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Orthoclads of tribe Orthocladiini (Diptera: Chironomidae) from India

(with 8 fig.)

Our survey of Indian Orthocladiid midges in Darjeeling and its adjoining areas (2,280 m) during the last three years have yielded a good number of species. They belong to the genera *Cricotopus* V. D. WULP, *Eukiefferiella* THIENEMANN, *Orthocladius* V. D. WULP and *Rheocricotopus* THIENEMANN & HARNISCH of tribe Orthocladiini (BRUNDIN, 1956). The genera were known in four species in *Cricotopus*, two species in *Eukiefferiella*, four species in *Orthocladius* and three species in *Rheocricotopus* before the present study (KIEFFER, 1913, CHAUDHURI & GHOSH, 1980; SINHARAY et al., 1978; CHAUDHURI & GHOSH, 1982 and CHAUDHURI & SINHARAY, 1983).

In the description of adults, measurements (mm) and counts are given for holotype with the ranges of paratypes being given in parenthesis with the number of individuals from which the measurements were made. The terminology used in this paper follows SOPONIS (1977) and SAETHER (1980).

The types at present with the senior author, will be deposited in the National Zoological Collections, Calcutta, British Museum (Natural History), London, Zoologische Staatssammlung, München; USNM, Washington D. C. and Museum of Zoology, University of Bergen, Norway in due course.

1. *Cricotopus (Isocladius) ateritarsus* spec. nov.

Male: Body length 3.82 (3.85–3.92, n = 6). Wing length 1.70 (1.65–1.83, n = 6) and breadth 0.50 (0.46–0.57, n = 6).

Head: Yellowish brown. Vertex with 2 inner verticals, 3 outer verticals and 2 post orbitals. Corona with 2 setae. Clypeus with 10–12 setae, clypeal ratio 1.2. Maxillary palp greyish, 3–4 sensilla clavata on palpomere III, ratio of palpomere length I–V: 10:12:26:32:45, L/W 3.71. Eyes with a dorsal extension of 0.066. Antenna brown, ratio of flagellomere length I–XIII: 8:4:4:4:3:3:3:3:3:4:4:4:55, AR 1.17; CA 1.37; CP 0.96. Cibarial pump and tentorium as in the fig. 12.

Thorax (Fig. 1b): Brown. Antepronotum collar-like, 4 antepronotals. Acrostichals 13 irregular, humerals 2 minute, dorsocentrals 6–7, uniserial and prealars 3–4. Scutellum with 8 setae, post scutellum bare.

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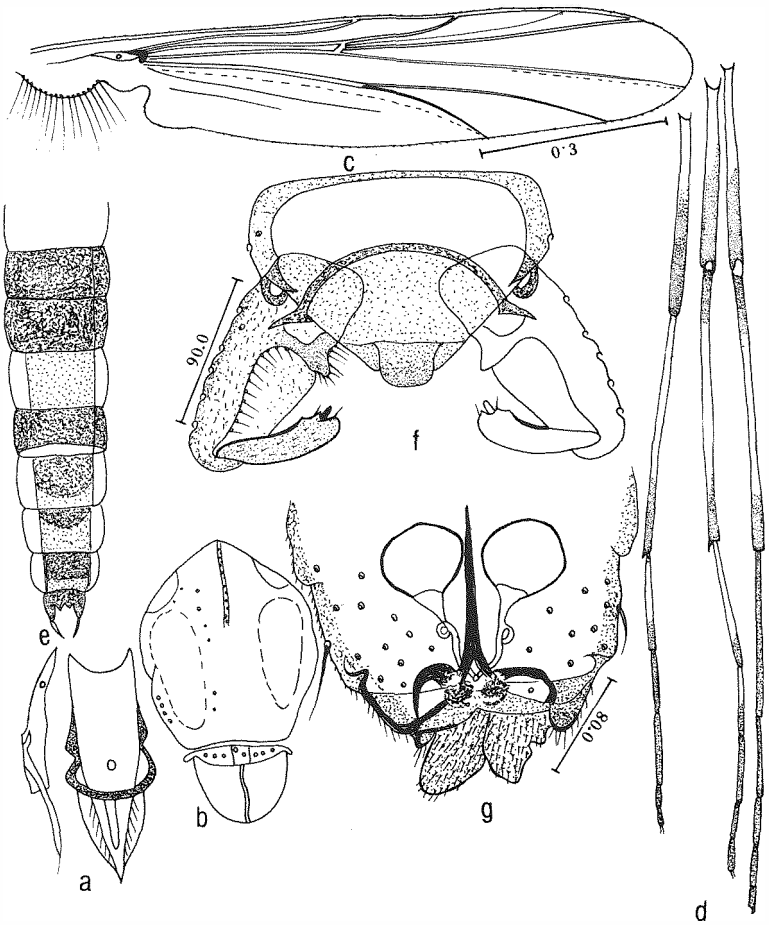

Figs. 1a–g. Adult of *Cricotopus (Isocladius) ateritarsus* spec. nov.: a, cibarial pump and tentorium; b, thorax; c, wing; d, legs; e, abdomen; f, ♂ hypopygium and g, ♀ genitalia.

Wing (Fig. 1c): Pale. Brachiolum with 1 seta and 16 sensilla campaniformia; C extended a very little 0.012 long; r-m proximal to f-Cu. Anal lobe produced. Squama with 16 setae. Haltere brown. VR 1.2; CR 0.91.

Legs (Fig. 1d): Femora dark brown at the distal half. Fore tarsomeres I–V, mid tarsomeres II–V and hind tarsomeres III–V dark brown. Spur of fore tibia 0.03 long, ratio of the length of spur to the apical diameter of fore tibia 10 : 11; spurs of mid tibia subequal, 0.021 and 0.018 long, ratio of the length of spurs to the apical diameter of mid tibia 7 : 11 and 6 : 11 spur of hind tibia markedly bent outward 0.057 long, ratio of the length of spur to

Proportions and ratios of leg segments

	Fe	Ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
Fore	70	71	30	26	12	8	6	0.42	3.28	5.42	1.44
Mid	60	61	27	16	12	7	7	0.44	3.60	4.84	1.3
Hind	72	74	38	20	16	9	8	0.51	3.47	4.42	1.8

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the apical diameter of hind tibia 19 : 11. Hind tibial comb with 12 setae 0.018 – 0.039 long. Empodium 0.027 long. Pulvilli present.
Abdomen (Fig. 1e): Tergites II – III and V – VIII with dark brown bands, others yellow. Tergite IX with 25 – 27 setae. Hypopygium (Fig. 1f) with anal point absent. Gonocoxite 0.18 long elongated with a moderate dorsal lobe and 10 – 12 setae, gonostylus 0.105 long shallow at the middle with a small crista dorsalis and an apical megaseta 0.01 long. Transverse sternapodeme 0.1, lateral sternapodeme 0.045, coxapodeme 0.024 and phallapodeme 0.06 long. HR 1.71; HV 3.95.

