

ILLUSTRATED KEY TO
MOSQUITOES OF VIETNAM

Chester J. Stojanovich
and
Harold George Scott

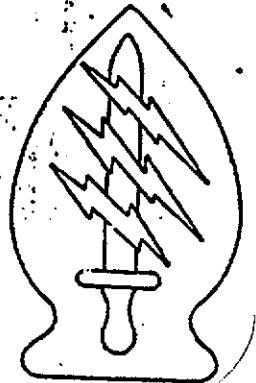
25 JANUARY 1966

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
Communicable Disease Center
Atlanta, Georgia 30333



DEDICATION

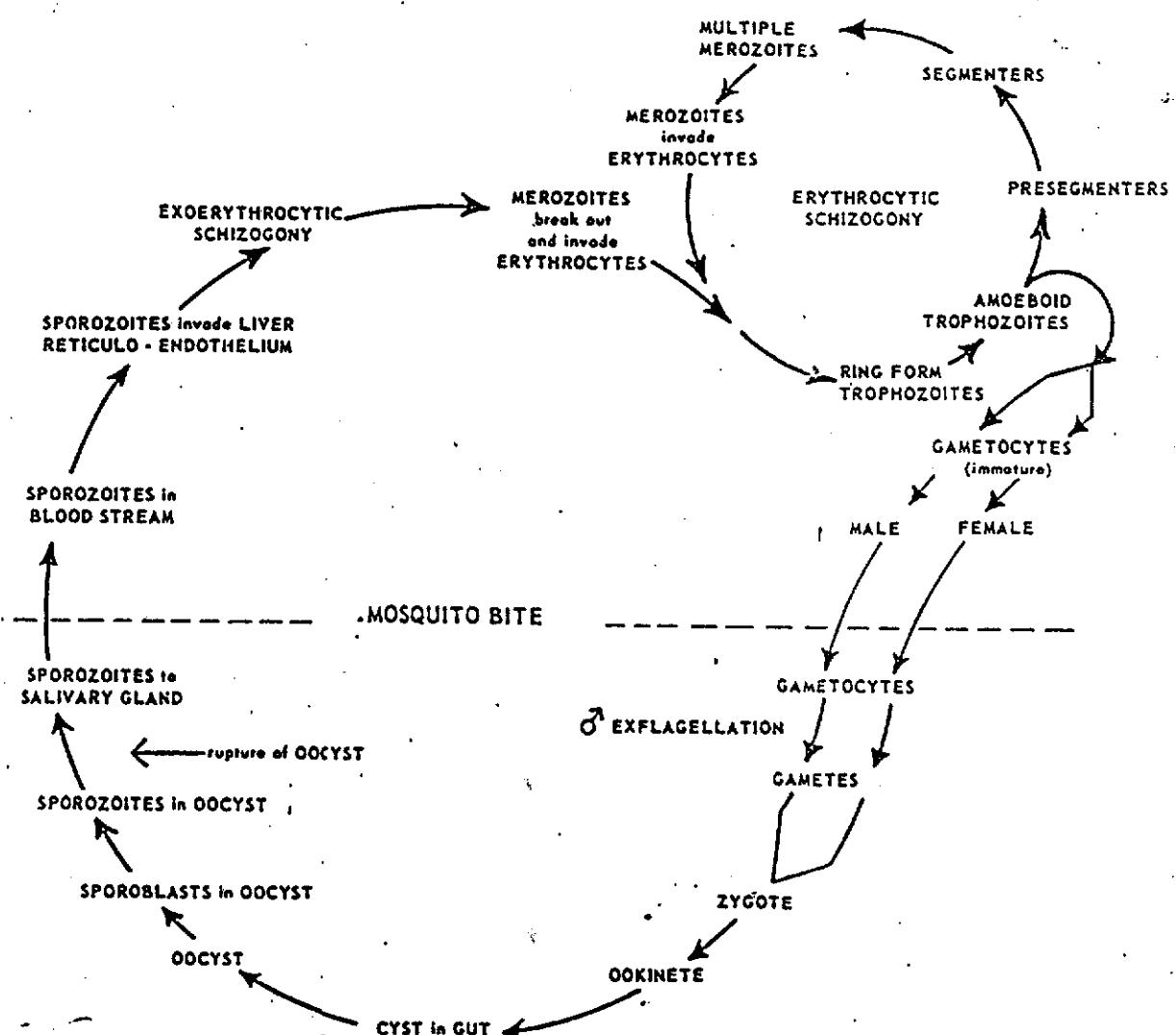
To Lt. Col. Richard L. Coppedge, Major Llewellyn J. Legters
and the other Special Forces "medics" of the U.S. Army John F. Kennedy Center
for Special Warfare, Ft. Bragg, North Carolina.



89104154006132

LIFE CYCLE OF THE MALARIA PARASITE (PLASMODIUM FALCIPARUM)

IN MAN: Endogenous Asexual Cycle
16 - 37 Days (average 11 days)



IN MOSQUITO: Exogenous Sexual Cycle
9 - 30 Days (average in tropics 11 days)

TABLE OF CONTENTS

Introduction		
List of Included Species		
Key to Larvae		
Genera	.....
<i>Anopheles</i>	.....	1
<i>Toxorhynchites</i>	.....	7
<i>Tripteroides</i>	.....	22
<i>Malaya</i>	.....	23
<i>Topomyia</i>	.....	24
<i>Ficalbia</i>	.....	25
<i>Mansonia</i>	.....	26
<i>Uranotaenia</i>	.....	28
<i>Hodgesia</i>	.....	32
<i>Orthopodomyia</i>	.....	36
<i>Aedeomyia</i>	.....	37
<i>Heizmannia</i>	.....	38
<i>Aedes</i>	.....	39
<i>Armigera</i>	.....	40
<i>Culex</i>	.....	53
		56
Key to Adults		
Genera	.....	71
<i>Anopheles</i>	.....	76
<i>Toxorhynchites</i>	.....	91
<i>Tripteroides</i>	.....	92
<i>Malaya</i>	.....	93
<i>Topomyia</i>	.....	94
<i>Ficalbia</i>	.....	95
<i>Mansonia</i>	.....	96
<i>Uranotaenia</i>	.....	99
<i>Hodgesia</i>	.....	103
<i>Orthopodomyia</i>	.....	104
<i>Aedeomyia</i>	.....	105
<i>Heizmannia</i>	.....	106
<i>Aedes</i>	.....	107
<i>Armigera</i>	.....	118
<i>Culex</i>	.....	122
		133
Bionomics	.....



INTRODUCTION

The mosquitoes of Vietnam are imperfectly known. However, this key deals with the 169 kinds considered to be present.

Known relationships of Vietnamese mosquitoes to human disease are:

HUMAN MALARIAS. *Plasmodium falciparum* and less commonly *Plasmodium vivax* and *Plasmodium malariae* are transmitted from man to man in the delta and coastal areas primarily by *Anopheles sinensis*, *Anopheles vagus*, and (in coastal sand-dune seepage areas) *Anopheles minimus*; secondarily by *Anopheles barbirostris*, *Anopheles tessellatus*, and *Anopheles umbrosus*. The malarias are transmitted in the highlands primarily by *Anopheles minimus*, and *Anopheles jeyporiensis candidiensis*; secondarily by *Anopheles aconitus*, *Anopheles batabacensis*, and *Anopheles maculatus*. During 1965, U.S. military forces in Vietnam suffered 30 cases of malaria per 1,000 personnel of which 97 percent was *falciparum* and 3 percent *vivax*. Resistance of both malarias to suppressive and curative drugs, and difficulty in maintaining adequate mosquito protective measures in combat situations make malaria the number-one health problem and precision mosquito control the number-one malaria control technique of the Vietnam war.

MALAYAN FILARIASIS. *Brugia malayi* is transmitted from man to man primarily by *Anopheles sinensis*, *Culex pipiens*, *Mansonia annulata*, *Mansonia annulifera*, *Mansonia indiana*, *Mansonia booneae*, *Mansonia uniformis*, *Anopheles campestris*, *Anopheles barbirostris* and *Mansonia dives*; secondarily by *Aedes lineatopennis* and *Culex vorax*.

BANCROFTIAN FILARIASIS. *Wuchereria bancrofti* is transmitted from man to man primarily by *Culex pipiens*, *Anopheles minimus*, *Anopheles sinensis*, *Culex fuscoccephalus*, *Culex gelidus*, *Aedes vigilax*, and *Mansonia uniformis*; secondarily by *Culex sitiens*, *Aedes lineatopennis*, *Culex sinensis*, *Culex tritaeniorhynchus*, *Culex vorax*, and *Anopheles jeyporiensis candidiensis*.

TROPICAL EOSINOPHILIA. This pulmonary involvement marked by extreme eosinophilia is caused by infestation of man with non-human filaria such as the dog heartworm (*Dirofilaria immitis*) and the cat filaria (*Brugia pahangi*). *Dirofilaria immitis* is transmitted from dog to man primarily by *Aedes albopictus*, *Aedes vexans*, and *Culex pipiens*; secondarily by *Mansonia dives*, *Mansonia booneae*, and *Mansonia annulata*; possibly by *Mansonia nigrosignata*. *Brugia pahangi* is transmitted from "cat" to man primarily by *Mansonia annulata*, *Mansonia uniformis* and *Armigeres subalbatus*; secondarily by *Anopheles campestris* and *Anopheles barbirostris*.

DENGUE. Dengue 2 and possibly dengue 1, 3, 4, 5, and 6 occur widely in Vietnam producing an epidemic haemorrhagic fever. Both the "domestic" *Aedes aegypti* and the slightly wilder *Aedes albopictus* are extensively distributed and responsible for transmission of the disease from man to man. Although the vector, *Aedes aegypti*, is common, YELLOW FEVER has never been reported from Vietnam.

JAPANESE "B" ENCEPHALITIS. A virus resembling that of Japanese "B" encephalitis has been isolated from North Vietnam. Antibodies to Japanese "B" virus have been detected in human sera at Hanoi. The disease is transmitted from hogs or birds to man primarily by the zoophilic *Culex tritaeniorhynchus*; possibly by *Aedes albopictus*, *Aedes vexans*, *Culex bitaeniorhynchus* and *Culex pipiens*.

CHIKUNGUNYA FEVER. *Aedes aegypti*, *Aedes albopictus*, *Culex gelidus*, *Culex tritaeniorhynchus* and *Mansonia uniformis* are probable vectors of chikungunya virus from horses, cattle, carabao and/or hogs to man. Non-human primates may also become infected. This group "A" arbovirus is reported from Malaya, Thailand, and Cambodia as well as India and Africa.

SINDBIS FEVER. *Culex tritaeniorhynchus*, *Culex bitaeniorhynchus* and/or *Aedes vigilax* are the probable vectors of sindbis virus from birds to man. This group "A" arbovirus is known from Malaya and the Philippines as well as Africa and Australia.

GETAH VIRUS. This group "A" arbovirus, also called AVM 2021, is known to occur in Malaya, Japan, and Australia. It is known to infect man, other primates and rabbits. Probable vectors are *Culex tritaeniorhynchus* and *Culex gelidus*. Its epidemiology is poorly known.

PRECISION MOSQUITO CONTROL. An effective technique for prevention of mosquito-borne diseases is precision mosquito control. It involves:

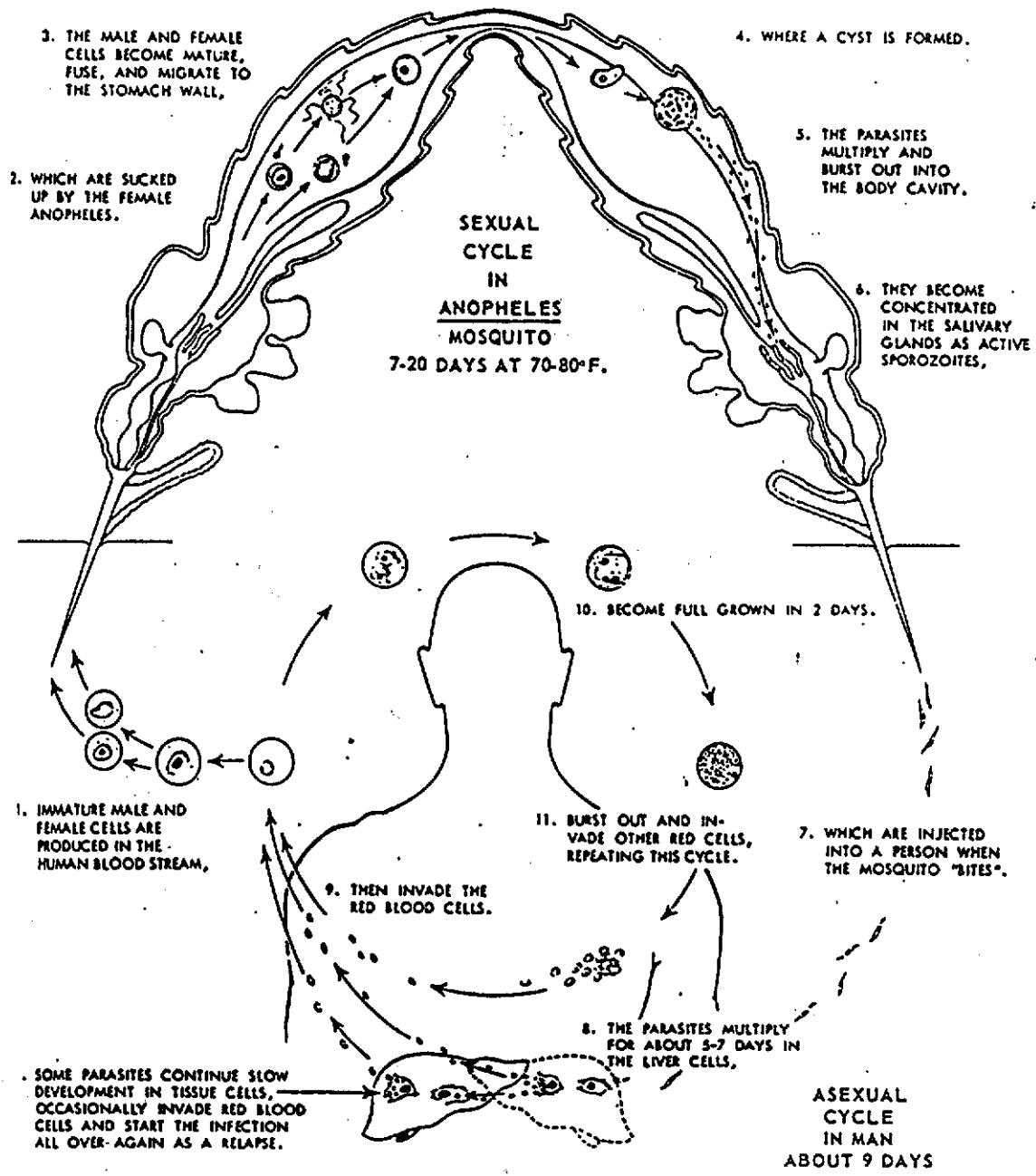
- (1) Identifying local mosquitoes, especially those biting man.
- (2) Looking up disease-vector potential of identified mosquitoes.
- (3) Looking up habitat data for disease-vector mosquitoes.
- (4) Delineating, on map and ground, probable larval and adult habitats of disease-vector mosquitoes.
- (5) Verifying these habitats by specimen collection and identification.
- (6) Selectively destroying or insecticiding verified habitats.
- (7) Verifying control success by demonstrating absence of disease-vector mosquitoes.

This publication provides necessary data for steps 1, 2, 3, 5, and 7 of this procedure.

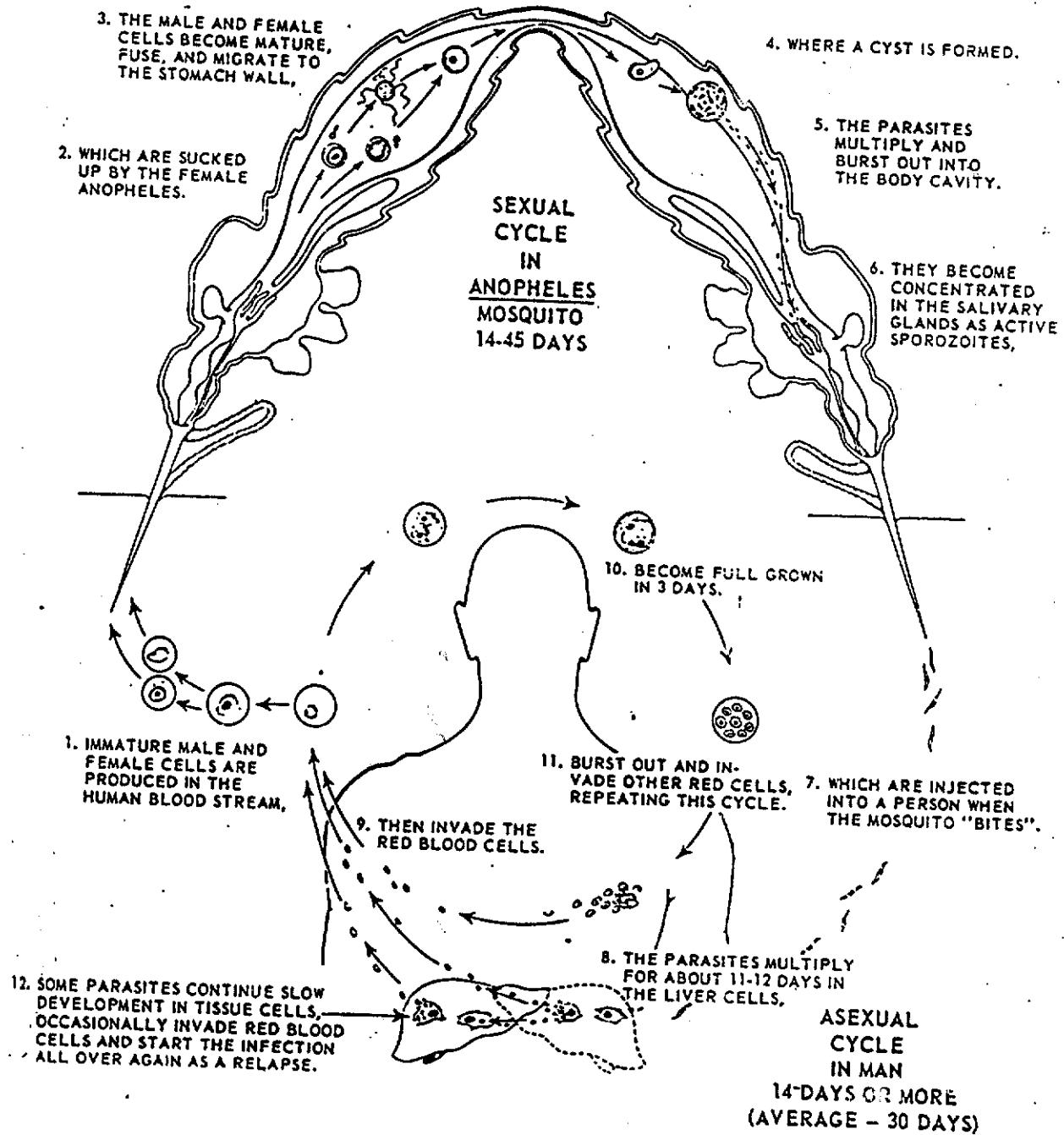
Other vector-borne diseases of current importance in Vietnam include PLAGUE (a bacterial disease transmitted from rodent to man by fleas and from man to man via respiratory droplets; more than 300 cases were reported from Vietnam during 1965), MURINE TYPHUS (a rickettsial disease transmitted from domestic rat to man by fleas), SCRUB TYPHUS (a rickettsial disease transmitted from rodent to man by "chigger" mites), TICK-BORNE TYPHUS (incompletely defined rickettsial diseases transmitted from rodents and/or birds to man by hard ticks), RUSSIAN SPRING-SUMMER ENCEPHALITIS (a group "B" arbovirus disease transmitted from rodents to man by hard ticks), LANGAT FEVER (a group "B" arbovirus disease transmitted from rodents or birds to man by hard ticks), RELAPSING FEVER (a spirochaetal disease transmitted from wild mammals to man by soft ticks; some types of relapsing fever are transmitted from man to man by human body lice), LEISHMANIASIS (protozoal disease transmitted from dogs and other mammals to man by *Phlebotomus sandflies*), SANDFLY FEVER (an arbovirus transmitted from man to man by *Phlebotomus sandflies*), RAT-BITE FEVER (a bacterial disease transmitted from domestic rat to man by rat-bite), and MELIOIDOSIS (a bacterial disease transmitted from other mammals including rats to man by direct contact).

The contributions of Major John E. Scanlon, MSC, U.S. Army and Scientist Director John W. McDowell, U.S. Public Health Service, in preparation of this publication are gratefully acknowledged.

**LIFE HISTORY OF
THE MALARIA PARASITE (PLASMODIUM VIVAX)
IN MAN AND THE ANOPHELES MOSQUITO**



**LIFE HISTORY OF
THE MALARIA PARASITE (PLASMODIUM MALARIAE)
IN MAN AND THE ANOPHELES MOSQUITO**



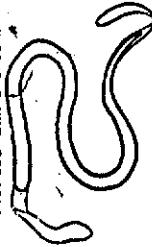
1966 — U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, PUBLIC HEALTH SERVICE
Communicable Disease Center, Atlanta, Georgia

PICTORIAL KEY TO MICROFILARIAE FOUND IN PERIPHERAL BLOOD OF MAN

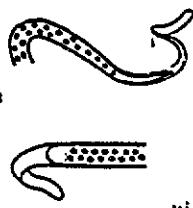
MADE BY ALAN W. DONALDSON
DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
COMMUNICABLE DISEASE CENTER
ATLANTA, GEORGIA

REV. 1968

Provided with a sheath



Nuclei not extending to tip of tail
Cephalic space as long as broad
Nocturnal periodicity
(Non-periodic on certain Pacific Islands)

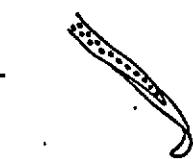


Wuchereria
banhofi

WORLD-WIDE DISTRIBUTION
IN TROPICS AND SUBTROPICS
VECTOR MOSQUITO

viii

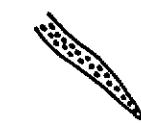
Nuclei extending to tip of tail



Acanthocera
persans

TROPICS OF AFRICA
AND SOUTH AMERICA
VECTOR: CULICIDES

Nuclei extending to top of tail
Test blunt
No periodicity



Nuclei not extending to tip of tail
Test sharply pointed



Malayocerca
ozzardi

CENTRAL AND
SOUTH AMERICA
VECTOR: CHILOPODES

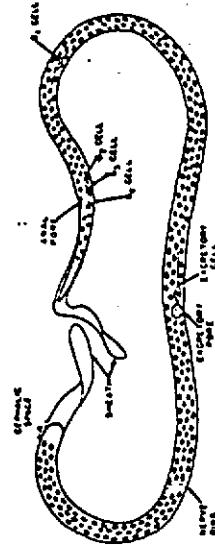
Nuclei not extending to tip of tail
Test sharp



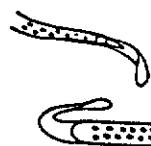
Nuclei not extending to tip of tail
Test sharp



DIAGRAM OF THE MORPHOLOGY OF A
STAINED MICROFILARIA (AFTER FENG)



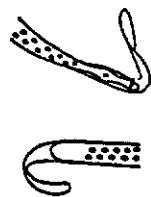
Test uniformly tapered
Cephalic space as long as broad
Diurnal periodicity



Loa
Loa

TROPICAL
WEST AFRICA
VECTOR: CHILOPODES

Test somewhat swollen, with two distinct nuclei
Cephalic space as long as broad
Nocturnal periodicity

