

New species and records of *Beardius* Reiss et Sublette (Diptera : Chironomidae)

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Keywords : Diptera, Chironomidae, systematics, *Beardius*, Costa Rica, Mexico.

The genus *Beardius* Reiss et Sublette is emended based on the inclusion of three new species, *B. aciculatus*, *B. lingulatus* and *B. triangulatus* netted along small rivers in the Guanacaste province in NW Costa Rica. *B. aciculatus* and *B. parvus* Reiss et Sublette also is present in samples from Vera Cruz, Mexico. A new record of *B. parvus* from Mato Grosso, Brazil, is given. The female of the genus is described for the first time based on *B. parvus* Reiss et Sublette. The genus is shown to be closely related to *Paratendipes* Kieffer. A cladogram is erected showing three species pair with *B. aciculatus* and *B. parvus* as the sister group of the remaining. A key to male imagines is given.

Nouvelles espèces et nouvelles récoltes de *Beardius* Reiss et Sublette (Diptera : Chironomidae)

Mots clés : Diptera, Chironomidae, systématique, *Beardius*, Costa Rica, Mexico.

Le genre *Beardius* Reiss et Sublette est défini à l'aide de la description de 3 nouvelles espèces récoltées le long de petite rivières de la province Guanacaste au NW du Costa Rica. *B. aciculatus* et *B. parvus* Reiss et Sublette sont également recensées dans des récoltes de Vera Cruz au Mexique. Une nouvelle récolte de *B. parvus* du Mato Grosso (Brésil) est signalée. La femelle du genre est décrite pour la première fois d'après *B. parvus* Reiss et Sublette. Le genre paraît proche parent de *Paratendipes* Kieffer. Un cladogramme met en évidence trois groupes d'espèces avec *B. aciculatus* et *B. parvus* comme groupe frère des deux autres. Une clé des imagos mâles est donnée.

1. Introduction

The genus *Beardius* was erected by Reiss & Sublette (1985) for three species, *B. parvus* Reiss et Sublette from Venezuela and Brazil, *B. truncatus* Reiss et Sublette from western North America and *B. breviculus* Reiss et Sublette from Panama. Larvae and pupae are known for *B. parvus* only; the larvae live as Aufwuchs inhabitants, mostly on flooded macrophytes of standing and flowing waters of the tropical lowlands of South America.

Until recently there have been few studies on the chironomid fauna in Costa Rica (Andersen & Sæther

1995, Coffman et al. 1992, Watson & Heyn 1992). During a course in tropical entomology in the Guanacaste Conservation Area in NW Costa Rica in 1993 three new *Beardius* species were collected with net along small rivers and streams. *B. aciculatus* was taken at Rio Sapoá, a 3-5 m wide and 20-50 cm deep, rather fast flowing river, with stony bottom. At the sampling site there were lots of dead leaves and some submerged vegetation. Two hundred meter upstream there was a 15-20 m wide man made pond. *B. lingulatus* and *B. triangulatus* were both netted along a small stream at Estacion Petilla. At the sampling site the stream was 1-2 m wide and 10-30 cm deep. The bottom substratum consisted of sand, gravel and stones.

In samples from the region of Vera Cruz, Mexico, collected by Lars Ove Hansen, both *B. aciculatus* and *B. parvus* were present, the latter including associated females. In material collected by Ulrike Nolte in a Malaise trap in Mato Grosso, Brazil, a male of *B. parvus* was present.

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2. Methods and terminology

The material examined were mounted on slides in Canada balsam following the procedure outlined by Sæther (1969). The general terminology follows Sæther (1980).

The types are deposited in the Museum of Zoology, University of Bergen, Norway (ZMBN).

3. Genus *Beardius* Reiss et Sublette

Beardius Reiss et Sublette, 1985:175.

Type species: *Beardius parvus* Reiss et Sublette, 1985:183.

The diagnosis given by Reiss & Sublette (1985) can be emended as follows: Male antennal ratio 0.5-1.5. Female with 5 flagellomeres, first flagellomere apparently consisting of two fused flagellomeres. Third palpomere with 3-5 lanceolate sensilla clavata. Scutum without or with weakly to well developed tubercle. Wing veins with setae on R, R₁ and R₄₊₅; on R and extreme apex of R₄₊₅; only on extreme apex of R₄₊₅; or setae entirely lacking. Sensilla chaeticae usually present on ta₁ of middle leg and sometimes on ta₁ of hind leg. Medial volsella needle-shaped, narrowly conical, triangular or tongue-shaped; without microtrichia or with fine and short to coarse and long microtrichia.

Female genitalia with straight gonocoxapodeme VIII ending on base of dorsomesal lobe of gonapophysis VIII. Gonocoxite IX small, bare. Tergite IX undivided, with numerous setae. Segment X bare. Postgenital plate pointed triangular, relatively large. Cercus moderately sized. Gonapophysis VIII divided into large dorsomesal lobe and small, brush-like ventrolateral lobe. Apodeme lobe indistinct, with straight apodeme. Coxosternapodeme evenly curved. Seminal capsules small, spherical to ovoid, with distinct microtrichia and distinct neck. Spermathecal ducts wide, straight. Labia apparently bare.

3.1. Systematics

Beardius clearly is closely related to *Paratendipes* Kieffer. However, it is difficult to find any synapomorphies unique to these two genera. Apparent apomorphies present in imagines of both *Beardius* and *Paratendipes* are for instance absence of frontal tubercles; anteprenotal lobes dorsally narrowed, strongly separated; acrostichals reduced in number; costa not extended; front tibial spur with weak scale, but conspicuously long spur; and transverse sternapodeme broadened. In the larvae the 6-7 segmented antennae with alternate Lauterborn organs, the pale median tooth or teeth of mentum, and the mandible with pale dorsal

tooth and only 2 inner teeth, probably are synapomorphies. Only the last character appear to be a valid synapomorphy for *Beardius* plus *Paratendipes*, while the other apomorphies are shared with for instance *Omisus* Townes and / or *Microtendipes* Kieffer. Symplesiomorphies for *Beardius* and *Paratendipes* are the presence of a median volsella in the male imago, while the few branches of the thoracic horn is a symplesiomorphy shared with a larger group of genera. *Beardius*, however, share more apomorphies and plesiomorphies with *Paratendipes* than with any other genus, even if only the larval mandible appear to be an objective synapomorphy for the two genera.

