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## RECORD OF THE GENUS *PERISTENUS* FOERSTER (HYMENOPTERA : BRACONIDAE) FROM INDIA, WITH DESCRIPTIONS OF FOUR NEW SPECIES

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### INTRODUCTION

The genus *Peristenus* is easily distinguished by the reduction of vein M+CU 1 of the forewing, the short submarginal cell of the forewing, the short and more or less curved ovipositor and sides of petiole meeting ventrally at the base. *Peristenus* species are koinobiont endoparasitoids of nymphs and adults of Miridae and Lygaeidae. The early instar nymph is parasitized and the mature parasite larva emerges from either the mature host nymph or adult. (Shaw, 1985 & 1988; Chen and van Achterberg, 1997). *Peristenus* was recently removed from synonymy in *Leiophron* and includes a natural assemblage of species distinct from *Leiophron* (Loan and Bilewicz-Pawinska, 1973). *Peristenus* has been revised for the Palearctic (Loan, 1974a) and Nearctic (Loan, 1974b) regions. A key to the Ethiopian species was provided by Nixon (1946). Shaw (1985) described the phylogeny of the genus *Peristenus* Foerster. Chen and van Achterberg (1997) were currently revised the genus from China.

The genus *Peristenus* is represented by only three species from Indo-Australian region *i.e.*, *P. helopeltidis* (Ferriere) from Java, *P. levigatus* Chen and van Achterberg from Yunnan and *P. pallipes* (Curtis) from Taiwan and Yunnan. In the present work this genus is recorded for the first time from India with descriptions of four new species.

### METHODS

The material was collected from various regions in India by using sweeping nets. The dried specimens were mounted on triangular cards observations and illustrations were done using the

drawing tube under SV11 Zeiss stereozoom microscope. Measurements were taken with the help of ocular micrometer fitted in one of the two eyepieces of the binocular microscope.

The terminology for the various parts and wing venation is after van Achterberg (1993) while Eady (1968) has been followed for description of surface-sculpture. The following abbreviations are used in the text : AOL = Anterior ocellar line (distance between the inner edges of anterior and lateral ocelli), POL = Posterior ocellar line (distance between the inner edges of lateral ocelli), OOL = Ocello ocular line (distance from the outer edge of a lateral ocellus to the compound eye),  $\emptyset$ OD = Ocellus diameter, F = Flagellomere; ZDAMU = Insect collection, Zoology Department, Aligarh Muslim University.

### Key to the Indian species of *Peristenus* Foerster (Females)

1. First metasomal tergite 2.2x its apical width; length of eye in dorsal view as long as temple; scutellar sulcus deep laterally margined with one median carina. ....  
..... *P. nitidus* Shamim & Ahmad, sp. nov.
- First metasomal tergite 1.5-1.8x its apical width; length of eye in dorsal view 1.8-3.0x temple; scutellar sulcus shallow and without lateral margin with one median and six weak lateral carinae. .... 2
2. Mesopleuron entirely coarsely punctate; face as long as wide. ....  
..... *P. punctatus* Shamim & Ahmad, sp. nov.
- Mesopleuron medially smooth; face 2x as long as wide. .... 3
3. Forewing vein m-cu postfurcal, 2.55x as long as wide; hindwing 4x as long as wide; pronotum antero-dorsally narrowly punctate, medially largely crenulate, postero-ventrally smooth; width of head in dorsal view 1.1x its length. .... *P. alami* Shamim & Ahmad, sp. nov.
- Forewing vein m-cu antifurcal, 2.7x as long as wide; hindwing almost 5x as long as wide; pronotum entirely largely crenulate; width of head in dorsal view 1.4x its length. ....  
..... *P. indicus* Shamim & Ahmad, sp. nov.

#### *Peristenus alami* Shamim and Ahmad, sp. nov.

(Figs. 1-2)

*Female* : Black except head, pronotum, metasoma beyond first tergite reddish brown; antenna, clypeus and pterostigma light brownish; legs, mandibles, tegulae and post tegulae yellowish; eyes greyish; ocelli transparent; wing membrane hyaline.