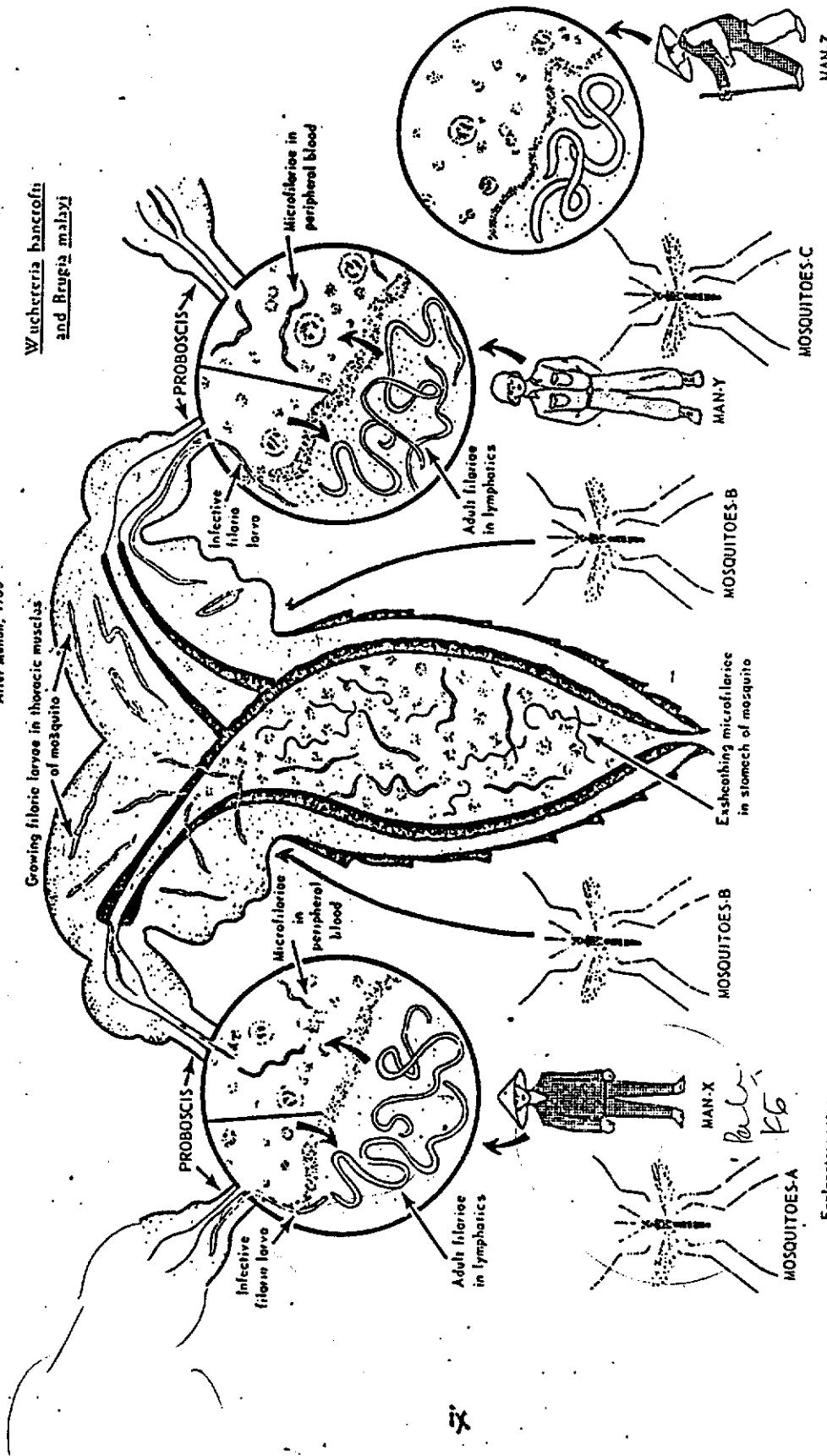


Brugia
malayi

CHINA, Indo-CHINA,
MALAYA, INDIA
VECTOR: MOSQUITO

THE CHAIN OF FILARIASIS TRANSMISSION

After Menon, 1963

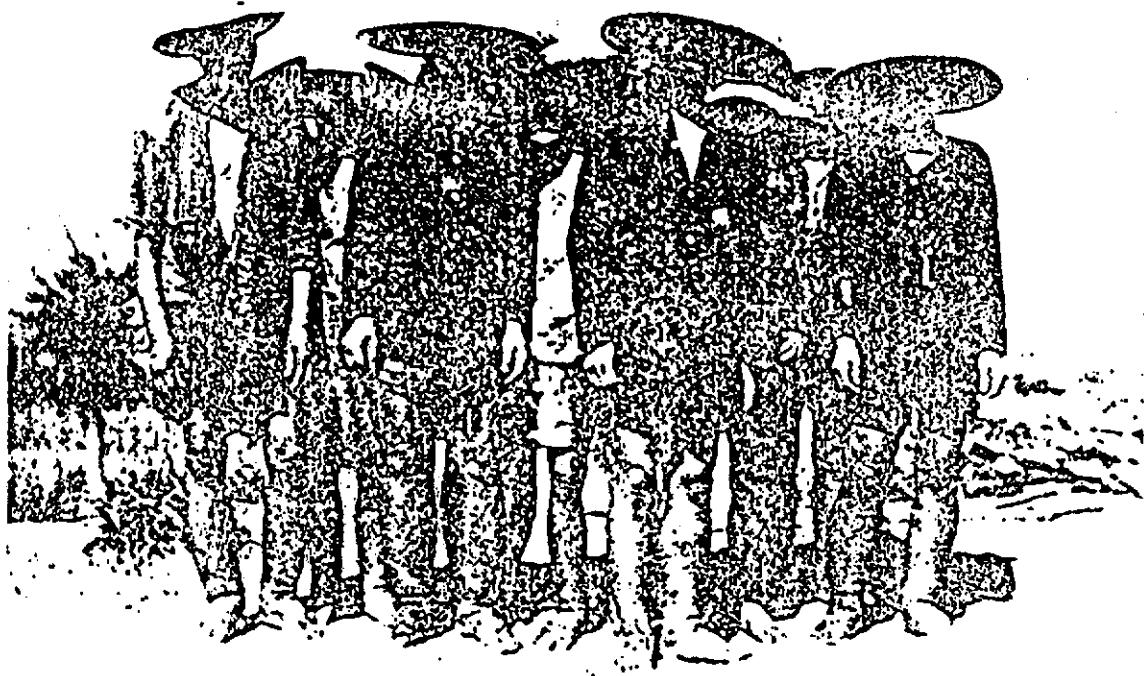


Explanatory notes:-

Infective vector mosquitoes (A) repeatedly inoculate Man "X" who becomes a symptomless filariaria carrier in about a year or more; he infects numerous vector mosquitoes (B) which in turn inoculate Man "Y" who also becomes a filariaria carrier and passes on the infection to still more vector mosquitoes (C).

A symptomless carrier (Man "X" or "Y"), continually exposed to further bites of infected vectors, may later develop filarial disease (Man "Z") with the onset of disease, his peripheral blood usually becomes free from filariariae so that he is no longer a carrier.

Prepared by Mervin George Scott, Ph.D., and Gregory Brown



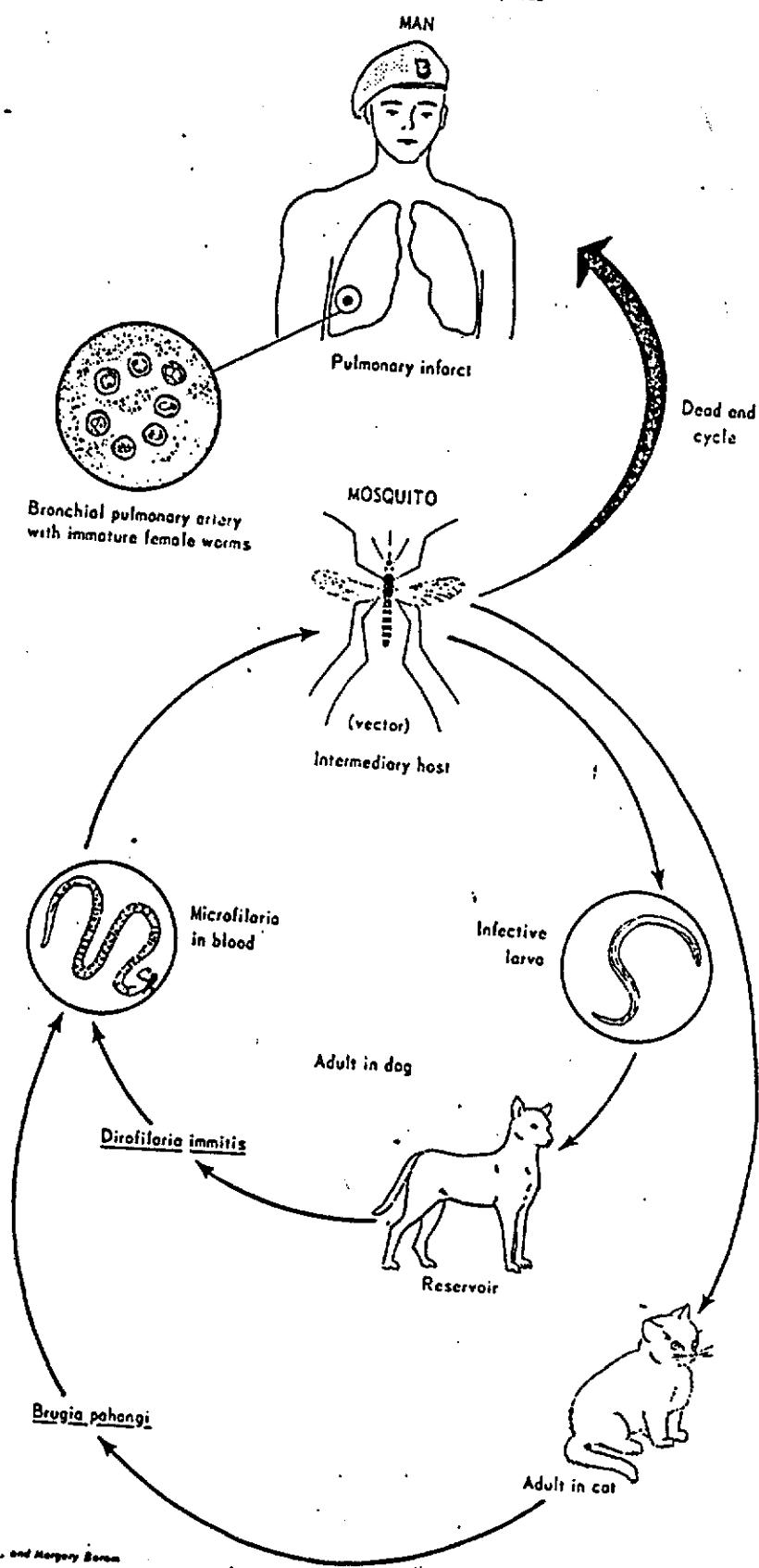
FILARIASIS VICTIMS AT DONG HOI



A-4D SKY HAWK MOSQUITO LARVICIDING (Courtesy U.S. Navy)

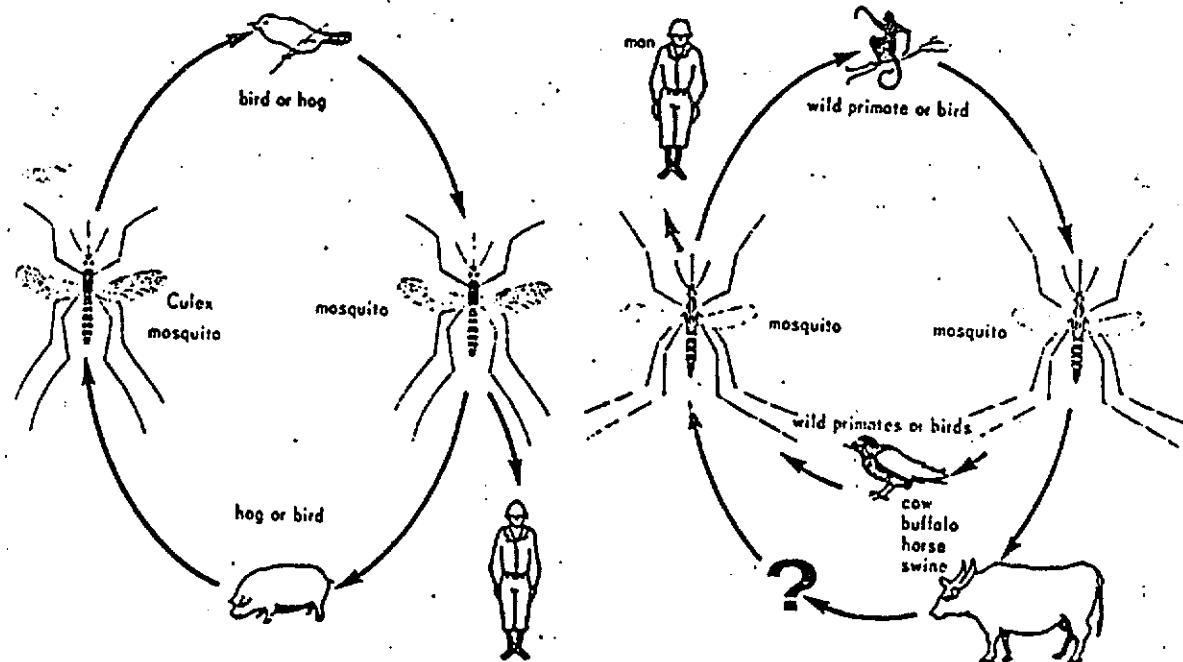
TROPICAL EOSINOPHILIA

After Harrison and Thompson, 1965



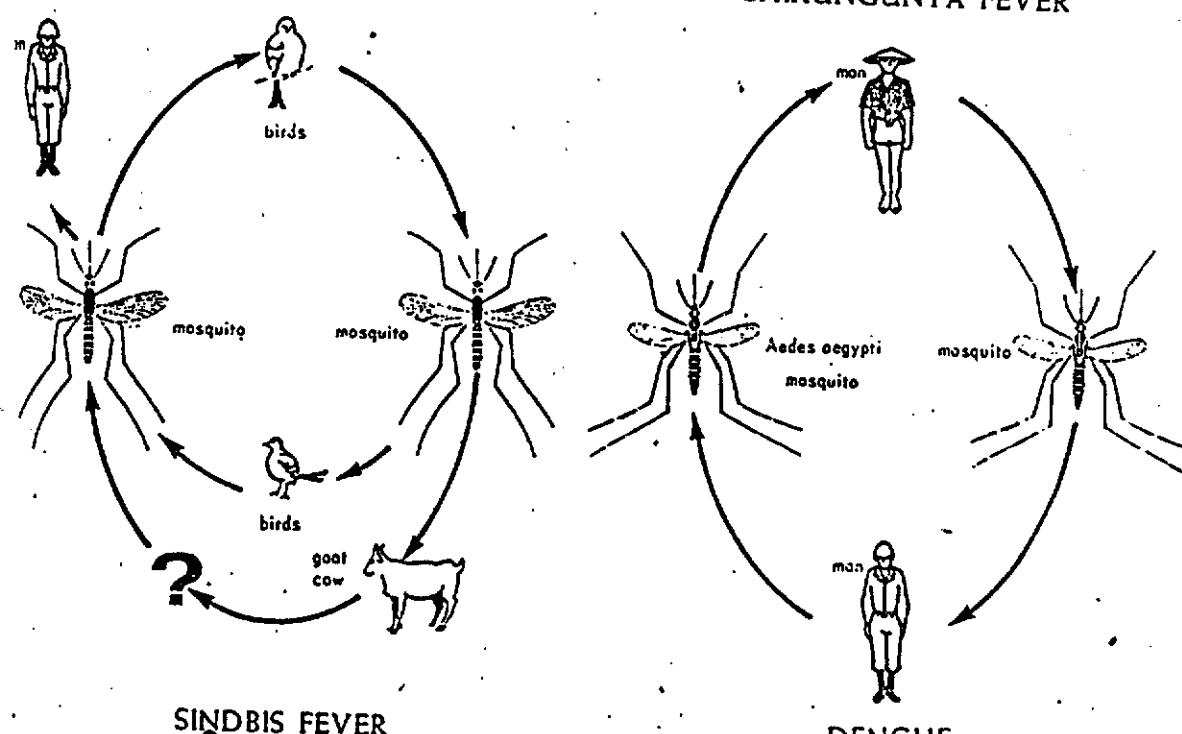
Prepared by Harold George Scott, Ph.D., and Margery Baron

ARBOVIRUSES IN VIETNAM



JAPANESE B ENCEPHALITIS

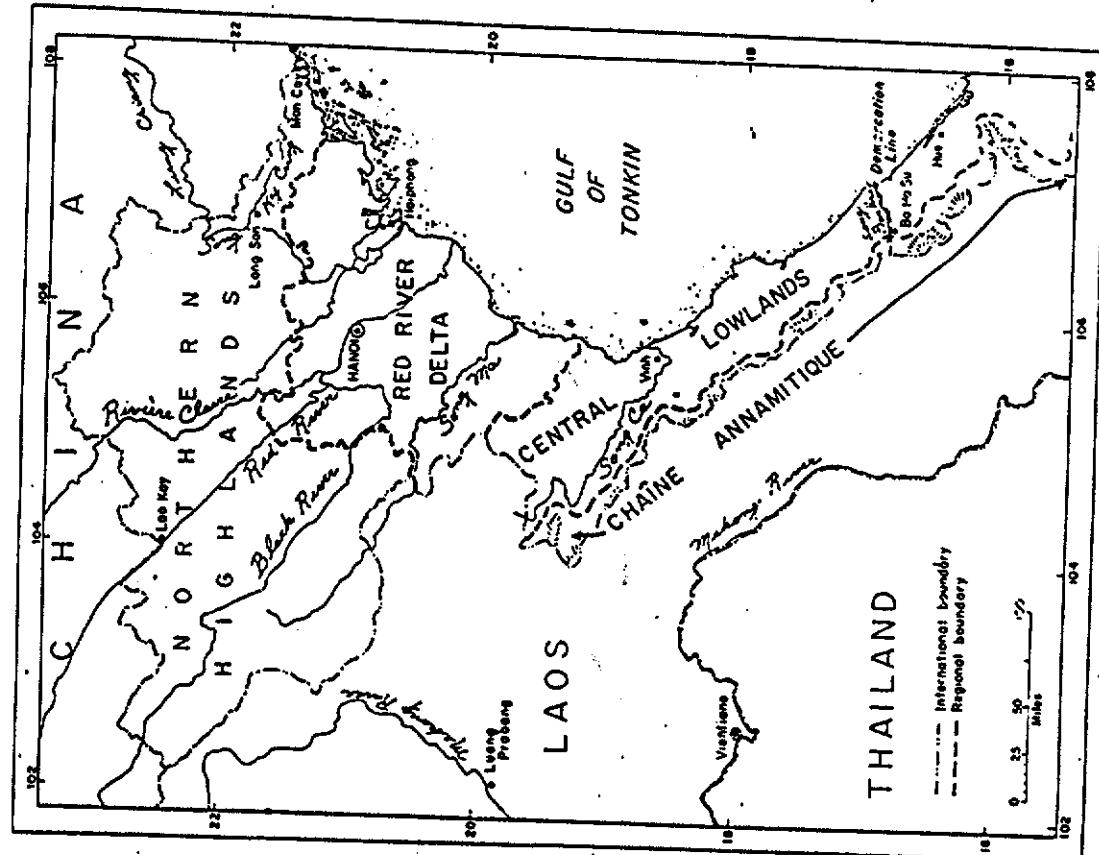
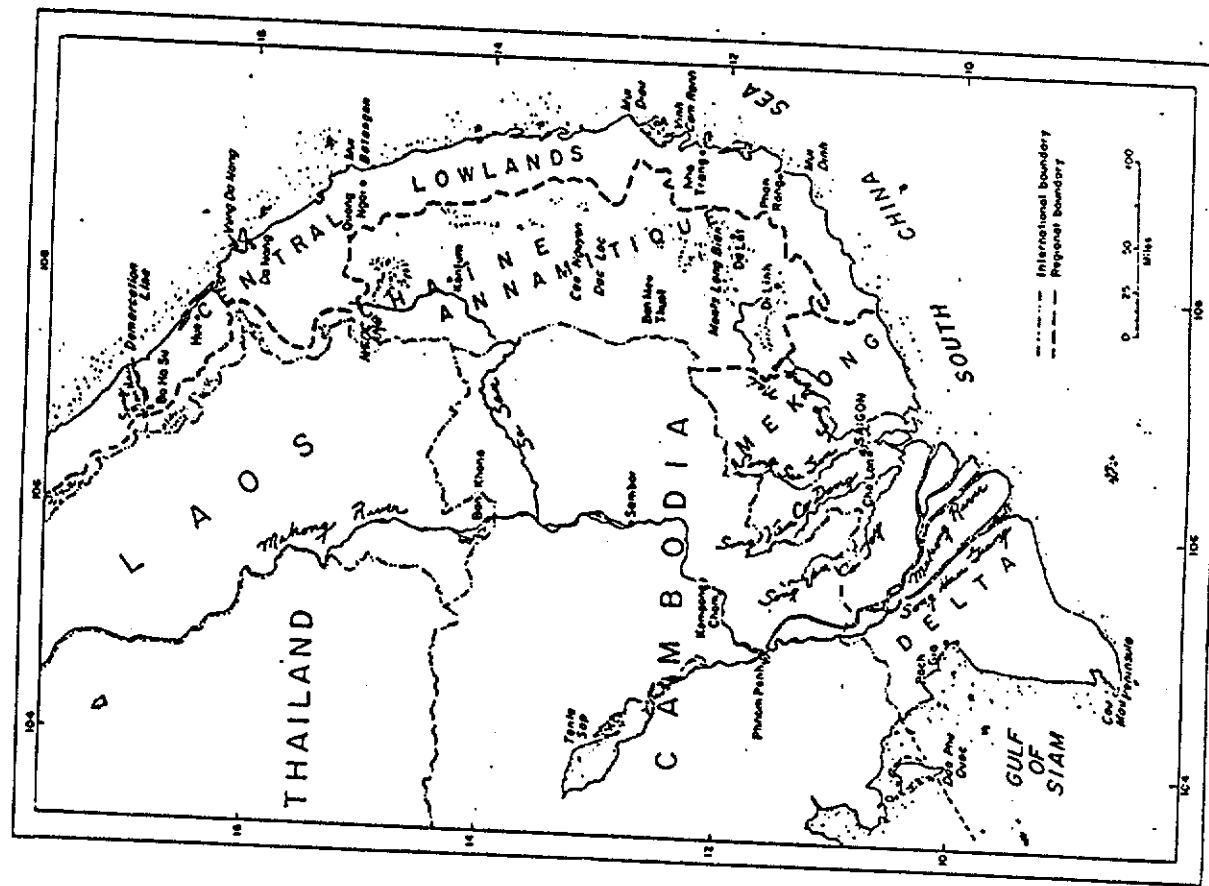
CHIKUNGUNYA FEVER



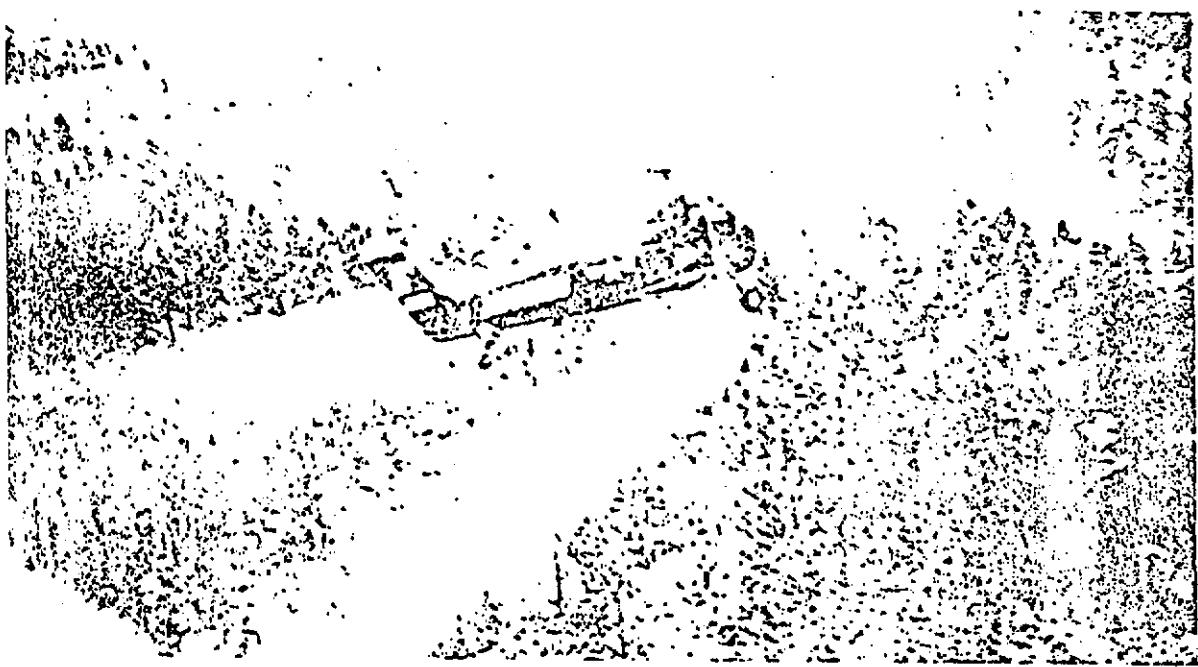
SINDBIS FEVER

DENGUE

Edited by Harold George Stern, Ph.D., and Hector Bourg



GEOGRAPHICAL REGIONS OF VIETNAM
From U.S. Army



HELICOPTER APPLYING MOSQUITO LARVICIDAL SPRAY (Courtesy U.S. Navy)



