

New species of *Oukuriella* (Diptera: Chironomidae) from Costa Rica

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Received 18 August 1994; accepted in revised form 29 September 1994

Key words: Chironomidae, *Oukuriella*, Costa Rica, Neotropical, new species, systematics

Abstract

The males of three new species of *Oukuriella* Epler are described from Costa Rica. The genus had been previously recorded only from South America. *Oukuriella annamae* sp. nov. has genitalia similar to *O. albistyla* Epler, but differs in having transverse bands on abdominal segments III, IV, VI and VII, a lower AR, no humeral setae and fewer dorsocentral setae. *Oukuriella costaricense* sp. nov. differs from other described species in the genus by its brown abdomen, unnotched posterior margin of tergite IX and distinctive superior volsella, with its sharply bent, thin upper arm directed medially, and digitus small and directed caudad. *Oukuriella rushi* sp. nov. has apices of femora tipped with brown, a brown abdomen and distinctive superior volsella, with upper arm shorter and broader, and digitus longer than *O. costaricense*. The female of *Oukuriella costaricense* is also described. This is the first female described for the genus. Based on male and female genitalia, *Oukuriella* is closely related to *Epedilum* Townes and *Zavreliella* Kieffer. A key is provided to separate the males of the six described species.

Introduction

The genus *Oukuriella* Epler was originally described from specimens from Brazil, Colombia and Uruguay (Epler, 1986). In a preliminary list of Costa Rican Chironomidae, Watson & Heyn (1992) listed two unnamed species of *Oukuriella*. Mr. Michael Heyn recently made some Costa Rican specimens of *Oukuriella* available to me; the material contained three new species of this genus that are described below. Nothing is known of the biology of the members of this genus. The immature stages of *Oukuriella* remain undescribed.

Methods

Morphological terminology and abbreviations follow Sæther (1980) and Epler (1988b). Unless otherwise stated, measurements are given in μm , and consist of the range and, if four or more specimens, the mean. The structure on the inner wall of the cibarial pump previously referred to as 'cibarial setae' are termed cibarial sensillae in this paper; these minute structures appear to be sensilla chaetica and are not true setae. Epler

(1986) gave a total number of dorsocentral setae from both sides of the thorax; this paper gives an average of the setae from both sides. Latitude and longitude coordinates are presented in decimal degrees.

It must be noted that the venarum ratio, VR, given in my earlier paper (Epler, 1986) was calculated incorrectly. In that paper the formula given in Soptonis (1977) was followed. However, she had used the reciprocal of the original formula for VR as given in Fittkau (1954) and followed by Sæther (1980) ($\text{VR} = \text{length of CU divided by length M}$). Correct VR values can be obtained by dividing the values given in my previous paper into one (i.e., $1/\text{previous VR}$).

Systematics

Sæther (1980) defined humeral setae as dorsocentral setae located anterior of the parapsidal suture. Following this definition, some *Oukuriella* species possess humeral setae. These humeral setae are similar in size and appearance to the dorsocentral setae. Of the three previously described species, only *O. albistyla* possesses humeral and dorsocentral setae (Epler, 1986:

Fig. 2). Dorsocentral setal numbers in Epler (1986) were given as totals from both sides of the thorax; to comply with the descriptions in this paper the number of humeral/dorsocentral setae in those earlier descriptions should read for *O. albistyla*: 1–2 humerals, 7–10 dorsocentrals; for *O. fasciata*: 4 dorsocentrals; for *O. simulatrix*: 4–6 dorsocentrals.

With the above information, the addition of the three new species from this paper and the discovery of the female of the genus, the description of the genus may be emended as follows:

Male: Thorax sometimes with humeral setae; caudal margin of T IX usually with a pronounced medial notch.

Female: Generally similar to male, with usual sexual dimorphism. Antenna with 5 apparent flagellomeres, first two basal flagellomeres apparently fused.

Genitalia with well developed dorsomesal lobe; ventrolateral lobe reduced and displaced laterally; apodeme lobe weak, without microtrichia. S VIII with gonocoxapodeme VIII running diagonally to near mesal tip of gonapophysis VIII, forming V-shaped structure; posteromesal angle of S VIII with a shelf which extends over ventrolateral lobe. Gonocoxite IX well developed, with setae. Tergite IX rounded caudally. Segment X without setae. Labia without microtrichia. Seminal capsules large, oval with distinctly sclerotized cylindrical neck; spermathecal ducts without loops or bends.