The immatures are known only of *B. parvus*. Nevertheless, the relationship between the different known species appear relatively clear. An attempt to delineate the cladogenesis is presented in Fig. 1. The following trends are used (a = apomorphies, p = plesiomorphies):

Trends 1

Male AR lower than 0.6 (a), higher than 1.0 (p). — R without seta (a), with (p).

Parallel loss of setae take place in *B. parvus* plus *B. aciculatus*.

Trends 2

Wing without seta on R₄₊₅ (a), with (p). — Microtrichia of median volsella very short (a), more well developed (p).

Parallelly *B. lingulatus* has equally short microtrichia.

Trends 3

Median volsella large, triangular with broad base (a); conical, tongue-shaped, needle-shaped, or short and pointed (p). — Superior volsella digitiform with obliquely truncate apex (a); Superior volsella when digitiform slightly S-shaped, with more rounded apex, or pediform (p).

Trend 4

Superior volsella slightly S-shaped with rounded apex (a), pediform or when digitiform nearly straight with obliquely truncated apex (p).

Trends 5

Weak central tubercle present (a), absent (p). — Median volsella with very short microtrichia (a), microtrichia larger (p).

Parallel development take place within *B. aciculatus* for the first of these trends, within *B. breviculus* for the second.

Trend 6

LR₂ 0.57-0.63 (a), LR₂ 0.70-0.84 (p).

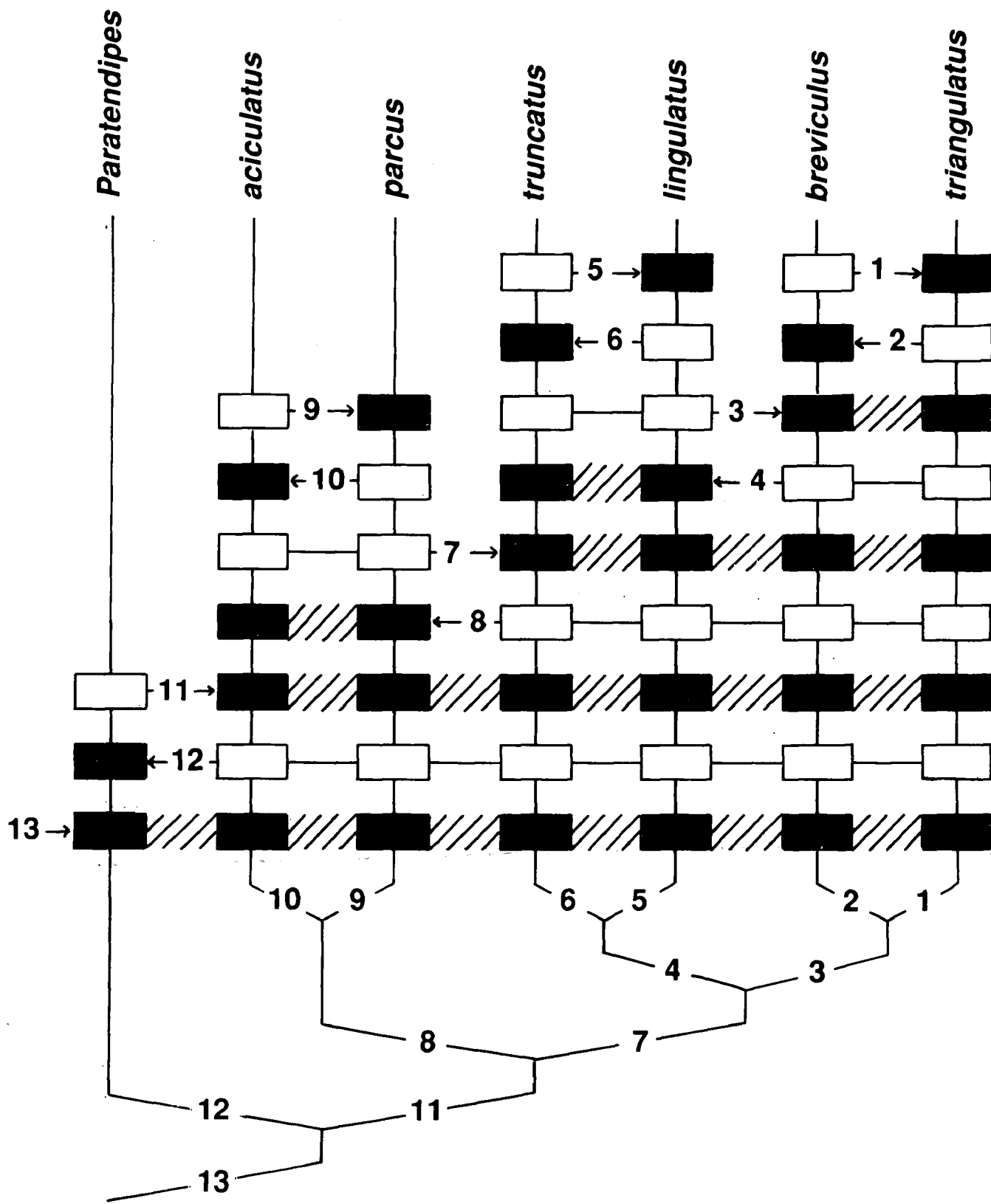


Fig. 1. Scheme of argumentation delineating the cladogenesis of the species of *Beardius* by means of trends 1-13 (p. 34-36).

Fig. 1. Cladogramme des espèces de *Beardius* établi à l'aide des caractères 1-13 (p. 34-36).

This trend is somewhat doubtful and *B. aciculatus* parallelly has an equally low leg ratio. *B. truncatus* is characterized by a number of plesiomorphies such as the shape of the median volsella, presence of acrostichals, and presence of setae on wing veins R, R₁, and R₄₊₅.

Trends 7.

Tergite IX without setae or conspicuously strong microtrichia (a), with setae or setae-like microtrichia (p). — Superior volsella slender, digitiform or weakly S-curved, subequal in width for its entire length (a); pediform, widest at base (p). — Superior volsella at most

with a few basal microtrichia (a), at least with basal and median microtrichia (p). — Inferior volsella long, slender, slightly clavate (a), shorter and wider (p).

Trends 8

Median anteprenotal lobes reduced, ending distinctly below apex of mesoscutum (a); less reduced, ending at apex of mesoscutum (p). — Median volsella weak, reduced to spine or pointed corner (a); well developed (p). — Inferior volsella with strong, apically dissected, spine-like sensilla chaetica (a); without (p).

Trend 9

Median volsella with blade-like structures apparently derived from microtrichia (a); without such structures (p).

