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# A reconsideration of the genus Apedilum Townes, 1945

## (Diptera: Chironomidae)

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### Abstract

The taxonomy of the genus *Apedilum* Townes, 1945 is reviewed. The adult males and females, pupae and larvae of the two Nearctic species, *A. elachistus* Townes and *A. subcinctum* Townes, are redescribed. A key for both species in all life stages is provided, and notes on the biology of the genus are given.

### Introduction

The genus *Apedilum* was established by Townes (1945) for 2 species, *A. elachistus* Townes and *A. subcinctum* Townes (the type species). *Chironomus nigrohalteris* Malloch, 1915 was also included; this species was considered by Townes (1945: 33) to be a senior synonym of *Ch. (Lauterborniella) brachylabis* Edwards, 1929. Roback (1957: 97) noted that Lenz (1941: 48) had established the genus *Paralauterborniella* for *Ch. (L.) brachylabis*. Since then, all 3 species have been treated as members of *Paralauterborniella*. However, as demonstrated in this paper, *A. elachistus* and *A. subcinctum* are not congeneric with *P. nigrohalteris*. The genus *Apedilum* is resurrected for the species *elachistus* and *subcinctum*, and *Paralauterborniella* becomes a monotypic genus.

The larva and pupa of *A. elachistus* (as *Paralauterborniella)* were briefly described by Beck & Beck (1970); the larva and pupa of *A. subcinctum* (as *Paralauterborniella)* were figured and keyed by Darby (1962). Portions of the pupal morphology of *A. subcinctum* (as *Paralauterborniella)* were illustrated and discussed in Pinder & Reiss (1986). In this paper the adult males and females, pupae and larvae of both species are described/redescribed.

### Methodology

Terminology follows Epler (1987) and Saether (1980); methodology follows Epler (1987). The female notum was measured from the anterior apex to its posteriormost point. Means are not given for samples of less than 3; all measurements are in micrometers unless otherwise stated. Abbreviations for collections from which material was borrowed are: BC = B. A. Caldwell, Georgia Dept. Natural Resources, Atlanta, GA, USA; CN = Canadian National Collection, Ottawa, Ontario, Canada (D. R. Oliver); FS = Florida State Collection of Arthropods at Florida A & M University, Tallahassee, FL, USA; GG = G. Grodhaus, California Dept. of Health, Vector Biology and Control Section, Berkeley, CA, USA; JE = J. H. Epler; KS = State Biological Survey of Kansas, Lawrence, KS, USA (L. C. Ferrington, Jr.); ZS = Zoologische Staatssammlung, Munich, West Germany (F. Reiss).

## Biology

*Apedilum* larvae most often inhabit submerged vegetation. DARBY (1962: 145–146) and MAGY et al. (1970) give more detailed information on biology and emergence phenology for *A. subcinctum*. Mr. Broughton A. Caldwell (pers. comm., 1987) has been kind enough to provide the following information for *A. elachistus* collected in Georgia:

On collecting dates in June and August, water temperatures ranged from 25.0° to 39.0° C. The following water quality parameters were recorded from the collection site in June: flow = 0.10 cfs; D. O. = 7.2 mg/l; pH = 6.8; conductivity = 101$\mu$mho/cm; $BOD_5$ = 3.0 mg/l; fecal coliform = 4900 MPN/100 ml; total solids = 88 mg/l; suspended solids = 10 mg/l; total ammonia = 0.06 mg/l (as N); $NO_2 + NO_3$ = <0.02 mg/l (as N), and total P = 0.53 mg/l.

Collection data for *A. elachistus* in Florida indicate that adult emergence takes place year round. In addition to occurring in freshwater, I have collected *A. elachistus* larvae from submerged vegetation in a brackish pond in Florida.

## Systematics

*Apedilum* is distinguished from *Paralauterborniella* by the following characters *(Paralauterborniella* in parentheses):

adult male: superior volsella globose (digitiform), gonostyli well developed (strongly reduced);

adult female: labia without microtrichia (with microtrichia), seminal capsule with distinct neck (without distinct neck);

pupa: cephalic tubercles absent (present), no nose present on wing sheath (present), 5 lateral lamellar setae on T VIII (4);

larva: mentum with deeply bifid median tooth (dome-shaped single median tooth), S II with short basal segment (long basal segment), pecten epipharyngis a single plate (2 plates), ventromental plates finely striated (coarsely striated), maxillary plate with well defined striae (weakly defined striae), mandible with 2 dorsal teeth and well developed pecten mandibularis (no dorsal teeth and reduced pecten mandibularis) and supraanal setae approximately equal to length of anal tubules (much longer than anal tubules).

*Apedilum* is probably most closely related to *Zavreliella* Kieffer and *Paralauterborniella,* and possibly *Oukuriella* Epler, as suggested by EPLER (1986). The sclerotized neck of the seminal capsule is a synapomorphy shared with *Zavreliella* (as *Lauterborniella* in SAETHER 1977).

At least one other species of *Apedilum* occurs in the Neotropics. I have examined associated larvae and pupae from the Rio Marauiá, Amazonas, Brazil which represent a new species. Only pharate adults within their pupal exuviae were available. The genitalia were similar to those of *A. elachistus* and *A. subcinctum,* but the larvae and pupae were distinctive. The undescribed larva has 52–55 maxillary plate striae and 2 sclerotized areas on the anteromedial portion of the frontoclypeal apotome. *(A. elachistus* and *A. subcinctum* larvae have the anterolateral portions of the frontoclypeal apotome sclerotized.) The pupa has 5 lateral lamellar setae of equal width, only 11–20 T II hooklets, the T VIII caudolateral comb is a cluster of small spines, and the thoracic horn has only 3 branches. Because completely developed, associated adults are not available, a complete description is not offered at this time.