Female: Body length 3.05 (3.08 = 3.02, n = 4). Wing length 1.82 (1.84 – 1.80, n = 4) and breadth 0.52 (0.55 – 0.50, n = 4).

Similar to male with usual sex differences. Antenna 5 segmented, ratio of flagellomere length I – V : 12 : 12 : 13 : 13 : 36, AR 0.72. Genitalia (Fig. 1g) with notum 0.165 long. Coxosternapodeme simple. Gonocoxite IX with 9 – 10 setae. Postgenital plate broad. Cerci well developed and setose. Seminal capsiles equal, spheroidal, 0.105 in diameter; ducts of seminal capsules open commonly into the vagina.

Material examined: Holotype ♂ (Type no. B. U. Ent. 153) India, Sikkim, 13 April, 1983, Coll. B. BUIYAN. Allotype ♀ data same as holotype. Paratypes 3 ♂♂ and 2 ♀♀, India, West Bengal, Darjeeling, 22 April, 1984, Coll. D. K. GUHA.

Diagnosis: *Cricotopus ateritarsus* is named due to dark brown tarsomeres of leg. Among the described species, the new species and *C. tamasimplex* SASA (1981a) appear to be nearer to each other in wing and gonostylus. In the gonocoxite and gonostylus of *C. albitibia* WALKER, *C. (Isocladius) sylvestris* (FABRICIUS) and *C. (Isocladius) myriophylli* OLIVER (1984) and the new species are almost identical. Inspite of similarities with a good number of species from different parts of the world the possession of the following characters will place it as a new member of *Cricotopus*: i) antepronotum with 4 antepronotals, ii) humerals 2, minute, iii) scutellum with 8 setae in a row, iv) squama with 16 setae, v) pattern of markings on the abdomen brown, vi) gonocoxite with a small dorsal lobe and vii) shallow gonostylus.

2. *Eukiefferiella lehmanni* spec. nov.

Male: Body length 2.03 (2.02 – 2.09, n = 5). Wing length 1.08 (1.03 – 1.09, n = 6) and breadth 0.35 (0.32 – 0.36, n = 6).

Head: Dark brown. Vertex with inner vertical, 0 outer vertical and 0 post orbital. Clypeus with 12 setae, Clypeal ratio 1.25. Maxillary palp yellowish brown, 2 sensilla clavata on palpomere III, ratio of palpomere length I – V : 6 : 10 : 20 : 27 : 32, L/W 2.85. Eyes with a dorsal extension of 0.057. Antenna brown, ratio of flagellomere length I – XIII : 6 : 7 : 7 : 8 : 10 : 10 : 10 : 10 : 10 : 10 : 10 : 90, AR 0.83; CA 0.60; CP 1.26. Cibarial pump and tentorium as in the fig. 2a.

Thorax (Fig. 2b): Dark brown. Antepronotum collar-like without antepronotal. Humeral pit conspicuous, humerals 0; dorsocentrals 9 – 10 uniserial and prealars 2. Scutellum with 6 setae, postscutellum with 5 – 6 setae.

Wing (Fig. 2c): White. Wing with fine microtrichia. Brachiolum with 1 seta and 21 – 22 sensilla campaniformia; veins without setae; C extended 0.03; r – m little proximal to f – Cu; Cu_2 curved and recurved at tip. Squama with 3 setae. Haltere dark brown. VR 1.11; CR 0.88.

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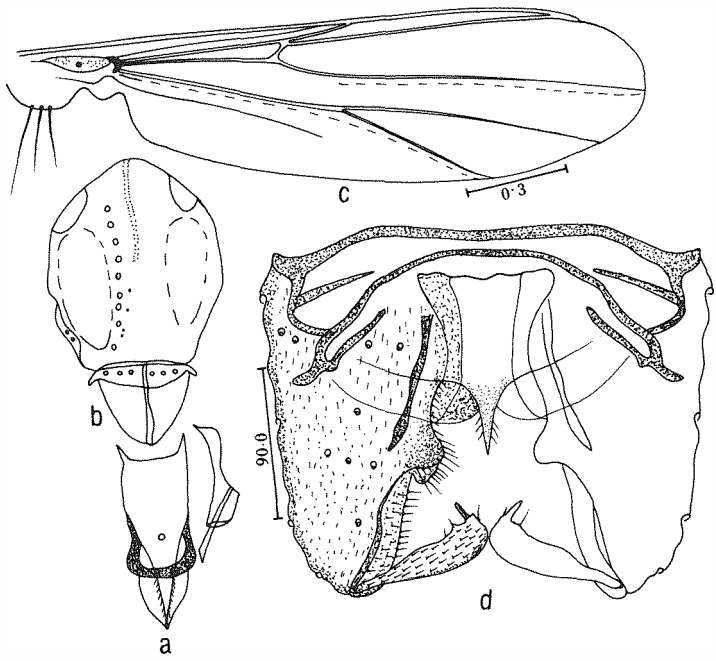

Figs. 2a–d. Adult of *Eukiefferiella lehmani* spec. nov.; a, cibarial pump and tentorium; b, thorax; c, wing; and d, ♂ hypopygium.

Leg: Fore and hind legs light brown and mid leg dark brown. Spur of fore tibia 0.015 long, ratio of the length of spur to the apical diameter of fore tibia 5:8; spur of mid tibia 0.012 long, ratio of the length of spur to the apical diameter of mid tibia 4:8; spur of hind tibia 0.03 long, ratio of the length of spur to the apical diameter of hind tibia 10:8. Hind tibial comb with 12 setae 0.018–0.033 long. Empodium 0.018 long.

Proportions and ratios of leg segments

	Fe	Ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
Fore	37	30	16	8	6	3	5	0.53	3.77	4.78	2.4
Mid	30	29	17	7	6	3	4	0.58	3.8	4.53	2.4
Hind	36	37	22	11	8	4	5	0.59	3.39	4.29	2.66

Abdomen: Tergite IX with 22–25 setae. Hypopygium (Fig. 2d) with anal point 0.021 long narrow and apex pointed with 3 setae in each laterad. Gonocoxite 0.14 long with a triangular dorsal lobe and 18–19 setae over it, gonostylus chopper like with 2 preapical seta and an apical megaseta 0.012 long. Transverse sternapodeme 0.075, lateral sternapodeme 0.039, coxapodeme 0.015 and phallapodeme 0.024 long. HR 2.52; HV 2.41.

Female: Unknown.

Material examined: Holotype ♂ (Type no. B. U. Ent. 154) India, West Bengal, Darjeeling, 21 July 1983, Coll. P. K. CHAUDHURI. Paratypes 3 ♂♂, data same as holotype.

