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FOUR NEW SPECIES OF THE GENUS *KIEFFERULUS* GOETGHEBUER, 1922 (DIPTERA: CHIRONOMIDAE) FROM DARJEELING HIMALAYAS, INDIA

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Kiefferulus atroxitarsis sp. n., *K. coclearis* sp. n., *K. papillus* sp. n. and *K. renicornis* sp. n. are described from the Darjeeling Himalayas (India, West Bengal) based on the larvae, pupae and adult males. A new dichotomous key to the adults of the Indian species of *Kiefferulus* is proposed.

KEY WORDS: Chironomidae, *Kiefferulus*, new species, adults, pupae, larvae, West Bengal, India.

Н. Дас¹⁾, А. Мазумдар²⁾. Четыре новых вида комаров-звонцов рода *Kiefferulus* Goetghebuer, 1922 (Diptera: Chironomidae) из Восточных Гималаев в Индии // Дальневосточный энтомолог. 2012. N 253. С. 1-23.

Из Западной Бенгалии в Индии по личинкам, куколкам и имаго самцов описаны четыре новых вида: *Kiefferulus atroxitarsis* sp. n., *K. coclearis* sp. n., *K. papillus* sp. n. и *K. renicornis* sp. n. Дана определительная таблица индийских видов рода *Kiefferulus*.

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INTRODUCTION

In our investigation of Himalayan chironomids (Diptera: Chironomidae), some larvae came to our notice in the flowing brook at Mirik of Darjeeling Himalayas. They were identified as members of the genus *Kiefferulus* Goetghebuer, 1922. The genus was erected by Goetghebuer (1922) to accommodate adults of one Belgian species, *Tanytarsus tendipediformis* which was designated as type of the genus. It is recorded in almost all Zoogeographical realms except Antarctica being dominant in Afrotropics and Orient (Freeman & Cranston, 1980; Wang, 2000; Chaudhuri et al., 2001). The immature of the genus first came to view due to Martin (1964) followed by Beck & Beck (1970), Forsyth (1975), Yamamoto (1979), Chaudhuri & Ghosh (1986), Pinder & Reiss (1986), and Pinder & Reiss (1983). The adults, pupae and larvae are diagnosed after Chaudhuri & Ghosh (1986), Pinder & Reiss (1983, 1986) and Cranston, Dillon, Pinder & Reiss (1989). Prior to this investigation, six species of the genus was known in India (Kieffer, 1911a; Chattopadhyay & Chaudhuri, 1991; Chaudhuri et al., 2001): *K. barbatitarsis* (Kieffer, 1911), *K. calligaster* (Kieffer, 1911), *K. inciderus* Chattopadhyay et Chaudhuri, 1991, *K. lasiochirus* (Kieffer, 1911), *K. psilochirus* (Kieffer, 1911), and *K. rostratus* (Kieffer, 1911).

MATERIAL AND METHODS

The larvae collected from Mirik (26°32' N, 88°07' E, alt. 1495 m) of the Eastern Himalayas of India, were allowed to rear in Petri dishes (8 cm in diameter) with coverage of nylon cages (10×10×15 cm) supported by card board frames. The rearing dishes were kept at room temperature, periodically aerated and water was replaced regularly. Micro-slide mounts of the life stages of each species were prepared following Chaudhuri & Chattopadhyay (1990). Descriptions of species are mostly after terminologies of Sæther (1980) and usages of Chaudhuri et al. (1992) and Hazra et al. (2003) have also been taken into account in some cases.

Measurements are in micro-millimeter (μm) except total length, length and width of wing which are in millimeter (mm) with mean value before and ranges suffixed by "n" signifying number of specimens considered.

Types of new species at present retained with the collection of insects at the Department of Zoology, University of Burdwan, India, will be deposited to the National Zoological Collections (NZC), Calcutta in due course.

DESCRIPTION OF THE NEW SPECIES

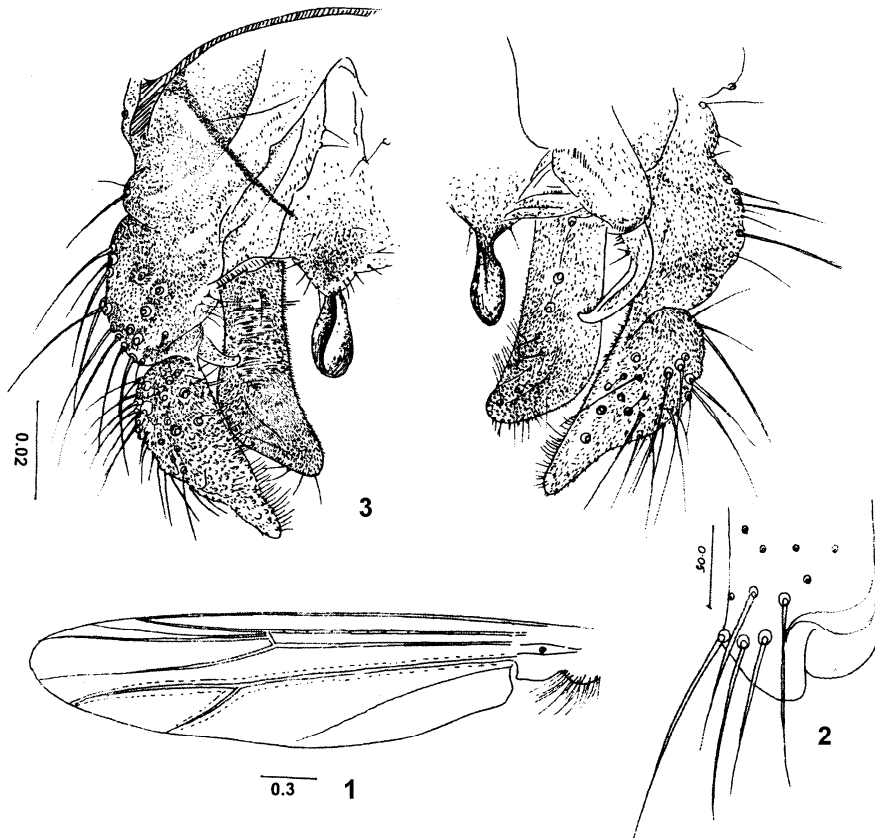
***Kiefferulus atroxitarsis* Das et Mazumdar, sp. n.**

Figs 1–14

MATERIAL. Holotype – ♂ with larval and pupal exuviae [reared] (Type no. B.U. Ent. 245), **India:** West Bengal: Mirik (26°32' N, 88°07' E), 10.XII 2009 (coll. N. Das). Paratypes – 4 ♂ with larval and pupal exuviae [reared], data same as holotype.

DESCRIPTION. MALE (n=5). Total length 5.67 (5.32-5.89), wing length 3.09 (3.07-3.10), wing width 0.84 (0.81-0.86) mm.

Head. Brown in colour. Vertex with 12-14 setae (IV 2, OV 6, Po 6-8). Eyes hemispherical, intensely dark brown without any dorsomedial extension. Corona bare. Frontal tubercles absent. Clypeus with 18-20 setae, clypeal ratio 1.59-1.68. Maxillary palpus yellowish brown and setaceous, palp segment III with sensory pit and 4-5 sensilla capitata; length ratio of palpomeres (μm) I-V: 28-35: 35-42: 84-98: 112-126: 196-210, total length 455-510, L/W 3.72-3.89. Antenna pale brown; length ratio of flagellomeres (μm) I-XI: 56-70: 28-35: 21-28: 28-35: 28-35: 28: 21-28: 21-28: 28: 28-42: 1344-1386, total length 1682-1702, AR 4.32-4.47. CA 0.69-0.71, CP 2.29-2.5.



Figs. 1-3. *Kiefferulus atroxitarsis* sp. n., adult male. 1 – wing; 2 – fore tibial scale; 3 – hypopygium.

Thorax. Yellowish brown. Antepronotum with a shallow emargination; acrostichals 9-10, biserial, dorsocentrals 6-7, uniserial, prealars 7-8, prescutellars 4-6, scutellars 16 in a row, postscutellum brown and bare.

Wing (Fig. 1). Pale yellow with light brown veins. Brachiolium with 1 seta and 3 campaniform sensilla, anterior veins brownish, veins *R* with 10-11 setae, veins *R*₁ and *R*₄₊₅ bare; vein *R*₂₊₃ meets *C* close to vein *R*₁ (137-140), *FCu* far distal to *RM*; *An* ends proximal to *FCu*; squama with 18-20 setae. CR 0.93-0.96, C_rR 0.88-0.92, VR_{cu} 0.92-0.96, VR_c 3.0-3.12.

Legs. Fore tibia with well developed scale (Fig. 2) (52-55 long and 19-22 width) and 3 apical setae (172-176, 181-184 and 191-194 long). Spurs of mid tibia equal, 28-30 long; ratio of length of spur to the apical diameter of mid tibia 5.5-6.5: 16-17, spurs of hind tibia unequal, 21-23 and 28-30 long, ratio of length of spur to the apical diameter of hind tibia 6.5-7.5: 19-20 and 9-10: 20-21; tarsomeres with numerous sensilla chaetica, fore tarsomeres IV-V and mid tarsomere V dark brown; hind tibial comb with 26-28 setae. Pulvilli well developed and hairy, ratio of length of pulvilli and claw 5-6: 10-11, empodium 65-69 long, claw dark and curved.