## Genus Apedilum Townes

*Apedilum* TOWNES, 1945: 32. Type-species: *Apedilum subcinctum* Townes, 1945, by original designation (misspelled as *succinctum).*

*Paralauterborniella* Lenz, 1941 (partim): ROBACK 1957: 97 (synonymized *Apedilum* with *Paralauterborniella);* PINDER & REISS 1983: 330 (larva); PINDER & REISS 1986: 341 (pupa).

Adult male.

Small chironomids, light brown to greenish-brown in general coloration. Wings with or without spots, wing length 1.1–1.8 mm.

Eyes bare. Temporal setae in single row beginning mesad to dorsomesal extension of compound eye, ending behind approximate middle of eye. Frontal tubercles minute (<2 micrometers). Antennal flagellum with 13 flagellomeres. Maxillary palp 5-segmented, basal segment weakly sclerotized. Clypeus subquadrate, setose. Cibarial setae present.

Antepronotum bare, narrowed and weakly notched dorsomesally. Thoracic scar small; humeral "pit" present as a single tubercle or 1 large tubercle with smaller tubercles, dorsocaudally to thoracic scar. Scutal tubercle absent. Acrostichal setae present in double row, anteriorly beginning close to antepronotum and running posteriorly to approximate mid-scutum. Dorsocentral setae in single row/side, with scattered sensilla campaniformia along setal row. Scutellar setae usually in 1 row. Supraalar seta 1/side. Prealar setae about 1–4/side.

Wing membrane without macrotrichia; squama without sétal fringe. Brachiolum with 1 seta and 2 groups of campaniform sensilla; R, $R_1$ and $R_{4+5}$ usually with setae, $R_{4+5}$ occasionally bare; costa ends at $R_{4+5}$; FCu distal to RM; RM oblique to $R_{4+5}$.

Metatarsal beard absent on foreleg. Foretibia without apical scale or spine. Middle and hind tibiae each with 2 combs, apparently fused; outer comb bearing one larger spine which projects beyond others. Sensilla chaetica present on metatarsus of middle leg, confined to apical 1/5; also sometimes present on apical 1/5 of hind metatarsus. Pulvilli vestigial; empodium thin, with sparse ventral fringe.

Gonostylus moderately inflated, short, slightly longer than gonocoxite, with straight inner margin; bearing several long setae along inner margin. Superior volsella well developed; globose-pediform, with microtrichia dorsally and ventrally; often membranous apically; bearing several to many large sensilla chaetica on mesal and dorsal surface. Inferior volsella well developed, elongate-digitiform, slightly arched dorsoventrally, with preapical and apical sensilla chaetica. T IX with small group of setae on each side posteriorly; anal point present or absent.

Female.

Generally similar to male; abdomen and wings stouter, and overall generally more setose than male. Antennae with 5 apparent flagellomeres. Frontal tubercles vestigial or absent.

Mid and hind metatarsi with 1–2 rows of sensilla chaetica on distal 1/2–2/3.

Genitalia with well developed dorsomesal and ventrolateral lobes; a narrow, bare apodeme lobe present. Posteromesal angle of S VIII with a shelf which extends partially over ventrolateral lobe. Labia without microtrichia. Seminal capsules spherical with distinct, more heavily sclerotized neck; spermathecal ducts without major loops or bends.

Pupa.

Small pupae, 3–5 mm long. Exuviae colorless to pale brown with light yellow-brown margins, cephalothorax darker. Cephalic tubercles absent, frontal setae well developed, lamellar. Dorsum of thorax moderately granulose, without scutal tubercle. Thoracic horn with 4 (6?) partly spinose or serrate branches; base of thoracic horn circular, with 1 apparent tracheal bundle. Thoracic setae/side: precorneal 2; dorsocentral 4 in 2 groups; median antepronotal 1; lateral antepronotal 1. Wing sheath without "nose" or at most a slight protuberance.

Abdominal segment I without lateral setae; segment II with 4 lateral hairlike setae, III with 4 lateral hairlike setae or 3 hairlike setae and 1 lamellar seta or 2 hairlike setae and 2 thin lamellar setae; IV with 2 hairlike and 2 lamellar lateral setae or 3 hairlike and 1 lamellar lateral setae; V-VII with 4 lateral lamellar setae; VIII with 5, rarely 4, lateral lamellar setae. Anal lobe with a pair of thin dorsal caudolateral setae and a fringe of 15–30 ventral lateral lamellar setae on each lobe. An uninterrupted median row of caudal hooklets on T II.

Intersegmental conjunctiva of T III/IV/V with fine to coarse spinules (usually poorly developed or absent on T III).

Caudolateral corners of VIII with one large spine or a comb of several smaller spines. Shagreen absent on T I. Dorsal shagreen on T II–VI subquadrate in outline, slightly wider anteriorly; shagreen points larger anteriorly. Segments VII and VIII with rounded anterolateral shagreen areas. Anal lobes without shagreen. Ventral shagreen present only on S VII and VIII as paired, weakly developed, round anterolateral areas. Pedes spurii A present on S IV, pedes spurii B present on segments I and II. Segments II–VIII with one dorsal and one ventral pair 0-setae.

Larva.

Small larvae, 3–5 mm long. Body greenish-gold (DARBY 1962: 145) in life. Head capsule pale yellow, with 2 pairs of eyespots.

Antenna with 6 segments, segment 4 approximately equal to 2. Antennal blade approximately as long as flagellum, with small accessory blade. Lauterborn organs well developed, alternately placed at apices of 2 and 3; a well developed style present near apex of segment 3. Ring organ present at approximate middle of basal segment.

Frontoclypeal apotome narrowed anteriorly, with anterolateral corners produced and more heavily sclerotized. Labrum with setae I–IVA+B present; S I broad, plumose, with toroidal bases joined medially; S II large, fringed, with short basal segment; S III hairlike, with small basal pedestal; S IVA small, two-segmented; S IVB smaller than S IVA, inflated, simple. Labral lamella with fringe. Pecten epipharyngis a distally broader, quadrilateral plate with 8–15 distal teeth. Premandible distally bifid, the inner blade wider than outer blade, with 1 smaller inner medial tooth; a medial premandibular brush present.