*Head* : Width of head in dorsal view 1.1x its length, almost as wide as long; antennal segments 18; scape 1.4x as long as wide; pedicel 1.5x as long as wide; F<sub>1</sub> 1.5x as long as F<sub>2</sub>; length of F<sub>1</sub>, F<sub>2</sub>-F<sub>4</sub>; F<sub>5</sub>-F<sub>15</sub> and F<sub>16</sub> 3x, 2x, 1.5x and 2.5x their width respectively; occipital carina weak dorsally and ventrally connected to hypostomal carina; OOL; POL : AOL;  $\emptyset$ OD = 5 : 4 : 6 : 1.5; length of

eye in dorsal view 1.37x its width and 1.83x temple; vertex almost 2x as wide as long, sparsely punctate; trons wider than long, punctate with mid-longitudinal carina between antennal socket; face punctate, densely setose, between eyes slightly greater than eye length; intertentorial line 2.23x tentorio-ocular line; clypeus about 2x as wide as long, smooth with long sparse setae; length of malar space 1.3x basal width of mandible.

*Mesosoma* : Length of mesosoma 2x its height; pronotum dorsally striate, antero-dorsally narrowly punctate, medially largely crenulate, postero-ventrally smooth; precoxal sulcus finely crenulate; mesopleuron medially smooth, dorsally and ventrally punctate to foveolate; notauli well defined, broad, deep and crenulate with large foveae posteriorly; middle lobe of mesoscutum finely punctate, lateral lobes with few sparse punctures anteriorly, smooth and polished posteriorly; scutellar suture shallow and without lateral margin, with one distinct median carina and six weak lateral carinae; scutellum oval shaped and smooth; medio-posterior depression small; side of scutellum and metanotum crenulate; propodeum anteriorly reticulate-rugose, only basally distinctly punctate with basal transverse carina.

*Wings* : Forewing 2.55x as long as wide; marginal cell short, almost as long as pterostigma, pterostigma about 2x as long as wide; length of vein 1-R1 0.43x length of pterostigma, equal to width of pterostigma; r small, issued behind middle of pterostigma; r : 2-SR : SR1+3-SR = 1 : 6 : 16; SR1 curved; m-cu postfurcal and cu-a postfurcal; 1-CU1 : 2-CU1 : 3-CU1 = 2 : 9 : 4.

*Legs* : Hind coxa smooth and shiny; length of hind femur, tibia and basitarsus 3.56x, 8.8x and 8x their width respectively; length of hind tibial spurs 0.30x hind basitarsus.

*Metasoma* : Length of metasoma about 2.2x as long as wide; length of first metasomal tergite 1.6x its apical width, its surface longitudinally irregularly rugose, apically distinctly widened; spiracles at middle of first metasomal tergite; rest of tergite smooth and shiny without any indication suture between 2 and 3; ovipositor sheath visible and setose; ovipositor small and curved downwards; length of ovipositor 0.55x the length of metasoma.

*Body length* : 5.5 mm; forewing, 2 mm.

*Male* : Similar to female except body length 2.55 mm, antennal segments broken apically.

*Holotype* : ♀, INDIA : Uttar Pradesh, Etawah, 5.iv.2004, Coll. Mohammad Shamim (ZDAMU).

*Paratype* : 1 ♂, with same data as holotype.

*Etymology* : The name of this species is after the well known Indian entomologist Prof. (Late) S. M. Alam in recognition of his great contribution in taxonomy of parasitic Hymenoptera.

*Remarks* : The new species *Peristenus alami* sp. nov. is closely resembles to *Peristenus indicus* sp. nov. However, it differs in having (i) Antennal segments 18 (antennal segments 17 in *P. indicus* sp. nov.). (ii) Forewing vein m-cu postfurcal (forewing vein m-cu antefurcal in *P. indicus* sp. nov.).

(iii) Pronotum antero-dorsally narrowly punctate, medially largely crenulate, postero-ventrally smooth (pronotum dorsally striate, remaining largely crenulate in *P. indicus* sp. nov.). (iv) Hindwing 6x as long as wide (hindwing 5x as long as wide in *P. indicus* sp. nov.). (v) Length of ovipositor 0.55x length of metasoma (length of ovipositor 0.11x length of metasoma in *P. indicus* sp. nov.).

*Peristenus indicus* Shamim and Ahmad, sp. nov.

(Fig. 3)

*Female* : Black except head, pronotum, metasoma beyond first tergite reddish brown; clypeus, wing veins brown, legs mandibles and basal segments of antennae yellowish; apical segment of antennae brownish yellow; ocelli transparent; eyes greyish and wing membrane hyaline.

