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Beardius new genus with notes on additional Pan-American taxa

(Diptera, Chironomidae)

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A new genus, *Beardius* gen. nov., of Chironomini is established and three new species are described. *Beardius parvus* spec. nov. is widely distributed in the tropical lowlands of South America. *Beardius truncatus* spec. nov. is known from western North America and *Beardius breviculus* spec. nov. from Panama.

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Introduction

In comparing Nearctic and Neotropical chironomids, we were impressed with the similarity of certain species in several genera which occur in the southern and southwestern part of the United States with those which occur in the Amazon Valley of Brazil. A comparison of three closely related species, one from Brazil and Venezuela, one from Panama, and the other from South Texas, has resulted in the description of a new genus, *Beardius*, and three new species.

In the descriptions of adults, measurements and counts are given for the holotype with the range of those from the paratypes being given in parenthesis together with the number of individuals from which the counts or measurement was made. The terminology used here follows SAETHER (1980).

Beardius gen. nov.

Type-Species: *Beardius parvus* spec. nov., by present designation.

Etymology: This genus is dedicated to the late Melvin Beard, a student at Eastern New Mexico University, Portales, New Mexico, who collected the type material of *Beardius truncatus* n. sp.

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Male. Head, Fig. 8. Eyes (where known) iridescent, with a long, broad dorsal extension, bare. Frontal tubercles lacking. Antenna fully plumose, with 13 flagellomeres. Temporal setae in a single row, extending to a point medial to the dorsal apex of the eyes. Palpal segments 3–5 with length greater than $3 \times$ the width. Clypeus small, subquadrangular, moderately setose.

Antepnotum strongly tapered dorsally, ending at or below the apex of the mesoscutum, Fig. 10; with the two halves separated by a broad notch; lateral setae lacking. Acrostichal setae reduced (Nearctic) or lacking (Neotropical). Dorsocentrals in a single row. Scutellars and prealars reduced in number.

Wing (Fig. 14). Without macrotrichia but with coarse microtrichia visible at $125 \times$. Wing veins with setae on R, R1 and R4+5 (Nearctic), or with only 1–2 setae at the extreme apex of R4+5 or entirely lacking (Neotropical). Squama bare.

Legs. Foretibial spur long, Fig. 1; with one long spine on one comb of PII and PIII, the other comb on each leg unarmed, Figs. 4, 5. Pulvilli Fig. 2, distinct, slightly shorter than the claws which are sharp. Sparse sensilla chaetica usually present near the apex of Ta 1 of PII.

Abdomen with a sparse chaetotaxy, Fig. 29. Male genitalia, Figs. 13, 27, 28; Anal tergum apically rounded, truncate or weakly conical, with or without basilateral or subapical setae; anal point lacking; anal tergal bands present or absent; superior volsella broadly foot-shaped, inturned, with sparse setae; microtrichia present or absent; inferior volsella inturned, broad or basally somewhat widened, becoming slightly to strongly narrowed near the middle, then widening to a clavate to capitate apex; with sparse, apically fimbriate sensilla chaetica near the apex and few apical setae; microtrichia, except of basalmédian part in *P. parvus*, lacking; median volsella narrowly conical to truncate-conical, with apical microtrichiae fine to coarse, becoming weakly lamellate in some species; gonocoxite shorter than gonostylus, with 3–4 strong, curved setae; gonostylus apically blunt-pointed, almost evenly attenuated from near the base to just proximal to the apex.

Pupa. Small, less than 5 mm in length; exuviae pale.

Cephalothorax. Frontal tubercles present, small, apically pointed; frontal setae present, short, subapically inserted (Fig. 20). Frontal warts absent. Thoracic horn with 6 strong, smooth branches (Fig. 18). Basal ring of the thoracic horn elliptical, with 1 round tracheal branch (Fig. 17). Thorax mostly smooth, weakly granulated only along the median raphe. Prealar tubercle absent. With 2 pairs of widely separated dorsocentrals, 1–2 precorneals, 1 antepnotal, 1 prealar, and 1 prealar setal alveolus.

Abdomen (Fig. 15). Terga and sterna I, VII, and VIII without chagrin; terga II–VI with an anterior, transverse band of strong denticles which merge with the continuous fine chagrin. Posterior hook row of tergum II continuous, occupying about half the tergum width. Intersegmental conjunctiva glabrous except that of IV/V which has a continuous wide band of anteriorly directed strong denticles. Pedes spurii A present on sternum IV. Pedes spurii B on segment II very weakly developed. Anterolateral and anteromedian tubercles lacking on sternum I. Posterolateral corner of segment VIII with a wide, short spur which is beset basally with hair-fine denticles; contiguous anteriorly with the spur are small to middle-sized, isolated denticles (Fig. 19). Segment I without L-setae; II–IV each with 3 pairs of short L-setae; V with 3 and VI–VIII with 4 pairs of longer LS-setae. Each segment with 1 pair of Od and 1 pair of Ov setae. Swim plate on each side with few (< 20) uniserial setae. Dorsal setae absent. Male genital sacs extend past the swim plate by about $1/3$ their length.

Larva. Small, ca. 4 mm long. Body pale, head pale brown in material fixed in alcohol. With 2 pairs of contiguous eye spots, the upper spot round, the lower reniform.

Head dorsum. Frontal apotome, clypeus and labral sclerite 2 present (Fig. 25).

Antenna (Fig. 22). With 7 segments; basal segment somewhat shorter than the flagellum; ring organ in the proximal fourth of the basal segment. Antennal seta lacking. Antennal blade slightly shorter than the flagellum or of equal length. Accessory blade short. Segment 3 with an apical peg sensillum. Large Lauterborn organs alternating on segments 2 and 3.

Labrum (Fig. 24). SI slender, fimbriate only on the medial side. Alveolus of SI occurring on a common base. SII slender, fimbriate only at the apex; each occurring on a low tubercle. SIII simple. SIV si-

milar to most Chironomini. Seta premandibularis simple. Labral lamella with uniform teeth. Pecten epipharyngis with 3 separated, apically toothed plates. Premandibles with 2 apical, rounded teeth.

