pmv = postmarginal vein; POL = post-ocellar distance; smv = submarginal vein; stv = stigmal vein; Gt₁-Gt₆ = gastral tergites 1-6.

RESULTS AND DISCUSSION

Key to the Indian species of *Dipara* Walker (females)

1. Wings reduced (species brachypterous).
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- Wings fully developed (species macropterous).
..... **11**
- 2. Median area of propodeum with uniform longitudinal rugae, arranged in a sub-circular form; frenum represented by a very narrow area with small rugae (Sureshan *et al.*, 2014: figs 10, 13); mesoscutum almost completely black with a characteristic ‘W’ shaped yellowish brown area.
..... ***D. yercaudensis* Sureshan**
- Propodeum without uniform longitudinal rugae, partly, irregularly carinated or with irregular areolae; scutellum always with frenum broader than above; mesoscutum not coloured as above, sometimes body completely brownish black. **3**
- 3. Mesoscutum with notauli not meeting in the posterior end. **4**
- Mesoscutum with notauli meeting in the posterior end..... **9**
- 4. Mesoscutum blackish brown in distal two-thirds; carina of pronotal collar characteristically angulate and slightly broken in the middle (Sureshan *et al.*, 2014: fig. 14); forewing stump long and narrow reaching beyond tip of petiole.
..... ***D. angulata* Sureshan & Nikhil**
- Mesoscutum without blackish brown colour as above, sometimes body uniformly brownish black, then forewing stump long and broad, reaching beyond tip of petiole otherwise; forewing stump very short and not reaching petiole. **5**
- 5. Forewing stump 4.3× as long as broad, reaching beyond tip of petiole; petiole stout, finely reticulate, 1.6× as long as broad; propodeum with characteristic median carina, plicae and costulae (Sureshan *et al.*, 2014: fig. 19)..... ***D. venkati* Sureshan**
- Forewing stump very short and narrow not reaching or just touching base of petiole; petiole slender, longitudinally carinate, more than 1.6× as long as broad; propodeum with or without median carina, plicae and costulae and not as above. **6**
- 6. Propodeum with baso-medial area between plicae conically elevated up to middle, surface not shiny, with longitudinal and transverse carinae and striae; wing stump extending well beyond the hind margin of scutellum, touching base of petiole and with 5 or 6 bristle
..... **8**
- Propodeum (Sureshan *et al.*, 2014: Fig. 18) with baso-medial area between plicae not conically elevated up to middle, surface almost shiny, sometimes with very weak striations; wing stump very short, not reaching much beyond hind margin of scutellum or sometimes hardly reaching hind margin of nucha, then with only 3 bristles. **7**
- 7. Forewing stump very short, only a little longer than tegula, not extending much beyond hind margin of scutellum; forewing with 2 bristles; OOL almost as long as POL; antenna with scape as long as eye, pedicel slightly longer than fu_1 ; general body colour yellowish brown.
..... ***D. intermedia* Sureshan & Narendran**
- Forewing stump 5.2× as long as tegula, hardly reaching tip of nucha, forewing with 3 bristles; OOL 1.2× POL; OOL almost as long as POL; antenna with scape 0.8x as long as eye, pedicel distinctly longer than fu_1 (Sureshan *et al.* 2017: Figs 1(B),1(D), 1(E) ; general body colour dark honey brown.....***D. tamila* Sureshan *et al.***
- 8. Body length, 2.6 mm; upper face and vertex distinctly reticulate; POL equal to OOL; antenna with fu_6 and fu_7 whitish yellow as clava; fl_2 – fl_5 dark brown; wing stump with 5 bristles; hind coxae reticulate.....
..... ***D. eukeralensis* Özdikmen**
- Body length, 1.5 mm; upper face and vertex