Trends 10

Scutum with well developed tubercle (a), tubercle vestigial or absent (p). — Median volsella spine-like, without microtrichia (a); not spine-like, with microtrichia (p). — Inferior volsella with ventrolateral ridge making volsella appear double (a), without such ridge (p).

Trends 11

Anal point absent (a), present (p). — Eyes iridescent (a), not iridescent (p). — Pedes spurii B of pupa absent or vestigial (a), developed (p). — Tergites VII and VIII of pupa devoid of shagreen (a), with some shagreen (p). — Larval ventromental plates with medial apex bent backwards (a), with medial apex bent forwards, dividing mentum into 3 parts (p). — Larval antennae with 7 segments (a), with 6 segments (p).

The pedes spurii B are parallelly reduced also in a relatively closely related genus such as *Microtendipes*. Some *Microtendipes* also lack shagreen of T VII and VIII. The backwards bent medial apex of the larval ventromental plates is unique amongst the genera near *Paratendipes*. It is a feature characteristic for more apomorphic genera of Chironomini.

Trends 12

Bases of larval seta anteriores (S I) fused (a), separate (p). — Larva with frontoclypeal apotome (a), with frontal apotome and clypeus (p).

Trends 13

Larval mandible with strong pale dorsal tooth and 2 distinct inner teeth (a); with or without dorsal tooth, with 3 inner teeth (p).

In addition there are a number of potential synapomorphies which validity can be ascertained only by delineating the cladograms between *Beardius*, *Paratendipes* and other related genera. Among these, mentio-

ned above, the conspicuously long spur on a weak scale of the front tibia also is found in *Omisus*, but otherwise is nearly unique.

The above cladogenesis will have to be modified when the immatures are found for more species although the two main groups appear clear.

3.2. Key to male imagines

1. Superior volsella pediform with basal and median microtrichia; apex of median anteprenotal lobes overhung by anterior apex of mesoscutum; stem of inferior volsella thick; inferior volsella with spine-like, apically dissected sensilla chaetica. 2

— Superior volsella digitiform, at most with a few basal microtrichia; apex of anteprenotal lobes ending near apex of mesoscutum; inferior volsella slender, slightly clavate, without spine-like sensilla chaetica. 3

2. Median volsella spine-like, bare; prominent scutal tubercle present (Fig. 3B). *B. aciculatus* sp. n.

— Median volsella short, triangular, with long apical microtrichia; scutal tubercle absent or vestigial (Reiss & Sublette 1985: figs 1-14) *B. parvus* Reiss et Sublette.

3. Median volsella conical with coarse microtrichia; R, R₁ and R₄₊₅ all with setae (Reiss & Sublette 1985: Fig. 27). *B. truncatus* Reiss et Sublette.

— Median volsella triangular or tongue-shaped, with weak and often short microtrichia; at most R and R₄₊₅ with setae. 4

4. Median volsella triangular, broad-based; superior volsella nearly straight. 5

— Median volsella tongue-shaped, superior volsella curved (Fig. 4E). *B. lingulatus* sp. n.

5. AR about 0.5, apical microtrichia of median volsella relatively long (Fig. 5E). *B. triangulatus* sp. n.

— AR about 1.3, apical microtrichia of median volsella very fine (Reiss & Sublette 1985: figs 28-29). *B. breviculus* Reiss et Sublette.

3.3 Description of species

Beardius parvus Reiss et Sublette

(Fig. 2; Reiss & Sublette: Figs 1-25)

Beardius parvus Reiss et Sublette, 1985: 183

Chironomini gen. A6 Reiss 1976, 1977

Material examined: Brazil, Amazonia, Ilha do Coarairo at Manaus, Pa. da Terra Nova, paratype ♂ 15. III. 1961, light catch, E. J. Fittkau; Mato Grosso, 16° 57' S