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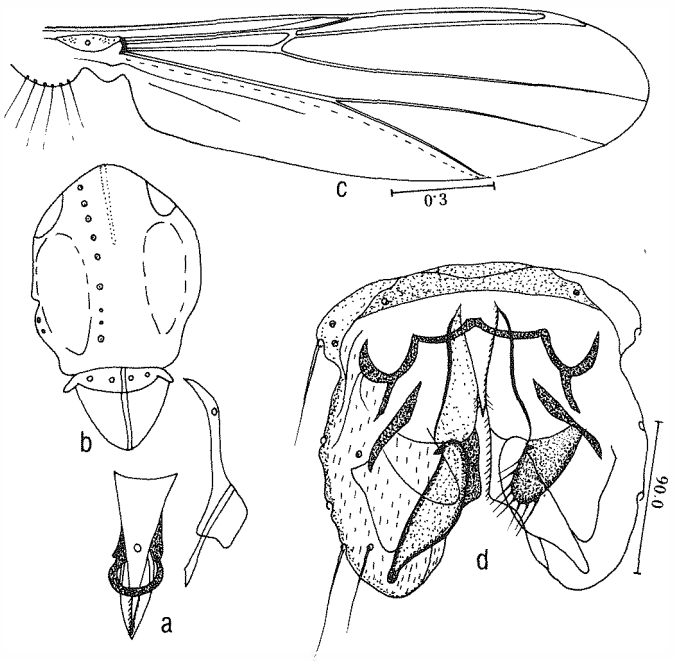
Diagnosis: This species is dedicated to Dr. JEAN LEHMANN for his valuable contribution to the study of european *Eukiefferiella*. The wing, gonocoxite, gonostylus and anal point of the new species and *E. colvescens* (EDWARDS). *E. verralli* (EDWARDS) both described by PINDER (1978) seem to be identical with those of new species. But the entity of the species as a new member of *Eukiefferiella* can be established by the following combination of characters: i) prominent humeral pit, ii) scutellum with 6 setae in a row, iii) post scutellum dark brown with 5–6 setae, iv) squama with 3 setae, v) anal point narrow and apex pointed with 3 setae in each laterad, vi) gonocoxite with a triangular dorsal lobe and vii) chopper like gonostylus.

3. *Eukiefferiella saccularis* spec. nov.

Male: Body length 2.24 (2.03–2.38, n = 4). Wing length 1.33 (1.26–1.4, n = 4) and breadth 0.58 (0.56–0.61, n = 4).

Head: Dark brown. Vertex without inner, outer verticals and post orbitals. Clypeus with 5 setae, clypeal ratio 1.29. Maxillary palp light brown, ratio of palpomere length I–V:7:14:12:24:30, L/W 1.71. Eyes without dorsal extension. Antenna brown, ratio of flagellomere length I–XIII:7:7:6:8:10:10:12:12:12:12:12:13:70, AR 0.57; CA 0.39; CP 0.86. Cibarial pump and tentorium as in the fig. 3a.

Thorax (Fig. 3b): Antepronotum collar-like without antepronotal. Humerals 0, dorsocentrals 7 uniserial and prealars 2. Scutellum with 4 setae, postscutellum bare.



Figs. 3a–d: Adult of *Eukiefferiella saccularis* spec. nov.: a, cibarial pump and tentorium; b, thorax; c, wing and d, ♂ hypopygium.

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Wing (Fig. 3c): White. Brachiloum with 1 seta and 18–19 sensilla campaniformia; C extended 0.075; r-m proximal to f-Cu; Cu_2 curved and recurved at tip. Squama with 6 setae. Haltere light yellow. VR 1.31; CR 0.90.

Legs: Spur of fore tibia 0.036 long; ratio of the length of spur to the apical diameter of fore tibia 12:7; spurs of mid tibia 0.01 and 0.02 long, ratio of the length of spurs to the apical diameter of mid tibia 5:8 and 6:8; spur of hind tibia 0.04 long, ratio of the length of spur to the apical diameter of hind tibia 12 10. Hind tibial comb with 12 setae 0.015–0.03 long. Empodium 0.02 long. Pulvilli absent.

Proportions and ratios of leg segments

	Fe	Ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
Fore	45	38	31	20	13	7	6	0.82	2.48	3.19	2.20
Mid	40	35	18	12	7	4	6	0.51	3.21	4.41	2.50
Hind	46	44	24	14	11	6	5	0.55	3.17	4.09	2.22

Abdomen: Tergite IX with 18–20 setae. Hypopygium (Fig. 3d) with anal point 0.03 long, pointed with 3 lateral setae and base with 2 setae. Gonocoxite 0.12 long with a pouch like dorsal lobe bearing 16–18 setae, gonostylus 0.07 long dilated distally with an apical megaseta 0.009 long. Transverse sternapodeme 0.07 long, lateral sternapodeme 0.05 long, coxapodeme 0.02 and phallapodeme 0.021 long. HR 1.82, HV 3.20.

Female: Unknown.

Material examined: Holotype ♂ (type no. B. U. Ent. 155), India, Sikkim, Gangtok, 22 December 1986, Coll. A. K. DEY. Paratypes 4 ♂♂, data same as holotype.

Diagnosis: *Eukiefferilla saccularis* is named after pouch like dorsal lobe of gonocoxite. This species is quite similar to *E. coerulescens* (KIEFFER) in respect to gonocoxite and gonostylus and *E. ilkleyensis* LEHMANN (1972) in wing, gonocoxite and gonostylus. The following characters will isolate the new species from all other species described so far: i) scutellum with 4 setae in a row, ii) squama with 6 setae, iii) anal point small pointed with 3 lateral setae and base with 2 setae, iv) gonocoxite with a pouch like dorsal lobe and v) gonostylus dilated distally.

4. *Orthocladius (Eudactylocladius) androgynus* spec. nov.

Male: Body length 3.64 (3.26–3.78, n = 8). Wing length 2.26 (2.10–2.38, n = 8) and breadth 0.78 (0.70–0.84, n = 8).
Head: Brown. Vertex with 2 inner verticals, 5 outer verticals and 3 post orbitals. Corona with 4 setae. Clypeus with 9 setae, Clypeal ratio 1.2. Maxillary palp light brown, 3 sensilla clavata in palpomere III, ratio of palpomere length I–V:7:10:30:32:33, L/W 2.72. Eyes with a dorsal extension of 0.123. Antenna brown, ratio of flagellomere length I–XIII:6:7:7:9:9:9:10:10:10:10:10:11:140, AR 1.2; CA 0.77; CP 1.71. Cibarial pump and tentorium as in the fig. 4a.

Thorax (Fig. 4b): Brown. Antepronotum collar-like with 1 antepronotal. Acrostichals 3 uniserial, humerals 0, dorsocentrals 13 uniserial and prelars 4. Scutellum with 12 setae, postscutellum bare.