- almost shiny, only weakly reticulate; POL slightly shorter than OOL; only fl₇ whitish yellow as clava; fu₃– fu₆ brown; wing stump with 6 bristles; hind coxa striate reticulate.***D. mohanae* Narendran & Sureshan**
9. Mesoscutum with distinct black patch covering almost posterior two-thirds; pronotum with a distinct transverse carina; forewing stump with one short and one long bristle.....
..... ***D. thirumalaii* Sureshan**
- Mesoscutum with black patch on posterior half of scapulae only; pronotum with or without transverse carina; forewing stump with 3 or 4 setae..... **10**
10. Propodeum without median carina; antenna with fu₆ partly whitish yellow as clava; forewing stump with 4 setae; gaster swollen with Gt₃–Gt₆ not very short, and yellowish brown with distinct yellow band overlapping Gt₁ and Gt₂; Size 1.8–1.9 mm
..... ***D. gastra* (Sureshan & Narendran)**
- Propodeum with weak median carina in posterior third, antenna with fu₆ completely brown; forewing stump with 3 setae; gaster narrow and compressed with Gt₃– Gt₆ short, and almost brown with epipygium and ventral part paler; Size 1.45–1.6 mm
..... ***D. malabarensis* (Narendran & Mini)**
11. Pronotal collar with separate long and stout bristles near posterior margin in addition to pubescence. **15**
- Pronotal collar without separate long and stout bristles near posterior margin in addition to pubescence. **12**
12. Mesoscutum posteriorly with a black or bluish black patch in lower half of scapulae; petiole 2–2.6× as long as broad in dorsal view **13**
- Mesoscutum posteriorly without black or bluish black patch in lower half of scapulae, sometimes black patch covering all the three lobes in posterior third; petiole 1.63× as long as broad in dorsal view**14**
13. Scapulae with the bluish black patch distinct and covering almost half length in the lower half; notauli closely converging posteriorly; petiole 2× as long as broad in dorsal view; pronotal collar carinated anteriorly.....
.....***D. debanensis* Sureshan**
- Scapulae with the black patch small, and not sharp, and covering only posterior third; notauli not closely converging posteriorly as above; petiole 2.6× as long as broad in dorsal view (Sureshan et al., 2014: figs 2, 20); pronotal collar not carinated anteriorly.
.....***D. andamanensis* Sureshan & Farsana**
14. Mesoscutum without any black patch or band, bristles a little above centre; reticulation of body fine; antenna with fu₄–fu₆ brown (fu₄ partly).
..... ***D. miniae* Narendran & Sureshan**
- Mesoscutum with a broad black patch covering all the three lobes in posterior third, bristles in the centre; reticulation of body coarse; antenna with fu₄– fu₇ brown.....
..... ***D. nigriscuta* Sureshan**
15. Scrobe long, separated from front ocellus by a distance as long as the diameter of front ocellus, exceeding well over middle length of eye from toruli. **16**
- Scrobe shorter, at the most reaching mid-level of eyes from toruli. **22**
16. Antennae inserted on an elevated point on face, head very narrow in profile view with eyes small (Fig. 1); notauli meeting posteriorly to form a broad ‘V’ touching transscutal articulation (Fig. 2).
..... ***D. elevata* Sureshan sp. nov.**
- Antennae inserted not on much elevated point as above, head more thicker in profile than as above, eyes not small as above; if notauli

