ILLUSTRATED KEY TO THE FEMALE ANOPHELINE MOSQUITOES OF CENTRAL AMERICA AND MEXICO[1,2]

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ABSTRACT. An illustrated key to the female anopheline mosquitoes of Central America from western Panama to the southern border of the United States is presented with a taxonomic summary and distribution table. Thirty-nine species and one subspecies are treated: *Chagasia* (1), *Anopheles* (*Anopheles*) (25 and one subspecies), *An.* (*Kerteszia*) (2), *An.* (*Lophopodomyia*) (1), *An.* (*Nyssorhynchus*) (9) and *An.* (*Stethomyia*) (1).

INTRODUCTION

Malaria continues to be a major health problem in Central America. In recent years the number of cases in the region has risen rather than declined (Bruce-Chwatt 1985). The key presented here was developed because available keys to the Central American anopheline mosquitoes (Komp 1941, 1942; Simmons and Aitken 1942; Russell et al. 1943; Lane 1953; Vargas and Martinez Palacios 1956; Forattini 1962; Stojanovich et al. 1966; Vargas 1975; Clark-Gil and Darsie 1983) are useful only in limited geographical areas, are not current or not effective.

We hope to disprove G. B. Fairchild (personal communication, 1989) who claimed that, "Keys are made by people who don't need them for those that can't use them." His message should be partially heeded nonetheless. One should not assume definitive determinations in every case based on the few characters a key provides. To make accurate identifications mosquito taxonomists often must use keys, detailed descriptions of all life stages, and even make comparisons with type specimens. In addition, specimen condition frequently influences the reliability of determinations. Unrubbed, undamaged specimens should be used for identifications whenever possible because color and/or position of scales and other vestiture is relied upon extensively in the key. Researchers and public health workers are therefore encouraged to confirm their identifications by sending samples to specialists when possible. It is also important that voucher specimens be deposited in appropriate museums so that it will be possible to verify identifications.

The morphological characters used here are based on original observations and previous usage in the literature. Especially helpful were: Faran (1980), Albimanus Section of subgenus *Nyssorhynchus*; Linthicum (1988), Argyritarsis Section of subgenus *Nyssorhynchus*; Zavortink (1970), treehole *Anopheles*; Zavortink (1973), subgenus *Kerteszia*; and Floore et al. (1976), Crucians Subgroup of subgenus *Anopheles*. The usefulness of wing spot characters has been enhanced by the recent redefinition of wing spot nomenclature (Wilkerson and Peyton 1990).

There are a few noteworthy changes from previous publications on the anophelines of the region. Two species were recently retrieved from synonymy: *Anopheles* (*Ano.*) *malefactor* Dyar and Knab, from synonymy with *An.* (*Ano.*) *punctimacula* Dyar and Knab (Wilkerson 1990b), and *An.* (*Ano.*) *chiriquiensis* Komp, from synonymy with *An.* (*Ano.*) *parapunctipennis* Martini (Wilkerson 1990a). Bruce Harrison (personal communication, 1989) provided characters to separate *An.* (*Ano.*) *intermedius* (Peryassu) from the closely related *An.* (*Ano.*) *apicimacula* Dyar and Knab. As a result, we determined that *An.* (*Ano.*) *intermedius* does not occur in Central America. Other notes are indicated in the key by superscript letters, e.g., "wing with mixed brown and yellowish-white scales[a]," and are presented in an "Explanation of Notes" section.

We do not intend for this key be used for eastern Panama because the mosquito fauna of the area is not well-known (E. L. Peyton, personal communication 1989). It is possible that northern South American species such as *An.* (*Nys.*) *benarrochi* Gabaldon, Cova Garcia and Lopez, *An.* (*Nys.*) *braziliensis* (Chagas), *An.* (*Ano.*) *maculipes* (Theobald), *An.* (*Ker.*) *lepidotus* Zavortink and/or *An.* (*Ker.*) *homunculus* Komp could be encountered in eastern Panama.

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Table 1. Central American and Mexican anopheline mosquitoes: taxonomic index, primary basis for key characters and primary taxonomic references.

Taxon	Couplet	Primary basis for key characters	Primary taxonomic references
Genus *Chagasia*			
bathana (Dyar)	(1)	Holotype	Vargas and Martinez Palacios (1956), Gabaldon et al. (1940), Komp (1942)
Genus *Anopheles*			
Subgenus *Anopheles*	(3, 5)		
apicimacula Dyar and Knab	(9)	Holotype	Vargas and Martinez Palacios (1956), Gabaldon et al. (1940), Komp (1942)
arboricola Zavortink	(21)	Topotypic specimens	Zavortink (1970)
aztecus Hoffmann	(14)	Literature, Mexican specimens	Hoffmann (1935), Aitken (1945), Vargas and Martinez Palacios (1956)
bradleyi King	(23)	Holotype	Floore et al. (1976)
chiriquiensis Komp	(28)	Lectotype	Wilkerson (1990a)
crucians Wiedemann	(23)	Floore et al. (1976) study specimens	Floore et al. (1976)
eiseni Coquillett	(17)	Holotype	Rozeboom (1941), Correa (1942), Lane (1953), Vargas and Martinez Palacios (1956)
fausti Vargas	(21)	Paratypes	Zavortink (1970)
franciscanus McCracken	(26)	Literature, US specimens	Aitken (1945), Carpenter and LaCasse (1955)
freeborni Aitken	(16)	Literature, US specimens	Aitken (1945), Carpenter and LaCasse (1955), Vargas and Martinez Palacios (1956)
gabaldoni Vargas	(8)	Paratype	Vargas and Martinez Palacios (1956)
hectoris Giaquinto-Mira	(27)	Topotypic specimens	Giaquinto-Mira (1931), Dampf (1939), Vargas and Martinez Palacios (1956)
judithae Zavortink	(13)	Holotype	Zavortink (1969, 1970)
malefactor Dyar and Knab	(11)	Lectotype	Wilkerson (1990b)
neomaculipalpus Curry	(10)	Topotypic specimens	Komp (1942), Vargas and Martinez Palacios (1956)
parapunctipennis			
ssp. *parapunctipennis* Martini	(28)	Neotype	Wilkerson (1990a)
ssp. *guatemalensis* De Leon	(28)	Lectotype	Wilkerson (1990a)
powderi Zavortink	(20)	Holotype	Zavortink (1970)
pseudopunctipennis Theobald	(26)	Literature, Central American specimens	Aitken (1945), Komp (1942), Carpenter and LaCasse (1955), Vargas and Martinez Palacios (1956)
punctimacula Dyar and Knab	(11)	Holotype	Wilkerson (1990b)
punctipennis (Say)	(25)	Literature, Mexican specimens	Aitken (1945), Carpenter and LaCasse (1955), Vargas and Martinez Palacios (1956)
quadrimaculatus Say	(16)	Literature, Mexican specimens	Carpenter and LaCasse (1955), Vargas and Martinez Palacios (1955)

Table 1. continued

Taxon	Couplet	Primary basis for key characters	Primary taxonomic references
veruslanei Vargas	(11)	Holotype	Vargas (1979a, b)
vestitipennis Dyar and Knab	(8)	Holotype	Komp (1942), Vargas and Martinez Palacios (1956), Belkin et al. (1970)
walkeri Theobald	(15)	Literature, US specimens	Carpenter and LaCasse (1955), Vargas and Martinez Palacios (1956)
xelajuensis De Leon	(19)	Zavortink (1970) (no specimens)	Zavortink (1970)
Subgenus *Kerteszia*	(6)		
neivai Howard, Dyar and Knab	(29)	Holotype	Zavortink (1973)
pholidotus Zavortink	(29)	Allotype	Zavortink (1973)
Subgenus *Lophopodomyia*	(2)		
squamifemur Antunes	(2)	Literature, Panama specimens	Antunes (1937), Deane et al. (1949), Vargas (1975)
Subgenus *Nyssorhynchus*	(6)		
albimanus Wiedemann	(31)	Faran (1980), Central American specimens	Faran (1980)
anomalophyllus Komp	(34)	Faran (1980) study specimens	Faran (1980)
aquasalis Curry	(34)	Faran (1980) study specimens	Faran (1980)
argyritarsis Robineau-Desvoidy	(36)	Linthicum (1988) study specimens	Linthicum (1988)
darlingi Root	(35)	Holotype	Linthicum (1988)
marajoara Galvao and Damasceno	(36)	Linthicum (1988) study specimens	Linthicum (1988)
oswaldoi (Peryassu)	(32)	Faran (1980) study specimens	Faran (1980)
strodei Root	(34)	Holotype	Faran (1980)
triannulatus (Neiva and Pinto)	(33)	Faran (1980) study specimens	Faran (1980)
Subgenus *Stethomyia*	(4)		
kompi Edwards	(4)	Holotype	Komp (1942), Lane (1953)

Two northern South American species known from eastern Panama are *An.* (*Ano.*) *mediopunctatus* (Theobald) (Stojanovich et al. 1966) and *An.* (*Nys.*) *nuneztovari* Gabaldon (Faran 1980).

Refer to Ward (1982) for an introduction to Central American mosquito taxonomic literature. Bionomics and disease transmission are not reviewed here, but the following species are considered to be vectors of malarial parasites in Central America (White 1982). These include 4 primary vectors, *An.* (*Nys.*) *albimanus* Wiedemann, *An.* (*Nys.*) *argyritarsis* Robineau-Desvoidy, *An.* (*Nys.*) *aquasalis* Curry, *An.* (*Nys.*) *darlingi* Root, and 3 secondary vectors, *An.* (*Nys.*) *marajoara* Galvao and Damasceno, *An.* (*Ano.*) *aztecus* Hoffmann, and *An.* (*Ano.*) *punctimacula* (?also *An.* (*Ano.*) *malefactor*). Other species should not be overlooked, however, especially on a local basis.

Harbach and Knight (1980, 1982) are followed for morphological terms and abbreviations with the exception that Roman numerals denoting abdominal segments follow the abbreviations for tergum and sternum instead of the other way around, e.g., S-II, not II-S, for sternum II. To assist the user in becoming familiar with mosquito terminology, morphological features are written out followed by their abbreviations, e.g., radius-four-plus-five (R_{4+5}).

Specimens were examined at 10–80× magnification with blue-filtered tungsten light. "Pure" white was established as a reference for determining other colors according to the method of Peyton and Ramalingam (1988). This was ac-

Table 2. Distribution of anopheline mosquitoes in Central America and Mexico.

Taxon	Mexico	Guatemala	Belize	Honduras	El Salvador	Nicaragua	Costa Rica	Panama	Females examined
Genus *Chagasia*									
bathana	V	CG	K			K and S	K	X	8
Genus *Anopheles*									
Subgenus *Anopheles*									
apicimacula	X	X	X	X	X	X	X	X	386
arboricola								X	1
aztecus	X								291
bradleyi	V			X		X			18
chiriquiensis							?K	X	7
crucians	X	CG	X	X		K and S			20
eiseni	X	X	X	X	X		X	X	473
fausti	X								4
franciscanus	V								8
freeborni	V								66
gabaldoni	X	K and S	X						29
hectoris	X	X		X	X				82
judithae	X								14
malefactor								X	180
neomaculipalpus	X	?K	X	X	X	X	X	X	370
parapunctipennis parapunctipennis	X	X							7
parapunctipennis guatemalensis		X							9
powderi							X		4
pseudopunctipennis	X	X	X	X	X	X	X	X	1,000+
punctimacula	X	X	X	X	X	X	X	X	838
punctipennis	X								12
quadrimaculatus	X								21
veruslanei	X								1
vestitipennis	X	X	X	X	X	X	X	X	276
walkeri	V								7
xelajuensis	Z	Z							0
Subgenus *Kerteszia*									
neivai	Za	Za	Za	?Za	S and A	Za	X	X	29
pholidotus								X	3
Subgenus *Lophopodomyia*									
squamifemur							MV	X	11
Subgenus *Nyssorhynchus*									
albimanus	X	X	X	X	X	X	X	X	1,000+
anomalophyllus							X	F	3
aquasalis						F	F	X	173
argyritarsis	X	X	L	X	X	L	X	X	63
darlingi	L	X	X	X	L				68
marajoara							L	X	22
oswaldoi							F	X	180
strodei	F	F	F	F	F	F	X	X	36
triannulatus						F	F	X	164
Subgenus *Stethomyia*									
kompi							S and A	X	31

CG = Clark-Gil and Darsie (1983); F = Faran (1980); K = Komp 1942; K and S = Knight and Stone (1977); L = Linthicum (1988); MV = M. Vargas (1975); S and A = Simmons and Aitken (1942); V = Vargas and Martinez Palacios (1956); X = examined; Z = Zavortink (1970); Za = Zavortink (1973).

complished by using 60× or higher magnification to position the light source(s) so that a white surface appeared as white as possible. Among the species treated here, the whitest structures found were hindtarsomeres 2 and 3 in species of the subgenus *Nyssorhynchus* and the scales of the halter in species of the Arribalzagia Series of the subgenus *Anopheles*.

Table 1 is a taxonomic index to the anophelines of Central America and Mexico. It lists the primary specimens used for determining key characters and also lists salient taxonomic lit-

erature citations. The regional distributions for the included species are given in Table 2. Figures 1–6 provide a summary of morphological terms and abbreviations. The specimens used to make the illustrations are listed in an appendix.