HELICOPTER APPLYING MOSQUITO LARVICIDAL DUST (Courtesy U.S. Navy)

LIST OF INCLUDED SPECIES

Aedes aegypti (Linnacus, 1757)
Aedes albolineatus (Theobald, 1904)
Aedes albopictus (Skuse, 1894)
Aedes alboscutellatus (Theobald, 1905)
***Aedes alongi* Galliard and Ngu, 1947
Aedes amesi (Ludlow, 1903)
Aedes andamanensis Edwards, 1922
Aedes annandalei (Theobald, 1910)
Aedes assamensis (Theobald, 1908)
Aedes butleri Theobald, 1901
Aedes caecus (Theobald, 1901)
Aedes cancricomes Edwards, 1922
Aedes chrysolineatus (Theobald, 1907)
Aedes desmotes (Giles, 1904)
Aedes dux Dyar and Shannon, 1925
**Aedes edwardsi* (Barraud, 1923)
Aedes elisae (Barraud, 1923)
Aedes gubernatoris (Giles, 1901)
Aedes imprimens (Walker, 1861)
**Aedes indosinensis* (Borel, 1928)
Aedes khazani Edwards, 1922
**Aedes laniger* (Wiedemann, 1821)
Aedes lineatopennis (Ludlow, 1905)
Aedes longirostris (Leicester, 1908)
Aedes macfarlanei (Edwards, 1914)
Aedes mediolineatus (Theobald, 1901)
Aedes mediopunctatus (Theobald, 1905)
Aedes niveodes Barraud, 1931
**Aedes niveoscutellum* (Theobald, 1905)
Aedes niveus (Ludlow, 1903)
**Aedes ostentatio* (Leicester, 1908)
Aedes poicilius (Theobald, 1903)
Aedes prominens (Barraud, 1923)
Aedes pseudoalbopictus (Borel, 1928)
Aedes saxicola Edwards, 1922
**Aedes taeniorhynchoides* (Christophers, 1911)
***Aedes tonkinensis* Galliard and Ngu, 1947
Aedes vexans (Meigen, 1830)
Aedes vigilax (Skuse, 1889)
Aedes vittatus (Bigot, 1861)
Adomyia cutasticta Knab, 1909
Anopheles aconitus Donitz, 1902
Anopheles alongensis Venhuis, 1940
Anopheles annandalei annandalei Prashad, 1918
Anopheles annandalei interruptus Puri, 1929
Anopheles annularis Van der Wulp, 1884
Anopheles baezai Gator, 1933
Anopheles balabacensis Baisas, 1936
Anopheles barbirostris Van der Wulp, 1884

Anopheles barbumbrosus Strickland and Chowdhury, 1927
Anopheles bengalensis Puri, 1930
Anopheles campestris Reid, 1962
Anopheles culicifacies Giles, 1901
Anopheles fluviatilis James, 1902
Anopheles gigas bailocyi Edwards, 1929
Anopheles indiensis Theobald, 1901
Anopheles insulaeflorum (Swellengrebel and Swellengrebel de Graff, 1919)
Anopheles jamesi Theobald, 1901
Anopheles jayporiensis candidiensis Koidzumi, 1924
Anopheles jayporiensis jayporiensis James, 1902
Anopheles karwari James, 1903
Anopheles kochi Donitz, 1901
Anopheles testeri Baisas and Hu, 1936
Anopheles lindsayi Giles, 1900
Anopheles litoralis King, 1932
Anopheles maculatus Theobald, 1901
Anopheles minimus Theobald, 1901
Anopheles nigerrimus Giles, 1900
Anopheles pallidus Theobald, 1901
Anopheles peditaenatus (Leicester, 1908)
Anopheles philippensis Ludlow, 1902
Anopheles ramsayi Covell, 1927
Anopheles sinensis Wiedemann, 1928
Anopheles sintonoides Ho, 1938
Anopheles splendidus Koidzumi, 1920
Anopheles stephensi Liston, 1901
Anopheles subpictus Grassi, 1899
Anopheles sundaicus Rosenwaldt, 1926
Anopheles tessellatus Theobald, 1901
Anopheles umbrosus Theobald, 1903
Anopheles vagus Donitz, 1902
Anopheles varuna Iyengar, 1924
Armigeres annulitarsis (Leicester, 1908)
Armigeres aureolineatus (Leicester, 1908)
**Armigeres cingulatus* (Leicester, 1908)
Armigeres dolichorhynchus (Leicester, 1908)
Armigeres durhami (Edwards, 1917)
Armigeres flarus (Leicester, 1908)
Armigeres kuchingensis Edwards, 1915
Armigeres longipalpis (Leicester, 1904)
Armigeres magnus (Theobald, 1908)
**Armigeres moultoni* Edwards, 1914
Armigeres pectinatus (Edwards, 1914)

*Larva too poorly known to be included in Key.
**Adult too poorly known to be included in Key.

LIST OF INCLUDED SPECIES (Continued)

- | | |
|--|---|
| <i>Atmigeres subalbatus</i> (Coquillett, 1908) | <i>Heizmannia communis</i> (Leicester, 1908) |
| <i>Culex annulus</i> Theobald, 1901 | <i>Heizmannia complex</i> (Theobald, 1910) |
| ** <i>Culex bernardi</i> (Borel, 1926) | <i>Hodgesia malayi</i> Leicester, 1908 |
| <i>Culex bitaeniorhynchus</i> Giles, 1901 | <i>Malaya genurostris</i> Leicester, 1908 |
| <i>Culex brevipalpis</i> (Giles, 1902) | <i>Malaya jacobseni</i> (Edwards, 1930) |
| <i>Culex cinctellus</i> Edwards, 1922 | <i>Mansonia annulata</i> Leicester, 1908 |
| <i>Culex fragilis</i> Ludlow, 1903 | <i>Mansonia annulifera</i> (Theobald, 1901) |
| <i>Culex fuscanus</i> Wiedemann, 1820 | <i>Mansonia bonneae</i> Edwards, 1930 |
| <i>Culex fuscoccephalus</i> Theobald, 1907 | <i>Mansonia crassipes</i> (Van der Wulp, 1881) |
| <i>Culex gelidus</i> Theobald, 1901 | <i>Mansonia dives</i> (Schiner, 1868) |
| <i>Culex halifaxi</i> Theobald, 1903 | <i>Mansonia indiana</i> Edwards, 1930 |
| <i>Culex infantulus</i> Edwards, 1922 | <i>Mansonia nigrosignata</i> (Edwards, 1917) |
| <i>Culex khuzani</i> Edwards, 1922 | <i>Mansonia ochracea</i> (Theobald, 1903) |
| <i>Culex malayi</i> (Leicester, 1908) | <i>Mansonia uniformis</i> (Theobald, 1901) |
| <i>Culex mimeticus</i> Noe, 1899 | <i>Orthopodomyia albipes</i> Leicester, 1904 |
| <i>Culex mimulus</i> Edwards, 1915 | <i>Orthopodomyia andamanensis</i> Barraud, 1934 |
| <i>Culex minor</i> (Leicester, 1908) | <i>Orthopodomyia anopheloides</i> (Giles, 1903) |
| <i>Culex minutissimus</i> (Theobald, 1907) | <i>Topomyia gracilis</i> Leicester, 1908 |
| <i>Culex nigropunctatus</i> Edwards, 1926 | <i>Toxorhynchites albipes</i> (Edwards, 1922) |
| <i>Culex pallidothorax</i> Theobald, 1905 | <i>Toxorhynchites kempfi</i> (Edwards, 1921) |
| <i>Culex pipiens</i> Linnaeus, 1758 | <i>Toxorhynchites splendens</i> (Wiedemann, 1819) |
| <i>Culex pseudosinensis</i> Colless, 1955 | <i>Tripteroides aranooides</i> (Theobald, 1901) |
| <i>Culex pseudovishnui</i> Colless, 1957 | <i>Tripteroides powelli</i> (Ludlow, 1909) |
| ** <i>Culex quadripalpis</i> (Edwards, 1911) | <i>Tripteroides proximus</i> (Edwards, 1915) |
| <i>Culex quinquefasciatus</i> Say, 1823 | * <i>Tripteroides similis</i> (Leicester, 1908) |
| <i>Culex raptor</i> (Edwards, 1922) | <i>Uranotaenia annandalei</i> Barraud, 1926 |
| <i>Culex rubithoracis</i> (Leicester, 1908) | * <i>Uranotaenia bicolor</i> Leicester, 1908 |
| <i>Culex sinensis</i> Theobald, 1903 | <i>Uranotaenia bimaculata</i> Leicester, 1908 |
| <i>Culex sitiens</i> Wiedemann, 1828 | <i>Uranotaenia campestris</i> Leicester, 1908 |
| <i>Culex tritaeniorhynchus</i> Giles, 1901 | * <i>Uranotaenia edwardsi</i> Barraud, 1926 |
| ** <i>Culex viridiventer</i> Giles, 1901 | * <i>Uranotaenia hongayi</i> Gaillard and Ngu, 1947 |
| <i>Culex vorax</i> (Edwards, 1921) | <i>Uranotaenia lateralis</i> Ludlow, 1905 |
| <i>Culex whitei</i> Barraud, 1923 | * <i>Uranotaenia luteola</i> Edwards, 1934 |
| <i>Culex whitmorei</i> (Giles, 1901) | <i>Uranotaenia macfarlanei</i> Edwards, 1914 |
| <i>Ficalbia chamberlaini</i> (Ludlow, 1904) | * <i>Uranotaenia maculipleura</i> Leicester, 1908 |
| <i>Ficalbia hybrida</i> (Leicester, 1908) | <i>Uranotaenia maxima</i> Leicester, 1908 |
| <i>Ficalbia luzonensis</i> (Ludlow, 1905) | <i>Uranotaenia obscura</i> Edwards, 1915 |
| <i>Ficalbia minima</i> (Theobald, 1901) | <i>Uranotaenia recondita</i> Edwards, 1922 |

* Larva too poorly known to be included in Key.
** Adult too poorly known to be included in Key.

KEY TO GENERA OF LARVAE

1. Air tube present (Fig. 1 A)..... 2

Air tube absent (Fig. 1 B)..... Anopheles page 7

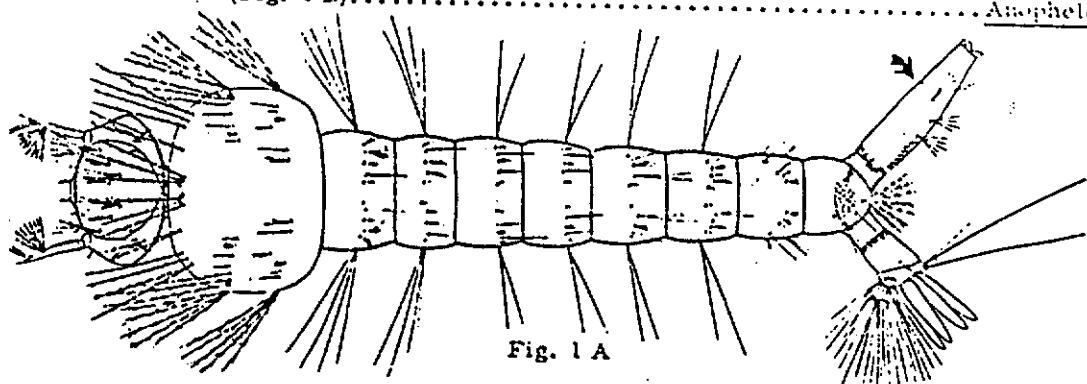


Fig. 1 A

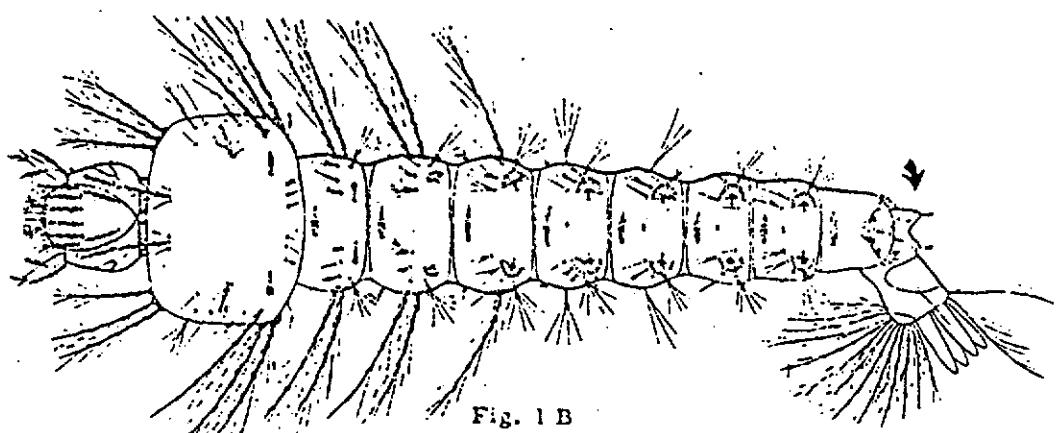


Fig. 1 B

2. Air tube pointed, with teeth (Fig. 2 A)..... Mansonia page 28

Air tube not pointed, without teeth (Fig. 2 B)..... 3

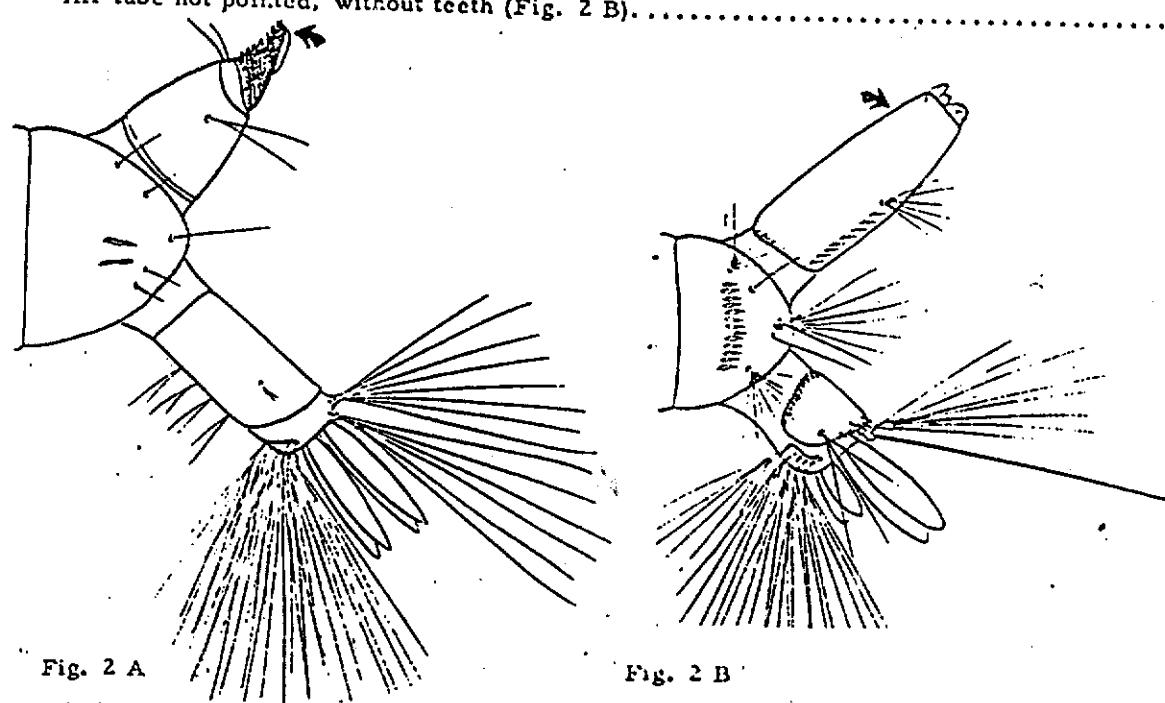


Fig. 2 A

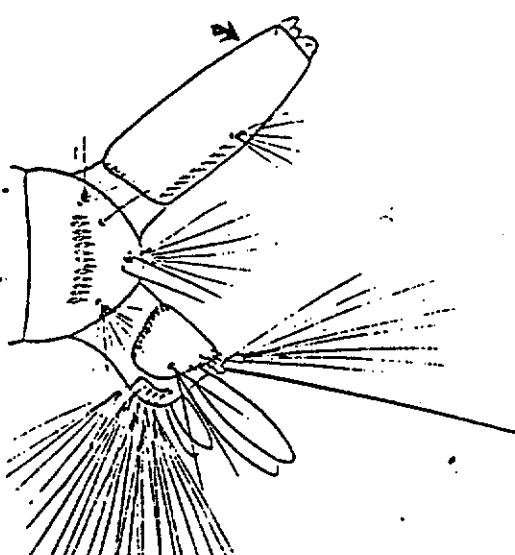


Fig. 2 B

- 3/ Air tube with several ventral siphonal tufts (Fig. 3 A)..... 4
 Air tube with one pair of ventral tufts (Fig. 3 B)..... 7

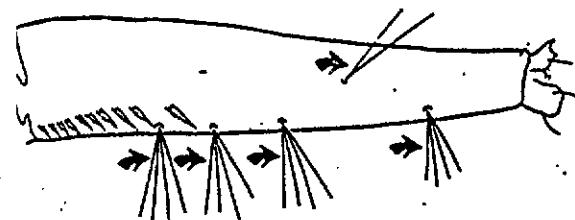


Fig. 3 A

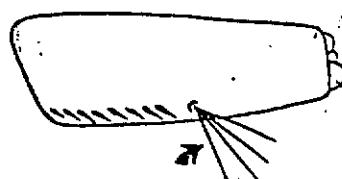


Fig. 3 B

- 4/ Air tube with acus at base (Fig. 4 A)..... Culex page 56 ✓
 Air tube without acus at base (Fig. 4 B)..... 5

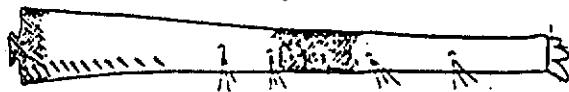


Fig. 4 A

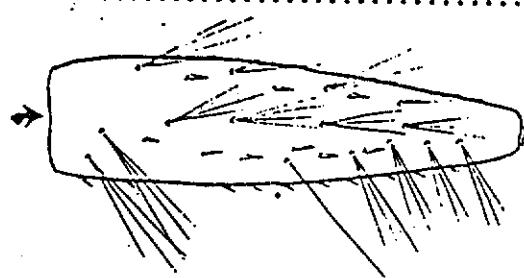


Fig. 4 B

- 5/ Comb scales in a single row (Fig. 5 A)..... Tripteroides page 23 ✓
 Comb scales in double row, triple row, or patch (Fig. 5 B)..... 6

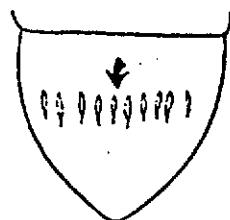


Fig. 5 A

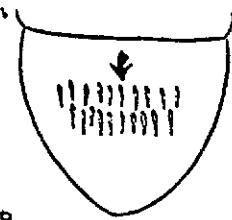


Fig. 5 B

- Some pecten teeth dorsal (Fig. 6 A)..... Topomyia page 25 ✓
 All pecten teeth ventral (Fig. 6 B)..... Malaya page 24 ✓

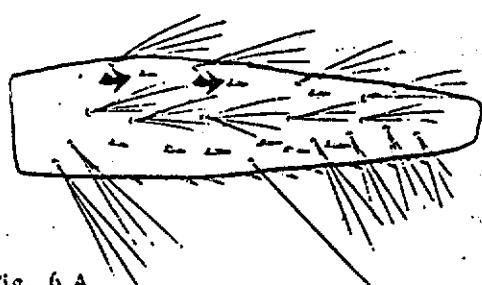


Fig. 6 A

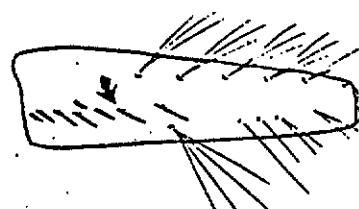


Fig. 6 B

7. Pecten teeth absent (Fig. 7 A)..... 8
 Pecten teeth present (Fig. 7 B)..... 12

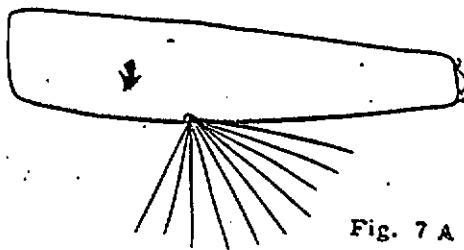


Fig. 7 A

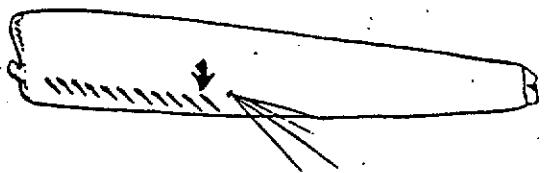


Fig. 7 B

8. Abdominal hairs in groups of 3-5 arising from sclerotized plates (Fig. 8 A).....
 Toxorhynchites page 22 ✓
 Abdominal hairs arising separately without strong sclerotized plates (Fig. 8 B)..... 9

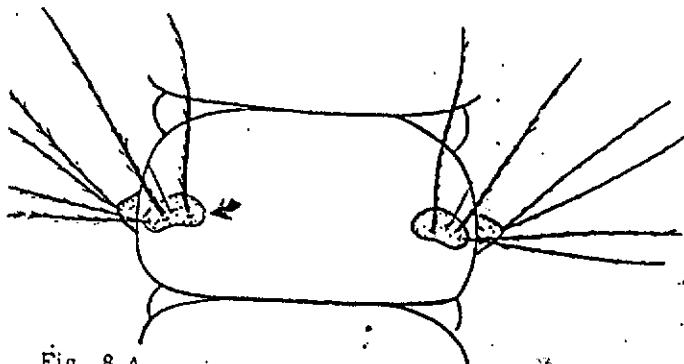


Fig. 8 A

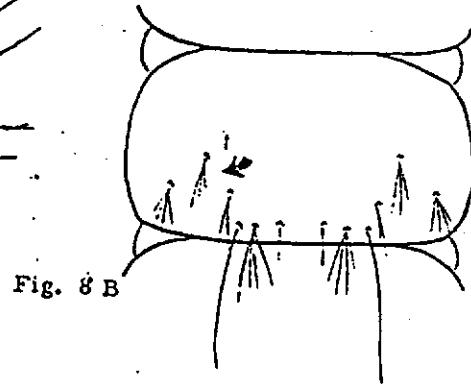


Fig. 8 B

9. Abdominal segments 7-8 with large sclerotized plate; comb with large and small scales
 (Fig. 9 A)..... Orthopodomyia page 37 ✓
 Abdominal segments 7-8 without large sclerotized plate; comb without large and small
 scales (Fig. 9 B)..... 10