- meeting posteriorly then scutellar frenum shiny..... **17**
17. Scutellar frenum completely shiny except for the crenulate foveae on the posterior margin; notauli deep and merging posteriorly to form a broad “V”, mid lobe of mesoscutum little above than the side lobes (Fig.6).....
..... ***D. nitidofrena* Sureshan sp. nov.**
- Scutellar frenum not shiny, always with longitudinal ridges or sculpture; mesoscutum and notauli different..... **18**
18. Petiole smooth and shiny without longitudinal carina, with maximum posterior width 1.13× dorsal length; frenal area of scutellum shorter than scutellar area in front; body large, length 4.5 mm. ***D. sringericus* (Narendran)**
- Petiole with distinct longitudinal carina or reticulation, with maximum posterior width 0.7–1.0× dorsal length; frenal area almost as long as scutellar area in front; body small, length 1.5–2.7 mm. **19**
19. Antenna with anellus wide, distinct; fu_1 anelliform, without sensilla (Sureshan & Farsana, 2015: Fig. 5); gastral petiole as long as broad in dorsal view; general pubescence on head and mesosoma long in the form of thin bristles (Sureshan & Farsana, 2015: Fig. 1)... ***D. ponmudiensis* Sureshan & Farsana**
- Antenna with anellus not wide as above, less distinct; fu_1 not anelliform, with sensillae; gastral petiole distinctly longer than broad; general pubescence of the body short, not in the form of bristles as above..... **20**
20. Petiole long, 1.7× as long as broad in dorsal view, almost half length of hind coxa, dorsally mostly reticulate and with carinae only in hind part (Sureshan et al, 2014: Fig. 17); face without metallic blue reflection. (Size 2.7 mm) ***D. nigra* Sureshan**
- Petiole short, 1.2–1.4× as long as broad in dorsal view, without reticulation, only longitudinally carinate, carinae sometimes weak medially; face with distinct metallic blue reflection. **21**
21. Petiole short, 1.2× as long as broad in dorsal view, and with a pair of setae very close to anterior margin; pronotal collar with a row of four strong setae near posterior margin; bristles on the mid lobe of mesoscutum little below middle; fore wing almost hyaline.....
..... ***D. hayati* Sureshan**
- Petiole long, 1.4× as long as broad in dorsal view, and with a pair of setae almost in the middle (Sureshan et al, 2014: Fig. 16); pronotal collar with a row of two strong setae near posterior margin; bristles on the mid lobe of mesoscutum little above middle; fore wing smoky.....
..... ***D. kannurensis* Sureshan & Farsana**
22. Forewing with three infumate patches; petiole a little longer than half length of hind coxa; axillae and pronotum pink; head mostly brownish pink with vertex and occiput darker. ***D. bouceki* (Narendran)**
- Forewing without inhumations, hyaline; petiole one-third as long as hind coxa; axillae, pronotum and head black.
..... ***D. keralensis* (Narendran)**

DESCRIPTIONS OF SPECIES

1. *Dipara elevata* Sureshan sp. nov. (Figs. 1-4)

Holotype; *Female*: Length 3.2 mm (without ovipositor), ovipositor exerted 0.84 mm. (Paratype female Reg. No. 10253: Length 2.0 mm (without ovipositor), ovipositor exerted 0.2 mm; Paratype female Reg. No. 10254: Length 2.2 mm (without ovipositor), ovipositor exerted 0.5 mm). Body honey brown except upper half of propodeum and gaster dorsally and laterally (on upper half) blackish brown; eyes silvery white; ocelli reflecting white; area of ocellar triangle black. Antennae testaceous except clava dark brown. Bristles of the body black. Legs uniformly testaceous. Wings almost uniformly



Figs 1-4 *Dipara elevata* Sureshan sp. nov. Figs 1-3 Holotype female. 1, Body in profile; 2, Head, mesosoma and petiole in dorsal view; 3, Metasoma in dorsal view. Fig. 4 Paratype male in profile. Figs 5-8 *Dipara nitidofrena* Sureshan sp. nov. Holotype female. 5, Body in profile; 6, Mesosoma in dorsal view; 7, Propodeum and petiole in dorsal view; 8, Metasoma in dorsal view.

smoky except basal cell and speculum hyaline.

Head (Figs 1, 2): In dorsal view 2.06× as broad as long and in frontal view 1.2× as broad as long; distinctly striate reticulate, clypeal and paraclypeal areas shiny, anterior margin of clypeus straight. Eyes small, length 1.5× width. Malar grooves distinct, carinated in the upper 2/3 portion; scrobe deep, shiny, separated from front ocellus by one ocellar diameter. Vertex straight, narrow with three pairs of strong bristles; occiput acutely declivous with occipital carina far below; POL 1.2× OOL. Antennae slender, inserted on a raised point, little below lower margin of eyes; interantennal area conically elevated with a median carina reaching

little above lower margin of eye; toruli separated by a distance 1.5× the individual diameter; scape slender, reaching front ocellus, length 1.4× eye length, pedicellus plus flagellum 1.4× width of eye; pedicel length 3.2× width; clava 2× as long as broad and as long as 2.5× preceding segments combined. Relative lengths: fu₁ 9.5, fu₂ 8, fu₃ 7.5, fu₄ 7, fu₅ 7, fu₆ 7, fu₇ 7, clava 19.