Evidence from the female genitalia indicates that *Oukuriella* is most closely related to *Apedilum* Townes and *Zavreliella* Kieffer. All three genera possess seminal capsules with sclerotized necks and labia without microtrichia. In the cladogram of Sæther (1977: Fig. 62), the sclerotized necks of the seminal capsules were considered apomorphic for '*Lauterborniella*'. However, the species Sæther examined was *L. varipennis* (Coq.), now considered a synonym of *Zavreliella marmorata* (Van der Wulp) (Reiss, 1990). Epler (1988a) considered the sclerotized seminal capsule necks a synapomorphy shared by *Zavreliella* and *Apedilum*. Following the analysis of Sæther (1977), the absence of microtrichia on the labia would be a symplesiomorphy.

Oukuriella females can be separated from *Apedilum* and *Zavreliella* by the presence of the elongated gonocoxapodeme VIII running diagonally to near the mesal tip of gonapophysis VIII, forming a V-shaped skeletal structure; and by the lack of setae on segment X. *Oukuriella* is also similar to *Zavreliella* in that the ventrolateral lobe is vestigial and displaced lat-

erally (Sæther 1977: Fig. 73D–F; as *Lauterborniella*); in *Apedilum* the ventrolateral lobe is well developed and more mesally located (Epler, 1988a: Fig. 2). Thus *Oukuriella* and *Zavreliella* would form a sister group to *Apedilum*, and all three genera would form a sister group to *Paralauterborniella* Lenz. A cladogram depicting this hypothesized relationship is given in Fig. 9. The undescribed immature stages of *Oukuriella* will undoubtedly shed more light on the relationship of these genera.

Oukuriella annamae Epler, sp. nov.

Type locality: Río Puerto Viejo at Estacion Biológica La Selva.

Type material: Holotype: male COSTA RICA: Provincia Heredia, Estacion Biológica La Selva, Río Puerto Viejo, 10.440° N, 84.012° W, el. 30 m, 19-vi-1986, leg. Holzenthal, Heyn, Armitage. Paratype: male, COSTA RICA: Provincia Heredia, Estacion Biológica La Selva, Quebrada Sura, 10.437° N, 84.010° W, el. 50 m, 20-21-vi-1986, leg. Holzenthal, Heyn, Armitage. Holotype (D421.1T), mounted on microscope slide in Canada balsam, to be deposited in Florida State Collection of Arthropods Chironomidae collection housed at Florida A & M University, Tallahassee, Florida, U.S.A.; paratype in author's collection.

Etymology: Named for Mrs. Anna Mae Conner, Middleburg, VA, in recognition for her kindness and continuous support.

Diagnosis: *O. annamae* is distinguished by the transverse bands on abdominal segments III, IV, VI and VII, AR greater than 1.00, lack of humeral setae and 5–6 dorsocentral setae.

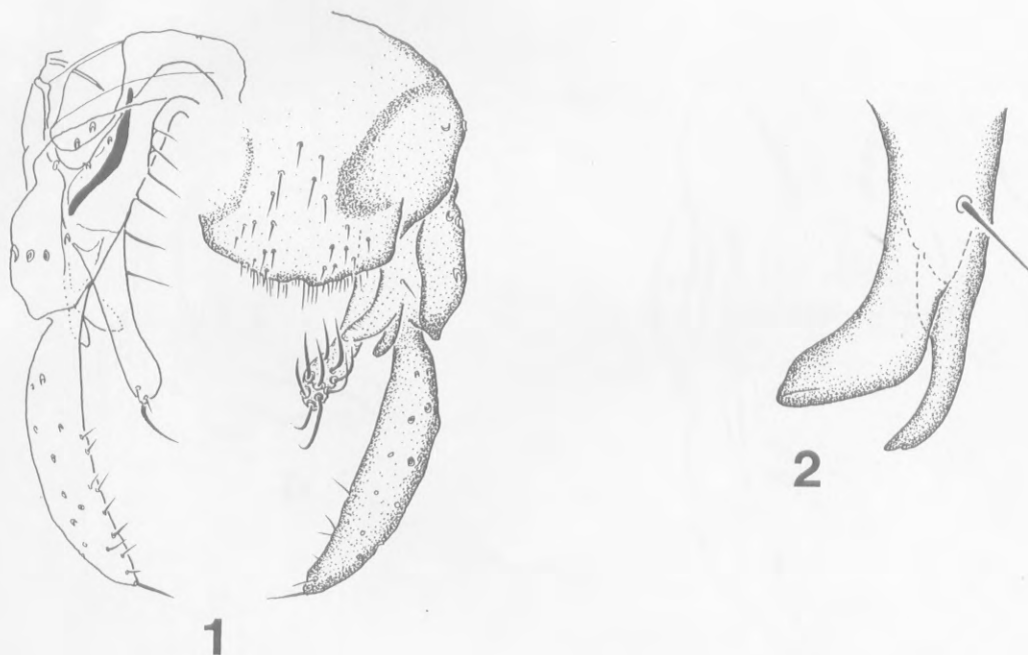
Male imago ($n = 2$; holotype and paratype):

Color: head and thorax brown; abdomen light brown with darker brown transverse bands on segments III, IV, VI and VII, gonostyli light brown; legs stramineous, with apices of fore femur and tibia brown. Wings immaculate.

