

Notes on the subgenus *Paragus (Pandasyopthalmus)* (Diptera, Syrphidae) from Nepal, with the description of a new species

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Paragus (Pandasyopthalmus) karnaliensis **spec. nov.** is described from high altitudes in the Nepal Himalaya. Some previous records of *Pandasyopthalmus* from Nepal are reviewed, and a key to the species of *Pandasyopthalmus* from Nepal and the adjacent Palearctic areas is given. *Paragus (Pandasyopthalmus) abrogans* Goeldlin de Tiefenau, 1971 is considered to be a distinct species, and not a junior synonym of *Paragus (Pandasyopthalmus) rufocinctus* (Brunetti, 1908).

Key words: *Paragus (Pandasyopthalmus) karnaliensis*, new species, key, Nepal, Himalaya, Syrphidae.

Zusammenfassung

Paragus (Pandasyopthalmus) karnaliensis **spec. nov.** wird aus Hochlagen des Nepal-Himalayas beschrieben. Einige ältere Nachweise von *Pandasyopthalmus* aus Nepal werden überprüft, und ein Bestimmungsschlüssel für die Arten der Untergattung *Pandasyopthalmus* für Nepal und die angrenzenden paläarktischen Gebiete wird vorgelegt. *Paragus (Pandasyopthalmus) abrogans* Goeldlin de Tiefenau, 1971 wird als distinkte Art betrachtet und nicht als jüngeres Synonym von *Paragus (Pandasyopthalmus) rufocinctus* (Brunetti, 1908).

Introduction

The subgenus *Pandasyopthalmus* Stuckenberg, 1954, is a group of small-sized aphid predators, distributed in the Old World but with one widespread Holarctic species (*P. haemorrhous* Meigen, 1822) (Vockeroth 1986).

The Oriental species of *Pandasyopthalmus* were recently reviewed (Thompson & Ghorpadé 1992) and a key to most of the Oriental *Paragus* was provided; however, a few records of *Paragus* from Nepal (Coe 1964) were not included, and at the time the true identity of *Paragus (Pandasyopthalmus) abrogans* Goeldlin, 1971, could not be clarified.

The West Palaearctic species of *Pandasyophthalmus* were revised by Goeldlin (1976) and two additional species have been described since then (Goeldlin & Lucas 1981, Simić 1986).

The East Palaearctic species of the subgenus have not been revised, and so the true identity of many records from that subregion remains questionable. However, only four species [*P. abrogans*, *P. haemorrhous*, *P. politus* Wiedemann, 1830 and *P. tibialis* (Fallén, 1817)] have been recorded from the continental East Palaearctic in the recent literature (e.g. Peck 1988, Mutin & Barkalov 1999, Sorokina 2002).

In the course of expeditions to West Nepal organised by the Naturkundemuseum Erfurt in 1995 and 1997, one of the authors (JW) collected a small series of a *Pandasyophthalmus* which was left undescribed under the name "*Paragus* (*Pandasyophthalmus*) spec. [aff. *haemorrhous* Meigen, 1822]" in Claußen & Weipert (2003). The purpose of this paper is to describe this new species, and to review some of the previous records

of *Pandasyophthalmus* from Nepal. A key to the species of *Pandasyophthalmus* now known from Nepal and the adjacent Palaearctic areas is also given.

Abbreviations:

BMNH = The Natural History Museum, London; MZL = Musée cantonal de Zoologie, Lausanne; NME = Naturkundemuseum Erfurt.



Photo 1: The bottom of the Garpung valley, east of Hurikot, at 3400 m a.s.l. (13.V.1995). Photo J. Weipert.



Photo 2: The mountain village Hurikot (3000 m a.s.l.), with its barren environs (9.V.1995). Photo J. Weipert.



Photo 3: The valley of the River Bapila near Gothiagon, at 2600 m a.s.l. (14.VI.1997). Photo J. Weipert.

Paragus (Pandasyophthalmus) karnaliensis **spec. nov.** (figs 1-3, 5, 7-9, 28, 30, 31)

= *Paragus tibialis tibialis*: Coe, 1964: 256 (male, misidentification)

= *Paragus (Pandasyophthalmus)* spec. [aff. *haemorrhous* Meigen, 1822]: Claußen & Weipert, 2003: 355

Material examined: Holotype: ♂, West-Nepal, Prov. Karnali, Garpung-Tal E Hurikot, 3100-3600m NN, 14.V.1995, leg. J. Weipert. – Paratypes: West-Nepal, Prov. Karnali, leg. J. Weipert: 3♂, 1♀, with the same data as the holotype; 1♂, Hurikot, 2800-3300m NN, 09.V.1995; 1♂, Gothigaon, 29°14'55"N, 82°18'48"E, Flußufer, 2600m NN, 14.VI.1997. – East Nepal: 1♂, "Taplejung Distr., above Sangu, c 6200', mixed vegetation by stream in gully, IX-X. 1961" – "Brit. Mus. East Nepal Exp 1961-1962. R.L. Coe Coll. B.M. 1962-177", BMNH.