Mandible with apical tooth, 2 dorsal preapical teeth, and 3 inner teeth. Pecten mandibularis composed of 8–11 strong setae. Seta subdentalis simple, well developed, 8–15 times longer than wide. Seta interna with 4 main branches, united basally.

Mentum with deeply bifid pale median tooth and 6 pairs of darker lateral teeth; 1st lateral teeth small and appressed to 2nd lateral teeth. Ventromental plates about twice as wide as long, with smooth anterior margin and continuous fine striae. Setae submenti simple. Maxillary plate with well developed striations. Triangulum occipitale not visible in ventral view.

Lateral and ventral tubules absent; 2 pairs of conical anal tubules. Procercus about as wide as long, with 6–8 large apical setae and 2 small, fine anterolateral preapical setae. Supraanal setae subequal to anal tubules.

### Key to all stages of Nearctic Apedilum

1. Adults . . . . . 2
– Immature stages . . . . . 3
2. Wing with pale spots; male never with anal point . . . . . *A. elachistus*
– Wing immaculate; male with or without anal point . . . . . *A. subcinctum*
3. Pupae . . . . . 4
– Larvae . . . . . 5
4. Caudolateral angle of T VIII with 1 large spur or large spur with smaller basal spur (s); T VIII lateral setae of equal width (Figs. 3 d, e) . . . . . *A. elachistus*
– Caudolateral angle of T VIII with group of smaller spurs; T VIII with 1 lateral seta thinner than other 4 (Figs 3 f, g, h) . . . . . *A. subcinctum*
5. 90–105 maxillary plate striae . . . . . *A. elachistus*
– 110–125 maxillary plate striae . . . . . *A. subcinctum*

## *Apedilum elachistus* Townes

*Apedilum elachistus* Townes, 1945: 33 (adult description).
*Paralauterborniella elachista* (Townes): Sublette & Sublette 1965: 173 (placement); Beck & Beck 1970: 30 (pupa, larva description).
nec *Paralauterborniella elachista* (Townes): Darby 1962: 47, 64, 88, 143 (misdetermination of *A. subcinctum*).

Male Imago (n = 5)

Color. Head and thorax light brown to dark brown; abdomen light brown to brown suffused with green, or completely light green with light brown areas on dorsum. Legs cream to pale brown, apices of femora sometimes darker brown. Wings with pale gray spots surrounding base of $R_{4+5}$; in center and apex of $r_{4+5}$ (these 2 spots sometimes joined by a narrow bridge); along $R_{4+5}$ from approximate midpoint to apex; at FCu and extending along $Cu_1$; and below An (see Townes 1945: fig. 205).

Length. Total 2.12–2.97, 2.69 mm. Thorax 0.69–0.84, 0.80 mm. Abdomen 1.43–2.13, 1.89 mm.

Head. Setae: temporal 20–32, 26; clypeal 12–16, 14; cibarial 4. Palpomere lengths (4): 28–40, 32; 30–45, 35; 63–90, 72; 90–105, 100; 123–173, 146. AR 0.83–1.23, 1.06.

Thorax. Setae: acrostichals 10–12, 11; dorsocentrals 16–24, 20; scutellars 6–9, 7; prealars 1–4, 4.

Wing. Length 1.13–1.48, 1.38 mm; with 0.35–0.49, 0.43 mm. VR 0.74–0.78, 0.76. Setae: $R+R_1$ 8–25, 15; $R_{4+5}$ 0–19, 8.