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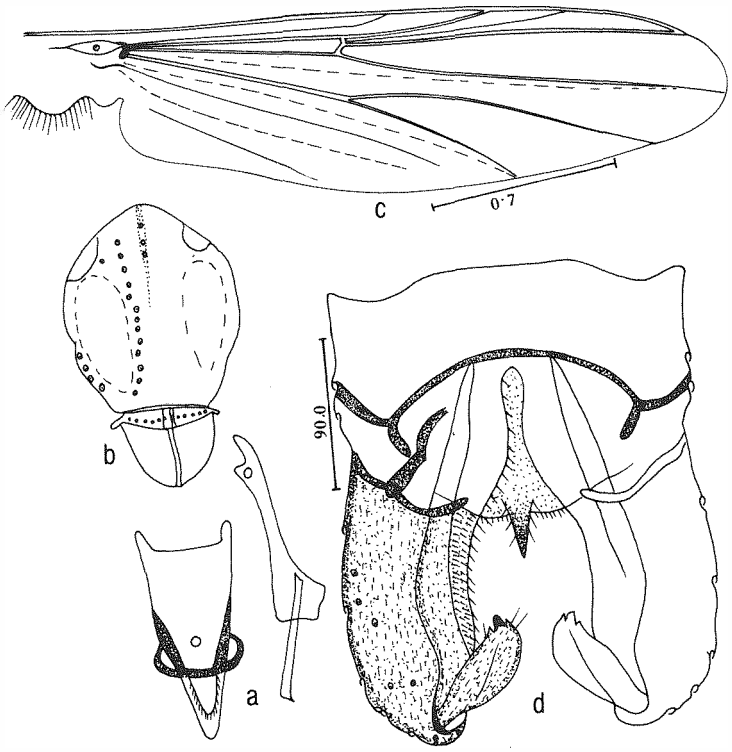

Figs. 4a–d. Adult of *Orthocladius (Eudactylocladius) androgynus* spec. nov.: a, cibarial pump and tentorium; b, thorax; c, wing and d, ♂ hypopygium.

Wing (Fig. 4c): White. Brachiolum with 1 seta and 2–3 sensilla campaniformia. R, 14 and R_1 with 1 seta; C extended 0.05; r–m proximal to f–Cu; Cu_2 curved at tip. Anal lobe rounded. Squama with 18 setae. Haltere brown. VR 1.09; CR 0.94.

Legs: Spur of fore tibia 0.024 long, ratio of the length of spur to the apical diameter of fore tibia 10:9; spurs of mid tibia 0.03 and 0.02 long, ratio of the lengths of spurs to the apical diameter of mid tibia 8:7 and 6:7; spurs of hind tibia equal, 0.027 long, ratio of the length of spurs to the apical diameter of hind tibia 9:8. Hind tibial comb with 12 setae 0.027–0.048 long. Empodium 0.012 long.

Proportions and ratios of leg segments

	Fe	Ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
Fore	60	65	30	17	13	8	7	0.46	3.44	4.46	2.67
Mid	60	57	27	17	12	7	6	0.47	3.43	4.6	2.38
Hind	62	75	38	23	18	9	8	0.50	3.01	3.91	2.88

Abdomen: Tergite IX with 35–38 setae. Hypopygium (Fig. 4d) with anal point 0.018 long, pointed with 3 setae. Gonocoxite 0.15 long, elongated with 20–22 setae, gonostylus short, 0.072 long and broad with an apical megaseta 0.009 long. Transverse sternapodeme 0.12,

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lateral sternapodeme 0.066, Coxapodeme 0.018 and phallapodeme 0.027 long. HR 2.5; HV 3.52.

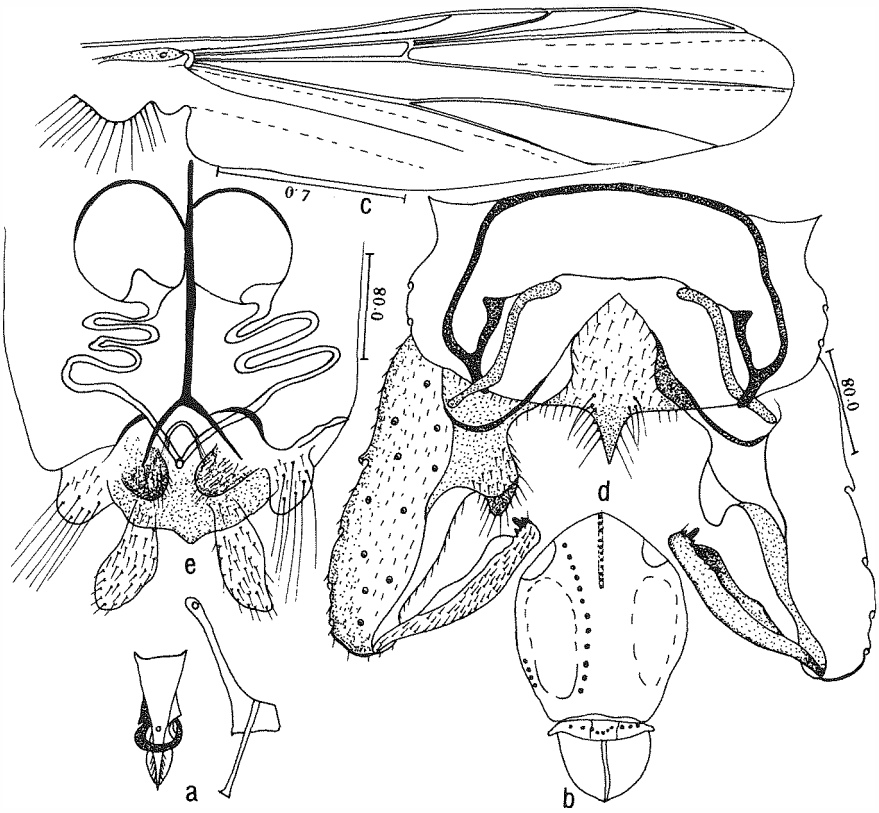
Female: Unknown.

Material examined: Holotype ♂ (Type no. B. U. Ent 166), India, West Bengal, Mungpoo, 6 March 1984, Coll. D. K. GUHA. Paratypes 6 ♂♂, data same as holotype, 5 ♂♂, Darjeeling, October 1983, Coll. T. K. DUTTA.

Diagnosis: For frequent occurrence of hermaphroditism the species is named as *Orthocladius (Eudactylocladius) androgynus*. It displays affinities with *O (E) brevipenis* CHAUDHURI and GHOSH (1982) in wing, gonocoxite and gonostylus except squama, *O. (E) gelidus* KIEFFER in gonocoxite and gonostylus and *O. (E) mixtus* (HOLMGREEN) in gonocoxite and anal point. The species may be distinguished by the gollowing combination of characters i) AR of male 1.2, ii) scutellum with 12 setae, iii) vein R with 14 and R_1 with 1 seta, iv) squama with 18 setae, v) gonocoxite elongated and vi) gonostylus short.