Length: Total 2.65–3.01 mm; thorax 0.55–0.76 mm; abdomen 2.10–2.25 mm.

Head: Setae: temporal 7–8; clypeal 15–18. Cibarial sensillae 4. Palpomere lengths: 35–38; 38–40; 107–110; 113–122; 183–210. AR 1.23.

Thorax: Setae: acrostichals 5–7; dorsocentrals 5–6; prealars 1; scutellars 4–5. 4–5 sensilla campaniformia present along row of dorsocentral setae.



Figs 1–2. *Oukuriella annamae*. Fig. 1: Hypopygium (left, ventral view showing internal apodemes; right, dorsal view). Fig. 2: Superior volsella, dorsal.

Wing: Length 1.50–1.53 mm; width 0.42–0.45 mm. VR 1.31–1.35. Setae: R 12–13, R₁ 12–14; R₄₊₅ 14–17.

Legs: Middle metatarsus and hind metatarsus without palmate sensilla chaetica. Lengths and proportions of legs:

	P ₁	P ₂	P ₃
femur	1000–1030	1000–1010	1000–1010
tibia	660–670	780	770
ta ₁	1110–1160	560	680–690
ta ₂	800–810	260	400–405
ta ₃	530	190	320
ta ₄	430–440	130	190
LR	1.66–1.76	0.72	0.88–0.90
BV	1.47–1.48	3.66–3.67	2.48
SV	1.43–1.53	3.18–3.20	2.57–2.62

Hypopygium (Fig. 1): Posterior margin of T IX with weak median notch. Superior volsella (Fig. 2) gently curved mediad, with 1–5 sensilla chaetica on basal

portion to bend of volsella, fine microtrichia on ventromedial surface; with ventral, posteriorly directed digitus. Inferior volsella with 9 apical dorsal sensilla chaetica, 1 ventral sensillum chaeticum; with 1 lateral setae near base at about 1/3 distance from base to apex and one seta at base.

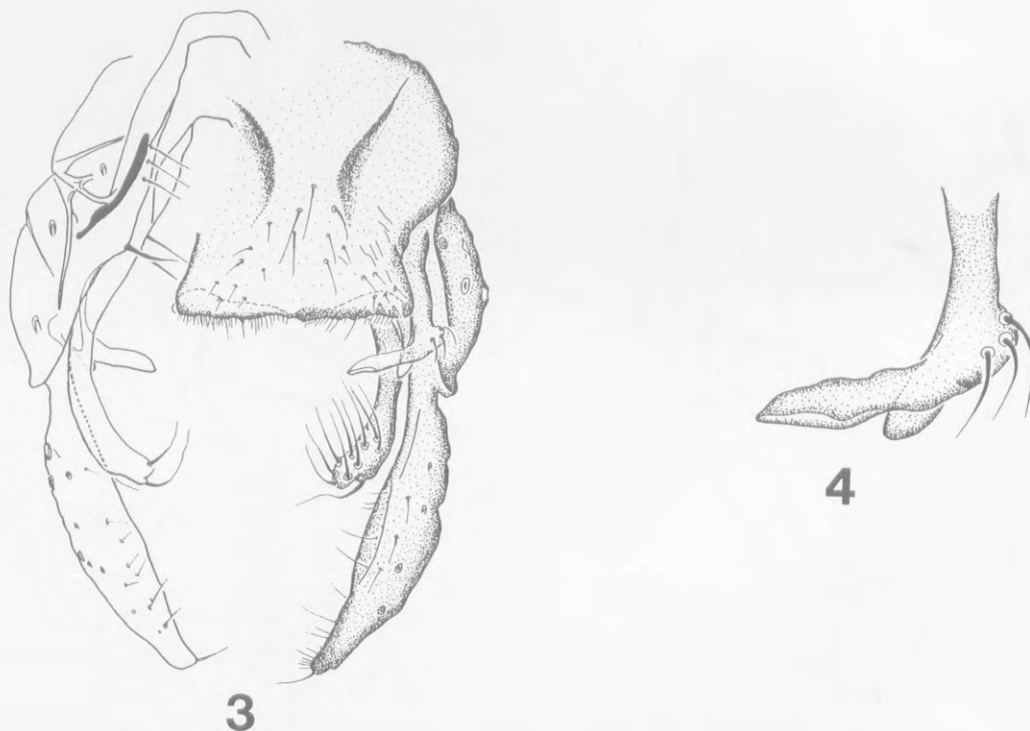
Remarks: The genitalia of this species are somewhat similar to *O. albistyla*. However, *O. annamae* lacks humeral setae and possesses transverse bands on abdominal segments III, IV, VI and VII. *Oukuriella fasciata* from Brazil also possesses transverse bands on the abdomen, but the genitalia of the two species are distinctly different (cf. Epler, 1986: Fig. 14).

