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Entomologica scandinavica

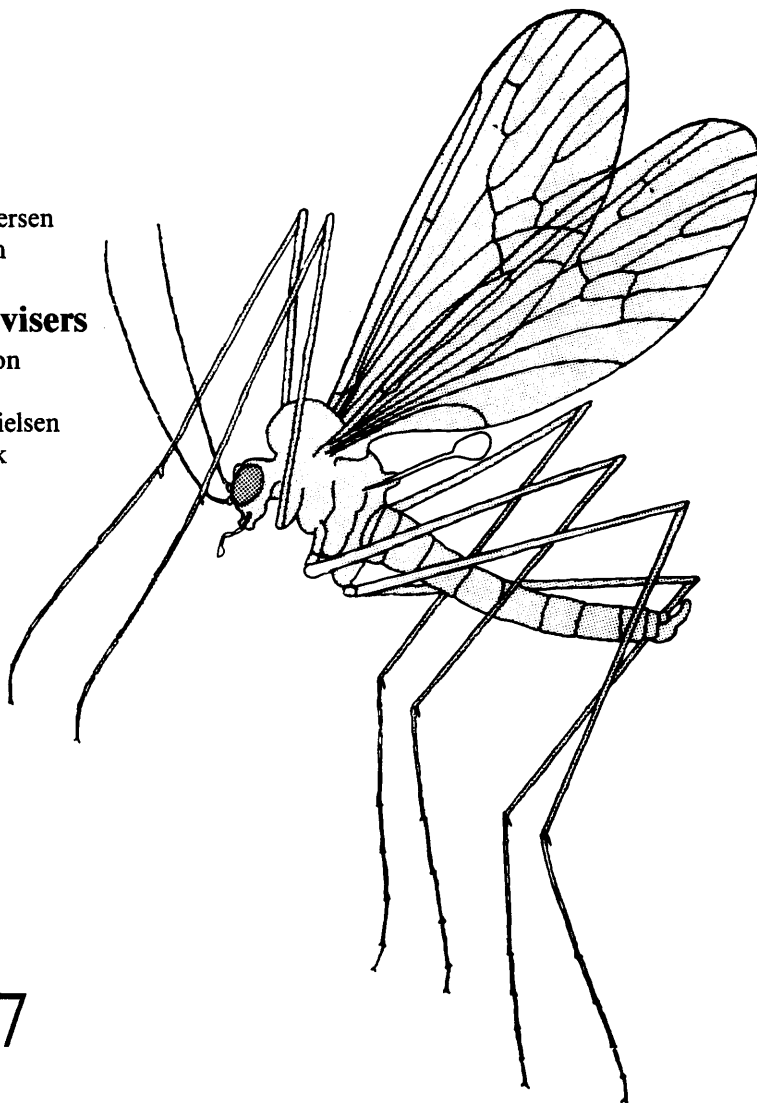
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A new species of *Anopheles* subgenus *Kerteszia* (Diptera: Culicidae) from Venezuela

RALPH E. HARBACH and JUAN CARLOS NAVARRO

Ent. scand.



Harbach, R. E. & Navarro, J. C.: A new species of *Anopheles* subgenus *Kerteszia* (Diptera: Culicidae) from Venezuela. *Ent. scand.* 27: 207-216. Copenhagen, Denmark. June 1996. ISSN 0013-8711.

Anopheles auyantepuiensis sp. n. of the subgenus *Kerteszia* is described and distinguished from *Anopheles neivai*. The larval and pupal stages and important features of the adult female are illustrated. Information is provided on the bionomics and taxonomy of the species.

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Introduction

Zavortink (1973) published a review of the neotropical subgenus *Kerteszia* of *Anopheles* and concluded that a single female from the Auyantepui mesa in southeastern Venezuela 'almost certainly represents a distinct species'. He did not name or describe the species because the specimen was badly damaged. In February 1994, one of us (JCN) had the opportunity to make collections of mosquitoes on the summit of Auyantepui which included this species. Subsequent study of this material has shown that the species is extremely similar to *A. neivai* Howard, Dyar & Knab, differing mainly in features of adult ornamentation and exhibiting only minor differences in the larval and pupal stages. In view of these differences, and the apparently allopatric distribution of *A. neivai*, we are formally naming and describing the 'Auyan-Tepui Mesa form' of Zavortink (1973) as a new species in this paper. This species differs from all other known species of *Kerteszia* in having scales on the acrostichal area of the scutum, a character shared with members of the subgenus *Nyssorhynchus*.

Material and methods

This study is based on material collected from terrestrial bromeliads and human bait on the summit of Auy-

antepui, Canaima National Park, Bolivar State, southeastern Venezuela. Larvae were collected from axils of bromeliads by extracting water with a pipette. Some larval collections were preserved in 80% ethanol for studies of insects occurring in phytotelmata. Samples for taxonomic studies were pooled and transported to Caracas for rearing to adults.

Observations of adult mosquitoes were made under simulated natural light. Larval and pupal chaetotaxy was studied using bright field microscopy. Except for wing spot nomenclature (Wilkerson & Peyton 1990), the morphological terminology and abbreviations recommended by Harbach & Knight (1980, 1982) are used throughout. In addition to the usual letters and symbols used to denote material examined, L_3 is used to indicate the third instar larva. The new species is recognized on the basis of correlated anatomical features in associated life stages. Diagnostic and differential characters were confirmed in all specimens available.

Anopheles (Kerteszia) auyantepuiensis sp. n.

(Figs. 1-5)

Anopheles (Kerteszia) sp., Auyan-Tepui Mesa form of Zavortink 1973: 32.