Mandible (Fig. 23). With a short, pale, erect dorsal tooth which is contiguous at the base with a smaller, flatter tooth on the inner surface of the mandible. Apical tooth short and dark as are the 2 inner teeth. Seta subdentalis straight, long and wide, bluntly rounded apically, reaching the level of the apical inner mandibular tooth. Seta interna and pecten mandibularis similar to most other Chironomini.

Mentum (Fig. 21). With a simple, pale, low middle tooth and 5 pairs of darker lateral teeth. First lateral tooth higher than the middle tooth, with the remaining lateral teeth progressively diminishing in size; outer two teeth on each side basally fused. Ventromental plates about as long as the mentum width; medially separated by about the width of the middle mental tooth; medial apex bent backwards. Seta submenti long, not extending past the mentum, apically weakly fimbriate.

Body. Tubuli ventrales and lateralis absent. Four short tubuli anales present. Seta on the base of the procercus as long as the anal setae.



Fig. 1–6. *Beardius parvus*, male adult. Fig. 1. Foretibial spur. Fig. 2. Pulvilli and claws. Fig. 3. Genitalia; inferior, superior and median volsella, ventral view. Figs. 4 and 5. Mesotibial combs. Fig. 6. Genitalia; median volsella, ventral view.

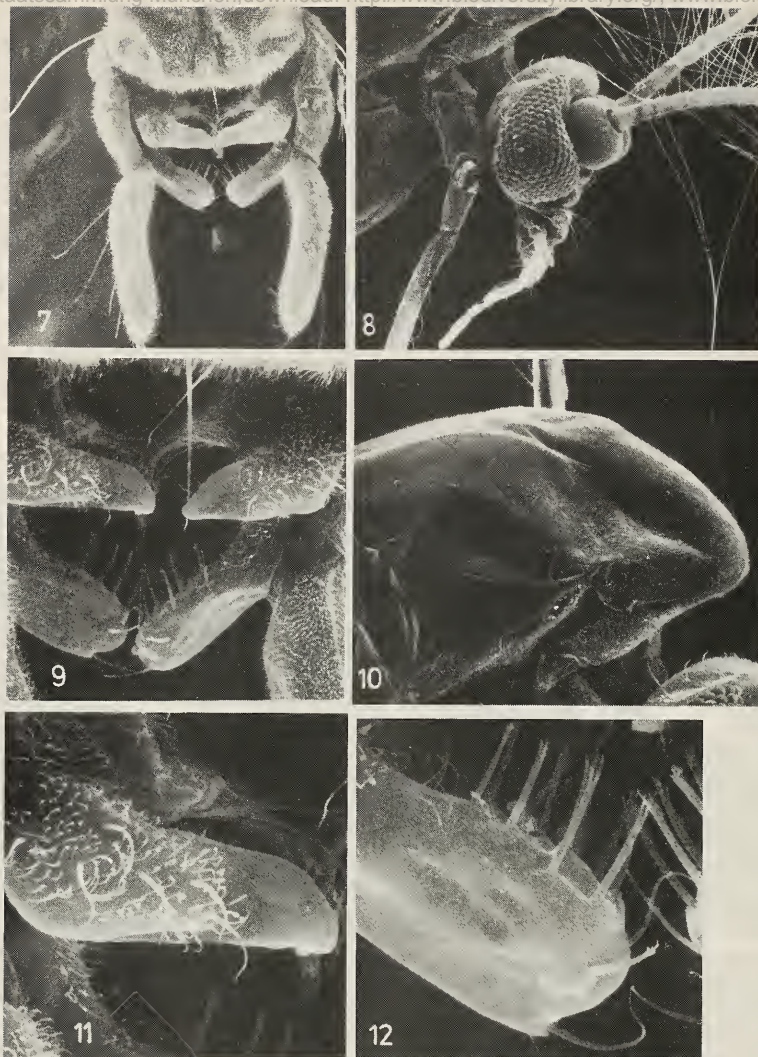


Fig. 7–12. *Beardius parvus*, male adult. Fig. 7. Genitalia, dorsal view. Fig. 8. Head. Fig. 9. Genitalia; superior, inferior and median volsella, dorsal view. Fig. 10. Antepronotum. Fig. 11. Genitalia; superior volsella. Fig. 12. Genitalia; inferior volsella.

Differential diagnosis:

Male. The long, slender foretibial spur, the bare squama and the male genitalia without an anal point but with a median volsella are unique.

Pupa. Among the Chironomini genera with sparsely-branched thoracic horns and a transverse band of strong denticles on abdominal terga II–VI, only *Beardius* has terga VII and VIII completely devoid of chargin. *Beardius* can be separated, in part, from similar *Polypedilum* pupae through having 4, instead of 3, pairs of LS-setae on abdominal segment VI, and by having hair-fine denticles on the base of each anal spur.

Larva. Among all known Chironomini larva, only *Beardius* has a 7-segmented antenna with alternating Lauterborn organs on segments 2 and 3. In addition, *Beardius* is distinctive in the presence of a

clypeus, only 2 inner mandibular teeth, a long, wide and simple seta subdentalis, and a simple, pale mental medial tooth.