*Head* : Head in dorsal view 1.46x as wide as long; antennal segments 17, distinctly shorter than body (1.62 mm); scape 1.66x as long as wide; pedicel 1.5x as long as wide;  $F_1$  1.5x as long as  $F_2$ ; length of  $F_1$ ,  $F_2$ - $F_3$ ,  $F_4$ - $F_{14}$  and  $F_{15}$  4x, 2x, 1.5x and 2x their width respectively; occipital carina weak dorsally and ventrally connected to hypostomal carina; OOL : POL : AOL :  $\emptyset$ OD = 5 : 6 : 4 : 2; length of eye in dorsal view 1.5x its width and 3x temple; vertex 2.13x as wide as long, sparsely punctate; frons wider than long, distinctly punctate with mid longitudinal carina between antennal socket; face densely punctate and setose, as long as wide; clypeus smooth, almost 2x as wide as long; intertentorial line 3x tentorio-ocular line; length of malar space 1.3x basal width of mandible.

*Mesosoma* : Length of mesosoma 1.7x its height; pronotum dorsally striate, remaining entirely largely crenulate; mesopleuron medially smooth, dorsally and ventrally crenulate to foveolate; notauli broad deep and crenulate with large foveae posteriorly; middle lobe of mesoscutum sparsely finely punctate, lateral lobes smooth; scutellar sulcus shallow, without lateral margin, with one median longitudinal carina and six weak lateral carinae; scutellum oval shape and sparsely finely punctate; medio-posterior depression small with a median carina; side of scutellum and metanotum crenulate; propodeum reticulate-rugose, only basally narrowly punctate with distinct basal transverse carina.

*Wings* : Forewing 2.7x as long as wide; marginal cell short, almost as long as pterostigma; pterostigma 2.3x as long as wide; length of vein 1-R1 0.35x length of pterostigma, almost equal to width of pterostigma; r short, issued just behind the middle of pterostigma; r : 2-SR : SR1+3-SR = 1 : 6 : 15; SR1 curved; cu-a postfurcal; m-cu antefurcal; 1-CU1 : 2-CU1 : 3-CU1 = 1 : 9 : 3, hind wing almost 5x as long as wide.

*Legs* : Hind coxa nearly smooth and shiny, length of hind femur, tibia and basitarsus 4x, 7x and 8x their width respectively; length of hind tibial spurs 0.29x and 0.33x hind basitarsus.

*Metasoma* : Length of metasoma 2.25x its width; length of first metasomal tergite 1.5x as long as apical width; basal width 0.5x as long as apical width, its surface rugostriate, apically distinctly

widened; spiracles at behind middle of first tergite; rest of tergite smooth and shiny without any indication suture between 2 and 3; ovipositor sheath just visible and sparsely setose; ovipositor small and curved downwards, its length about 0.11x length of metasoma.

*Body length* : 2.57 mm; forewing 2 mm.

*Male* : Similar to female except antennae 18 segmented; face wider than long;  $F_2$ - $F_{10}$  2x as long as wide;  $F_{11}$ - $F_{15}$  1.5x as long as wide,  $F_{16}$  2.5x as long as wide; metasoma 2x its width; first metasomal tergite 1.25x its apical width.

*Hologype* : ♀, INDIA : Uttar Pradesh, Etawah, 6.v.2004, Coll. Mohammad Shamim (ZDAMU).

*Paratype* : ♂, with same data as holotype.

*Etymology* : The new species refers to country name India, where type material were collected.

*Remarks* : The new species *Peristenus indicus* sp. nov. is closely related to *Peristenus punctatus* sp. nov. However, it differs in having (i)  $F_1$  4x as long as wide ( $F_1$  3x as long as wide in *P. punctatus* sp. nov.). (ii) Vein m-cu antefurcal (vein m-cu interstitial in *P. punctatus* sp. nov.). (iii) Length of vein 1-R1 0.35x length of pterostigma (length of vein 1-R1 0.46x length of pterostigma in *P. punctatus* sp. nov.).

***Peristenus nitidus* Shamim and Ahmad sp. nov.**

(Figs. 4-5)

*Female* : Black except head, pronotum, metasoma beyond first metasomal tergite reddish brown; legs, mandibles, tegulae and post tegulae yellowish; antenna brown, basally paler; ovipositor sheath, pterostigma and veins brown; ocelli and ovipositor transparent; wing membrane hyaline.