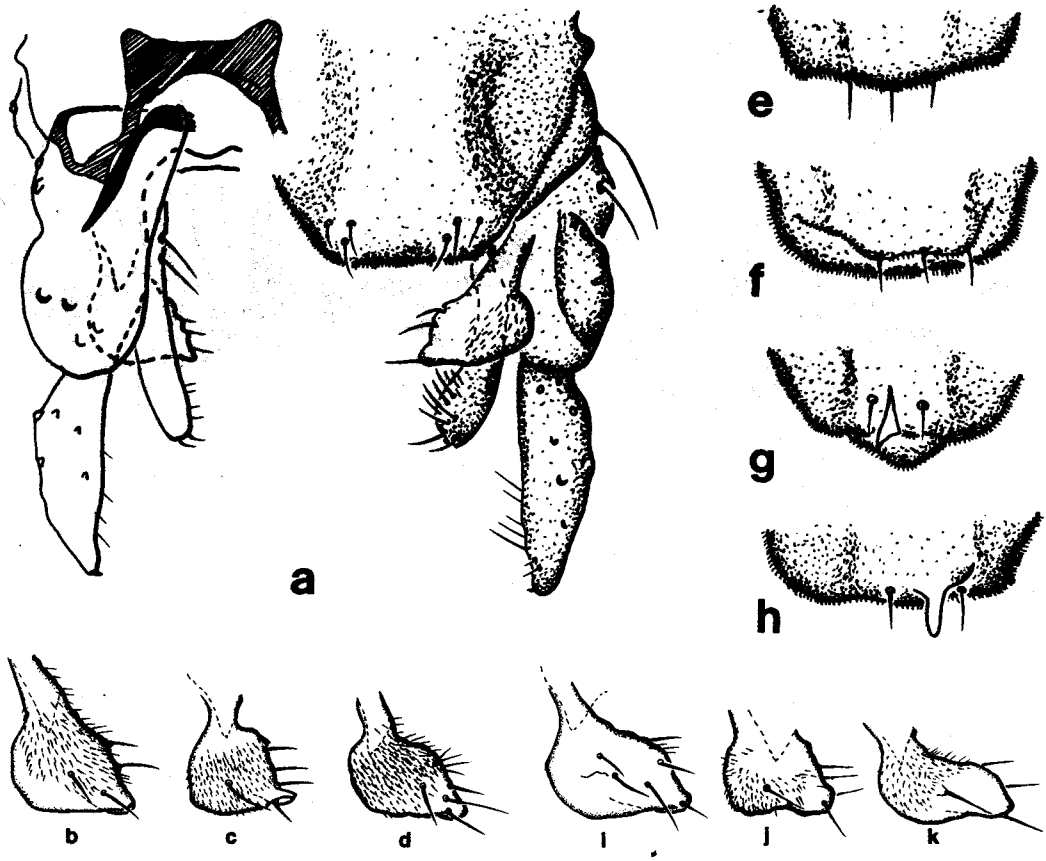


Fig. 1. Male genitalia. *A. elachistus:* a. hypopygium; b–d. variations of superior volsella. *A. subcinctum:* e–h. variations of caudal apex T IX, anal point; i–k. variations of superior volsella.

Legs. Palmate sensilla chaetica: 4–11, 7 on middle metatarsus, 0–1 on hind metatarsus. Lengths and proportions of legs:

| ♂ | fe | ti | $ta_1$ | $ta_2$ | $ta_3$ | $ta_4$ | $ta_5$ | LR | BV | SV |
|---|---|---|---|---|---|---|---|---|---|---|
| $P_1$ | 500–650, 586 | 415–550, 513 | 590–660, 618 (3) | 280–330, 297 (3) | 220–255, 232 (3) | 135–180, 152 (3) | 90–100, 93 (3) | 1.07–1.27, 1.16 (3) | 2.12–2.40, 2.29 (3) | 1.77–1.95, 1.85 (3) |
| $P_2$ | 560–725, 637 | 440–570, 511 | 290–335, 308 | 130–169, 147 | 90–115, 107 | 50–70, 65 | 40–70 60 | 0.57–0.66, 0.60 | 3.67–4.16, 3.85 | 3.45–3.89, 3.72 |
| $P_3$ | 580–750, 672 | 500–640, 602 | 380–475, 444 (4) | 190–260, 235 (4) | 170–220, 204 (4) | 90–110, 103 (4) | 60–80, 73 | 0.73–0.76, 0.74 (4) | 2.63–3.01, 2.79 (4) | 2.80–2.93, 2.85 (4) |

Hypopygium (Figs 1 a–d). As in generic description. Anal point absent.

Female Imago (n = 4)

Color. Similar to male.

Length. Total 1.85–2.17, 2.04 mm (3). Thorax 0.65–0.76, 0.71 mm (3). Abdomen 1.20–1.46, 1.33 mm (3).

Head. Setae: temporal 23–24, 24; clypeal 19–25, 23; cibarial 3–5, 4. Palpomere lengths: 22–28, 24; 23–33, 27; 53–58, 55; 70–90, 81; 113–128, 120 (3). AR 0.41–0.49, 0.45.

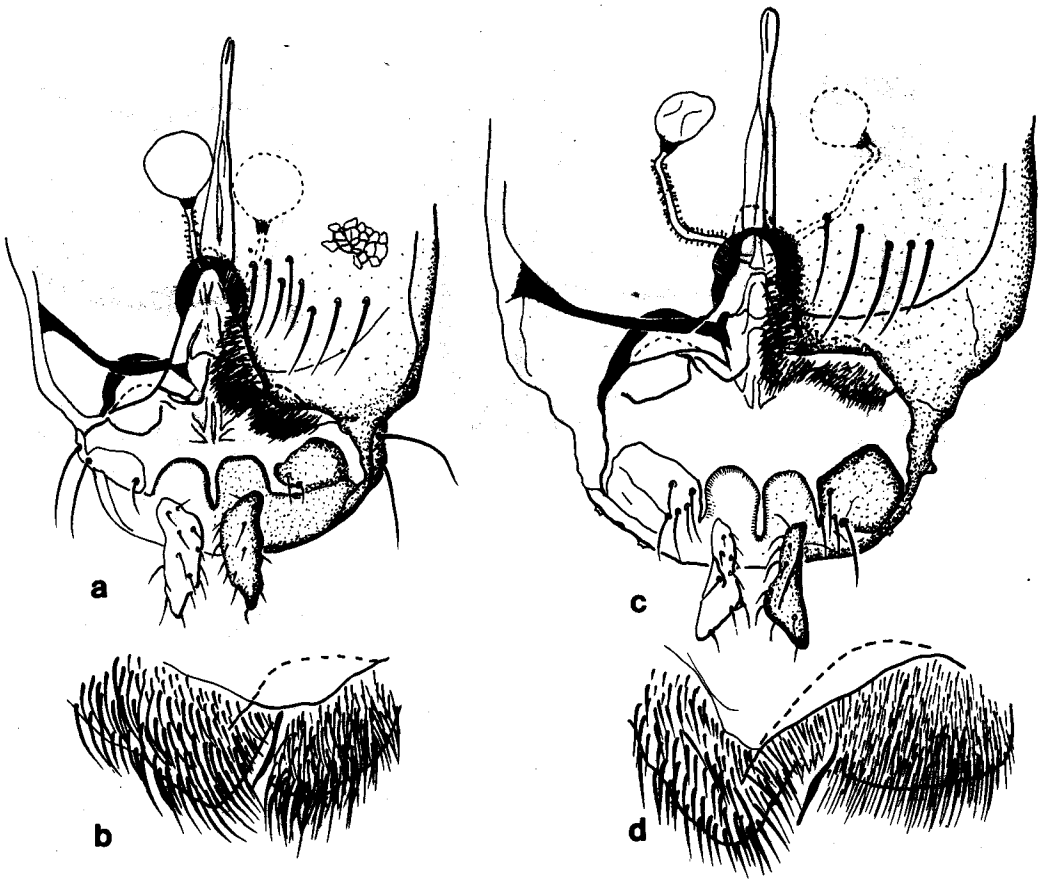


Fig. 2. Female genitalia. *A. elachistus:* a. apex of abdomen, ventral aspect; b. DmL, ApL, VlL. *A. subcinctum:* c. apex of abdomen, ventral aspect; d. DmL, ApL, VlL.