***Beardius parvus* spec. nov.**

Chironomini gen. A6 REISS 1976, 1977

Etymology: Latin, meaning frugal, scanty, referring to the sparse setae of the ninth tergum of the male genitalia.
Male: Coloration. Head and thorax marked with pale brown; abdomen and legs pale. Head, Fig. 8. Antennal ratio 1.42 (1.27–1.49; n = 6). Palpal proportions, 39 (34); 94 (71–83); 94 (67–71); 156

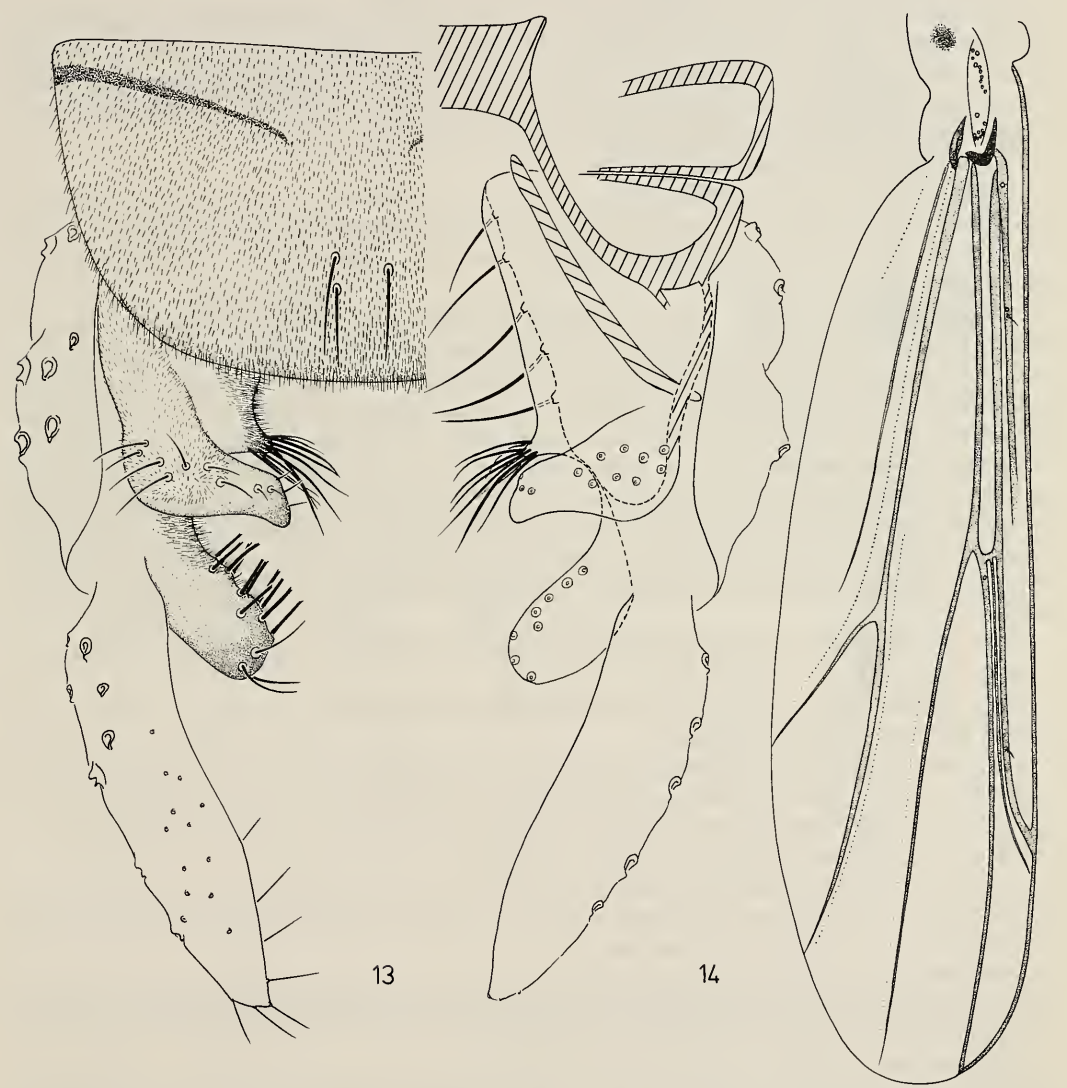


Fig. 13–14. *Beardius parvus*, male adult. Fig. 13. Genitalia, dorsal view. Fig. 14. Wing.

Thorax. Anteprenotum ends distinctly below the apex of the mesoscutum, Fig. 10. Dorsocentral setae 5 (5–7; n = 6). Acrostichal setae absent. Prealar setae 2 (0–2; n = 6); supraalar setae lacking. Scutellum with 5 (4–5; n = 6) setae.

Wing. Venation, Fig. 14. Membrane with microtrichia visible at 150×. Venarum ratio, 1.18 (1.14–1.23; n = 4). Wing length, 1.58 mm (1.38–1.51; n = 5). R and R1 without setae. R4+5 with 2 (1–2; n = 5) setae immediately proximal to the junction with the costa.

Legs. Tibial combs and spurs, Figs. 1, 4, and 5. Sensilla chaetica of Ta1 on PII 2 (0–2; n = 5). Leg ratios: PI, 1.80 (1.83–2.10; n = 4); PII, 0.72 (0.76–0.84; n = 4); PIII, 1.03 (1.10–1.13; n = 3); B.R. PI 2.78 (2.79; n = 1). Pulvilli about half as long as the claws, Fig. 2.

Genitalia, Figs. 7, 13. Gc/Gs ratio = 0.96 (0.89–1.0; n = 5); anal tergum apically rounded, without basilateral but with 1–7 (2.64; n = 25) subapical setae; the foot-shaped superior volsella bears conspicuous microtrichia, Fig. 11; the inferior volsella is broad, sharply inturned and has a series of medial sensilla chaetica which are strong and apically dissected, Fig. 12; the median volsella is short and bears long blade-like structures, apparently derived from microtrichia, Figs. 3, 6.

Pupa. Small, 3.6 mm long. Exuviae pale.

Cephalothorax. Frontal tubercles small, short, and conical-pointed; frontal setae short and thin, subapically inserted (Fig. 20). Thoracic horn with 6 smooth branches (Fig. 18). One distinct prealar seta mostly present, as well as one prealar setal scar, which in all (?) Holarctic Chironomini genera appears to be absent (Fig. 16).