Length and proportions of leg segments (µm). Fore leg: Fe – 1020-1110, Ti – 960-1020, ta₁ – 1170-1230, ta₂ – 720-840, ta₃ – 720-810, ta₄ – 570-630, ta₅ – 240-330, LR – 1.21-1.26, BV – 1.40-1.43, SV – 2.75-2.79, BR – 1.57-1.62. Mid leg: Fe – 960-1020, Ti – 990-1035, ta₁ – 480-525, ta₂ – 330-420, ta₃ – 270-345, ta₄ – 210-300, ta₅ – 120-150, LR – 0.48-0.51, BV – 2.61-2.73, SV – 5.90-6.1, BR – 7.20-7.41. Hind leg: Fe – 1110-1230, Ti – 1290-1380, ta₁ – 750-825, ta₂ – 510-585, ta₃ – 450-510, ta₄ – 240-270, ta₅ – 180-210, LR – 0.58-0.61, BV – 2.28-2.31, SV – 4.70-4.79, BR – 7.88-7.92.

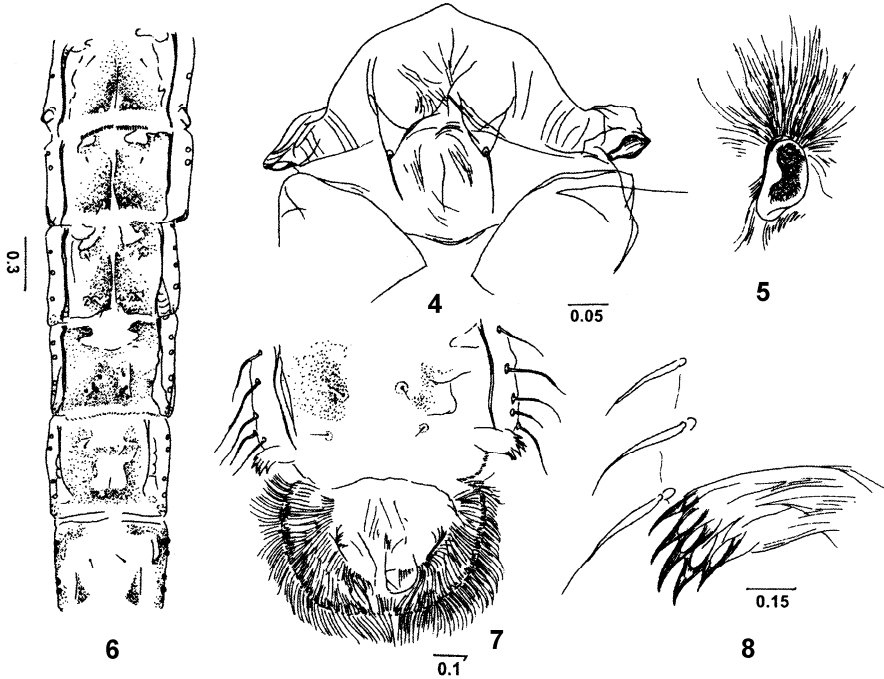
Abdomen. Brown in colour. Tergites with numerous long lateral setae. Hypopygium (Fig. 3). Anal tergite bands strongly developed but separated at mid point. Anal point 105-111 long and 28-31 broad, median parts globular, basal part constricted and swollen apex with setae (8-12) at base. Gonocoxite stout 196-201 long and 119-121 width with 14-15 long dorsal setae; gonostylus 224-227 long and 81-84 width with broad mostly and narrowed down to apex with many setae at its inner margin. Superior volsella slender, sickle like with broad base, distal part little bent inward ending with very small hook and with 3 long setae at base; inferior volsella massive, elongated, 220-224 long and 67-70 width with long dorsomedian setae and short upwardly directed setae at apex. Transverse sternapodeme 109-112 long, lateral sternapodeme 191-196 long and phallapodeme 108-112 long. HR 0.869-0.875, HV 3.01-3.04.

PUPA (n=5). Colour brown, exuviae pale. Total length 6.03 (5.98-6.04) mm.

Cephalothorax (Fig. 4). Brown in colour. Frontal apotome with cone shaped tip; cephalic tubercles funnel like 39-42 long and 70-74 in diameter at base, frontal setae subapical, 48-51 long; ratio of cephalic tubercles and frontal setae 0.82-0.84. Precorneal setae 2, prealar tubercle just behind the wing sheath. Antennal sheath 1125-1140 long, curved, bow shaped with superficial annulations. Thorax with a number of brownish spots, wing sheath 1500-1530 long, thoracic horn (Fig. 5) 96-98 wide, plumose with dumbbell like dark basal ring.

Abdomen (Fig. 6). Tergite I bare, II with shagreen and posterior transverse row of 44-46 hooks, III, IV and V with more or less similar median and lateral bands of shagreen, VII-VIII with faint dorsolateral shagreen. Segment II with a pair of small

caudolateral pedes spurii B (101-103×77-81), IV-VI with a pair of prominent caudolateral pedes spurii A (79-82×61-65) gradually decreasing in size from (V-VI); segments I-IV with 1, 2, 3 and 4 lateral setae respectively, V-VIII, 4, 4, 4 and 5 lateral setae respectively, VIII (Fig. 7) with strong caudolateral spur. Sternite I with short median transverse band of long points forming anterolateral shagreen, II with an anterior and posterior transverse bands of long points and lateral longitudinal bands of smaller points, III with similar bands of long points without posterior band. Anal comb (Fig. 8) with slender stem and tip bearing a single row of 5 pointed teeth. Anal lobe (Fig. 7) 446-448 long fringed with 2-3 rows of numerous filaments. Genital sac in male stout, elongated 329-323 long with blunt projecting apex. G/F in male 0.96-1.10.

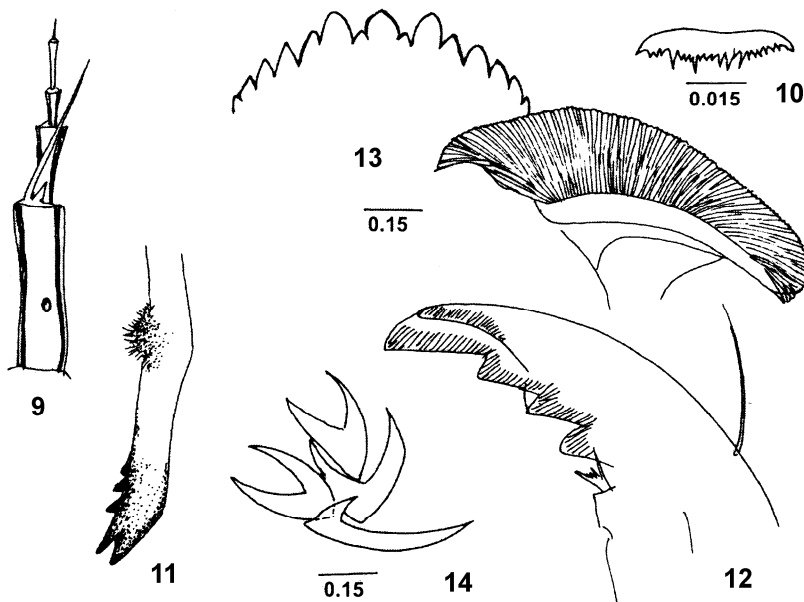


Figs. 4-8. *Kiefferulus atroxitarsis* sp. n., male pupa. 4 – cephalothorax; 5 – thoracic horn; 6 – abdomen; 7 – anal lobe; 8 – anal comb.

LARVA (n=5). Total length 7.40 (6.20-9.47) mm.

Head. Frontal apotome 323-327 with transverse elliptical pit on anterior margin, frontal setae 2 pairs, distance between two setae 183-187, clypeal setae 1 pair. Antenna (Fig. 9) 5 segmented, 155-181 long; length ratio of flagellomeres (μm) I-V: 90.3-94.6: 32.3-34.4: 19.4-21.5: 17.2-21.5: 8.6-12.9, total length 168-184. AR 1.16-1.40, antennal blade 75-78 long nearly equal to length of flagellum, accessory blade 34-36, ring organ (Fig. 9) at 1/3 of basal segment; lauterborn organ short with style, length of lauterborn organ nearly equal to the length of basal antennal segment,

ratio of lauterborn organ with stylus and antennal segments 0.48-0.49. Labrum. S I finely plumose 20-22 long, S II simple and slender 56-60 long, S III and S IV short, S IVA, 15, S IV B with 11 setae. Labral sclerites 1 and 2 separated, labral lamellae simple 60-64 long, pecten epipharyngis (Fig. 10) with 19-20 large and small teeth. Premandible (Fig. 11) 82-86 long with 5 apical teeth and distinct premandibular brush, pecten hypopharyngis dark and paired. Mandible (Fig. 12) 172-176 long and 68-76 wide with 5 teeth, dorsal tooth pale yellow, small 11-15 long, apical 17-21 long and three others dark, seta subdentalis 20-22 long, spatula like with coarse margin, pecten mandibularis 12-14 filiform; seta interna plumose, sensilla minusculum 2. Maxilla with well developed galea lamella, lacinial chaetae 2, anterior chaetae 2, sensilla basiconica 2 and pecten galearis distinct; maxillary palp 3 segmented with a ring organ 3-4 in diameter at its base, apical sensilla 2, seta maxillaris closer. Prementohypopharyngeal complex rugose with a median lamella, 3 broad paramedian lamellae and 4 sensilla each with a basal ring and a U bar, and 2 rows of chaetulae on outer corner of prementum. Mentum (Fig. 13) with one median trifold (20-22×17-19) and 6 closely appressed lateral teeth, ventromental plate 90-94 wide, serrated, distance between two ventromental plates 56-60.