The mountain village Hurikot (photo 2) clings to a south-facing slope north of the River Behri, at an altitude of 2800-3200 m a.s.l. The village is surrounded by terraced fields. In 1995 the vegetation in the environs of the village was scanty, except alongside the streams where there was a luxuriant cover of trees and shrubs.

The deeply incised Garpung valley, east of Hurikot, extends from west to east at an altitude of 3000-4400 m a.s.l. (photo 1). To the north and south it is enclosed by steeply towering mountain ridges rising to more than 5000 m. The locality where *Paragus karnaliensis* spec. nov. was collected was situated at the bottom of the valley, close to the camp site, at an altitude of 3400 m a.s.l.

The small village of Gothigaon is situated about 13 km east of Jumla, the administrative capital of the district, in the valley of the River Bapila, at an altitude of 2600 m a.s.l. Small fields are cultivated alongside the river. The valley slopes are more or less covered with coniferous and deciduous trees (photo 3), but the south-facing slopes are largely unwooded.

Deposition of types: Holotype in coll. NME. Paratypes: 1♂ paratype in BMNH; 4♂ and 1♀ paratypes in coll. "Institut für Biologische Studien Jörg Weipert", Plaue; 1♂ paratype in the private coll. of Claus Claußen.

Etymology: The epithet is derived from Karnali, a province in Northwest Nepal, where most of the specimens of the type series were collected.

Diagnosis: Subgeneric characters as given in Stuckenberg (1954). Male very similar to *P. haemorrhous*, except for the following genitalic characters (figs 7-9, 30, 31): surstylus with a shallow convexity on apical margin; gonostylus: dorsal and ventral margins slightly diverging from base to apex or subparallel, apical margin with a shallow convexity, outer apico-dorsal corner with an inwardly-curved carina, inner surface sclerotized on about apical third; sternite X (minis) with lateral arms subparallel.

Description:

♂: Head (figs 1-2): Face yellow, with yellowish hairs and black medial vitta reaching antennal pits or becoming faint above; gena and oral margin black; frontal lunule brownish; frontal triangle yellow with short pale yellow hairs, except for occasional black ones around lunule; vertex black, shining, yellowish haired, but one or two brow-

nish to black hairs may occur in front of ocellar triangle and laterally behind posterior ocelli; occiput thinly yellowish-grey pruinose above, usually with a narrowly shining black line along eye margins, yellowish haired; occiput below thickly whitish dusted, with somewhat dense shining white hairs; eye hairs uniform, whitish, about as long as diameter of posterior ocellus; eye contiguity about 3–4 ommatidia long. Postpedicellus (fig. 3) about twice as long as wide, brownish to blackish, but reddish basoventrally to a variable extent; basal segments of antenna black, with a few short pale hairs.

Thorax: scutum and scutellum black, shining, with erect yellowish hairs and with fine, widely-spaced punctures on dorsum, more densely spaced in front of suture, on sides and in front of scutellum; pleura black, thinly grey pruinose, with whitish hairs, long and conspicuous on posterior anepisternum and on dorsal portion of katepisternum. Legs reddish yellow, apices of femora and basal third of tibiae somewhat paler, with the following parts brownish to black: coxae, trochanters, basal 1/3 to basal 2/5 of front femora, basal 2/5 to basal 3/5 of mid femora and basal 3/4 of hind femora; hind tibia often with a more or less complete brownish or black submedian ring occupying about 1/3 the length of tibia; basal tarsomeres of hind leg may be darkened dorsally; hairs on legs all pale yellowish. Wing (fig. 5): clear, short-microtrichose except for bare areas on the following cells: basal costal, costal, basal radial, basal medial in basal 2/3, about basal 1/3 of anal cell; vein M1 about two times as long as apical section of M2 (a in fig. 5).

Abdomen: all tergites black, shining, sometimes with bluish shine laterally, punctures somewhat large and deep; hairs on tergites short, erect or semi-erect and pale yellow on disc, and longer and whitish on sides, apical portions of tergites II and III at least partly with short black hairs, which may be discernible only under strong light and high magnification; venter shining black with short pale hairs, sternites III and IV subrectangular, sternite III about 1.1 times as long as sternite IV at the midline (fig. 28). Genitalia as in diagnosis and in figs 7–9, 30, 31.