Thorax. Setae: acrostichals 6–11, 9; dorsocentrals 26–32, 29; scutellars 7–8, 8; prealars 4.

Wing. Length 1.26–1.43, 1.36 mm; width 0.48–0.54, 0.51 mm. VR 0.70–0.74, 0.72. Setae: $R+R_1$ 18–22, 20; $R_{4+5}$ 10–19, 15.

Legs. Palmate sensilla chaetica: 18–25, 21 on middle metatarsus; 17–22, 20 on hind metatarsus. Lengths and proportions of legs:

| ♀ | fe | ti | $ta_1$ | $ta_2$ | $ta_3$ | $ta_4$ | $ta_5$ | LR | BV | SV |
|---|---|---|---|---|---|---|---|---|---|---|
| $P_1$ | 460-520,<br>494 | 415-470,<br>444 | 470-520,<br>504 | 195-220,<br>211 | 140-160,<br>150 | 90-110,<br>103 | 65-75,<br>73 | 1.09-1.17,<br>1.14 | 2.65-2,74,<br>2.69 | 1.80-1.94,<br>1.86 |
| $P_2$ | 520-585,<br>561 | 420-480,<br>463 | 240-270,<br>261 | 105-130,<br>118 | 70-85,<br>79 | 40-55,<br>48 | 45-55,<br>53 | 0.56-0.57,<br>0.57 | 4.17-4.54,<br>4.35 | 3.89-3.94,<br>3.92 |
| $P_3$ | 560-630,<br>603 | 510-580,<br>553 | 350-400,<br>378 | 185-220,<br>204 | 160-190,<br>174 | 70-90<br>81 | 60-70,<br>68 | 0.68-0.69<br>0.68 | 2.85-2.99,<br>2.92 | 3.03-3.11,<br>3.06 |

Abdomen. Notum 162–175, 168; cerci 73–87, 81 long. S VIII with 5–9, 7 setae/side; T X with 12–21, 15 setae; Gc IX with 1–2 setae/side. DmL, VlL and ApL as in Figs. 2a, b.

Pupa: (n = 7)

Color. Clear with pale yellow-brown borders.

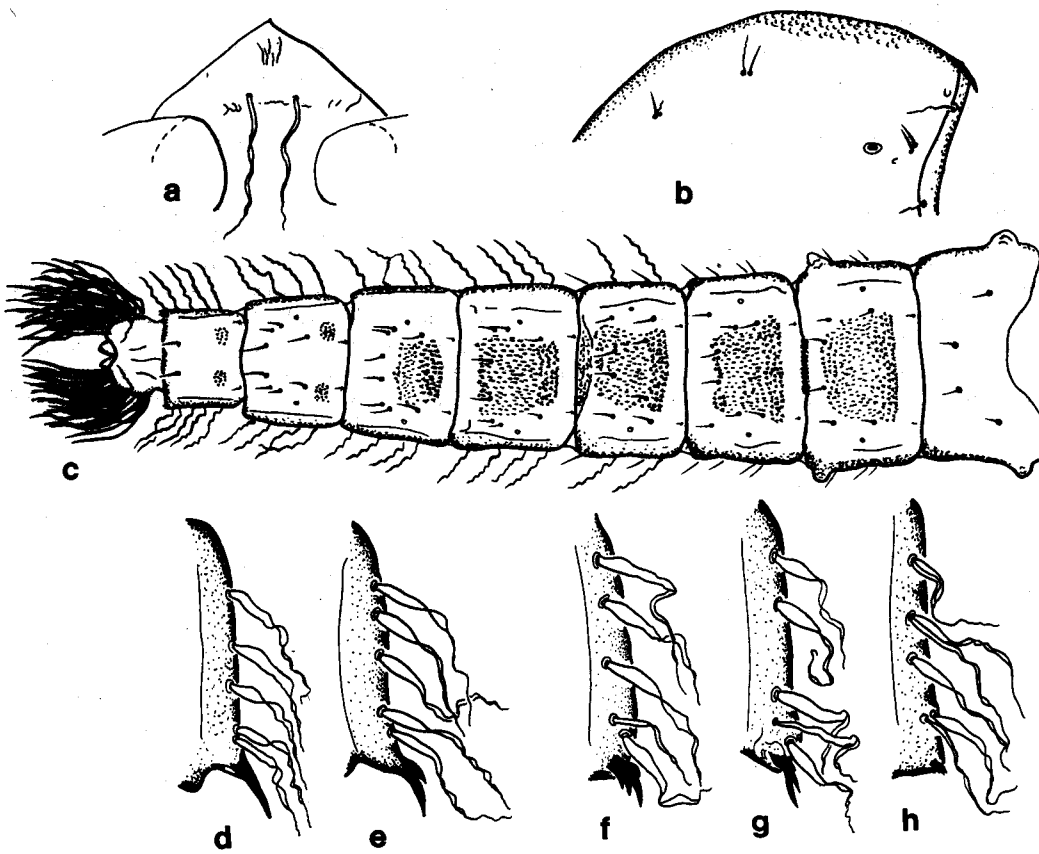


Fig. 3. Pupa. *A. subcinctum:* a. frontal apotome; c. abdomen, dorsal; f–h. lateral margin, T VIII. *A. elachistus:* b. thorax, lateral aspect; d–e. lateral margin, T VIII.

Length. Total 1.98–2.34 mm (3). Cephalothorax 0.66 mm (1). Abdomen 1.68 mm (l).