The holotype specimen of *O. annamae* has only one sensillum chaeticum near the base of the superior volsella (Fig. 2); the paratype specimen has four/five sensilla chaetica (four on one volsella, five on the other) running from the bend of the volsella to near its base.

Oukuriella costaricense Epler, sp. nov.

Type locality: Río Bella Vista near Las Alturas.

Type material: Holotype: male, COSTA RICA: Provincia Puntarenas, Río Bella Vista, c. 1.5 km NW



Figs 3–4. *Oukuriella costaricensis*, male. Fig. 3: Hypopygium. Fig. 4: Superior volsella, dorsal.

of Las Alturas, 8.951° N, 82.846° W, el. 1400 m, 15-17-vi-1986, leg. Holzenthal, Heyn, Armitage. Allotype: female, COSTA RICA, Provincia Puntarenas, Río Bella Vista, c. 1.5 km NW of Las Alturas, 8.951° N, 82.846° W, el. 1400 m, 8-9-vi-1987, leg. Holzenthal, Hamilton, Heyn. Paratypes: 6 males, same data as holotype; 28 males, 1 female, same data as allotype. Holotype (D422.1T) and allotype (D422.2T) mounted on microscope slides in Canada balsam, to be deposited in Florida State Collection of Arthropods Chironomidae collection housed at Florida A & M University, Tallahassee, Florida, U.S.A. Paratypes on slides and in alcohol to be deposited in Florida State Collection of Arthropods Chironomidae collection and in author's collection.

Etymology: Named for the country of Costa Rica.

Diagnosis: The male of *O. costaricensis* is distinguished by the sparsely setose antennae with low AR (0.40–0.45), 2–3 humeral setae, the distinctive hypopygium, with truncate posterior margin and lack of prominent median notch, and by its distinctive supe-

rior volsella, with sharply bent, thin upper arm directed medially, and digitus small and directed caudad.

Male imago ($n = 3 - 5$; holotype and 4 paratypes):