*Head* : Width of head in dorsal view 1.5x its length; antennal segments 24, distinctly shorter than body (2.8 mm), apical segment not distinctly wider; scape 2x as long as wide, length of  $F_1$  2.6x  $F_2$ , length of  $F_1$ ,  $F_2$ ,  $F_3$ - $F_9$ ,  $F_{10}$ - $F_{15}$ ,  $F_{16}$ - $F_{21}$  and  $F_{22}$  2.6x, 2x, 1.6x, 1.3x, 1.1x and 2x their width respectively; occipital carina weak dorsally but strong laterally and connected to hypostomal carina ventrally; OOL : POL : AOL : ØOD = 9 : 7 : 5 : 2; length of posterior side of stemmaticum 1.4x its lateral side; eyes in dorsal view almost as long as temple; temple roundly slightly narrowed behind eyes, sparsely punctate with hairs; vertex punctate with hairs; frons densely and evenly punctate with a thin median frontal carina between antennal socket; face densely evenly punctate and largely setose, its width 1.66x its length; intertentorial line 2.2x tentorio-ocular line; clypeus nearly smooth, its width 2.5x its length; length of malar space 1.6x basal width of mandible.

*Mesosoma* : Length of mesosoma 2.4x its height; pronotum dorsally striate, antero-dorsally punctate, medially crenulate, postero-ventrally smooth; precoxal sulcus only medially shortly present; mesopleuron sparsely punctate, shiny surface between punctures, smooth dorsally somewhat rugose; middle lobe of mesoscutum evenly and finely punctate, lateral lobes finely punctate, anteriorly

smooth; notauli broad and crenulate with large foveae posteriorly; scutellar sulcus wide and deep, laterally margined and one distinct median carina; scutellum sparsely finely punctate, nearly cone shaped; medio-posterior depression small; propodeum reticulate-rugose, only basal part of propodeum punctate up to basal transverse carina.

*Wings* : Forewing 2.8x as long as wide; pterostigma 2.27x as long as wide; length of vein 1-R1 0.4x length of pterostigma and equal to width of pterostigma; r short, issued just behind middle of pterostigma; r : 2-SR : SR1+3-SR = 2 : 10 : 25; m-cu antefurcal; cu-a postfurcal; hindwing 5x as long as wide; 1-M : 1r-m : 2-SC+R = 9 : 7 : 5.

*Legs* : Hind coxa smooth, its length 1.4x its width; length of hind femur, tibia and basitarsus 5.1x, 9.5x and 9x their width respectively; length of hind tibial spurs 0.44x and 0.39x hind basitarsus.

*Metasoma* : Length of metasoma about 2.5x as long as wide; length of first metasomal tergite 2.2x (22 : 10) its apical width, basal width 0.55x (5.5 : 10) apical width, its surface reticulate-rugose, apical margin nearly smooth, apically slightly widened; spiracles behind middle of first tergite smooth and shiny without any indication suture between 2 and 3; hypopygium setose; ovipositor sheath visible, its length 0.5x ovipositor and 0.03x forewing, slender and densely setose; ovipositor distinctly curved downwards, 0.12x the length of metasoma.

*Body length* : 3.75 mm; forewing, 3.5 mm.

*Male* : Same as holotype except antennae 30 segmented and yellowish brown; mandibles, legs brown; face with comparatively less hairs.

*Holotype* : ♀ INDIA : Jammu and Kashmir, Poonch, 20.ix.2004, Coll. Zaheer Ahmad (ZDAMU). *Paratype* : 1 ♂, with same data as holotype.

*Etymology* : The new species name indicates its smooth hind coxae.

*Remarks* : The new species *Peristenus nitidus* sp. nov. is closely related to *Peristenus montanus* Chen and van Achterberg (1997). However, it differs in having (i) Length of mesosoma 2.4x its height (length of mesosoma 1.7x its height in *P. montanus*). (ii) Length of malar space 1.6x basal width of mandible (length of malar space equal to basal width of mandible in *P. montanus*). (iii) Length of first tergite 2.2x its apical width, reticulate-rugose (length of first tergite 1.7x its apical width, longitudinally irregularly rugose in *P. montanus*). (iv) Hind coxa smooth (hind coxa finely punctate in *P. montanus*). (v) Temple and vertex sparsely punctate (temple and vertex nearly smooth in *P. montanus*).

***Peristenus punctatus* Shamim and Ahmad, sp. nov.**

(Fig. 6)

*Female* : Black except ovipositor sheath, clypeus, labrum, metasoma beyond first tergite and pterostigma reddish brown; mandibles, antennae, maxillary palp, legs, tegulae and post tegulae

yellowish; ocelli and ovipositor transparent; eyes greyish; wing membrane hyaline and wing veins brownish.