Abdomen (similar to *A. subcinctum*, Fig. 3c). Shagreen as in generic description. Posterior margin of T II with transverse row of 26–30, 28 (4) hooklets. T VIII with 5 equally sized lamellar lateral setae. Caudolateral spurs on T VIII (Figs. 3d, e) single or with small basal spurs. Anal lobes with 16–28, 20 setae. DR 1.65–3.20, 2.23.

Fourth instar larva: (n = 9)

Color. Head capsule light yellow.

Head. Postmentum length 113–125, 118 (8). Mandible (Fig. 4c) length 103–113. Pecten mandibularis composed of 8–11, 10 setae. Mentum width 80–90, 84 (5). Ventromental plate with smooth anterior margin; width 69–80, 74; length 32–37, 35; VPR 1.86–2.41, 2.13; IPD 15–18, 17 (3); PSR 4.11–5.33, 4.61 (3); 90–105, 100 (8) maxillary plate striae. Length of antennal segments (7): 60–66, 62; 13–16, 15 (6); 16–20, 17; 12–14, 13; 6–9, 7; 4–6, 5. AR 0.95–1.15, 1.05 (6). Frontoclypeal apotome as in Fig. 4b.

Remarks.

There are 2 apparent forms of adult male *A. elachistus*. Those with a low AR (0.83–0.85) have high $R+R_1$ (23–25) and $R_{4+5}$ (17–19) setal counts and a low number (4–5) of palmate sensilla chaetica on the mid metatarsus. Those with a higher AR (1.19–1.21) have 8–12 $R+R_1$ and 0–2 $R_{4+5}$ setae and a higher number (7–11) of palmate sensilla chaetica on the mid metatarsus. These differences were noted in California and Florida populations.

I have also examined 2 males from Piedra de los Indios, Colonia, Uruguay which probably are this species. The genitalia are indistinguishable from *A. elachistus* and the wing markings, although much fainter, are similar.

TOWNES (1945) also recorded *A. elachistus* from Alabama, Mississippi and its type locality in Galveston, Texas.

Material examined (BLT = black, light trap): U.S.A.: CALIFORNIA: Imperial Co., Wister Wildlife Management Area nr Niland, swarming along canal, 26-XII-1981, leg. J. H. Epler, 30 males (JE). FLORIDA: Broward Co., Plantation Canal, 9-II-1960, W. Beck, 1 larva (FS); Dade Co., Gould's Monkey Jungle, BLT, 24-IV-1968, R. E. Woodruff, 1 male (FS); Homestead, BLT, R. Baranowski, 1 male (FS); Duval Co., Jacksonville, BLT, 30-IX-1969, R. King, 12 males (FS); Hamilton Co., roadside ditch nr Occident, 6-IX-1967, W. Beck, 1 male/Pex/Lex (FS); Leon Co., Tallahassee, 2112 Faulk Dr., at light, 5-VI-1980, Leg. A. R. Soponis, 1 male (FS); Marion Co., Sharpe's Ferry Field Sta., malaise trap, 8–13-X-1975, W. R. H., 1 male (FS); Monroe Co., Big Pine Key, light trap, 10-IV-1970, W. W. Wirth, 7 males, 1 female (FS); Big Pine Key, BLT, 25-V-1978, L. Stange, 1 male (FS); Stock Island, BLT, 25-I-1967, F. A. Buchanan, 1 male (FS); Palm Beach Co., Palm Beach (residence), 4-XII-1979, R. P. Tomasello, 9 males, 3 females (FS); St. John's Co., St. John's River, W. Beck, 1 male/Pex/Lex (FS); Taylor Co., Hickory Mounds Impoundment, 20-II-1983, leg. J. H. Epler, 51 males (JE); Wakulla Co., St. Marks Natl. Wldlf. Ref., lighthouse pool, 19-IV-1980, swarms totaling approx. 600 males & females (JE); same locality & collector, 30-IV-1980, 37 males, 1 female (JE); same locality & collector, BLT, 30-V-1980, 66 males, 3 females (JE); same locality & collector, 6-II-1983, 80 males (JE); same locality & collector, 8-III-1986, 1 larva (JE); St. Marks Natl. Wldlf. Ref., Stony Bayou Pool, 23-IX, 27-X-1984, leg. J. H. Epler, 75 males (JE); St. Marks Natl. Wldlf. Ref., Nature Trail, 25-XII-1984, leg. J. H. Epler, 14 males (JE). Also probably from FL: 5 males/Pex/Lex – no data – (FS). GEORGIA: Pierce Co., Sixty Foot Branch 1.0 mi downstream of confluence "Patterson Creek", 18-VI-1986, leg. B. A. Caldwell & V. Barnes, 2 pupae, 5 larvae (BC); same locality, 20-VIII-1986, leg. B. A. Caldwell & C. Stevens, 1 pharate female pupa/Lex (BC).

## *Apedilum subcinctum* Townes

*Apedilum subcinctum* TOWNES, 1945: 33 (adult description).

*Paralauterborniella subcincta* (Townes): SUBLETTE 1960: 202 (adult description, placement); DARBY 1962: 47, 64, 88, 143 (figures of larva, pupa, adult; biology); SUBLETTE & SUBLETTE 1965: 173 (placement); MAGY, et al. 1970:

115 (biology; although often cited as pp. 116–119, a note from Grodhaus on the reprint indicates original pagination was 115–119).

*Paralauterborniella subcincta alamedensis* Sublette, 1960: 203 (description of variant subspecies).

Male Imago (n = 5)

Color. Head and thorax brown to almost black; abdomen light brown to dark brown, sometimes suffused with green, or completely green with light brown areas on dorsum. Legs pale brown, base of femora sometimes lighter; femora darker than remainder of leg. Wings immaculate.

Length. Total 2.43–3.20, 2.74 mm (4). Thorax 0.68–0.90, 0.70 mm (4). Abdomen 1.75–2.30, 1.95 mm.