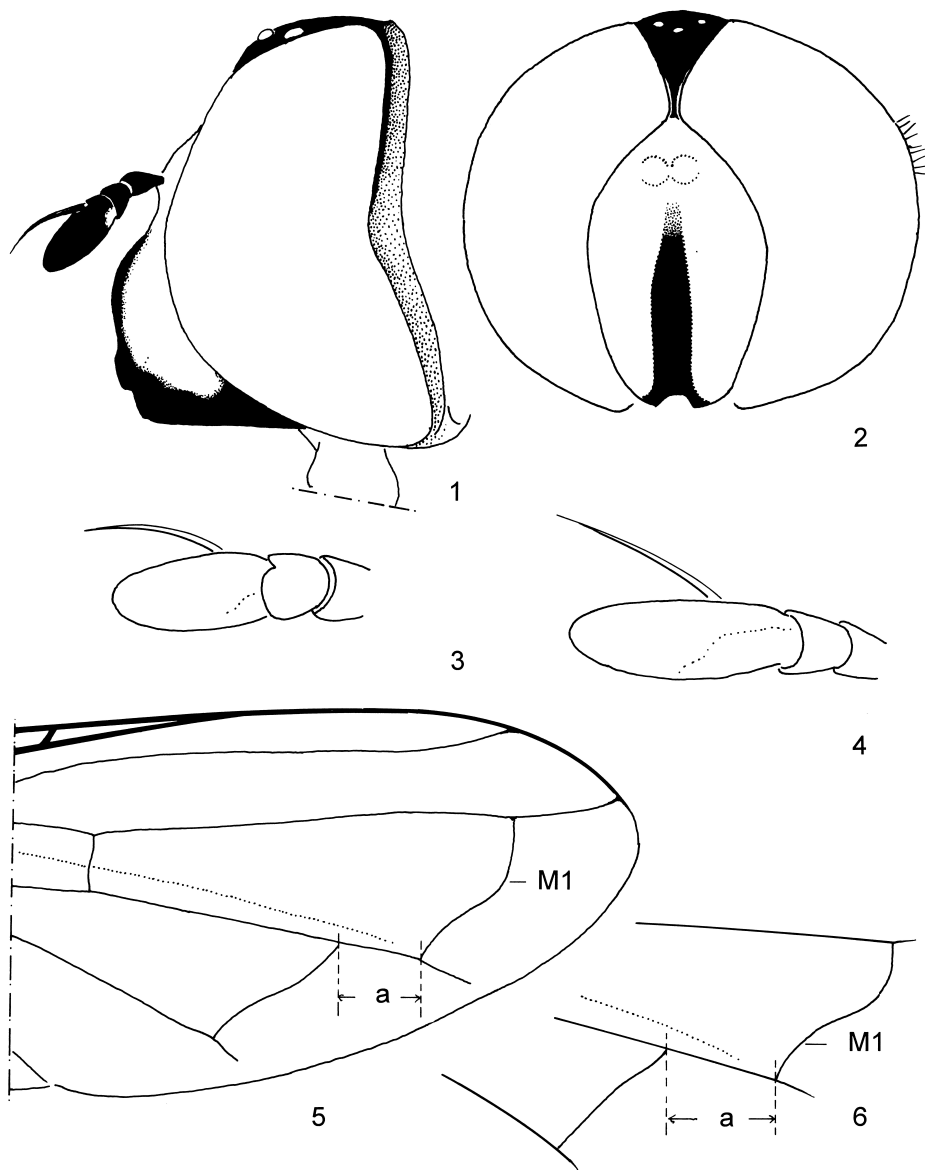
Length: Body 4.2–5.6 mm; wing 3.4–4.5 mm.

♀: Similar to male except for the normal sexual dimorphism and the following characters: Face with the black median vitta broader, its width at level of central prominence more than one-third of the width of the face; antennae completely brownish-black, frons and vertex bluish-black, shining, with erect yellowish hairs; apical portions of tergites II – IV with the short black hairs more conspicuous than in the male.

Length: Body 4.6 mm; wing 4.3 mm.