5. *Orthocladius (Orthocladius) deflectus* spec. nov.

Male: Body length 3.75 (3.60–3.78, n = 6). Wing length 1.70 (1.66–1.72, n = 4) and breadth 0.54 (0.55–0.58, n = 4).



Figs. 5a–e. Adult of *Orthocladius (Orthocladius) deflectus* spec. nov.: a, cibarial pump and tentorium; b, thorax; c, wing ; d, ♂ hypopygium and e, ♀ genitalia.

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Head: Dark brown. Vertex with inner verticals, 5 outer verticals and 0 post orbital. Corona with 2 setae. Clypeus with 4 setae, Clypeal ratio 1.33. Maxillary palp brown, ratio of palpomere length I–V:10:7:26:30:15, L/W 2.6. Eyes with a dorsal extension of 0.15. Antennal brown, ratio of flagellomere length I–XIII:5:6:7:9:9:9:9:9:9:9:9:150, AR 1.5; CA 0.69; CP 1.95. Cibarial pump and tentorium as in the fig. 5a.

Thorax (Fig. 5b): Dark brown. Antepronotum collar-like with 2 antepronotals. Acrostichals 12 uniserial, humerals 0, dorsocentrals 12–13 uniserial and prealars 4. Scutellum with 10 setae, postscutellum bare.

Wing (Fig. 5c): White. Brachiolum with 1 seta and 23–24 sensilla campaniformia. R, 12; R_{2+3} and R_{4+5} without setae; C extended 0.042; r–m slightly proximal to f–Cu; Cu_2 ends parallel to the wing margin. Anal lobe rounded. Squama with 13–11 setae. Haltere light brown. VR 1.18; CR 0.91.

Legs: Spur of fore tibia 0.018 long, ratio of the length of spur to the apical diameter of fore tibia 6:7; spurs of mid tibia 0.027 and 0.03 long; ratio of the length of spurs to the apical diameter of mid tibia 9:11 and 10:11; spur of hind tibia 0.054 long, ratio of the length of spur to the apical diameter of hind tibia 18:15. Hind tibial comb with 11 setae 0.021–0.057 long. Empodium 0.021 long.

Proportions and ratios of leg segments

	Fe	Ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
Fore	60	70	42	25	20	12	10	0.6	2.56	3.09	3.87
Mid	58	60	30	20	15	9	8	0.5	2.84	3.68	3.37
Hind	67	72	43	22	18	12	8	0.59	3.01	3.65	3.33

Abdomen: Tergite IX with 35–37 setae. Hypopygium (Fig. 5d) with pointed anal pointed 0.03 long bearing 3 lateral setae and 3 setae at each base. Gonocoxite 0.168 long with a bent beak-like dorsal lobe and 14 setae, gonostylus 0.093 long with a crista dorsalis and an apical megaseta 0.012 long. Transverse sternapodeme 0.09, lateral sternapodeme 0.066, coxapodeme 0.033 and phallapodeme 0.039 long. HR 1.87; HV 3.31.

Female: Body length 3.34 (3.32–3.40, n = 4). Wing length 2.15 (2.14–2.20, n = 4) and wing breadth 0.79 (0.75–0.82, n = 4).

Similar to male with usual sex differences. Antenna 5 segmented, ratio of flagellomere length I–V:12:15:13:12:33, AR 0.63. Genitalia (Fig. 5e) with notum 0.12 long. Coxosternapodeme simple. Gonapophysis VIII with 3 lobes. Gonocoxite IX with 6–7 setae. Postgenital plate moderate. Cerci moderately developed and setose. Seminal capsules black, equal and spheroidal 0.09 in diameter; ducts of seminal capsules open commonly into the vagina.

Material examined: Holotype ♂ (Type no. B. U. Ent. 168) India, West Bengal, Kurseong, 8 March 1984, Coll. D. K. GUHA, Allotype ♀, data same as holotype. Paratypes 4 ♂♂ and 2 ♀♀, India, West Bengal, Miric, 10 March 1984, Coll. D. K. GUHA.

Diagnosis: This species has been named *Orthocladius (Orthocladius) deflectus* for its bent beak-like dorsal lobe of gonocoxite. It seems closely related to *O. (O.) oblidens* WALKER, *O (O.) saxicola* KIEFFER and *O. (O.) wiensi* SAETHER (1969) in gonocoxite and anal point

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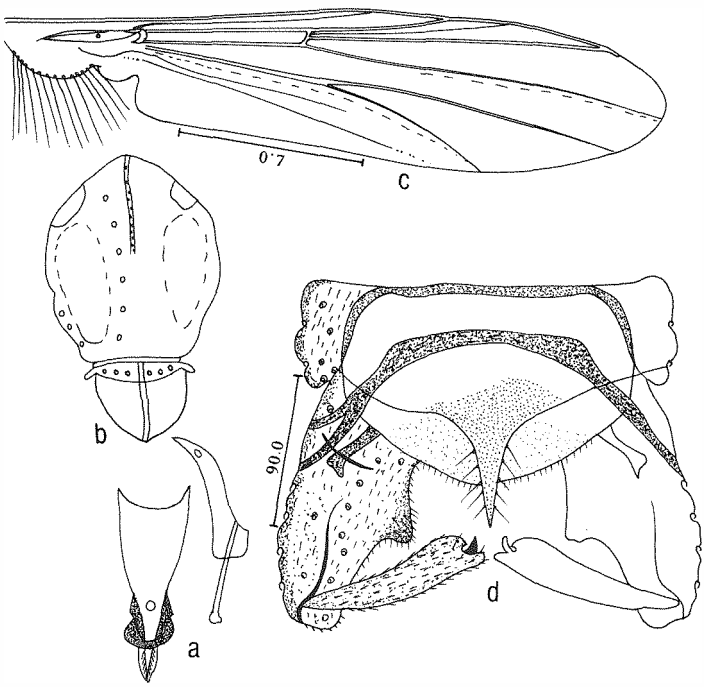
and *O. (O.) nigritus* MALLOCH in wing and anal point. However, the following characters will distinguish *O. (O.) deflectus* from all other species of *Orthocladius:* i) scutellum with 10 setae, ii) 12 setae present in vein R of wing, iii) squama with 13–14 setae, iv) anal point pointed with 3 setae, v) gonocoxite with a bent beak-like dorsal lobe and vi) crista dorsalis present.

6. *Orthocladius (Orthocladius) uniradialis* spec. nov.

Male: Body length 2.24 (2.16–2.28, n = 4). Wing length 1.29 (1.20–1.31, n = 4) and breadth 0.43 (0.45–0.40, n = 4).