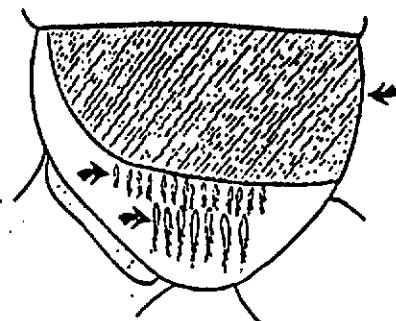


Fig. 9 A

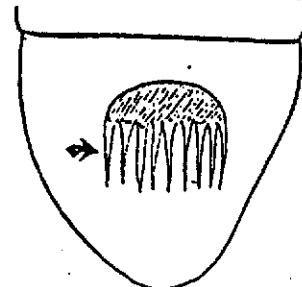


Fig. 9 B

10. Antenna greatly swollen (Fig. 10 A).....Aedeomyia page 38

Antenna not greatly swollen (Fig. 10 B).....11

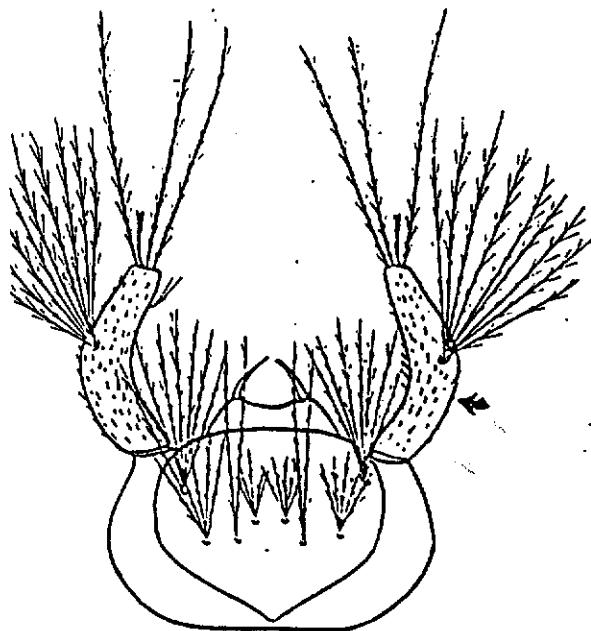


Fig. 10 A

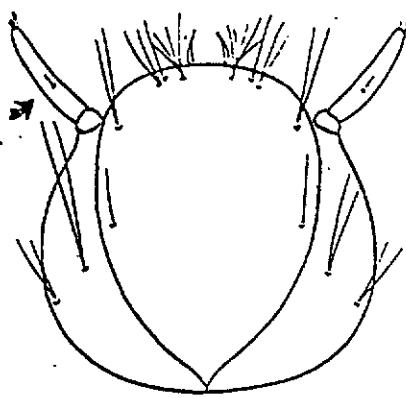


Fig. 10 B

11. Air tube 5-6 times as long as basal width; gills slender (Fig. 11 A).....Ficalbia page 26

Air tube very short; gills sausage-shaped (Fig. 11 B).....Armigeres page 53

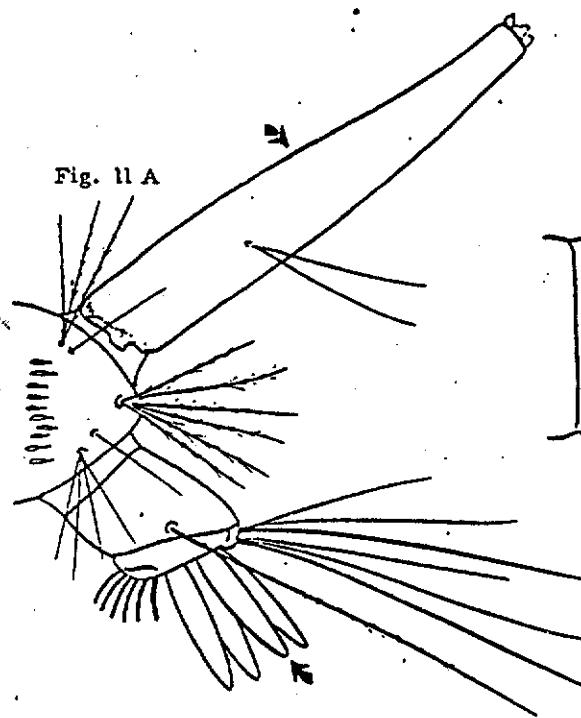


Fig. 11 A

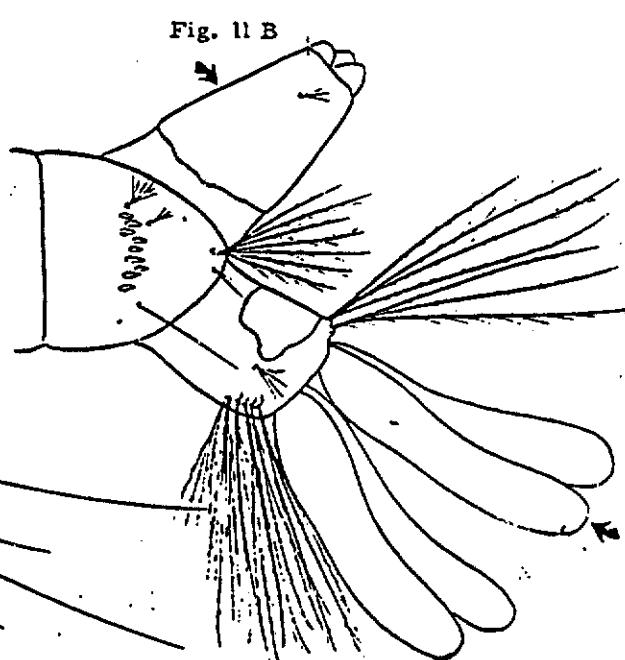


Fig. 11 B

12. Air tube with basal pair of siphonal tufts (Fig. 12 A).....13

Air tube without basal pair of siphonal tufts (Fig. 12 B).....14

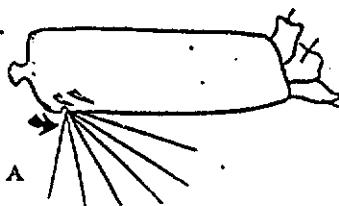


Fig. 12 A

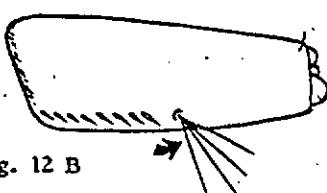


Fig. 12 B

13. Air tube about 1 1/2 times as long as basal width (Fig. 13 A).....Hodgesia page 36

Air tube about 2 1/2 times as long as basal width (Fig. 13 B).....Ficalbia page 26

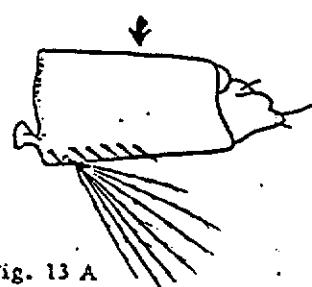


Fig. 13 A

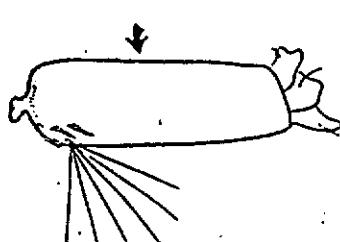


Fig. 13 B

14. Abdominal segment 8 with chitinized plate (Fig. 14 A).....15

Abdominal segment 8 without chitinized plate (Fig. 14 B).....16

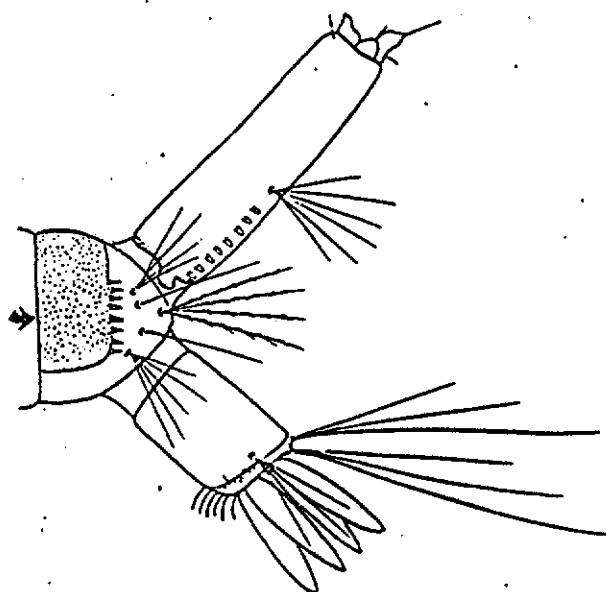


Fig. 14 A

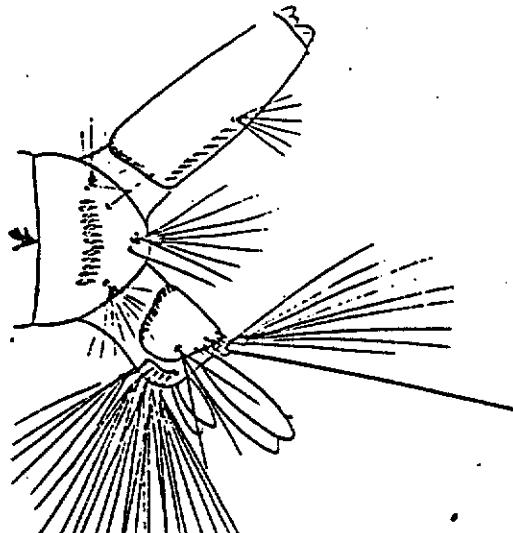


Fig. 14 B

15. Upper head hair 5 stout; if not stout comb scales with fringe (Fig. 15 A & B).....
.....Uranotaenia page 32

Upper head hair 5 not stout; comb scales without fringe (Fig. 15 C & D).....Aedes page 40 ✓

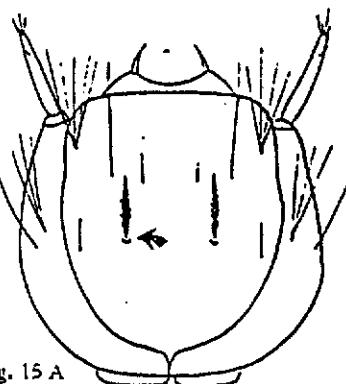


Fig. 15 A



Fig. 15 B

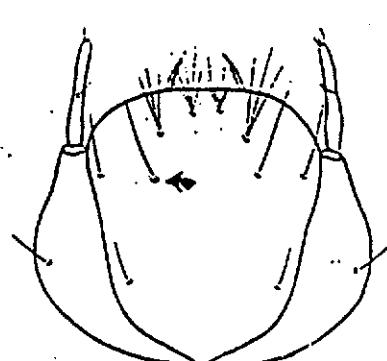


Fig. 15 C



Fig. 15 D

16. Antenna longer than head (Fig. 16 A).....Ficalbia page 26

Antenna not longer than head (Fig. 16 B)..... 17

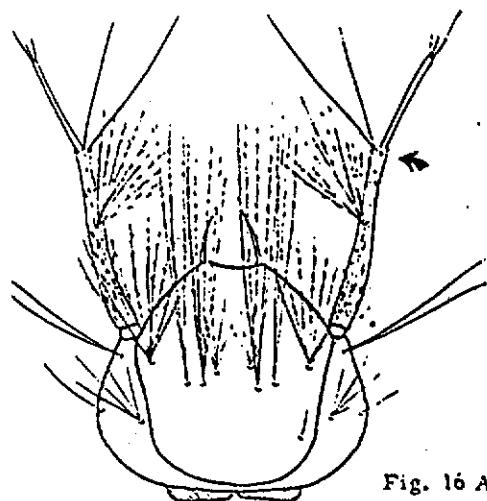


Fig. 16 A

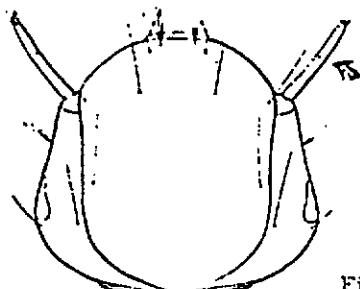


Fig. 16 B

17. Head hair 4 small; comb not with mixed pointed and rounded scales (Fig. 17 A & B).....
.....Aedes page 40

Head hair 4 large; comb with mixed pointed and rounded scales (Fig. 17 C & D).....
.....Heizmannia page 39

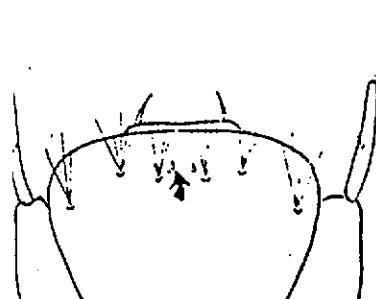


Fig. 17 A

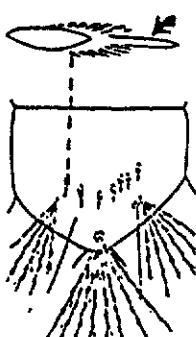


Fig. 17 B

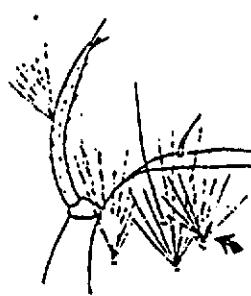


Fig. 17 C

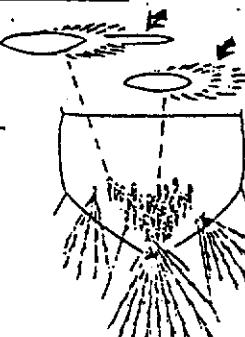
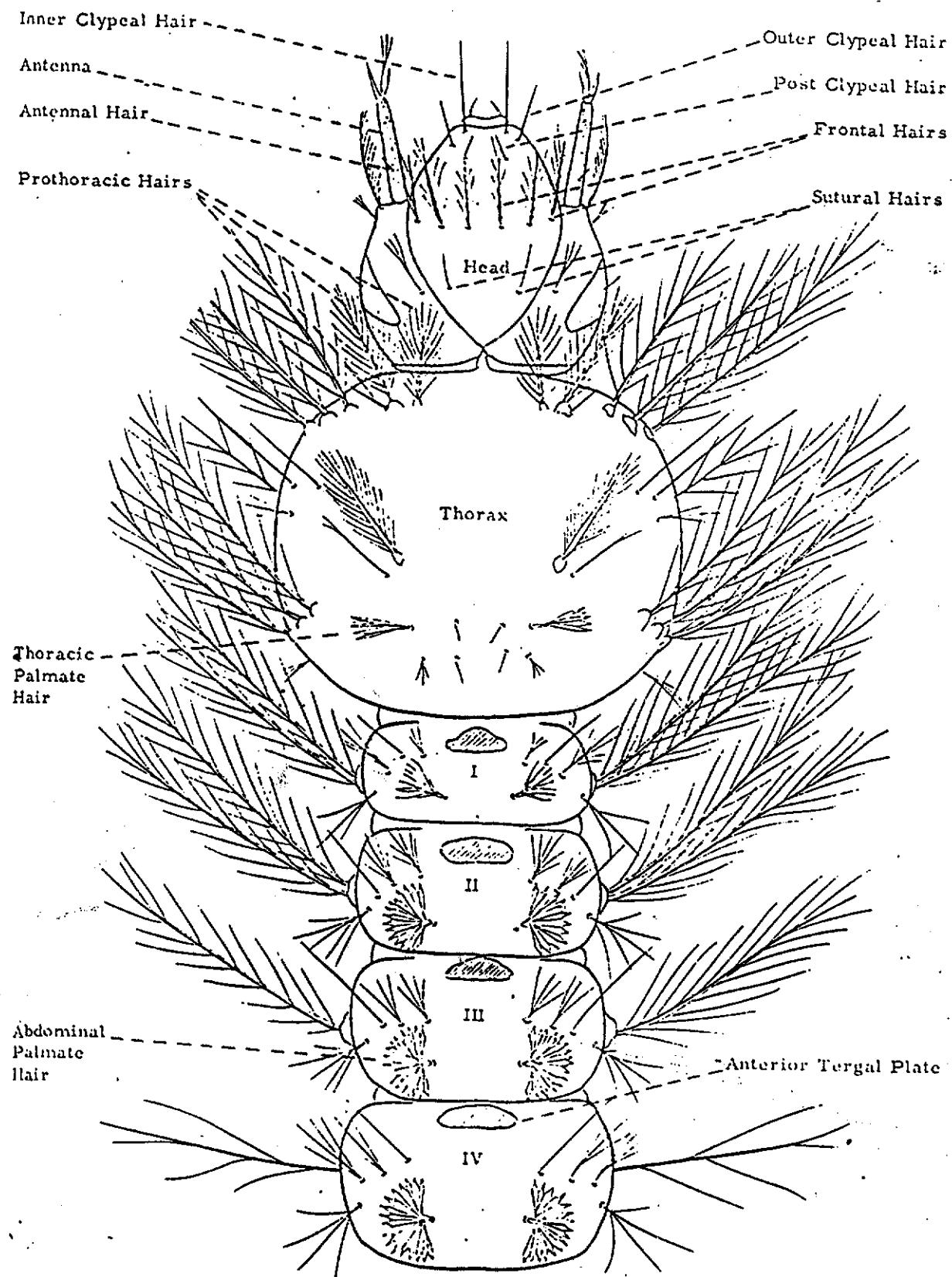
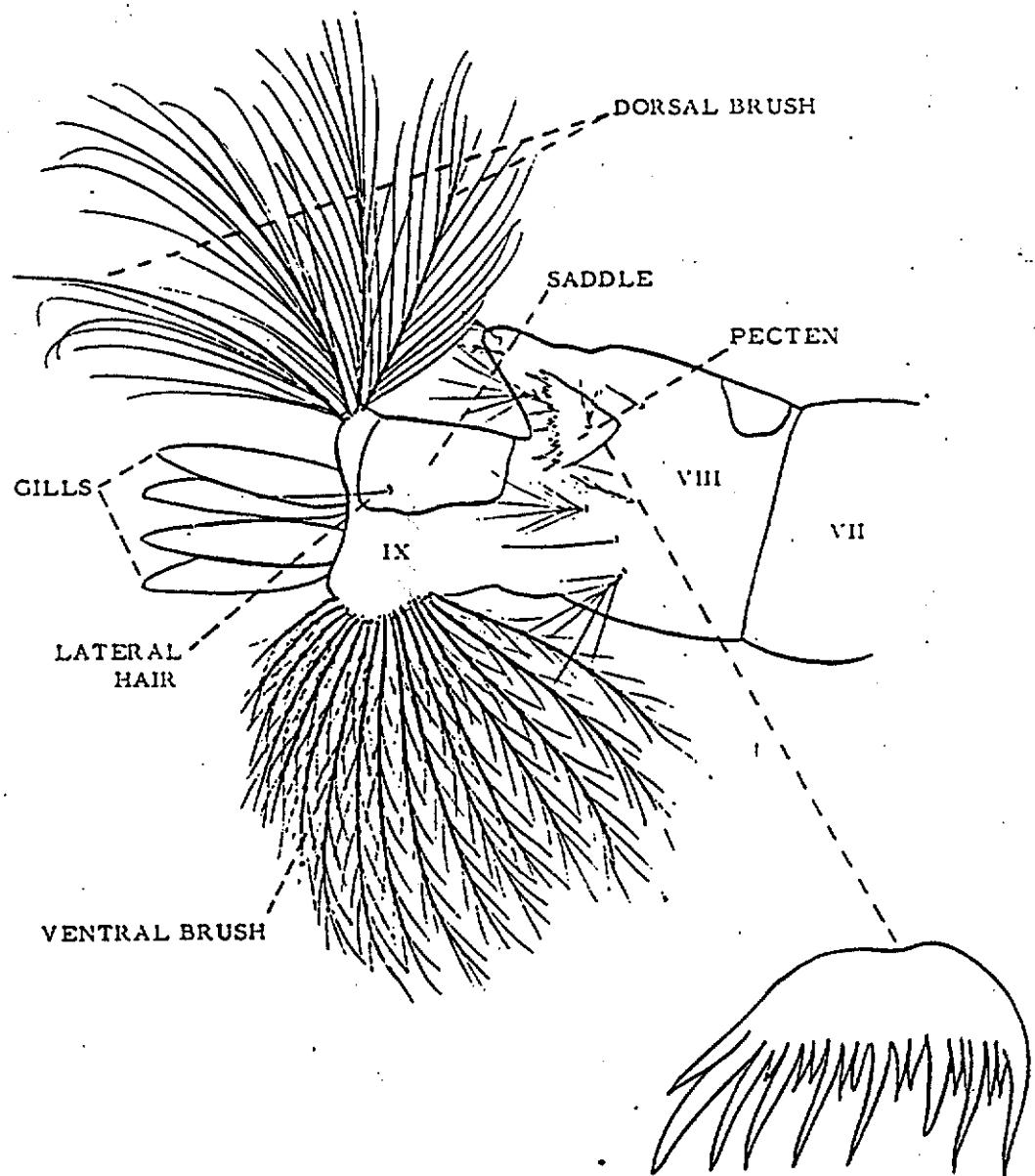


Fig. 17 D

ANOPHELES LARVA



TERMINAL SEGMENTS OF ANOPHELES LARVA



KEY TO ANOPHELES LARVAE

1. Distance between inner clypeal bases more than distance between outer and inner clypeal bases (Fig. 1 A)..... 2

Distance between inner clypeal bases less than distance between outer and inner clypeal bases (Fig. 1 B)..... 22

Inner Clypeal

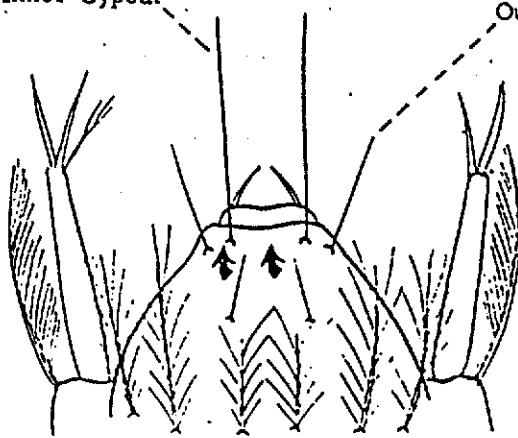


Fig. 1 A

Outer Clypeal

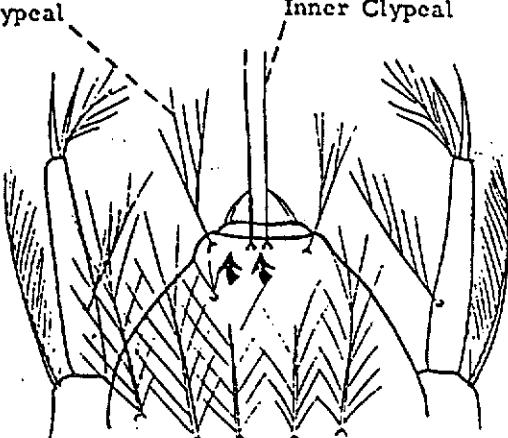


Fig. 1 B

Inner Clypeal

3

2. Abdominal segments 3-7 with large anterior tergal plates (Fig. 2 A)..... 3

Abdominal segments 3-7 with small anterior tergal plates (Fig. 2 B)..... 5

Tergal Plate

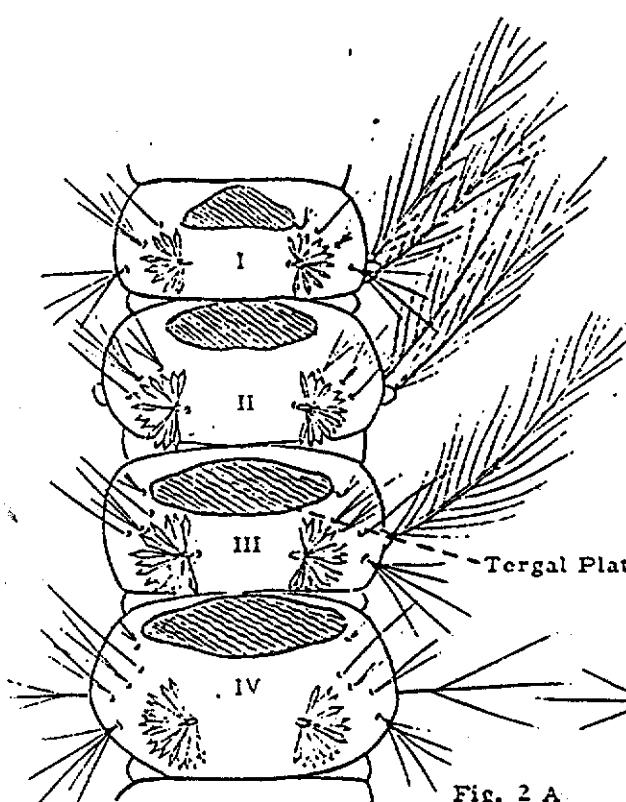


Fig. 2 A

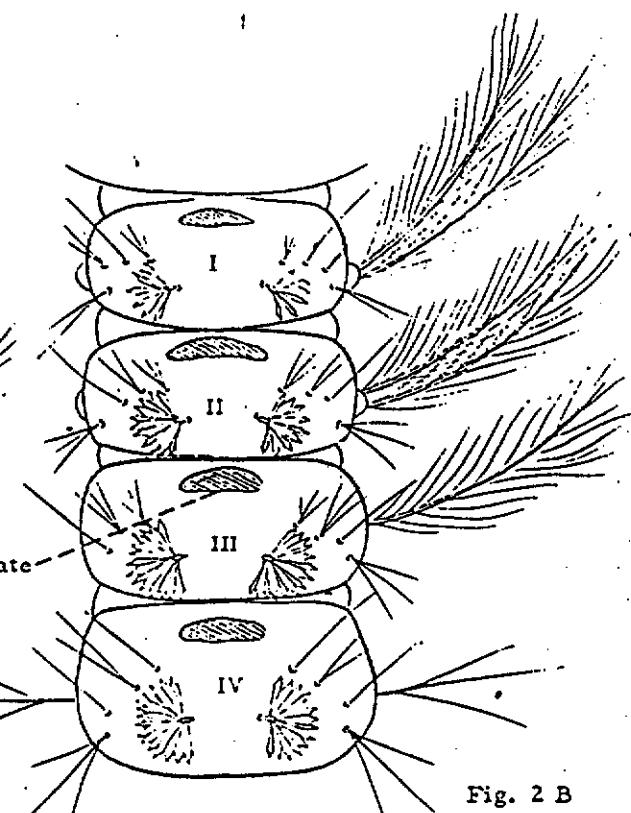


Fig. 2 B

1 Inner and outer clypeal hairs simple (Fig. 3 A)..... 4

Inner and outer clypeal hairs feathered (Fig. 3 B).....

