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WYEOMYIA (*NUNEZIA*) *PAUCARTAMBOENSIS,* A NEW SPECIES OF SABETHINI (DIPTERA: CULICIDAE) FROM THE PERUVIAN ANDES WITH A DIAGNOSIS OF THE SUBGENUS *NUNEZIA*

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Abstract.—***Wyeomyia* (*Nunezia*) *paucartamboensis* Porter, new species** is described from specimens reared from tank bromeliads growing in humid premontane forest on the eastern slopes of the Peruvian Andes. The description, with relevant illustrations and images, is of the adult male and female, as well as of the pupal and fourth-instar larval stages. In addition, a diagnosis of the subgenus *Nunezia* is presented with emphasis on differentiation from other subgenera of *Wyeomyia*.

Key Words: mosquito, Neotropical, taxonomy, bromeliads

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The subgenus *Nunezia* Dyar, 1928 of the genus *Wyeomyia* Theobald, 1901 was established for *Dendromyia* (*Eunicemyia*) *bicornis* Root 1928 (*In* Dyar 1928). Subsequently, *Nunezia* was placed in synonymy by Edwards (1932) under the subgenus *Wyeomyia*. However, Lane and Cerqueira (1942) resurrected *Nunezia* as a valid subgenus of the genus *Wyeomyia* and at the same time included a second species, *Wy. lateralis* Petrocchi, 1927 (*In* Shannon and Del Ponte 1927). *Wyeomyia trujilloi* Pulido and Sutil, 1981 was synonymized with *Wy. bicornis* by Navarro and Liria (2007). *Wyeomyia lateralis* was described on the basis of 3 females from Zapla in the Argentine province of Jujuy. Neither the male nor the immature stages of *Wy. lateralis* have been described, and the type female apparently no longer exists (Belkin et al. 1968). The original description of *Wy. bicornis* was based on a male and a larva, without illustration, from Ocumare de la Costa, Aragua, Venezuela (Belkin et al. 1968). Lane and Cerqueira (1942) added a description of the female and also the locality of Moyobamba, Peru. Incomplete descriptions of the male genitalia and fourth-instar larva of *Wy. bicornis* were presented by Lane (1953) and Navarro and Liria (2007); the latter authors also illustrated the pupa.

Based on described, as well as several undescribed species, the subgenus *Nunezia* may be characterized as one associated primarily with moderate to relatively high altitudes (to at least 2,700 m) in South America, although one undescribed species occurs in the lowlands of

the Colombian Choco. The larval stages of all known species develop in bromeliads and females are aggressively anthropophilic.

The new species described here is from the eastern foothills of the Peruvian Andes at elevations ranging from 1,098–1,426 m. This species was encountered during a survey of mosquitoes along an elevation gradient undertaken primarily in Paucartambo Province of the Cusco Region, with emphasis on species associated with phytotelmata.

Material and Methods

Descriptions are based on specimens collected as larvae or pupae from bromeliads, many of which were subsequently reared to adults. With exception of certain observations pertaining to adults, i.e., color and distribution of scales and certain setae, the descriptions are based on specimens mounted in Euparal on microscope slides following, with modifications, procedures described by Pecor and Gaffigan (1997). Microscope slide-mounted specimens were examined using bright field and phase contrast microscopy, and pinned (pointed) adults were observed under simulated natural light. SEM images were created using a FEI Environmental Scanning Electron Microscope, model XL30.

The terminology of Harbach and Knight (1980) and Harbach and Kitching (1998) is followed with regard to morphological characters and the numbering system for chaetotaxy. Measurements and numbers are from at least 10 specimens (20 setae); any exceptions are noted. The number of branches possessed by most setae is readily apparent; although due to their size or position, a few setae, such as abdominal setae 11, may be difficult to evaluate. The lengths of setae are often given, but they should be considered as estimates and are primarily for general comparisons. Clarification of certain measurements may be found in Porter 2009. In addition, for the pupal stage, length of the male and female genital lobes is measured from the distal margin (viewed ventrally) of sternum IX. Abbreviations used in the descriptions include tergum VIII width (TW), tergum VIII length (TL), sternum VIII width (SW), and sternum VIII length (SL).

In the material examined section, individual samples and individual specimens associated with each sample are presented as follows using PE08232–09 as an example: PE, Peru; 08, Región Cusco; 232, sample number; –09, specimen number. Also, "same as preceding" indicates collection data is the same as the previous sample except as described, often the only distinction being a different sample. Life stages are represented by the following symbols and abbreviations: ♂, male; ♀, female; L, fourth-instar larva; Le, fourth-instar larval exuviae; P, pupa; Pe, pupal exuviae. The letter G designates genitalia and is used in combination with the sex symbols.

The holotype is deposited in the Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru. Paratypes are deposited in the National Museum of Natural History (USNM), Smithsonian Institution, Washington, D.C., USA.

Results and Discussion

Wyeomyia (*Nunezia*) *paucartamboensis* Porter, new species

(Figs. 1–5)

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Description.—Male. *Head:* A prominent strip of broad, bright white scales extends along edge of compound eyes from dorsal surface of vertex to postgena, interrupted by small cluster of darker scales subdorsally. Darker scales with blue to greenish-yellow iridescence

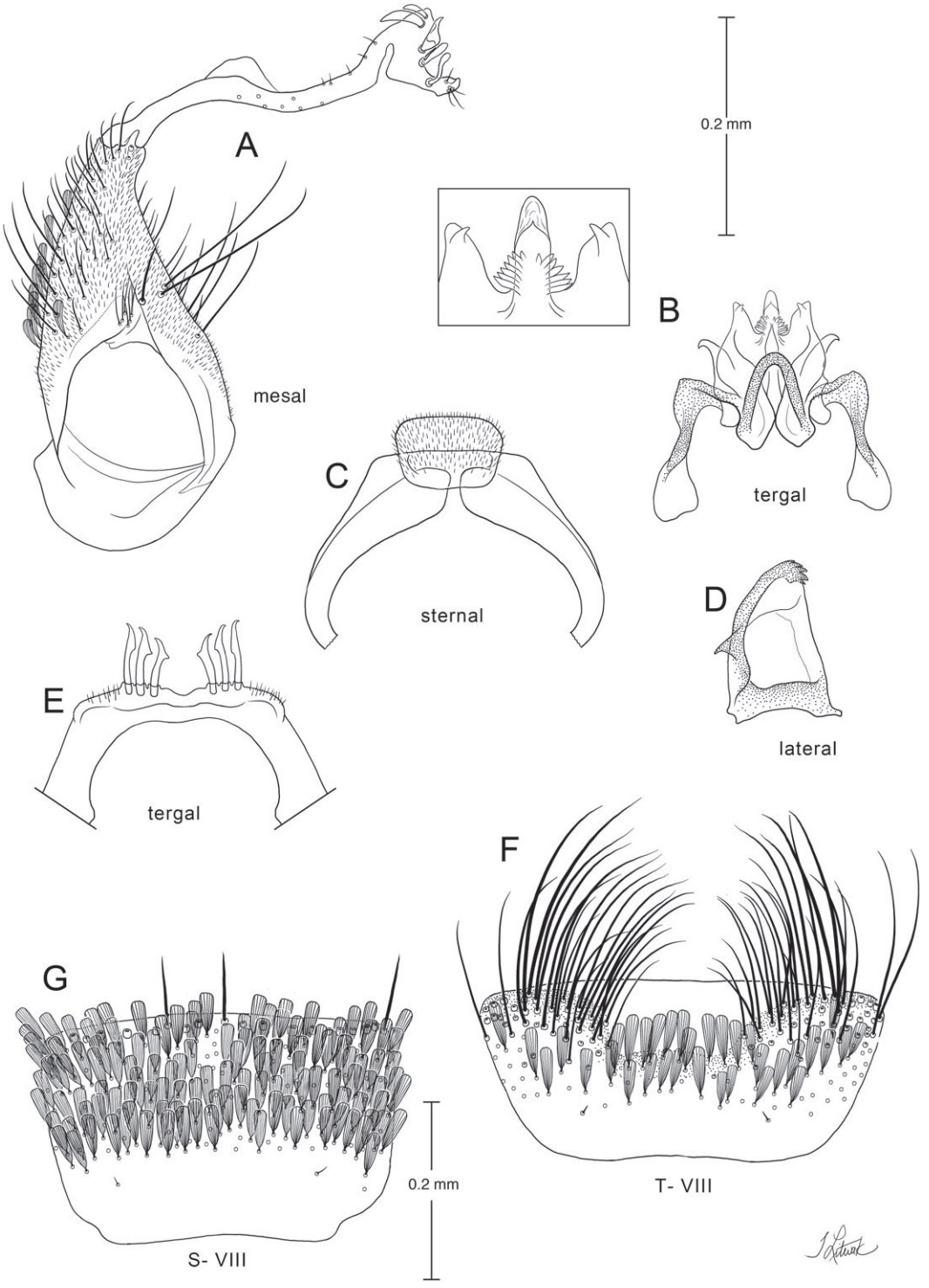
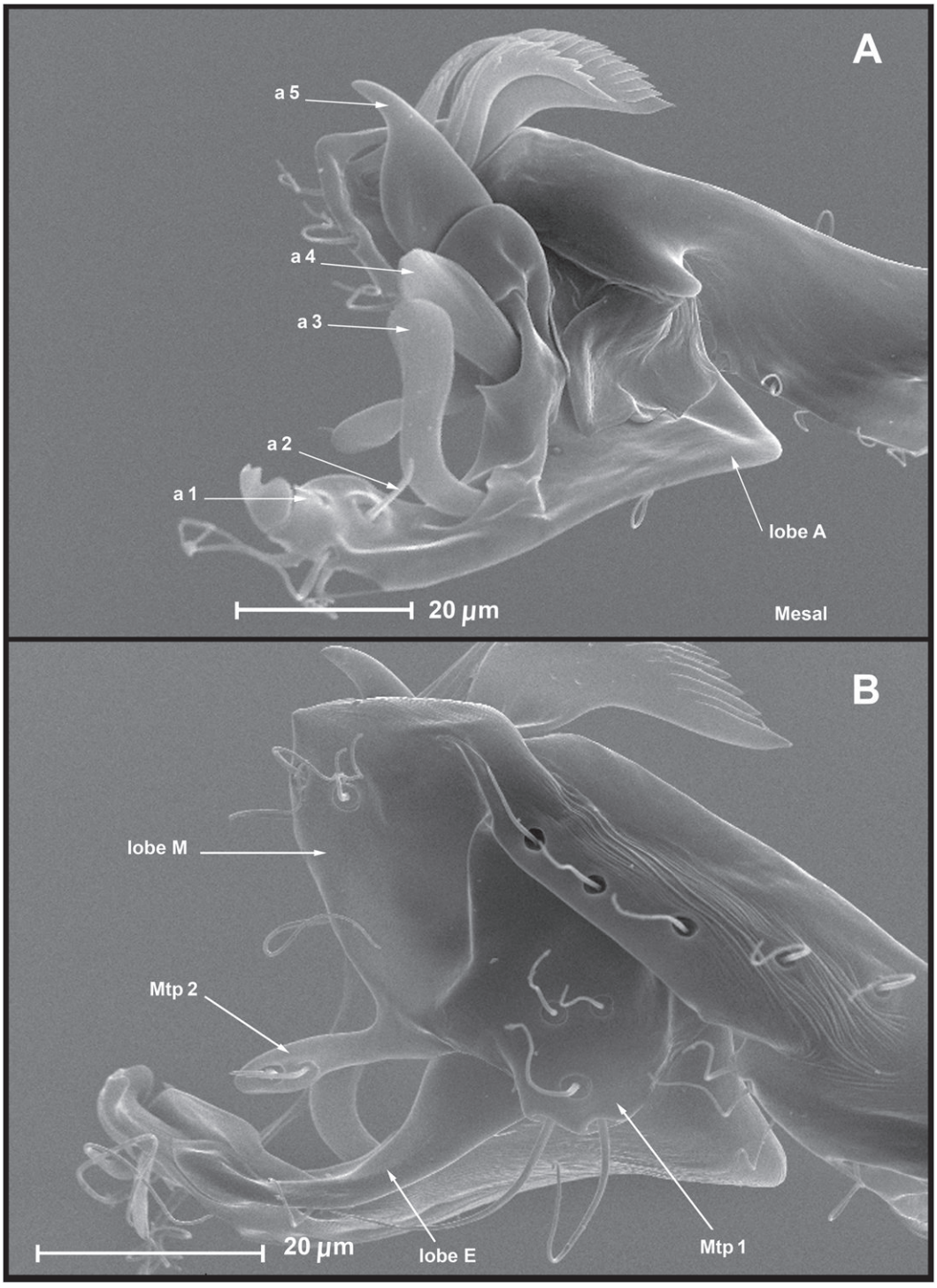


Fig. 1. Male genitalia (A–E), tergum VIII (F) and sternum VIII (G) of *Wyeomyia paucartamboensis*. Aspects as indicated: A, Gonocoxite and gonostylus; B, Aedeagus with parameres and basal pieces attached; C, Sternum IX; D, Proctiger; E, Tergum IX.