Head: Brown. Vertex with 0 inner vertical, 2 outer vertical and 6 post orbitals. Clypeus with 6 setae, Clypeal ratio 1.20. Maxillary palp light brown, ratio of palpomere length I–V:5:13:22:20:18, L/W 3.14. Eyes without dorsal extension. Antenna brown. 1 apical seta present in the ultimate flagellomere, ratio of flagellomere length I–XIII:5:5:5:6:6:6 :6:8:8:8:9:9:100, AR 1.22; CA 0.69; CP 1.60. Cibarial pump and tentorium as in the fig. 6a.

Thorax (Fig. 6b): Brown. Antepronotum collar-like, 4 antepronotals. Acrostichals 11 irregular, humerals 0, dorsocentrals 6 uniserial and prealars 3. Scutellum with 6 setae, post scutellum bare.



Figs. 6a–d. Adult of *Orthocladius (Orthocladius) uniradialis* spec. nov.: a, cibarial pump and tentorium; b, thorax; c, wing and d, ♂ hypopygium.

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Wing (Fig. 6c): Transparent. Brachiolum with 1 seta and 5–6 sensilla campaniformia. R with 1 seta; C extended 0.05; r–m proximal to f–Cu. Anal lobe well developed. Squama with 14 setae. Haltere light brown. VR 1.25; CR 0.90.

Leg: Spur of fore tibia 0.04 long, ratio of the length of spur to the apical diameter of fore tibia 13:9; spurs of mid tibia 0.03 and 0.02 long, ratio of the length of spurs to the apical diameter of mid tibia 10:8 and 6:8; spur of hind tibia 0.06 long, ratio of the length of spur to the apical diameter of hind tibia 20:9. Hind tibial comb with 9 setae 0.021–0.09 long. Empodium 0.02 long.

Proportions and ratios of leg segments

	Fe	Ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
Fore	39	38	30	15	11	6	5	0.79	2.89	3.50	2.50
Mid	32	36	18	10	7	5	4	0.50	3.31	4.25	1.43
Hind	42	45	27	14	11	6	5	0.60	3.17	3.95	1.86

Abdomen: Tergite IX with 22–25 setae. Hypopygium (Fig. 6d) with long anal point 0.04 and pointed with 5 setae. Gonocoxite 0.129 long with a nose-like dorsal lobe bearing 16–17 setae, gonostylus 0.078 long broad, hammer shaped with an apical megaseta 0.01 long. Transverse sternapodeme 0.078, lateral sternapodeme 0.075, Coxapodeme 0.018 and phallapodeme 0.021 long. HR 1.88; HR 3.14.

Female: Unknown.

Material examined: Holotype ♂ (Type no. B. U. Ent. 168), India, West Bengal, Darjeeling, 10 April 1985, Coll. P. K. CHAUDHURI. Paratypes 3 ♂♂, data same as holotype.

Diagnosis: The name *Orthocladius (Orthocladius) uniradialis* is termed due to the presence of only one seta on R vein of wing. It draws remarkable similarity with *O. (O.) makabensis* SASA (1979) except thoracic chaetotaxy, *O. bergensis* FREEMAN (1956) in gonocoxite and wing except anal lobe and *O. (O.) ferringtoni* SOPONIS (1983) in hypopygium. Inspite of similarities the following characters separate the species as a new member of *orthocladius:* i) antepronotum with 4 antepronotals, ii) scutellum with 6 setae in a row, iii) 1 seta present in vein R of wing, iv) squama with 14 setae, v) anal point pointed with 5 setae, vi) gonocoxite with a nose-like dorsal lobe, and vii) peculiar hammer-like gonostylus.

7. *Rheocricotopus (Psilocricotopus) bicornuatus* spec. nov.

Male: Body length 3.78 (3.49–4.07, n = 3). Wing length 2.73 (2.66–2.80, n = 3) and breadth 0.61 (0.58–0.64, n = 3).

Head: Dark brown. Vertex with 1 inner vertical, 1 out vertical and 0 post orbital. Corona with 2 setae. Clypeus with 11 setae, clypeal ratio 1.10. Maxillary palp brown, ratio of palpomere length I–V:8:11:28:52:60, L/W 2.33. Eyes with a dorsal extension of 0.051. Antenna brown, ratio of flagellomere length I–XII:9:10:10:10:11:11:11:13:13:13:15:15:53, AR 0.38; CA 0.63; CP 0.75. Cibarial pump and tentorium as in the fig. 7a.

Thorax (Fig. 7b): Dark brown. Antepronotum collar-like without antepronatal. Acrostichals 13–14 uniserial, humerals 0, dorsocentrals 14–15 biserial and prealars 3. Scutellum with 10–12 setae, postscutellum bare.

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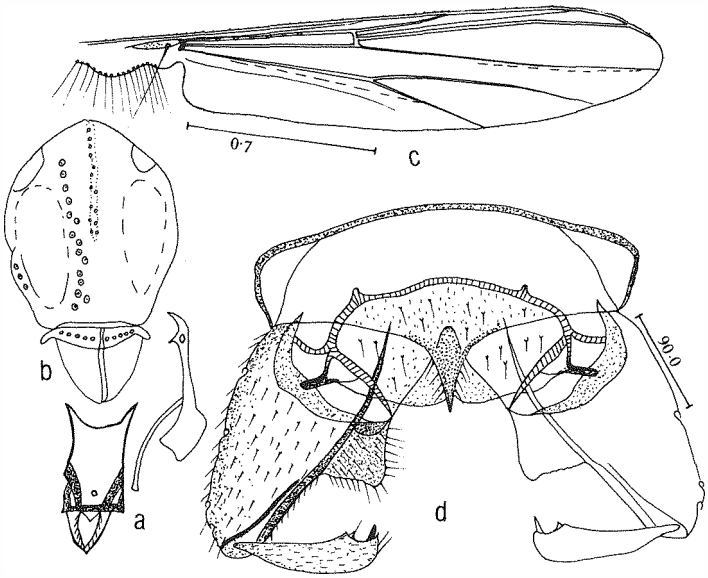

Figs. 7a–d. *Rheocricotopus (Psilocricotopus) bicornuatus* spec. nov.: a, cibarial pump and tentorium; b, thorax; c, wing and d, ♂ hypopygium.

Wing (Fig. 7c): White. Brachiolum with 1 seta and 13 sensilla campaniformia. R with 6 setae; r–m proximal to f–Cu; Cu_2 straight. Squama with 16 setae. Haltere brown. VR 1.09; CR 0.96.

Legs: Spur of fore tibia 0.05 long, ratio of the length of spur to the apical diameter of fore tibia 15:16; spurs of mid tibia unequal, 0.018 and 0.024 long, ratio of the length of spurs to the apical diameter of mid tibia 6:16 and 8:16; spur of hind tibia 0.05 long, ratio of the length of spur to the apical diameter of hind tibia 15:17. Hind tibial comb with 13 setae 0.021–0.036 long. Empodium small 0.006 long.