Figs. 9-14. *Kiefferulus atroxitarsis* sp. n., male larva. 9 – antenna; 10 – pecten epipharyngis; 11 – premandible; 12 – mandible; 13 – mentum; 14 – claw.

Body. Anterior and posterior parapods pale tubular, with terminal claws (Fig. 14). Procercus with 6-8 anal setae. Anal tubules 1 pair 170-176 long, ventral tubule 1 pair 289-293 long.

ETYMOLOGY. The name, '*atroxatarsis*' originates from Latinized version of dark brown tarsomere.

DISCUSSION. The species resembles *K. calligaster* (Kieffer, 1911) in superior and inferior volsella (Kieffer, 1911a) and *K. dux* (Johannsen, 1905) in possession of basal constriction in anal point (Johannsen, 1905). But the following combination of characters separates it from other species and favours its consideration as a new member of *Kiefferulus* from India: Adult male. Dark brown hemispherical eyes without any dorsomedian extension, palp segment III with sensory pit bearing 4-5 sensilla capitata, scutellars 16 in a row; brachiolum with 1 seta and 3 campaniform sensilla, *FCu* far distal to *RM*, *An* ends proximal to *FCu*, squama with 18-20 setae; tarsomeres with numerous sensilla chaetica, fore tarsomeres IV-V and mid tarsomere V dark brown; separate anal tergite band, anal point having constricted base with swollen apex bearing 8-12 setae; superior volsella sickle like ending in a small hook, inferior volsella elongated, with long dorsomedian setae and short upwardly directed setae at apex. Pupa. Brown with pale exuviae; frontal apotome cone shaped, cephalic tubercles funnel like, frontal setae subapical; antennal sheath curved, bow shaped with superficial annulations; thorax with a number of brownish spots, thoracic horn wide plumose with dumbbell like basal ring, thorax with a number of brownish spots, a pair of small pedes spurii B on segment II and a pair of prominent pedes spurii A on segments IV-VI; sternite I with short median transverse anterolateral shagreen, II with an anterior and posterior transverse long and lateral longitudinal bands, III with similar bands of long points without posterior band, anal comb with slender stem and tip bearing a row of 5 teeth, anal lobe fringed with 2-3 rows of numerous filaments. Larva. Frontal apotome with transverse elliptical pit on anterior margin, frontal setae 2 pairs, antennal blade nearly equal to length of flagellum, ring organ at 1/3 of basal segment; lauterborn organ short with style, pecten epipharyngis with 19-20 large and small teeth, premandible with 5 apical teeth and distinct premandibular brush, pecten hypopharyngis dark and paired, mandible with 5 teeth, dorsal tooth pale yellow, seta subdentalis spatula like with coarse margin, pecten mandibularis filiform, maxilla with well developed galear lamella, distinct pecten galearis, prementohypopharyngeal complex rugose with a median lamella, 3 broad paramedian lamellae and 4 sensilla each with a basal ring and a U bar and 2 rows of chaetulae on outer corner of prementum, mentum with one median trifold and 6 closely appressed lateral teeth, ventromental plate serrated.

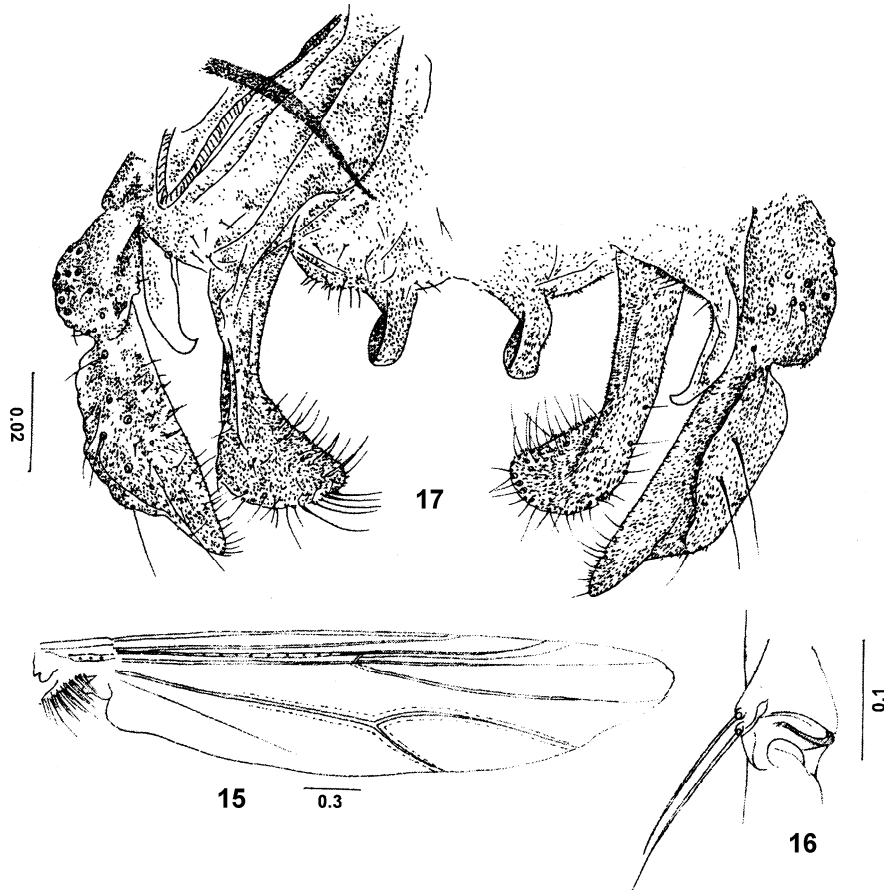
***Kiefferulus coclearis* Das et Mazumdar, sp. n.**

Figs 15-28

MATERIAL. Holotype – ♂ with larval and pupal exuviae [reared] (Type no. B.U. Ent. 246), **India**: West Bengal: Mirik, 10.XII 2009 (coll. N. Das). Paratypes – 2 ♂ with larval and pupal exuviae [reared], data same as holotype.

DESCRIPTION. MALE (n=3). Total length 6.30 (6.20-6.50), wing length 3.36 (3.32-3.42), wing width 0.9 (0.7-1.0) mm.

Head. Vertex with 12-14 setae (IV 2, OV 5-6, Po 5-6). Frontal tubercles absent. Eyes spherical without dorsomedian extension. Corona bare. Clypeus with 9-11 setae, clypeal ratio 1.69-1.72. Maxillary palpus yellowish, palp segment III with sensory pit and 5-6 sensilla capitata, length ratio of palpomeres (μm) I-V: 21-28: 35-42: 112-126: 140-154: 154-168, total length 476-490, L/W 4.11-4.14. Antenna brown, length ratio of flagellomeres (μm) I-XI: 70-84: 28: 28: 21-28: 21-28: 28-35: 28-35: 21-28: 28-35: 21-28: 1232-1386, total length 1638-1708, AR 4.75-4.86. CA 0.5-0.508, CP 1.82-1.87.



Figs. 15-17. *Kiefferulus coclearis* sp. n., adult male. 15 – wing; 16 – fore tibial scale; 17 – hypopygium.

Thorax. Yellowish brown. Antepronotum with a small V shaped emargination; Acrostichals 8-9, biserial, dorsocentrals 11-12, uniserial, prealars 6, prescutellars 3-5 scattered, scutellars 10-11 in a row, postscutellum brown and bare.

Wing (Fig. 15). Pale yellow with conspicuous pale brown veins. Brachiolium with 3 setae and 3 campaniform sensilla, veins *R* with 14 setae, veins *R*₁ and *R*₄₊₅ bare, vein *R*₂₊₃ meets *C* very close (84-88) to vein *R*₁, *FCu* distal to *RM*, *An* ends well before *FCu*; squama with 23-24 setae. CR 0.94-0.96, C_rR 0.99-1.0, VR_{cu} 0.98-99, VR_c 4.80-4.83.

Leg. Fore tibia with scale (Fig. 16) (39-42 long and 17-19 width); with 2 subequal setae 56-61 and 63-68 long. Spurs of mid tibia equal, 14-18 long, ratio of length of spur to the apical diameter of mid tibia 7.5-8.5: 24.5-25.5, spurs of hind tibia unequal 21-24 and 32-35 long, ratio of length of spur to the apical diameter of hind tibia 4-5: 19-20 and 8-9: 19-20; tarsomeres with many sensilla chaetica, fore tarsomere slightly dark in colour; hind tibial comb with 22-26 setae. Pulvilli large, setaceous, ratio of length of pulvilli and claw 5-6: 7-8, empodium short (42-47), claw curved and dark brown in colour.

Length and proportions of leg segments (µm). Fore leg: Fe – 930-990, Ti – 1020-1080, ta₁ – 1140-1170, ta₂ – 720-780, ta₃ – 690-780, ta₄ – 570-630, ta₅ – 270-315, LR – 1.11-1.17, BV – 1.37-1.41, SV – 2.71-2.76, BR – 1.75-1.79. Mid leg: Fe – 1020-1080, Ti – 1080-1125, ta₁ – 510-540, ta₂ – 360-420, ta₃ – 300-330, ta₄ – 240-270, ta₅ – 150-195, LR – 0.47-0.50, BV – 2.48-2.50, SV – 5.83-5.87, BR – 4.29-4.31. Hind leg: Fe – 1260-1290, Ti – 1200-1230, ta₁ – 720-765, ta₂ – 480-510, ta₃ – 450-495, ta₄ – 240-285, ta₅ – 150-195, LR – 0.60-0.64, BV – 2.40-2.44, SV – 5.13-5.17, BR – 5.71-5.79.