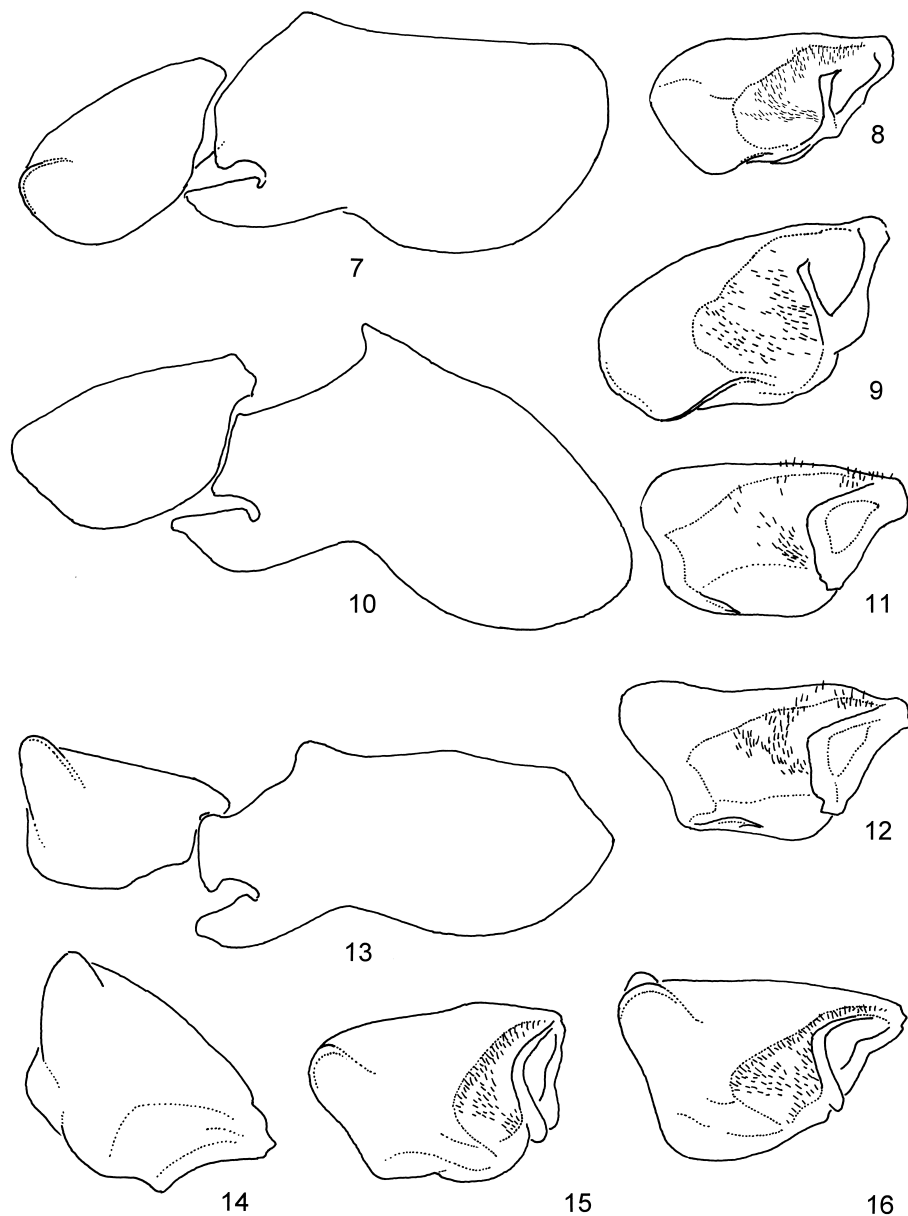
Discussion

The known Palearctic and Oriental species of the *tibialis* species-group (Stuckenberg 1954) are closely similar morphologically and are separable in most cases only by structural differences in the male terminalia, especially by the shape of the gonostylus. Structures of the inner surface of the gonostylus were recently used by Doczkal (1996)



Figs 1-3, 5: *Paragus karnaliensis* spec. nov. ♂ (various specimens from the type series); – **figs 4, 6: *P. rufocinctus* (Brunetti)** ♂, Vietnam. – 1. head, lateral; – 2. head, frontal; – 3. antenna, inner surface; – 4. antenna, inner surface; – 5. wing, apical portion; – 6. wing, detail.

[Hairs in figs 1-6 not depicted, except for details in fig. 2].



Figs 7-9: *Paragus karnaliensis* spec. nov. (West Nepal: Karnali); – **figs 10-12:** *P. haemorrhous* Meigen (North Germany); – **figs 13, 16:** *P. rufocinctus* (Brunetti), holotype; – **figs 14, 15:** *P. rufocinctus* (Brunetti) (Vietnam). – **Figs 7, 10, 13:** hypandrium and gonostylus, lateral; – **figs 8, 9, 11, 12, 15, 16:** gonostylus, inner surface; – **fig. 14:** gonostylus, outer surface.

for separating the European species of *Pandasyopthalmus*. The extent of sclerotised and membranous areas and the arrangement of microtrichia on that sclerite have specific and distinct patterns among the species studied.