Proportions and ratios of leg segments

	Fe	Ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
Fore	70	68	60	32	26	19	10	0.88	2.27	2.50	2.16
Mid	62	65	36	17	12	6	5	0.55	3.45	5.52	2.83
Hind	70	76	45	25	18	10	7	0.59	3.18	4.17	3.85

Abdomen: Tergite IX with 37–40 setae. Hypopygium (Fig. 7d) with anal point 0.042 long, pointed with 4 setae. Gonocoxite 0.237 long with a prominent setaceous dorsal lobe bearing 24–25 setae, gonostylus 0.108 long with an apical megaseta 0.009 long. Transverse sternapodeme 0.105, lateral sternapodeme 0.045, coxapodeme 0.033 and phallapodeme 0.018 long. HR 1.76; HV 3.85.

Female: Unknown.

Material examined: Holotype ♂ (Type no. B. U. Ent. 176), India, West Bengal, Kurseong, 26 July 1986, Coll. S. CHATTOPADHYAY. Paratypes 6 ♂♂, data same as holotype, 2 ♂♂, West Bengal, Lebong, 24 July 1986, Coll. S. CHATTOPADHYAY.

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Diagnosis: The name, *Rheocricotopus (Psilocricotopus) bicornuatus* has been coined after the horn like structure of transverse sternapodeme. It appears nearer to *R. (P.) glabrigcollis* (MEIGEN) and *R. (P.) gouini* (GOETGHEBUER) in gonocoxite and gonostylus but can easily be distinguished from other species by the following combination of characters: i) AR of male 0.38, ii) scutellum with 10 – 12 setae in a row, iii) squama with 18 setae, iv) anal point pointed with 4 setae, v) two horn like structure in transverse sternapodeme.

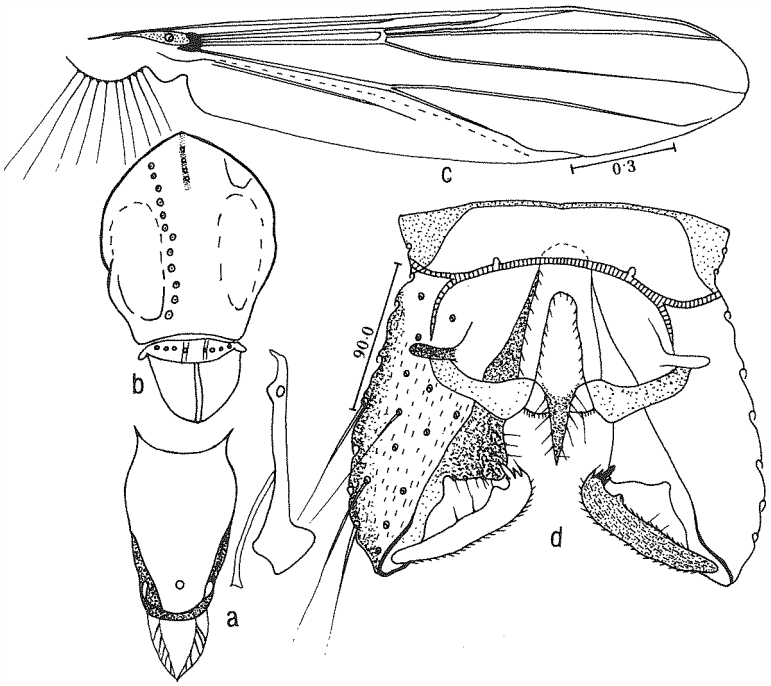
This species may be included under *atripes* group as described by SAETHER (1985) due to the large and nearly rectangular humeral pit.

8. *Rheocricotopus (Psilocricotopus) frequens* spec. nov.

Male: Body length 3.38 (3.28 – 3.40, n = 6). Wing length 1.82 (1.75 – 1.89, n = 6) and breadth 0.69 (0.67 – 0.72, n = 6).

Head: Dark brown. Vertex with 1 inner vertical, 2 outer verticals andopost orbital. Corona with 1 seta. Clypeus with 9 – 10 setae, clypeal ratio 1.20. Maxillary palp brown, 3 sensilla clavata on palpomere III, ratio of palpomere length I – V: 10:20:20:22:12:25, L/W 2.75. Eyes with a dorsal extension of 0.114. Antenna brown, ratio of flagellomere length I-XIII: 5:6:6:6:8:12:12:12:12:12:12:12:12:110, AR 0.95; CA 0.53; CP 1.35: Cibarial pump and tentorium as in the fig. 8a.

Thorax (Fig. 8b): Dark brown. Antepronotum collar like without antepronotals. Acrostichals 4 – 5 uniserial, humarals 0, dorsocentrals 10 – 12 biserial and prealars 1 – 2. Scutellum with 8 setae, postscutellum bare.



Figs. 8a – d. Adult of *Rheocricotopus (Psilocricotopus) frequens* spec. nov.: a, cibarial pump and tentorium; b, thorax; c, wing and d, ♂ hypopygium.

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Wing (Fig. 8c): White. Brachiolum with 1 seta and 18 sensilla campaniformia. R with 8 setae; C slightly extended. Cu_2 curved, r–m proximal to f–Cu. Squama with 10 setae. Haltere brown. VR 1.15; CR 1.08.

Legs: Spurs of fore tibia unequal 0.039 and 0.015 long, ratio of the length of spurs to the apical diameter of fore tibia 13:14 and 5:14; spurs of mid tibia also unequal, 0.018 and 0.015 long, ratio of the length of spurs to the apical diameter of mid tibia 6:11 and 5:11; spur of hind tibia 0.042 long, ratio of the length of spur to the apical diameter of hind tibia 14:15. Hind tibial comb with 12–13 setae 0.015–0.039 long. Empodium 0.018 long.

Proportions and ratios of leg segments

	Fe	Ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BV	SV	BR
Fore	58	66	58	31	23	16	8	0.87	2.33	2.63	2.29
Mid	60	58	34	15	11	6	5	0.58	4.10	5.36	2.33
Hind	65	73	42	20	17	8	6	0.57	3.52	4.45	5.17

Abdomen: Tergite IX with 20–25 setae. Hypopygium (Fig. 8d) with anal point 0.033 long with 6 setae. Gonocoxite 0.156 long with a large triangular dorsal lobe bearing 4–5 setae, gonostylus 0.087 long with an apical megaseta 0.012 long. Transverse sternapodeme 0.12, lateral sternapodeme 0.06, coxapodeme 0.021 and phallapodeme 0.018 long. HR 2.2; HV 3.37.

Female: Unknown.

Material examined: Holotype ♂ (Type no. B. U. Ent. 177), India, West Bengal, Darjeeling, 6 April, 1984, Coll. D. K. GUHA. Paratypes 6 ♂♂, data same as holotype.