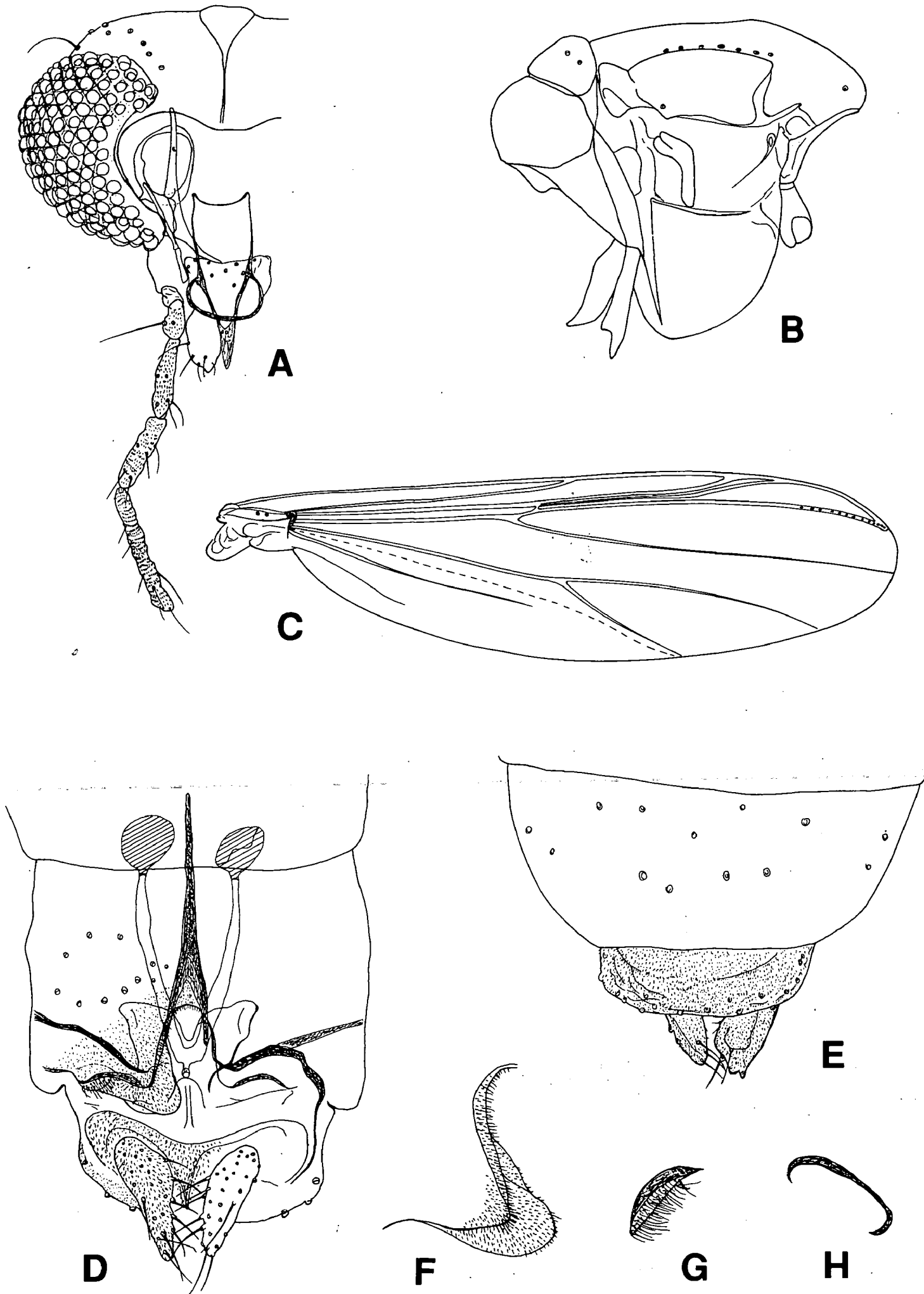


Fig. 2. *Beardius parvus* Reiss et Sublette, female imago : A. Head; B. Thorax; C. Wing; D. Genitalia, ventral view; E. Genitalia, dorsal view; F. Dorsomesal lobe; G. Ventrolateral lobe; H. Apodeme lobe.

Fig. 2. *Beardius parvus* Reiss et Sublette, imago femelle; A. Tête; B. Thorax; C. Aile; D. Genitalia, vue ventrale; E. Genitalia, vue dorsale; F. Lobe méso-dorsal; G. Lobe latéro-ventral; G. Lobe de l'apodème.

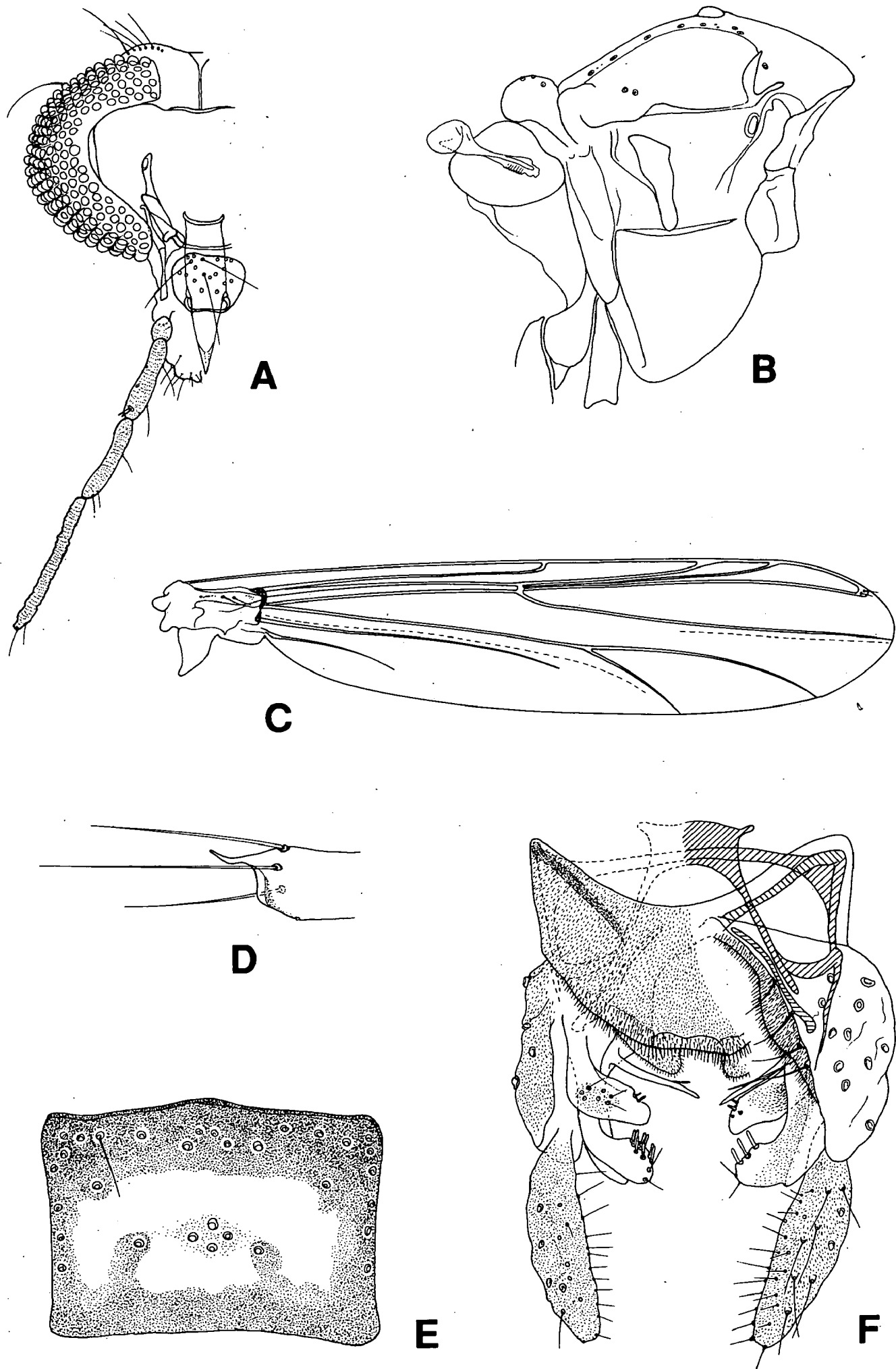


Fig. 3. *Beardius aciculatus* sp.n., male imago : A. Head; B. Thorax; C. Wing; D. Spur on front tibia; E. Abdominal tergum III; F. Hypopygium, dorsal view left, ventral view right.

Fig. 3. *Beardius aciculatus* n.sp. imago mâle : A. Tête; B. Thorax; C. Aile; D. Eperon du tibia antérieur; E. Tergite III; F. Hypopyge, gauche vue dorsale, droite vue ventrale.