Figs. 2. *Wyeomyia paucartamboensis* male: SEM of head of gonostylus. A, mesal view. B, lateral view. Lobe A, tergal lobe; a1–a5, specialized setae on sternal edge of lobe A. Lobe M, lateral lobe. Lobe E, arises between lobes A and M. Mtp1, lobe M tergal process 1. Mtp2, lobe M tergal process 2.

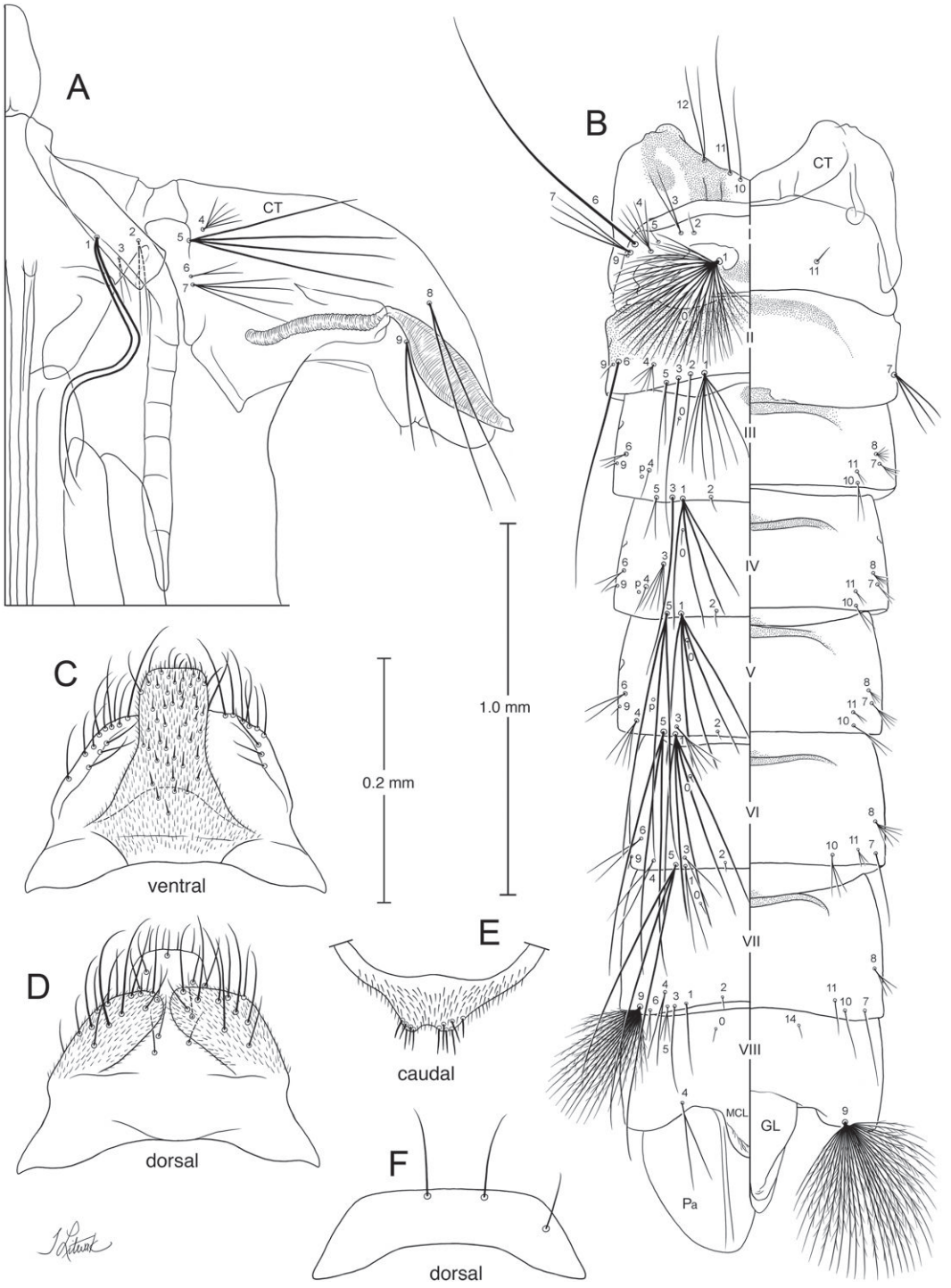


Fig. 3. A, B; Pupa of *Wyeomyia paucartamboensis*: A, left side of cephalothorax, dorsal to right; B, dorsal (left) and ventral (right) aspects of metathorax and abdomen. C–F. Female genitalia, aspects as indicated: C, postgenital lobe and cerci; D, cerci with post genital lobe; E, Insula; F, Tergum IX.

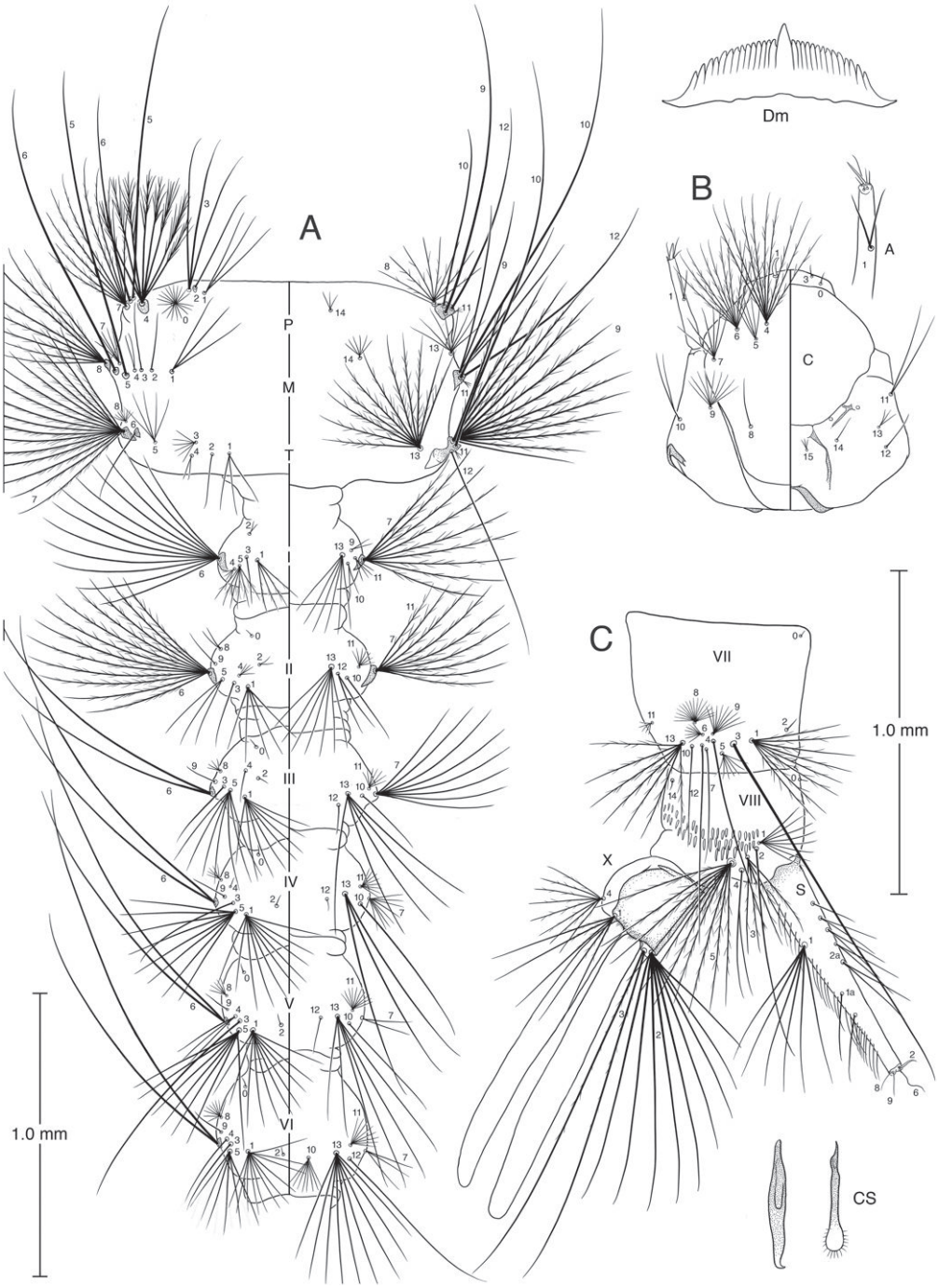


Fig. 4. Fourth-instar larva of *Wyeomyia paucartamboensis*. A, Thorax and abdominal segments I–VI, dorsal and ventral aspects of left side; B, Head, dorsal and ventral aspects of left side; C, Abdominal segments VII–X, left side. C=cranium, CS=comb scale, Dm=dorsomentum, M=mesothorax, P=prothorax, T=metathorax, I–VIII,X=abdominal segments, 1–15=setal numbers for specified areas.

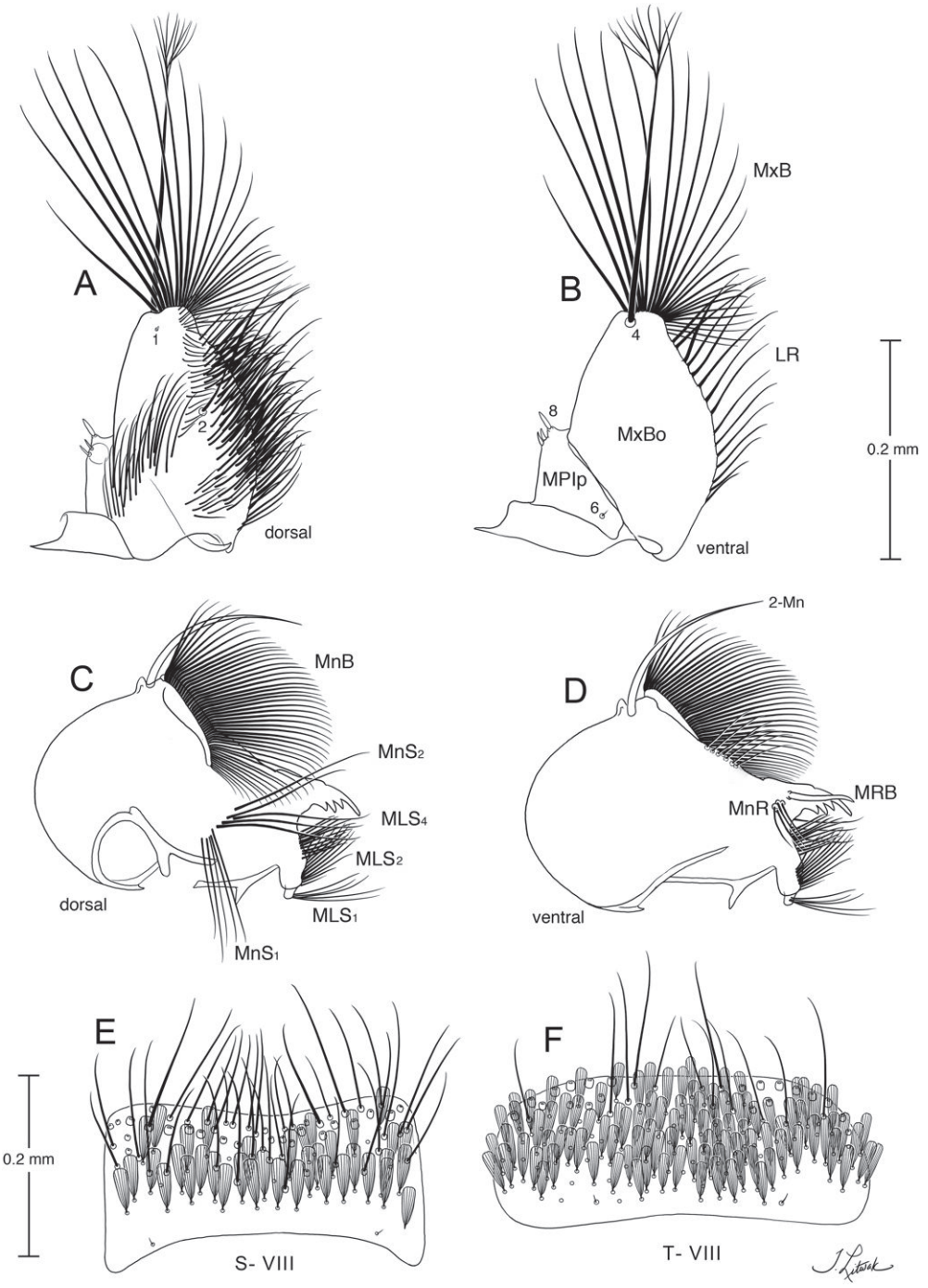


Fig. 5. Maxilla (A,B) and mandible (C,D) of fourth-instar larva and sternum VIII (E) and tergum VIII (F) of the female of *Wyeomyia paucartamboensis,* aspects as indicated. LR , laciniarastrum 1; MnB, mandibular brush; MLS_1, mandibular lobe spicules 1; MLS_2, mandibular lobe spicules 2; MLS_4, mandibular lobe spicules 4; MnR, mandibular rake; MRB, mandibular rake blade; 2-Mn, mandibular seta 2; MnS_1, mandibular sweeper 1; MnS_2, mandibular sweeper 2; MxBo, maxillary body; MxB, maxillary brush; MPlp, maxillary palpus.