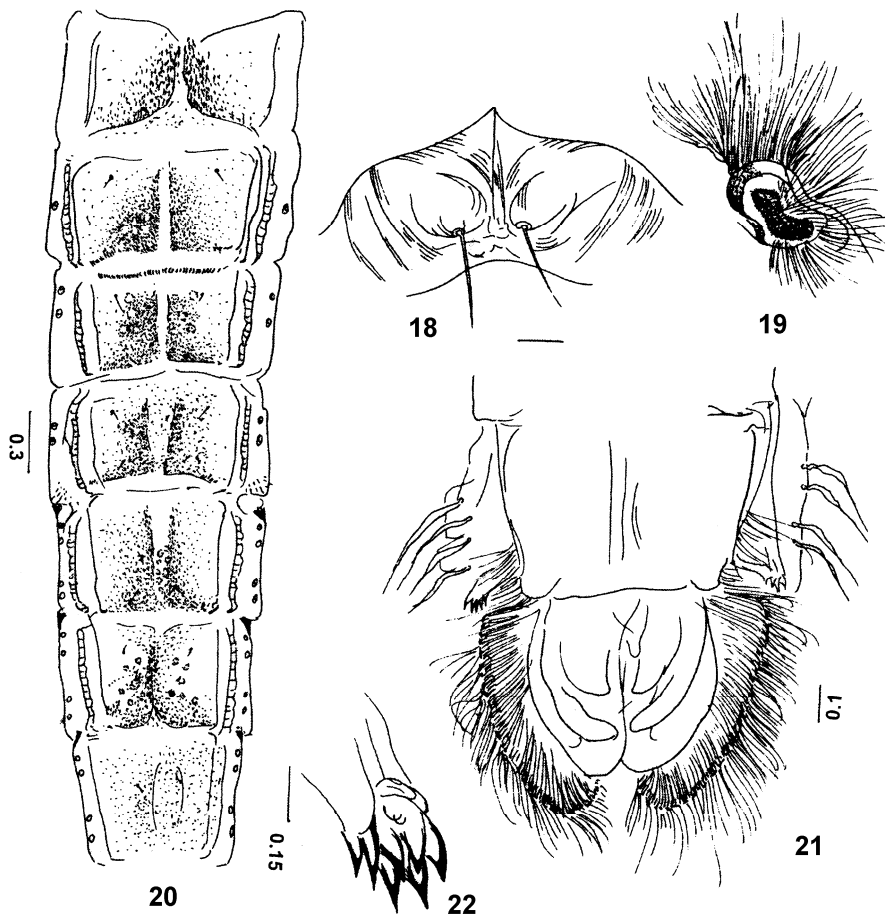
Abdomen. Dark yellow in colour with lateral setae. Hypopygium (Fig. 17). Anal tergite band highly developed and separate just above the basal region of anal point. Anal point short with 10-12 setae at base. Gonocoxite short, thick 150-157 long and 60-63 width with 11-12 setae; gonostylus thick 236-240 long and 87-90 width, apex tapered with numerous setae at its inner margin. Superior volsella sickle shaped, bent inward, beak like ending in a small hook bearing 3 setae at base; inferior volsella massive 238-241 long, spatula like with dorsal setae and 24 inwardly curved setae. Transverse sternapodeme 196-199 long, lateral sternapodeme 193-196 long and phallapodeme 109-112 long. HR 0.61-0.625, HV 3.1-3.2.

PUPA (n=3). Colour yellowish brown, exuviae pale. Total length 7.54 (7.20-7.77) mm.

Cephalothorax (Fig. 18). Brown in colour. Frontal apotome with triangular apex, cephalic tubercles 147-150 long and 61-63 in diameter at base frontal setae subapical 319-322 long; ratio of cephalic tubercles and frontal setae 0.46-0.48. Pre-corneal setae 2 arranged side by side, prealar tubercle just behind the wing sheath. Antennal sheath stout, 1500-1540 long with feeble annulations. Thorax with numerous light brown patches, wing sheath 1740-2010 long, thoracic horn (Fig. 19) 60-63 wide as 3 plumose bunches of fine filaments with dark concave base of 60-64 wide.

Abdomen (Fig. 20). Tergite I bare, II with brown shagreen and posterior transverse row of 48-60 hooks, III-V with posterior broad transverse bands of setae, III-VI with similar median and lateral bands of shagreen, VII-VIII with faint dorso-lateral shagreen. Sternite I with short median transverse band, II with an anterior and posterior transverse band of long points and lateral longitudinal bands of smaller

points, III with similar bands of long points without posterior band. Segment II with a pair of small digitiform pedes spurii B (90-92×70-73), IV with a pair of bulge like pedes spurii A (71-73×65-67); segments I-IV with 1, 2, 2 and 4 lateral setae respectively, V-VIII with 4, 4, 4 and 5 lateral setae respectively, VIII (Fig. 21) with strong caudolateral dark projecting spur. Anal comb (Fig. 22) with a stem and tip bearing 7 setae in two rows. Anal lobe (Fig. 21) 510-530 long fringed with 2 rows of numerous filaments. Genital sac tubular 488-496 long with blunt apex. G/F in male 0.94-0.98.

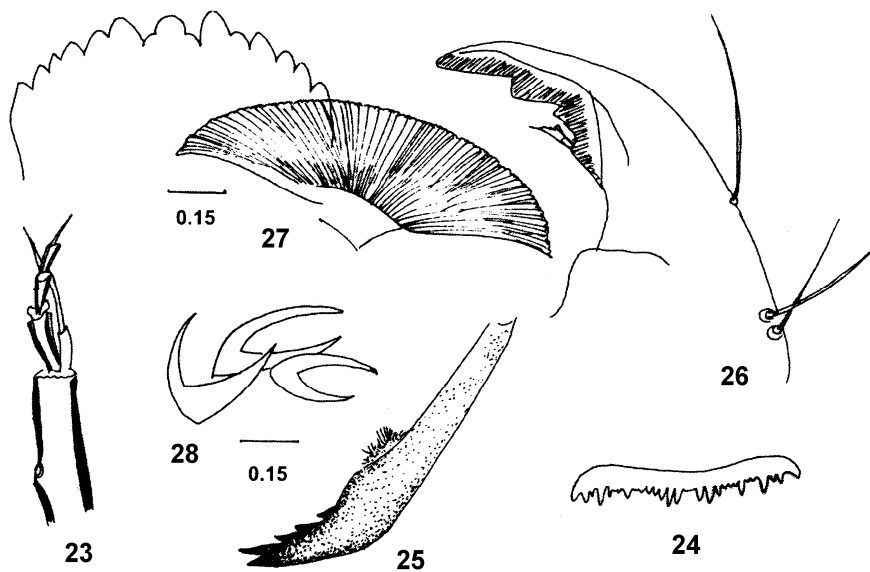


Figs. 18-22. *Kiefferulus coclearis* sp. n., male pupa. 18 – cephalothorax; 19 – thoracic horn; 20 – abdomen; 21 – anal lobe; 22 – anal comb.

LARVA (n=3). Total length 5.28 (5.08-6.76) mm.

Head. Frontal apotome with transverse elliptical pit on anterior margin, frontal apotome 335-340, frontal setae 2 pairs, distance between two setae 136-142, clypeal

setae 1 pair. Antenna (Fig. 23) 5 segmented, 133-159, basal segment longer than flagellum; length ratio of flagellomeres (μm) I-V: 81.7-86: 21.5-25.8: 15.05-17.2: 10.75-12.9: 6.45-8.6, total length 138-147. AR 1.25-1.27; antennal blade 60-63 nearly equal to length of flagellum but not extending, accessory blade 25-26 long, little shorter than 2nd flagellomere, ring organ (Fig. 23) 1/3 of basal segment; lauterborn organ short with style, length nearly equal to that of basal antennal segment, ratio of lauterborn organ with stylus and antennal segments 0.41; Labrum. S I finely plumose 26-28 long, S II simple and slender 37-39, S III and S IV short, S IV A 15, S IV B 9 setae, labral sclerites 1 and 2 separated, labral lamellae simple 68-71 long, pecten epipharyngis (Fig. 24) with 24 small and large teeth appearing as bunches. Premandible (Fig. 25) 79-82 long with 5 teeth well developed brush; pecten hypopharyngis dark and paired. Maxilla with well developed galear lamella, lacinial chaetae 2, anterior chaetae 2, sensilla basiconica 2 and pecten galearis distinct;



Figs. 23-28. *Kiefferulus coclearis* sp. n., male larva. 23 – antenna; 24 – pecten epipharyngis; 25 – premandible; 26 – mandible; 27 – mentum; 28 – claw.

maxillary palp 3 segmented with ring organ 3-4 in diameter, apical sensilla 2, seta maxillaris closer. Mandible (Fig. 26) 169-172 long and 75-77 wide with 4 teeth, dorsal tooth pale yellow, apical tooth 15-17 long, seta subdentalis 27-30 long pen tip like with coarse margin, pecten mandibularis filiform, seta interna plumose, sensilla minusculum 2 simple, ring organ near base. Premento-hypopharyngeal complex rugose with median lamella, 2 broad paramedian lamellae and 5 sensilla each with a basal ring and a U bar, and 2-3 rows of chaetulae on outer corner of prementum. Mentum (Fig. 27) with 1 median not so distinctly trifid 29-30 \times 15-17 and

6 closely appressed lateral more or less equal teeth; ventromental plate 55-60 wide, serrated, distance between two ventromental plates 135-138. Body. Anterior and posterior parapod yellowish, tubular terminated with claws (Fig. 28). Procercus short, stout and with 6-8 anal setae. Anal tubule 1 pair 150-153 long; ventral tubule slender 1 pair 306-311 long.