Anopheles (Kerteszia) neivai of Cova Garcia 1962: 365-367.

Anopheles (Kerteszia) sp. of Anduze 1941:823; Anduze 1942:435.

Etymology. – The specific name, *auyantepuiensis*, is a Latinized geographical name meaning from Auyantepui.

Material examined. – Thirty-one specimens (15♀, 4Le,

2Pe, 7L, 2L₃, 1P), including 2 larval rearing (one without adult) and 1 pupa with an associated larval exuviae comprise the type series of *A. auyantepuiensis* sp. n.

Venezuela: Bolivar State, Parque Nacional Canaima, Auyantepui, 1700, ii.1994, Navarro & Liria, 1LePeQ (VEZ458, holotype, Le & Pe on separate microscope slides), 1LePe (VEZ34-465), 1LeP (VEZ481) 5L (VEZ431, VEZ435, VEZ441A, VEZ797A, VEZ797B), 1L₃ (VEZ441B), 8Q (VEZ1, 2, 4, 7-11); Auyantepui, 1730 m, CEB-HUM, ii.1994, Navarro & Liria, 1Le (VEZ795), 2L (VEZ794A, 794B), 1L₃ (VEZ794C), 3Q (VEZ3, 5, 6); Isla Ratoncito, nr Auyantepui, 500 m, ii.1994, Liria, 3Q (VEZ12-14).

The holotype (VEZ458) and 14 paratypes (VEZ435, VEZ481, VEZ795, VEZ794B, VEZ494C, VEZ797B, VEZ6-11, 13, 14) are deposited in the Laboratorio de Biología de Vectores, Museo de Biología, Universidad Central de Venezuela, Caracas. The remaining paratypes (VEZ34-465, VEZ431, VEZ441A, VEZ441B, VEZ794A, VEZ797A, VEZ1-5, VEZ12) are deposited in the Natural History Museum, London.

Description. – Female. Head: Integument dark brown. Interocular space and immediately adjacent portion of vertex with frontal tuft of white scales and golden setae, remainder of vertex and occiput with erect dark brown to black spatulate

scales except for few immediately adjacent to ocular setae sometimes partially or completely white; ocular setae golden brown to black. Clypeus bare. Antenna length 1.49-1.65 mm (\bar{x} = 1.57 mm, n = 10 for this and following measurements); pedicel dark brown to black mesally, yellowish brown laterally; without scales; flagellum dark, flagellomere 1 with dark scales on mesal surface. Proboscis entirely dark-scaled; length 2.42-2.84 mm (\bar{x} = 2.64 mm), 1.30-1.62 length of forefemur (\bar{x} = 1.41), 0.97-1.11 length of maxillary palpus (\bar{x} = 1.05). Maxillary palpus dark-scaled with a few white scales dorsally at apices of palpomeres 3-5; scales erect on all of palpomere 2 and proximally on 3; length 2.24-2.73 mm (\bar{x} = 2.52 mm), 0.90-1.03 length of proboscis (\bar{x} = 0.96).

Thorax: Integument pruinose, with pattern of light to dark brown areas. Scutum (Fig. 1) with 4 longitudinal brown stripes between acrostichal and dorsocentral areas and dorsocentral areas and lateral margins; pale (yellowish) setae on anterior promontory, scutal fossa, antealar area, mid-anteriorly and posterolaterally on prescutellar area, anterior half of acrostichal area and scattered among dark setae on dorsocentral area, generally longer dark (brownish black) setae on posterior half of acrostichal area, entire dorsocentral area, supraalar area and anterolaterally on prescutellar area; acrostichal area with more or less double line of narrow white scales extending from anterior promontory to very near prescutellar setae (Fig. 1), white scales also in lateral fossal line, on antealar and supraalar areas and scattered on median and posterior areas of scutal fossa. Scutellum without scales, posterior margin with long and short brownish black setae. Mesopostnotum and postpronotum bare. Anteppronotum mainly with yellowish setae and scattered pale scales, upper (anterior) area with dark setae and patch of dark spatulate scales. Pleura with yellowish setae on upper proepisternum (1-2), prespiracular area (1-3), upper mesokatepisternum (2-6), prealar knob (1-4) and upper mesepimeron (3-5); mesopleuron with white scales in distinctive arcuate patch on upper mesokatepisternum, in small cluster on lower mesokatepisternum adjacent to mesokatepimeron, on prealar knob and in small patch with upper mesepimeral setae.

Wing (Fig 2): Length 3.25-4.05 mm (\bar{x} = 3.61 mm); veins dark-scaled with spots of white scales as follows: costa usually with basal, humeral, sector, accessory sector, subcostal and preapical

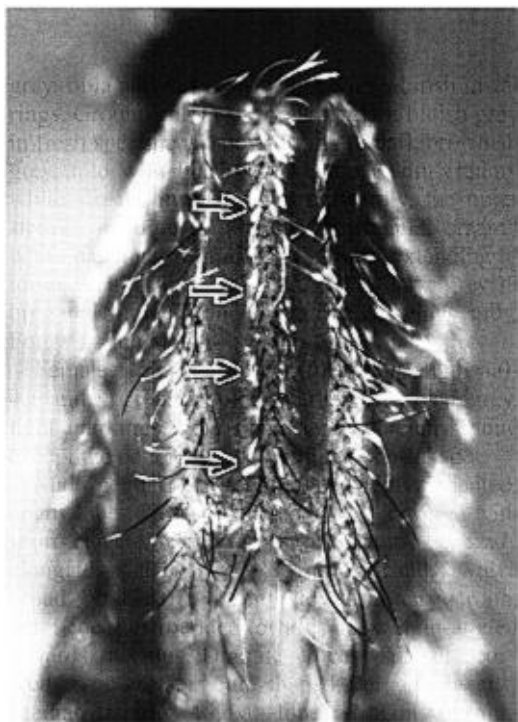


Fig. 1. *Anopheles auyantepuiensis* sp. n. Scutum of female showing presence of acrostichal scales (arrows), a feature unique among species of the subgenus.