are limited primarily to posterior surface of occiput; single, transverse row of dark erect scales on occiput (sensu Harbach and Kitching 1998). Ocular setae dark, sparse, close to margin of eye; 2 long, dark approximated interocular setae present. Interocular space without setae, narrows to width equal to or slightly less than that of single corneal facet. Frontal pit below postfrontal sutures. Clypeus and frons without setae and scales. Frons with dense covering of fine aculeae between postfrontal suture and antennal socket. Surface of clypeus finely rugose resembling that of pedicel, both with shiny greyish pubescence. Maxillary palpus (MPlp) short (length 0.19–0.24 mm, mean 0.21, n = 14) with dark, rather large spatulate scales except ventrally; 2 palpomeres, proximal palpomere small, quadrate, distal palpomere rather claviform (length 0.17–0.21 mm, mean 0.19 mm, n = 14). Proboscis, from lateral perspective, distinctly curved; dorsal surface dark-scaled with blue iridescence, white scales at base extend to about length of maxillary palpus; ventral surface similarly dark-scaled, with white scales basad often extending weakly to about 0.2 length; 6 or fewer basal labial setae present, variable in length to about 0.17 mm. Proboscis (P) (length 2.24–2.37 mm, mean 2.30 mm, n = 7) almost twice length of antenna (flagellum [F] length 1.16–1.27 mm, mean 1.22 mm, n = 7) mean P:F 1.89 (n = 7), but slightly shorter than forefemur (Fe-I), mean P:Fe-I 0.93 (n = 7); mean MPlp:P 0.09 (n = 7). *Antenna*: Scape with cluster of 3 minute setae mesad and pedicel with 1–5 (usually 2) small dark setae mesad and 1 minute seta dorsobasal (basal microseta of Harbach and Kitching 1998). Flagellum verticillate, basal flagellomeres with whorls of 10–12 setae, longest setae about 0.54–0.62 mm (0.45–0.49 flagellum length); flagellomere 1 with dorsomesad cluster of 3–7 scales; length of selected flagellomeres (Flm) derived from 7 specimens (14 antennae) as follows: Flm_5 0.08–0.09 mm, Flm_6 0.08–0.09 mm, Flm_{11} 0.09 mm, Flm_{12} 0.12 mm, Flm_{13} 0.15–0.17 mm; mean Flm_{13}:Flm_5 1.87. Distal two flagellomeres not disproportionately longer than preceding flagellomeres.

Thorax: Integument dark brown. Scutum with rather broad scales with copper and blue iridescence, silvery white scales extend along lateral margins from scutal angle to near scutellum, a few white scales sometimes near anteromedial margin of prescutellar area, anterior promontory with a few white scales and 5–6 strong dark setae, also 1 or 2 small pale setae may be present; arcrostichal and dorsocentral setae absent; however, 2 rows of acrostichal scales form prominent median longitudinal line. Supraalar and antealar areas combined with 22–28 (mean 25, n = 14) primarily dark brown setae (those near scutal angle pale). Midlobe of scutellum with broad white scales basally, scales usually darker distally, with 4 large dark brown setae and infrequently 1–3 small dark setae. Lateral lobes of scutellum with scales concolorous with scutum and 4 large and 1–3 small dark setae. Mesopostnotum dark brown with medial cluster of 4 or 5 pale setae. Antepronotal lobes widely separated, with broad median cluster of dark scales, silvery white scales dorsad and ventrad, infrequently white scaling very reduced; each lobe with 5–9 (mode 7, n = 14) dark brown setae. Postpronotum without setae, covered with broad silvery white scales. Pleuron with silvery white scales, although anterior 0.4–0.5 of mesokatepisternum and 0.2–0.3 of posterior margin of mesanepimeron bare. Paratergite, mesomeron, and metapleuron entirely bare. Pleural chaetotaxy pale yellow and as follows: 1–4 prespiracular

setae (mode 3, n = 14, variable in size); 2 upper proepisternal setae; 1 or 2 lower mesokatepisternal setae; upper mesokatepisternal setae absent; 2–6 prealar setae (mode 4, n = 14); 6–14 upper mesepimeral setae; 4 minute metepisternal setae; postspiracular and lower mesepimeral setae absent. *Legs:* Forecoxa with silvery white scales over entire length of anterior surface, pale yellow setae distally; midcoxa and hind coxa with dense covering of silvery white scales, also a few pale yellow setae. Anteprocoxal membrane with white scales; postprocoxal membrane bare; base of hind coxa slightly below dorsal margin of mesomeron. Foretrochanter with silvery white scales laterally, anterior surface primarily glabrous but with small dark scales distally. Mid- and hind trochanters with silvery white scales on anterior and posterior surfaces, upper surface primarily glabrous but with small dark scales distally. Upper surface of forefemur dark-scaled although white scales usually on basal 0.2, ventral surface with white scales on about basal 0.4, may continue narrowly to 0.6. Upper surface of midfemur entirely dark-scaled; anteroventral surface dark-scaled except white scales on basal 0.4; posteroventral surface with white scales, narrowing distally. Upper surface of hind femur entirely dark-scaled, anteroventral surface broadly white-scaled although dark scales may predominate over distal 0.1. Forefemur (Fe-I) (mean length 2.47 mm, n = 7) slightly longer than foretibia (Ti-I) (mean length 2.26 mm, n = 7), mean Fe-I:Ti-I 1.10 (n = 7); about equal in length to midfemur (Fe-II) (mean length 2.45 mm, n = 7), mean Fe-I:Fe-II 1.01 (n = 7); longer than hind femur (Fe-III) (mean length 1.72 mm, n = 7), mean Fe-I: Fe-III 1.44 (n = 7); and slightly longer than proboscis (P) (mean Fe-I:P 1.07, n = 7). Tibiae and tarsomeres dark-scaled; although ventral surface of hind tibiae with pale to whitish scales extending to near distal end, and similar, but less extensive, white scaling may occur ventrally over basal 0.6 of Ta-III_1. Scales on dorsal surface of tibiae and tarsomeres I with blue-green iridescence similar to those of femora, scales on dorsal surface of tarsomeres 2-5 with blue iridescence. Midtarsomeres stout, diameter of Ta-II_2 about 1.5–1.7X diameter of Ta-I_2. Strong setae (in a few instances also spicules) occur near the distal end of most leg segments. As examples, some details associated with distal ends of Ti-I and Ti-III are interpreted as follows: Ti-I with comb of about 15 spicules and an adjacent cluster of 3 or 4 stout setae, longest 0.12–0.15 mm; Ti-III with comb of 6 or 7 prominent setae (distal to comb of spicules) and an adjacent cluster of 2 or 3 setae, longest 0.16–0.17 mm. Ungues simple, dark; foreungues equal in size, about 0.05 mm in length, somewhat curved; midungues dissimilar, larger unguis strongly curved near base to about 90° angle, 0.11–0.12 mm in length, tip acute, smaller unguis 0.05–0.06 mm in length, curved to about 45°–70° angle; hind ungues equal in size, about 0.03 mm in length, somewhat curved.

Wing: Length 2.30–2.48 mm (mean 2.38 mm, n = 7), wing scales mostly decumbent and concolorous with those of scutum. Dorsal scales spatulate with rounded ends but variable in size: C and R_1 covered with scales; Sc mostly bare, a few rather long scales over about distal 0.33; R_s and R_{2+3} mostly bare with only a few long slender scales, becoming more numerous and somewhat broader on R_2 and R_3; R_{4+5} with rather small and appressed scales over entire length; M bare, M_1 with some long narrow scales, which become smaller and broader distally;

CuA, M_2 and M_{3+4} with scales smaller and narrower than those of R_1, appearing as single appressed line, those basally on CuA somewhat broader; 1A with single line of narrow appressed scales, base and distal end of vein bare. Ventral scales spatulate with rounded ends, variable in size: C and Sc with numerous scales; R_1 with basal 0.5 bare, long slender scales over distal half; R_s, R_{2+3}, R_2, and R_3 covered with scales similar to, but smaller than, those on Sc; R_{4+5} with scattered long slender scales, more numerous distally; M with about basal 0.2 bare, rest with single row of appressed scales, which continue into M_1, but scales become longer and narrow over distal 0.5 of M_1; M_2 with a few long slender scales; CuA bare, a few long, narrow scales distal to fork; M_{3+4} with a few long narrow scales; 1A bare, couple of long slender scales distally. Vein R_2 length 0.65–0.75 mm, n = 7; vein R_{2+3} length 0.21–0.31 mm, n = 7; R_2:R_{2+3} 2.23–3.75; R_S length 0.49–0.55 mm, n = 7; R_S:R_{2+3} 1.77–2.50; R_{4+5} length 0.92–1.03, n = 7; R_{4+5}:R_S 1.77–1.92; M_1 length 0.49–0.58 mm, n = 7. Alula with 3–7 (mode 5, n = 10) dark piliform setae.

Halter: Scabellum tan, pedicel with white scales extending to base of capitellum, capitellum covered with dark scales concolorous with those of scutum.

Abdomen: Abdominal terga primarily with dark scales similar in color to those of scutum; a rather straight line laterad demarcates union of dark scales with white scales of sterna including those at lateral margin of terga. Thus, tergum II rather broadly white-scaled laterad especially basolaterad; terga III–V narrowly white-scaled laterad and terga VI, VII more broadly white-scaled especially distolaterad. Tergum I narrowly dark-scaled medially with a few white scales laterad. Terga I–V pale brown; sterna I–V even lighter; tergum and sternum VI, VII distinctly darker. Both sides of tergum I with diffuse group of 19–25 (n = 7) prominent pale yellow setae. Tergal setae beyond tergum I primarily dark, sternal setae pale yellow. Setae along distal margin of terga as follows: terga II, III with about 6–8, terga IV, V with about 9–12, and tergum VI with 16–18. Tergum VII distal margin somewhat concave with 17–22 (n = 9) setae, length along median plane 0.19–0.22 mm (n = 6). Distal margin of sterna II–IV with 9–12 setae, distal margin of sterna V, VI with, respectively, 14–16 and 16–19 setae. Sternum VII distal margin slightly concave but with slight hump medially, length along median plane 0.24–0.31 mm (n = 7), distal margin with 18–22 (n = 8) setae, also 29–41 setae (longest usually 0.16 mm) distributed more or less medially in funnel- to bowl-shaped pattern, widest distally and beginning about 0.3 length from base, scales confined primarily to basal and lateral regions.