ETYMOLOGY. The name '*coclearis*' derives from the spatula like inferior volsella.

DISCUSSION. The species shows affinity with *Kiefferulus inciderus* Chattopadhyay et Chaudhuri, 1991 and *K. martini* Freeman, 1961 in superior volsella (Chattopadhyay & Chaudhuri, 1991; Freeman, 1961) and with *K. intertinctus* (Skuse, 1889) in anal point (Skuse, 1889). But the following combination of characters segregates it from other species favouring establishment of a new species of *Kiefferulus* from India: Adult male. Frontal tubercles absent, spherical eyes without dorsomedian extension; wing with conspicuous light brown veins, brachiolum with 3 setae, squama fringed with 23-24 setae; legs with 5-6 apical setae on fore tibial scale, fore tarsomere slightly dark; separate anal tergite band. Anal point with 10-12 basal setae; superior volsella inwardly curved with narrow ending, massive inferior volsella with spatula like apex. Pupa. Cephalothorax with frontal apotome bearing triangular apex, sub apical frontal setae, thoracic horn with 3 plumose bunches of fine filaments and thorax dark and numerous light brown patches; tergite II with brown shagreen and posterior transverse row of 48-60 hooks, segment VIII with strong caudolateral macroseta, anal lobe long and genital sac with elongated with blunt apex. Larva. Antennal blade nearly equal to length of flagellum without any extension, long accessory blade, little shorter than 2nd flagellomere, ring organ at 1/3 of basal segment, short lauterborn organ with style. Distinct pecten galearis; mandible with 4 teeth, seta subdentalis with long pen tip and coarse margin, filiform pecten mandibularis.

***Kiefferulus papillus* Das et Mazumdar, sp. n.**

Figs 29-42

MATERIAL. Holotype – ♂ with larval and pupal exuviae [reared] (Type no. B.U. Ent. 247), **India**: West Bengal: Mirik, 10.XI 2009 (coll. N. Das). Paratypes – 4 ♂ with larval and pupal exuviae [reared], data same as holotype.

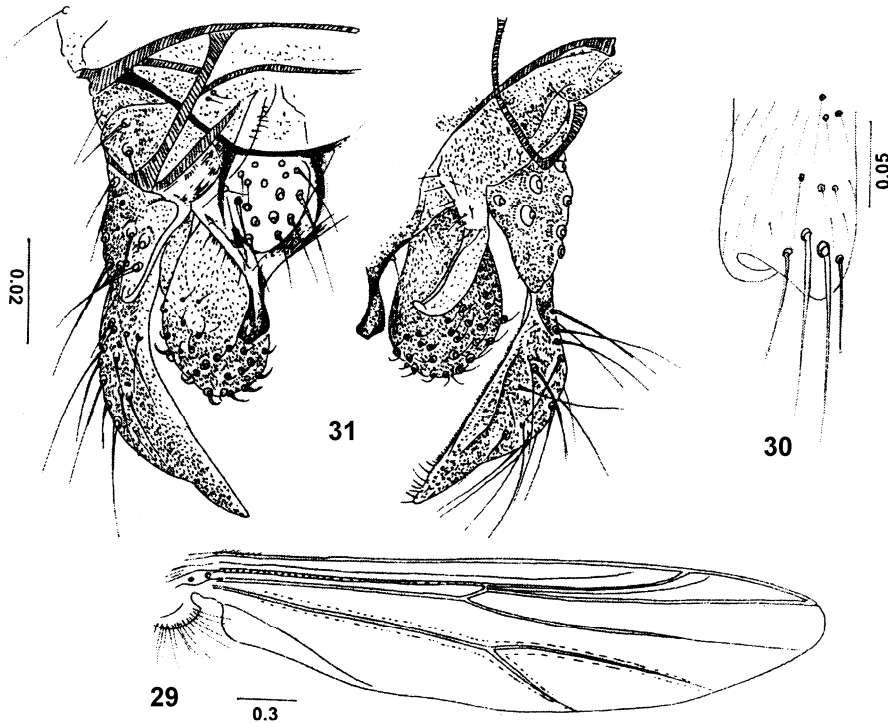
DESCRIPTION. MALE (n=5). Total length 5.64 (5.31-5.82), wing length 3.33 (3.15-3.45), wing width 0.87 (0.84-0.9) mm.

Head. Brown in colour. Vertex with 15-16 setae (IV 3, OV 7-8, Po 5). Eyes hemispherical with a little dorsomedian extension (34-38). Corona bare. Frontal tubercles absent. Clypeus with 13-15 setae, clypeal ratio 1.59-1.65. Maxillary palpus yellowish brown with setae, palp segment III without sensory pit and sensilla capitata, IV with few dark brown bands; length ratio of palpomeres (µm) I-V: 28-42: 56-63: 210-224: 161-168: 112-126, total length 572-607, L/W 4.11-4.17. Antenna brown to dark brown; length ratio of flagellomeres (µm) I-XI: 56-70: 63-70: 28-35: 21-35: 21-28: 21-28: 28-35: 21-35: 28-35: 21-28: 1064-1106, total length 1378-1480, AR 3.68-3.74. CA 0.51-0.55, CP 1.38-1.43.

Thorax. Anteprenotum with V shaped emargination; acrostichals 9-10, biserial, dorsocentrals 12-14, uniserial, prealars 7, prescutellars 3-5 scattered, scutellars 12 in a row, postscutellum brown and bare.

Wing (Fig. 29). Hyaline. Brachiolum with 2 setae and 2 campaniform sensilla, anterior veins brownish, veins R , 34, R_1 , 30 and R_{4+5} with 15 setae respectively, distance between meeting points of veins R_1 and R_{2+3} at C 97-100, FCu distal to RM , An ends before FCu ; squama with 15-16 setae. CR 0.98-0.99, C_rR 0.91-0.94, VR_{cu} 0.96-0.98, VR_c 3.11-3.16.

Legs. Fore tibia with well developed oblong scale (Fig. 30) (46-49 long and 20-23 width) and 4 apical setae (90-92, 97-100, 156-159 and 180-183 long). Spurs of mid tibia equal, 46-49 long; ratio of length of spur to the apical diameter of mid tibia 7-8: 16.5-17.5, spurs of hind tibia unequal, 26-28 and 32-35 long, ratio of length of spurs to the apical diameter of hind tibia 6-7: 19-20 and 7.5-8.5: 18.5-19.5; tarsomeres with many sensilla chaetica, tarsomeres IV-V dark brown; hind tibial comb with 21-23 setae; Pulvilli (47-41) well developed, hairy, oval in shape, the ratio of length of pulvilli and claw 7: 9, empodium moderate 30-32 long, claw dark and curved.

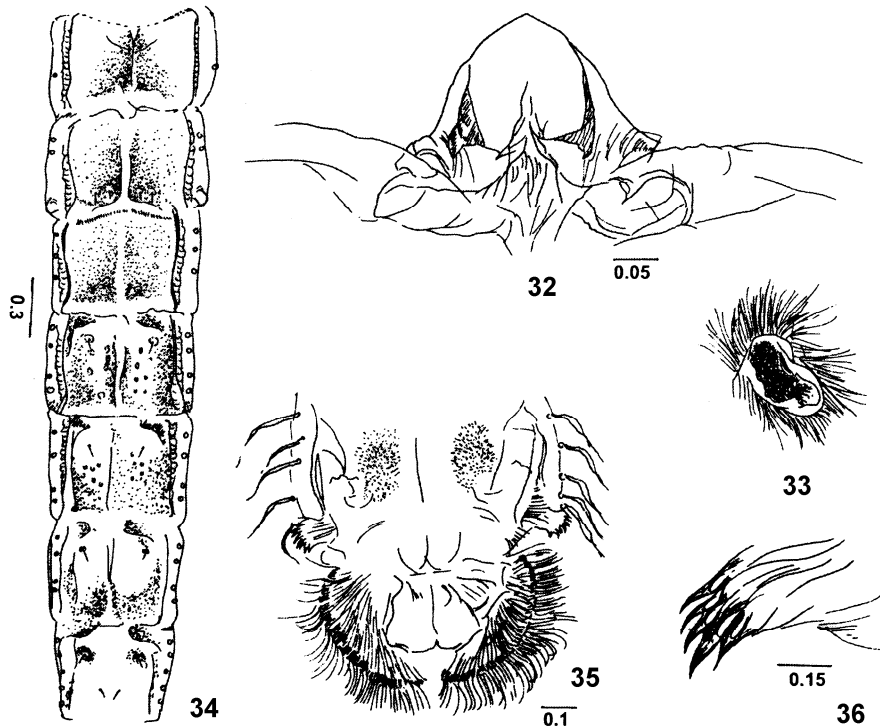


Figs. 29-31. *Kiefferulus papillus* sp. n., adult male. 29 – wing; 30 – fore tibial scale; 31 – hypopygium.