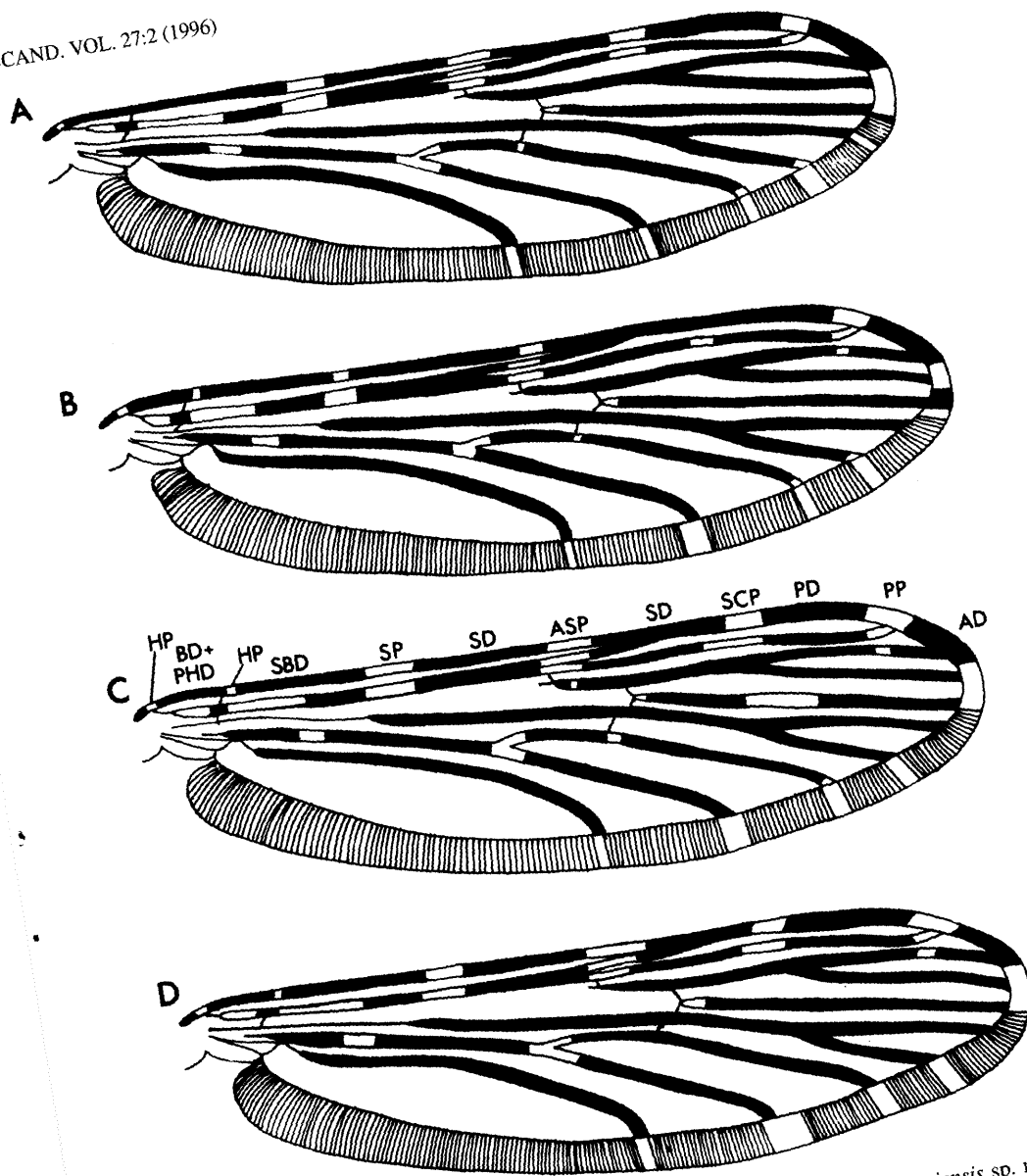


Fig. 2. Schematic outline drawings showing wing spot variations in *Anopheles auyantepuiensis* sp. n. (A-C) compared to the typical pattern of *A. neivai* (D). Abbreviations for wing spots: BP = basal pale; BD = basal dark; PHD = prehumeral dark; HP = humeral pale; SBD = subbasal dark; SP = sector pale; SD = sector dark; ASP = accessory sector pale; SCP = subcostal pale; PD = preapical pale; PP = preapical pale; AD = apical dark.

pale spots, humeral and subcostal pale spots sometimes absent; remigium pale-scaled except at humeral crossvein; vein R base pale 0.5-0.7 distance to sector pale spot; vein R_1 with fairly

constant accessory sector, subcostal and preapical pale spots, subcostal pale spot sometimes reduced; R_s infrequently with 1-2 pale scales on distal side of basal spur; small pale spot present or