Using Thompson & Ghorpadé (1992), *Paragus karnaliensis* spec. nov. keys to *Paragus (Pandasyopthalmus) rufocinctus* (Brunetti, 1908), from which the new species can be separated by the characters given in the key below. In its external morphology, *P. karnaliensis* spec. nov. fully agrees with the description of *Paragus indicus* (Brunetti, 1908) (Brunetti 1908, 1915, 1923); however, a male type of *P. indicus* was restudied by Thompson & Ghorpadé (1992) and was tentatively synonymised with *P. politus*. This synonymy is accepted in the present study because of the distinctive genitalia characters of male *P. politus*.

P. karnaliensis spec. nov. is most closely related to the Holarctic *P. haemorrhous*, but can be separated by constant differences as given in the diagnosis above.

Previous records of *Pandasyopthalmus* from Nepal

Paragus (Pandasyopthalmus) abrogans Goeldlin de Tiefenau, 1971 (figs 23-25, 38)

Thompson & Ghorpadé (1992:7) (as a questionable Synonym of *P. rufocinctus*)

Material studied: Holotype ♂, with the following labels: 1) "Typus" [red], 2) "Iran (Maz.) Polur 2-IX-1955 F. Schmid", 3) "Holotypus" [red]. [The type is in good condition; genitalia dissected]. A series of 12♂ and 8♀ from East Turkey, in the collection of R. Hayat, was also studied.

The type locality, the small village of Polur is situated north east of Tehran on the north-facing slope of the Alborz mountain chain at an altitude of 2340 m a.s.l., close to mount Damavand.

P. abrogans is closely related to *P. rufocinctus*, but is clearly separable by the shape of the gonostylus, the structures on the inner surface of the gonostylus and the yellow lateral margins of tergite II (black in *P. rufocinctus*). Because of these differences, especially the structures of the gonostylus, we consider *P. abrogans* Goeldlin, 1971 to be a distinct species, and not a junior synonym of *P. rufocinctus* (Brunetti, 1908), as suggested by Thompson & Ghorpadé (1992).

Paragus (Pandasyopthalmus) rufocinctus (Brunetti, 1908) (figs 4, 6, 13-16, 26, 34)

Thompson & Ghorpadé (1992: 8)

Material studied: Holotype ♂, with the following labels: 1) "Type ♂", 2) "Rangoon Burma 23.XII.04-3.I.05 Brunetti", 3) "*Pipizella rufocincta* Brunetti Type ♂", 4) "Pres. by E. Brunetti Brit. Mus. 1927-184", 5) "Brunetti Collection", BMNH. [The type is in fairly good condition, but both antennae, two apical tarsomeres of left mid leg, four apical tarsomeres of left hind leg and right hind leg are missing. Genitalia dissected]. – 1♂, "Vietnam, Prov. Son La, Son La town, ca. 600m, 01.XI.2003, leg. T. Romig", T. Romig collection.

A single ♂ of *P. rufocinctus* is hitherto recorded from Nepal (Amlekhgani) by Thompson & Ghorpadé (1992).

Paragus politus Wiedemann, 1830 (figs 19-20, 36)

= ? *Pipizella indica* Brunetti, 1908: 52 (synonymy by Thompson & Ghorpadé 1992).

= *Paragus tibialis rufiventris*: Coe, 1964: 256 (East Nepal records in part, misidentification).

= *Paragus tibialis rufiventris*: Kapoor et al., 1979: 62 (check-list citation of the records in Coe 1964).

Brunetti (1917: 83, sub nom. *Paragus indicus* [Brunetti, 1908]); Brunetti (1923: 33, sub nom. *P. indicus*); Knutson et al. (1975: 328, sub nom. *P. tibialis rufiventris* Brunetti, 1913); Coe (1964: 256, sub nom. *Paragus tibialis rufiventris* Brunetti, 1913).

Material studied: East-Nepal, ♂, "Taplejung Distr., above Sangu, c 6500'. Evergreen scrub. 5-13.X.1961" [genitalia dissected CC]; 1♂, "Taplejung Distr., above Sangu, 6200'. Mixed vegetation by stream in gully. IX-X.1961"; 2♂, "Taplejung Distr.: Dobhan. Cut rice steppes above River Maewa, c 4000', 28.1.62"; 2♂, "Taplejung Distr.: Sangu, c 6200' "/" yellow blooms of cultivated Compositae. 16.-29.X.1961". – All specimens with the additional label: "Brit. Mus. East Nepal Exp 1961-1962 R.L. Coe Coll. B.M. 1962-177".