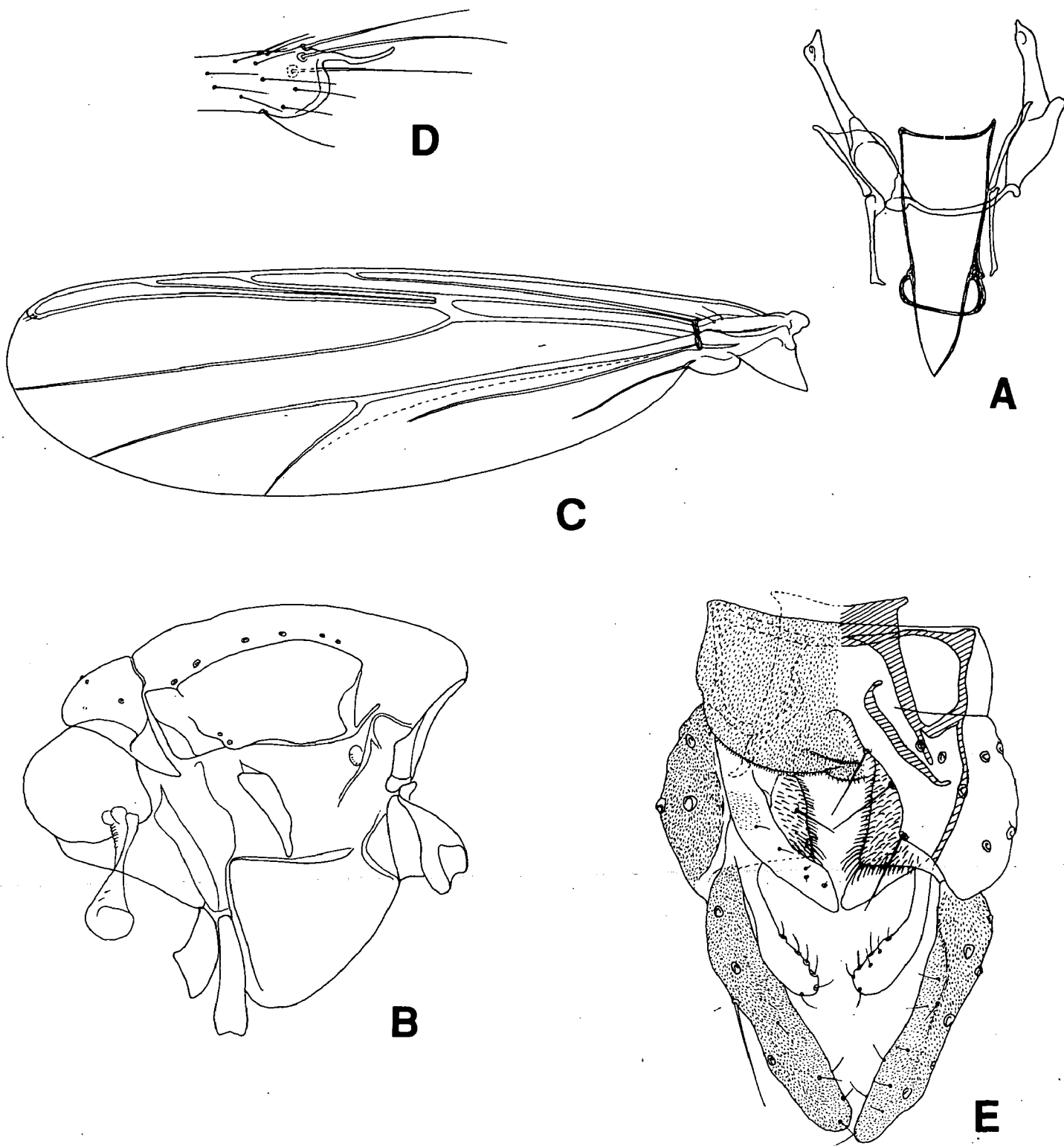


Fig. 4. *Beardius lingulatus* sp.n., male imago : A. Cibarial pump, tentorium and stipes; B. Thorax; C. Wing; D. Spur on front tibia; E. Hypopygium, dorsal view left, ventral view right.

Fig. 4. *Beardius lingulatus* n.sp. imago mâle : A. Pompe du cibarium, tentorium et stipes ; B. Thorax; C. Aile; D. Eperon du tibia antérieur; E. Hypopyge, gauche vue dorsale, droite vue ventrale.

56° 53'W, ♂, 23-24. IV. 1994, Malaise trap, U. Nolte. Mexico, Vera Cruz, Los Tuxtlas, Salto de Eyipantla, 14♂♂, 6♀♀, 18. I. 1995, sweep net, L.O. Hansen (ZMBN).

Diagnostic characters: see key.

Description

The male imago is described by Reiss & Sublette (1985). The specimens from Mexico have a wing length of 1.56-1.72, 1.69 mm (n = 14), and the Brazilian specimen a wing length of 1.31 mm. The Mexican specimens have an AR of 1.16-1.39, 1.28 (14) with the ulti-

mate flagellomere measuring 558-619, 578 μm in length. The Brazilian specimen has lost the antenna.

Female imago ($n = 6$ except when otherwise stated)

Total length 2.97-3.28, 3.12 mm. Wing length 1.76-1.83, 1.79 mm. Total length / wing length 1.66-1.86, 1.75. Wing length / length of profemur 2.21-2.44, 2.32. Thorax with vittae, posterior part of postnotum and lower part of preepisternum brown, coloration less extensive than in male. Legs stramineous with apical half of front femur, basal 1/2 and apical 1/4 of front tibia brown; other tibia with more indistinct median ring. Abdomen pale with darker cerci.

Head (Fig. 2A). Flagellomere lengths (in μm): 45-53, 49; 26-30, 29; 28-34, 31; 26-34, 28; 49-68, 58. First flagellomere apparently consisting of two fused subequal flagellomeres. AR 0.33-0.54, 0.42. Temporal setae 9-11, 10; including 3-4, 4 inner verticals; 4-6, 5 outer verticals; and 1-2, 2 postorbitals. Clypeus with 9-12, 11 setae. Tentorium 113-169, 135 μm (5) long; 17-

23, 19 μm wide. Stipes 109-135, 118 μm long; 34-41, 38 μm wide. Palp segment lengths (in μm): 23-30, 28; 34-45, 41; 81-98, 88; 68-90, 82; 139-165, 151 (5). Third palpal segment with 3-5, 4 lanceolate sensilla clavata; longest 19-26, 21 μm long.

Thorax (Fig. 2B). Anteprenotum with 0-1, 0 setae. With vestigial scutal tubercle. Dorsocentrals 5-9, 7 including 0-1, 1 close to anteprenotum; prealar 1. Scutellum with 4-6, 5 setae.