It is worth noting the definitions of 4 of the pale wing spots used in the key (Wilkerson and Peyton 1990). The sector pale (SP) spot is "the group of pale scales occurring on the costa, subcosta and/or radius associated with or just distad of the sc-r crossvein." The accessory sector pale (ASP) spot is "the group of pale scales associated with crossvein r_1-r_s on vein R, sometimes also on veins Sc and C, usually separated by a dark spot from the sector pale but sometimes fused with the sector pale." The preapical pale (PP) spot refers to the "pale scales on the costa and radius-one proximal to the end of R_1,

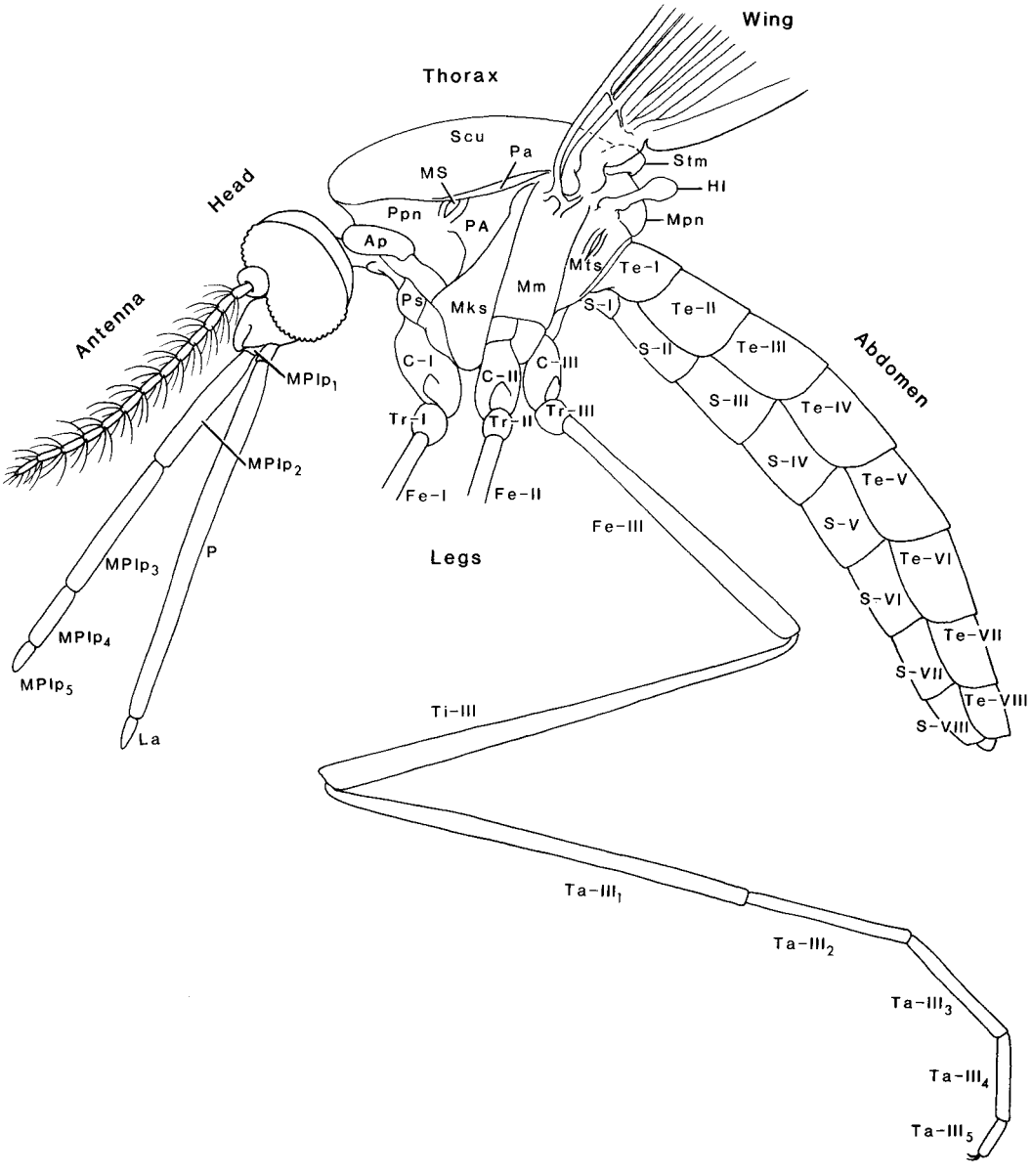


Fig. 1. Female anopheline mosquito, lateral view. Ap: antepronotum; C-I:forecoxa; C-II: midcoxa; C-III: hindcoxa; Fe-I: forefemur; Fe-II: midfemur; Fe-III: hindfemur; Hl: halter; La: labellum; Mks: meskatepisternum; Mm: mesepimeron; $MPlp_{1-5}$: maxillary palpus, segments 1–5; Mpn: mesopostnotum; MS: mesothoracic spiracle; Mts: metepisternum; P: proboscis; Pa: paratergite; PA: postspiracular area; Ppn: postpronotum; Ps: proepisternum; S-I-VIII: sterna I-VIII; Scu: scutum; Stm: scutellum; $Ta\text{-}III_{1-5}$: hindtarsomeres 1–5; Te-I-VIII: terga I-VIII; Ti-III: hindtibia; Tr-I: foretrochanter; Tr-II: midtrochanter; Tr-III: hindtrochanter.

between the preapical dark and apical dark." The apical pale (AP) spot is "the area of pale scales on the costa at the end of R_1."

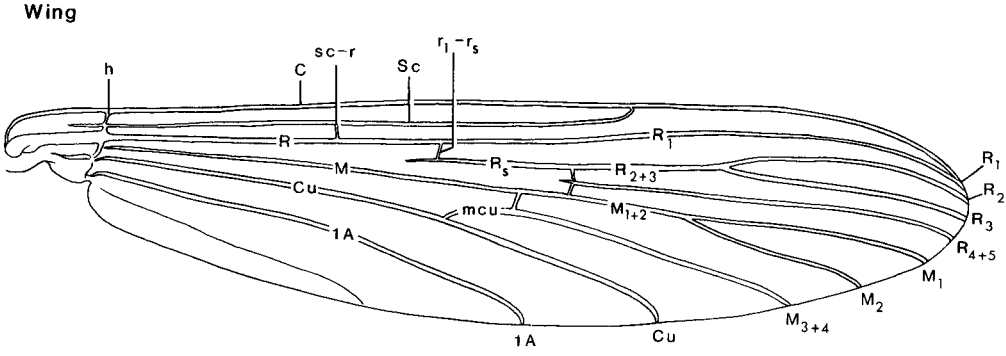


Fig. 2. Wing of a female *Anopheles* mosquito; veins and crossveins. C: costa; Cu: cubitus; h: humeral crossvein; M: media; M_1: -media-one; M_{1+2}: media-one-plus- two; M_2: -media-two; M_3+_4: media-three-plus-four; mcu: mediocubital crossvein; R: radius; R_1: radius-one; r_1-r_s: radial crossvein; R_2: radius-two; R_2+_3: radius-two-plus-three; R_3: radius-three; R_4+_5: radius-four-plus-five; R_s: radial sector; Sc: subcosta; sc-r: subcostal crossvein; lA: Anal.

Abbreviations for Figs. 3–6: AD: apical dark spot; AP: apical pale spot; APD: accessory preapical dark spot; ASD: accessory sector dark spot; ASP: accessory sector pale spot; BD: basal dark spot; BP: basal pale spot; h: humeral crossvein; HD: humeral dark spot; HP: humeral pale spot; PD: preapical dark spot; PHD: prehumeral dark spot; PHP: prehumeral pale spot; POSCD: postsubcostal dark spot; POSCP: postsubcostal pale spot; PP: preapical pale spot; PRSCD: presubcostal dark spot; PRSCP: presubcostal pale spot; PSD: presector dark spot; PSP: presector pale spot; r_1-r_s -radial crossvein; SBD: subbasal dark spot (humeral dark spot plus presector dark spot); sc-r: subcostal crossvein; SCA: subcostal area; SCD: subcostal dark spot; SCP: subcostal pale spot; SD: sector dark spot; SP: sector pale spot.

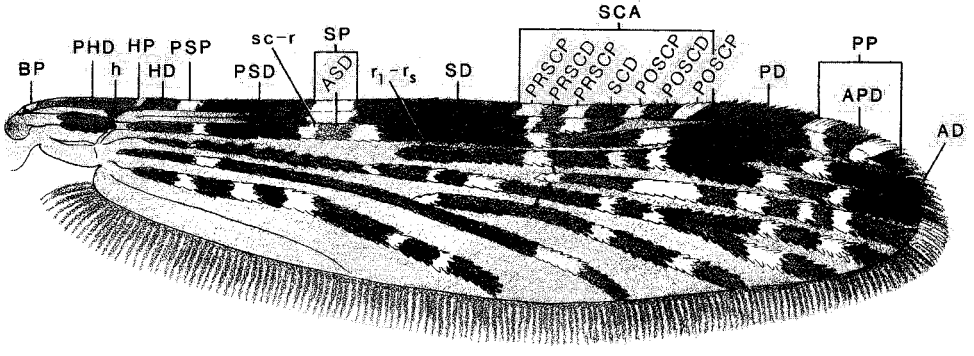


Fig. 3. Wing of *Anopheles* (*Anopheles*) *apicimacula*.

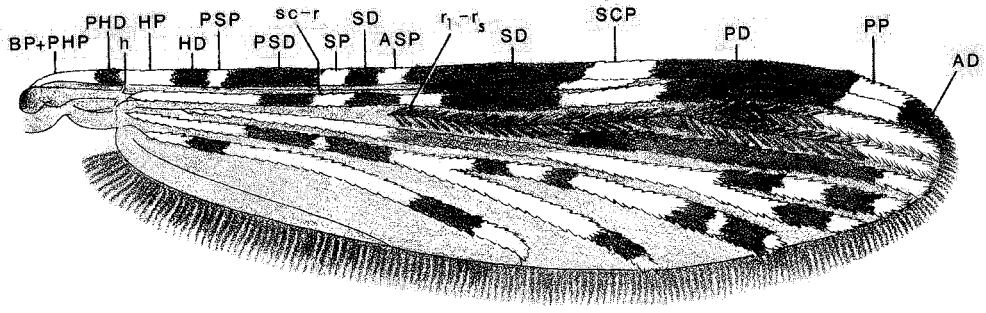


Fig. 4. Wing of *Anopheles* (*Nyssorhynchus*) *oswaldoi.*

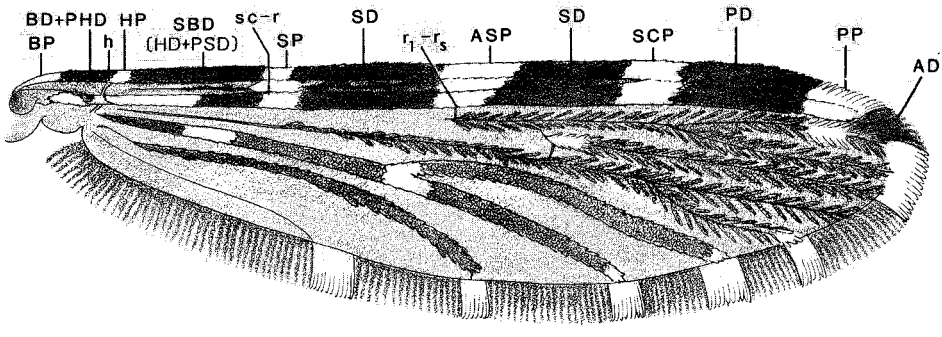


Fig. 5. Wing of *Anopheles* (*Kerteszia*) *neivai.*

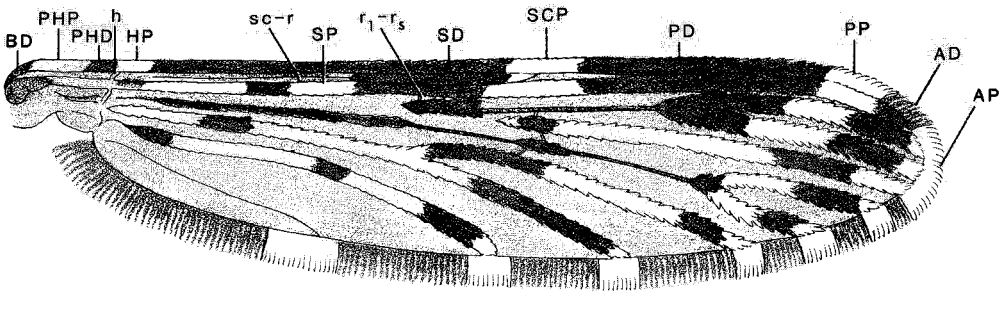


Fig. 6. Wing of *Anopheles* (*Anopheles*) *hectoris.*

KEY TO THE FEMALE ANOPHELINES OF CENTRAL AMERICA AND MEXICO

1. Scutellum (Stm) slightly trilobed, with setae confined to lobes (Fig. 7); postpronotal (Ppn) setae and scales present (Fig. 8); wing with mixed brown and yellowish-white scales[a], not forming a well-defined pattern of spots ..... *Chagasia bathana*

Scutellum (Stm) evenly rounded, bearing a continuous line of setae (Fig. 9); postpronotal (Ppn) setae and scales absent (Fig. 10); wing scales either unicolorous or with 1 or more distinct pale spots 2

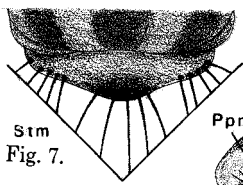


Fig. 7. *Chagasia bathana*

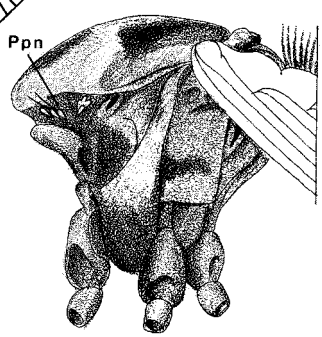


Fig. 8.