Abdomen (Fig. 15). Terga I, VII, and VIII without chagrin. Terga II–VI with an anterior transverse band of strong denticles which, on tergum II, is contiguous with a central field of fine chagrin. On the following terga the central chagrin field becomes reduced so that on tergum VI only a few denticles remain. Tergum V also with a lateral, longitudinal stripe of chagrin. Posterior hook row on tergum II continuous, occupying about 1/2 the width of the segment. Only intersegmental conjunctiva IV/V with a continuous wide band of orally directed denticles. Pedes spurii B on segment II very weakly developed. Posterolateral corners of segment VIII mostly with only a single wide spur which is beset with basal hair-fine denticles, occasionally with a second smaller spur (Fig. 19). Additional denticles may occur anterior to the base of the spur. The 4 pairs of LS-setae on abdominal segment VIII may have, in addition, an adjacent pair of shorter L-setae. Swim plate with 12–19 uniserial setae on each side.

Larva. Small, ca. 4 mm long. Body pale, head pale brown in alcohol-fixed material. With 2 pairs of contiguous eye spots.

Head dorsum (Fig. 25). Frontal apotome separated from the clypeus by a weakly-curved suture. S3 of the clypeus located on the margin.

Antenna (Fig. 22). With 7 segments. Basal segment 0.87 as long as the flagellum. Segments 2–5 of about equal length; segment 6 somewhat longer; segment 7 almost half as long as segment 6.

Lauterborn organs large, about as long as the corresponding antennal segment. Antennal blade shorter than the flagellum, reaching to the end of segment 6.

Labrum (Fig. 24). SI set in a short socket, narrow, leaf-shaped, densely fimbriate only at the apex. Pecten epipharyngis composed of 3 separate small plates which are apically tridentate; the median tooth twice as wide and higher than the side teeth.

Mandible (Fig. 23). With a dark apical tooth and 2 dark inner teeth. Dorsal tooth pale, short and distinct; on the basal inner side merging with a wide, flat tooth. Seta interna composed of 4 thickly-branched arms. Pecten mandibularis with about 15 lamellae.

Mentum (Fig. 21). With a simple, pale middle tooth and 5 pairs of dark lateral teeth. Middle tooth shorter than the first laterals. Lateral teeth 4 and 5 basally fused. Anterior margin of the ventromental plates smooth; striations extending to the margin. Seta submenti weakly fimbriate in the apical half.

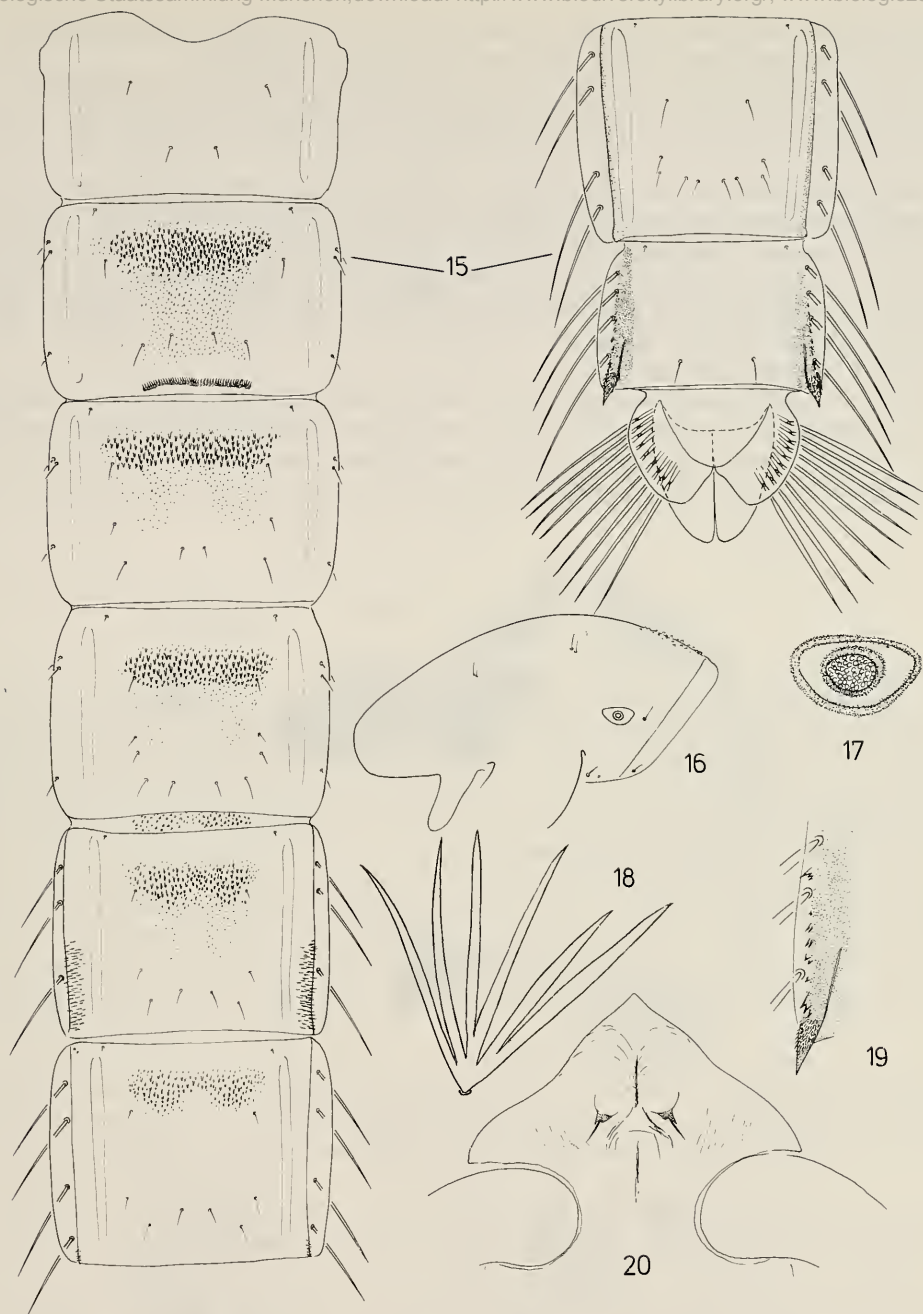


Fig. 15–20. *Beardius parvus*, male pupa. Fig. 15. Abdomen, dorsal view. Fig. 16. Thorax, lateral view. Fig. 17. Basal ring of thoracic horn. Fig. 18. Thoracic horn. Fig. 19. Spur of segment VIII. Fig. 20. Frontal plate.