Wing (Fig. 2C). VR 1.27-1.37, 1.33. Brachiolum with 2 setae; R_{4+5} with 10-14, 12 setae; remaining veins bare.

Legs. Spur of front tibia 53-60, 56 μm long; spur of middle tibia including comb 71-75, 74 μm long; of hind tibia 64-83, 73 μm long. Width at apex of front tibia 34-53, 47 μm ; of middle tibia 53-56, 54 μm ; of hind tibia 56-60, 59 μm . All tarsi except of one front and one hind leg lost. Lengths (in μm) and proportions of legs ($n = 1$ on ta_1 - ta_5 of p_1 and p_3):

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅		LR	BV	SV
P1	728-803, 775	539-605, 566	718	397	302	146	80	P1	1.28	2.17	1.80
P2	765-851, 803	647-709, 681	-	-	-	-	-	P2	-	-	-
P3	898-992, 944	737-917, 800	444	227	180	104	71	P3	0.60	3.58	3.68

Number of setae on tergites I-VIII as :16-24, 21 (5); 12-25, 21; 17-26, 20; 17-28, 22; 16-28, 22; 16-27, 22; 17-26, 21; 12-18, 16. Number of setae on sternites I-VIII as: 0 (5); 2-5, 3 (4); 3-7, 5 (4); 6-11, 9; 10-16, 13; 12-19, 16; 13-23, 16; 16-25, 20.

Genitalia (Fig. 2 D-H). Tergite IX with 14-25, 19 setae. Cercus 94-105, 99 μm long. Notum 116-131, 126 μm long. Seminal capsule 38-49, 42 μm long excluding 8-11, 10 μm long distinct neck; 34-38, 36 μm wide.

Distribution

The new records show that the species is distributed at least from Mato Grosso, Brazil, to Vera Cruz, Mexico, with records from Brazil, Venezuela, and Mexico.

Beardius aciculatus sp. n. (Fig. 3)

Type material: Holotype: ♂, Costa Rica, Guanacaste Province, Rio Sapoa, 2 km south of road La Cruz to Santa Cecilia, 200 m a.s.l., 2. V. 1993, sweep net, T. Andersen (ZMBN No. 170). Paratypes: 24♂♂, Mexico, Vera Cruz, San Andreas Tuxtla, Laguna Enchantada, 20. I. 1995, sweep net, L. O. Hansen.

Diagnostic characters: see key.

Etymology

From Latin *acicula*, small pin, needle, and *-atus*, provided with, referring to the shape of the median volsella.

Description

Male imago ($n = 10$ except when otherwise stated)

Total length 2.69-3.67, 3.03 mm. Wing length 1.32-1.92, 1.55 mm (25). Total length / wing length 1.82-2.10, 1.96. Wing length / length of profemur 1.97-2.26, 2.08. Head pale; thorax brown; femora with distal 2/3 brown, front tibia brown, mid and hind tibia with proximal 2/3 brown, tarsi pale; abdomen with tergite I brown, tergites II-IV with anterior and posterior 1/3 brown, tergites V and VI with anterior 1/3 brown, rest of abdomen pale.

Head (Fig. 3A). AR 1.20-1.51, 1.33 (24). Thirteenth flagellomere 477-647, 542 μm (24) long. Temporal setae 11-16, 13; in single, slightly staggered row; including 2-4, 3 inner verticals; 4-8, 6 outer verticals; and 3-6, 4 postorbitals. Clypeus with 15-22, 19 setae. Tentorium 128-169, 145 μm long; 25-56, 37 μm wide. Stipes 135-173, 149 μm long; 30-49, 41 μm wide. Palp segment lengths (in μm): 26-45, 35; 41-56, 47; 109-143, 120; 116-135, 124 (9); 165-229, 193 (7). Third palpal segment with 3-4, 4 lanceolate sensilla clavata; longest 19-23, 21 μm (9) long.

Thorax (Fig. 3B). With distinct scutal tubercle. Dorsocentrals 6-10, 7 in single row; prealars 2-3, 2. Scutellum with 4-9, 6 setae.

Wing (Fig. 3C). VR 1.24-1.34, 1.29. R_{2+3} ends at 0.4 the distance between R_1 and R_{4+5} . Brachiolum with 2-3, 2 setae; extreme apex of R_{4+5} with 1-3, 2 setae; remaining veins bare.

Legs. Spur of front tibia 38-53, 44 μm (8) long, surrounded by three strong setae, each about 110-170 μm long (Fig. 3D); spur of middle tibia including comb

41-56, 47 μm long; of hind tibia 45-60, 53 μm long. Width at apex of front tibia 45-60, 50 μm ; of middle tibia 47-64, 52 μm ; of hind tibia 48-71, 57 μm . Sensilla chaetica 4-6, 5 at apex of ta_1 of middle leg; 1-3, 2 at apex of ta_1 of hind leg. Lengths (in μm) and proportions of legs ($n = 6$ on ta_1 - ta_5 of p_1 , 9 on ta_1 - ta_5 of p_3):

	fe	ti	ta_1	ta_2	ta_3	ta_4
p_1	662-851, 746	443-600, 515	735-954, 866	359-463, 417	278-369, 336	188-236, 220
p_2	710-917, 775	556-775, 637	335-444, 368	180-246, 206	131-194, 157	76-113, 90
p_3	801-1106, 924	596-851, 696	531-718, 593	278-359, 310	196-284, 234	106-142, 117
	ta_5	LR	BV	SV	BR	
p_1	85-99, 92	1.59-1.70, 1.63	1.98-2.20, 2.03	1.48-1.53, 1.51	2.9 (1)	
p_2	47-66, 55	0.55-0.60, 0.58	3.42-3.60, 3.50	3.74-3.99, 3.84	-	
p_3	57-80, 63	0.80-0.89, 0.84	2.99-3.23, 3.08	2.63-2.89, 2.76	4.3-5.7 (3)	

Abdomen with sparse chaetotaxy (Fig. 3E).

Hypopygium (Fig. 3F). Anal point lacking, anal tergum apically concave with about 10 strong apicolateral microtrichia, tergal bands present. Laterosternite IX with 1-2, 1 seta. Phallapodeme 74-109, 81 μm long; transverse sternapodeme 33-68, 51 μm long. Gonocoxite 129-180, 151 μm long; superior volsella pediform; inferior volsella 53-71, 60 μm long, broad, sharply inturned and with series of medial sensilla chaetica which are strong and apical dissected; superior volsella 53-68, 59 μm long; median volsella 53-98, 62 μm long, needle-like with 1 setae, without microtrichia. Gonostylus 109-135, 118 μm long. HR 1.18-1.37, 1.28; HV 2.32-2.86, 2.67.