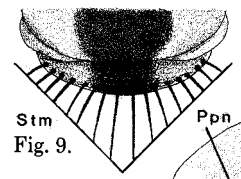


Fig. 9. *An. (Ano.) punctimacula*

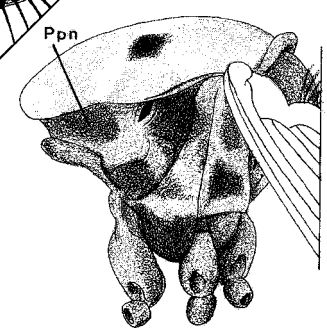


Fig. 10.

2(1). Hindfemur (Fe-III) with a distinct apical patch of dark erect scales (Fig. 11) ..... *Anopheles (Lophopodomyia) squamifemur*

Hindfemur (Fe-III) without a distinct apical patch of dark erect scales (Fig.12) 3

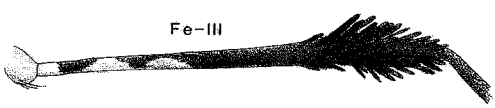


Fig. 11. *An. (Lph.) squamifemur*

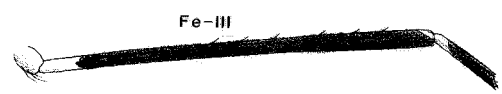


Fig. 12. *An. (Ano.) hectoris*

3(2). Femora (Fe) and tibiae (Ti) unicolorous or variously marked, speckles, if present, small, dark or not abundant (Figs. 13 and 14); costa (C) with a single small to large pale spot (subcostal pale, SCP) in the vicinity of the junction with subcosta (Sc) (Figs. 16 and 17) or costa (C) wholly dark-scaled in the area of the subcostal junction (Sc); sector pale spot (SP), if present, not interrupted by a dark spot (ASD) (Figs. 16 and 17) 4

Femora (Fe) and tibiae (Ti) with abundant large pale speckles (Fig. 15); costa (C) with a small to large dark spot (subcostal dark, SCD) at junction with subcosta (Sc) (Figs. 18 and 19), the dark spot bordered on each side by one or more pre- and postsubcostal pale and dark spots (PRSCP, PRSCD, POSCP, POSCD) (Fig. 3); sector pale spot (SP) interrupted by a dark spot (accessory sector dark) (ASD) (Figs. 18 and 19) ..... *Anopheles (Anopheles)* (in part), Arribalzagia Series[b] 7

Fig. 13. *An. (Ker.) neivai*

Fig. 14. *An. (Nys.) albimanus*

Fig. 15. *An. (Ano.) vestitipennis*

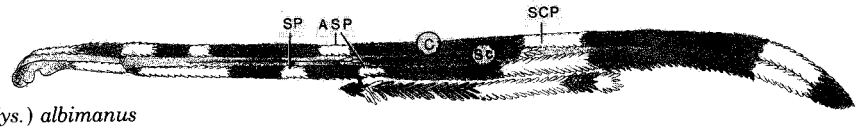


Fig. 16. *An. (Nys.) albimanus*

Fig. 17. *An. (Ano.) chiriquiensis*

Fig. 18. *An. (Ano.) punctimacula*

Fig. 19. *An. (Ano.) vestitipennis*

4(3). Scutum (Scu) with a single narrow, sometimes faint, middorsal silvery pollinose[c] stripe (Fig. 20); head without scales except for sparse erect scales on the vertex (V) (Fig. 23); small species with unicolorous dark legs and wings ..... *Anopheles (Stethomyia) kompi*

Scutum (Scu) unicolorous or variously marked, but not as above (Figs. 21, 22, 25); head with numerous erect scales on vertex (V) and occiput (Occ) (Fig. 24) 5

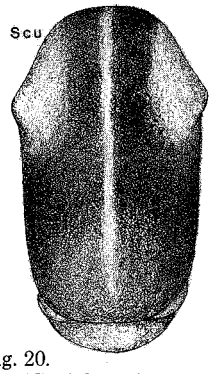


Fig. 20.
An. (Ste.) kompi

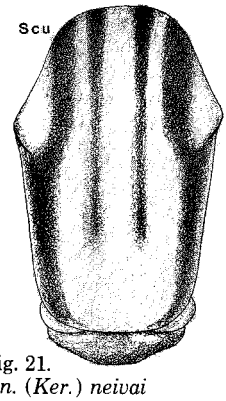


Fig. 21.
An. (Ker.) neivai

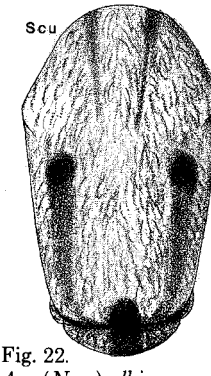


Fig. 22.
An. (Nys.) albimanus

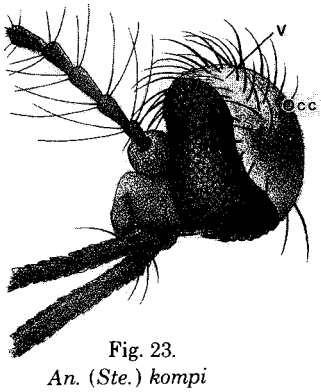


Fig. 23.
An. (Ste.) kompi

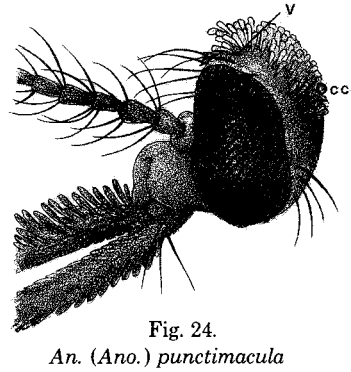


Fig. 24.
An. (Ano.) punctimacula

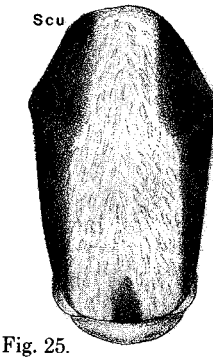


Fig. 25.
An. (Ano.) hectoris

5(4). Hindtarsomeres (Ta-III_{1-5}) with conspicuous apical pale bands, or some hindtarsomeres with conspicuous apical pale bands and others entirely pale (Figs. 26 and 27); pale spotting on costa (C) well-developed, usually with 8 pale spots present including: basal (BP), prehumeral (PHP), humeral (HP), presector (PSP), sector (SP), accessory sector (ASP), subcostal (SCP) and preapical (PP) (Fig. 29) 6

Hindtarsomeres (Ta-III_{1-5}) mostly dark, without conspicuous bands, at most with small basal patches or very narrow bands of pale scales on some tarsomeres (Fig. 28); pale spotting on costa (C) absent or less developed, 1–5 pale spots may be present including some combination of the following: basal pale (BP), prehumeral pale (PHP), humeral pale (HP), sector pale (SP), subcostal pale (SCP), preapical (PP), apical pale (AP) (Fig. 30) ..... *Anopheles* (*Anopheles*) (in part) 12

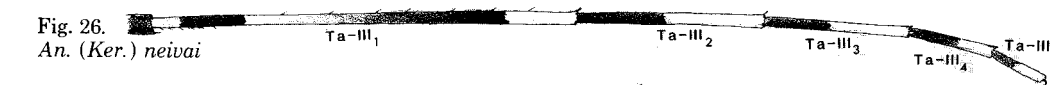


Fig. 26. *An.* (*Ker.*) *neivai*

Fig. 27. *An.* (*Nys.*) *oswaldoi*

Fig. 28. *An.* (*Ano.*) *hectoris*

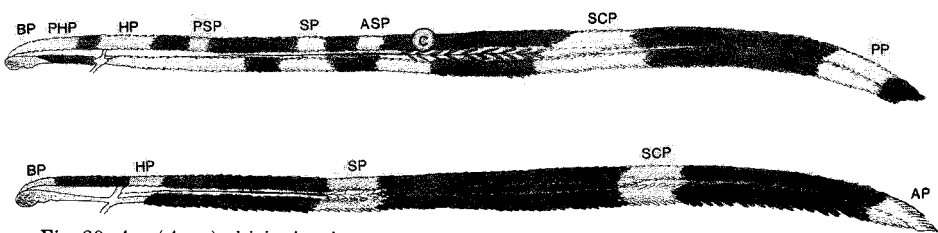


Fig. 30. *An.* (*Ano.*) *chiriquiensis*

6(5). Scutum (Scu) with 4 longitudinal dark stripes (Fig. 31); hindtarsomeres (Ta-III_{1-5}) with conspicuous apical pale bands (Fig. 32); accessory sector pale (ASP) spot near middle of costa (C), nearly equidistant between sector pale (SP) and subcostal pale (SCP) spots (Fig. 35) ..... *Anopheles* (*Kerteszia*) 29

Scutum (Scu) otherwise (Fig. 33); hindtarsomeres 3 and 4 (Ta-$III_{3,4}$) entirely white (Fig. 34); accessory sector pale (ASP) spot about 0.4 from wing base, conspicuously closer to sector pale (SP) than to subcostal pale (SCP) spot (Fig. 36) ..... *Anopheles* (*Nyssorhynchus*) 30

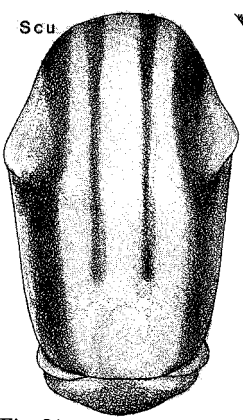


Fig. 31. *An.* (*Ker.*) *neivai*

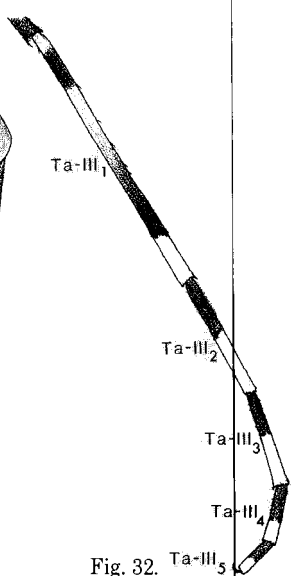


Fig. 32.

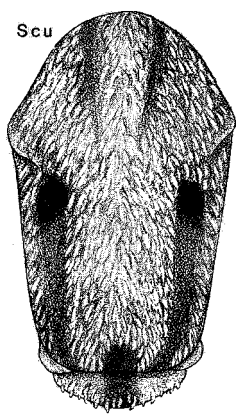


Fig. 33. *An.* (*Nys.*) *albimanus*

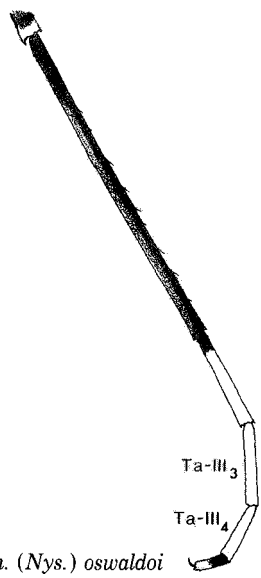


Fig. 34. *An.* (*Nys.*) *oswaldoi*

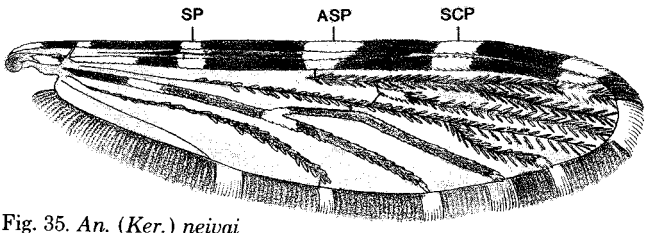


Fig. 35. *An. (Ker.) neivai*

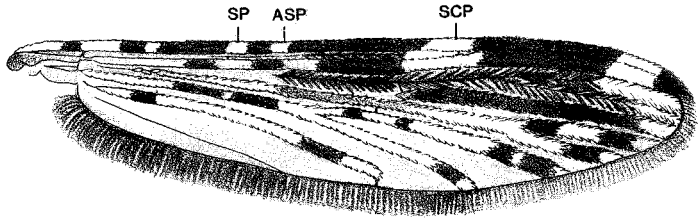


Fig. 36. *An. (Nys.) oswaldoi*

7(3). Scutum (Scu) and scutellum (Stm) without distinct dark pollinose spots (Fig. 37); wing predominantly dark-scaled; radius-four-plus-five (R_{4+5}) usually predominantly dark-scaled (Fig. 39) 8

Scutum (Scu) and scutellum (Stm) with 3 distinct dark pollinose spots accentuated by silvery pollinosity, 2 lateral spots anterior to wing bases and median spot on prescutelar area (PrA) continuous onto scutellum (Stm) (Fig. 38); wing predominantly pale-scaled; radius-four-plus-five (R_{4+5}) usually predominantly pale-scaled (Fig. 40) 9