Male genitalia (Figs. 1, 2): Tergum VIII (ventral in position) (Fig. 1F) narrow, TW 1.9–2.3X TL (mean 2.1, n = 6); covered with small spicules, which become minute and more numerous basally, about basal 0.34 glabrous; pair of prominent setal clusters distolaterad, each with 38–48 setae (mean 42, n = 16), which tend to increase in length mesad to distad, longest setae 0.2–0.3 mm, curved distally toward median plane; median area lightly sclerotized distally; scattered spatulate scales in spiculate region but absent from lightly sclerotized median area; pair of minute setae or punctures located sublaterad and just distal to basal glabrous region. Sternum VIII (dorsal in position) (Fig. 1G) SW 1.4–1.7X SL (mean 1.5, n = 7), length along midline 0.22–0.27 mm; distal margin slightly convex; covered with small spicules, which become minute and more numerous basally, about basal

0.34 glabrous; distal region with dense covering of dark, decumbent, spatulate scales; 18–24 (mean 20, n = 8) setae in single row along distal margin; pair of minute setae or punctures located sublaterad in basal glabrous region. Tergum and sternum IX (Fig. 1E,C respectively) fused laterally, forming complete ring; tergum IX bearing 3 stout, relatively short setae on either side of narrow median bridge (width 0.05 mm, n = 8); apices of setae curved, setae closest to median plane (length 0.04–0.05 mm, n = 8) often with preapical spur-like protuberance mesad, adjacent pair often with preapical expansion, and lateral pair with slight preapical expansion; sternum IX rather resembling a raised bowl between base of gonocoxites, lightly sclerotized center of "bowl" densely spiculate.

Gonocoxite (Fig. 1A): Brown, spiculate; broad basally, tapering gradually toward apical end. Lower tergomesal surface membranous; about apical 0.67 of tergomesal area densely spiculate; tergal surface with 2 very long setae (tergal pair) (0.22–0.24 mm in length) at about mid-length from base to apex of gonocoxite, loose cluster of 3 long setae (longest 0.12–0.15 mm) basal to tergal pair, a weak irregular row of 7–11 shorter setae extend from just basad of tergal pair to apical end. About distal 0.67 of sternolateral surface covered with scales, sternomesal surface spiculate with dispersed setae. Single stout seta (length 0.07–0.10 mm) located at level of tergal pair near mid-length of basal mesal lobe but may not emanate from it.

Basal mesal lobe: Brown, very narrow, spiculate, directed mesad and fused medially with its mate on other gonocoxite; from mesal perspective, rather comma-shaped, broader distal (mesal) region with 2–5 fine setae.

Gonostylus (Figs. 1A, 2): Slightly longer than gonocoxite. Stem long, narrow, sinuous, extending to base of crest on lobe M; sternal surface with broad, triangular, membranous expansion at about midlength and a few moderately long fine setae between expansion and head; tergal surface with scattered small very fine setae, also a few distally on sternal surface. Head as presented; lobe A (mesad to lobe M) distinctly separated from stem, length 0.07 mm, rather boot-shaped, apical end with small partially incised process, curved upward with notched tip. Also, 3 small specialized sinuous setae occur subapically on tergal edge, one of which is branched. Sternal edge of lobe A with 5 specialized setae (a1–a5): a1 very near apical end, minute (0.005 mm); a2 short, rather peglike, near apical end of lobe; a3 clavate, very stout but somewhat flattened, curved near base; a4 large, rather foliform, apex broadly rounded; a5 very large, foliform but rather blade-shaped. Prominent, but relatively simple, lobe M is laterad and sternal to lobe A. Characteristic features include distosternal margin flat, presence of a distinct rounded lobe (lobe M tergal process 1 [Mtp1] with several fine setae tergolaterad, and prominent digitate process (lobe M tergal process 2 [Mtp2] extending from distotergal margin. In addition, recurved subapical crest of specialized setae arises from sternomesal surface, consisting of very broad wing-shaped foliform seta with serrate distal margin; smaller sickle-shaped seta slightly mesad with serrate distal margin; third narrower seta in close proximity with distal peglike protrusions; and fourth seta slightly distad, overlapping somewhat with others and resembling third seta. An additional process is apparent between lobes A and M, best observed in SEM image of lateral side. This apparently glabrous, rather long

slender process may be described, at least tentatively, as lobe E, although it is not readily apparent in related species.

Aedeagus (Fig. 1B): Slightly longer than wide (mean L:W 1.43, n = 6); submedian tergal arms bend toward each other, weakly joined at midline to form tergal bridge. Apical tergal arms widely separated, stout, short, not extending to apical end of median sternal plate, with small acute apical process directed mesad. Median sternal plate long; slender; with 6–8 lateral leaflets, which become progressively smaller toward rugose apical end.

Proctiger (in lateral view) (Fig. 1D): With rather narrow basal sclerotization (tergum X); paraproct with apex rather truncate and denticulate with 4–7 teeth, cercal setae absent.

Female. Like male except as follows. *Head:* Length of maxillary palpus (0.25–0.28 mm, mean 0.27 mm, n = 13); distal palpomere (0.23–0.27 mm, mean 0.24, n = 12) longer than in males. White scales at base of proboscis reduced, limited to ventral or lateroventral surface. Length of proboscis (P) (2.12–2.38 mm, mean 2.27 mm, n = 7) similar to that of males and very similar to length of forefemur (Fe-I) (mean P:Fe-I 0.97, n = 7). Flagellum (F) of antennae slightly longer (1.28–1.38 mm, mean 1.34 mm, n = 7) than in males; consequently, mean P:F of 1.69 (n = 7) is less than that of males. Also, mean Flm_{13}:Flm_5 of 1.60 is less than in males. Basal flagellomeres with whorls of 6–8 setae, which tend to be slightly shorter than those of males.

Thorax: Compared with males, presence of white scales on scutum is generally reduced, especially along lateral margins and anteromedial margin of prescutellar area. Also, white scales on midlobe of scutellum often reduced or absent. Midungues similar in size (0.05 mm) and shape with moderate curvature. Corresponding with longer wing length of females (2.56–2.93 mm, mean 2.76 mm, n = 7), veins also tend to be somewhat longer, except length of R_{2+3} (0.21–0.28 mm, n = 7), which was similar to that in males; also, ratio R_{4+5}:R_S (1.74–2.19) similar in both sexes. Veins have denser covering of scales than in males and some have additional scale types. Dorsal surface of vein M from its base to crossvein M_{3+4} with a row of ligulate, anterior directed scales; dorsal surface of vein R_s with ligulate scales directed posteriorly; and vein R_{2+3} with this type of scales directed slightly anterior. Ligulate scales also occur on posterior wing surface, especially on veins R_{4+5}, M_2, M_{3+4}, and CuA.

Abdomen: Tergum VII distal margin somewhat rounded, length along median plane 0.28–0.32 mm, width 0.58–0.65 mm (n = 7); distal margin with 20–24 setae; dense covering of dark spatulate scales with truncate apices. Sternum VII length along median plane 0.28–0.34 mm, width 0.45–0.49 mm (n = 7), distal margin with 17–19 setae and 1–9 preapical setae, dense covering of white spatulate scales.

Genitalia (Figs. 3, 5): Tergum VIII (Fig. 5F) with distal margin broadly rounded, widest near base (width 0.41–0.46 mm, length along median plane 0.15–0.19 mm, n = 7); 36–46 setae confined to distal 0.33, no setae along median plane, closest seta on either side of median at distal margin relatively short (0.08–0.10 mm) and directed mesad, remaining setae longer (longest 0.16–0.24 mm), also directed mesad; covered with dark spatulate scales and minute spicules although narrowly glabrous along basal margin. Sternum VIII (Fig. 5E) wider than long (width 0.35–0.40 mm, length along median plane 0.12–0.16 mm, n = 7), distal margin somewhat concave; number of setae variable (46–76), prevalent at or near distal

margin and medially where they extend basad, although basal 0.2–0.5 length without setae; most setae directed mesad, variable in length, longest usually 0.13–0.17 mm, infrequently to 0.22 mm; covered with white spatulate scales and fine spicules, although narrowly glabrous along basal margin. Tergum IX (Fig. 3F) narrow (width 0.18–0.23 mm, length along median plane 0.04–0.06 mm, n = 7), covered with fine spicules, 2–9 setae variably arranged but often with 3 medial and 1 lateral seta on each side. Insula (Fig. 3E) wider than long (width at expanded base 0.16–0.19 mm, length along median plane 0.04 mm, n = 4), concave medially over entire length and also at apical margin, along median plane spicules minute basally with gradual increase in size toward apex, largest spicules basolaterad, spicules dense mesad becoming dispersed laterad; raised area on either side of apical concavity with 4–6 short (0.04 mm) spinelike setae and often 1–3 similar setae slightly basolaterad. Postgenital lobe (Fig. 3C) with ventral and dorsal surfaces densely spiculate; without apical median indentation; dorsal surface with 5–7 setae (longest 0.04–0.06 mm) on either side of median plane and in apical 0.5 length, apical margin with 4–6 somewhat shorter setae; ventral surface with about 40 very small fine setae; length along median plane 0.10–0.11 mm, dorsal postgenital lobe index quite variable, 1.36–1.83 (mean 1.60, n = 7). Cercus (Fig. 3D) densely spiculate, quite wide and broadly rounded apically, convergent medially or nearly so; each cercus with 19–27 setae, longest setae 0.06–0.08 mm. Three spherical spermathecal capsules, one slightly larger (0.08–0.09 mm) than other two (0.06–0.07 mm).

Pupa (Fig. 3). Position and character of setae as figured; number of branches in Table 1. Overall color pattern of pupal exuviae remains similar among different individuals but variation occurs in intensity of pigmentation.

Cephalothorax (Fig. 3A): Primarily pale to light brown; postscutal area and adjacent region of mesothoracic wing mottled with pale and brown areas. Seta 1-CT strongly developed, 2-branched, length 0.77–0.87 mm (mean 0.82 mm, n = 7), markedly sinuous; 5-CT strong, usually 4- or 5-branched, length 0.62–0.75 mm (mean 0.68 mm, n = 8); 8-CT at edge of small pale area, double, long, length 0.58–0.70 mm (mean 0.64 mm, n = 8); 9-CT fine, double, length 0.28–0.33 mm (mean 0.30 mm, n = 9). Metathoracic wing with distinct pale and brown pattern, area at base of 10,11-CT pale but light brown at base of 12-CT, crescent shaped pale area within submedian brown region, broadly pale laterally although base of narrow portion adjacent to lateral margin of abdominal segment I light tan, broad lateral pale region with a medial foveolate area (similar to that figured by Murley 1951), second such area near lateral margin of submedian darker region. Seta 10-CT single, length 0.36–0.42 (mean 0.40 mm, n = 9); 11-CT rather strong, always longer than 10-CT, length 0.42–0.51 mm (mean 0.46 mm, n = 11); 12-CT double, length 0.30–0.38 mm (mean 0.34 mm, n = 12).

Trumpet (Fig. 3A): Rather short (length 0.47–0.60 mm, mean 0.53 mm, n = 24); expanded medially, distinctly narrowed at apical end; brown, broadly pale submedially, narrowly pale at base and apical end, tracheoid area distinctly striate; reticulate area crenulate.

Abdomen (Fig. 3B): Color varies from brown, light brown, to pale. Tergum I light brown, darker medially. Tergum II brown, broadly pale posteromesad and laterally near seta 6-II. Tergum III brown basomedially, progressively lighter toward lateral

Table 1. Number of branches for pupal setae of *Wyeomyia* (*Nunezia*) *paucartamboensis*.