Beardius lingulatus sp. n. (Fig. 4)

Type material: Holotype: ♂, Costa Rica, Guanacaste Province, Parque Nacional Guanacaste, Estacion Petilla, 700 m a.s.l., 8. V. 1993, sweep net, T. Andersen (ZMBN No. 171). Paratypes: 2♂♂, as holotype.

Diagnostic character: see key.

Etymology

From Latin *lingulatus*, tongue-like, referring to the shape of the median volsella.

Description

Male ($n = 3$)

Total length 2.39-2.51 mm. Wing length 1.17-1.22 mm. Total length / wing length 1.97-2.14. Wing length / length of profemur 1.94-2.00. Head, abdomen and legs pale, thorax pale brown.

Head. AR 0.98-0.99. Antenna with 13 segments; thirteenth flagellomere 394-398 μm long. One speci-

men apparently with 12 segmented antennae, AR 1.14, thirteenth flagellomere 428 μm long. Temporal setae 9-11 in single row, including 2-3 inner verticals, 4-5 outer verticals, and 2-4 postorbitals. Clypeus with 9-12 setae. Tentorium 105-107 μm long, 21-25 μm wide (Fig. 3A). Stipes 107-117 μm long, 21-23 μm wide. Palp segment lengths (in μm): 27-35, 27-29, 84-90, 107-115, 144-150. Apex of third palpal segment with 2-3 sensilla clavata on the outside, longest 14-18 μm long.

Thorax (Fig. 4B). Scutal tubercle present. Dorsocentrals 5-6, prealars 2. Scutellum with 4 setae.

Wing (Fig. 4C). VR 1.33-1.38. R_{2+3} ends at 1/3-1/2 the distance between R_1 and R_{4+5} . Brachiolum with 2 setae, R with 2-5 setae, extreme apex of R_{4+5} with 1-2 setae, remaining veins bare.

Legs. Spur of front tibia 40-48 μm long, surrounded by three strong setae, 149-163, 135-141 and 123-130 μm long (Fig. 4D); spur of middle tibia including comb 44-58 μm long; of hind tibia 51-63 μm long. Width at apex of front tibia 39-46 μm , of middle tibia 37-48 μm , of hind tibia 44-47 μm . Sensilla chaetica 2 at apex of ta_1 of middle leg, 1 at apex of ta_1 of hind leg. Lengths (in μm) and proportions of legs:

	fe	ti	ta_1	ta_2	ta_3	ta_4
p_1	596-629	343-384	748-825	359-409	310-327	204-245
p_2	613-621	449-458	335-351	163-180	118-126	57-65
p_3	662-678	498-523	449-507	245-261	172-196	82-98
	ta_5	LR	BV	SV	BR	
p_1	74-90	2.15-2.33	1.71-1.85	1.16-1.24	2.5-2.8	
p_2	33-41	0.73-0.78	3.48-3.74	3.05-3.20	3.5-4.2	
p_3	41-49	0.89-0.98	2.85-2.97	2.35-2.60	4.1-4.6	

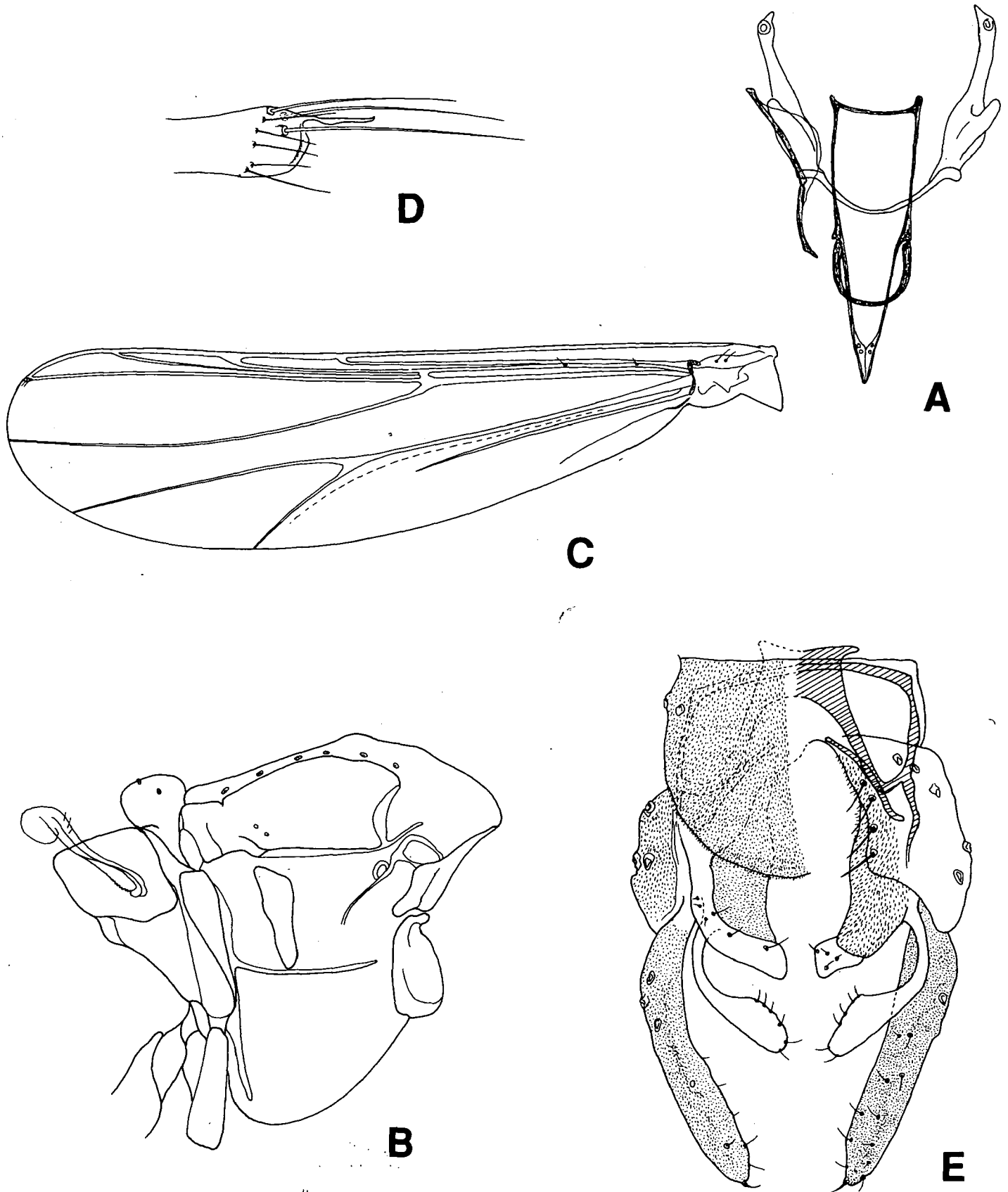


Fig. 5. *Beardius triangulatus* sp.n., male imago: A. Cibarial pump, tentorium and stipes; B. Thorax; C. Wing; D. Spur on front tibia; E. Hypopygium, dorsal view left, ventral view right.