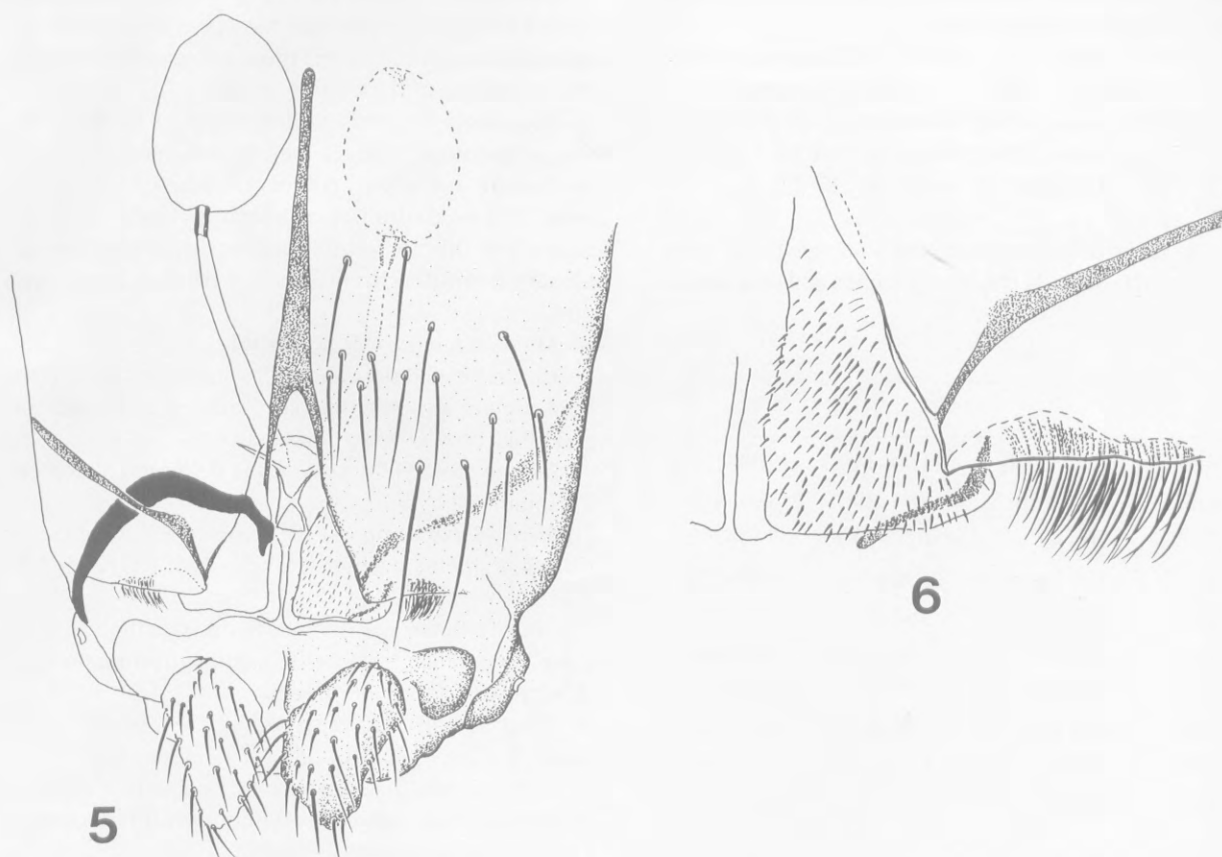
Color: head, thorax and abdomen brown, gonostyli light brown; legs stramineous. Wings immaculate.

Length: Total 2.89–3.26, 3.08 mm; thorax 0.76–0.90, 0.85 mm; abdomen 2.08–2.43, 2.24 mm.

Head: Setae: temporal 9–14, 11; clypeal 17–21, 19. Cibarial sensillae ($n = 2$) 2–3. Palpomere lengths ($n = 3$): 25–40; 35–40; 87–98; 98–113; 5th palpomere distorted, not measurable. Antennae sparsely setose; AR 0.40–0.45, 0.42.

Thorax: Setae: acrostichals 5–8, 6; humerals 2–3, 2; dorsocentrals 5–7, 6; prealars 1; scutellars 5–6, 5. 3–4 sensilla campaniformia present along row of dorsocentral setae.

Wing: Length 1.73–1.90, 1.83 mm; width 0.58–0.67; 0.63 mm. VR 1.47–1.55, 1.51. Setae: R 11–14, 13; R₁ 15–18, 16; R₄₊₅ 14–22, 18.



Figs 5–6. *Oukuriella costaricensis*, female. Fig. 5: Apex of abdomen, ventral. Fig. 6: Detail of (left to right) labia, dorsomesal lobe, apodeme, ventrolateral lobe.

Legs: Middle metatarsus and hind metatarsus without palmate sensilla chaetica. Lengths and proportions of legs:

	P ₁	P ₂	P ₃
femur	1000–1160, 1080	980–1160, 1093	1010–1170, 1074
tibia	620–700, 680	740–850, 804	760–830, 791
ta ₁	995–1130, 1069	520–570, 548	665–700
ta ₂	600–680, 647	240–270, 255	370–390
ta ₃	390–420, 409	170–190, 180	310–330
ta ₄	390–420, 404	125–145, 136	200–220
ta ₅	145–160, 154	60–70, 68	80–90
LR	1.51–1.62, 1.57	0.65–0.70, 0.68	0.84–0.87
BV	1.70–1.81, 1.77	3.76–3.90, 3.83	2.54–2.65
SV	1.58–1.69, 1.65	3.31–3.65, 3.47	2.62–2.86

Hypopygium (Fig. 3): Posterior margin of T IX apparently without median notch. Superior volsella (Fig. 4) sharply bent, thin upper arm directed mediad, with 3–4 sensilla chaetica at bend of volsella and with small ventral tooth distal of bend; with ventral, posteriorly directed digitus; volsella without fine microtrichia. Inferior volsella with 6–9 apical dorsal sensilla chaetica, 2 ventral sensilla chaetica; with 2 lateral setae near base.

Female imago ($n = 2$, allotype and paratype):

Color: head, thorax and abdomen brown; legs stramineous. Wings immaculate.

Length: Total 2.03 mm; thorax 0.73–0.78 mm; abdomen 1.25–1.30 mm.