Seta no.	Cephalothorax	Abdominal segments							
	CT	I	II	III	IV	V	VI	VII	VIII
0	–	–	1	1	1	1	1	1	1
1	2	16–33(21,31)	6–10(7)	3–6(4)	4–6(4)	3–6(5)	1–3(2)	1–3(1)	–
2	2,3(2)[1]	1	1	1	1	1	1	1	–
3	2,3(2)[2]	1–3(2)	1	1	4–7(5)	2–5(4)	2,3(2)	1	–
4	4–7(5)	4–9(5,6)	3–6(4,5)	1,2(1)	1–3(1)	3–6(4)	1–4(2)	2,3(2)[2]	1,2(2)
5	3–5(4)	1	1,2(1)	2–4(2)	3,4(3)[2]	3	3	2–4(3)	–
6	1–3(2)	1	1	1,2(1)	1–3(2)	1–3(2)	1–4(2)	2,3(2)	–
7	4–6(4)	3–7(3)	2–6(3)	4–6(4)	2,3(2)	3–7(4)	1	1	–
8	2	–	–	3–8(6)	4–7(5)	4–7(4)	3–7(5)	2–5(3)	–
9	2	1	1	1	1	1	1	16–23(20)	25–31(29)
10	1,2(1)[2]	–	–	1–3(2)	2–4(2)	2	1–4(2,3,4)	1,2(1)	–
11	1	1	–	1–4(2)	2–4(2)	1–4(2)	2–5(3)	1,2(1)	–
12	2	–	–	–	–	–	–	–	–
13	–	–	–	–	–	–	–	–	–
14	–	–	–	–	–	–	–	–	1

[1] Range followed in parenthesis by mode; based on 10 specimens (20 setae).
[2] One exception from number in parenthesis.

and distal margins, a pair of weak submedial pale spots basad. Tergum IV brown basomedially, progressively lighter toward lateral and distal margins; tergum V pale, light brown medially; tergum VI pale, light brown basomedially; tergum VII pale. Terga III–VI with narrow band on distomesal margin, appearing quite dark on tergum III, becoming progressively lighter through tergum VI; terga III–VII with moderate covering of spicules, extending to near lateral margin. Sterna III–VII similar to corresponding terga but with rather narrow dark band on basomesal margin and also along distal margin; coverage of spicules reduced, especially medially and toward lateral margin. Tergum and sternum VIII very light brown to pale; tergum with moderate covering of spicules although glabrous posteromesad; sternum with reduced coverage of spicules. Distinctive small brown sclerite-like anterior extensions of sterna occur between sterna II,III; III,IV; IV,V; V,VI; and VI,VII (not shown); becoming smaller between successive segments. Seta 0-II–VII single, very small, 0.02–0.03 mm in length. Seta 1-I dendritic, fanlike, length often 0.39–0.43 mm, 16–33 branches (mean 25, n = 21) at 0.25 length with additional secondary and tertiary branching distad. Seta 1-II strong (length 0.28–0.34 mm, n = 10), branching begins 0.15–0.22 from base; 1-III–V prominent, multi-branched, 1-VI frequently 2-branched (length 0.25–0.31 mm, mean 0.28 mm, n = 10); 1-VII usually single (length 0.21–0.26 mm, mean 0.23 mm, n = 10). Seta 2-I–VII single, 2-II midway between I-II and 3-II (length 0.19–0.25 mm, mean 0.22 mm, n = 10), 2-III length 0.05–0.07 mm (n = 8), 2-IV–VI small (length 0.03–0.04 mm), 2-VII usually 0.04 mm in length. Seta 3-I usually 2-branched (length 0.29–0.37 mm, mean 0.32 mm, n = 11); 3-II,III single, long, 0.50–0.59 mm; 3-IV anteromesad of 4-IV, multi-branched (length 0.18–0.23 mm, n = 9); 3-V slightly cephalad of 1-V, usually 3- or 4-branched (length 0.26–0.29 mm, n = 7); 3-VI slightly cephalad of 1-VI (length 0.20–0.26 mm, n = 7); 3-VII prominent (length 0.28–0.35 mm, n = 9). Seta 4-I multi-branched (length 0.14–0.17 mm, n = 8); 4-II usually 4- or 5-branched, 4-III usually single, fine (length 0.09–0.13 mm, n = 8); 4-IV fine, often single, rarely 3-branched (length 0.11–0.14 mm, n = 6); 4-V multi-branched (length 0.17–0.21 mm, n = 9); 4-VI often 2-branched (length 0.22–0.25 mm, n = 10); 4-VII prominent (length 0.24–0.29 mm, n = 9); 4-VIII length 0.32–0.42 mm (n = 6). Seta 5-I fine, short (length 0.05–0.06 mm, n = 7); 5-II single, seldom 2-branched (length 0.28–0.35 mm, n = 8), 5-III fine, length 0.14–0.18 mm (mean 0.17, n = 7). Seta 5-IV–VI strong, 3-branched, long, 5-IV length 0.70–0.85 mm (mean 0.74mm, n = 10); 5-V length 0.74–0.87 mm (mean 0.81 mm, n = 11); 5-VI length 0.68–0.80 mm (mean 0.72 mm, n = 10); 5-VII fine (length 0.07–0.13 mm, n = 8). Seta 6-I strong, long (length 0.79–0.90 mm, mean 0.84 mm, n = 10); 6-II strong, long (length 0.64–0.84 mm, mean 0.73 mm, n =11); 6-III–V (length 0.17–0.21 mm, n = 12); 6-III fine, single, occasionally 2-branched; 6-IV 2-branched, infrequently single or 3-branched; 6-V 2-branched, seldom single or 3-branched; 6-VI usually 2-branched (length 0.16–0.20, n = 9); 6-VII often 2-branched. Seta 7-I rarely more than 5-branched (length 0.22–0.27 mm, mean 0.25 mm, n = 11); 7-II often 3- or 4-branched (length 0.18–0.24 mm, n = 7); 7-III,IV fine (length 0.08–0.10 mm, n = 10), 7-IV 2- or 3-branched; 7-V rarely more than 5-branched, longer than 7-III,IV (length 0.11–0.14 mm, n = 6); 7-VI length 0.26–0.33 mm (mean 0.30 mm, n = 9); 7-VII length 0.21–0.26 mm (mean 0.24 mm, n = 11). Seta 8-III–VI fine, 8-III often 6- or 7-branched, 8-IV often 5-branched, 8-III,

IV length 0.04–0.05 mm (n = 22), 8-V length 0.04–0.06 mm (n = 12), 8-VI length 0.08–0.10 mm (n = 11); 8-VII length 0.10–0.12 mm (n = 10). Seta 9-I fine (length 0.05–0.06 mm, n = 9); 9-II length 0.07–0.09 mm (n = 10); 9-III–VI very small (length 0.03–0.04 mm, n = 31); 9-VII,VIII long, aciculate; 9-VII longest branches 0.31–0.35 mm (mean 0.33 mm, n = 10); 9-VIII seldom fewer than 27 branches, longest 0.39–0.47 mm (mean 0.42, n = 11). Seta 10-III fine (length 0.17–0.20 mm, mean 0.18 mm, n = 7); 10-IV length 0.17–0.24 mm (mean 0.21 mm, n = 10); 10-V long (length 0.23–0.28 mm, mean 0.26, n = 10); 10-VI fine (length 0.11–0.15 mm, n = 10); 10-VII single, seldom 2-branched (length 0.19–0.25 mm, mean 0.21 mm, n = 12). Seta 11-I fine (length 0.04–0.05 mm, n = 9); 11-III–VI branching very fine, 11-III–V length 0.03–0.04 mm (n = 33), 11-VI usually 2- or 3-branched (length 0.04–0.05, n = 12); 11-VII fine, single, seldom 2-branched (length 0.13–0.17 mm, n = 7). Seta 14-VIII length 0.03–0.04 mm (n = 9). Puncture near seta 4 on abdominal segments III–V, slightly posterolaterad of 4-III,IV, anterior and slightly mesad of 4-V.

Paddle (Fig. 3B): Pale, length 0.42–0.51 mm (mean 0.47 mm, n = 12), width 0.29–0.34 mm (mean 0.31 mm, n = 12), width both paddles combined 0.59–0.64 mm (mean 0.62 mm, n = 12); lateral and mesal margins rather sparsely spiculate, spicules more numerous distally; midrib prominent, rather narrow, extends to apex.

Median caudal lobe (Fig. 3B): Length: males 0.10–0.12 mm (mean 0.11 mm, n = 9); females 0.13 mm n = 3).

Female genital lobe: Length 0.21–0.23 mm (mean 0.22 mm), width 0.22, 0.23 mm (n = 3).

Male genital lobe (Fig. 3B): Light brown; length (l) 0.37–0.41 mm (mean 0.39 mm, n = 9), width (w) 0.18–0.20 mm (mean 0.18 mm, n = 9), mean l:w 2.15 (range 1.98–2.23); distal margin slightly rugose; ventrodistal surface minutely tuberculate with tiny spicules; dorsal surface with prominent preapical rather short, narrow strip on each lobe.

Fourth-instar larva (Figs. 4, 5). Position and character of setae as figured; number of branches in Table 2. *Head* (Fig. 4B): Slightly wider than long and light tan, often rather truncate basally. Collar absent, but occipital foramen approximated basally. Slits of occipital foramen extend laterally and reach basolateral margin of head capsule. Margins surrounding each slit darkly tanned, especially at thickened lateral end. Hypostomal suture complete, slightly curved, caudal end laterad to caudal end of anterior tentorial pit. Distance of seta 14 from dorsomentum about half of that to caudal margin of head capsule. Dorsomentum (Fig. 4B) with 1 large central tooth and 12–15 smaller lateral teeth on each side; dense cluster of filamentous spicules associated with ventral surface, spicules longest medially (up to 0.08 mm), with fine branches distally. *Maxilla* (Fig. 5A,B): Mean length 0.23 mm, n = 10; mesal margin produced and rounded; maxillary brush quite long, with 27-32 spicules, longest apically but slightly shorter than seta 4-Mx (mean length 0.28 mm, n = 6), seta 4-Mx stout, branched distally. Seta 1-Mx conical, minute (0.01 mm), located near base of maxillary brush. Seta 2-Mx 0.04–0.05 mm long, located 0.5–0.6 from base of maxilla and along basal edge of fine, dense laciniarastrum 2. Laciniarastrum 1 a row of long, slender teeth, longer teeth distad. Maxillary palpus closely adnate to maxillary body, triangular in ventral view with base extended mesad; with distinct peg-like apical seta 8 and a subapical circular depression associated with 2 minute peg-like setae; seta 6-Mx

Table 2. Number of branches for larval setae of *Wyeomyia* (*Nunezia*) *paucartamboensis*

	Head	Thorax			Abdominal segments								
Seta no.	C	P	M	T	I	II	III	IV	V	VI	VII	VIII	X
0	1	19–23(20)	–	–	–	1	1	1	1	1	1	1	–
1	1	2–4(3)	3–5(3)	3,4(3)	3–6(4)	5,6(5)	5–9(8)	8–10(9)	8–12(10)	8–11(9,10)	6–10(8)	6–11(8)	4–6(5)
2	–	1	1	1	1–4(2)	1–3(2)	1,2(1)	1,2(1)	1,2(1)	1	1	1	8–10(9)
3	1	3,4(3)	1,2(1)	4–8(6)	1	1	1	1,2(1)	1	1	1	5–7(5)	2
4	8–12(9)[1]	7–12(8)	2	2–4(2)	3–6(4)	3–6(4)	1,2(1)	1,2(1)	2–4(3)	1	1	2	7–10(8)
5	4–7(5)	1	1	4–6(5)	5–10(7)	3–5(4)	6–10(7)	6–9(7,8)	5–8(7)	6–9(6)	6–11(8)	8–12(10)	–
6	7–12(10)	1	1,2(1)[2]	1,2(1)[2]	11–17(12)	10–14(12)	2	2,3(2)[2]	2	2	7–10(8)	–	–
7	5–8(6)	7–10(9)	3–6(4,5)	15–22(16)	8–12(9)	7–10(9)	6–11(8)	7–9(8)	5–7(6)	3–5(3)	1	–	–
8	1,2(1)	8–10(8)	8–12(9)	7–10(8)	–	2–4(2)	4–7(4)	3–8(5)	4–6(5)	7–15(9)	16–23(16)	–	–
9	6–10(8)	1,2(1)[2]	4–6(5)	10–17(13)	2,3(2)[2]	1,2(1)	1–3(1)	1	1	1,2(1)	6–11(9)	–	–
10	1,2(1)	1	1	1	2,3(2)	1	1,2(1)	1	1	6–11(6,8)	1,2(1)	–	–
11	2,3(2)[2]	3–5(3)	2–5(3)	2–4(3)	2–4(4)	5–10(7)	6–11(6,8)	7–11(8)	7–11(10)	7–13(8)	5,6(5)	–	–
12	1–3(1)	1	1	1	–	2–4(2)	1,2(1)	1,2(1)[2]	1,2(1)[2]	1	1	–	–
13	2–4(3)	–	6–10(7)	8–12(11)	5–7(6)	6–9(7)	4–6(5)	2–4(3)	5–7(6)	8–12(9)	6–9(7)	–	–
14	1,2(1)[2]	2–5(3)	5–8(6)	–	–	–	–	–	–	–	–	1	–
15	2–5(3)	–	–	–	–	–	–	–	–	–	–	–	–

[1] Range followed in parenthesis by mode; based on 10 specimens (20 setae).