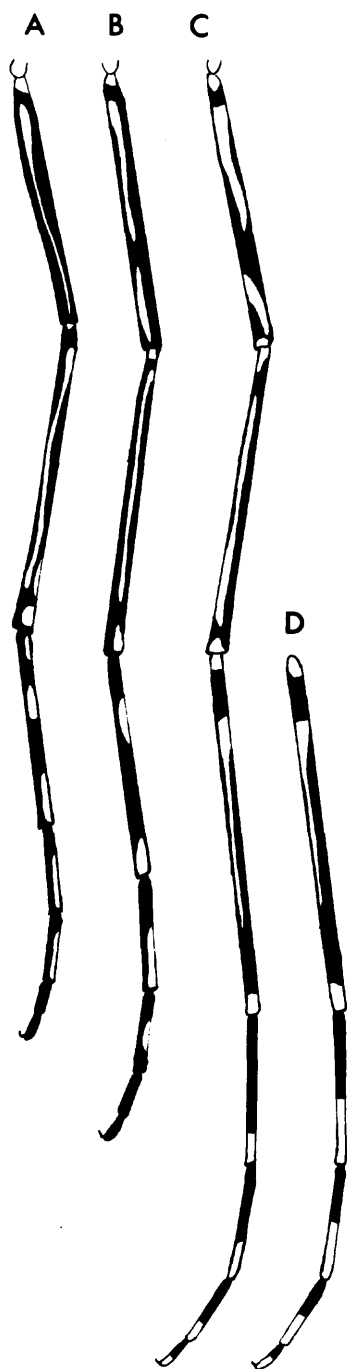


Fig. 3. Legs (anterior aspects) of *Anopheles auyantepuiensis* sp. n. showing variation of pale markings on the hindtarsus: (A) foreleg; (B) midleg; (C) hindleg; (D) hindtarsus.

absent on R_2 adjacent to preapical pale spot on R_1 ; R_{4+5} with small basal pale spot and with or without variable submedian pale line; CuA with subbasal and variable median pale spots, median pale spot adjoins pale base of mcu; M_{3+4} usually with small pale spot at mcu; veins M_2 , M_{3+4} and sometimes M_1 and CuA pale at tip. Apical pale fringe spot large, normally undivided; additional pale fringe spots at apices of M_2 , M_{3+4} , CuA, 1A and sometimes M_1 .

Halter: Scabellum and pedicel with pale integument, capitellum dark-scaled with small patch of white scales dorsally at base.

Legs (Fig. 3): Coxae largely devoid of scales; anterior surface of forecoxa with dark scales proximally and white scales distally, posterior surface with small cluster of ventrally directed white scales at apex, inner surface with cluster of long dark scales at apex; outer surface of midcoxa with elongate white scales at least partially separated into proximal and distal clusters, posterior surface with few white scales projecting from apex; outer posterior margin of hindcoxa with small apical patch of white scales. Foretrochanter with dark and pale scaling on ventral surface; mid- and hindtrochanters with white scaling on ventral surface. Femora, tibiae and tarsi as figured; foretarsomeres 1-3 with and 4-5 without dorsal white scaling; midtarsomeres 1-2 with, 3-4 with or without and 5 without dorsal white scaling, often very reduced on 1-3 when 4-5 entirely dark-scaled; hindtarsomeres with variable but relatively narrow apical white bands, band on apical 0.05-0.10 ($\bar{x} = 0.06$) of tarsomere 1, 0.15-0.42 ($\bar{x} = 0.27$) of tarsomere 2, 0.30-0.50 ($\bar{x} = 0.40$) of tarsomere 3, 0.30-0.45 ($\bar{x} = 0.38$) of tarsomere 4 and 0.35-0.50 ($\bar{x} = 0.41$) of tarsomere 5, sometimes weak and ill-defined on tarsomeres 5.

Abdomen: Integument light to dark brown, sterna generally lighter; terga and sterna without scales.

Male and egg. Unknown.

Larva, fourth instar (Fig. 4). Character and placement of setae as figured, numbers of branches in Table 1; $n = 5$ for measurements, $= 10$ for setal branching counts.

Head: Slightly wider than long, length 0.61-0.65 mm ($\bar{x} = 0.63$ mm), width 0.62-0.69 mm ($\bar{x} = 0.66$ mm); moderately tanned, with darker patches dorsally and ventrally, collar and dorso-

Table 1. Numbers of branches for fourth-instar larval setae of *Anopheles auyantepuiensis* sp. n. (five specimens, ten setae).

Seta no.	Head C	Thorax			Abdominal segments									
		P	M	T	I	II	III	IV	V	VI	VII	VIII	X	
0	1	1	—	—	—	1	1	1	1	1	1	1	—	
1	1	4-10(5)	41-55(41)	1	1	12-19(16)	17-24(21)	19-28(26)	17-25(24)	18-26(20)	13-17(15)	2-4(4)	1	
2	1,2(1)	17-23(18)	1	1	1	1	1-3(3)	1	1	1	1	1	13-20(17)	
3	1	1	1	5-8(7)	1	1	1,2(1)	2,3(2)	1,2(1)	1	1	1-3(2)	9-16(11)	
4	1	21-28(21)	3,4(4)	3,4(3)	5-9(7)	5-7(6)	1,2(1)	1	3-5(4)	1	1	1	9*	
5	1	29-42(38)	1	31-43(43)	3,4(3)	4-8(4)	3-7(5)	3-5(3)	2-5(4)	3-5(4)	2-4(3)	2,3(2)	—	
6	1	1	2-5(4)	3-7(4)	29-40(30)	28-45(35)	1	1	1	1	1,2(2)	—	—	
7	1,2(1)	33-44(40)	3-5(3)	36-46(39)	26-42(28)	27-46(29)	3-7(5)	2-5(4)	3-5(4)	3,4(4)	3-5(4)	—	—	
8	1	26-47(44)	27-38(35)	29-45(38)	—	1,2(1)	1,2(2)	1,2(2)	1,2(2)	1-3(2)	2-6(4)	1-S, 1,2(1)		
9	1	1	1	1	5-6(6)	5-8(6)	3-6(4)	2-5(3)	2-4(3)	2,3(3)	2,3(2)	2-S, 1		
10	1	1	1	1	1	1	1-3(2)	1-3(1)	1-3(3)	2-4(2)	4-9(5)	6-S, 1-3(2)		
11	2-4(3)	1	1	1	1-4(3)	1-3(1)	1	1	1	1	1	9-S, 1		
12	1	1	2-5(2)	2-5(3)	3,4(3)	1	1	1	1	1	2,3(2)	—	—	
13	1	3-5(3)	5-11(9)	1-3(2)	3	3	2,3(2)	1,2(2)	2	2-5(3)	2,3(2)	—	—	
14	1	2,3(2)	6-9(8)	—	—	—	—	1	1	1	1	1	—	
15	1	—	—	—	—	—	—	—	—	—	—	—	—	