Head. Setae: temporal 18–38, 28 (4); clypeal 13–22, 18 (4); cibarial 4–5, 4 (3). Palpomere lengths (4): 40–49, 44; 33–58, 43; 85–161, 116; 88–150, 116; 140–180, 164 (3). AR 0.66–1.59, 1.15 (4).

Thorax. Setae: acrostichals 9–12, 11; dorsocentrals 15–30, 21; scutellars 6–10, 8; prealars 3–4, 4.

Wing. Length 1.25–1.73, 1.48 mm; width 0.37–0.46, 0.41 mm. VR 0.78–0.81, 0.79 (3). Setae: $R+R_1$ 13–16, 15 (3); $R_{4+5}$ 1–22, 9.

Legs. Palmate sensilla chaetica: 4–7, 6 on middle metatarsus, 0–2 on hind metatarsus. Lengths and proportions of legs (4):

| | fe | ti | $ta_1$ | $ta_2$ | $ta_3$ | $ta_4$ | $ta_5$ | LR | BV | SV |
|---|---|---|---|---|---|---|---|---|---|---|
| $P_1$ | 600–740, 655 | 460–680, 583 | 570–650, 608 | 280–360, 320 | 215–270, 243 | 140–185, 165 | 85–105, 96 | 0.96–1.28, 1.06 | 2.16–2.29, 2.24 | 1.80–2.18, 2.03 |
| $P_2$ | 650–800, 718 | 515–665, 595 | 310–360, 329 | 140–205, 178 | 105–160, 136 | 65–100, 88 | 60–80, 74 | 0.53–0.60, 0.55 | 3.31–3.99, 3.49 | 3.76–4.09, 3.99 |
| $P_3$ | 670–890, 790 | 580–790, 696 | 410–560, 490 (3) | 220–330, 280 (3) | 190–290, 243 (3) | 95–160, 132 (3) | 65–95, 83 (3) | 0.71–0.72, 0.71 | 2.55–2.91, 2.68 (3) | 2.96–3.05, 3.00 (3) |

Hypopygium (similar to *A. elachistus*, Fig. 1a). As in generic description; with or without anal point (Figs. 1e–h)

Female Imago (n = 5)

Color. Similar to male.

Length. Total 1.67–2.19 mm (2). Thorax 0.74–0.87, 0.82 mm (4). Abdomen 0.93–1.35 mm (2).

Head. Setae: temporal 20–23, 22 (3); clypeal 15–16, 16 (3); cibarial 4 (3). Palpomere lengths: 28–35, 31 (3); 38–42, 39 (3); 105 (2); 110–118 (2); 167 (1). AR 0.47–0.53, 0.49 (4).

Thorax. Setae: acrostichals 9–12, 10 (4); dorsocentrals 24–40, 34; scutellars 7–11, 10; prealars 4.

Wing. Length 1.56–1.73, 1.63 mm; width 0.57–0.61, 0.59 mm. VR 0.76–0.79, 0.78. Setae: $R+R_1$ 21–26, 23; $R_{4+5}$ 25–41, 31.

Legs. Palmate sensilla chaetica: 19–24, 22 on middle metatarsus; 17–24, 20 on hind metatarsus. Lengths and proportions of legs (4):

| | fe | ti | $ta_1$ | $ta_2$ | $ta_3$ | $ta_4$ | $ta_5$ | LR | BV | SV |
|---|---|---|---|---|---|---|---|---|---|---|
| $P_1$ | 550–620, 580 | 460–580, 531 | 495–575, 543 | 240–280, 263 | 170–215, 189 | 110–145, 121 | 80–90, 86 | 0.95–1.22, 1.03 | 2.15–2.71, 2.52 | 1.80–2.33, 2.09 |
| $P_2$ | 660–760, 709 | 545–645, 591 | 300–330, 313 | 150–170, 158 | 110–125, 116 | 70–85, 75 | 60–75, 69 | 0.51–0.55, 0.53 | 3.81–3.90, 3.86 | 4.02–4.26, 4.16 |
| $P_3$ | 680–820, 751 | 620–750, 691 | 430–525, 483 | 245–355, 289 | 200–230, 216 | 105–120, 111 | 80–100, 89 | 0.69–0.70, 0.70 | 2.47–2.88, 2.73 | 2.95–3.02, 2.99 |

Abdomen. Notum 163–173, 168 (3); cerci 85–93, 90 (3) long. S VIII with 5 setae/side (3); T X with 15–22 (2) setae; Gc IX with 1 seta/side (2). DmL, VlL and ApL as in Figs. 2c, d.

Pupa: (n = 9)

Color. Clear with pale yellow-brown borders.