Diagnosis (larva and pupa): Since only this species is known in the immature stages the generic diagnosis will suffice to separate the larva and pupa from other Chironomini.

The male resembles *B. truncatus* in having long microtrichia on the median volsella. It differs from that species and *B. breviculus* in having the antepronotum terminating below the apex of the mesoscutum rather than at the apex, and in having distinct microtrichia on the superior volsella.

Ecology and distribution: According to known records, the larvae of *Beardius parvus* live as Aufwuchs inhabitants, mostly on flooded macrophytes of standing and flowing waters of the tropical lowlands of South America. The species is one of the dominant chironomid species of the floating meadows which, in the Amazonian lowlands, are mostly composed of the flooded stalks of the grasses *Paspalum repens*, *Paspalum fasciatum*, and *Echinochloa polystachya* (JUNK 1970). Other plant substrata also become colonized in essentially lower abundance; for example, decomposing leaves of *Victoria regia* or root tufts of *Eichhornia crassipes*.

Artificial substrata also become acceptable as cononizing sites, at times in high abundane. In experimental containers filled with wood fiber, which by extrapolation simulated the floating meadows in the Lago do Calado, Central Amazonia, *B. parvus* was the most abundant chironomid species (JUNK 1970). The species was also found regularly, along with numerous other chironomid larvae, in the

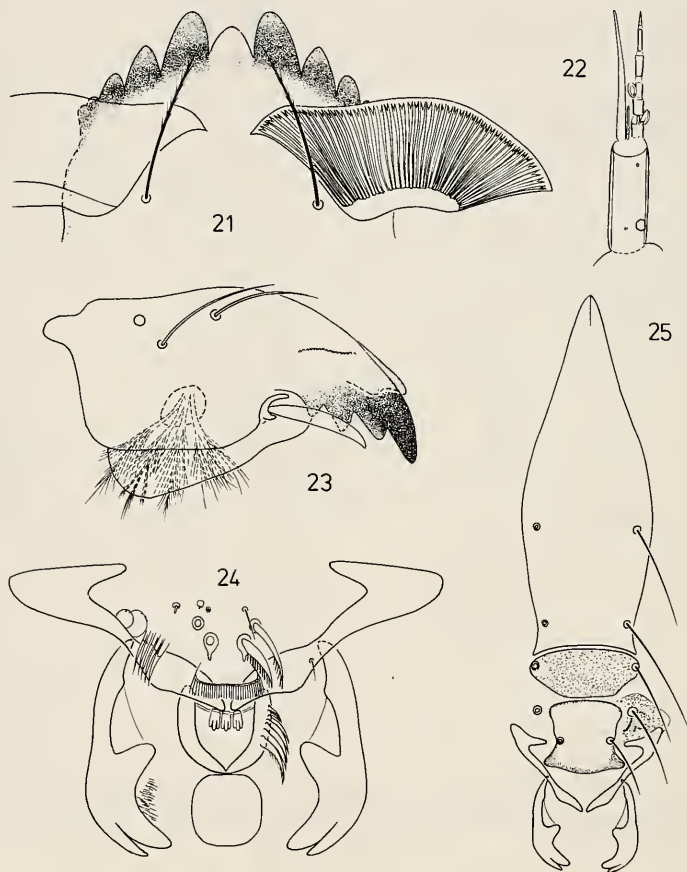


Fig. 21–25. *Beardius parvus*, larval head. Fig. 21. Mentum and ventromental plates. Fig. 22. Antenna. Fig. 23. Mandible. Fig. 24. Labro-epipharyngeal region. Fig. 25. Dorsal sclerites.

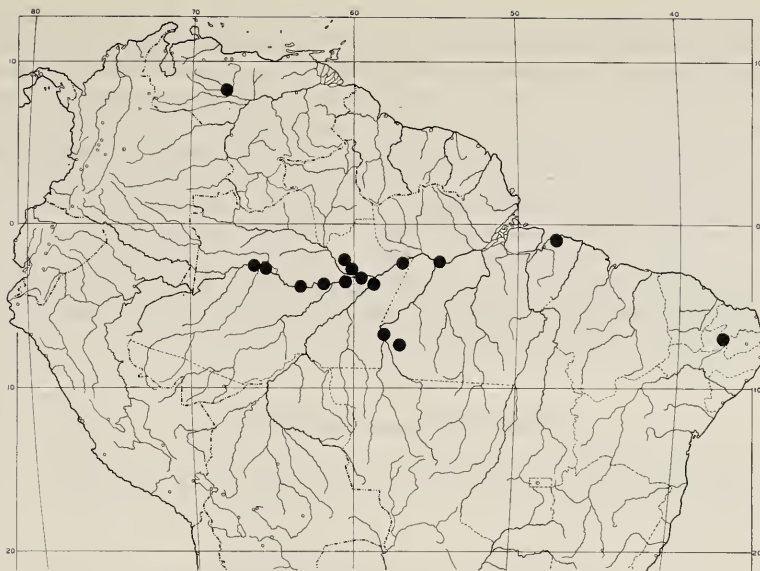


Fig. 26. *Beardius parvus*, distribution map.

Limnokinial of the Amazonian Varzea lakes (REISS 1976, 1977, sub Chironomini gen. A6). The larvae live here in and on surface drifting organic particles; for example on fragments of stalks, branches or fragments of wood. They accomplish their total metamorphosis on these substrata almost completely independent of the strong yearly water level fluctuations. As has already been discussed in detail (REISS 1976, 1977) the larvae of most Amazonia Aufwuchs species outlast the low water phase in the water sediment with strongly reduced populations – a situation analogous to the winter months in higher latitudes. Also the larvae of *B. parvus* have been demonstrated to occur in expected amounts in the sediments as, for example, in the Paraná da Terra Nova in the Ilha do Careiro in the Amazon in the vicinity of Manaus. The larvae live in fine sediments in ca. 2.5–5 m depth. Also on the drier areas of Northeast Brazil larvae occur in sediments of a poorly defined water body (“Strudeloch at Itaparica”). According to unpublished accounts by F. Lenz in the years 1935/36, 41 of 112 larvae from sediments in these water bodies belong to *B. parvus*.