*Head* : Width of head in dorsal view 1.6x its length, antennal segments 17; antenna distinctly shorter than body (1.65 mm); scape 1.66x as long as wide; pedicel 1.5x as long as wide; length of  $F_1$ ,  $F_2$ - $F_3$ ,  $F_4$ - $F_{15}$  3x, 2x and 1.5x their width respectively; length of maxillary palp almost 0.6x height of head; occipital carina weak dorsally; OOL : POL : AOL : ØOD = 5 : 6 : 4 : 1; length of posterior side of stemmaticum 2x its lateral side; length of eye in dorsal view 1.4x its width and 2x temple; vertex 2.1x as wide as long, sparsely punctate; frons punctate with a mid-longitudinal carina; face as long as wide with dense and long whitish pilosity; densely punctate; between eyes slightly greater than eye length; intertentorial line 2.6x tentorio-ocular line; clypeus smooth, its width 2.6x its length; malar space as long as basal width of mandible.

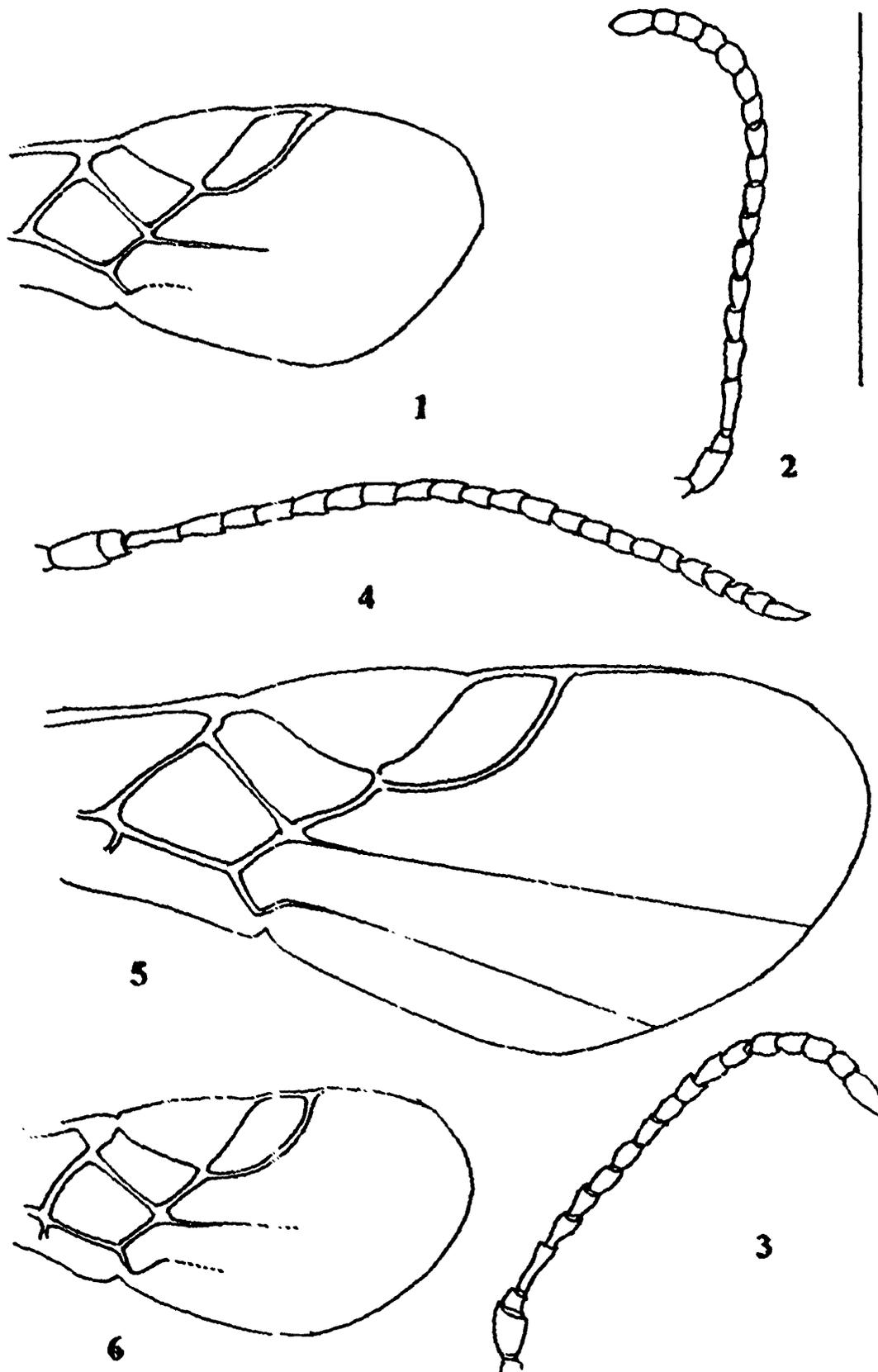
*Mesosoma* : Length of mesosoma 1.7x its height; pronotum dorsally striate, antero-dorsally finely punctate, medially crenulate and postero-ventrally punctate; precoxal sulcus shortly present, sparsely crenulate; mesopleuron entirely coarsely punctate; notauli broad and crenulate with large foveae posteriorly; middle lobe of mesoscutum finely punctate; lateral lobes with few sparse punctures anteriorly, smooth and polished posteriorly; scutellar sulcus shallow, without lateral margin with one median longitudinal carina and six weak lateral carinae; scutellum raised somewhat oval shaped and smooth; side of scutellum crenulate; medio-posterior depression small and oval shaped; metanotum crenulate; propodeum entirely reticulate-rugose, only basally narrowly punctate with a distinct basal transverse carina.