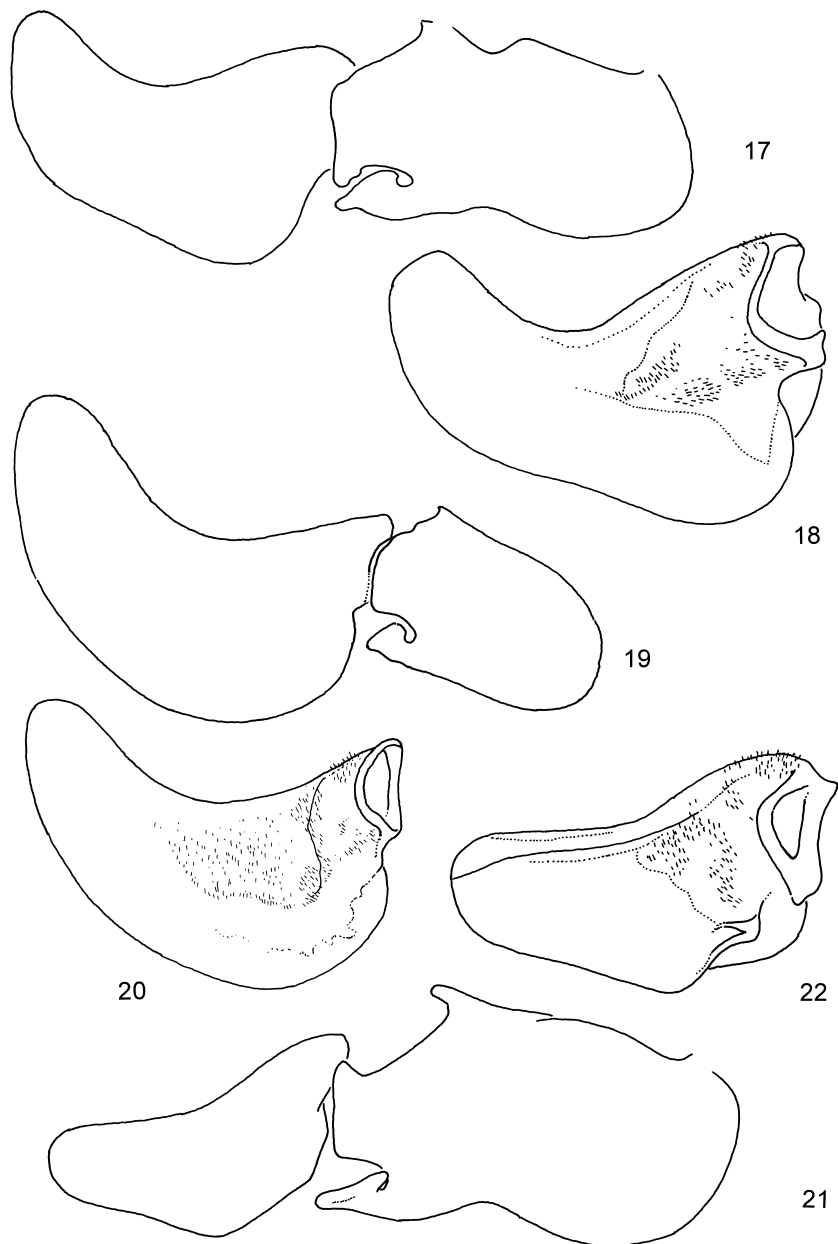
The material of male *Paragus tibialis rufiventris* recorded by Coe (1964: 256) was re-studied, except for the record from "Taplejung District, Sangu, c 6,200 ft., from mixed vegetation from stream in gully, IX-X.1961", from which locality only one of the 7 males recorded by Coe (1964) was examined. All the re-examined males are typical *P. politus* with tergites III-V partly reddish.

Records of *Paragus (Pandasyopthalmus) tibialis tibialis* in Kapoor et al. (1979: 55, Kathmandu valley) should be re-examined to clarify their true identity.