aconitus

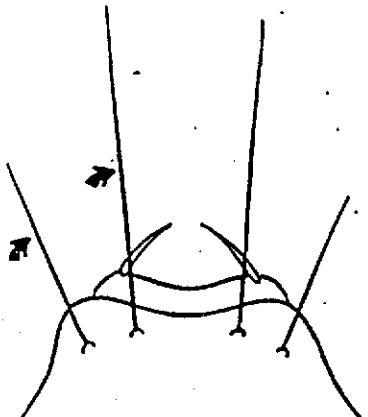


Fig. 3 A

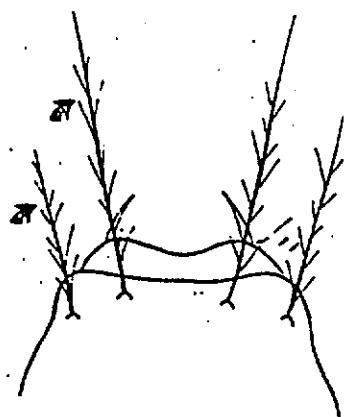


Fig. 3 B

4 Hair O arising on tergal plates 2-7 (Fig. 4 A)..... varuna

Hair O not arising on tergal plates (Fig. 4 B)..... fluvialis and minimus



Fig. 4 A

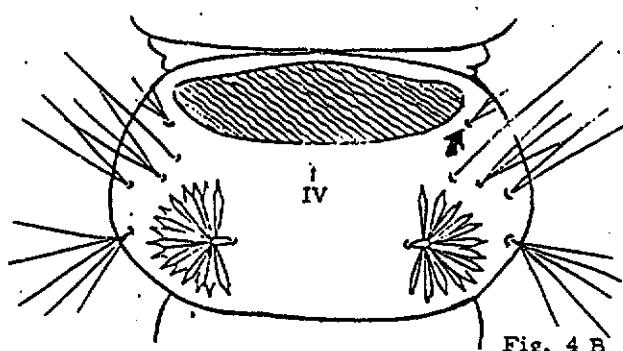


Fig. 4 B

5 Inner and outer clypeal hairs simple (Fig. 5 A)..... 6

Inner and outer clypeal hairs feathered (Fig. 5 B)..... 15

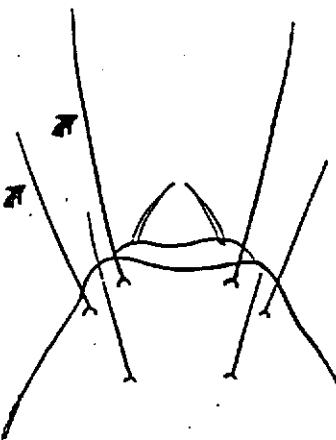


Fig. 5 A

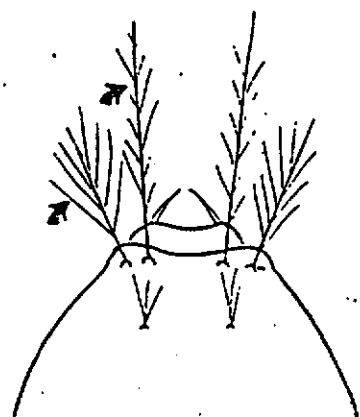


Fig. 5 B

6. Palmate hairs on segment 2 weakly developed, about equal to palmate hairs on segment 1 (Fig. 6 A)..... 7

Palmate hairs on segment 2 fairly well developed much larger than palmate hairs on segment 1 (Fig. 6 B)..... 8

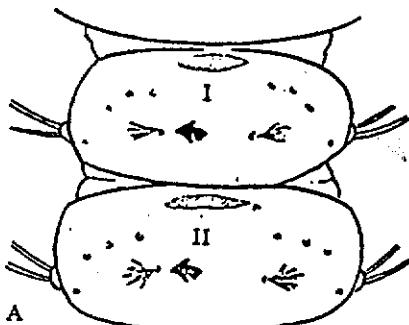


Fig. 6 A

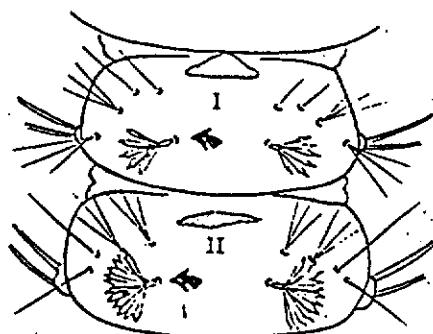


Fig. 6 B

7. Prothoracic hair 1 with only 2-4 branches (Fig. 7 A)..... tessellatus

Prothoracic hair 1 numerous branches (Fig. 7 B)..... balabaeensis

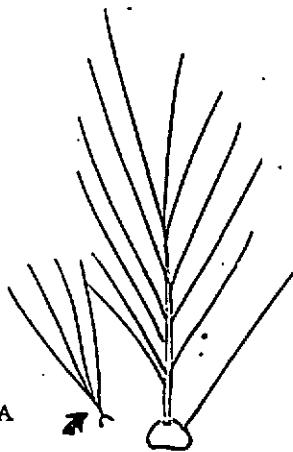


Fig. 7 A

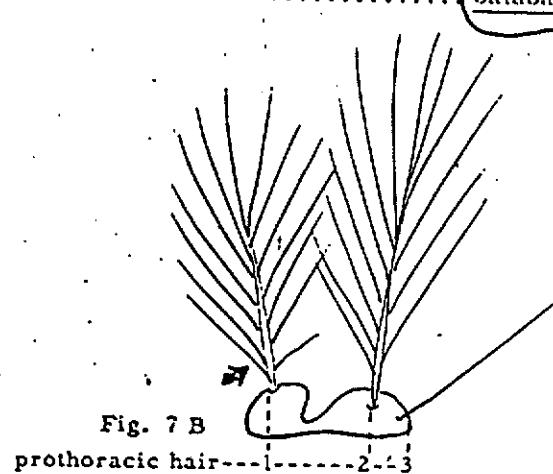


Fig. 7 B
prothoracic hair - 2-4

8. Distance between inner clypeal bases at least twice distance between outer and inner clypeal bases (Fig. 8 A)..... 9

Distance between inner clypeal bases less than twice distance between outer and inner clypeal bases (Fig. 8 B)..... alongensis

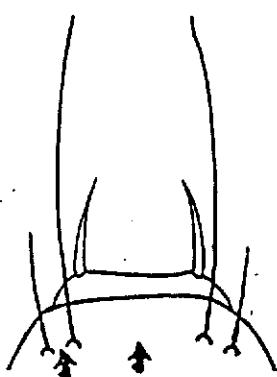


Fig. 8 A

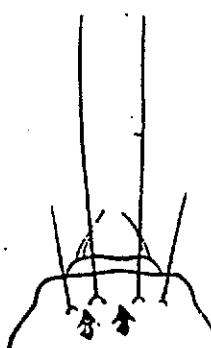


Fig. 8 B

9. Post clypeal hair very short, inserted nearer midline than inner clypeal hair (Fig. 9 A)..... *vagus*

Post clypeal hair not very short, not inserted nearer midline than inner clypeal hair (Fig. 9 B)..... 10

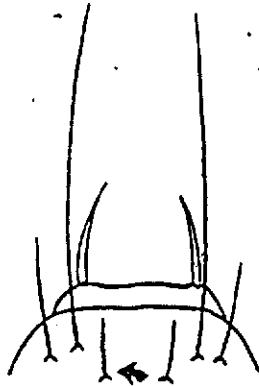


Fig. 9 A

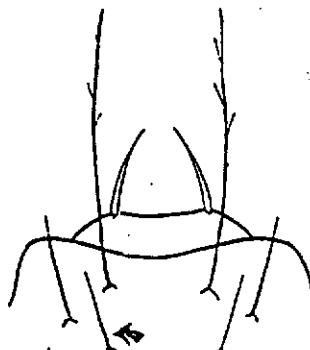


Fig. 9 B

10. Inner clypeal hair about 4 times longer than outer clypeal hair; filaments of abdominal palmate hair not elongated (Fig. 10 A & B)..... *kochi*

Inner clypeal hair shorter; filaments of abdominal palmate hair elongated (Fig. 10 C & D). 11



Fig. 10 B



Fig. 10 D

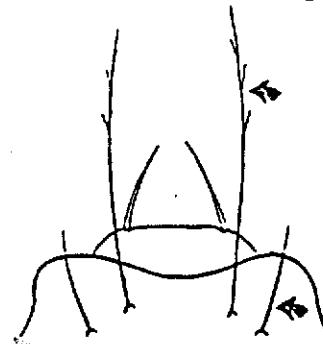


Fig. 10 A

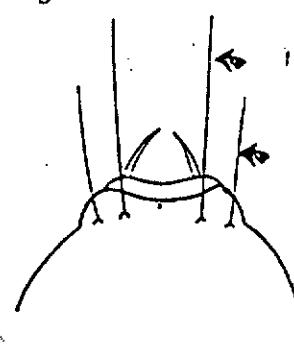


Fig. 10 C

11. Palmate hair on abdominal segment I with broad leaflets (Fig. 11 A)..... 12

Palmate hair on abdominal segment I with hair-like leaflets (Fig. 11 B)..... 14

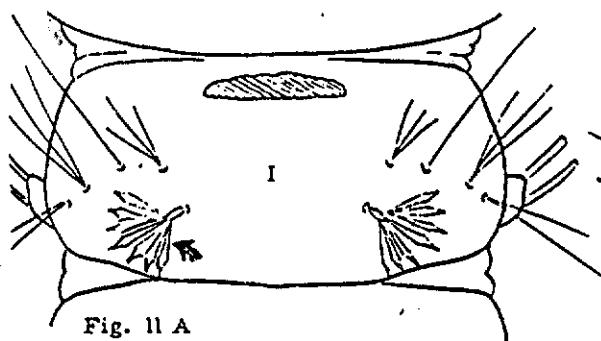


Fig. 11 A

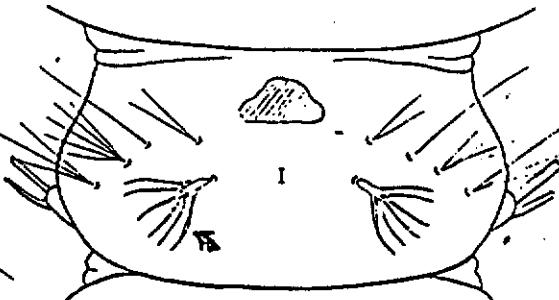


Fig. 11 B

12. Leaflets on thoracic palmate hair flattened (Fig. 12 A)..... culicifacies
 Leaflets on thoracic palmate hair hair-like (Fig. 12 B)..... 13

Fig. 12 A

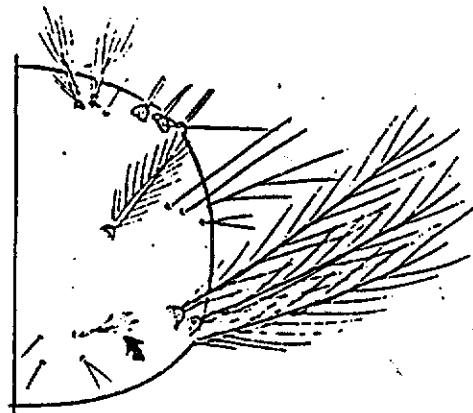
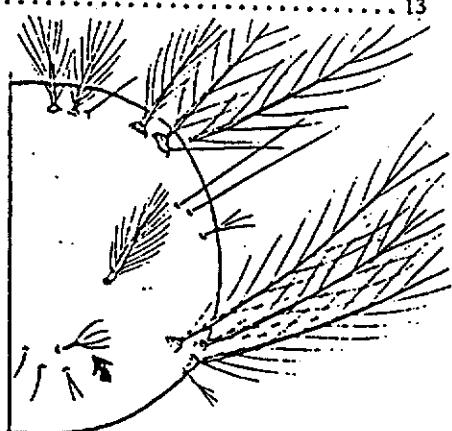


Fig. 12 B



13. Outer clypeal hair at least 2/3 the length of inner clypeal hair; prothoracic hairs 1, 2, and 3 with moderately large tubercles (Fig. 13 A & B)..... litoralis
 Outer clypeal hair usually less than 2/3 length of inner clypeal hair; prothoracic hairs 1, 2, and 3 with weakly developed tubercles (Fig. 13 C & D)..... subpictus and sundaicus

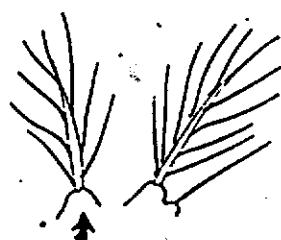
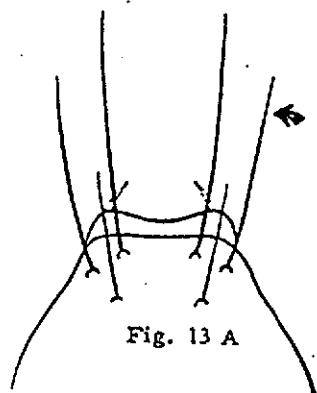


Fig. 13 B

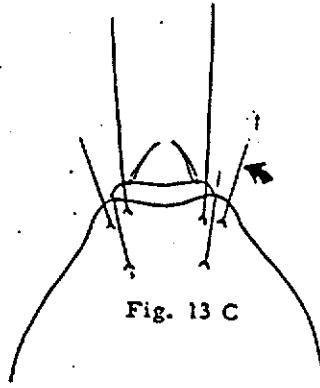


Fig. 13 C

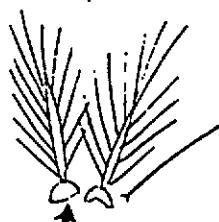


Fig. 13 D

14. Outer and inner clypeal hair finely feathered (Fig. 14 A)..... maculatus
 Outer clypeal hair always simple, inner clypeal hair usually simple (Fig. 14 B)..... stephensi

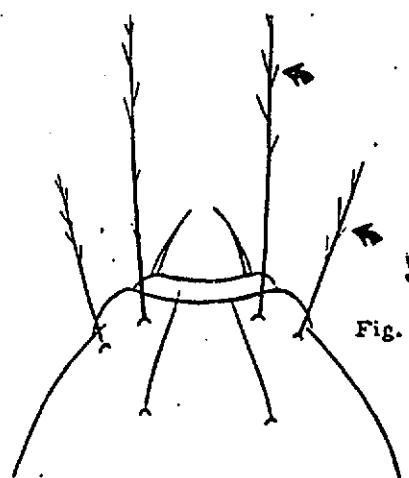


Fig. 14 A

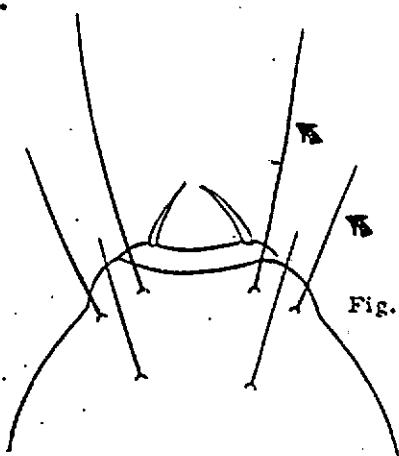


Fig. 14 B

15. Outer clypeal hair with long, brush-like branches (Fig. 15 A)..... 16

Outer clypeal hair without long, brush-like branches (Fig. 15 B)..... 19

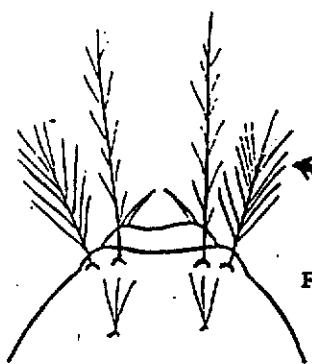


Fig. 15 A

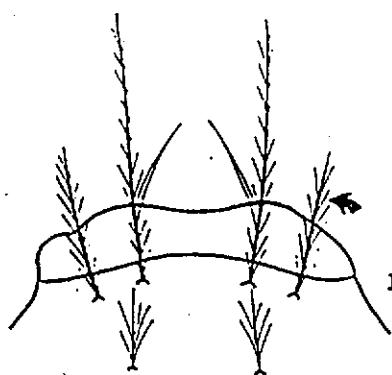


Fig. 15 B

16. Sutural hair simple or split at tip (Fig. 16 A)..... 17

Sutural hair split near base into 2-8 branches (Fig. 16 B)..... 18

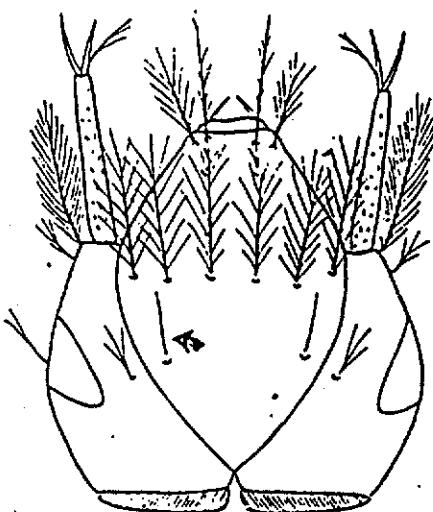


Fig. 16 A

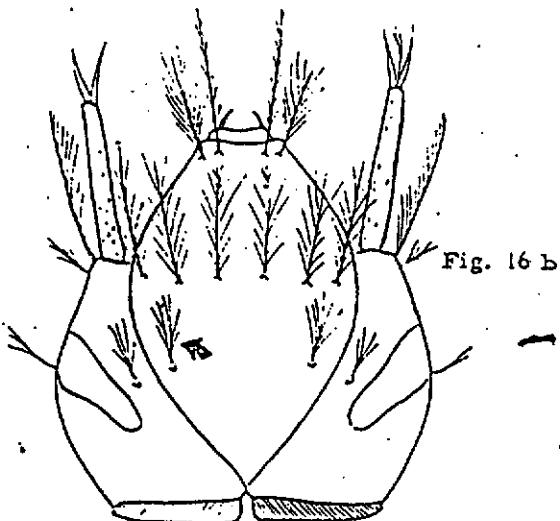


Fig. 16 B

17. Palmate hair on abdominal segment 1 with well-developed leaflets (Fig. 17 A).... annularis

Palmate hair on abdominal segment 1 without well-developed leaflets (Fig. 17 B).... jamesi

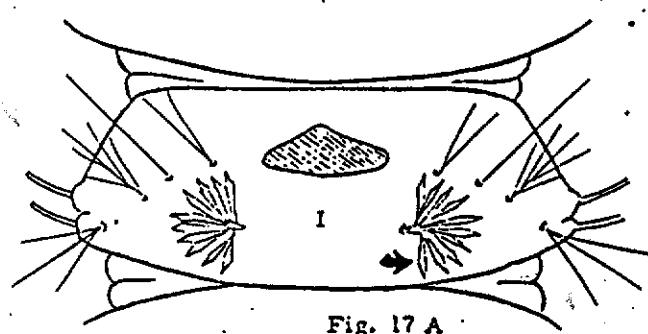


Fig. 17 A

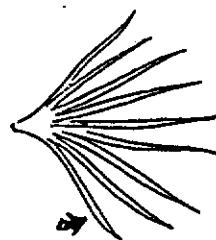


Fig. 17 B

24. Both long pleural hairs of meso and metathorax simple (Fig. 24 A)... annandalei annandalei*
 One long pleural hair of meso and metathorax barbed (Fig. 24 B)... annandalei interruptus

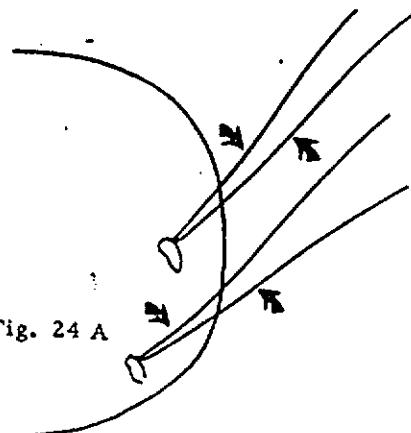


Fig. 24 A

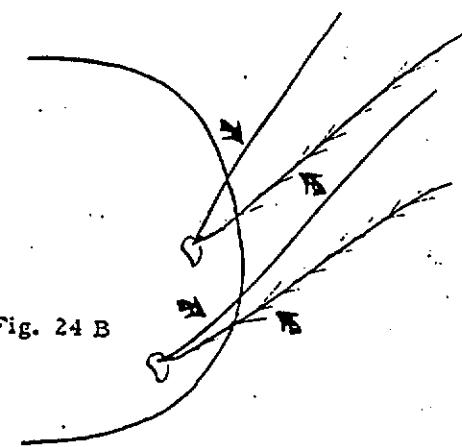


Fig. 24 B

25. Outer clypeal hair with 35 or more branches (Fig. 25 A)..... 26
 Outer clypeal hair with fewer than 20 branches (Fig. 25 B)..... 31

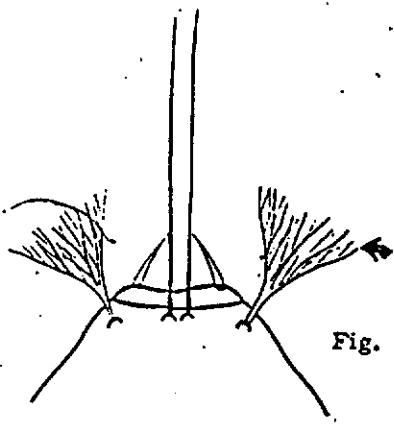


Fig. 25 A

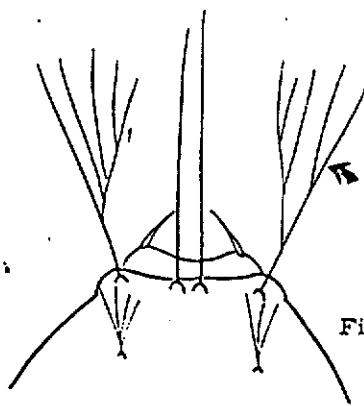


Fig. 25 B

26. Prothoracic hair I with branches arising near base (Fig. 26 A)..... 27
 Prothoracic hair I simple or with few branches at tip (Fig. 26-B)..... 28

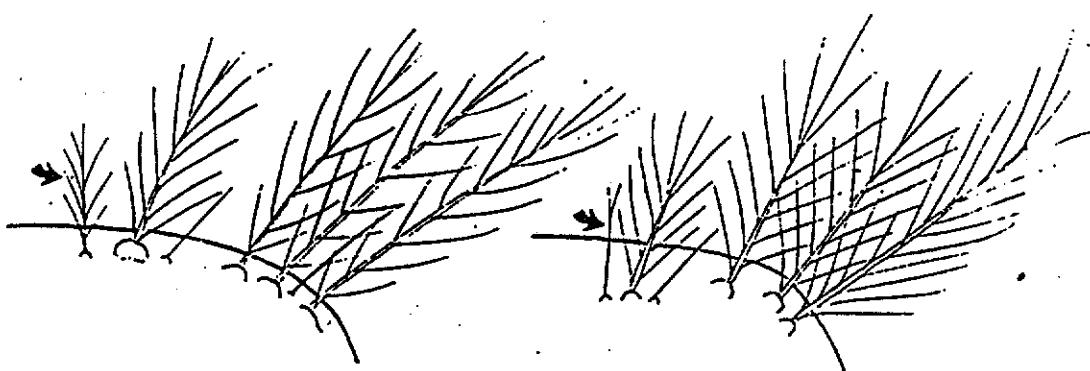


Fig. 26 A

Fig. 26 B

probably does not occur in Vietnam

1. Outer clypeal hair with 30-65 branches (Fig. 27 A)..... *Larbitostris*
 Outer clypeal hair with 65-95 branches (Fig. 27 B)..... *campestris*

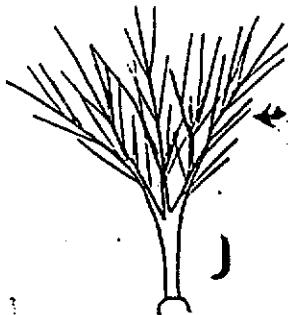


Fig. 27 A

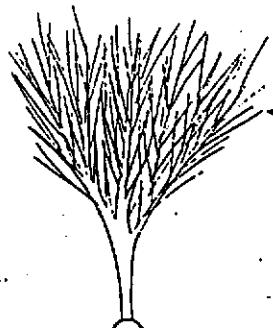


Fig. 27 B

28. Mesothoracic hair 5 small, with branches spreading from base (Fig. 28 A). *peditaeniatus*
 Mesothoracic hair 5 not small, with branches stiff and erect (Fig. 28 B)..... 29