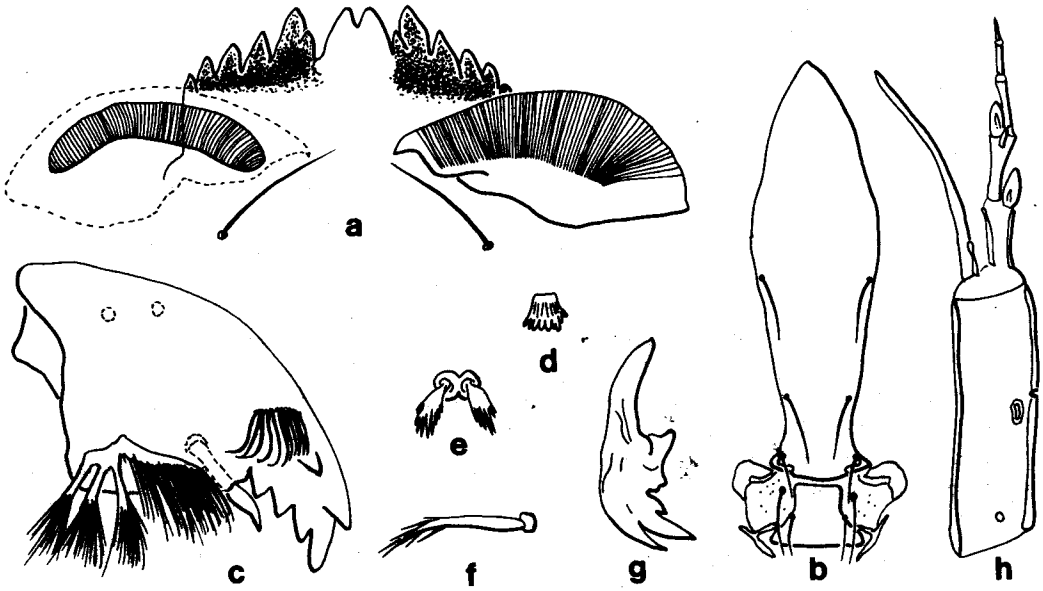


Fig. 4. Larva. *A. elachistus:* a. mentum, maxillary plate striae (left), ventromental plate striae (right); b. frontoclypeal apotome; c. mandible; d. pecten epipharyngis; e. S I; f. S II; g. premandible; h. antenna.

Length. Total 2.56–3.14, 2.88 mm (5). Cephalothorax 0.74–0.93, 0.80 mm (5). Abdomen 1.81–2.79, 2.20 mm (6).

Abdomen (Fig. 3c). Shagreen as in generic description. Posterior margin of T II with transverse row of 20–35, 28 hooklets. T VIII with 5 lamellar lateral setae, one of which is usually narrower than the others; occasionally some setae are bifid (Figs. 3f–h). Caudolateral spurs on T VIII (Figs. 3f–h) a comb of small spines. Anal lobes with 20–28, 24 setae. DR 1.63–3.29, 2.22.

Fourth instar Larva: (n = 6)

Color. Head capsule light yellow.

Head. Postmentum length 116–148, 133 (5). Mandible length 108–133 (3). Pecten mandibularis composed of 9–11, 10 setae. Mentum with 68–96, 80 (4). Ventromental plate with smooth anterior margin; width 71–87, 82 (5); length 37–44, 42 (4); VPR 1.97–2.21, 2.06 (4); IPD 16–25, 22 (4); PSR 3.28–4.44, 3.72 (4); 110–125, 118 maxillary plate striae. Length of antennal segments (5): 59–79, 69; 15–17, 16; 16–18, 17; 14–19, 16; 8–10, 9 (4); 5–6, 6 (4). AR 0.91-1.13, 1.00 (4). Frontoclypeal apotome similar to *A. elachistus* (Fig. 4b).

Remarks.

Townes (1945: 33) stated that the genitalia of *A. subcinctum* were similar to *A. elachistus* except for the presence of an anal point and "the slightly longer superior appendage". Measurements of the length and width of the superior volsellae revealed no significant differences between the 2 species in the length or width of the superior volsellae.

The male's anal point may be present or absent. Sublette (1960: 202) believed that the presence or absence of an anal point was due to differences in mounting technique. I have found that this generally is not the case with this species. Although the anal point, when present, may be dislocated laterally due to cover slip pressure (Fig. 1g), many specimens I examined possessed no anal point (Figs. 1e, f). No differences were noted in the immature stages associated with males with or without anal points. Darby (1962) encountered pointless males in his study and considered them to belong to *A. elachistus;*

however, the lack of wing spots, as noted by Darby, and the illustrated pupal T VIII spurs (Darby 1962: fig. 137) identify his specimens as *A. subcinctum*.

Although Darby (1962: fig 136a) illustrated a pupal thoracic horn with 6 branches, I have not been able to discern more than 4 branches on the thoracic horn of either *A. subcinctum* or *A. elachistus*.

Magy et al. (1970) have noted that at times of peak emergence, *A. subcinctum* can be considered a pest species.

Townes (1945) also recorded this species from its type locality in Reno, Nevada.

Material examined: Canada: ONTARIO: Marmora, 1-VII-1952, J. Vockeroth, 3 males (CN). Mexico: JALISCO: Guadalajara, Zucht aus Springbrunnen, 15-V-1981, leg. H. Fittkau, 1 male/Pex, 2 Pex (ZS). U.S.A.: ARIZONA: Coconino Co., Lake Elaine nr Flagstaff, light trap, 15-X-1986, K. Brenneman & H. Speidel, 2 males (JE). CALIFORNIA: Imperial Co., Hot Mineral, pool from hot spring overflow, 29-III-1967, leg. R. Soroker & G. Grodhaus, 1 male/Pex, 1 pharate male pupa/Lex, 2 larvae (GG); Lassen Co., 3 mi. SE Johnstonville, reared from *Typha* leaf, leg. G. Grodhaus, 1 male, 1 female, 1 pharate male pupa/Lex, 2 Pex, 1 larva (GG); Merced Co., Los Banos Reservoir, 1-V, 28-VII-1968, E. W. Mortenson, 3 males (GG); San Luis Obispo Co., San Luis Obispo, Laguna Lake, 30-VII-1964, 1 female (GG); same locality, 20-VII-1966, leg. G. Grodhaus, 1 male, 1 pharate male pupa (GG); same locality & collector, 26-VIII-1965, 1 pharate male pupa, 1 larva (GG); same locality, light trap, 8-IX-1965, leg. J. Montez, 2 males (CN); Solano Co., Vallejo, Lake Dalwigk, 2 males, 3 females, 2 larvae (GG). KANSAS: Barber Co., North Elm Creek, 12.0 mi. N, 7.0 mi. W of Medicine Lodge, 10-VIII-1981, leg. J. Gelhaus, 1 male (KS); Montgomery Co., Verdigris River, 3.0 mi. E, 2.5 mi. S of Independence, 23-VIII-1980, leg. J. Gelhaus, 1 male (KS). NEW MEXICO: Albuquerque, drainage ditch nr Rio Grande, 20-IV-1967, 1 male/Pex/Lex (CN).


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