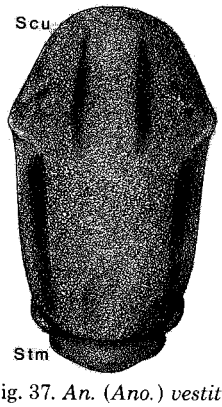


Fig. 37. *An. (Ano.) vestitipennis*

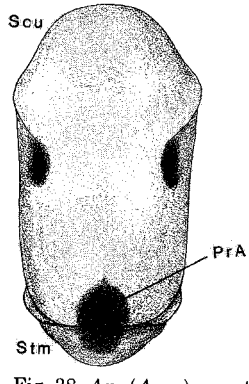


Fig. 38. *An. (Ano.) punctimacula*

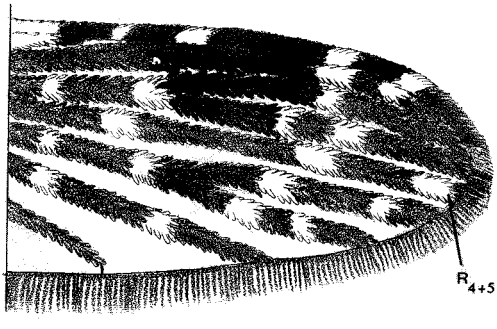


Fig. 39. *An. (Ano.) gabaldoni*

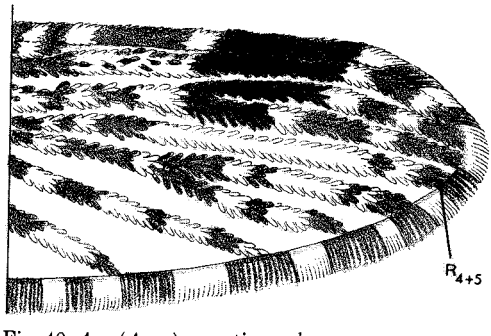


Fig. 40. *An. (Ano.) punctimacula*

8(7). Abdominal terga without posterolateral scale-tufts (Fig. 41); abdominal sterna with sparse scales (Fig. 42) ..... *vestitipennis*

Abdominal terga with posterolateral scale-tufts (Fig. 43); abdominal sterna with numerous pale and dark scales (Fig. 44) ..... *gabaldoni*

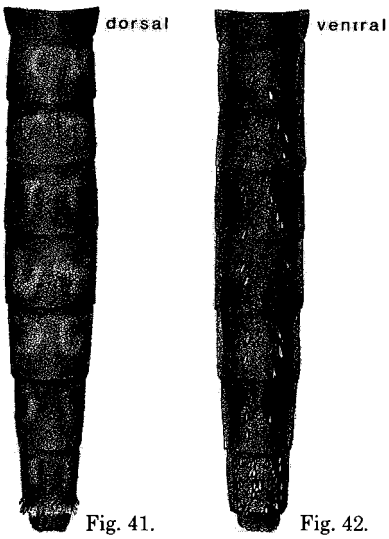


Fig. 41. Fig. 42.

An. (Ano.) vestitipennis

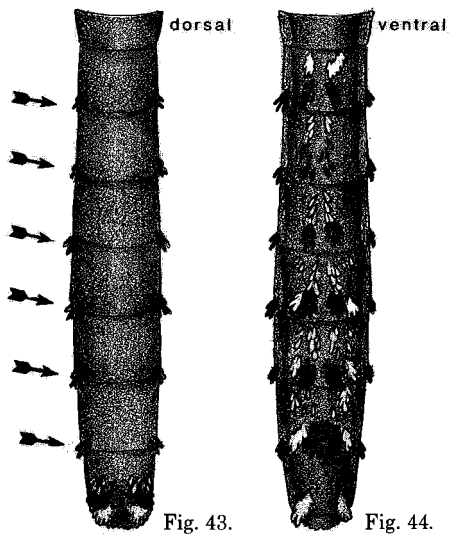


Fig. 43. Fig. 44.

An. (Ano.) gabaldoni

9(7). Scales on median portion of cubitus (Cu) dark, appressed to vein and smaller than scales on adjoining veins (Fig. 45); anterior wing veins with 4 primaryy dark spots (best seen with little or no magnification), apical dark (AD) spot as distinct as presector dark (PSD), sector dark (SD) and preapical dark (PD) spots (Fig. 45) ..... *apicimacula*

Scales on cubitus (Cu) not as above, mostly pale or a mixture of pale and dark, usually not appressed to vein and usually about same size as scales of adjoining veins (Fig. 46); anterior wing veins with 3 or 4 primary dark spots, apical dark (AD) spot may be indistinct (Fig. 46) 10

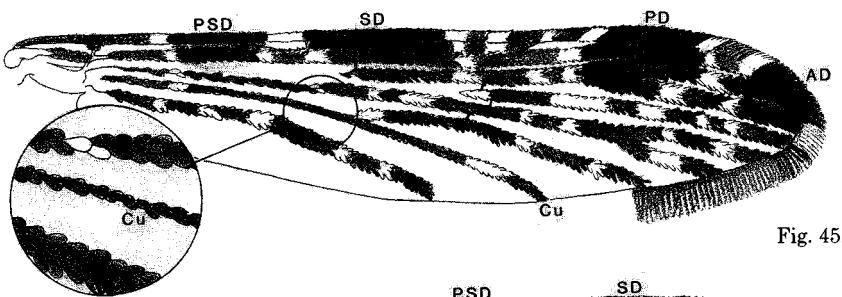


Fig. 45. *An. (Ano.) apicimacula*

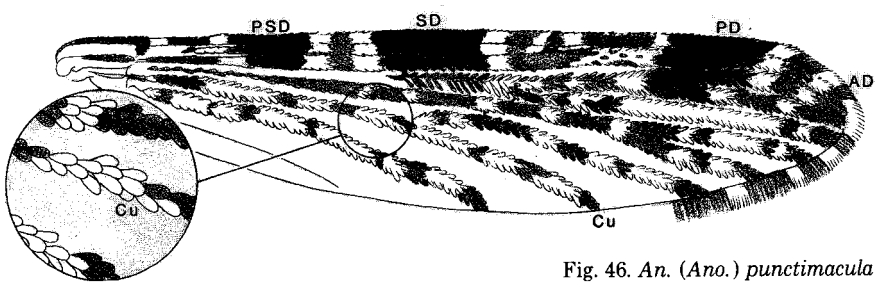


Fig. 46. *An. (Ano.) punctimacula*

10(9). Preapical dark (PD) spot small, 0.06–0.12 length of wing (mean 0.09) (Fig. 47); sternum I (S-I) usually with a few posterolateral pale scales (Fig. 48); hindtarsomere 5 ($Ta\text{-}III_5$) with a dark band (Fig. 49) ..... *neomaculipalpus*

Preapical dark (PD) spot larger, 0.11–0.23 length of wing (mean 0.17) (Fig. 50); sternum I (S-I) bare (Fig. 51); hindtarsomere 5 ($Ta\text{-}III_5$) with or without a dark band (Fig. 52) 11

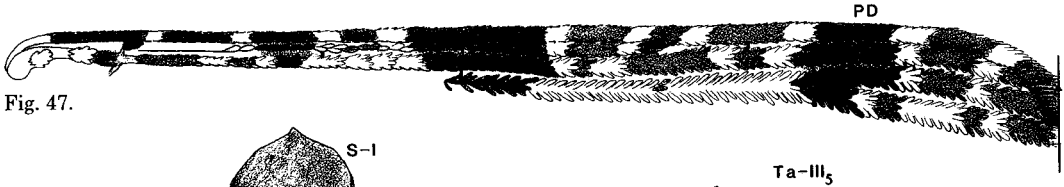


Fig. 47.

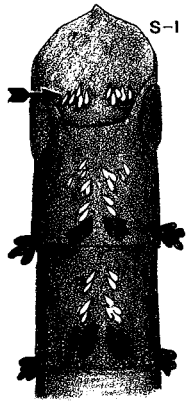


Fig. 48.

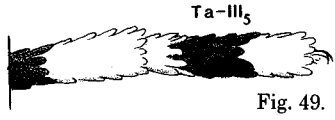


Fig. 49.

An. (Ano.) neomaculipalpus

Fig. 50.

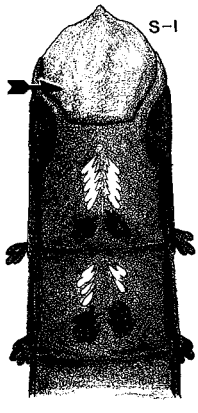


Fig. 51.

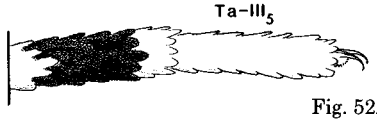


Fig. 52.

An. (Ano.) malefactor

11(10). Mesepimeron (Mm) without scales (Fig. 54); pale wing scales mostly yellow except for distinctly contrasting white scales on either side of presector dark (PSD), sector dark (SD) and preapical dark (PD) spots (Fig. 53); hindtarsomere 5 ($Ta\text{-}III_5$) usually with a dark band or spot (Fig. 55) ..... *punctimacula*

Mesepimeron (Mm) usually with several pale upper mesepimeral scales (UMSc)(Fig. 57); pale wing scales a mixture of pale yellow and white (Fig. 58) hindtarsomere 5 ($Ta\text{-}III_5$) pale (Fig. 56) ..... *malefactor*[d]

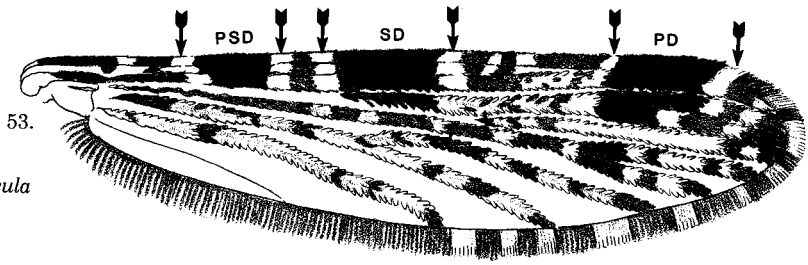


Fig. 53. *An. (Ano.) punctimacula*

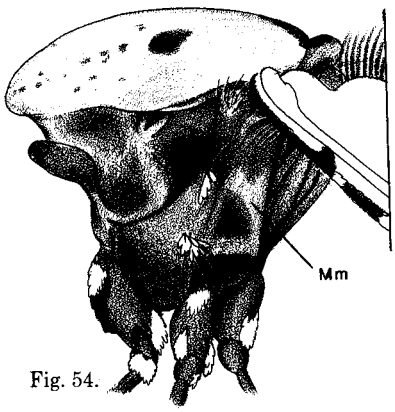
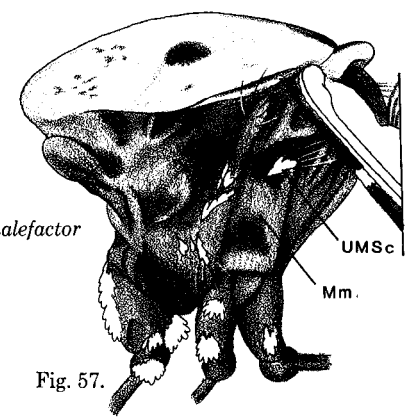


Fig. 54.

Fig. 55.



An. (Ano.) malefactor

Fig. 57.

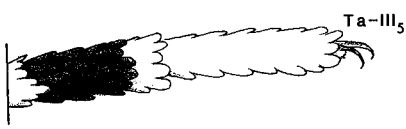


Fig. 56.

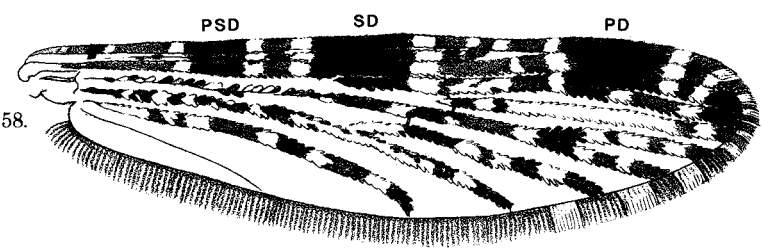


Fig. 58.