*Wings* : Forewing 2.5x as long as wide; length of vein 1-R1 0.46x length of pterostigma, equal to width of pterostigma; marginal cell short, almost as long as pterostigma; pterostigma about 2x as long as wide; r short, issued just behind middle of pterostigma; r : 2-SR : SR1+3-SR = 1 : 5 : 16; SR1+3-SR curved; m-cu interstitial; 1-CU1 : 2-CU1 : 3-CU1 = 1 : 7 : 3, 1-CU1 oblique; cu-a postfurcal and 1-SR+M straight; hindwing about 3x as long as wide; 1-M : 1-r-m : 2-SC+R = 4 : 5 : 3.

*Legs* : Hind coxa smooth; length of hind femur, tibia and basitarsus 3.3x, 7.5x and 6x their width respectively; length of hind tibial spurs 0.33x hind basitarsus.

*Metasoma* : Length of metasoma about 2.5x as long as wide; length of first metasomal tergite 1.8x its apical width, basal width 0.5x apical width, rugostriate, apically distinctly widened; spiracles at middle of first tergite; rest of tergite smooth without any indication suture between 2 and 3; ovipositor sheath small, just visible, ovipositor small and curved; length of ovipositor 0.11x length of metasoma.

*Body length* : 2.55 mm; forewing, 1.9 mm.



**Figs. 1-2.** : *Peristenus alami* Shamim & Ahmad, sp. nov.; 1. Forewing, 2. Antenna.

**Fig. 3.** : *Peristenus indicus* Shamim & Ahmad, sp. nov.; 3. Antenna.

**Figs. 4-5.** : *Peristenus nitidus* Shamim & Ahmad, sp. nov.; 4. Antenna, 5. Forewing.

**Figs. 6.** : *Peristenus punctatus* Shamim & Ahmad, sp. nov.; 6. Forewing.

*Male* : Male similar to female except length of body 2.27 mm; of forewing 1.75 mm; width of head in dorsal view 1.25x its length; length of mesosoma 2x its height; forewing 3.5x as long as wide; length of metasoma 1.8x as long as wide and F<sub>11</sub>-F<sub>14</sub> as long as wide.

*Holotype* : ♀, INDIA : Uttar Pradesh, Aligarh, 6.xi.2001, Coll. Mohammad Shamim (ZDAMU).  
*Paratype* : 1 ♂, with same data as holotype.

*Etymology* : The new species name indicates its mesopleuron entirely punctate.

*Remarks* : The new species *Peristenus punctatus* sp. nov. is closely resembles with *P. pallipes* (Curtis). However, it differs in having (i) Antennal segments 17 (antennal segments 20-25 in *P. pallipes*). (ii) Occipital carina weak dorsally but strong laterally (occipital carina strong in *P. pallipes*). (iii) Notauli broad and deep with large foveae posteriorly (notauli narrow and linear foveae in *P. pallipes*). (iv) First metasomal tergite rugostriate (first metasomal tergite striate in *P. pallipes*).

## SUMMARY

The genus *Peristenus* Foerster is recorded for the first time from India. Four new species viz., *Peristenus alami* Shamim & Ahmad sp. nov., *Peristenus indicus* Shamim & Ahmad sp. nov., *Peristenus nitidus* Shamim & Ahmad sp. nov., *Peristenus punctatus* Shamim & Ahmad sp. nov., are described and illustrated from India and a key to the Indian species is given.

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