*Pairs of setae.

mentum heavily tanned; dorsomentum with 5 or 6 teeth on either side of median tooth, first lateral tooth distinctly shorter than median and second lateral teeth. Seta 2-C strongly developed, long, single, rarely 2-branched, usually sparsely aciculate; 3-C stout, half or more length of 2-C, usually sparsely aciculate; 4-15-C and 6-Mx all single and simple except 7-C occasionally 2-branched and 11-C always split or forked apically, 14-C shorter and stouter than the others.

Antenna: Moderately tanned, apex slightly darker, mesal and ventral surfaces strongly spiculate beyond basal 0.2; length 0.27-0.28 mm.

Thorax: Integument smooth, hyaline; dark pigment granules obvious internally. Setae 9,10-P,M,T sparsely to moderately aciculate; 11-P well developed, long; 2-M aciculate basally; 13-T usually double, occasionally single or triple.

Abdomen: Integument hyaline, smooth except for fine spicules on segment X; dark pigment granules internally, especially in segments VI-VIII. Seta 1-I single, simple; 1-II-VII palmate, each with stout conical stem giving rise to narrow leaflets with blunt or truncate tips; 5-I-VII well developed, with multiple branches, 5-VIII normally double (1 of 12 setae triple); 6-III-VI unlike 6-I,II, equally long, single, aciculate; 13-I,II triple, 13-III-V,VII normally double (2 of 14 setae triple on

segment III; 1 of 14 single on segment IV; 1 of 12 triple on segment VII), 13-VI usually triple (2-5). Pecten plate moderately tanned; spines (18-25, \bar{x} = 21) all long with lateral spicules on both sides to tip. Seta 1-S almost always single; 6-S usually split (double) distally (1-3); 8-S absent. Saddle moderately tanned, darker along anterior margin and ventral edge before seta 1-X; posteroventral area with long, simple spicules. Most caudal seta of 4-X shorter than saddle, single or double, simple.

Pupa (Fig. 5). Character and positions of setae as figured; numbers of branches in Table 2; n = 6 for measurements and counts of paired structures, = 3 for other measurements.

Cephalothorax: Lightly to moderately tanned. Seta 13-CT present, single.

Trumpet: Evenly tanned, yellow; angusticorn, without meatal cleft; pinna relatively short, about 0.25 trumpet length; length 0.53-0.46 mm; width at midlength 0.11-0.13 mm; index 3.31-4.18 (\bar{x} = 3.62).

Abdomen: Lightly to moderately tanned, lighter posteriorly; length 2.81-3.48 mm (\bar{x} = 3.41 mm). Seta 9-IV peglike, very short, similar to 9-III, length 12-15 μ m; 9-V very long, spinelike, similar to 9-VI in length and development, length 0.21-