Head: Setae: temporal 11–12; clypeal 19–23. Cibarial sensillae ($n = 1$) 4. Palpomere lengths: 35–

38; 43; 103–105; 113–115; 5th palpomere distorted, not measurable. AR 0.40–0.41.

Thorax: Setae: acrostichals 6–8; humerals 2; dorsocentrals 6–7; prealars 1; scutellars 5. 2 sensilla campaniformia present along row of dorsocentral setae.

Wing: Length 1.90–2.01 mm; width 0.66–0.69 mm. VR 1.46–1.49. Setae: R 14–17; R₁ 20–23; R₄₊₅ 40–41.

Legs: Middle metatarsus and hind metatarsus without palmate sensilla chaetica. Lengths and proportions of legs:

	P ₁	P ₂	P ₃
femur	1190–1240	1180–1190	1200–1210
tibia	730–750	885–890	880–890
ta ₁	1260 (<i>n</i> = 1)	610–640	730–790
ta ₂	830 (<i>n</i> = 1)	290	415–450
ta ₃	510 (<i>n</i> = 1)	190–200	340–355
ta ₄	460 (<i>n</i> = 1)	140–150	210–250
ta ₅	170 (<i>n</i> = 1)	70	80–90
LR	1.68 (<i>n</i> = 1)	0.69–0.72	0.83–0.89
BV	1.65 (<i>n</i> = 1)	3.83–3.89	2.55–2.66
SV	1.58 (<i>n</i> = 1)	3.25–3.39	2.66–2.85

Abdomen: Notum 138–145; cerci 78–80. Gc IX with 2–3 setae. Dorsomesal lobe, ventrolateral lobe and apodeme lobe as in Fig. 6.

Remarks: The male of this species is unusual in the elongated female-like antennae, characterized by sparse setation and a low AR; and the apparent lack of a median notch on the posterior margin of T IX. However, a weak notch is apparently present on the disto-ventral margin of the tergite, which appears to be folded under the posterior margin.

Oukuriella rushi Epler, sp. nov.

Type locality: Río Puerto Viejo at Estacion Biológica La Selva.

Type material: Holotype: male, COSTA RICA: Provincia Heredia, Estacion Biológica La Selva, Río Puerto Viejo, 10.440° N, 84.012° W, el. 30 m, 19-vi-1986, leg. Holzenthal, Heyn, Armitage. Holotype (D423.1T), mounted on microscope slide in Canada balsam, to be deposited in Florida State Collection of Arthropods Chironomidae collection housed at Florida A & M University, Tallahassee, Florida, USA.

Etymology: Named for Mr. Dennis Rush, Bende-meer, CO, a close friend who has opened his home for use as a research station and provided support throughout my studies of the Chironomidae.

Diagnosis: *O. rushi* is distinguished by its large size, palpomere 3 longer than 4, darkened apices of the femora and tibiae, AR of 1.33, lack of humeral setae, 8 dorsocentral setae, numerous dorsal sensilla chaetica on inferior volsella and superior volsella with numerous sensilla chaetica basal to bend of dorsal portion.

Male imago (*n* = 1; holotype):

Color: head, thorax and abdomen brown, gonostyli light brown; legs stramineous, with apices of femora and tibiae brown. Wings immaculate.

Length: Total 3.96 mm; thorax 0.98 mm; abdomen 2.98 mm.

Head: Setae: temporal 12; clypeal 17. Cibarial sensillae 4. Palpomere lengths: 50; 52; 145; 137; 273. AR 1.33.