Length and proportions of leg segments (μm). Fore leg: Fe – 1410-1530, Ti – 1050-1095, ta₁ – 1950-2040, ta₂ – 1050-1125, ta₃ – 810-870, ta₄ – 780-825, ta₅ – 300-375, LR – 1.91-1.97, BV – 1.49-1.53, SV – 2.32-2.37, BR – 1.27-1.31. Mid leg: Fe – 1350-1380, Ti – 1200-1260, ta₁ – 720-765, ta₂ – 330-360, ta₃ – 240-285, ta₄ – 180-210, ta₅ – 90-105, LR – 0.60-0.63, BV – 3.89-3.91, SV – 7.73-7.77, BR – 5.82-5.86. Hind leg: Fe – 1410-1470, Ti – 1560-1605, ta₁ – 990-1035, ta₂ – 510-570, ta₃ – 360-390, ta₄ – 240-255, ta₅ – 120-135, LR – 0.62-0.64, BV – 3.20-3.23, SV – 5.83-5.86, BR – 7.88-7.91.

Abdomen. Pale yellow with profuse setae. Tergites with numerous long lateral setae. Hypopygium (Fig. 31). Anal tergite band strongly fused (H type) without setae. Anal point dark and well developed with apex more or less triangular bearing 16-18 median long setae. Gonocoxite short, stout with 9-10 long setae; gonostylus slender with 7-8 strong setae at its inner margin and numerous long dorsal setae and a short apical seta. Superior volsella sickle like, very little inwardly curved distad ending with nipple like apex and with 4 setae at base; inferior volsella highly globose with numerous setae. Transverse sternapodeme 77-80 long, lateral sternapodeme 103-106 long and phallapodeme 62-64 long. HR 0.47-0.49, HV 3.35-3.38.

PUPA (n=5). Total length 7.23 (6.60-7.68) mm.

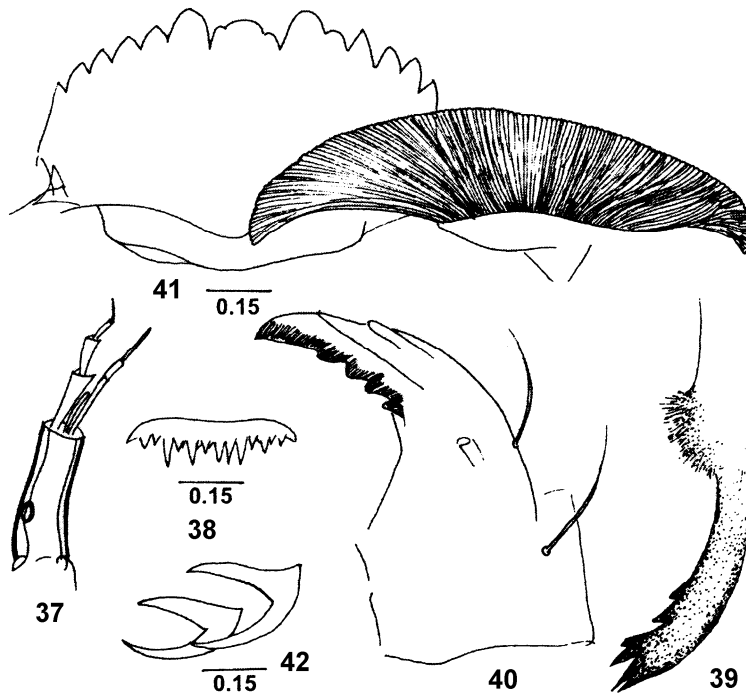


Figs. 32-36. *Kiefferulus papillus* sp. n., male pupa. 32 – cephalothorax; 33 – thoracic horn; 34 – abdomen; 35 – anal lobe; 36 – anal comb.

Cephalothorax (Fig. 32). Dark brown. Frontal plate 45-48 long and 67-70 in diameter at base with one pair of tubercles, frontal apotome well developed, cone shaped, frontal setae apical, 29-35 long, ratio of cephalic tubercles and frontal setae 1.37-1.41, precorneal setae 2, prealar tubercle just behind the wing sheath. Antennal sheath stout, 1.05-1.08 long with superficial annulations. Thorax rugose, wing sheath 1.74-2.01 long, thoracic horn (Fig. 33) 74-77 wide with a bunch of fine filaments and dark basal ring. Wing sheath 1.74-2.01 long.

Abdomen (Fig. 34). Tergite I bare, II with brown shagreen and posterior transverse row of 46-50 hooks, III, IV and V with similar median and lateral bands of shagreen, VII-VIII with faint dorsolateral shagreen. Sternite I with short median transverse band of long points forming anterolateral shagreen, II with an anterior and posterior transverse band of long points and lateral longitudinal bands of smaller points, III with similar bands of long points without posterior band. Segment II with a pair of posterolateral pedes spurii B (103-107×82-90), IV with a pair of posterolateral pedes spurii A (84-86×77-78); segments I-IV with 1, 2, 3, and 4 lateral setae respectively, V-VIII with 4, 4, 4 and 5 lateral setae respectively, VIII (Fig. 35) with a pair of projecting anal comb. Anal comb (Fig. 36) with stem and a row of 5 sharp pointed teeth. Anal lobe (Fig. 35) 398-412 long fringed with numerous filaments. Genital sac triangular with blunt apex 252-336 long. G/F in male 0.77-0.84.

LARVA (n=5). Total length 6.28 (5.88-6.68) mm.



Figs. 37-42. *Kiefferulus papillus* sp. n., male larva. 37 – antenna; 38 – pecten epipharyngis; 39 – premandible; 40 – mandible; 41 – mentum; 42 – claw.

Head. Frontal apotome 391 with transverse elliptical pit on anterior margin, frontal setae 2 pairs, distance between two setae 95-104, clypeal setae 1 pair. Antenna (Fig. 37) 5 segmented, 121-129 long, basal segment longer than flagellum; length ratio of flagellomeres (μm) (I-V): 68.8-77.4: 25.8-30.1: 17.2-21.5: 8.6-10.75: 4.3-6.45, total length 127-141; AR 1.12-1.15, antennal blade 56-60 nearly equal to length of flagellum but not extending flagellum, accessory blade 26-28 little shorter than 2nd flagellomere, length of blade and accessory blade 55-58 and 24-28 respectively; ring organ (Fig. 37) prominent 1/3 of basal segment; lauterborn organ short with style, length of lauterborn organ nearly equal to the length of basal antennal segment, ratio of lauterborn organ with stylus and antennal segments 0.53-0.55. Labrum. S I finely plumose 24-28, S II simple and slender 47-52, S III and S IV short, S IV A 15, S IV B with 9 setae, labral sclerites 1 and 2 separated, labral lamellae simple 57-62 long, pecten epipharyngis (Fig. 38) with 13 large and small teeth. Premandible (Fig. 39) 71-77 long with 6 teeth and well distinct brush, pecten hypopharyngis dark and paired. Mandible (Fig. 40) 198-203 long and 91-95 wide with 5 teeth, dorsal tooth pale yellow, small and 11-14 long, apical 16-19 long and three others dark, seta subdentalis 22-25 long spatula like with coarse margin, pecten mandibularis 12-14 filiform, seta interna plumose, sensilla minusculum 2, ring organ near the base. Prementohypopharyngeal complex with rugose median lamella, 1 broad paramedian lamella and 3 sensilla each with a basal ring and a U bar, and 3 rows of chaetulae on outer corner of prementum. Mentum (Fig. 41) with one median trifid (26-29 \times 17-19) and 6 closely appressed lateral teeth, ventromental plate 90-95 wide, serrated, distance between two ventromental plates 73-75.

Body. Anterior and posterior parapods yellow, tubular with apex bearing claws (Fig. 42). Procercus with 6-8 anal setae. Anal tubules 2 pairs and 136 long, ventral tubule 1 pair 306-322 long.

ETYMOLOGY. The name, '*papillus*' derives from the nipple like tip of superior volsella.

DISCUSSION. This species shows similarity with *Kiefferulus calligaster* Yamamoto, 1979 and *K. umbraticola* (Yamamoto, 1979) in possession of 2 setae in brachiolum (Yamamoto, 1979). It approximates *K. inciderus* in having 4 setae on fore tibial scale (Chattopadhyay & Chaudhuri, 1991) and also appears resemblances with *K. chloronotus* (Kieffer, 1911) in inferior volsella (Kieffer, 1911b). But the following combination of characters justifies it to consider as a new member of *Kiefferulus*: Adult Male. Eyes hemispherical with a short dorsomedian extension, palp segment III without sensory pit and sensilla capitata; scutellars 12 in a row; hyaline wing with brachiolum bearing 2 setae and 2 campaniform sensilla, *FCu* distal to *RM*, *An* ends before *FCu*, squama with 15-16 setae; hypopygium with strongly fused (H type) and bare anal tergite; dark anal point dark with more or less triangular apex bearing 16-18 median long setae; sickle shaped superior volsella with beak like apex; inferior volsella globose with numerous setae. Pupa. Cephalothorax with frontal plate bearing 1 pair of tubercles, frontal apotome cone shaped, prealar tubercle just behind wing sheath; antennal sheath stout with superficial annulations; thoracic horn intensely plumose with a bunch of fine filaments; tergite

II with shagreen and posterior transverse row of 46-50 hooks, III, IV and V with similar median and lateral bands of shagreen, sternite I with short median transverse band of long points; anal comb with stem and a row of 5 sharp pointed teeth, anal lobe fringed with numerous filaments. Larva. Antenna with accessory blade little shorter than 2nd flagellomere, prominent ring organ at the basal segment, short lauterborn organ with style, pecten epipharyngis with 13 large and small teeth, premandible with 6 teeth and well distinct brush, mandible with 5 teeth, dorsal tooth pale yellow with ring organ near the base.