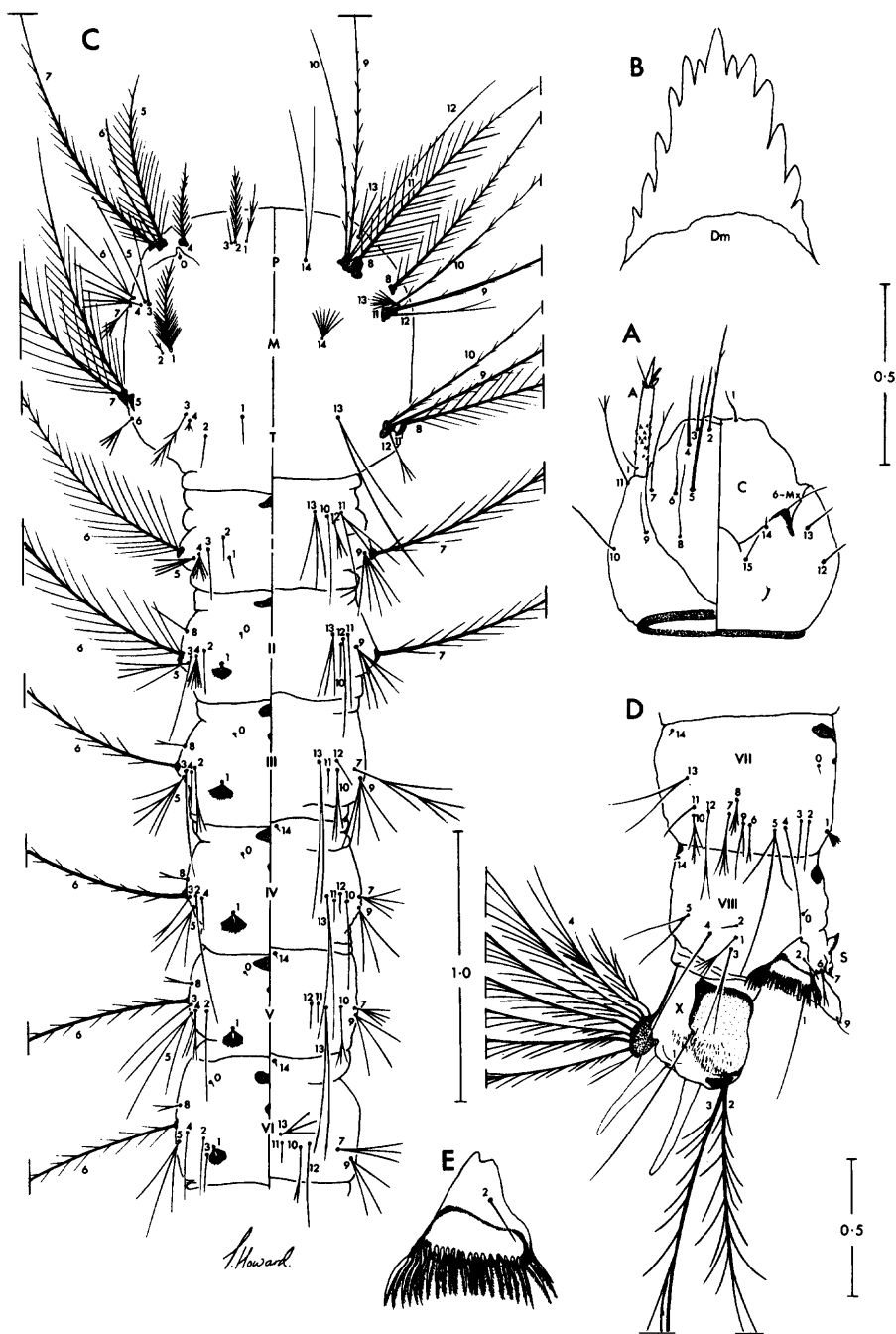


Fig. 4. *Anopheles auyantepuiensis* sp. n., fourth-instar larva: (A) head (dorsal and ventral aspects of left side); (B) dorsotum; (C) thorax and abdominal segments I-VI (dorsal and ventral aspects of left side); (D) abdominal segments VII-X (left side); (E) pecten. Scales in mm.

Table 2. Numbers of branches for pupal setae of *Anopheles auyantepuiensis* sp. n. (three specimens, six setae).

Seta no.	Cephalothorax CT	Abdominal segments									Paddle P
		I	II	III	IV	V	VI	VII	VIII	IX	
0	—	—	1	1	1	1	1	1	1	—	—
1	2,3(2)	11-16*	1-3(1)	1,2(1)	1-3	1-3(1)	1-3(1)	1,2(1)	—	1	2-4
2	1-3(2)	1,2(1)	1	1	1-5	1-3	1-5(4)	2-4(2)	—	—	—
3	1,2(2)	4-7(5)	1,2(1)	1,2(1)	1,2(1)	1-3(3)	1-4	1-6	—	—	—
4	2-4(3)	2-4	3-6(5)	1-3(2)	1-3(3)	1-3(3))	1-3	1,2(2)	1-3(2)	—	—
5	4-7(4)	3-8(6)	1-3(1)	1,2(2)	1-3	1-5	2-5	1-5(4)	—	—	—
6	3,4(4)	1-4(3)	1-4(1)	1,2(2)	1-3(1)	3,4	3,4(3)	4-7(6)	—	—	—
7	1-3(1)	1-3(2)	1,2	2,3(2)	2,3(2)	3-5(3)	1-6	4-6(4)	—	—	—
8	1	—	1	1	1	1,2(1)	1-3	1-3(3)	—	—	—
9	2-4(3)	1	1	1	1	1	1	1	1	—	—
10	1	—	—	1-3(3)	1-3(2)	1-3	1-3	1-3(1)	—	—	—
11	2,3(2)	—	—	1	1	1	1	1	—	—	—
12	3-8	—	—	—	—	—	—	—	—	—	—
13	1	—	—	—	—	—	—	—	—	—	—
14	—	—	—	—	1	1	1	1	1	—	—

*Primary branches.

0.22 mm, 0.4-0.5 length of segment; 1-VII on posterior edge of segment.

Genital lobe: Lightly tanned; length about 0.3 mm in female, about 0.5 mm in male.

Paddle: Lightly tanned, dorsal surface with differentiated membranous area at base; asymmetrical, outer part much larger than inner part, outer margin with short barblike spicules extending approximately 0.5-0.9 from base followed by long wavy spicules to 0.5 distance to seta 1-P; length 0.84-1.02 mm (\bar{x} = 0.94 mm), width at widest point 0.44-0.59 mm (\bar{x} = 0.53 mm), index 1.73-1.91 (\bar{x} = 1.80). Seta 1-P short, rather stout and peglike with apex imperceptibly split or forked; 2-P absent.

Systematics. — *Anopheles auyantepuiensis* sp. n. is somewhat of a systematic paradox. Although the adult female is distinct in having acrostichal scales and narrow pale bands on the hindtarsus, this species is otherwise so similar to *A. neivai* Howard, Dyar & Knab that it could conceivably represent an extreme geographical variant of the latter. The situation is analogous to island forms which are completely geographically separated from morphologically similar mainland populations. *Anopheles auyantepuiensis* sp. n. is known only from Auyantepui, which is located just south

of the known range of *A. neivai*. The latter species occurs throughout the north of Venezuela, extending eastward and westward along the coast (Zavortink 1973). Although the morphological differences are not proof of genetic isolation, it seems likely that *Anopheles auyantepuiensis* sp. n. and *A. neivai* are separate biological species. The new species appears to be a geographically isolated relict of an ancestral species which also gave rise to *A. neivai*. Since the presence of acrostichal scales is a unique condition among species of *Kerteszia* (Peyton et al. 1992), we infer that *A. auyantepuiensis* sp. n. is not a relatively recent arrival on Auyantepui. It is not certain whether the presence of acrostichal scales represents an apomorphic character for the new species or a plesiomorphic condition shared with species of the subgenus *Nyssorhynchus*.