Fig. 5. *Beardius triangulatus* n.sp. imago mâle: A. Pompe du cibarium, tentorium et stipes; B. Thorax; C. Aile; D. Eperon du tibia antérieur; E. Hypopyge, gauche vue dorsale, droite vue ventrale.

Abdomen with sparse chaetotaxy; number of setae on tergites I-VIII as: 20, 23, 26, 31, 32, 28, 24, 25 (1).

Hypopygium (Fig. 4E). Anal point lacking; anal tergum without setae; tergal bands absent. Laterosternite IX with 2 strong setae. Phallapodeme 43-47 μm long; transverse sternapodeme 29-35 μm long. Gonocoxite 84-94 μm long; superior volsella curved, digiform, 43-53 μm long; inferior volsella clavate, 54-69 μm long; median volsella tongue-shaped. Gonostylus 108-113 μm long. HR 0.77-0.84; HV 2.19-2.30.

Beardius triangulatus sp. n. (Fig. 5).

Type material: Holotype: ♂, Costa Rica, Guanacaste Province, Parque Nacional Guanacaste, Estacion Petilla, 700 m a.s.l., 8. V. 1993, sweep net, T. Andersen (ZMBN No. 172).

Diagnostic characters: see key.

Etymology

From Latin *triangulus*, having three angles, and *-atus*, provided with, referring to the shape of the median volsella.

Description

Male (n = 1)

Total length 2.37 mm. Wing length 1.17 mm. Total length / wing length 2.03. Wing length / length of pro-femur 2.14. Head, abdomen and legs pale, thorax pale brown.

Head. AR 0.54. Thirteenth flagellomere 244 μm long. Temporal setae 9 in single row, including 3 inner verticals, 3 outer verticals, and 3 postorbitals. Clypeus with 10 setae. Tentorium 121 μm long, 18 μm wide (Fig. 5A). Stipes 107 μm long, 29 μm wide. Palp segment lengths (in μm) :33, 31, 76, 86, 148. Apex of third palpal segment with 3 sensilla clavata, longest 14 μm long.

Thorax (Fig. 5B). Scutal tubercle lacking. Dorsocentrals 6, prealars 2. Scutellum with 4 setae.

Wing (Fig. 5C). VR 1.45. R_{2+3} ends at 1/2 the distance between R_1 and R_{4+5} . Brachiolum with 2 setae, extreme apex of R_{4+5} with 2 setae, remaining veins bare.

Legs. Spur of front tibia 46 μm long, surrounded by three strong setae, 126, 105 and 99 μm long (Fig. 5D); spur of middle tibia 58 μm long, of hind tibia 57 μm long. Width at apex of front tibia 41 μm , of middle tibia 41 μm , of hind tibia 44 μm . Sensilla chaetica not observed. Lengths (in μm) and proportions of legs:

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅	LR	BV	SV	BR
P ₁	547	343	768	335	278	212	106	2.24	1.78	1.16	2.4
P ₂	580	441	310	172	122	57	41	0.70	3.40	3.29	4.2
P ₃	629	490	458	245	180	90	49	0.93	2.80	2.45	3.8

Abdomen with sparse chaetotaxy; number of setae on tergites I-VIII as: 26, 39, 31, 34, 36, 26, 25, 20.

Hypopygium (Fig. 5E). Anal point lacking; anal tergum without setae; tergal bands absent. Laterosternite IX with 2 strong setae. Phallapodeme 45 μm long; transverse sternapodeme 34 μm long. Gonocoxite 84 μm long; superior volsella digitiform, 58 μm long; inferior volsella clavate, 62 μm long; median volsella triangular, 25 μm high with 41 μm wide base, with long, apical microtrichia. Gonostylus 115 μm long. HR 0.73; HV 2.06.

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References

- Andersen T. & Sæther O.A. 1995. — The first record of *Buchonomyia* Fittkau and the subfamily Buchonomyiinae from the New World (Diptera: Chironomidae). Pp. 363-367 in: Cranton, P.S. (ed.): *Midges: from genes to ecosystems*. CSIRO, Melbourne.
- Coffman W.P., Rosa C. de la, Cummins K.W. & Wilzbach M.A. 1992. — Species richness in some Neotropical (Costa Rica) and Afrotropical (West Africa) lotic communities of Chironomidae (Diptera). In: Bund, W.J. van de & Kraak, M.H.S. (eds.): *Proc. 11th Int. Symp. Chironomidae. Neth. J. Aq. Ecol.* 26: 229-237.
- Reiss F. 1976. — Die Benthoszoozöosen zentralamazonischer Várzeeseen und ihre Anpassungen an die jahresperiodischen Wasserstandsschwankungen. *Biogeographica* 7: 125-135.
- Reiss F. 1977. — The benthic zoocoenoses of central Amazon Várzea lakes and their adaptations to the annual water level fluctuations. *Geo-Eco-Trop.* 1: 65-75.
- Reiss F. & Sublette J.E. 1985. — *Beardius* new genus with notes on additional Pan-American taxa. *Spixiana*, Suppl. 11: 179-193.
- Sæther O.A. 1969. — Some Nearctic Podonominae, Diamesiinae, and Orthoclaadiinae (Diptera: Chironomidae). *Bull. Fish. Res. Bd Can.* 170: 1-154.
- Sæther O.A. 1980. — Glossary of chironomid morphology terminology (Diptera: Chironomidae). *Ent. scand.*, Suppl. 14: 1-51.
- Watson C.N. & Heyn M.W. 1992. — A preliminary survey of the Chironomidae (Diptera) of Costa Rica, with emphasis on the lotic fauna. In: Bund, W.J. & van de Kraak, M.H.S. (eds.): *Proc. 11th Int. Symp. Chironomidae. Neth. J. Aq. Ecol.* 26: 257-262.