Mesosoma (Figs.1, 2): Length 1.5× width. Pronotum with a separate row of 10 strong bristles, collar transversely reticulate with a smooth band posteriorly, shiny on lower lateral aspect. Prepectus broad, shiny, longer than tegula. Mesoscutum distinctly and transversely reticulate, width 1.7×

median length, notauli distinct, posteriorly meeting to form a broad 'V' touching transscutal articulation; bristles on the midlobe distinctly below middle. Scutellum length 1.1× width, frenal area with distinct rugae, area in front distinctly reticulate, first pair of scutellar bristles in the middle of reticulate area; frenal area almost as long as area in front. Propodeum width 2.4× median length with an anterior triangular elevated area in the form of a tubercle which continued as a median carina; plicae distinct only posteriorly which is connected with a strong transverse carina, remaining area of propodeum uniformly with irregular rugae; spiracles small, oval, separated far away from the posterior margin of metanotum, callus almost shiny with sparse long setae. Mesopleuron shiny except anterior margin with transverse rugae. Metapleuron shiny. Hind coxae with transverse rugae in the basal half and reticulate in the distal half; femur finely reticulate; tibia distinctly reticulate. Relative length of hind coxa 37, femur 49, tibia 59, tarsus 39. Forewing 3.6× as long as broad, marginal fringe long, pubescence distinct, speculum open below, extended below mv almost up to base of stv. Relative lengths of smv 46, mv 79, pmv 27, stv 12.

Metasoma (Fig. 3): Gaster (including petiole) 1.4× as long as head plus mesosoma combined. Petiole with distinct longitudinal carina on posterior half and reticulate on other areas, a pair of backwardly directed hairs near base, length 1.4× width. Gaster 2.8 × as long as broad in dorsal view (without petiole); Gt₁ 0.4× as long as whole length of gaster, Gt₂, Gt₄, Gt₅ and Gt₆ almost equal; Gt₃ less than half of Gt₄; ovipositor sheath and ovipositor distinctly exerted out. Hypopygium reaching hind margin of Gt₁.

Male (Fig. 4): Length 1.7 mm. Morphologically entirely different from female in having body colour almost black except gaster brownish black, body slender, antennae with 9 pedunculate funicular segments and clava with long bristles, apart from scape, pedicel, and transverse anellus; head almost completely shiny; mesoscutum with notauli meeting posteriorly to form a broad "Ú" rather than "V"; scutellar frenum with longitudinal rugae on sides; propodeum with anterior elevated area not

prominent; gastral petiole very long and uniformly reticulate; gaster short and compressed.

Material examined: Holotype: Female, INDIA: Tamil Nadu, Yercaud, 06.iii.2014, Coll. S. Manickavasagam, Reg. No. ZSI/WGRC/IR/INV/5080; Paratype: 1 male, data same as that of holotype, Reg. No. ZSI/WGRC/IR/INV/5081; 1 Female, Kerala, Idukki district, Periyar Tiger Reserve, Manalar, 7.iv.2013, Coll. P.M. Sureshan, Reg. No. ZSI/WGRC/IR/INV/10253; 1 Female, Kerala, Idukki district, Idlimotta, 25.v.2014, Coll. P.M. Sureshan, Reg. No. ZSI/WGRC/IR/INV/10254.

Etymology: The name of the species is derived from the latin word elevatio = raised and in having antenna inserted on an elevated point on face.