[2] One exception from number in parenthesis.

located basomesad on palpus, very fine, short (0.01 mm). *Mandible* (Fig. 5C,D): Width 0.25–0.28 mm (mean 0.27 mm, n = 10); dorsal mandibular tooth with tip somewhat blunt and twice as long as 3 teeth below it. Mandibular rake blade (MRB) arising near base of mandibular teeth on ventral surface, 0.06–0.07 mm in length; mandibular rake (MnR) usually comprised of 4 narrow scimitar-shaped spicules, longest 0.05–0.06 mm in length. Distinct posterior labula present, apical end of labula with cluster of piliform spicules (mandibular lobe spicules 1 [MLS_1] 0.08–0.09 mm in length; just anterior to MLS_1 a small dense cluster of piliform spicules (mandibular lobe spicules 2 [MLS_2] 0.06–0.07 mm in length; mandibular lobe spicules 4 (MLS_4) (length 0.05–0.06 mm) located beneath mandibular teeth and extend as a narrow row to near MLS_2. Seta 2-Mn single, 0.17–0.19 mm in length, curved, extending beyond spicules of adjacent mandibular brush (MnB) (0.11–0.13 mm in length). Mandibular sweeper 1 (MnS_1) comprised of 6–8 spicules, of which 3–5 are strong and quite long (0.14–0.16 mm); mandibular sweeper 2 (MnS_2) with 6 or 7 prominent spicules 0.13–0.15 mm in length. *Antenna* (Fig. 4B): Short (0.34–0.37 mm, mean 0.35 mm, n = 19), slender; seta 1-A 2-branched, infrequently 3-branched, borne dorsally 0.53–0.64 (mean 0.57, n = 19) from base, extending from below apex to beyond apex of antenna. *Head capsule setae* (Fig. 4B): 1-C strongly developed, stout; 4–7-C fanlike, multi-branched, 4,6-C prominent, moderately aciculate, twice as long as 5,7-C, 5-C fine, length 0.18–0.21 mm (mean 0.19 mm, n = 10); 8-C single, infrequently 2-branched, fine, 0.20–0.25 mm in length (n = 5); 9-C fine, length 0.13–0.18 mm (n = 7); 11-C 2-branched, rarely 3-branched, branches unequal in length; 12,13-C fine, 12-C almost always single or 2-branched; 15-C weak, length 0.03–0.05 mm. *Thoracic setae* (Fig. 4A): Seta 0-P very fine, stellate, distolaterad of 2,3-P; 1,3-P fine, 1-P mesad of 2,3-P, 2-P slightly dorsal to 3-P; 4-P strong, length 0.38–0.45 mm (mean 0.42 mm, n = 10), fanlike, branches simple but distad with many strong aciculae often appearing densely pectunculate; 5–7-P clustered together, 5-P strong, length 1.43–1.81 mm (mean 1.61 mm, n = 9), 7-P slightly dorsad of 5,6-P, about 0.33 length of 5-P, aciculate; 8-P weak, about 0.25 mm in length, slightly ventromesad to 5-P; 9-P long, similar in length to 5-P, 12-P somewhat shorter, about 1.08 mm, 10-P about 0.70 mm in length, 11-P very fine, about 0.04 mm in length; 14-P very fine, usually 3-branched, about 0.08 mm in length. Setae 1–4-M fine, 1-M often 3-branched, longest branch 0.34–0.47 mm (mean 0.41, n = 9), 2-M length 0.26–0.32 mm (mean 0.29 mm, n = 9), 3-M similar in length (mean 0.30 mm, n = 10), 4-M shorter 0.18–0.23 mm (mean 0.21 mm, n = 10); 5,6-M long, similar in length, 5-M 1.02–1.15 mm (mean 1.07 mm, n = 11), 6-M 1.05–1.23 mm (mean 1.15 mm, n = 10); 7-M fine, short slightly basomesad of 6-M; 8-M strong, aciculate, length 0.62–0.85 mm (mean 0.71 mm, n = 9); 9-M similar in length to 8-M (mean 0.74 mm, n = 10) and aciculate, 10-M strong 1.59–1.89 mm in length (mean 1.69 mm, n = 9), 11-M very fine about 0.04 mm in length, 12-M about 0.5 length of 10-M; 13-M distinctly cephalad of 9–12-M cluster; 14-M very fine, about 0.05 mm in length. Seta 1-T fine, predominately 3-branched, length 0.25–0.30 mm (mean 0.27 mm, n = 10); 2-T fine, length 0.26–0.33 mm (mean 0.29 mm, n = 9); 3,4-T very fine, 4-T posterior to 3-T, 4-T usually 0.08 mm in length, 3-T often 0.09 mm in length; 5-T length 0.20–0.25 mm (mean 0.23, n = 8); 6-T slightly raised

on small tubercle adjacent to 7-T, length 0.30–0.48 mm (mean 0.39 mm, n = 9); 7-T strong, branches pectunculate, becoming somewhat aciculate distally, mean length 0.62 mm (n = 5); 8-T fine, similar in size to 4-T; 9-T strong, branches aciculate, longest 0.67–0.77 mm (mean 0.71 mm, n = 7); 10-T strong, single, mean length 1.20 mm (n = 4); 11-T fine, very short, about 0.04 mm; 12-T single, slightly longer than 9-T; 13-T aciculate, length 0.43–0.52 mm (mean 0.47 mm, n = 11). *Abdominal setae* (Fig. 4A, C): Seta 0-II–VII minute (about 0.03 mm in length). Seta 1-I–VII stellate, longest branches of 1-I (mean 0.25 mm, n = 9) and 1-II (mean 0.28 mm, n = 11) somewhat shorter than those of 1-III (mean 0.38 mm, n = 9), mean length of 1-IV 0.34 mm (n = 9), mean lengths of 1-V–VII all 0.33 mm. Seta 2-I–VII fine, short about 0.03 mm in length; 2-I,II often 2-branched, distinctly cephalad of 1-I, II; 2-III–V usually single, 2-VI,VII single, 2-III–VII distinctly mesad of 1-III–VII. Seta 3-I–VII single; 3-I,II similar in length (mean 0.27 mm and 0.28 mm, respectively), 3-I mesad of 5-I, 3-II posterior to 4-II; 3-III,VI similar in length (0.40–0.51 mm, mean 0.44 mm, n = 8, 7, respectively), both slightly cephalad of seta 5; 3-IV length 0.53–0.68 mm (mean 0.62 mm, n = 8), slightly anterolaterad of 5-IV; 3-V long, 0.97–1.16 mm (mean 1.07 mm, n = 7), slightly anterolaterad of 5-V; 3-VII prominent, length 1.13–1.28 mm (mean 1.20 mm, n = 12). Seta 4-I,II fine, usually 3- or 4-branched, very short, 4-I posterior to 5-I, mean length 0.04 mm (n = 9), 4-II anterior to 3-II, mean length 0.07 mm (n = 8); 4-III,IV often single, anterolaterad of 1-III,IV, length similar to 4-II; 4-V usually 3- or 4-branched, slightly anterior to 3-V, length 0.18–0.22 mm (mean 0.20 mm, n = 10); 4-VI slightly anterolaterad of 3-VI, mean length 0.43 (n = 6); 4-VII length 0.54–0.65 mm (mean 0.59 mm, n = 8). Seta 5-I–VII stellate; 5-I often 7- or 8-branched, prominently aciculate, length 0.13–0.18 mm (mean 0.15 mm, n = 10); 5-II length 0.23–0.32 mm (mean 0.28 mm, n = 10); 5-III length 0.38–0.43 mm (mean 0.41 mm, n = 7); 5-IV length 0.44–0.53 mm (mean 0.49 mm, n = 10); 5-V length 0.41–0.51 (mean 0.46, n = 10); 5-VI often 6- or 7-branched, slightly shorter than 5-V; 5-VII short, mean length 0.07 mm (n = 7), often 8- or 9-branched. Seta 6-I,II multi-branched, aciculate; 6-I length 0.71–0.86 mm (mean 0.77 mm, n = 10), 6-II length 0.68–0.79 mm (mean 0.73 mm, n = 10); seta 6-III–VI strong, 2-branched, branches unequal in length, weakly aciculate basally, 6-III length 1.16–1.28 mm (mean 1.21 mm, n = 8), 6-IV–VI of similar length, about 1.41 mm; 6-VII fine, very short, mean 0.03 mm (n = 7). Seta 7-I,II multi-branched, aciculate, very similar in length, 7-I length 0.52–0.62 mm (mean 0.57 mm, n = 8); 7-III often 8- or 9-branched, aciculate, length 0.49–0.58 mm, (mean 0.53 mm, n = 9); seta 7-IV,V multi-branched, fine, 7-IV mean length 0.07 mm (n = 9), 7-V mean length 0.17 mm (n = 13); 7-VI fine, mean length 0.22 mm (n = 11); 7-VII single, fine, mean length 0.37 mm (n = 9). Seta 8-II–VII very fine, 8-II usually 2-branched, 8-II–IV very small, mean length 0.04 mm; 8-V,VI often slightly longer, mean length of 0.05 mm; 8-VII stellate, length 0.07–0.09 mm (mean 0.08, n = 11). Seta 9-I very fine, near edge of tubercle bearing 6,7-I, mean length 0.03 mm (n = 11); 9-II rather stout, anterior of tubercle bearing 6,7-II, single or 2-branched, length 0.14–0.20 mm (mean 0.17 mm, n = 10); seta 9-III–VI rather stout; anterior to 6-III–VI; single, 9-III,VI infrequently branched; mean length 9-III 0.11 mm (n = 10), 9-IV 0.09 mm (n = 10), 9-V 0.08 mm (n = 9), 9-VI 0.09 mm (n = 11). Seta 9-VII

frequently with 9 or 10 branches, mean length 0.14 mm (n = 10). Seta 10-I fine, posterolaterad of 13-I, 2- or 3-branched, length 0.11–0.15 mm (mean 0.12 mm, n = 8). Seta 10-II–V single (10-III infrequently 2-branched), posterolaterad of 13-II–V; mean length 10-II 0.29 mm (n = 12), 10-III 0.27 mm (n = 10), 10-IV 0.73 mm (n = 9), 10-V 0.42 mm (n = 7); seta 10-VI fine, multi-branched, distinctly mesad of 13-VI, length about 0.09 mm; 10-VII single or 2-branched, length 0.27–0.34 mm (mean 0.30 mm, n = 7). Seta 11-I–VII very fine, minute, length 0.02–0.04 mm, usually 0.03 mm; 11-I often 3-or 4-branched, laterad of 13-I; 11-II–VI multi-branched, frequently with 8 branches; 11-II near base of 7-II ventrally; 11-III anterolaterad of 10-III; 11-IV–VI slightly anterior to 10-IV–VI. Seta 12-II fine, usually 2-branched, posterior and often slightly laterad to 13-II, length 0.13–0.20 mm (mean 0.16 mm, n = 11); 12-III fine, often single, posterior and often slightly mesad of 13-III, mean length 0.07 mm (n = 7); 12-IV,V fine, distinctly mesad of 13-IV,V, length of 12-IV about 0.08 mm, length of 12-V about 0.11 mm; 12-VI prominent, length 0.61–0.73 mm (mean 0.67 mm, n = 9); 12-VII single, length 0.57–0.68 mm (mean 0.63 mm, n = 10). Seta 13-I–VI stellate, simple, multi-branched; 13-II often 7- or 8-branched; mean length of 13-I,II 0.35 mm (both n = 9); 13-III length 0.42–0.56 mm (mean 0.49 mm, n = 11), 13-IV length 0.61–83 mm (mean 0.70 mm, n = 11), 13-V length 0.52–71 mm (mean 0.60 mm, n = 10), 13-VI length 0.42–0.53 mm (mean 0.47 mm, n = 7); 13-VII stellate, weakly aciculate basally, length 0.35–0.43 mm (mean 0.39 mm, n = 13). Puncture dorsally on segments III–V; anteromesad of 5-III, anterior to anteromesad of 5-IV, mesad to anteromesad of 4-V. *Segment VIII* (Fig. 4C): Comb plate absent; complex pattern of comb scales comprised of several loose rows with anterior to posterior gradation of increasing size (number of scales estimated to be 60–80). Distal row comprised of 2 distinct scale types, most prominent appears as a row of 11–17 strong stout scales with rather blunt slightly hooked apices from which minute spicule arises, second type, (alternating between stout scales), similar in length but differs distally in shape and strength with a weak but broadly rounded fringed apex, shorter scales cephalad appear to resemble latter type of scale. Seta 1-VIII stellate; simple; slightly dorsad to, or at level of, most dorsal comb scale; length 0.14–0.19 mm (mean 0.16 mm, n = 11). Seta 2-VIII single, simple, slightly ventroposterior to I-VIII, length 0.70–0.80 mm (mean 0.74 mm, n = 9); 3-VIII weakly aciculate, length 0.28–0.37 mm (mean 0.33 mm, n = 10); 4-VIII 2-branched, weakly aciculate, slightly mesad of 5-VIII, length 0.51–0.60 mm (mean 0.56, n = 8); 5-VIII aciculate, often with 10 or 11 branches, length 0.49–0.62 mm (mean 0.55 mm, n = 12); 14-VIII minute, mean length 0.02 mm. *Siphon* (Fig. 4C): Rather slender, narrowing gradually from base to apex (length 0.68–0.79 mm, mean 0.75 mm, n = 15); pigmentation uniformly light except basal edge dark, surface smooth although rows of minute spicules occur basally; siphon index 4.7–5.3 (mean 5.1, n = 15). Filamentous pectin extends from near base to near apex of siphon. Seta 1-S 6–9-branched (mode 7, n = 29), length 0.45–0.53 mm (mean 0.48 mm, n = 14), weakly aciculate, located basally at about 0.33 siphon length (mean 0.31, n = 15). Ventral accessory seta (1a-S) represented by 2 single setae at 0.53–0.62 (mean 0.59, n = 15) and 0.63–0.71 (mean 0.68, n = 15) siphon length, lower 1a-S with mean length of 0.25 mm (n = 14) and upper, 0.22 mm (n = 14). Dorsal accessory seta (2a-S) usually consists of row of 5 setae,