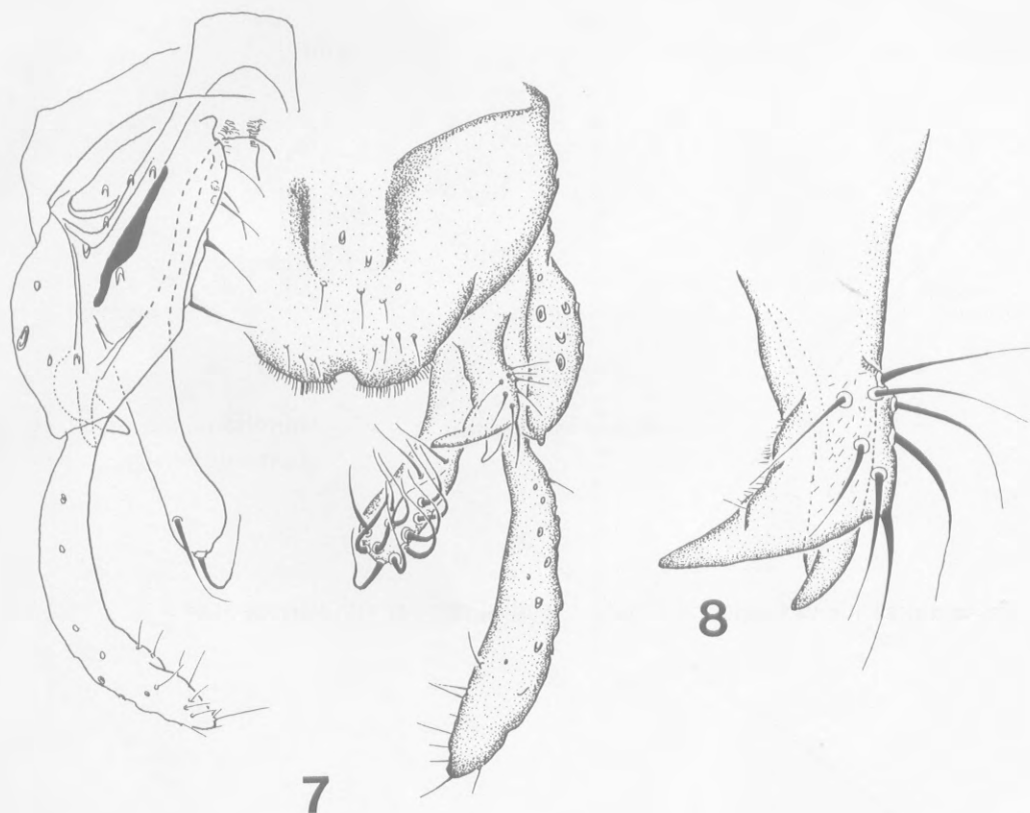
Thorax: Setae: acrostichals 5; dorsocentrals 8; prealars 1; scutellars 6. 4 sensilla campaniformia present along row of dorsocentral setae.

Wing: Length 1.78 mm; width 0.50 mm. VR 1.28. Setae: R 12, R₁ 15; R₄₊₅ 25.

Legs: Middle metatarsus with 1 palmate sensillum chaeticum; hind metatarsus without sensilla chaetica. Lengths and proportions of legs:

	P ₁	P ₂	P ₃
femur	1310	1280	1280
tibia	890	960	955
ta ₁	1360	630	810
ta ₂	980	330	500
ta ₃	690	240	375
ta ₄	560	150	230
ta ₅	220	75	95
LR	1.56	0.66	0.85
BV	1.47	3.61	2.54
SV	1.58	3.56	2.76

Hypopygium (Fig. 7): Posterior margin of T IX with well developed median notch. Superior volsella (Fig. 8) gently curved mediad, with 8 sensilla chaetica at bend of volsella, a dorsal group of fine microtrichia and microtrichia on medial surface; with ventral, posteriorly directed digitus. Inferior volsella with 16 apical dorsal sensilla chaetica, 2 ventral sensilla chaetica;



Figs 7–8. *Oukuriella rushi*. Fig. 7: Hypopygium. Fig. 8: Superior volsella, dorsal.

with 2 lateral setae near base and 1 lateral seta at about 1/8 distance from base to apex.

Remarks: *O. rushi* is very similar to *O. simulatrix*. It differs in its large size, more numerous sensilla chaetica on the superior and inferior volsellae, and palpomere 3 being longer than palpomere 4. Examination of more adult specimens and the unknown immature stages of both species will be necessary to clearly define their relationship.

Key to adult males of *Oukuriella*

- | | | |
|----|---|------------------------|
| 1 | Abdomen light brown with darker brown, transverse bands on some tergites | 2 |
| 1' | Abdomen brown, without transverse bands of darker color | 3 |
| 2 | Tergites III, IV, VI and VII with transverse bands | <i>O. annamae</i> |
| 2' | Tergites IV and VI with transverse bands | <i>O. fasciata</i> |
| 3 | AR less than 0.50; T IX without posterior medial notch (Fig. 3) | <i>O. costaricense</i> |
| 3' | AR greater than 1.00; T IX with medial notch usually well developed (Figs 1, 5) | 4 |
| 4 | Thorax with 1–2 humeral setae; femora and tibiae without darkened apices . . | <i>O. albistyla</i> |
| 4' | Thorax without humeral setae; at least fore femur and tibia with darkened apices | 5 |
| 5 | Superior volsella with 8 sensilla chaetica near bend (Fig. 8); inferior volsella with 16 dorsal sensilla chaetica (Fig. 7) | <i>O. rushi</i> |
| 5' | Superior volsella with 2–3 sensilla chaetica near bend (Epler, 1986; Fig. 12); inferior volsella with 9–11 dorsal sensilla chaetica | <i>O. simulatrix</i> |