12(5). Wing entirely dark-scaled (including fringe at apex) (Figs. 59 and 60) 13

Wing with one or more pale spots (wing may be entirely dark-scaled except for a pale spot restricted to fringe at apex) (Figs. 61 and 62) 17

Fig. 59. *An. (Ano.) quadrimaculatus*

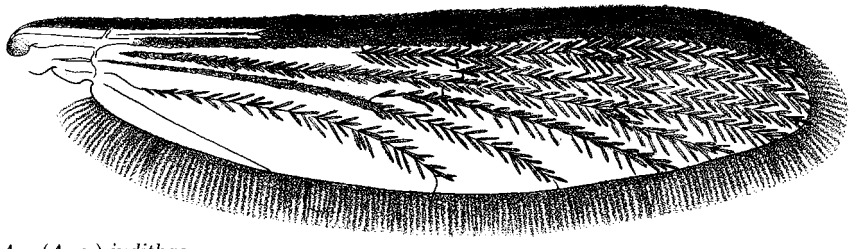


Fig. 60. *An.* (*Ano.*) *judithae*

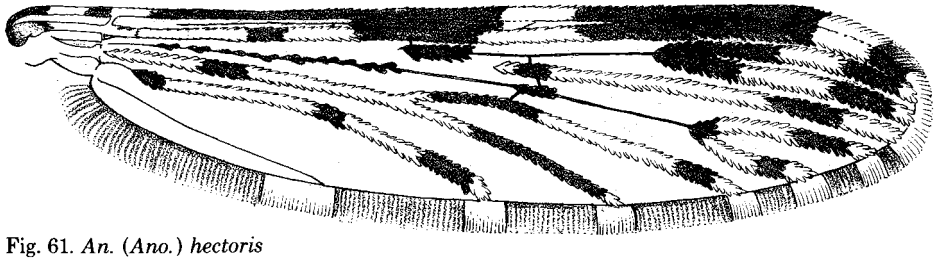


Fig. 61. *An.* (*Ano.*) *hectoris*

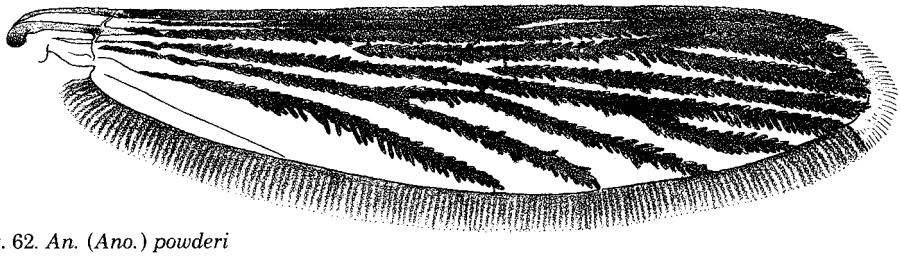


Fig. 62. *An.* (*Ano.*) *powderi*

13(12). Wing scales uniformly dark, without patches of denser and/or darker scales at crossveins and furcations (Fig. 60); maxillary palpus and legs entirely dark-scaled ..... *judithae*

Wing scales darker and/or more dense at crossveins and furcations, forming faint dark spots (often better seen without magnification) (Fig. 59); maxillary palpus entirely dark-scaled or with pale scales at articulations and apex of palpomere 5; legs entirely dark or with pale scales at articulations 14

14(13). Scales and setae of interocular space (IS), and usually pale scales of vertex (V), golden yellow (Fig. 63); scales on apices of femora (Fe) and tibiae (Ti) not noticeably contrasting with other scaling of legs (Fig. 66) ..... *aztecus*

Scales and setae of interocular space (IS), and pale scales of vertex (V) white or yellowish white (Figs. 64 and 65); apices of femora (Fe) and tibiae (Ti) white-scaled, noticeably contrasting with dark brown scaling of legs (Fig. 67) 15

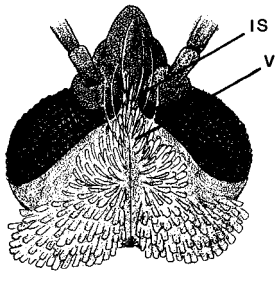


Fig. 63. *An.* (*Ano.*) *aztecus*

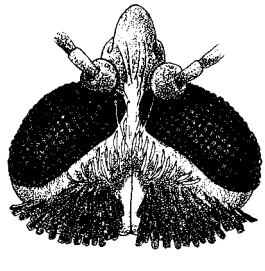


Fig. 64. *An.* (*Ano.*) *walkeri*

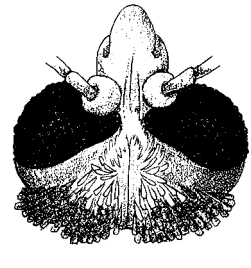


Fig. 65. *An.* (*Ano.*) *freeborni*

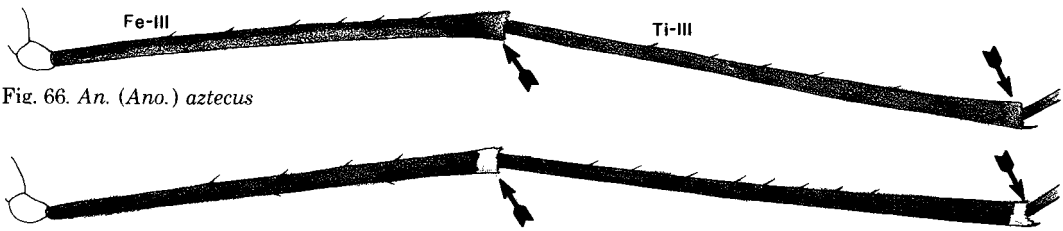


Fig. 66. *An.* (*Ano.*) *aztecus*

Fig. 67. *An.* (*Ano.*) *walkeri*

15(14). Maxillary palpus (MPlp) with pale scales at articulations of palpomeres 2–3, 3–4, 4–5 and at apex of 5 (Fig. 68) ..... *walkeri*

Maxillary palpus (MPlp) uniformly dark-scaled (Fig. 69) 16

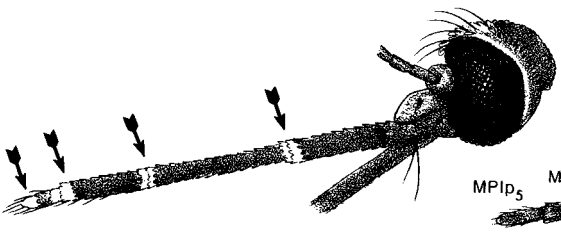


Fig. 68. *An.* (*Ano.*) *walkeri*

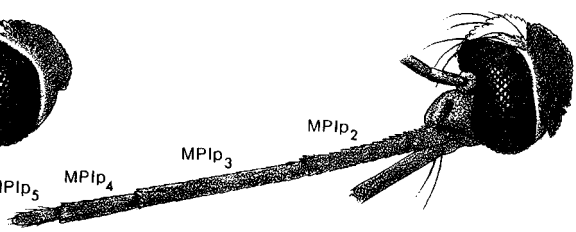


Fig. 69. *An.* (*Ano.*) *quadrimaculatus*

16(15). Wing scales narrow, short and sparse, wing membrane readily visible on apical 0.5 of wing (Fig. 70) (northwestern Mexico) ..... *freeborni*[e]

Wing scales broader, longer and more numerous, little of wing membrane visible on apical 0.5 of wing (Fig. 71) (eastern Mexico) ..... Quadrimaculatus Complex[f]

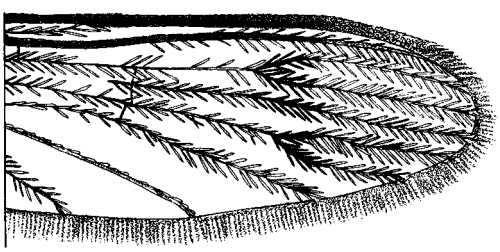


Fig. 70. *An.* (*Ano*) *freeborni*

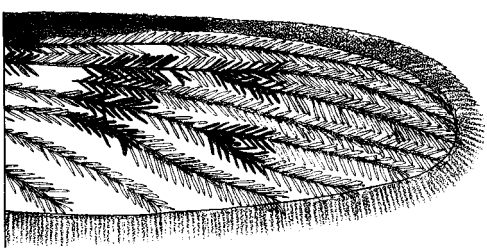
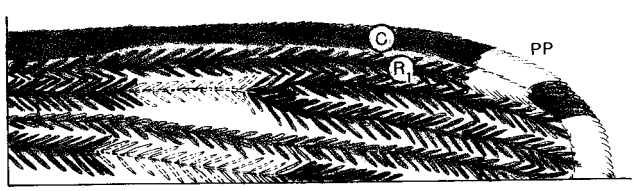


Fig. 71. *An.* (*Ano.*) *quadrimaculatus*

17(12). Hindtibia (Ti-III) with a conspicuous broad apical white band (Fig. 72); apex of hindfemur (Fe-III) with a few pale scales; costa (C) dark-scaled except for a distinct preapical pale (PP) spot on costa (C) and radius-one (R_1) (Fig. 73) ..... *eiseni*

Hindtibia (Ti-III) either dark-scaled apically, with a narrow apical white band or with a conspicuous apical white patch; hindfemur (Fe-III) variable; costa (C) variable 18

Fig. 72.



An. (*Ano.*) *eiseni*

Fig. 73.

18(17). Hindfemur (Fe-III) with a broad apical white band (Fig. 74); wing dark-scaled except for apical pale (AP) spot on costa (C) and radius-one (R_1), or on wing fringe (WF) at and posterior to radius-one (R_1) (Figs. 76–78) 19

Hindfemur (Fe-III) either dark, with a narrow apical white band or with a few apical pale scales (Fig. 75); wing variable 22

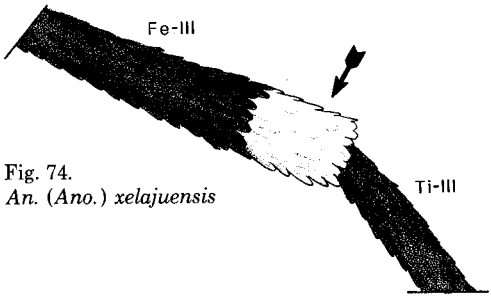


Fig. 74.
An. (Ano.) xelajuensis

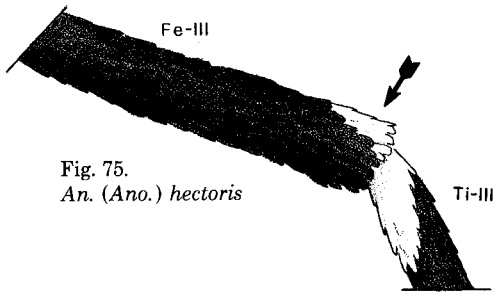


Fig. 75.
An. (Ano.) hectoris

Fig. 76.
An. (Ano.) fausti

19(18). Apices of costa (C) and radius-one (R_1) (including fringe) pale-scaled (Fig. 77); small pale fringe spots (PFS) present at ends of media-one (M_1), media-two (M_2) and media-three-plus-four (M_{3+4}); denser patches of scales form dark spots at furcations, at crossveins and at base of wing (Fig. 77) ..... *xelajuensis*

Apices of costa (C) and radius-one (R_1) dark-scaled, pale scales confined to fringe from radius-one (R_1) to radius-four-plus-five (R_{4+5}) or media-one (M_1) (Fig. 78); pale fringe spots (PFS) not present at ends of media-one (M_1), media-two (M_2) and media-three-plus-four (M_{3+4}); denser patches of wing scales not present (Fig. 78) 20

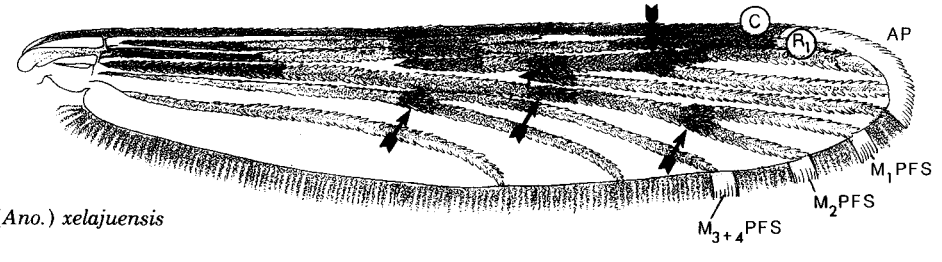


Fig. 77. *An. (Ano.) xelajuensis*

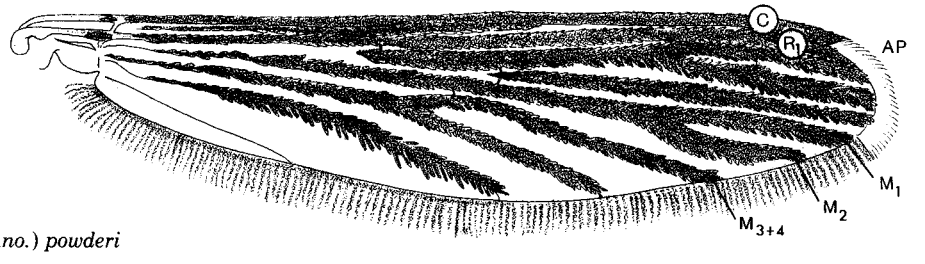


Fig. 78. *An. (Ano.) powderi*

20(19). Maxillary palpus (MPlp) entirely dark-scaled (Fig. 79); wing profusely scaled; scales in middle of anal vein (1A) spread widely from vein (Fig. 82) ..... *powderi*

Maxillary palpus (MPlp) with pale scales at articulations and apex (Fig. 80); wing moderately scaled; scales in middle of anal vein (1A) appressed or slightly spreading from vein (Fig. 81) 21