The following modifications of specific couplets in the female, larval and pupal keys of Zavortink (1973) will distinguish *A. auyantepuiensis* sp. n. from other species of *Kerteszia*. *Anopheles auyantepuiensis* sp. n. is distinguished from *A. neivai* primarily on the basis of adult and pupal differences. The larvae of these two species are very similar to one another and may be indistinguishable in many cases.

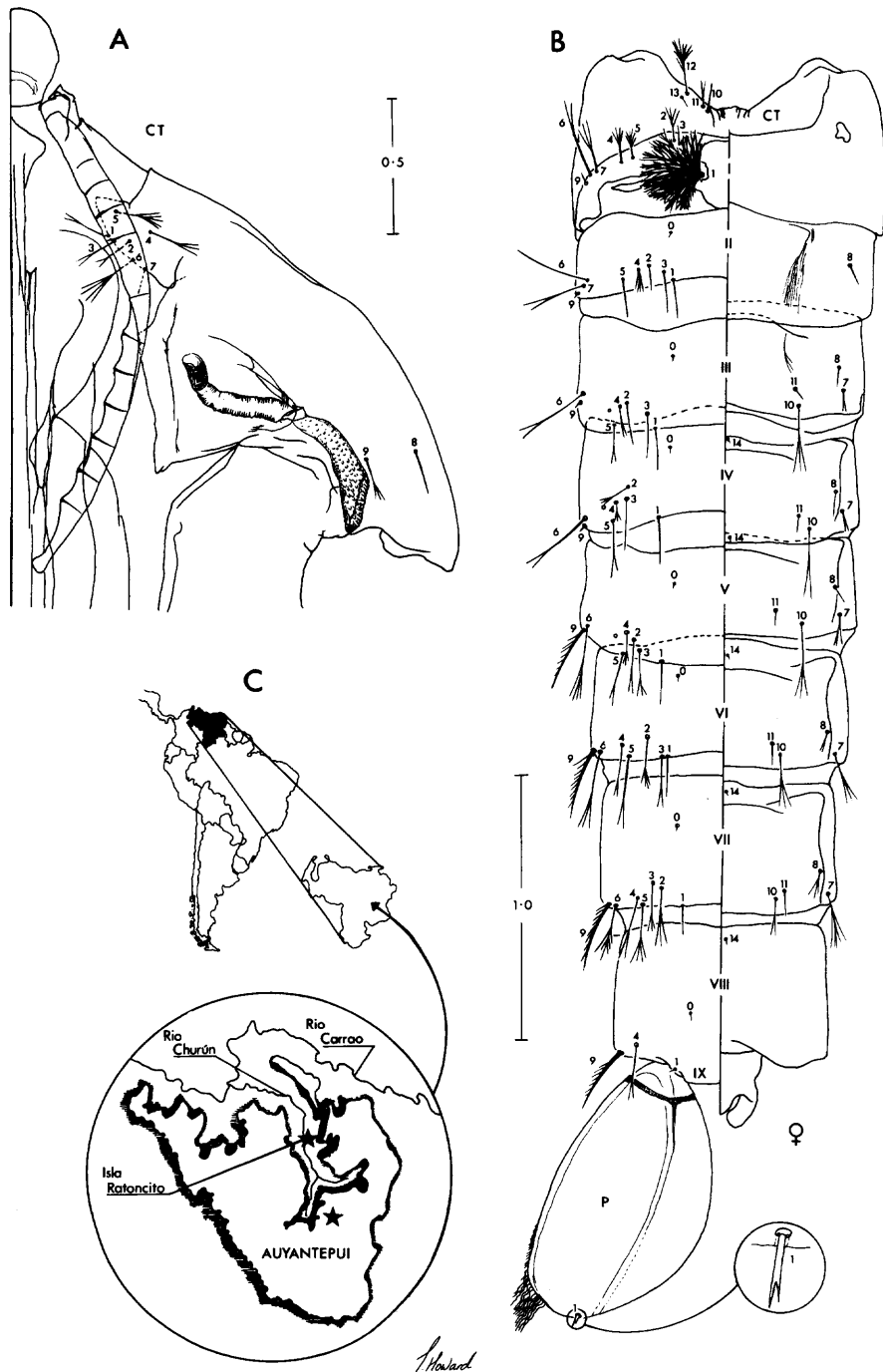


Fig. 5. *Anopheles auyantepuiensis* sp. n.: (A) pupa, dorsolateral aspect of cephalothorax, left side; (B) pupa, dorsal and ventral aspects of left side of metathorax and abdomen; (C) sketch map of Venezuela showing Auyantepui and collection sites. Scales in mm.