An exclusive relationship between this species with white, black or clear water does not exist since occurrences in all three water types exist. Unquestionable, however, is the principal occurrences of larvae with the appearance of larger stands of floating water plants in Amazonia white water rivers and their association with these floating assemblages. In the plant-poor black waters a substratum for Aufwuchs species is usually lacking.

Beardius parvus is widely distributed in the tropical lowlands of South America (Fig. 26). Most of the localities lie in the Amazonian region and the Coastal region Northwest of Belém, Pará. Only a few localities indicate the occurrence in the Orinoco Basin and in the State of Paraíba, NE Brazil.

Type Material. Holotype: 1 male imago, Llanos baixos on the lower Rio Portuguesa at Camaguan, NW San Fernando, Venezuela, 17-II-1973; drift net at the outflow of a ground water pump, leg. F. Reiss; euparal slide preparation in the Zoologische Staatssammlung, München.

Paratypes: 1 male, Florianopolis, upper Rio Solimões, Amazonia, Brazil, 31-VIII-1961, light catch; 1 male, Ilha Jucara, upper Rio Solimões, 3-IX-1961; 1 male, Lago Catuá, upper Rio Solimões, 11-IX-1961; 2 males, Punta Periquitos, middle Rio Solimões, 15-IX-1961, leg. E. J. Fittkau. 1 male, 1 larva, surface drift, Lago Cabaliana, lower Rio Solimões, 14-III-1972 and 27-V-1971, leg. F. Reiss; 1 male, 2 pupae with larval exuviae, Lago do Calado, lower Rio Solimões, 2-IX-1968, ex floating meadows, leg. W. Junk; 1 male, Pa. do Xiborena at Manaus, ex rotting leaves

of *Victoria regia*, 24-III-1961, leg. E. J. Fittkau; 1 larva from surface drift, Lago dos Passarinhos, Ilha do Careiro at Manaus, 31-V-1971, leg. F. Reiss; 2 males, Pa. da Terra Nova, Ilha do Careiro at Manaus, 15-III-1961, light catch, leg. E. J. Fittkau; 1 pupa (male), 2 pupae (females) with larval exuviae, experimental pond in the Reserva Duke at Manaus, VII-VIII-1981, leg. U. Nolte; 1 male, Ig. Cachoeira, Rio Cuieiras, lower Rio Negro, 15-IV-1961, leg. E. J. Fittkau; 2 males, lower Rio Negro at Ponta Negra, Manaus, 23-VI-1961, leg. E. J. Fittkau; 1 male, Amazon shore at Parintins, 9-IX-1959, light catch, leg. W. Sattler and H. Sioli; 1 male, Santarém, shore of Rio Tapajós, light catch, 27-XI-1941, leg. H. Sioli; 1 male, Rio Tapajós at the mouth of Rio Juruena, 13-I-1961, leg. E. J. Fittkau; 2 males, 1 male with exuvia, Rio Cururú in the outflow area of Rio Ziganea, collected from *Utricularia*, 24-I-1961, leg. E. J. Fittkau; 5 males at Quatipurú, Zona Bragantina, State of Pará, collected from water plants, 5-IV and 9-IV-1963, leg. E. J. Fittkau; 2 larvae, Itaparica, State of Paraíba, NE Brazil, 25-I-1935, leg. F. Lenz. Euparal slide preparations of paratypes have been deposited on the Zoologische Staatssammlung, München; collection of J. E. Sublette; British Museum (Natural History), London; Canadian National Collection, Ottawa; the U.S. National Museum; and the Zoological Museum, University of Bergen.

***Beardius truncatus* spec. nov.**

Etymology: Latin, meaning abbreviate or cut-off, referring to the apex of the 9th tergum.

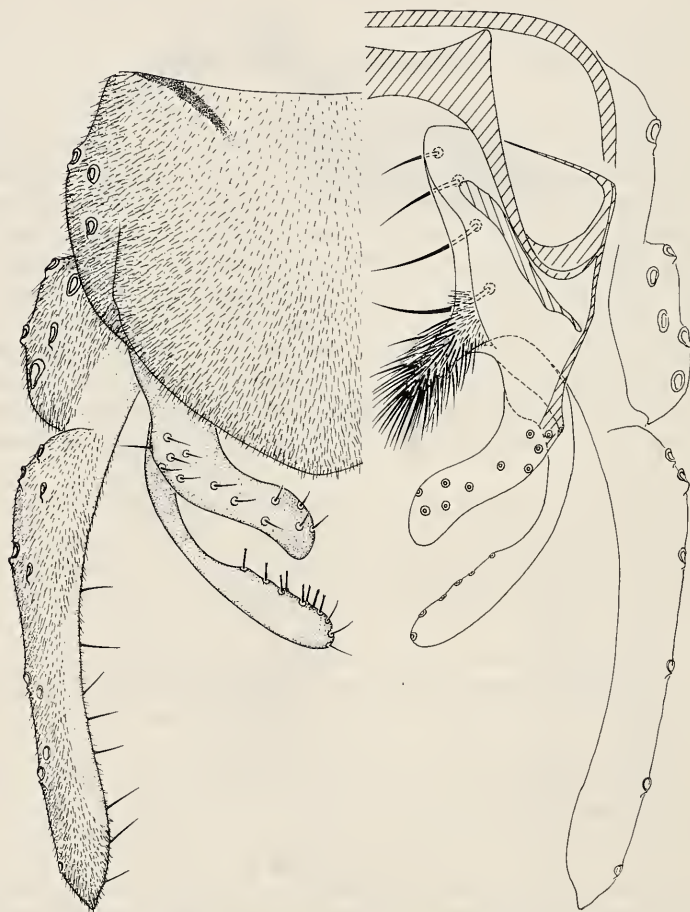


Fig. 27. *Beardius truncatus*, male genitalia, dorsal view.