these setae usually appear paired, lower 2 basad of 1-S, middle seta often about level with 1-S; basal seta often single, others 2-branched. Seta 2-S prominent, laterally compressed, narrowed apically with fine curved tip; 6-S single, rather sinuate, longer than 2,8,9-S and stronger than 8,9-S; 8,9-S fine, single. *Segment X*: Saddle tan, slightly darker than siphon, basal edge darker; incomplete ventrally; saddle length 0.27 mm (n = 18); surface smooth with many clusters of minute, fine spicules, which become longer toward posterior margin; spicules near posterior margin extend beyond edge of saddle. Seta 1–3-X well developed; 1-X frequently 5-branched, aciculate, length 0.32–0.44 mm (mean 0.38 mm, n = 13); 2-X frequently 9-branched, aciculate, branches ascending in length from shortest (mean 0.37 mm, n = 13) to longest (mean 1.03 mm, n = 11); 3-X long (mean 1.25 mm, n = 12), weakly aciculate; 4-X usually with 8 or 9 branches, finely aciculate on one side, length 0.19–0.25 mm (mean 0.22 mm, n = 12).

Etymology.—The name *paucartamboensis* is derived from Paucartambo Province, one of 13 provinces of the Cusco Region of Peru. This province, situated on the eastern slopes of the Andes, includes the steeply sloped and forested mountainous terrain where the species was encountered.

Bionomics.—*Wyeomyia paucartamboensis* was encountered during a survey of mosquitoes associated with phytotelmata, undertaken in the Peruvian Department of Cusco and an adjacent region of the Department of Madre de Dios. Within the Department of Cusco, sampling was concentrated in the Province of Paucartambo and extended over an altitudinal gradient from about 300 m to over 2,500 m. *Wyeomyia paucartamboensis* was observed only in bromeliads and only over a relatively narrow range in elevation extending from 1,098–1,426 m with nearly all specimens occurring within 1,300–1,400 m. At this elevation, the region may be characterized as premontane wet forest on steeply sloping terrain. Larvae and pupae of *Wy. paucartamboensis* were found in several unidentified species of *Tillandsia* and *Guzmania* as well as in *Mezobromelia capituigera* (Griseb.) J.R. Grant. Bromeliads harboring the immature stages were at heights of 3–15.6 m above ground. Females of species in the subgenus *Nunezia* tend to be anthropophilic with a diurnal pattern of biting activity. Although distinct from a morphological perspective, larvae of *Wy.* (*Nunezia*) appear to have similar behavioral traits to those of *Wy.* (*Hystatomyia*). Both of these subgenera undergo larval development in bromeliads. However, they appear to have distinct altitudinal distributions, with species of *Wy.* (*Hystatomyia*) primarily limited to humid tropical lowland forests, whereas species of *Wy.* (*Nunezia*) occur in humid tropical premontane and lower montane forests to heights of at least 2,700 m. Exceptions are an undescribed species of *Wy.* (*Nunezia*), which occurs in the Pacific lowland forests of the Colombian Choco, the relatively low (800–1,100 m) habitat of *Wy. bicornis* (Heinemann and Belkin 1978), and the elevation range (1,000–1,200 m) of *Wy.* (*Hystatomyia*) *baltae* (Porter 2009).

Distribution.—*Wyeomyia paucartamboensis* is known only from the premontane location on the eastern slopes of the Peruvian Andes (Distrito Kosñipata, Provincia Paucartambo, Región Cusco, Peru) where the type specimens were collected.

Material examined.—Two hundred and twenty-one specimens including exuviae and genitalia dissections (38♂ 36♀ 14♂G 5♀G 43Le 74Pe 11L).

Represented in this material are 43 complete and 31 partial rearings.

Holotype: — ♂ (PEO8273-02), with dissected genitalia on microscope slide, LePe on separate slide, PERU: Cusco, Provincia Paucartambo, Distrito Kosñipata, San Pedro (13°03.85'S, 71°33.30'W), 1,415 m, hbt: *Tillandsia* sp. (*Fernández & Wittman*) (Museo de Historia Natural, Lima).

Paratypes: (All in USNM) PERU: Cusco, Provincia Paucartambo, Distrito Kosñipata, San Pedro (13°02.86'S, 71°31.76'W), 1,323 m, 23-III-2005, hbt: *Guzmania* sp., (*Fernández & Wittman*), (4♂ 6♀ 1♂G 1♀G 1LePe♂ 5LePe♀ 3Pe♂ 1Pe♀ 2L – PE08232–09, –101 [adult on microscope slide with dissected genitalia], –02, –04, –05, –06, –07, –102, –103, –104). Same as preceding except hbt: *Tillandsia* sp., (1♂ 3♀ 1♀G 1LePe♂ 3Pe♀ 1L – PE08233–104 [adult on microscope slide with dissected genitalia], –01, –102, –103); same as preceding, (3♂ 2♀ 1♂G 2LePe♂ 1LePe♀ 1Pe♂1Pe♀ – PE08245–101 [adult on microscope slide with dissected genitalia], –04, –05, –09, –102); same as preceding, (4♂ 4♀ 1♂G 1♀G 3LePe♂ 4LePe♀ 1Pe♂ – PE08247–08, –103 [adult on microscope slide with dissected genitalia}, –01,–04, –07, –09, –10, –12); same as preceding, (1♀ 1PE♀ – PE08249–100); same as preceding except, (13°03.26'S, 71°32.96'W), 1,375 m, 25-III-2005, (1♂ 2♀ 1♂G 1♀G 1LePe♂ 1LePe♀ 1Pe♀ – PE08254–02, –03 [adult on microscope slide with dissected genitalia], –102); same as preceding, (1♂ 2♀ 1LePe♂ 2LePe♀ – PE08257–01, –02, –04); same as preceding except (13°03.62'S, 71°33.16'W), 1,426 m, hbt: *Guzmania* sp., (1♂ 2♀ 1♀G 1Pe♂ 2Pe♀ – PE08262–100 [adult on microscope slide with dissected genitalia], –102, –103); same as preceding except (13°03.85'S, 71°33.30'W), 1,415 m, hbt: *Tillandsia* sp., (1♂, 1Pe♂ – PE08270–100); same as preceding, (6♂ 3♀ 2♂G 1♀G 3LePe♂ 3Pe♂ 3Pe♀ – PE08273–04, –05, –109 [adult on microscope slide with dissected genitalia], –01, –102, –103, –104, –106, –107); same as preceding, (6♂ 6♀ 3♂G 1♀G 5LePe♂ 4LePe♀ 1Pe♂ 2Pe♀ 6L – PE08275–14, –18, –19 [adult on microscope slide with dissected genitalia], –01.1, –01.2, –01.3, –01.4 –02, –03, –11, –13, –15.1, –15.2, –16, –17, –104, –105, –106); same as preceding except 26-III-2005, (2♂ 3♀ 1♂G 2LePe♂ 2LePe♀ 1Pe♀ – PE08276–11 [adult on microscope slide with dissected genitalia], –01, –03, –05, –102); same as preceding, (3♂ 1♀ 1♂G 3LePe♂ 1Pe♀ 2L – PE08278–03, –05.1, –05.2 –06, –09, –100); same as preceding, (1♀ 1Pe♀ – PE08279–01); same as preceding (1♂ 1Pe♂ – PE08280–100); same as preceding except hbt: *Mezobromelia capituligera* (Griseb.) J.R. Grant, (1♂ 1♀ 1Pe♂ 1Pe♀ – PE08281–102, –104); same as preceding except, (13°02.36'S, 71°30.52'W), 1,098 m, hbt: *Tillandsia* sp., (2♂ 1♂G 1LePe♂ 1Pe♂ – PE08283–03, –100).

Discussion.—*Nunezia,* originally proposed as a subgenus by Dyar (1928), has not been well characterized, but does possess significant differences from other *Wyeomyia* to warrant subgeneric status. A phylogenetic analysis by Judd (1996,1998) of a representative group of sabethine mosquitoes, based on a series of morphological characters, inferred that within the genus *Wyeomyia* the subgenus *Nunezia* is most closely associated with the subgenera *Phoniomyia* Theobald, 1903, *Dodecamyia* Dyar, 1918 (monotypic with *Wy. aphobema* Dyar, 1918) and *Hystatomyia* Dyar, 1919. The larval stages of most species within these subgenera undergo development in tank bromeliads. Significant morphological

differences characterize these subgenera. While it is not the purpose of this paper to present a detailed analysis of such differences, a few pertinent characters are presented that clearly differentiate *Nunezia* from the related subgenera. Special attention also is given to differentiating *Wy. paucartamboensis* from *Wy. bicornis* and, to some extent, from other sabethine genera with prominent shared characters. Although not included in the comparisons, the subgenus *Wyeomyia* also has many species that undergo larval development in bromeliads. The following references to *Wy. aphobema* are based on specimens from the Peruvian Amazon region.

Females of *Nunezia* often may be distinguished in having a downward curved proboscis similar in length to the forefemur; antennal flagellum about 0.6 length of the proboscis; small silvery white patch of scales on the vertex immediately behind the compound eyes; frequent presence of silvery scales on the scutellum; iridescent silvery to violaceous scales on upper portion of antepronotum; silvery white to silvery scales on the thoracic pleura; and the tibiae and tarsomeres dark-scaled, although hind tibia and first hind tarsomere may have some white scales ventrally. The proboscis of females of *Phoniomyia* also curves downward and is long, exceeding the length of the forefemur by about 0.17–0.25 (Lane 1953); the antenna is about one-third as long as the proboscis (Correa and Ramalho 1956); vertex of the head and the antepronotum with iridescent scales; thoracic pleura with silvery scales; and mid- and/or hind tarsomeres nearly always with at least some white scales (Lane 1953). The proboscis of females of *Hystatomyia* is comparatively stout, short (about 0.75 length of forefemur) and with about the apical 0.3 slightly expanded as viewed laterally; the antenna is slightly shorter than the proboscis, often about 0.95 the length of the proboscis; scales on the vertex of the head and the antepronotum are dull and concolorous with those of the scutum; scales of the thoracic pleura are white to silvery white; the midtarsomeres may have white scales, which are extensive in some species. The proboscis of *Wy. aphobema* curves downward, but to a lesser degree than in *Nunezia* and *Phoniomyia,* is about 0.85 the length of the forefemur and, like *Hystatomyia*, is expanded apically; the antenna is 0.8–0.9 the length of the proboscis; the vertex of the head has iridescent blue-green scales and the antepronotum has similar lustrous blue-violet scales; the thoracic pleura have silvery scales; midtarsomeres 2–4 have a line of white scales on one side, which often extends to tarsomere 5 and frequently begins on tarsomere 1.