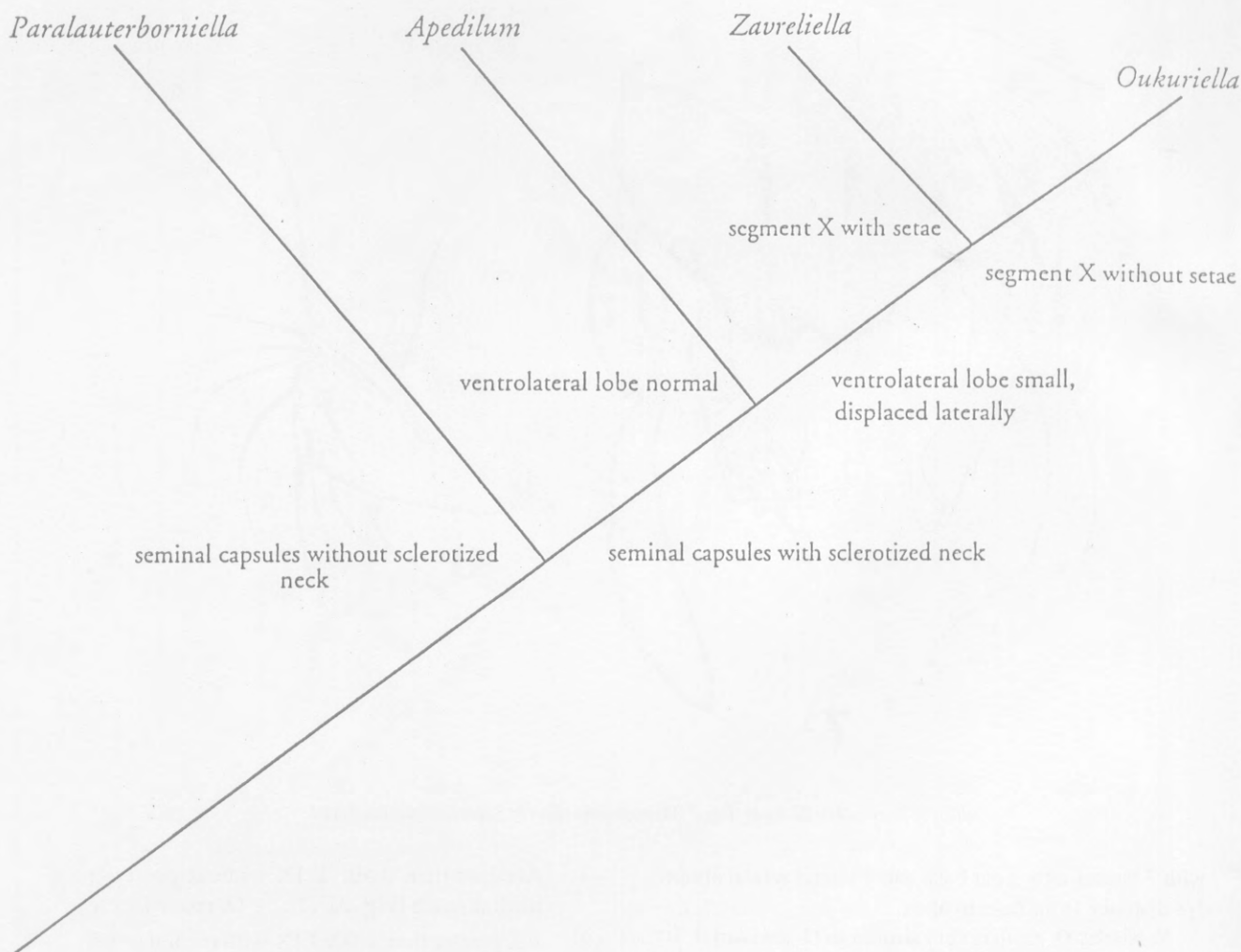


Fig. 9. Cladogram depicting hypothesized relationship between *Paralauterborniella*, *Apedilum*, *Zavreliella* and *Oukuriella* utilizing characters from the female genitalia.

Acknowledgments

I am grateful to Mr Michael Heyn, Clemson University, for making the specimens available to me. I thank Mr B. A. Caldwell, Dr. P. S. Cranston and Dr. I. R. Walker for their comments on a draft of this paper. Dr. Barry Merrill and Judy Merrill (Merrill Consultants, Dallas, TX) provided computer equipment.

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