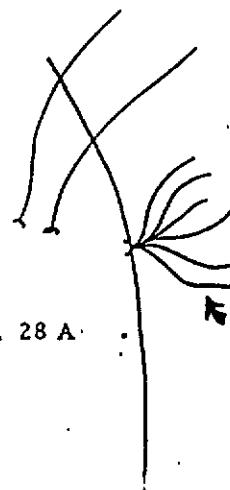


Fig. 28 A

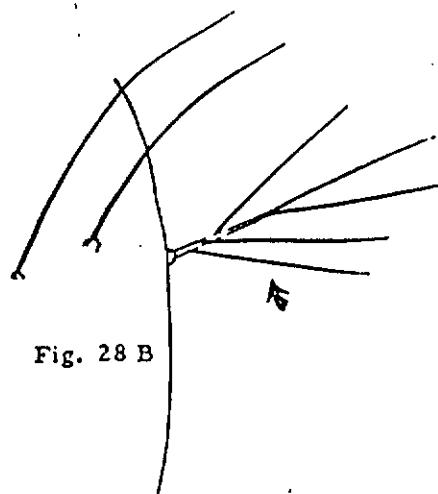


Fig. 28 B

29. Palmate hairs large; leaflets pale at base and tip (Fig. 29 A)..... *migerrimus* and *sinensis*
 Palmate hairs not large; leaflets uniformly colored (Fig. 29 B)..... 30



Fig. 29 A



Fig. 29 B

30. Sutural hair with 11 or more branches; pecten teeth 6 or fewer (Fig. 30 A & B)... indiensis

Sutural hair with fewer than 11 branches; pecten teeth 7 or more (Fig. 30 C & D)... lesteri



Fig. 30 A



Fig. 30 B



Fig. 30 C

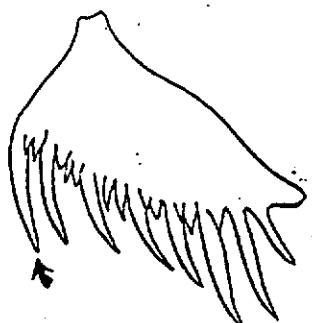


Fig. 30 D

31. Outer clypeals with 11-20 branches (Fig. 31 A)..... 32

Outer clypeal hair with 10 or fewer branches, usually 5 or fewer; if 10 branches are present inner clypeal hair is always simple (Fig. 31 B)..... 33

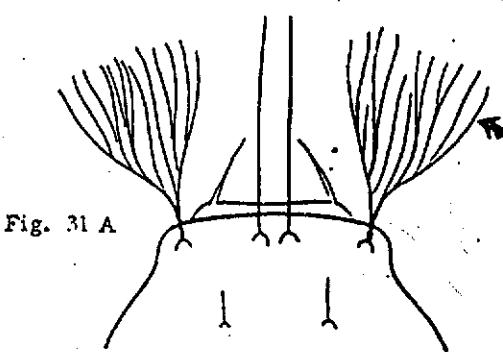


Fig. 31 A

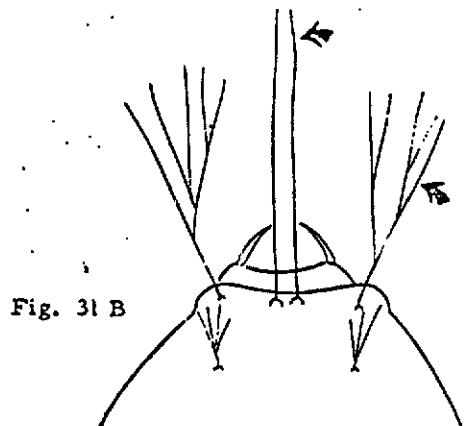


Fig. 31 B

32. Inner clypeal hair simple or forked at tip; at least some palmate hairs on abdominal segments with leaflets (Fig. 32 A & B)..... barbumbrosus

Inner clypeal hair finely branched at tip; palmate hairs on abdominal segments without leaflets (Fig. 32 C & D)..... baezai

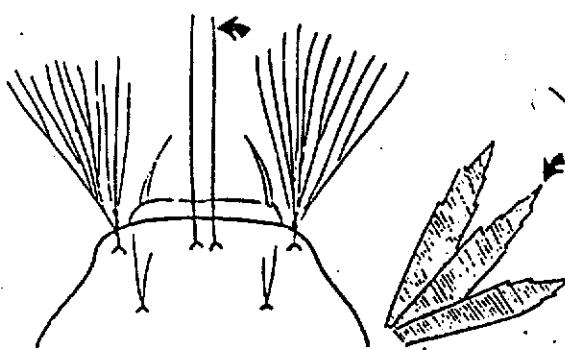


Fig. 32 A

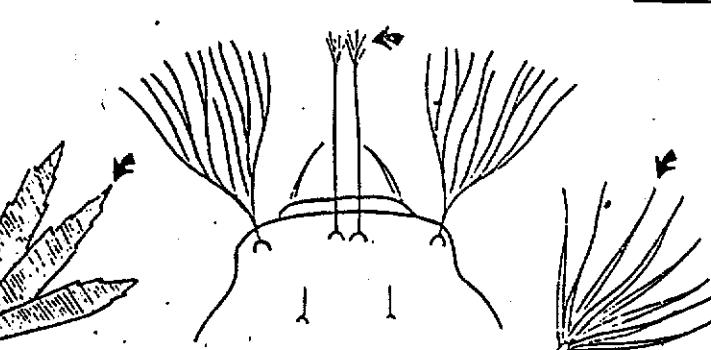


Fig. 32 C

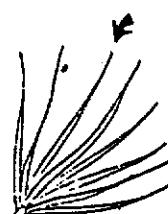


Fig. 32 D

- B. Inner clypeal hair with 2-5 branches; bases not nearly touching (Fig. 33 A).... bengalensis
 Inner clypeal hair simple, bases nearly touching (Fig. 33 B)..... 34

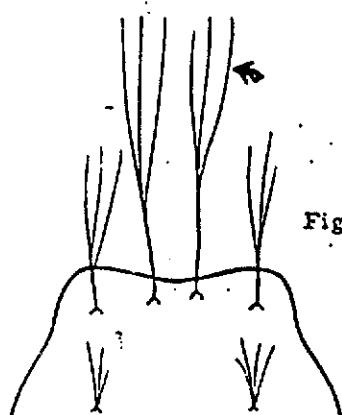


Fig. 33 A

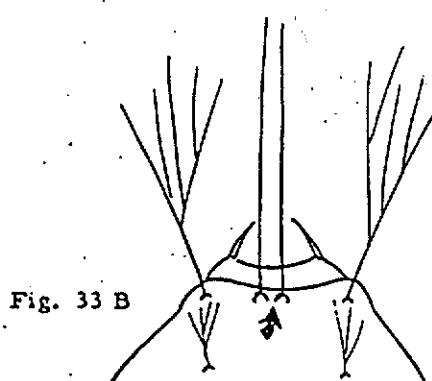


Fig. 33 B

- H. Outer clypeal hair with 5-10 branches; prothoracic hair I with fewer than 5 branches (Fig. 34 A & B)..... umbrosus

Outer clypeal hair simple; prothoracic hair I with 5 or more branches (Fig. 34 C & D) 35

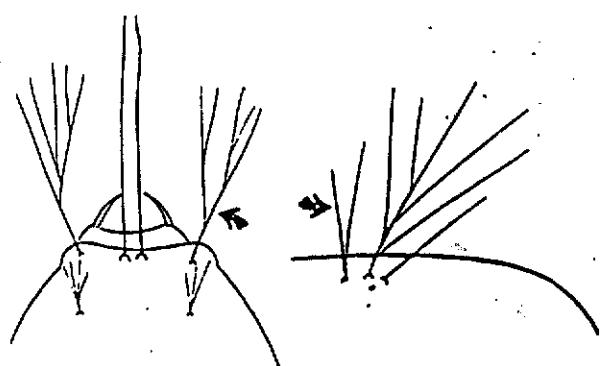


Fig. 34 A

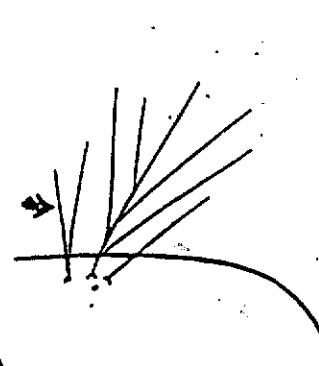


Fig. 34 B

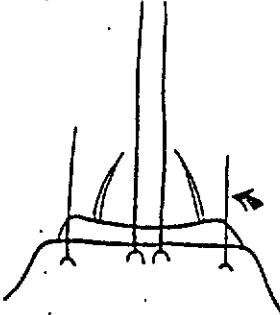


Fig. 34 C

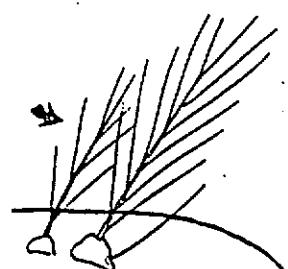


Fig. 34 D

- i. Palmate hair I on abdominal segment I well developed; outer clypeal hair about 1/3 length of inner clypeal hair (Fig. 35 A & B)..... insulaeflorum

Palmate hair I on abdominal segment I not well developed; outer clypeal hair more than 1/3 length of inner clypeal hair (Fig. 35 C & D)..... 36

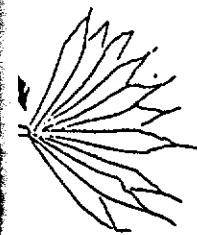


Fig. 35 A

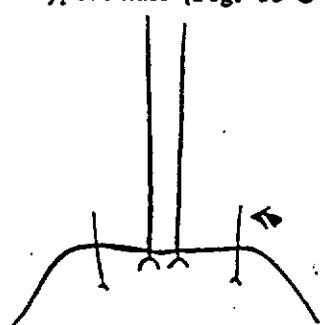


Fig. 35 B



Fig. 35 C

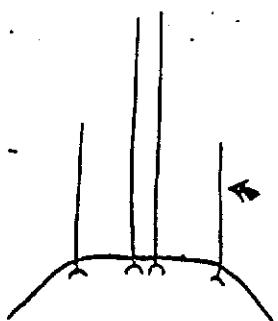


Fig. 35 D

36. Palmate hairs well developed on thorax; prothoracic hair 1 with about 10 branches, basal tubercle weakly developed (Fig. 36 A & B)..... *lindesayi*

Palmate hairs not well developed on thorax; prothoracic hair 1 with 3-8 branches, basal tubercle strongly developed (Fig. 36 C & D)..... *gigas baileyi*



Fig. 36 A



Fig. 36 C

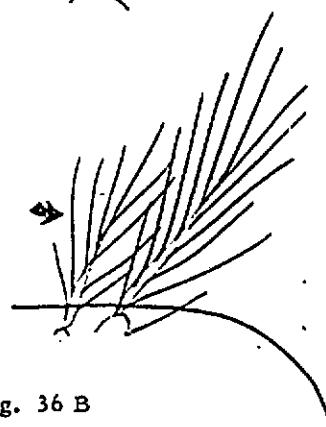


Fig. 36 B

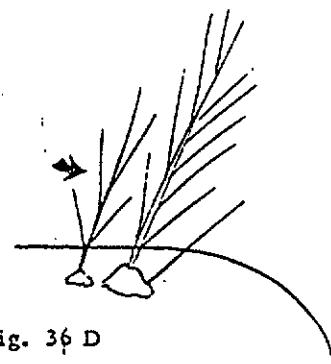


Fig. 36 D

KEY TO TOXORHYNCHITES LARVAE

1. Mesothoracic dorso-lateral plate divided (Fig. 1 A)..... albipes
Mesothoracic dorso-lateral plate not divided (Fig. 1 B)..... 2

Fig. 1 A

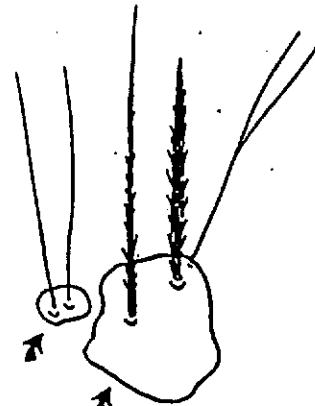
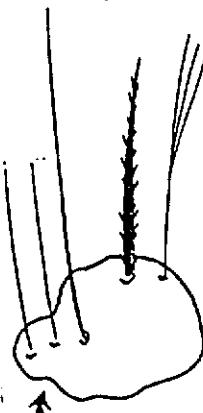


Fig. 1 B



2. Dorso-lateral plate on abdominal segment 7 with 2 bristles and 3 hairs (Fig. 2 A)..... splendens
Dorso-lateral plate on abdominal segment 7 with 1 bristle and 4 hairs (Fig. 2 B).... kempi



Fig. 2 A

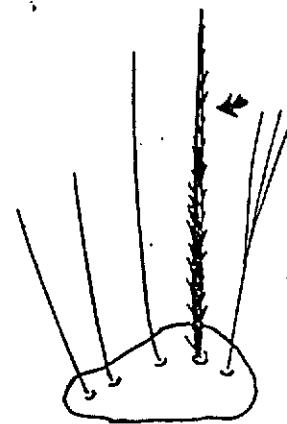


Fig. 2 B

KEY TO TRIPTEROIDES LARVAE

1. Segment 8 of abdomen with sclerotized plate (Fig. 1 A).....araeoides
- Segment 8 of abdomen without plate (Fig. 1 B).....2

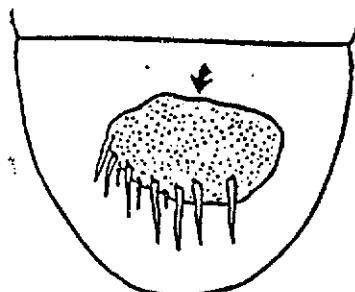


Fig. 1 A

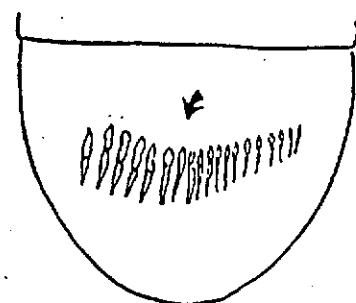


Fig. 1 B

2. Comb scales 10-15 (Fig. 2 A).....proximus
- Comb scales 16-24 (Fig. 2 B).....powelli

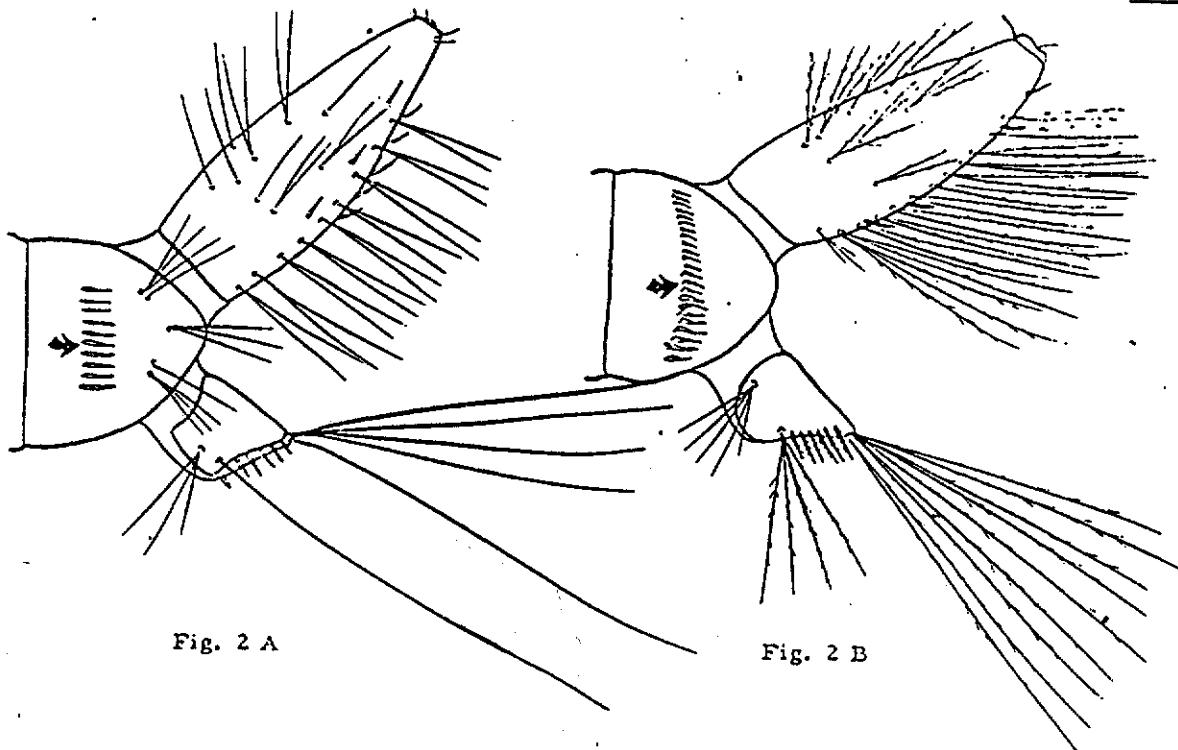


Fig. 2 A

Fig. 2 B

KEY TO MALAYA LARVAE

1. Comb scales in 2 rows; gills pointed (Fig. 1 A)..... jacobsoni

Comb scales in 3 rows; gills rounded (Fig. 1 B)..... genurostris

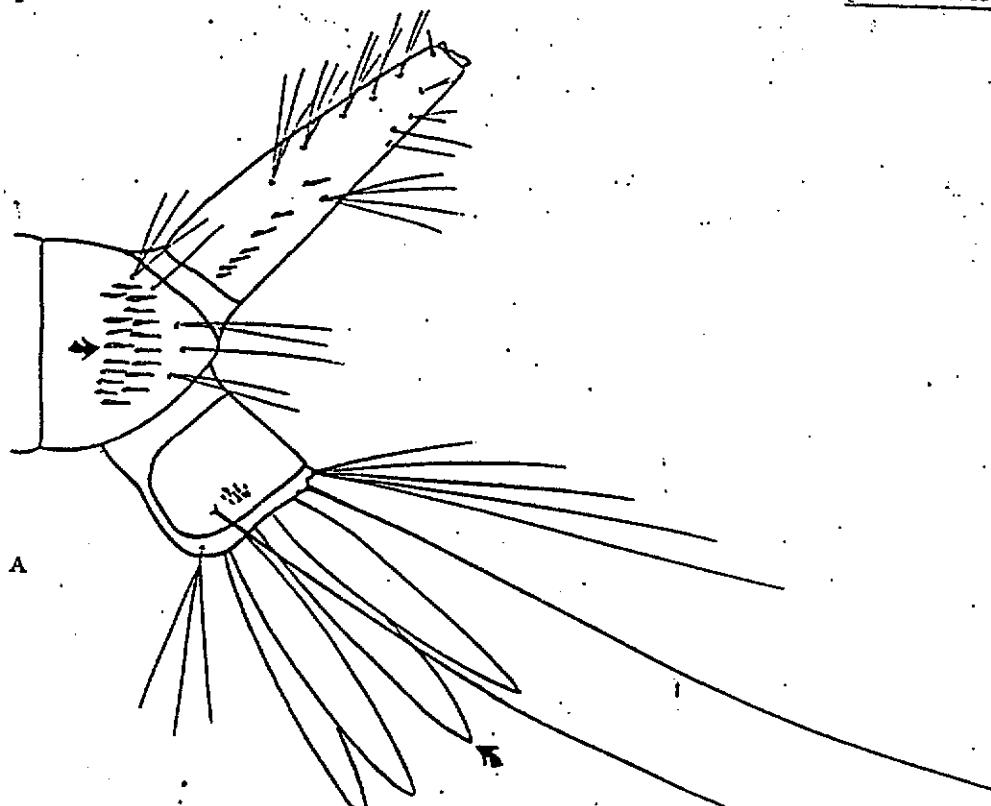


Fig. 1 A

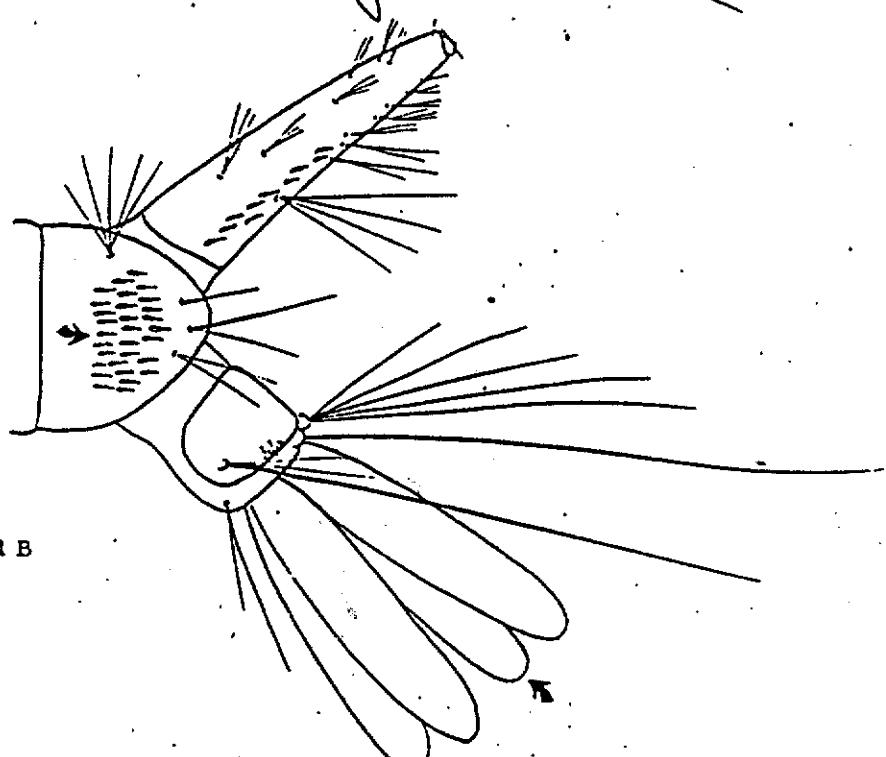


Fig. 1 B

TOPOMYIA LARVA

I. Only known species in Vietnam (Fig. 1 A & B) gracilis

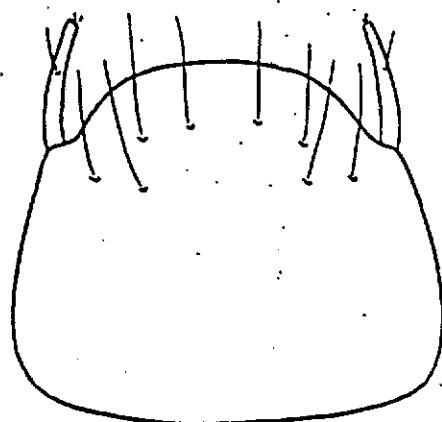


Fig. 1 A

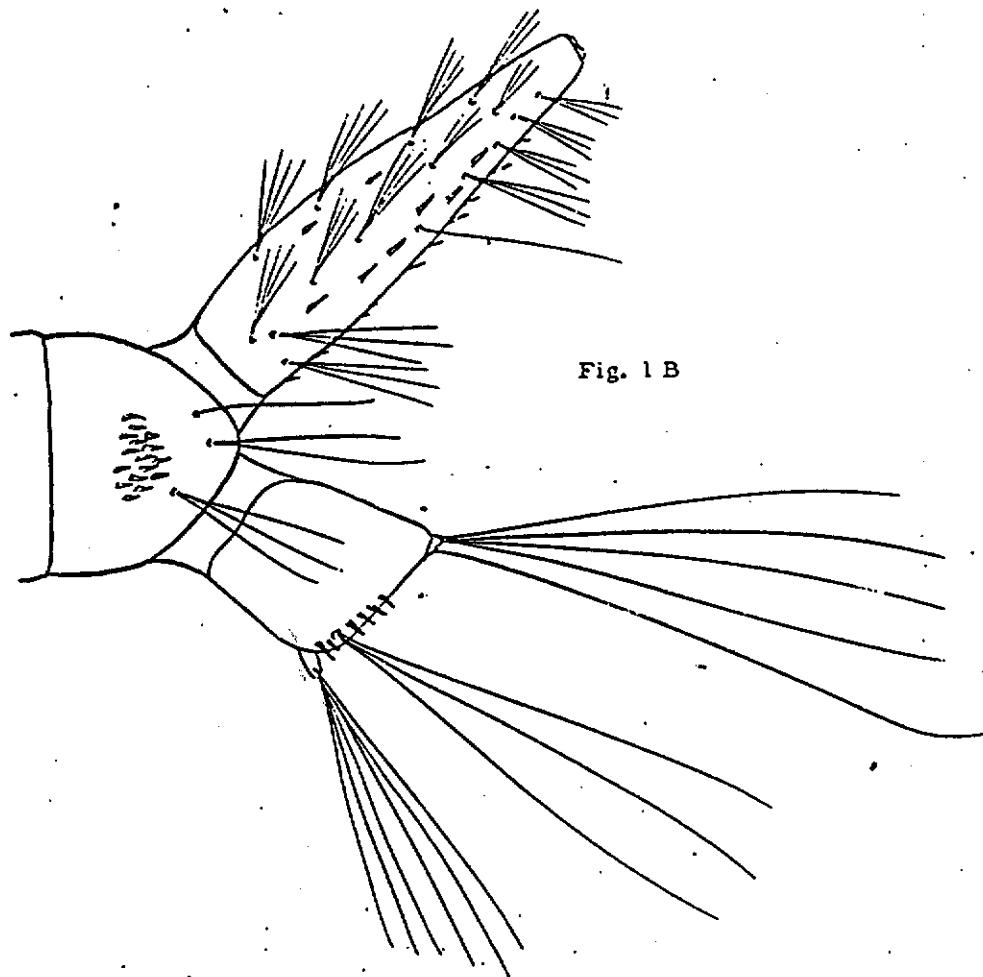


Fig. 1 B

KEY TO FICALBIA LARVAE

1. Siphonal tuft near base; antennal hair inserted beyond middle (Fig. 1 A & B).....minima
Siphonal tuft near middle; antennal hair inserted near middle (Fig. 1 C & D).....2