As would be expected, important characters defining the subgenus *Nunezia* are associated with the male genitalia. The gonostylus of *Wy.* (Nunezia) species appears to have two distinct lobes arising independently from the stem, which correspond with the designations A and M of Belkin et al. (1970) (Fig. 2). Lobe A is prominent and nearly always has a unique row of five specialized setae on the sternal edge. These setae increase in size distad to basad and may vary in shape; the basal seta tends to be very large, often peglike but sometimes foliform. Lobe M, laterad to lobe A, has a sternal crest comprised to varying degrees of filamentous, featherlike, and foliform setae. Lobe M also has one, and in some species two, tergal processes. The most common tergal process, designated lobe M tergal process 1 (Mtp1), is situated on the lateral surface of Lobe M. When present, a second smaller process, lobe M tergal

process 2 (Mtp2), occurs at the distotergal margin of lobe M. Being tergal in position, these two processes do not appear to correspond with any of the sternal lobes associated with lobe M described by Belkin et al. (1970).

With regard to the related subgenera, pronounced differences exist in the form and location of the gonostylus. In *Hystatomyia*, the gonostylus is simple and located subapically, in *Dodecamyia* it is apical but simple, and in *Phoniomyia* it is variable, i.e., simple, divided - appearing digitate (Correa and Ramalho 1956), or absent (but with strong setae including foliform ones on apical margin of gonocoxite). Another prominent difference exhibited by *Phoniomyia* is an absence of the basal mesal lobe associated with the gonocoxite (Lane 1953).

Although similar in general structure, the male genitalia of *Wy.* (*Nunezia*) *paucartamboensis* differ significantly from that of *Wy.* (*Nunezia*) *bicornis*. The following observations are based on direct comparisons with the slide-mounted male genitalia of the holotype of *Wy. bicornis* (USNM type no. 44162). Gonostylus lobe A of *Wy. bicornis* has a prominent subapical, rather triangular-shaped cuticular extension on the sternal surface at about the level of specialized setae a2 and a3, which is absent in *Wy. paucartamboensis*. Also, specialized setae a3 and a4 are peglike and much smaller in *Wy. bicornis*. Seta a5 in this species is a strong, gently curved spiniform seta as opposed to the very large foliform seta of *Wy. paucartamboensis*. The sternal crest on lobe M of *Wy. bicornis* appears to consist of two rather narrow feather-like setae and 5- or 6 simple setae just distad that curve basad toward the feather-like setae; consequently, it does not have the very broad wing-shaped foliform seta associated with the crest of W*y. paucartamboensis*. The prominent digitate process (Mtp2) on lobe M of *Wy. paucartamboensis* is very reduced and rather resembles a nipple in *Wy. bicornis*. There also appears to be species-specific differences associated with the aedeagus. In *Wy. bicornis*, leaflets of the sternal plate are on a rather slender column and occur almost entirely beyond the apical tergal arms, whereas in *Wy. paucartamboensis* the leaflets are on a stouter and shorter column and do not extend beyond the apical tergal arms.

The characteristic filamentous pecten on the larval siphon of species of *Wy.* (*Nunezia*) (Fig. 4C) is shared with other Sabethini, most prominently species of *Onirion* Harbach & Peyton, 2000, *Isostomyia* Coquillett, 1906, *Runchomyia* Theobald, 1903, and certain phylogenetic lineages of *Sabethes* Robineau-Desvoidy, 1827 (Harbach and Peyton 2000). Morphological characters defining the genus *Sabethes* – absence of prealar setae (except *Sa. petrocchiae* Shannon & Del Ponte), maxillae with prominent apical tooth, and maxillary palpus fused with maxillary body – are not features of species of the subgenus *Nunezia*. Likewise, species of *Isostomyia* and *Runchomyia* exhibit several morphological differences from *Wy.* (*Nunezia*), including a ridged apical spine on the maxilla, a simple undivided gonostylus, and the apical arms of the aedeagus joined medially. Among other differences, species in the genus *Onirion* differ from those in *Wy.* (*Nunezia*) by their relatively simple gonostylus (no distal lobes), proctiger with numerous very long cercal setae, larval head with a circular occipital foramen, larval head setae 4–7-C normally single, and maxilla with stout apical tooth.

Fourth-instar larvae of *Wy.* (*Nunezia*) are differentiated from those of other *Wyeomyia* by a combination of characters.

Setae 4–6-C are multibranched: the usual ranges are 4-C with 7–12 branches, 5-C with 4–7 branches, and 6-C with 6–12 branches. Seta 4-P is strong, with distinctive distal branching and/or very strong distal aciculae. Seta 5-I is aciculate, often most prominently at about mid-length. The aciculae of seta 7-T are predominantly, if not completely, on one side of the branches. The comb on segment VIII has many scales of varying sizes arranged in several rows with the most prominent and strongest scales along the caudal margin of the comb. Many of the strongest scales appear to have a minute apical spicule. Seta 2-X is multibranched with 5–10 branches. Distinctive characters associated with the siphon include its moderately long length; a filamentous pecten extending over almost its entire length; seta 2a-S comprised of 5 strong setae, the proximal of which tends to be single but the rest are 2-branched; 1a-S consists of 2 single setae distad to multibranched 1-S.

Characters associated with the distinctive siphon of *Nunezia* (Fig. 4C) are especially useful for differentiating this subgenus from the related subgenera. When a filamentous pecten occurs in *Phoniomyia*, it does not extend over almost the entire length of the siphon as in *Nunezia*. The pecten of *Hystatomyia* and *Wy. aphobema* is comprised of spine like spicules. In addition to the typical arrangement of spicules along a single posterior line, some spicules in *Wy. aphobema* also occur basally at varying distances away from the line. The pattern of accessory setae in *Nunezia* (2a-S comprised of 5 strong setae and 1a-S of 2 single setae distad) appears to be unique. In *Hystatomyia* the accessory setae are more abundant, especially the ventral ones (1a-S), which occur in a row of about 7 setae. The ventral accessory setae of *Phoniomyia* are also quite numerous. The siphon of *Wy. aphobema* is not as distinctly elongate and slender as those of the related subgenera, and it has a variable but often large number of accessory setae, many of which may be considered 2a-S or in close association with these setae (figures by Dyar 1928 and Lane 1953 appear to be incomplete). Another obvious larval difference is branching of seta 2-X, which has 8–10 branches in *Wy. paucartamboensis* and 5–7 (n = 12) in *Wy. bicornis* as opposed to single in *Wy. aphobema*, single or two branches in *Phoniomyia*, and two or three branches in *Hystatomyia*. As described by Judd (1998), the larval maxilla of *Hystatomyia* and *Phoniomyia* has a unique very small cuplike extension of the cuticle on the outer margin from which seta 3-Mx emanates. This cuplike extension is absent in *Wy. aphobema*, but 3-Mx does occur on the outer margin. However, 3-Mx does not occur in *Wy. paucartamboensis* nor in several other undescribed species of the subgenus *Nunezia*. Unlike *Hystatomyia* and *Wy. aphobema*, the minute (length 0.01 mm) peglike seta 1-Mx in Nunezia species is borne near the apical margin at the level of 4-Mx but on the dorsal surface of the maxilla. Seta 1-Mx is slightly longer in the species of the subgenus *Hystatomyia* and even more pronounced (length 0.02 mm) in *Wy. aphobema*. A more readily apparent difference is in head seta 6-C, which is 2-branched in *Wy. aphobema* but multiple-branched in species of the related subgenera.

Comparisons between *Wy. paucartamboensis* and *Wy. bicornis* (based on 12 larval exuviae of topotypic specimens [Heinemann and Belkin 1978]) indicate a few subtle differences. Seta 8-P appears consistently to have 8–10 branches (mode 8) in *Wy. paucartamboensis* but 5–7 (mode 6) in *Wy. bicornis*. Seta 1-X has 4–6 branches

(mode 5) in *Wy. paucartamboensis* but 2 or 3 branches (mode 2) in *Wy. bicornis*. Also, the number of branches of seta 2-X in these species tend to be different, with *Wy. paucartamboensis* having 8–10 branches (mode 9) and *Wy. bicornis* having 5–8 (mode 5). Seta 1-S of the siphon has 6–9 branches (mode 7) in *Wy. paucartamboensis* but 4–6 branches (mode 5) in *Wy. bicornis*. Siphon length differs slightly, being 0.68–0.79 mm (mean 0.75 mm) in *Wy. paucartamboensis* and 0.76–0.83 mm (mean 0.80 mm) in *Wy. bicornis*.

Few characters appear to differentiate the pupal stage of *Nunezia* from those of other *Wyeomyia*. The trumpet is somewhat distinctive and exhibits two rather distinct forms. The form in *Wy. bicornis* and *Wy. paucartamboensis*, *shown* in Fig. 4A, is significantly swollen medially. The other form is slender, tubelike, as illustrated for *Wy.* (*Nunezia*) *trujilloi* by Pulido and Sutil (1981); and, thus, somewhat resembles the trumpet of various *Phoniomyia* species but is much shorter than the trumpet of species of the subgenus *Hystatomyia*. The trumpet of *Wy. aphobema* is short, about 0.4 mm in length, and somewhat flared apically. Another rather unique characteristic of *Nunezia* pupae is the occurrence of strong 2- or 3-branched seta 5-IV–VI. Within *Wyeomyia*, a 2-branched seta 5 on these abdominal segments occurs primarily within the subgenera *Spilonympha* Motta & Lourenço-de-Oliveira, 2005 and *Phoniomyia*, the latter also having some species with seta 5-IV–VI 3-branched on at least one of the abdominal segments. Seta 5-IV–VI is 3-branched in both *Wy. paucartamboensis* and *Wy. bicornis*. Seta 5-CT is strong and multibranched in subgenus *Nunezia*; branching ranges from 3–8, but most often has 4 or 5 branches. Similarly, 5-CT is 3- to 5-branched in *Phoniomyia*; however, it is primarily 2-branched in *Wy. aphobema* and occurs as a strong, long, single seta in *Hystatomyia*. In *Nunezia*, abdominal seta 2-II is quite long, nearly always over 0.5 the length of seta 1-II. For *Wy. paucartamboensis*, the mean length ratio of seta 2-II:seta 1-II is 0.72 (n = 9), range 0.62–0.80. Seta 2-II also is greater than 0.5 the length of 1-II in *Wy. aphobema* and is longer than 1-II in some species of *Phoniomyia*. However, in *Hystatomyia* 2-II tends to be very short relative to 1-II, often only 0.1–0.2 the length of 1-II. In *Nunezia*, branching of seta 1-II begins somewhat beyond the base; for Wy. *paucartamboensis*, it begins 0.15–0.23 (n = 11) from the base. Seta 8-CT of *Wy. aphobema* is comparatively short, about 0.2 mm, and slightly less than the length of seta 9-CT. In contrast, 8-CT of *Nunezia* and *Hystatomyia* tends to be in the range of 0.6 to 0.8 mm in length and about twice the length of 9-CT. Seta 8-CT appears to be consistently 2-branched in *Nunezia* , 2- to 4-branched in *Hystatomyia* and *Wy. aphobema*, and often single but sometimes double in *Phoniomyia* (Correa and Ramalho 1956).

Setal length and branching patterns of the pupa appear to be similar in *Wy. bicornis* and *Wy. paucartamboensis*. Most apparent differences between the pupae of these two species are associated with color patterns. The trumpet of *Wy. bicornis* is primarily brown over the basal 0.5–0.7 and then gradually becomes lighter and is pale apically. The trumpet of *Wy. paucartamboensis* also is primarily brown but is broadly pale submedially and narrowly pale at the apex. Pigmentation differences also exist in the metathoracic wing. In *Wy. bicornis*, seta 12-CT occurs at the extreme caudolateral end of the median pale area of the wing adjacent to where setae 10,11-CT

arise on the metanotum. However, in *Wy. paucartamboensis*, the median pale area does not extend to 12-CT and is replaced by light brown pigmentation. Also, the metathoracic wing of *Wy. paucartamboensis* has a prominent submedian brown area with a crescent-shaped pale mark. In contrast, the metathoracic wing of *Wy. bicornis* is primarily pale with a narrow submedian brown area and an adjacent small brown spot.

Although not comprehensive, comparisons of the "bromeliad" subgenera indicate significant morphological differences, especially with regard to characters associated with the male genitalia and fourth-instar larvae. More extensive analyses, both morphological and molecular, may indicate paraphyletic relationships among these subgenera.

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