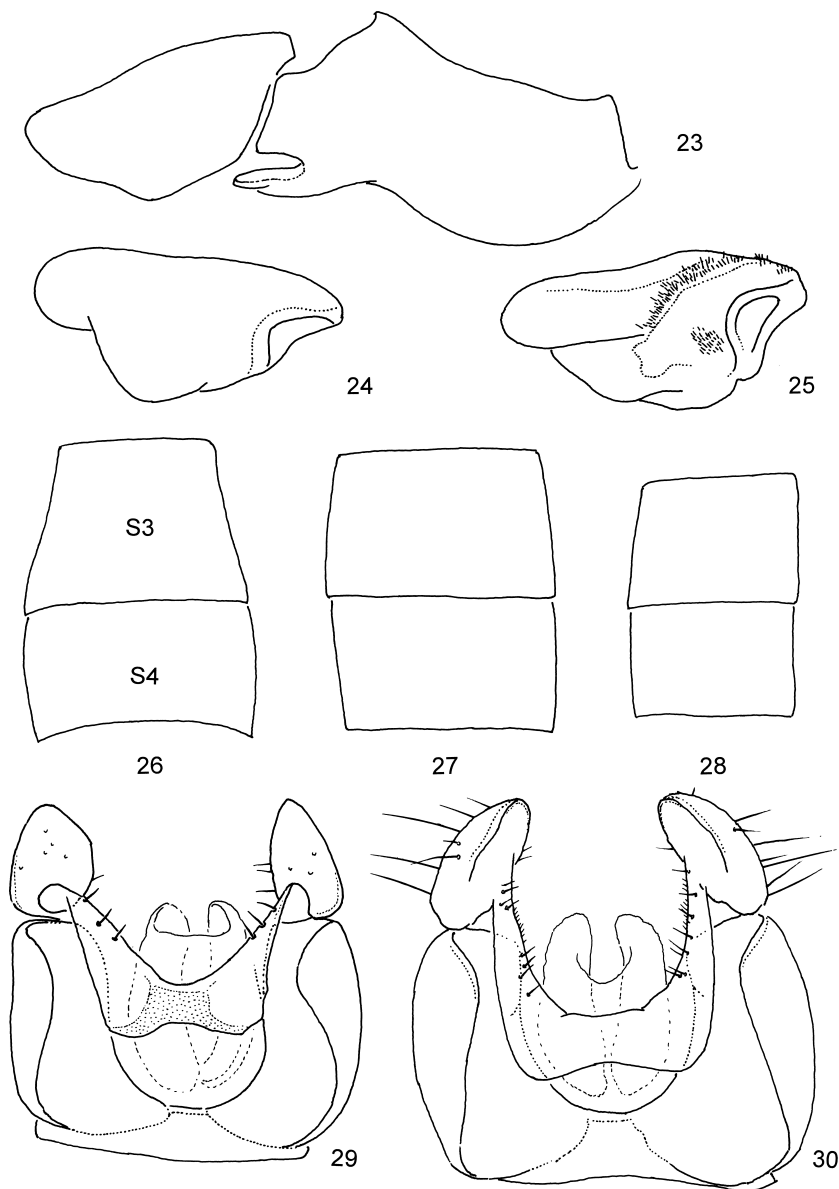
Key to the known *Pandasyopthalmus* of Nepal
 and the adjacent continental Palearctic areas ¹⁾

- 1 Holoptic: males 2
- Dichoptic: females (cannot be separated with certainty at present)
- 2 Gonostylus about as long as or slightly longer (up to 1.3 times) than theca, its dorsal margin in apical half strongly curved dorsad; inner surface of gonostylus without carina below dorsal margin (figs 17, 20) 3
- Gonostylus shorter than theca, but if only slightly shorter then dorsal margin of gonostylus straight or only with a shallow concavity (figs 21, 22) and inner surface of gonostylus with an outstanding carina below dorsal margin (fig. 22) 4

¹⁾ Note: The term "pale" is used in the key for all pale portions of the integument, which may vary intraspecifically from pale yellow to reddish.



Figs 17, 18: *Paragus tibialis* (Fallén) (Turkey); – figs 19, 20: *P. politus* Wiedemann (East Nepal); – figs 21, 22: *P. constrictus* Simić (North Germany). – Figs 17, 19, 21: hypandrium and gonostylus, lateral; – figs 18, 20, 22: gonostylus, inner surface.