Male: Coloration. All specimens were slide mounted on euparal prior to examination but some color pattern is evident: the thoracic vittae, postnotum and ventral apex of the preepisternum are pale brown; the abdomen is pale except for terga VI–VIII each of which has a narrow basal brown fascia; and the legs are pale except for the tarsi which are dark on the apex of Ta 1 of PI, all of Ta2–5 of PI, apex of Ta3 on PII and PIII and all of Ta4+5 of PII and PIII.

Head. Antennal ratio, 1.27; $n = 1$ (paratype male). Palpal proportions, 36:107:117:204 μm (paratype male). Ocular ratio, 0.28 (0.24–0.26; $n = 6$). Clypeus with 12 (9–14; $n = 10$) setae. Temporal setae 11 (8–12; $n = 10$), reaching 0.43 of the distance between the dorsal apex of the eye and the midline of the head.

Thorax. Anteprepronotum extends dorsally to the apex of the mesoscutum. Dorsocentral setae 8 (7–10; $n = 9$). Acrostichal setae 1 (2–6; $n = 9$). Prealar setae 2 ($n = 10$). Scutellum with 5 (4–6; $n = 9$) setae.

Wing. Venation similar to *B. parvus* (Fig. 14). Venarum ratio, 1.29 (1.27–1.30; $n = 6$). Wing length, 1.44 mm (1.44–1.61; $N = 8$). R with 11 (10–15; $n = 7$) setae; R1 with 3 (1–5; $n = 7$) setae; R4+5 with 7 (2–11; $n = 7$) setae.

Legs. Tibial combs similar to those of *B. parvus* (Figs. 1, 4, 5). Sensilla chaetica of Ta1 on PII, 5 (2–5; $n = 10$). Pulvilli present; almost as long as the claws. Leg ratios: PI, 1.51 (1.49–1.62; $n = 5$); PII, 0.59 (0.57–0.63; $n = 12$); PIII, 0.76 (0.77–0.79; $n = 2$); B. R., PI, 2.5 (1.39–2.10; $n = 2$).

Genitalia, Fig. 27. Gc/Gs ratio 0.62 (0.50–0.66; $n = 7$). Anal tergum weakly conical, with few basilateral setae; subapical setae absent. Superior volsella without microtrichia. Inferior volsella slender, inturned, widened at the apex. Median volsella narrowly conical, with coarse apical microtrichia.

Larva, pupa, and female adult unknown.

Diagnosis: This species differs from the other two members of the genus in having acrostichal setae, numerous R setae, sparse R1 setae, a lower PII leg ratio and a lower Gc/Gs ratio.

Holotype male: Amistad Lake, Devil's River, Val Verde Co., Texas, U.S.A., April 4, 1972, at light, M. Beard (in the collection of the Zoologische Staatssammlung, München).

Paratypes: 39 males collected with the holotype (in the collections of the U.S. National Museum, Canadian National Collections, Illinois Natural History Survey, California, Academy of Sciences, University of Bergen, Zoologische Staatssammlung, München, and that of the junior author).

***Beardius breviculus* spec. nov.**

Etymology: Latin, the diminutive of brevis, meaning short; referring to the very short microtrichia on the median volsella of the male genitalia.

Male. Coloration. Greatly faded in the macerated, slide-mounted specimen, but with narrow fasciae visible on the bases of terga VI–VIII, as in *B. truncatus*.

Head. Antennal ratio, 1.32. Palpi missing. Ocular ratio not determinable on the distorted holotype, but apparently near that of *B. truncatus*. Clypeus with 6 setae. Temporal setae 8.

Thorax. Anteprepronotum similar to *B. truncatus*. Dorsocentral setae 6. Acrostichal setae lacking. Prealar setae 3.

Wing. Somewhat distorted, but apparently very similar to the other two species described herein. Membrane with microtrichia visible at 150 \times . Venarum ratio 1.27. Wing length, 1.24 mm. R with 3 setae. R1 and R4+5 without setae.

Legs. Tibial combs similar to Figs. 1, 4, 5. Fore and hind tarsi missing. Sensilla chaetica of Ta1 on PII, 4. Pulvilli present. Leg ratio: PII, 0.75.

Abdomen. Terga sparsely setose (Fig. 29). Genitalia, Fig. 28. Anal tergum weakly conical, with few basilateral setae; subapical setae absent. Superior volsella without microtrichia. Inferior volsella slender, inturned, and widened at apex; shorter than in *B. truncatus*. Median volsella truncate-conical, with very fine microtrichia.