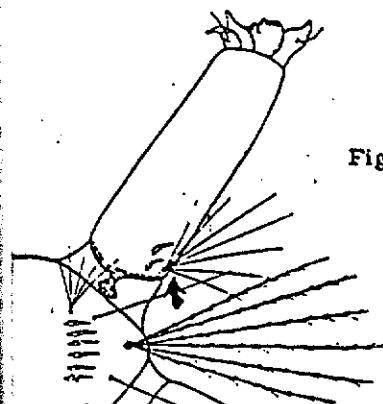


Fig. 1 A

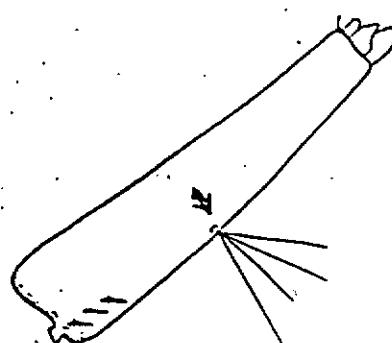


Fig. 1 C

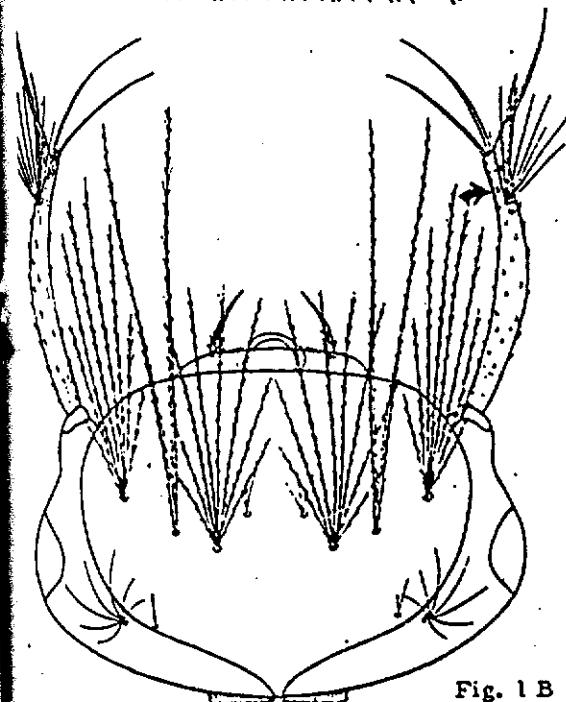
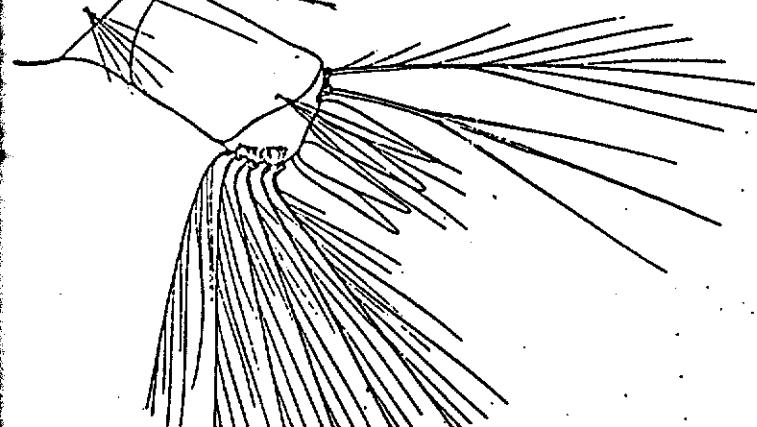


Fig. 1 B

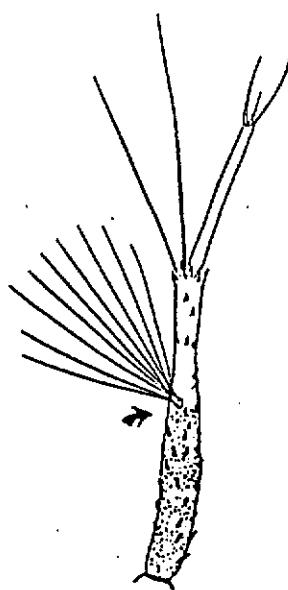


Fig. 1 D

2. Pecten absent (Fig. 2 A).....*luzonensis*
Pecten present (Fig. 2 B)..... 3

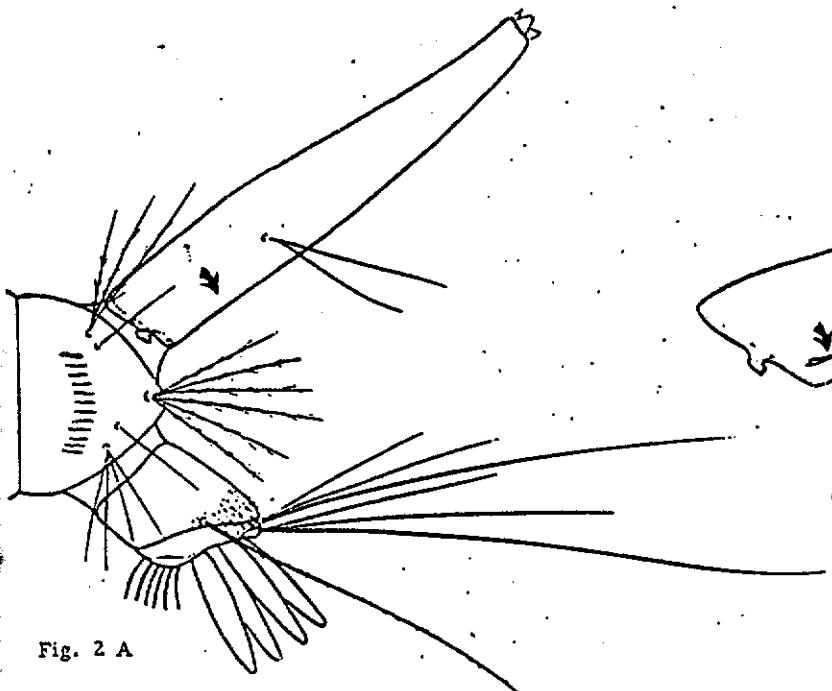


Fig. 2 A

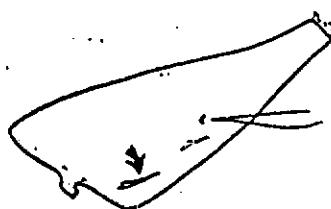


Fig. 2 B

3. Air tube tapered (Fig. 3 A)..... *hybrida*
Air tube not tapered (Fig. 3 B)..... *chamberlaini*

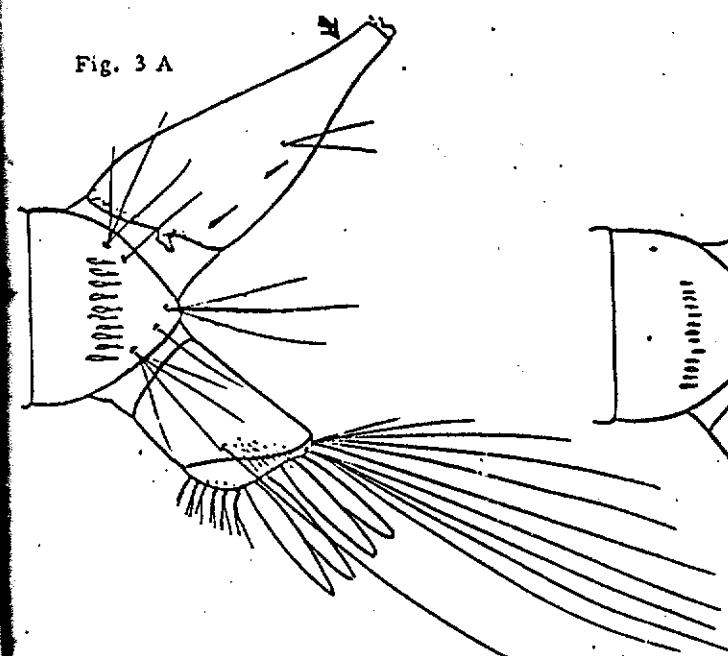


Fig. 3 A

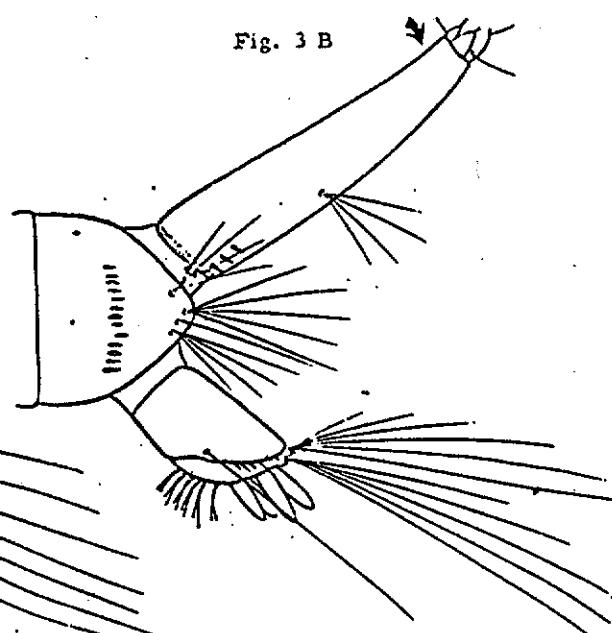


Fig. 3 B

KEY TO MANSONIA LARVAE

Flagellar segment of antenna at least 2/3 as long as remainder of antenna (Fig. 1 A)....., 2

Flagellar segment of antenna much shorter (Fig. 1 B)....., 4

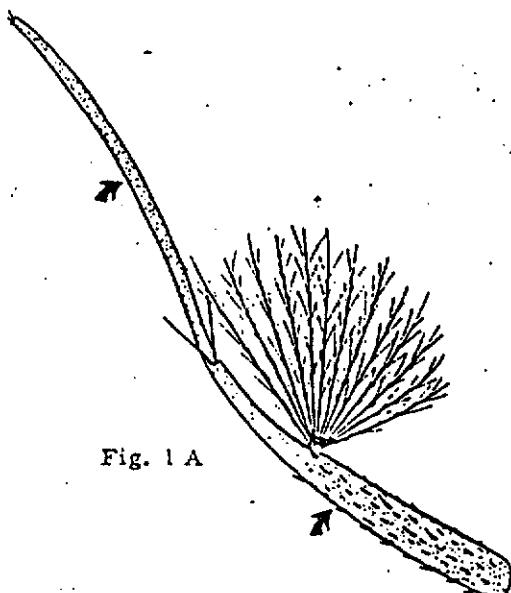


Fig. 1 A

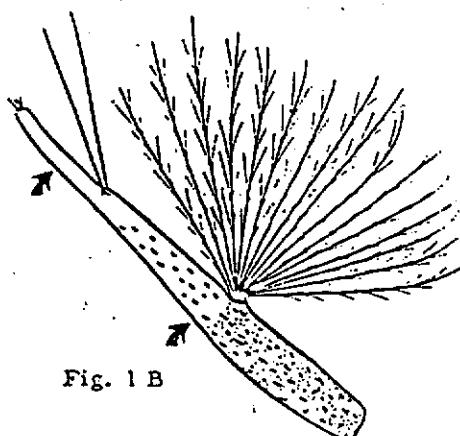


Fig. 1 B

Comb scale with long median spine (Fig. 2 A)....., 3

Comb scale without long median spine (Fig. 2 B)....., ochracea

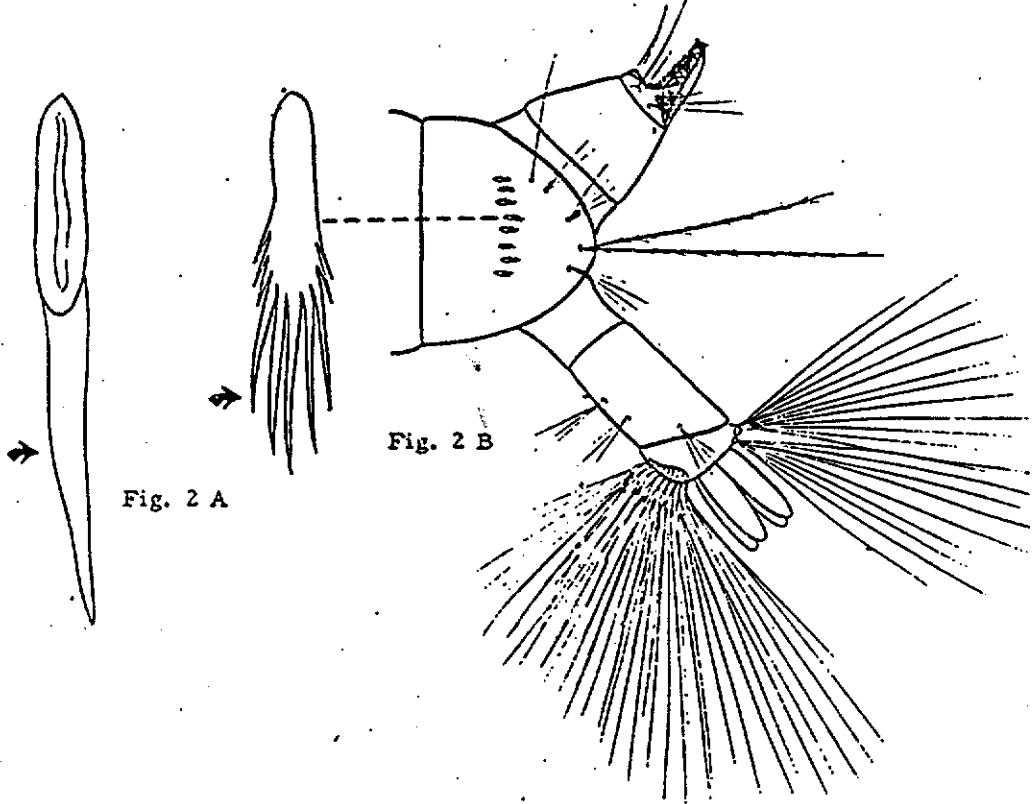


Fig. 2 A

Fig. 2 B

3. Flagellar segment of antenna longer than remainder of antenna (Fig. 3 A).....crassipes

Flagellar segment of antenna shorter than remainder of antenna (Fig. 3 B).....nigrosignata

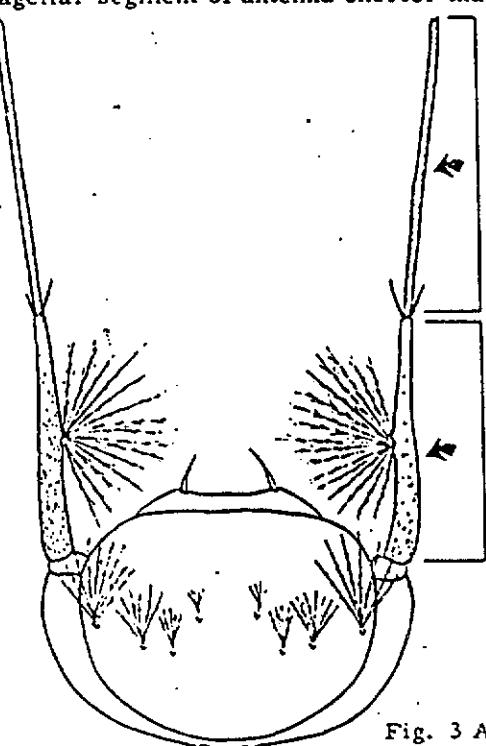


Fig. 3 A

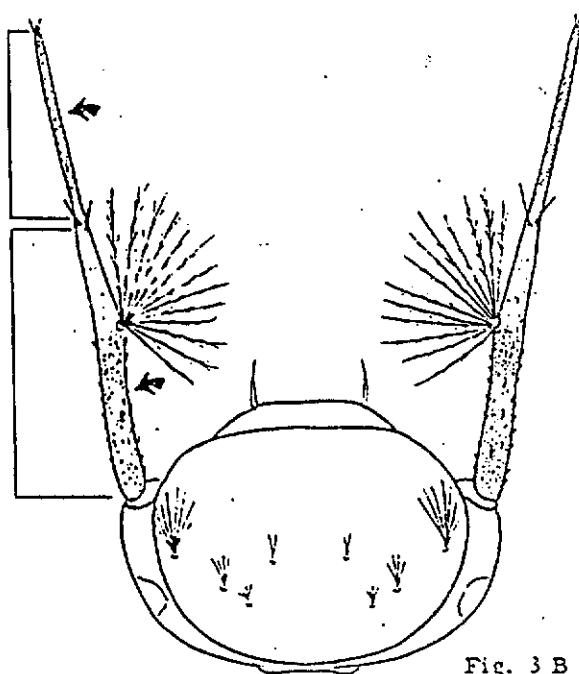


Fig. 3 B

4. Antenna with basal half pigmented (Fig. 4 A).....5

Antenna with pigmented ring near antennal tuft and at base (Fig. 4 B).....6

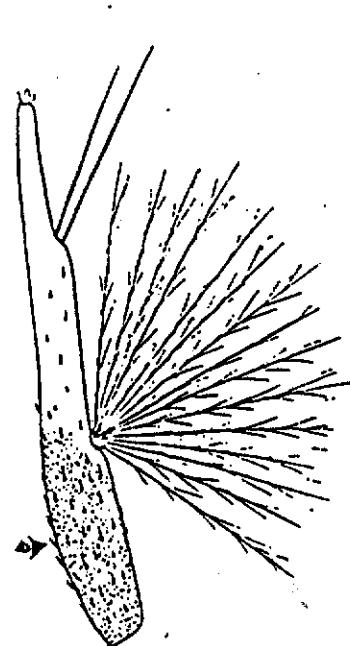


Fig. 4 A

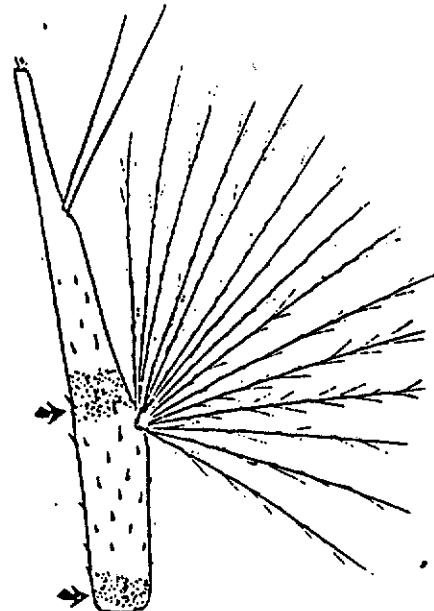
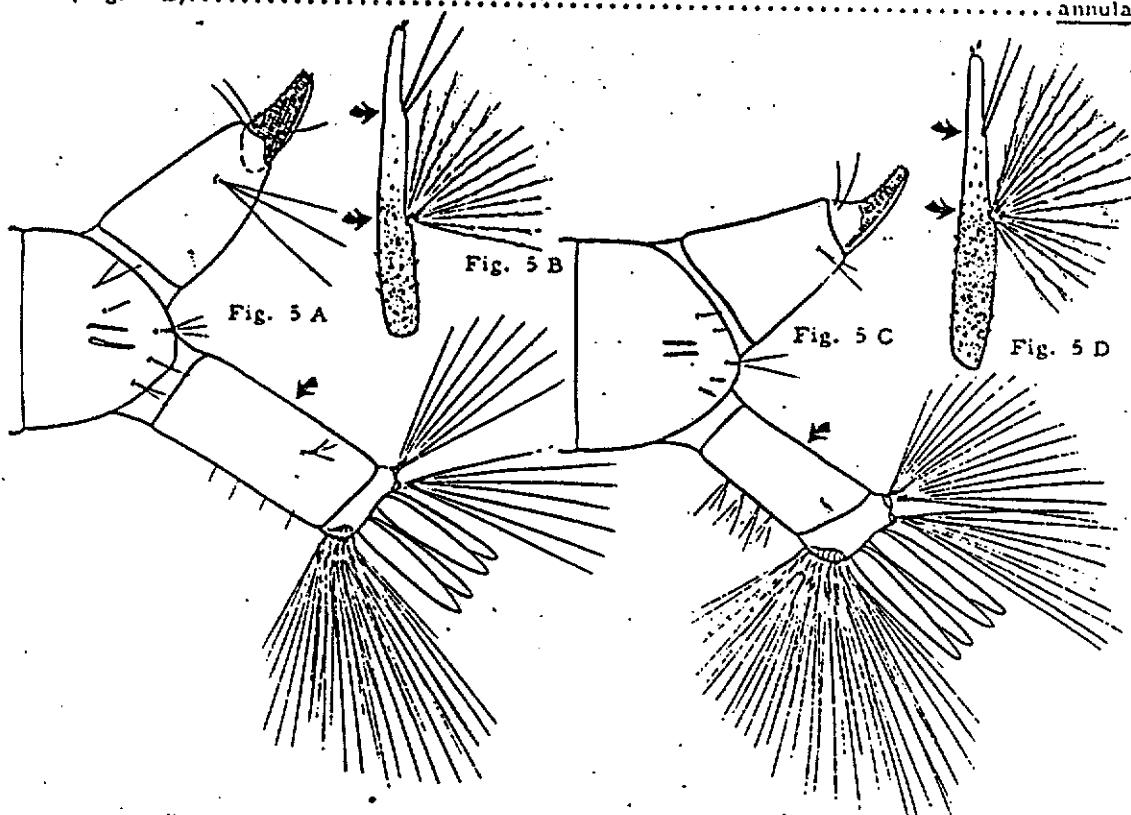


Fig. 4 B

5. Saddle 2 1/2 times as long as wide (Fig. 5 A); antennal tuft not inserted near subterminal setae (Fig. 5 B)..... annulifera

Saddle 2 times as long as wide (Fig. 5 C); antennal tuft inserted near subterminal setae (Fig. 5 D)..... annulata