FEMALES

- 4(1) Mesepimeron with only upper patch of scales 5
 – Mesepimeron with both upper and anterior (middle) patches of scales 6
 5(4) Hindtarsomere 5 entirely white-scaled; maxillary palpus with outstanding scales on palpomeres 2-4; wing without apical pale fringe spot..... *bambusicolus*
 – Hindtarsomere 5 dark-scaled basally, white-scaled in distal 0.6 or less; maxillary palpus with outstanding scales on palpomere 2 and proximal portion of 3; wing with apical pale fringe spot..... 5'
 5'(5) Acrostichal area without scales; hindtarsomeres 2-4 with broad white band in distal 0.5-0.7..... *neivai*
 – Acrostichal area with scales; hindtarsomeres 2-4 with narrower white band in distal 0.15-0.5 *ayantepuiensis* sp. n.

LARVAE

- 3(2) Seta 6-VI long, aciculate, similar to 6-III-V; seta 1-VII palmate; most caudal seta of ventral brush (4-X) weakly developed, shorter than saddle, usually simple; seta 8-S absent..... 3'
 – Seta 6-VI shorter, with few long branches proximally, dissimilar to 6-III-V; seta 1-VII not palmate; most caudal seta of ventral brush (4-X) usually longer than saddle, pectinate or plumose; seta 8-S present 4
 3'(3) Seta 13-III-V normally triple and shorter than segment; seta 5-VIII usually triple *neivai*
 – Seta 13-III-V normally double and longer than segment; seta 5-VIII usually double.....
 *ayantepuiensis* sp. n.

PUPAE

- 3(2) Paddle marginal spicules entirely filamentous and extending into proximal 0.5 of margin; seta 2-P present; seta 1-VII removed from caudal margin of tergum *pholidotus*
 – Paddle marginal spicules filamentous distally, barblike proximally, not extending into proximal 0.5 of margin; seta 2-P absent; seta 1-VII inserted on caudal margin of tergum 3'
 3'(3) Seta 1-P slender, simple, relatively long, length >65 µm; seta 9-IV short, length >25 µm; seta 9-V similar but shorter and weaker than 9-VI, 0.2-0.4 length of segment..... *neivai*
 – Seta 1-P rather stout, minutely split or forked apically, relatively short, length <65 µm; seta 9-IV very short, length <15 µm; seta 9-V very long, similar to 9-VI in length and development, 0.4-0.5 length of segment.....
 *ayantepuiensis* sp. n.

Bionomics. – Larvae of *A. ayantepuiensis* sp. n. were collected from terrestrial bromeliads (Bromeliaceae) in forest on the Auyantepui summit, southeastern zone (5°53'53"N; 62°29'09"W) at elevations of 1,700 and 1,730 m. This relict

mountain (mesa), located within Canaima National Park in Bolivar State, is a geological formation dating from the Precambrian Era. Collections were made from 1-8 February 1994 during the dry season. Larvae were found in the axils of *Brocchinia tatei* L.B. Smith (subfamily Pitcairniaceae), *Vriesea rubra* (Ruiz & Pavon) Beer and *V. duidae* (L.B. Smith) Guoda (subfamily Tillandsioideae). *Brocchinia tatei* and *V. duidae* are restricted to Venezuela while *V. rubra* has a distribution that includes Colombia, Guyana, Ecuador, Peru and Venezuela (Smith 1971; Smith & Downs 1974, 1977; Oliva-Esteva & Steryrmarm 1987).

The oviposition sites and larval habitats of *A. ayantepuiensis* appear to be restricted to large bromeliads in forest. *Brocchinia tatei*, *V. rubra* and *V. duidae* were found to hold an average of 488, 261 and 277 ml per axil, respectively (unpubl. data). No larvae of *A. ayantepuiensis* sp. n. were found in the axils of smaller bromeliads in the tepuian forest, e.g. *B. acuminata* L.B. Smith and *Tillandsia spiculosa* var. *stenoglossa* (L.B. Smith) Guoda, or in bromeliads and pitcher plants growing in open areas (savannas) and meadows either on the mountain or surrounding lowlands (La Gran Sabana), including *B. hecetioides* Mez, *B. reducta* Baker and *Heliophora heterodoxa* Steyermark (pitcher plant, family Sarraceniacae). An unidentified species of *Wyeomyia* (*Nunezia*) and one of *Culex* (*Microculex*) were collected in association with larvae of *A. ayantepuiensis* sp. n.

For some unknown reason, larvae of *A. ayantepuiensis* sp. n. transported to Caracas were very difficult to rear in the laboratory. Development time from first instar to adult was approximately 35-40 days, and most larvae died before reaching adulthood.

Adult females are aggressive, crepuscular biters. Specimens were captured on human bait between 1845 and 2000 hours in tepuian forest along with specimens of *Aedes* (*Howardina*) *sexlineatus* (Theobald) and an unidentified species of *Aedes* (*Ochlerotatus*). Biting activity declined abruptly as ambient temperature plummeted after 2000. Temperatures on Auyantepui reach a maximum of 26-27°C in the forest during daytime and a minimum 5-6°C at night. An occasional female was captured in a camping tent erected in an open savanna area. Light trap collections yielded two males of *Anopheles* (*Kerteszia*) *homunculus* Komp, thus confirming the altitudi-

nal and distributional record for this species reported by Cova Garcia (1962). A few females of *A. auyantepuiensis* sp. n. were captured at an elevation of 500 m on Isla Ratoncito, a small prominence associated with Auyantepui (Fig. 5C).

Distribution. – This species is known only from Auyantepui, Bolivar State, Venezuela (Fig. 5C). It was first collected from this locality (as Oyantepuy) in June 1937 (Anduze 1941), again in April 1956 (Cova Garcia 1962) and finally in February 1994 (specimens examined here). A single damaged female from Anduze's collection is deposited in United States National Museum of Natural History (Zavortink 1973). The specimens examined by Cova Garcia are apparently non-extant.

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