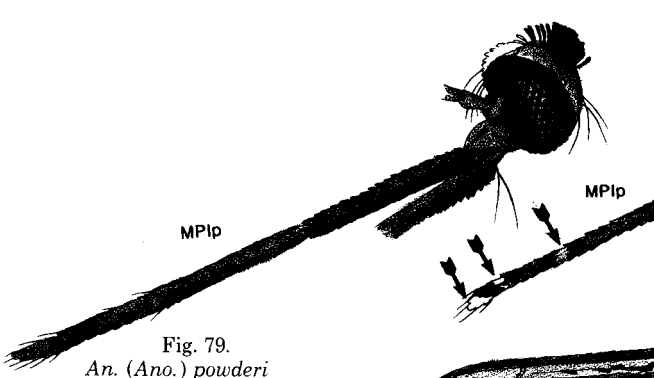


Fig. 79.
An. (Ano.) powderi

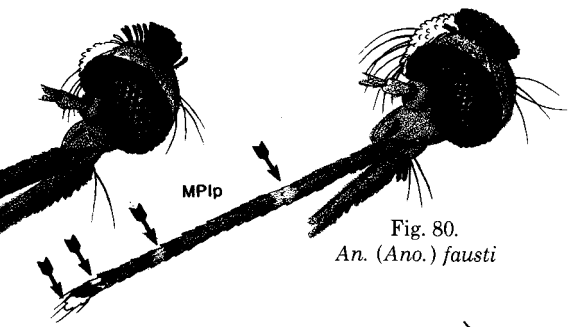


Fig. 80.
An. (Ano.) fausti

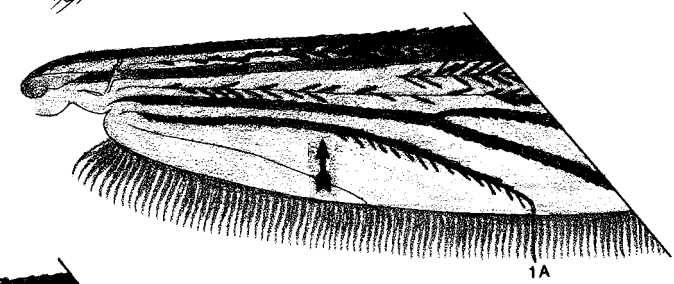


Fig. 81. *An. (Ano.) fausti*

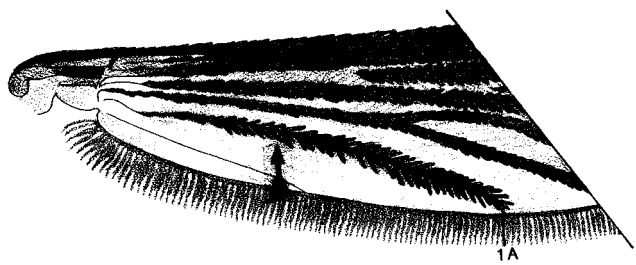


Fig. 82. *An. (Ano.) powderi*

21(20). Apices of fore- (Fe-I) and midfemora (Fe-II) with a few white scales (Fig. 83) ..... *fausti*

Apices of fore- (Fe-I) and midfemora (Fe-II) dark-scaled (Fig. 84) ..... *arboricola*

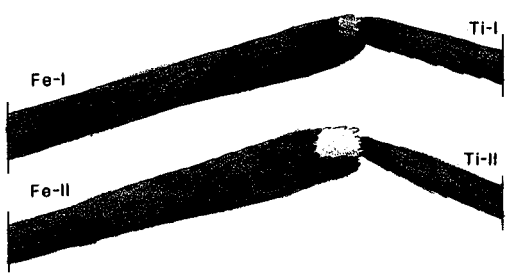


Fig. 83. *An. (Ano.) fausti*

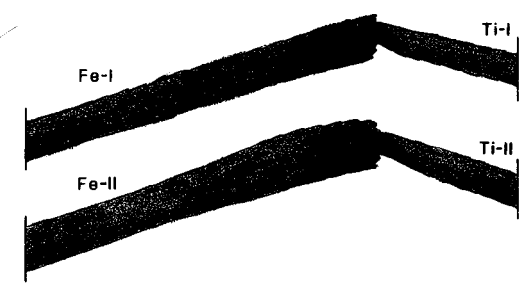


Fig. 84. *An. (Ano.) arboricola*

22(18). Costa (C) with an apical pale (AP) spot only (Fig. 85) 23

Costa (C) with at least apical pale (AP) and subcostal pale (SCP) spots (Fig. 86) 24

Fig. 85. *An.* (*Ano.*) *bradleyi*

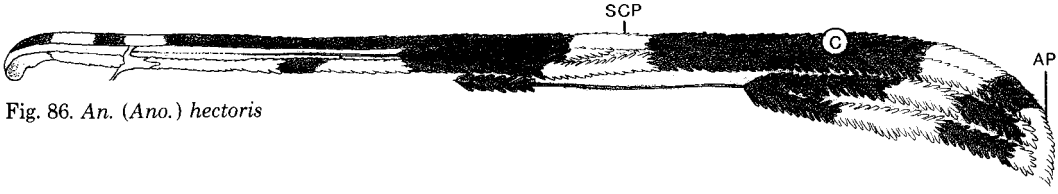


Fig. 86. *An.* (*Ano.*) *hectoris*

23(22). Cubitus (Cu) usually pale-scaled to mediocubital crossvein (mcu) (Fig.87) ..... *bradleyi*[x]
Cubitus (Cu) usually dark-scaled to mediocubital crossvein (mcu) (Fig. 88) ..... *crucians*

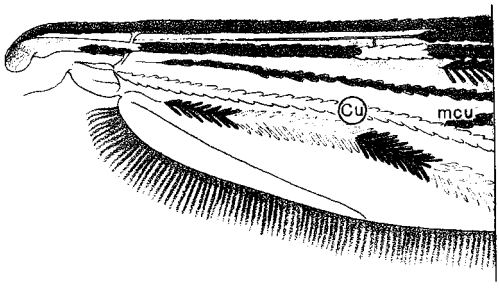


Fig. 87. *An.* (*Ano.*) *bradleyi*

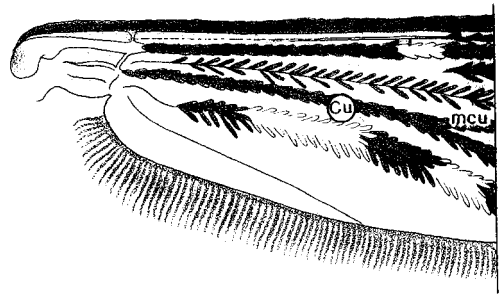


Fig. 88. *An.* (*Ano.*) *crucians*

24(22). Base of costa (C) dark-scaled, without prehumeral pale (PHP) or humeral pale (HP) spots (Fig. 89) 25
Base of costa (C) with humeral pale (HP) and/or prehumeral pale (PHP) spots (Figs. 90 and 91) 27

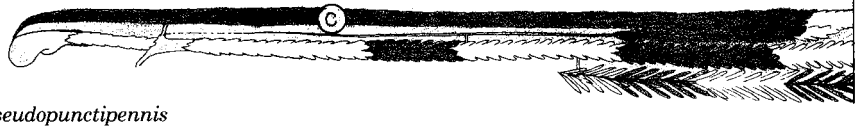


Fig. 89. *An.* (*Ano.*) *pseudopunctipennis*

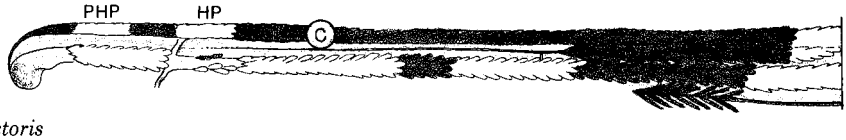


Fig. 90. *An.* (*Ano.*) *hectoris*

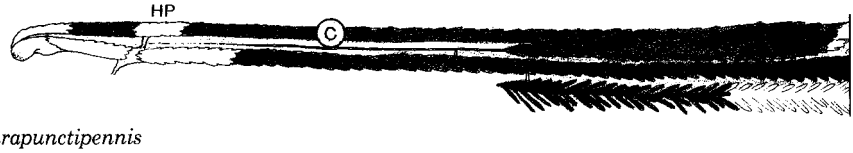


Fig. 91. *An.* (*Ano.*) *parapunctipennis*

25(24). Cubitus (Cu) dark-scaled (Fig. 92); radius (R) and radius-one (R_1) dark except at subcostal (SCP) and apical (AP) pale spots (Fig. 92); no sector pale (SP) spot at radial crossvein ($r_1 - r_s$) (Fig. 92); maxillary palpus (MPlp) entirely dark-scaled (Fig. 94) ..... *punctipennis*

Cubitus (Cu) predominantly pale-scaled with dark spots at each end (Fig. 93); radius (R) and radius-one (R_1) pale except at presector (PSD), sector (SD) and subapical dark (SAD = PD + AD) spots (Fig. 93); with sector pale (SP) spot at radial crossvein ($r_1 - r_s$) (Fig. 93); maxillary palpus (MPlp) pale-scaled at articulations (Fig. 95) 26

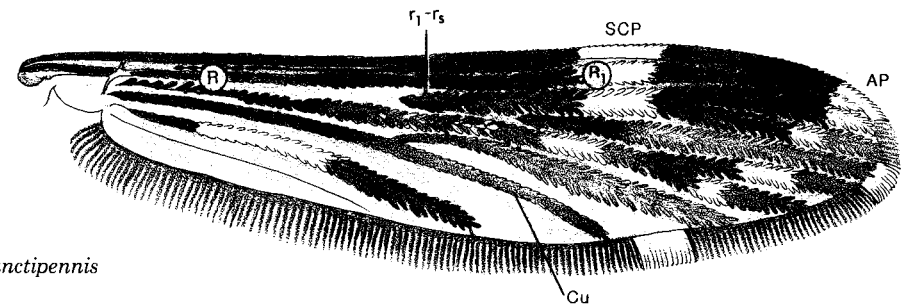


Fig. 92.
An. (Ano.) punctipennis

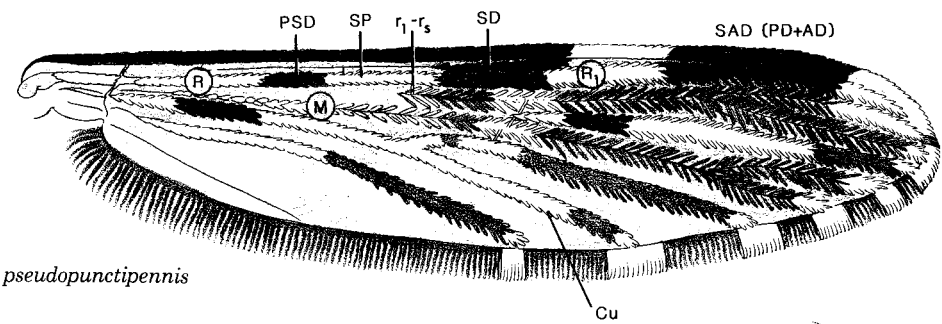


Fig. 93.
An. (Ano.) pseudopunctipennis

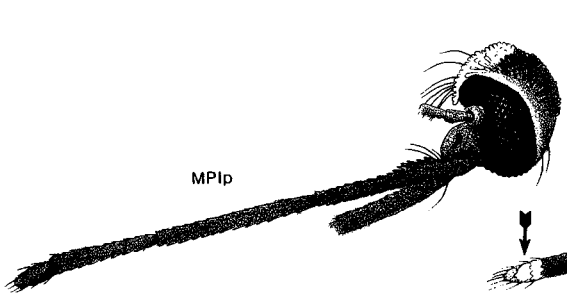


Fig. 94.
An. (Ano.) punctipennis

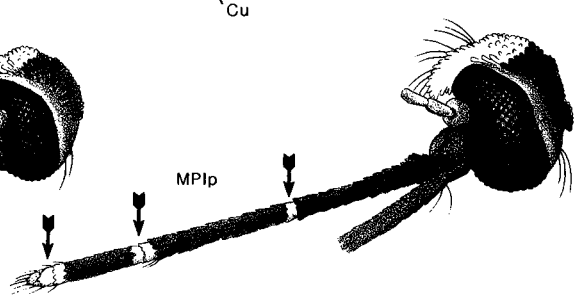


Fig. 95.
An. (Ano.) pseudopunctipennis

26(25). Palpomere 5 ($MPlp_5$) pale-scaled (Fig. 96); media (M) predominantly pale-scaled (Fig. 93) ..... *pseudopunctipennis*

Palpomere 5 ($MPlp_5$) pale basally, dark apically (Fig. 97); media (M) predominantly dark-scaled (Fig. 98) ..... *franciscanus*

Fig. 96. *An. (Ano.) pseudopunctipennis*

Fig. 97. *An. (Ano.) franciscanus*

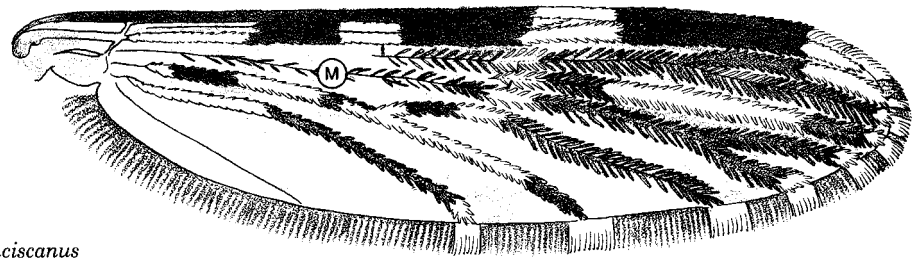


Fig. 98.
An. (Ano.) franciscanus

27(24). Entire broad middorsal silvery pollinose stripe of scutum (Scu) overlain by slender white fusiform scales (Fig. 100); sector pale (SP) spot present on radius (R) but not on costa (C) (Fig. 99); pale scales of wing, thorax and proboscis white ..... *hectoris*

Only extreme anterior margin of broad middorsal silvery pollinose stripe of scutum (Scu) with slender white fusiform scales (Fig. 102); sector pale (SP) spot either absent or present on both costa (C) and radius (R) (Figs. 101 and 103); pale scales of wing, thorax and proboscis yellowish white 28

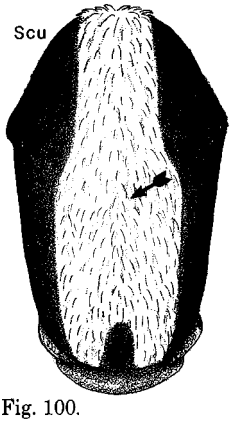


Fig. 100.