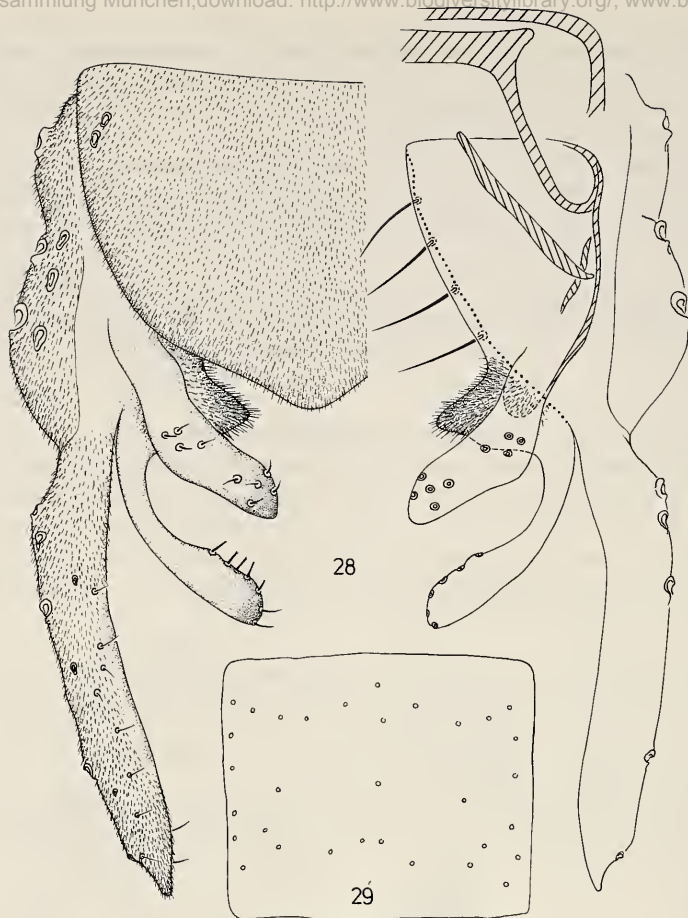


Fig. 28–29. *Beardius breviculus*, male adult. Fig. 28. Genitalia, dorsal view. Fig. 29. Abdominal tergum III.

Diagnosis (Male). This species resembles *B. parvus* in lacking acrostichal setae; it agrees with *B. truncatus* in lacking ninth tergal setae and in having a less reduced antepronotum. It differs from both in having very short microtrichia on the median volsella.

Type material. Holotype male: Naranjal, Panama, October 1, 1956, F. S. Blanton (in the U.S. National Museum collection).

Paratypes: 2 males, Camp Pina, Canal Zone (Panama), 29-IV-1954 (in the collection of Cornell University and ZSBS).

Key to male adults

1. Antepronotum apex overhung by the anterior apex of the mesoscutum; superior volsella with microtrichia; stem of inferior volsella thick (Fig. 13) *B. parvus*
- Antepronotum apex near the anterior apex of the mesoscutum; superior volsella without microtrichia; stem of inferior volsella slender (Figs. 27, 28) 2

2. Microtrichia of median volsella coarse (Fig. 27); vein R with several setae; median volsella conically produced (Fig. 27); R 1 and R 4 + 5 with sparse setae *B. truncatus*
- Microtrichia of median volsella fine (Fig. 28); vein R with sparse setae, other wing veins lacking setae; median volsella truncate-conical (Fig. 28) *B. breviculus*

Discussion

The Nearctic and Neotropical Regions contain a rich and varied chironomid fauna. In the north temperate to polar regions it has become apparent, in recent years, that a significant Holarctic element exists. A less apparent element in the Nearctic fauna is a Neotropical component which occurs largely in the southern tier of states in the United States through the Antilles or through Mexico into South America. Most of the genera common to both zoogeographic regions occur in lowlands and are essen-



Fig. 30. *Goeldichironomus holoprasinus*, distribution map.

Table 1: Synopsis of chironomid genera with primary Pan-American distribution.

Numbers represent described species, in parenthesis additional species that have been recognized as new but are as yet undescribed.

* *Asheum curticaudatum* (Rempel, 1939) nov. comb.

	Nearctic	Neotropical
Tanypodinae		
<i>Ablabesmyia annulata</i> group	1	(2)
<i>Coelotanypus</i> Kieffer	5	6 (5)
<i>Djalmabatista</i> Fittkau	1 (1)	6 (7)
<i>Labrundinia</i> Fittkau	6	(7)
<i>Larsia</i> Fittkau	6	1 (6)
<i>Pentaneura</i> Philippi	2	2
<i>Tanypus</i> Meigen	11	1
Orthoclaðiinae		
<i>Antillocladius</i> Saether	2	2
<i>Comptosmittia</i> Saether	1	1
<i>Lipumetriocnemus</i> Saether	2	1
<i>Lopescladius</i> Oliveira	2	2 (5)
Chironominae		
<i>Asheum</i> Sublette & Sublette	1	1* (2)
<i>Axarus</i> Roback	4	(2)
<i>Caladomyia</i> Säwedäl	(2)	8 (10)
<i>Goeldichironomus</i> Fittkau	5	7 (8)
<i>Hyporhygma</i> Reiss	1	(1)
<i>Nilothauma</i> Kieffer	3 (1)	(1)
<i>Nimbocera</i> Reiss	1	1
<i>Paralauterborniella</i> Lenz	3 (1)	(2)
<i>Pseudochironomus</i> Malloch	11	1 (2)
<i>Xestochironomus</i> Wirth & Sublette	2	10
<i>Zavreliella</i> Kieffer	1	11
Chironomini Genus A Roback	1	4

tially warm adapted, either limnetic or rheophilic species. As BRUNDIN (1966) has demonstrated, the cold stenothermic rheophils have not been able, for the most part, to cross the tropic-temperate lowlands. Known exceptions are the genera *Enkiefieriella* und *Pseudosmittia*.

South America contains a large number of undescribed genera and species (FITTKAU 1971, 1978; FITTKAU and REISS 1979). These have been reviewed and incorporated in Table 1. Cosmopolitan genera have been excluded. Described species are indicated by number; the additional number of undescribed new species is indicated by a number in parentheses.

Known distributions are suggestive of three probable routes of invasion from the Neotropic to the Nearctic Region: (1) via Central America and the West Indies; (2) via the Caribbean lowlands of Central America and Mexico; (3) and via the Pacific Coast of Mexico. Examples of each are: (1) a recent report (WIRTH, 1979) of *Goeldichironomus amazonicus* (Fittkau), with distribution in Brazil, Peru, Nicaragua, Panama, Mexico, West Indies, and Florida; and possibly *Cladopelma boydi* (Beck), Columbia, South Mexico, Florida (LICHTENBERG, 1979). (2) *Goeldichironomus carus* (Townes) with distribution in Columbia, Venezuela, Costa Rica, Panama, Florida and Texas (CONTRERAS-LICHTENBERG, 1982). (3) *Caladomyia* Säwedäl with species distributed in Brazil (SÄWEDÄL 1981) and southern Cali-

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