Remarks: This species is unique among other Oriental species in having antennae inserted on an elevated point on face which is not much prominent in other species, head in profile view very narrow; notauli meeting posteriorly to from a broad 'V' and, narrow forewings and male with pedunculate funicular segments. It runs into the couplet 14 of the key to Oriental species of *Dipara* by Sureshan & Farsana (2015) and resembles *D. nigra* Sureshan in general morphology but differs from it in having slender antennae, different body colour, wings and gaster.

2. *Dipara nitidofrena* Sureshan sp. nov. (Figs. 5 - 8)

Holotype: Female: Length 2.00 mm. Body pale yellow except for the following: Head blackish brown, antennae pale testaceous except clava brown, eyes silvery, mesoscutum and scutellum blackish brown, gaster except Gt₃ dark brown dorsally and laterally on upper half of Gt₁, wings hyaline, pubescence of body pale brown and pubescence of wing brown.

Head (Fig.5): In dorsal view 2.1× as broad as long and in frontal view 1.2× as wide as long, finely engraved reticulate, almost shiny. Clypeus smooth, anterior margin straight. Malar grooves finely

indicated. Vertex almost straight, POL subequal to OOL (7:8); occipital area finely reticulate with a fine carina far below. Antennae inserted slightly below lower margin of eyes, below middle of face, scape length 1.2× eye length, eye length 1.3× width; pedicellus plus flagellum length 1.4× width; pedicel long 2× as long as fu_1 ; fu_1 - fu_4 almost quadrate; fu_5 - fu_7 transverse; clava 2× as long as broad, slightly shorter than three preceding segments combined, all funicular segments with one row of long sensillae.

Mesosoma (Figs. 5, 6, 7): 1.6× as long as broad. Pronotum almost completely shiny, collar distinctly carinated anteriorly with a separate row of strong bristles. Mesoscutum distinctly reticulate, reticulation finer anteriorly; notauli deep towards posterior end and almost merging together to form a broad “V” so that the mid lobe little raised than the lateral lobes; bristles on the mid lobe located below middle; mesoscutum width 1.4× length. Scutellum similarly sculptured as on mesoscutum, frenal area shiny except for small rugulate foveolae on the posterior rim, 1.5× as broad as median length, frenal area half as long as area in front. Prepectus shiny, longer than tegula. Mesopleuron and metapleuron shiny except for a row of rugulate foveolae in the anterior margin of the former. Propodeum 1.9× as broad as median length, there is triangular elevated area anteriorly in the form of a blunt spine which continued as median carina, spiracles small, round, separated far away from posterior margin of metanotum, plicae present only posteriorly which is terminated as a lateral blunt spine after joining with a short transverse carina, remaining median area with regular longitudinal carinae; callus smooth with scattered hairs. Legs slender, hind coxae with transverse rugae, fore and mid coxae almost shiny. Relative lengths of hind coxa 28, femur 38, tibia 41, tarsus 13. Forewing 3.8× as long as broad, narrow, basal one third portion almost bare except for few setae on basal hairline; marginal fringe long. Relative lengths of veins: smv 32, mv 48, pmv 19, stv 6.

Metasoma (Figs. 5, 8): Gaster 1.1× as long as head plus mesosoma combined, length 2.7× width in dorsal view; petiole uniformly longitudinally carinate and reticulate with a pair of long white hairs in the

upper 1/3 portion, length 1.4× width; a distinct yellow band covering Gt_3 & Gt_4 ; hypopygium not reaching tip of Gt_1 .

Material examined: Holotype, female, INDIA: Nagaland, 19.i.2015, Coll. S. Manickavasagam; Reg. No. ZSI/WGRC/IR/INV/5082.

Etymology: The species name is derived from latin word nitidus = shiny and in having a shiny scutellar frenum.

Remarks: This species is unique among other Oriental species in having a completely shiny scutellum which is not found in other species, and mesoscutum with deep notauli merging posteriorly to form a broad ‘V’ and lateral lobes situated little below median lobe. It runs into couplet 14 of the key to Oriental species of *Dipara* by Sureshan and Farsana (2015) and resembles *D. andamanensis* Sureshan which is having partly smooth frenum, but differs from in having different gaster, antennae, body colour and propodeum.

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