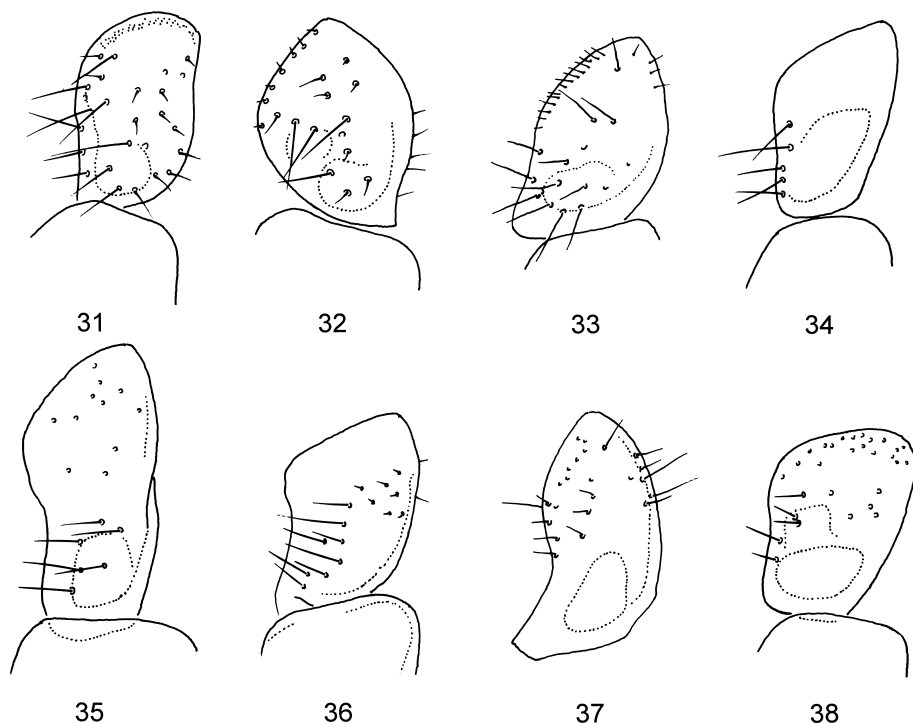


Figs 23-25: *Paragus abrogans* Goeldlin de Tiefenau (Turkey). – 23. hypandrium and gonostylus, lateral; – 24. left gonostylus, outer surface; – 25. left gonostylus, inner surface. – **Figs 26-28:** sternites III and IV. – 26. *P. rufocinctus* (Brunetti), holotype; – 27. *P. haemorrhous* Meigen (Austria); – 28. *P. karnaliensis* spec. nov. (West Nepal: Karnali). – **Figs 29, 30:** epandrium, ventral. – 29. *P. haemorrhous* Meigen (North Germany); – 30. *P. karnaliensis* spec. nov. (West Nepal: Karnali).

- 3 Gonostylus about 1.3 times as long as theca, with evenly rounded ventral margin (fig. 19); surstylus short in lateral view (fig. 36) *P. politus* Wiedemann
- Gonostylus about as long as theca, with ventral margin "heel-shaped" basally (fig. 18); surstylus long in lateral view (fig. 35) *P. tibialis* (Fallén)
- 4 Tergite II black, with lateral margins pale, and hind margin often pale, completely pale haired; gonostylus apico-dorsally with a distinct bulge (figs 24-25) *P. abrogans* Goeldlin de Tiefenau
- Tergite II completely black, posterior margin often with some short black hairs (except in *P. constrictus* in part); gonostylus of a different shape 5
- 5 Gonostylus long (0.8 times as long as theca, fig. 21), with lateral margins converging in apical half (fig. 22); sternite IV more than 3 times as wide as long .. *P. constrictus* Simić
- Gonostylus short (0.5-0.7 times as long as theca (as in figs 7, 10, 13), with lateral margins subparallel; sternite IV less than 3 times as wide as long (figs 26-28) 6
- 6 Postpedicellus 3 times as long as wide (fig. 4); occiput on dorsal half of head completely pale dusted; sternite III trapezoid, about 1.3 times as long as sternite IV at the midline (fig. 26); apical section of vein M2 (a in fig. 6) long ($M1/a = 1.6$); outer surface of gonostylus apico-dorsally with an outstanding lamella (figs 13-14) *P. rufocinctus* (Brunetti)
- Postpedicellus 2 times as long as wide (as in fig. 3); occiput in dorsal half of head narrowly shining black along eye margins (at least partly so); sternite III rectangular, about 1.1 times as long as sternite IV at the midline (figs 27-28); apical section of M2 (a in fig. 5) short ($M1/a = 2.0$); outer surface of gonostylus without an apico-dorsal lamella (figs 9-10) 7
- 7 Surstylus with a shallow convexity on apical margin (fig. 31); gonostylus: dorsal and ventral margins slightly diverging from base to apex or subparallel, outer apico-dorsal corner with an inwardly-curved carina (fig. 7), inner surface sclerotised in about apical third (figs 8-9); sternite X (minis) with lateral arms subparallel (fig. 30) *P. karnaliensis* spec. nov.
- Surstylus apically pointed (figs 32-33); gonostylus: outer apico-dorsal corner without an inwardly-curved carina (fig. 10), inner surface sclerotised in about apical fourth (figs 11-12); sternite X (minis) with lateral arms diverging (fig. 29) *P. haemorrhous* Meigen

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Figs 31-38: right surstylus, strictly lateral. – 31. *P. karnaliensis* spec. nov. (West Nepal: Karnali); – 32. *P. haemorrhous* Meigen (North Germany); – 33. *P. haemorrhous* Meigen (Turkey); – 34. *P. rufocinctus* (Brunetti), holotype; – 35. *P. tibialis* (Fallén) (Turkey); – 36. *P. politus* Wiedemann (East Nepal); – 37. *P. constrictus* Simić (North Germany); – 38. *P. abrogans* Goeldlin de Tiefenau (Turkey).

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