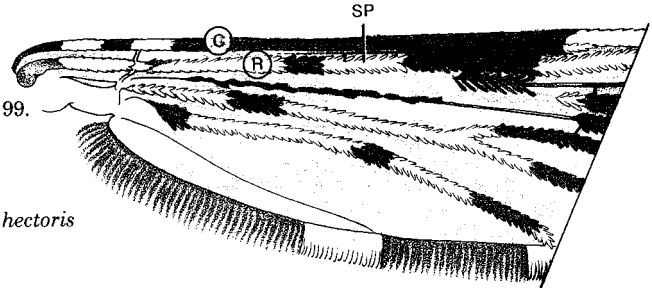


Fig. 99.
An. (Ano.) hectoris

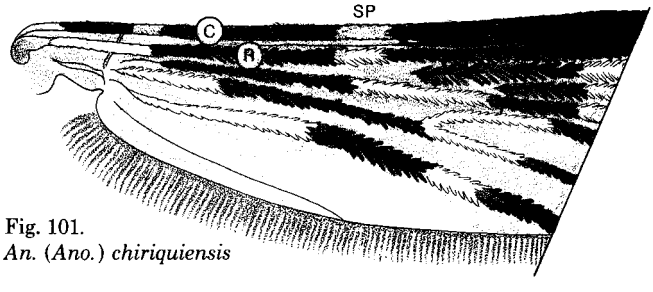


Fig. 101.
An. (Ano.) chiriquiensis

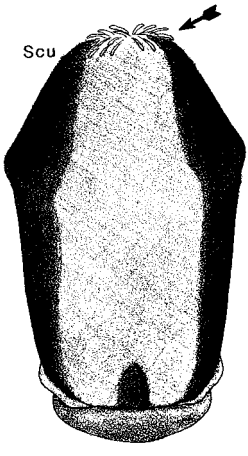


Fig. 102.

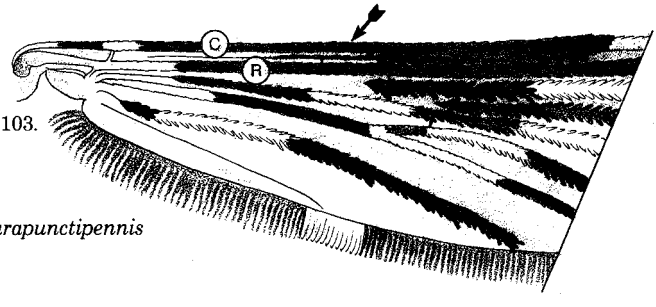


Fig. 103.
An. (Ano.) parapunctipennis

28(27). Sector pale (SP) spot absent (Fig. 104); maxillary palpus (MPlp) mostly dark with pale scales at apex of palpomere 3 ($MPlp_3$) and at base and apex of palpomeres 4 and 5 ($MPlp_4$, $MPlp_5$) (Fig. 106); capitellum (Ca) of halter dark brown (Fig. 108) ..... *parapunctipennis* and *parapunctipennis guatemalensis* [h]

Sector pale (SP) spot present on costa (C) and radius (R) (Fig. 105); maxillary palpus (MPlp) with more extensive pale scaling, with pale scales at the apex of palpomere 2 ($MPlp_2$), base of 3 ($MPlp_3$), most of 4 ($MPlp_4$), except for a dark median band and, palpomere 5 ($MPlp_5$) pale, sometimes with a dark median band (Fig. 107); capitellum (Ca) of halter mostly yellowish (Fig.109) .. *chiriquiensis*

Fig. 104.

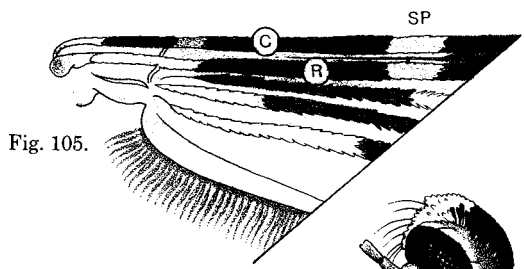


Fig. 105.

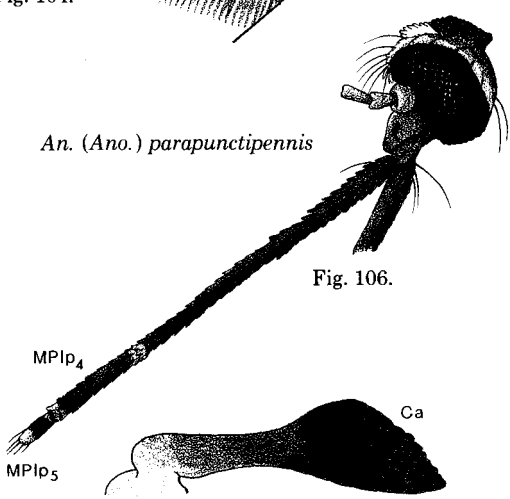


Fig. 106.

Fig. 108.

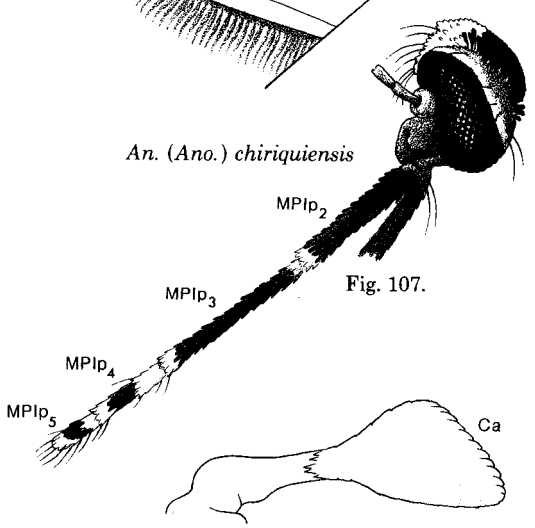


Fig. 107.

Fig. 109.

29(6). Terga and sterna II-VII without obvious scales (Fig. 110); basal 0.3–0.5 of hindtarsomere 2 ($Ta\text{-}III_2$) dark, remainder pale (Fig. 112) ..... *neivai*

Terga and sterna II-VII with numerous scales (Fig. 111); basal 0.8–0.9 of hindtarsomere 2 ($Ta\text{-}III_2$) dark, apex pale (Fig. 113) ..... *pholidotus*

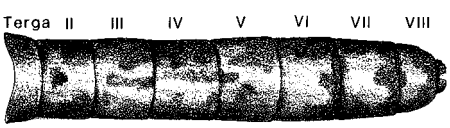


Fig. 110. *An. (Ker.) neivai*

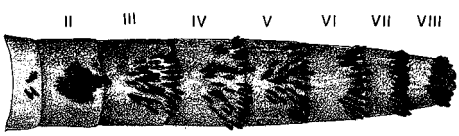


Fig. 111. *An. (Ker.) pholidotus*

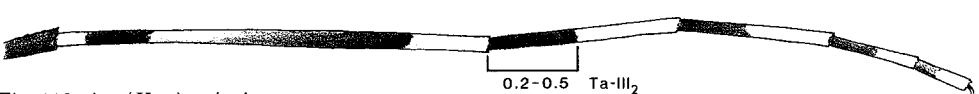


Fig. 112. *An. (Ker.) neivai*

Fig. 113. *An. (Ker.) pholidotus*

30(6). Hindtarsomere 5 (Ta-III_5) with a basal dark band (Fig. 114) ..... Albimanus Section ... 31

Hindtarsomere 5 (Ta-III_5) entirely white (Fig. 115) ..... Argyritarsis Section ... 35

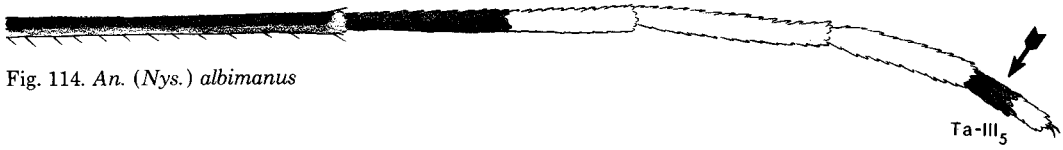


Fig. 114. *An. (Nys.) albimanus*

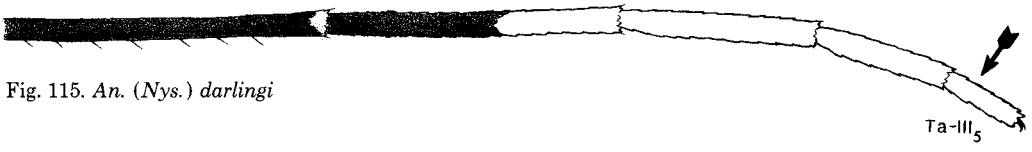


Fig. 115. *An. (Nys.) darlingi*

31(30). Tergum II (Te-II) without dark posterolateral scale-tufts (Fig. 116); palpomere 4 (MPlp$_4$) with dark or yellow to golden-brown scales on mediolateral surface, scales never white or cream-colored (Fig. 118); foretarsomere 5 (Ta-I_5) usually all dark ..... *albimanus*

Tergum II (Te-II) with dark posterolateral scale-tufts (Fig. 117); palpomere 4 (MPlp$_4$) with at least some white or cream-colored scales on mediolateral surface (Fig. 119); foretarsomere 5 (Ta-I_5) variable 32

Fig. 116.

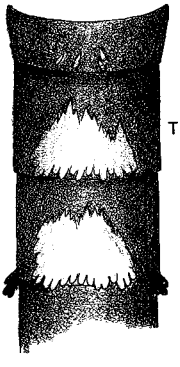


Fig. 117.

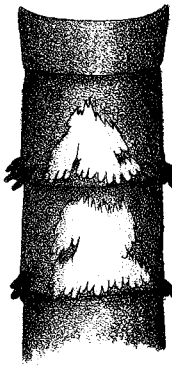


Fig. 118.

An. (Nys.) albimanus

Fig. 119.

An. (Nys.) oswaldoi

32(31). Hindtarsomere 2 (Ta-III_2) with basal dark band less than 0.25 length of tarsomere (Fig. 120) ..... *oswaldoi*

Hindtarsomere 2 (Ta-III_2) with basal dark band greater than 0.3 length of tarsomere (Fig. 121) ... 33

Fig. 120. *An. (Nys.) oswaldoi*

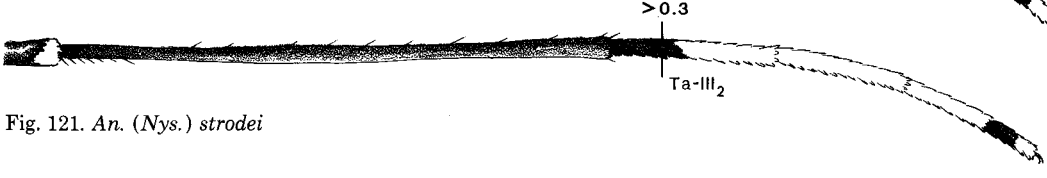


Fig. 121. *An. (Nys.) strodei*

33(32). Humeral pale (HP) spot small, 0.5–1.3 times length of prehumeral dark (PHD) (Fig. 122); middle of mesepimeron (Mm) usually with a patch of pale anterior mesepimeral scales (AM5c) (Fig. 124); hindtarsomere 2 with basal dark band 0.4–0.7 length of segment ..... *triannulatus*

Humeral pale (HP) spot large, greater than 1.3 times length of prehumeral dark (PHD) spot (Fig. 123); middle of mesepimeron (Mm) without a patch of pale scales (Fig. 125); hindtarsomere 2 with basal dark band 0.3–0.6 length of segment 34

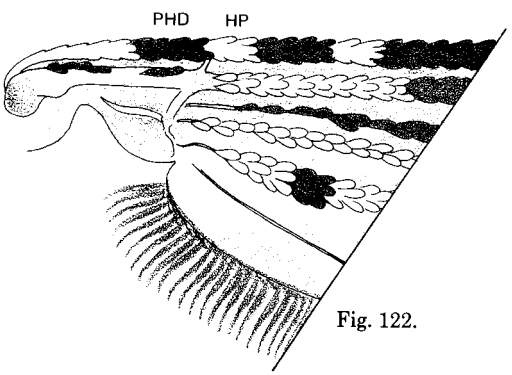


Fig. 122. *An. (Nys.) triannulatus*

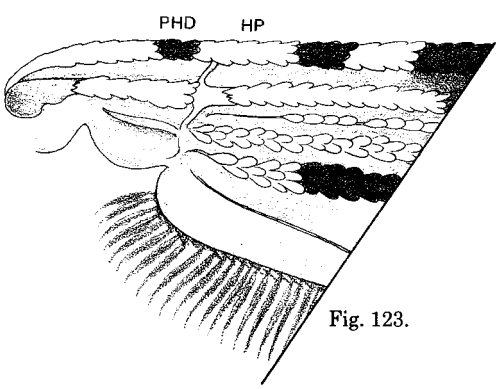


Fig. 123. *An. (Nys.) strodei*

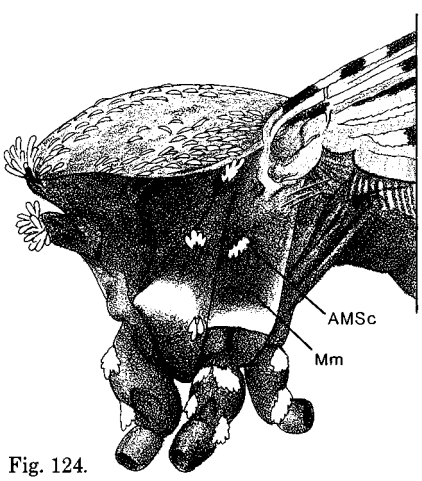


Fig. 124.