***Kiefferulus renicornis* Das et Mazumdar, sp. n.**

Figs 43–56

MATERIAL. Holotype – ♂ with larval and pupal exuviae [reared] (Type no. B.U. Ent. 248), **India**: West Bengal: Mirik, 10.XII 2009 (coll. N. Das). Paratypes – 3 ♂ with larval and pupal exuviae [reared], data same as holotype.

DESCRIPTION. MALE (n=4). Total length 6.36 (6.24-6.58). Wing length 3.42 (3.41-3.42), wing width 0.95 (0.9-1.0) mm.

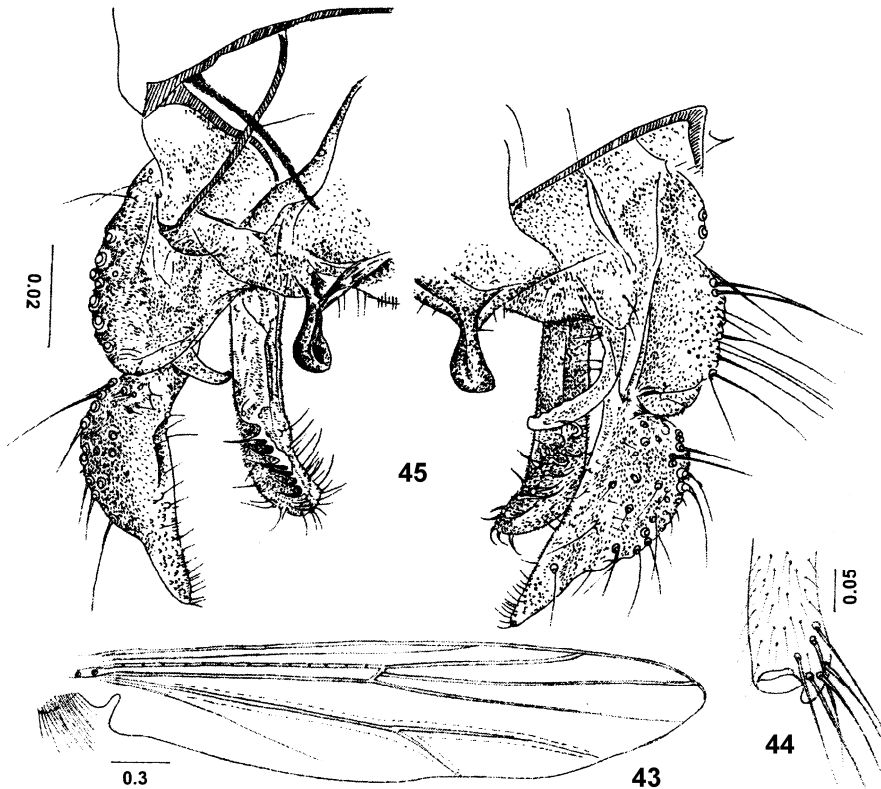
Head. Pale brown in colour. Vertex with 14-16 setae (IV 2, OV 6-7, Po 6-7). Eyes hemispherical with a dorsomedian extension of 61–68. Corona bare. Frontal tubercles absent. Clypeus with 18-20 setae, clypeal ratio 1.48-1.56. Maxillary palpus yellowish brown, palp segments with few setae, palp segment III without sensory pit and sensilla capitata, palp segment IV with yellowish brown bands, length ratio of palpomeres (μm) I-V: 35-42: 35-42: 56-70: 140-156: 196-203, total length 472-507, L/W 3.33-3.46. Antenna brown, length ratio of flagellomeres (μm) I-XI: 42-56: 28-42: 28: 21-28: 21-28: 21-28: 21-28: 28: 21-28: 21-28: 1246-1274, total length 1532-1572, AR 4.21-4.39, CA 0.51-0.54, CP 189-1.94.

Thorax Antepnotum well developed collar like with a small V-shaped emargination; acrostichals 14-16, biserial, dorsocentrals 12-14, uniserial, prealars 6, prescutellars scattered, 4-6, scutellars 12-14 setae in two rows, postscutellum brown and bare.

Wing (Fig. 43): Membrane hyaline. Brachiolium with 2 setae and 3 campaniform sensilla, anterior veins brownish, veins R , 14-15, R_1 , 1 seta and R_{4+5} bare, vein R_{2+5} meets C closer to vein R_1 (252-256), FCu distal to RM , An ends before FCu ; squama with 21-24 setae. CR 0.95-0.964, C_rR 0.93-0.97, VR_{cu} 0.99-1.02, VR_c 1.29-1.33.

Legs. Pale yellow. Fore tibial scale (Fig. 44) elongated (60-64 long and 35-39 width) with 3 long apical setae (1328-1333, 1505-1509 and 1542-1548 long). Spurs of mid tibia equal, 28-30 long, ratio of length of spur to apical diameter of mid tibia 5-6: 12-13; spurs of hind tibia unequal (19-22 and 28-30 long), ratio of length of spurs to apical diameter of hind tibia 5-6: 18-19 and 7-8: 18-19; hind tibial comb with 23-25 short setae; tarsomeres with numerous sensilla chaetica, tarsomeres IV dark brown. Pulvilli well developed and with microtrichia, ratio of length of pulvilli and claw 4-4.5: 10-11, empodium short (43-47), claw dark at apex and curved.

Length and proportions of leg segments (μm). Fore leg: Fe – 1050-1110, Ti – 1020-1080, ta₁– 1200-1230, ta₂– 720-750, ta₃– 750-795, ta₄– 570-600, ta₅– 300-345, LR – 1.17-1.20, BV – 1.36-1.41, SV – 2.76-2.79, BR – 1.47-1.51. Mid leg: Fe – 1080-1125, Ti – 1140-1170, ta₁– 540-585, ta₂– 360-390, ta₃– 300-330, ta₄– 240-270, ta₅– 150-180, LR – 0.47-0.49, BV – 2.62-2.64, SV – 6.17-6.21, BR – 7.78-7.81. Hind leg: Fe – 1260-1290, Ti – 1500-1560, ta₁– 900-945, ta₂– 510-555, ta₃– 480-510, ta₄– 270-300, ta₅– 180-210, LR – 0.60-0.63, BV – 2.54-2.59, SV – 5.41-5.45, BR – 4.13-4.17.

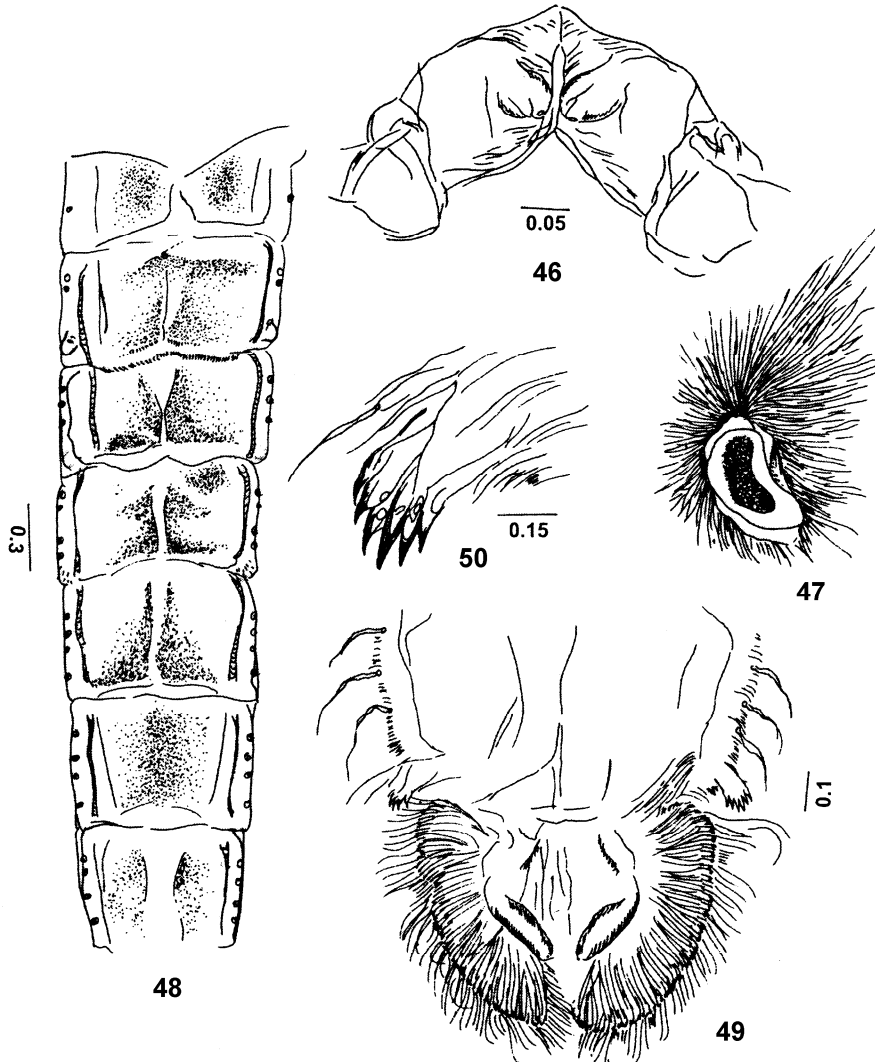


Figs. 43-45. *Kiefferulus renicornis* sp. n., adult male. 43 – wing; 44 – fore tibial scale; 45 – hypopygium.