Diagnosis: The name frequens applied to the species indicates the presence of numerous sensilla campaniformia on the brachiolum of wing. It bears resemblences with *R. (P.) glabricollis* (MEIGEN), *R. (P.) lindbergi* LEHMANN (1969) and *R. (P.) tirolus* LEHMANN (1969) in the structure of gonocoxite, gonostylus and anal lobe. But the following combination of characters will isolate the new species from other *Rheocricotopus* described so far, i) AR of male 0.95, ii) scutellum with 8 setae in a row, iii) numerous sensilla campaniformia in brachiolum of wing, iv) vein Cu_2 curved, v) squama with 10 setae and vi) anal point with 6 setae.

This species may also included under the group atripes described by Saether (1985) for the presence of large and nearly rectangular humeral pit.

Key to the adults of Indian species of Subgenus *Isocladius* KIEFFER

1. Pulvilli present. Tergites not dark brown 2
   Pulvilli absent. Tergites dark brown 3
2. Scutellum shiny. Cu bent. Hind tibia not markedly bent . . . . . *brunettii* KIEFFER
   Scutellum not shiny. Cu straight. Hind tibia markedly bent . . . . . *ateritarsus* **spec. nov.**
3. Costa strongly extended. Hind femur with a brown ring . . . . . *spatulicornis* (KIEFFER)
   Costa slightly extended. Hind femur without brown ring 4
4. Maxillary palp sufficiently long. Middle of the empodium with hook . . . *anomalus* (KIEFFER)
   Maxillary palp moderate. Middle of the empodium without hook 5
5. Humerals present. Gonostylus swollen distad . . . . . *tenuisetosus* CHAUDHURI & GHOSH
   Humerals absent. Gonostylus narrowed distad . . . . . *albipes* CHAUDHURI & GOSH

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Key to the adults of Indian species of *Eukiefferiella* THIENEMANN

1. Post orbitals present. AR less than 0.55. Prealars 3 2
   Postorbitals absent. AR more than 0.55. Prealars 2 3
2. AR 0.28–0.29. Squama with 4 setae. Gonocoxite with a small triangular dorsal lobe . . . . . *debilis* SINHARAY & CHAUDHURI
   AR 0.53–0.55. Squama with 5 setae. Gonocoxite with a prominent thumb-like dorsal lobe . . . . . *peculiaris* SINHARAY & CHAUDHURI
3. Humeral pit present; postscutellum setaceous. Base of anal point bare. Dorsal lobe of gonocoxite triangular; gonostylus chopper-like . . . . . *lehmanni* **spec. nov.**
   Humeral pit absent; postscutellum bare. Base of anal point with setae. Dorsal lobe of gonocoxite pouch-like; gonostylus dilated . . . . . *saccularis* **spec. nov.**

Key to the Subgenera of *Orthocladius* VAN DER WULP

1. Gonocoxite with well developed dorsal lobe 2
   Gonocoxite without dorsal lobe . . . . . Subg. *Eudactylocladius* THIENEMANN
2. Scutellum usually multiserial. Anal point robust with rounded apex . . . . . Subg. *Euorthocladius* THIENEMANN
   Scutellum usually uniserial. Anal point moderately developed with pointed apex 3
3. Temporals biserial to multiserial. Fore tarsomere I with long beard. Anal point moderate to long. . . . . Subg. *Pogonocladius* BRUNDIN
   Temporals uniserial. Fore tarsomere I without long beard. Anal point short to long . . . . . Subg. *Orthocladius* S. Str.

Key to the adults of Indian species of Subgenus *Eudactylocladius* THIENEMANN

1. Humerals absent; antepronotal 1. Squama with 18 setae . . . . . *androgynus* **spec. nov.**
   Humerals present; antepronotals 5–6. Squama with less than 18 setae 2
2. Acrostichals uniserial. Vein R_{4+5} without setae. Anal point with 1–3 setae 3
   Acrostichals biserial. Vein R_{4+5} with setae. Anal point with numerous setae . . . . . *nigronotus* CHAUDHURI & GHOSH
3. Postorbital present. Anal point small with 1 seta on each side *brevipennis* CHAUDHURI & GHOSH
   Postorbital absent. Anal point moderate with 3 setae on each side *nudus* CHAUDHURI & GHOSH

Key to the adults of Indian species of Subgenus *Orthocladius* VAN DER WULP

1. Antepronotals absent; dorsocentrals biserial. Vein R_1 and R_{4+5} with setae. Anal point small with numerous setae . . . . . *novostylus* CHAUDHURI & GHOSH
   Antepronotals present; dorsocentrals uniserial. Vein R_1 and R_{4+5} bare. Anal point moderate to long with 3–5 setae 2
2. Postorbitals present. Vein R with only 1 seta. Dorsal lobe of gonocoxite nose-like . . . . . *uniradialis* **spec. nov.**
   Postorbitals absent. Vein R with 12 setae. Dorsal lobe of gonocoxite beak-like . . . . . *deflectus* **spec. nov.**

Key to the adults of Indian species of Subgenus *Psilocricotopus* SAETHER

1. Acrostichals present. Scutellum with a single row of setae. Anal lobe rounded 2
   Acrostichals absent. Scutellum with 2 rows of setae. Anal lobe projecting . . . . . *nemoacrostichalis* CHAUDHURI & SINHARAY
2. AR 1.2. R without setae. Fore femur with a dark band at its distal one third . . . . . *valgus* CHAUDHURI & SINHARAY
   AR 0.38–0.95. R with setae. Fore femur without dark band at its distal one third 3
3. Sensilla clavata present. Scutellum with less than 10 setae. Transverse sternapodeme without horn 4
   Sensilla clavata absent. Scutellum with more than 10 setae. Transverse sternapodeme with horn. . . . . *bicornuatus* **spec. nov.**

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4. Dorsocentrals uniserial. Vein Cu_2 curved. Anal point with 6 setae. Crista dorsalis ill-developed . . . . . *himalayensis* CHAUDHURI & SINHARAY
Dorsocentrals biserial. Vein Cu_2 straight. Anal point with 3 setae. Crista dorsalis well developed . . . . . *frequens* spec. nov.

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Summary

Eight new species *Cricotopus (Isocladius) ateritarsus, Eukiefferiella lehmanni, E. saccularis, Orthocladius (Eudactylocladius) androgynus, O. (Orthocladius) deflectus, O. (O.) uniradialis, Rheocricotopus (Psilocricotopus) bicornuatus, R. (P.) frequens* are described from India. New keys to recognise the Indian species of each genus are also provided.

Zusammenfassung

Acht neue Arten werden aus Indien beschrieben: *Cricotopus (Isocladius) ateritarsus, Eukiefferiella lehmanni, E. saccularis, Orthocladius (Eudactylocladius) androgynus, O. (Orthocladius) deflectus, O. (O.) uniradialis, Rheocricotopus (Psilocricotopus) bicornuatus, R. (P.) frequens.* Bestimmungstabellen zum Erkennen der indischen Arten in ihren Gattungen stehen zur Verfügung.

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