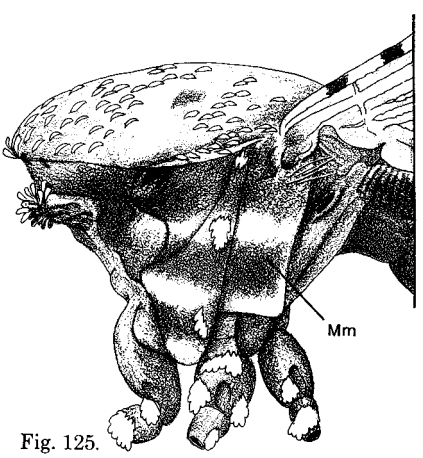


Fig. 125.

34(33). Pale scales on wing and coxae usually white or nearly so ..... *strodei* and *anomalophyllus*[1]

Pale scales on wing and coxae yellowish, not white ..... *aquasalis*

35(30). Humeral pale (HP) spot short, 0.25–0.33 times length of prehumeral dark (PHD) spot (Fig. 126); mesepimeron (Mm) without a patch of pale upper mesepimeral scales (UMSc) (as in Fig. 129); mesepimeron (Mm) usually with a patch of pale anterior mesepimeral scales (AMSc) (Fig. 128); dark caudolateral scale-tufts present on tergum II (TeII) (Fig. 128); anterior pale wing scales yellowish ..... *darlingi*

Humeral pale (HP) spot long, not less than 1.25 times length of prehumeral dark (PHD) spot (Fig. 127); mesepimeron (Mm) usually with a patch of upper mesepimeral pale scales (UMSc) (Fig. 129); mesepimeron (Mm) without a patch of anterior pale scales (AMSc) (as in Fig. 128); dark caudolateral scale-tufts absent on tergum II (Te-II) (Fig. 129); anterior pale wing scales white 36

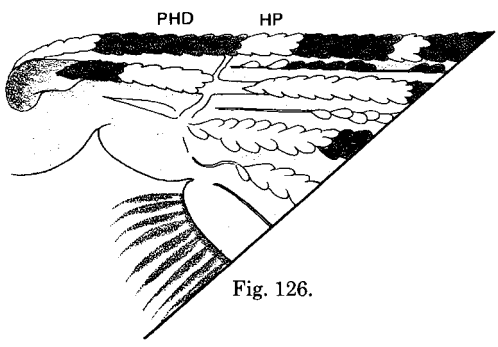


Fig. 126. *An. (Nys.) darlingi*

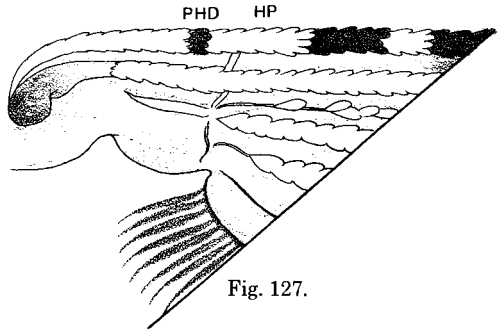


Fig. 127. *An (Nys.) marajoara*

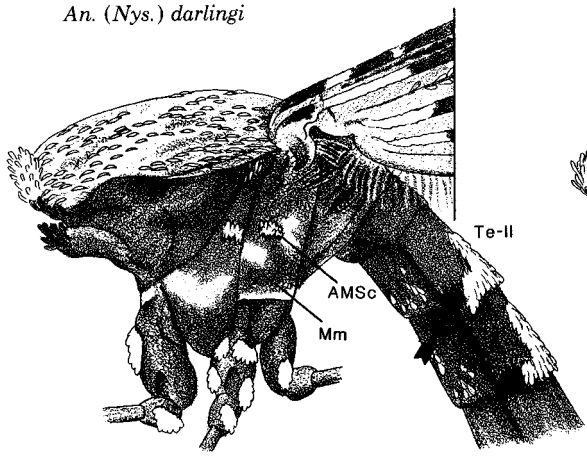


Fig. 128.

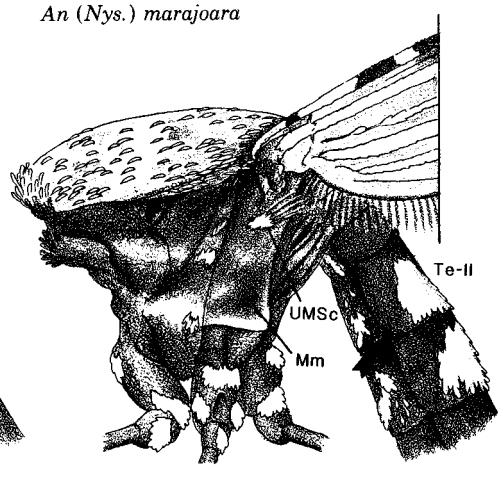


Fig. 129.

36(35). Sternum I (S-I) with submedian rows of white scales (Fig. 130); basal dark band of hindtarsomere 2 (Ta-III_2) usually 0.5–0.7 (range 0.3–0.8) length of tarsomere (Fig. 132) ..... *marajoara*

Sternum I (S-I) without scales (Fig. 131); basal dark band of hindtarsomere 2 (Ta-III_2) less than 0.4 length of tarsomere (Fig. 133) ..... *argyritarsis*

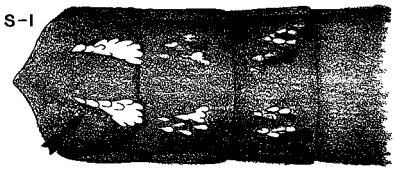


Fig. 130. *An (Nys.) marajoara*

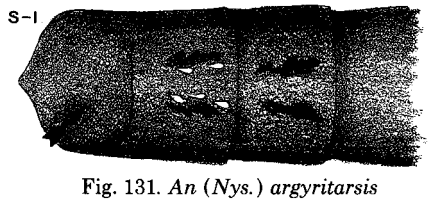


Fig. 131. *An (Nys.) argyritarsis*

Fig. 132. *An (Nys.) marajoara*

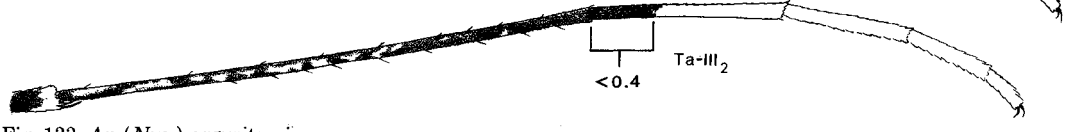


Fig. 133. *An (Nys.) argyritarsis*

EXPLANATION OF NOTES

[a] Unless otherwise noted the colors given refer to scale color.

[b] Some specimens of *An.* (*Ano.*) *vestitipennis* lack presubcostal pale (PRSCP) spots. In these specimens the "isolated" dark spot is continuous with the sector dark (SD) spot and therefore not present. This should not cause confusion since the character of speckled legs is constant and postsubcostal pale (POSCP) spot(s) will still be present.

[c] Dust-like or powdery appearance of the cuticula. This term describes what is normally seen with a dissecting microscope, but are actually "microtrichiumlike spicules comprising the tomentum which covers the cuticula (except the wing membrane)" (Harbach and Knight 1980).

[d] *Anopheles veruslanei* Vargas (1979a, b) from Quintana Roo, Mexico, will key out here. The identity of this species cannot be determined with certainty. Since *An. malefactor* is known only from Panama and Colombia it is likely that *An. veruslanei* will prove to be distinct and identifiable when more material becomes available.

[e] It is possible that the species called *An. freeborni* in northern Mexico is actually a very similar species, *An. hermsi*, recently described from southern California by Barr and Guptavanij (1988).

[f] Recent evidence (Narang et al. 1989; Kaiser et al. 1988a, b; Lanzaro et al. 1988) documents at least 4 species in the Quadrimaculatus Complex in the U.S. The morphology of these taxa has not been studied, and it is uncertain which form(s) occur in Mexico.

[g] See Floore et al. (1976). *Anopheles bradleyi* and *An. crucians* can only be identified reliably in the immature stage. The character given in the key is about 75% reliable for adult females (B. A. Harrison, personal communication).

[h] These 2 taxa are treated by Wilkerson (1990a). Though they are morphologically similar, their status remains unchanged until more material becomes available. Females of *An. parapunctipennis guatemalensis* are distinguishable from the nominotypical subspecies by the absence of pale scales on vein R_1 at the subcostal pale (SCP) spot.

[i] Faran (1980) states that the females of these 2 species are very similar and difficult to separate. *Anopheles anomalophyllus* is readily identified by the male genitalia since it is the only member of the Albimanus Section with well-developed aedeagal leaflets. In addition, it is known only from southern and central Costa Rica and the Atlantic coast of western Panama.

ACKNOWLEDGMENTS

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APPENDIX

Essential label information is listed for the specimens used to produce the illustrations. Species names are given in alphabetical order. Except where noted, all specimens are in the National Museum of Natural History, Museum Support Center, Smithsonian Institution, Washington, DC.

Anopheles (*Nys.*) *albimanus*, Honduras, HONC 66–110, Acc. 1179, Strickman; *An.* (*Ano.*) *apicimacula*, Mexico, Chiapas, MX 141–3, Acc. 1250; *An.* (*Ano.*) *arboricola*, Panama, El Volcan, VI-30–43, T. H. G. Aitken, 690203–4; *An.* (*Nys.*) *argyritarsis*, Panama, Gorgas Mem. Lab., '63, PA 460–104; *An.* (*Ano.*) *aztecus*, (2), Mexico, MX 17 and MX 19; *Ch. bathana*, (2), British Honduras, 1967, BH 429; *An.* (*Ano.*) *bradleyi*, Cocoa FL, Lt 11(?) March 48, Halsten; *An.* (*Ano.*) *chiriquiensis*, Panama, Chiriqui, PN 94–104, 10 Oct. 85, Peyton and Strickman; *An.* (*Ano.*) *crucians*, Honduras, 1986, HONC 25–10, Strickman, Acc. 1179; *An.* (*Nys.*) *darlingi*, (2), Los Amates, Guatemala, Feb 18–28, 05, Jas. S. Hine; *An.* (*Ano.*) *eiseni*, Honduras, 1986, HONC 217–13, Strickman, Acc. 1179; *An.* (*Ano.*) *fausti*, (In Instituto de Salubridad y Enfermedades Tropicales, Mexico City, Mexico) paratype, Col. M. Macias, IV-1942, Tlapexhuocan, S.L.P; *An.* (*Ano.*) *franciscanus*, (2) New Mexico, Artesia, July 3, 1948, Beadle and New Mexico, Tucumari, June 25, 48, Beadle; *An.* (*Ano.*) *freeborni*, California, Saratoga Springs, Death Valley, I–11–55, Belkin, Lot/sub 153; *An.* (*Ano.*) *gabaldoni*, (In Liverpool School of Tropical Medicine) British Honduras, Bertram, 1845 on 18–12–67, Hummingbird Highway, Mile 49; *An.* (*Ano.*) *hectoris*, Honduras, 1986, HONC 112–10, Acc. 1179, Strickman; *An.* (*Ano.*) *judithae*, Mexico, MEX 685–43, 71, Mosq. Midd. Amer.; *An.* (*Ste.*) *kompi*, Panama, Almirante, Jan.–Feb. 1928, W. H. W. Komp; *An.* (*Ano.*) *malefactor*, Panama, GG 8, Gorgas Mem. Lab., '58, WRBU Prep RW 123; *An.* (*Nys.*) *marajoara*, (2), KO 113–3, W. H. W. Komp; *An.* (*Ker.*) *neivai*, (2), Costa Rica, 1971, CR 500–12 and CR 422–101, Mosq. Middle Amer.; *An.* (*Ano.*) *neomaculipalpus*, (2), Panama, 1965, Gorgas, PA 838, and PA 748; *An.* (*Nys.*) *oswaldoi*, Panama, 1972, PA 1176–5, Mosq. Middle Amer.; *An.* (*Ano.*) *parapunctipennis guatemalensis*, Guatemala A. C., paralectotype, 10,500 p, /Anoph Chiriquiensis, ?Chgis; *An.* (*Ker.*) *pholidotus*, allotype, Panama, Bocas de Toro Prov., Caldera, Chiquita Trail, 31-X-55, Orguela; *An.* (*Ano.*) *powderi*, Panama, Cerro Punta, Chiriqui, (6000 ft), V-26–46, Galindo; *An.* (*Ano.*) *pseudopunctipennis*, Honduras, HONC 113–14, Strickman, Acc. 1179; *An.* (*Ano.*) *punctimacula*, (3), Panama, PA 1175–58, PA 1175–64 and PAX 49; *An.* (*Ano.*) *punctipennis*, Mexico, Monterrey, N.L., X-1945, Col. M. Macias; *An.* (*Ano.*) *quadrimaculatus*, Mexico, Tampico, March 10–1921, J.A. Le Prince; *An.* (*Lph.*) *squamifemur*, Panama, PA 94–2, 65/66, Gorgas Mem Lab; *An.* (*Nys.*) *strodei*, Panama, Juan Diaz, 12/7/36, MEP Acc. No. 596; *An.* (*Nys.*)

triannulatus, Panama, 17–3, MEP-GML 1977; *An.* (*Ano.*) *vestitipennis*, (2), Honduras, Strickman, Acc. 1179, HONC 209, and HONC 208; *An.* (*Ano.*) *walkeri*, Merimentau La, June 18, 1923, W. H. W. Komp; *An.* (*Ano.*) *xelajuensis*, after Zavortink (1970).

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