Abdomen. Brown in colour. Tergites with numerous long lateral setae. Hypopygium (Fig. 45). Anal tergite band, simple and separate without setae. Anal point 70-73 long and 27-31 broad dark brown constricted at base with setae, tip globular. Gonocoxite stout 168-172 long and 112-116 width with numerous dorsal and lateral long setae; gonostylus 220-224 long and 84-88 broad at base, apex abruptly narrowed down with 13-14 setae at its inner apical margin. Superior volsella long, sickle shaped inwardly curved ending in a small hook and with 2 setae at base; inferior volsella

thick, long reaching nearer the apex of gonostylus with apical and subapical dense setae. Transverse sternapodeme 136-140 long, lateral sternapodeme 206-210 long and phallapodeme 164-168 long. HR 0.5-0.54, HV 3.05-3.1.

PUPA (n=4). Exuvia yellowish brown. Total length 8.1 (7.8-8.3) mm.



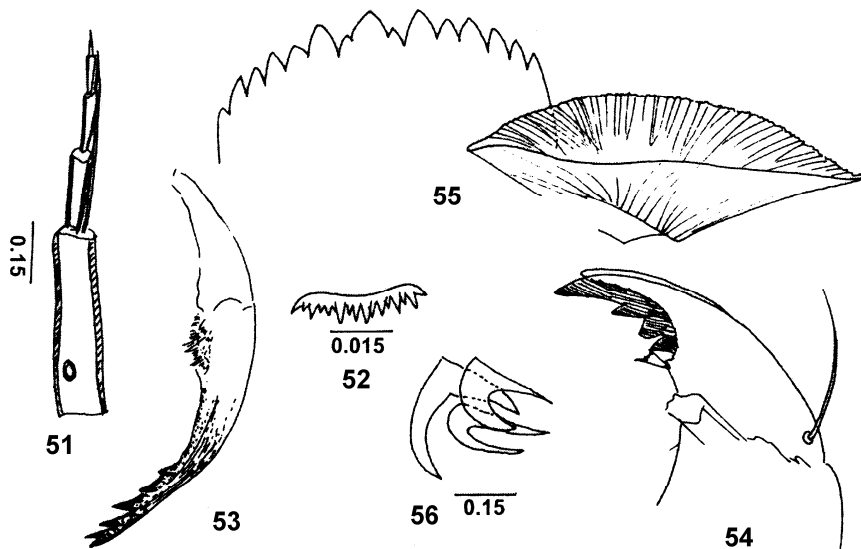
Figs. 46-50. *Kiefferulus renicornis* sp. n., male pupa. 46 – cephalothorax; 47 – thoracic horn; 48 – abdomen; 49 – anal lobe; 50 – anal comb.

Cephalothorax (Fig. 46). Brown in colour. Frontal plate 120-125 long and 176-180 in diameter at base bearing 1 pair of tubercles, frontal apotome well developed, triangular, frontal setae 130-136 long, ratio of cephalic tubercles and frontal setae

1.25-1.28. Precorneal setae 2, prealar tubercle just behind the wing sheath. Antennal sheath slender 780-810 long with superficial annulations. Thorax mottled with brown patches, wing sheath 2100-2160 long and 570-600 wide; thoracic horn (Fig. 47) intensely plumose 112-114 wide with kidney shaped dark base.

Abdomen (Fig. 48). Tergite I bare, II with brown anterior shagreen and posterior 70-74 overlapping row of hooks, III, IV and V with similar median and lateral bands of shagreen, VII-VIII with faint dorsolateral shagreen, sternite I with short median transverse band of long points forming anterolateral shagreen, II with an anterior and posterior transverse band of long points and lateral longitudinal bands of smaller points, III with similar bands of long points without posterior band. Segment II with a pair of pedes spurii B (99-101×79-82), IV with a pair of caudolateral pedes spurii A (72-77×69-71); segments I-IV with 1, 2, 3 and 4 lateral setae respectively, V-VIII with 4, 4, 4 and 5 lateral setae respectively, VIII (Fig. 49) with caudolateral dark spur. Anal comb (Fig. 50) with a moderate stem and apex bearing 6 sharp teeth, 4th largest. Anal lobe (Fig. 49) 660-705 long fringed with 2-3 rows of 135-140 setae. Genital sac triangular with blunt apex 425-431 long.

LARVA (n=4). Total length 6.23 (5.88-6.76) mm.



Figs. 51-56. *Kiefferulus renicornis* sp. n., male larva. 51 – antenna; 52 – pecten epipharyngis; 53 – premandible; 54 – mandible; 55 – mentum; 56 – claw.

Head. Frontal apotome 391-397 long, with transverse elliptical pit at anterior margin, frontal setae 1 pair, distance between two setae 146-153, clypeal setae 1 pair. Antenna (Fig. 51) 5 segmented 155-176 long, basal segment longer than flagellum;

length ratio of flagellomeres (μm) I-V: 86-90.3: 34.4-38.7: 17.2-21.5: 15.05-17.2: 6.45-8.6, total length 161-171, AR 1.05-1.06, antennal blade 60-65, accessory blade 32-37, ring organ (Fig. 51) at 1/3 of basal segment; lauterborn organ short with style, length of lauterborn organ nearly equal to length of basal segment, ratio of lauterborn organ with stylus and antennal segments 19-20: 38-39. Labrum. S I 17-19 long finely plumose, S II 47-51 long simple and slender, S III and S IV short, S I V A 12, S IV B 8, labral sclerites 1 and 2 separated, labral lamellae 11-14 long simple; pecten epipharyngis (Fig. 52) with 14 (7 large, 7 small) teeth. Premandible (Fig. 53) 77-82 long with 6 teeth and distinct premandibular brush, pecten hypopharyngis dark and paired. Mandible (Fig. 54) 198-204 long and 82-86 wide with 5 teeth, dorsal tooth yellowish brown, apical 26-30 long and three others dark, seta subdentalis 18-22 long spatula like with coarse margin, pecten mandibularis 12-14 filiform, seta interna plumose, sensilla minusculum 2. Prementohypopharyngeal complex with rugose median lamella, 3 broad paramedian lamellae and 5 sensilla each with a basal ring and a U bar, and 3 rows of chaetulae on outer corner of prementum. Mentum (Fig. 55) with median trifid tooth 22-24 \times 30-32 and 6 closely appressed lateral subequal teeth, first one larger, ventromental plate 66-69 wide, serrated, distance between two ventromental plates 89-95. Body. Anterior and posterior parapods well developed, pale yellowish, tubular, with terminal minute claws (Fig. 56). Procercus short, with 17-19 anal setae. Anal tubules 1 pair, 161-170 long, ventral tubule 1 pair 340-347 long.

ETYMOLOGY. The name, '*renicornis*' derives from kidney shaped base of thoracic horn of pupa.

DISCUSSION. The species resembles *Kiefferulus dux* (Johannsen, 1905) in superior volsella (Johannsen, 1905) and *K. inciderus* in structure of gonostylus (Chattopadhyay & Chaudhuri, 1991). It bears similarity with *K. calligaster* and *K. umbraticola* in the number of setae of brachiolum. In spite of the above similarities, the combination of the following diagnostic characters favours for proposal it as a new member of *Kiefferulus* from India: Adult male. Palp segment III without sensory pit and sensilla capitata; antepnotum well developed collar like with a small V shaped emargination, scutellum with 14-16 setae in two rows; brachiolum with 2 setae and 3 campaniform sensilla, *FCu* distal to *RM*, *An* ends before *FCu*; fore tibial scale with 5 long setae, tarsomere IV dark brown; anal point with 2 lateral constrictions, superior volsella long incurved with beak like tip, inferior volsella extended beyond anal point. Pupa. Frontal apotome well developed, triangular, antennal sheath slender with superficial annulations; thorax mottled with brown patches, thoracic horn intensely plumose with kidney like dark base; tergite I bare, II with brown anterior shagreen and posterior 70-74 overlapping row of hooks, anal comb with 6 setae, anal lobe with numerous filamentous setae. Larva. Frontal apotome with transverse elliptical pit at anterior margin, frontal setae 1 pairs, pecten epipharyngis with 7 large 7 small teeth, premandible with 6 teeth and distinct premandibular brush, pecten hypopharyngis dark and paired, mandible with 5 teeth, dorsal tooth yellowish brown others dark, pecten mandibularis filiform; pale yellowish tubular anterior and posterior parapods with minute claws, procercus short with 17-19 anal setae.

Key to the Indian species of *Kiefferulus* Goetghebuer (males)

1. Anal tergite bands fused 2
– Anal tergite bands separated 3
2. *FCu* clearly distal to *RM*. Superior volsella with nipple like apex *K. papillus*
– *FCu* opposite to *RM*. Superior volsella with hooked apex *K. barbatitarsis*
3. Scutum with 3 indistinct linear bands *K. rostratus*
– Scutum without any such band 4
4. Basal half of distal flagellomeres whitish *K. lasiochirus*
– All flagellomeres with same colouration 5
5. Eyes with dorso-medial extension 6
– Eyes without dorso-medial extension 8
6. Abdomen with dark lateral bands *K. psilochirus*
– Abdomen without such band 7
7. Scutellum with 12-14 setae in two rows *K. renicornis*
– Scutellum with 6 setae in single row *K. calligaster*
8. Brachiolum with more than 1 seta and 14-16 campaniform sensilla *K. inciderus*
– Brachiolum with 2-3 setae and 3 campaniform sensilla 9
9. Brachiolum with 3 setae. Anal point short without any constriction. Inferior volsella spatula like *K. coclearis*
– Brachiolum with 1 seta. Anal point elongated with constricted base and swollen apex. Inferior volsella straight *K. atroxitarsis*

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