6. Abdominal segments 3-4 with lateral hair single (Fig. 6 A)..... 7

Abdominal segments 3-4 with lateral hair double (Fig. 6 B)..... 8

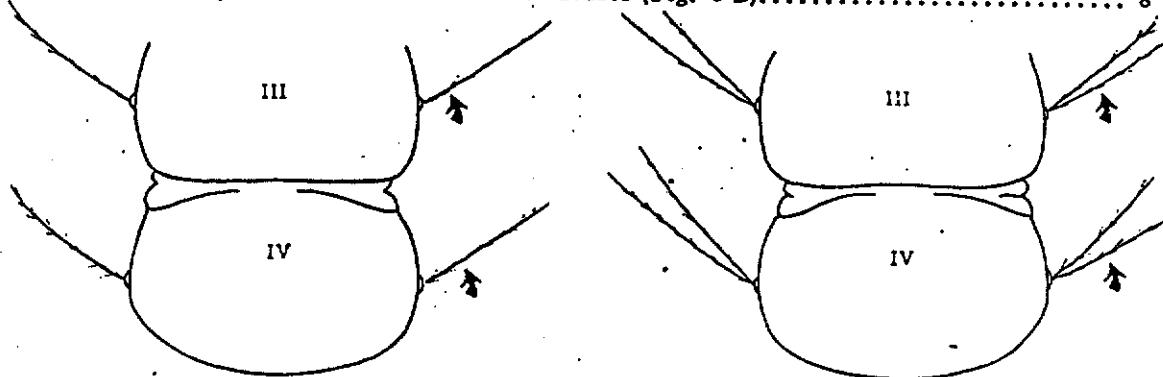
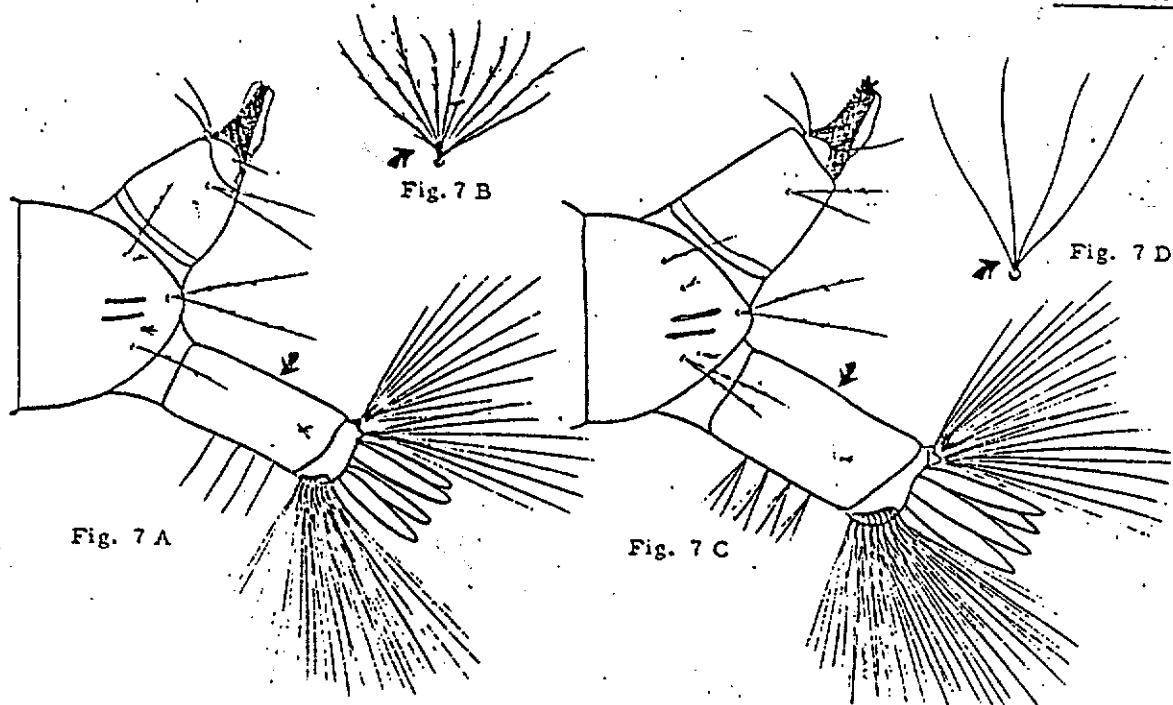


Fig. 6 A

Fig. 6 B

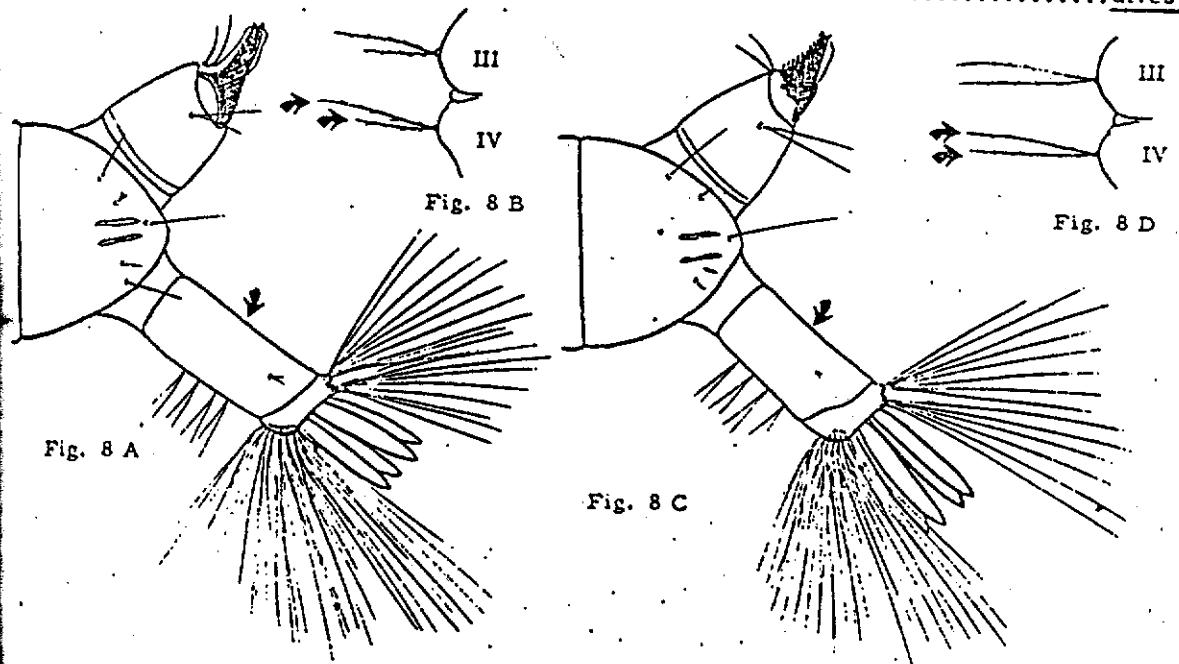
7. Saddle more than 2 times as long as wide (Fig. 7 A); prothoracic hair 4 with 10 branches (Fig. 7 B)..... indiana

Saddle less than 2 times as long as wide (Fig. 7 C); prothoracic hair 4 with 4 branches (Fig. 7 D)..... uniformis



8. Saddle more than 2 times as long as wide (Fig. 8 A); lateral hair on abdominal segments 3-4 with branches not equal (Fig. 8 B)..... bonneae

Saddle 2 times as long as wide (Fig. 8 C); lateral hair on abdominal segments 3-4 with branches equal (Fig. 8 D)..... dives



KEY TO URANOTAENIA LARVAE

- 1 Comb scales apically rounded (Fig. 1 A)..... recondita
 Comb scales not apically rounded (Fig. 1 B)..... 2



Fig. 1 A

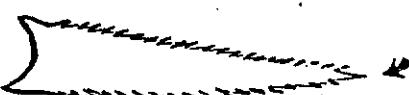


Fig. 1 B

- Upper head hair stout (Fig. 2 A)..... 3
 Upper head hair hair-like (Fig. 2 B)..... 8

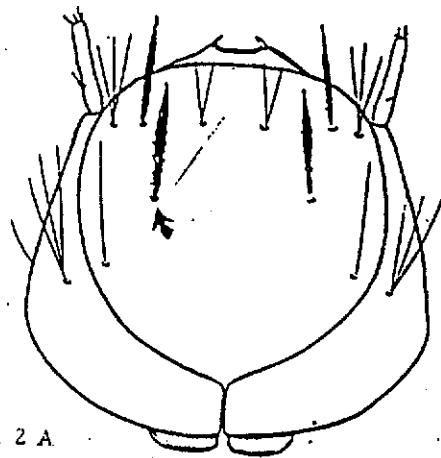


Fig. 2 A

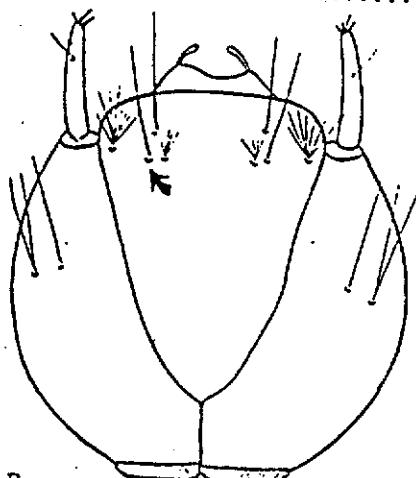


Fig. 2 B

- Lower head hair stout (Fig. 3 A)..... 4
 Lower head hair hair-like (Fig. 3 B)..... maxima

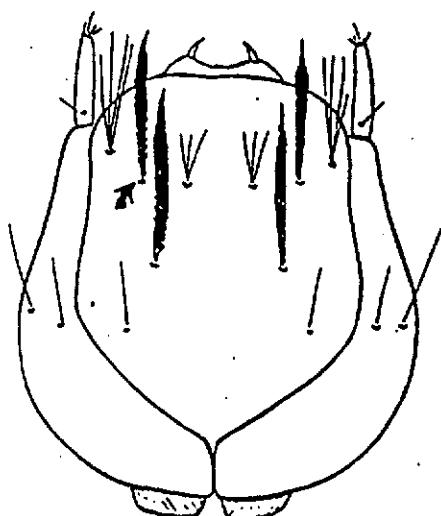


Fig. 3 A

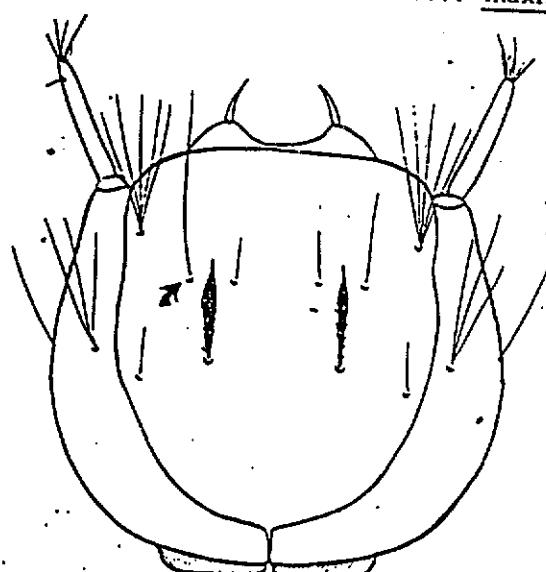


Fig. 3 B

4. Antenna without leaf-like setae (Fig. 4 A)..... 5

Antenna with leaf-like setae (Fig. 4 B)..... annandalei



Fig. 4 A

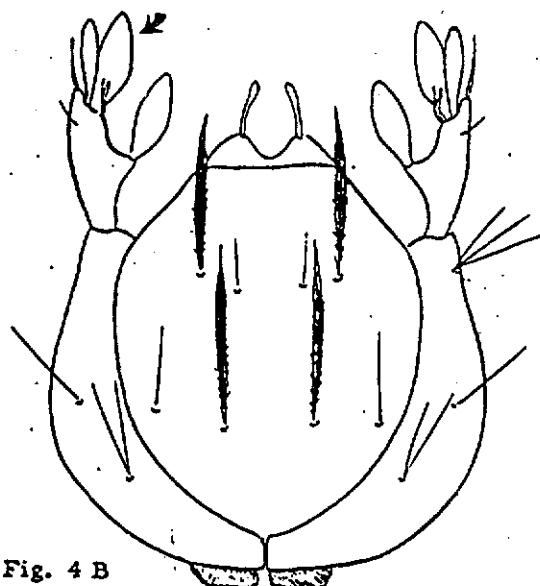


Fig. 4 B

5. Air tube about 4 times as long as basal width (Fig. 5 A)..... 6

Air tube about 1 3/4 times as long as basal width (Fig. 5 B)..... obscura

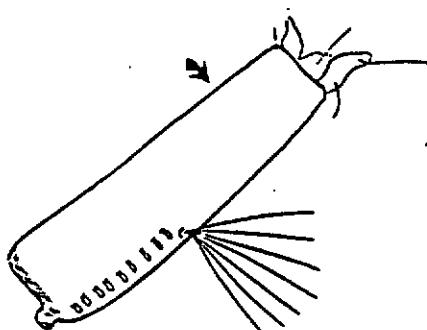


Fig. 5 A

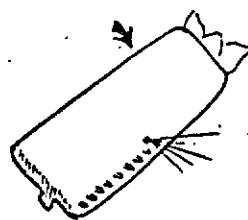


Fig. 5 B

6. Gills at least as long as saddle (Fig. 6 A)..... 7
 Gills much shorter than saddle (Fig. 6 B)..... *lateralis*

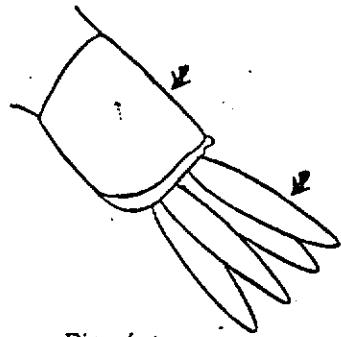


Fig. 6 A

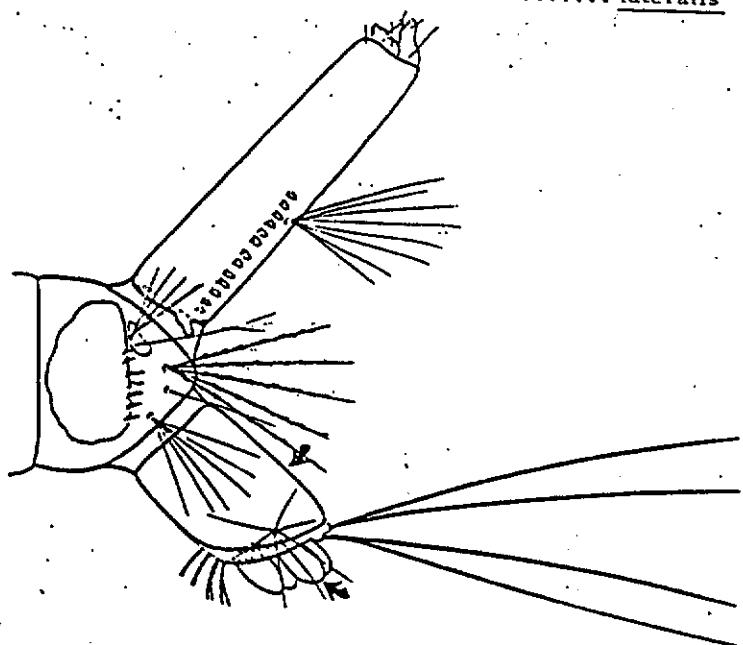


Fig. 6 B

7. Pecten teeth about 14 (Fig. 7 A)..... *macfarlanei*
 7 Pecten teeth about 11 (Fig. 7 B)..... *campestris*

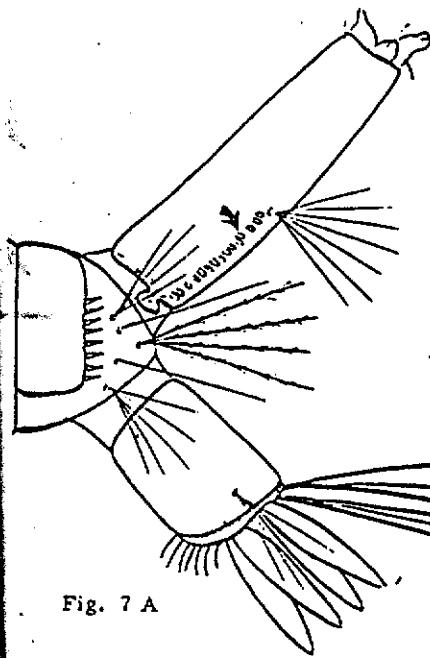


Fig. 7 A

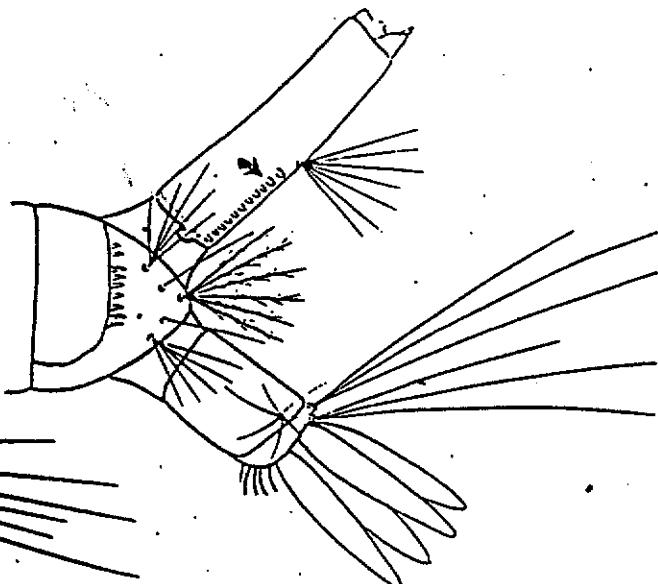


Fig. 7 B

8. Comb scales about 18 (Fig. 8 A)..... hongayi

Comb scales 6-10 (Fig. 8 B)..... bimaculata

Fig. 8 A

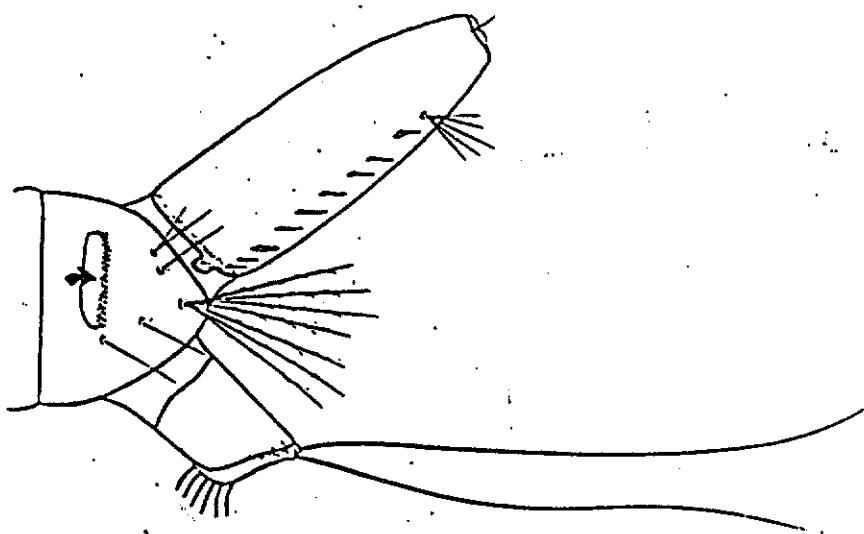
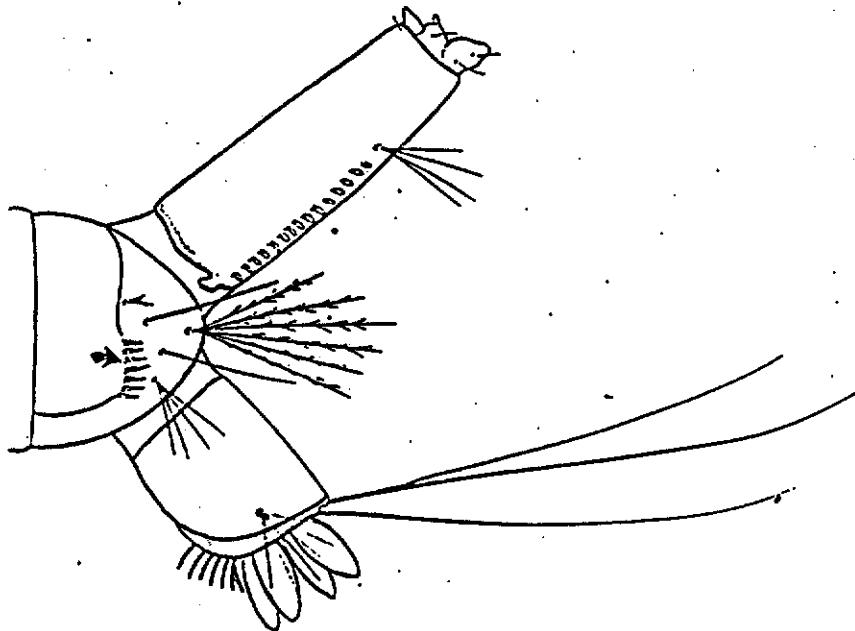


Fig. 8 B



HODGESIA LARVA

1. Only known species in Vietnam (Fig. 1 A & B)..... malayi

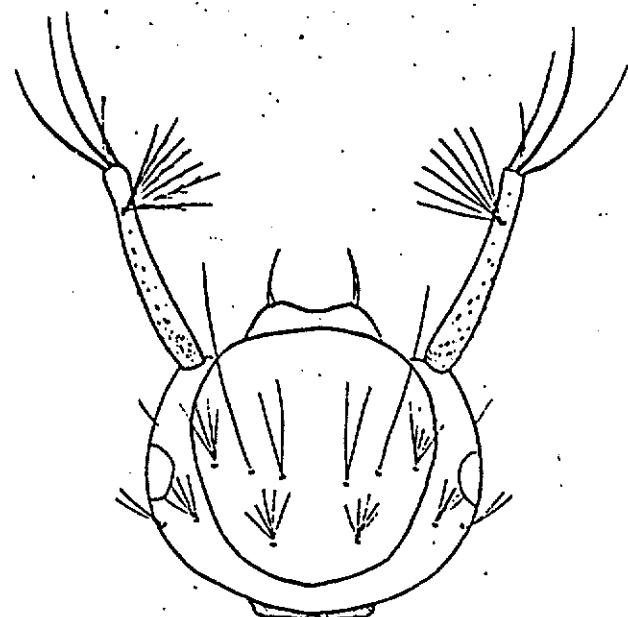


Fig. 1 A

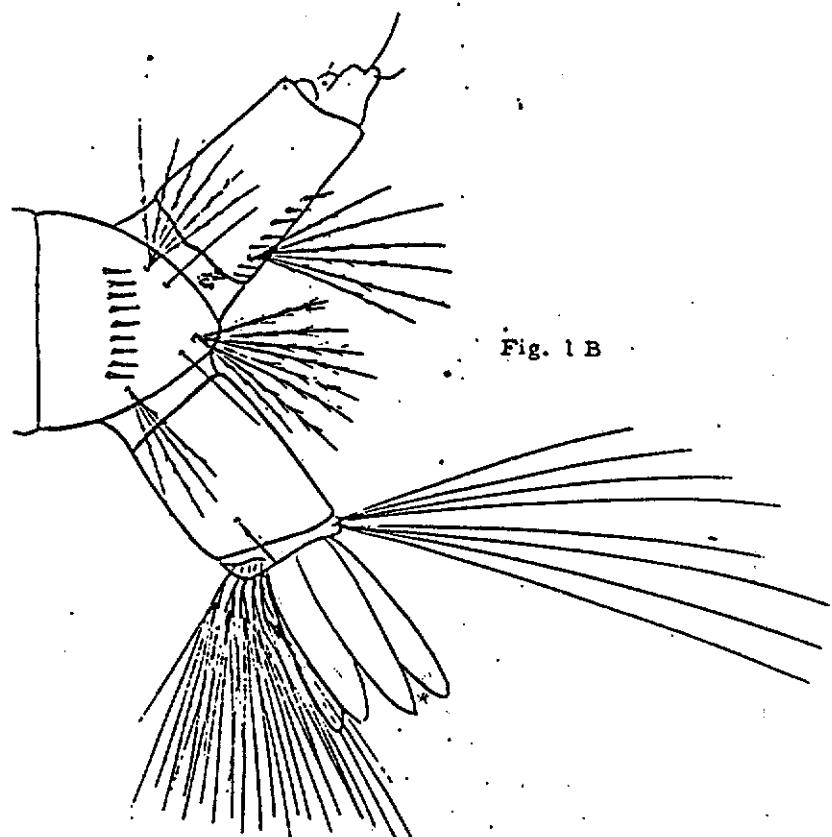


Fig. 1 B

KEY TO ORTHOPODOMYIA LARVAE

1. Larger comb scales with stout lateral spines (Fig. 1 A)..... 2
Larger comb scales with small lateral spines (Fig. 1 B)..... albipes



Fig. 1 A

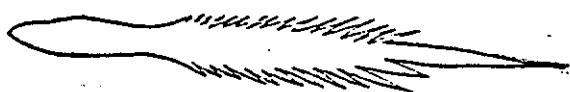


Fig. 1 B

2. Siphonal tuft inserted at 0.32-0.42 the length of siphon from base (Fig. 2 A) .. andamanensis
Siphonal tuft inserted at 0.42-0.5 the length of siphon from base (Fig. 2 B).... anopheloides

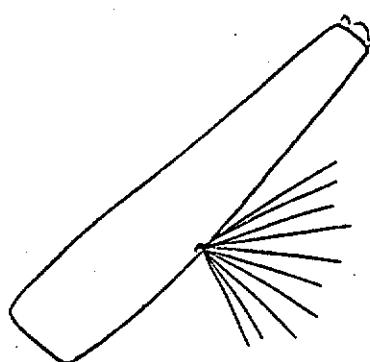


Fig. 2 A

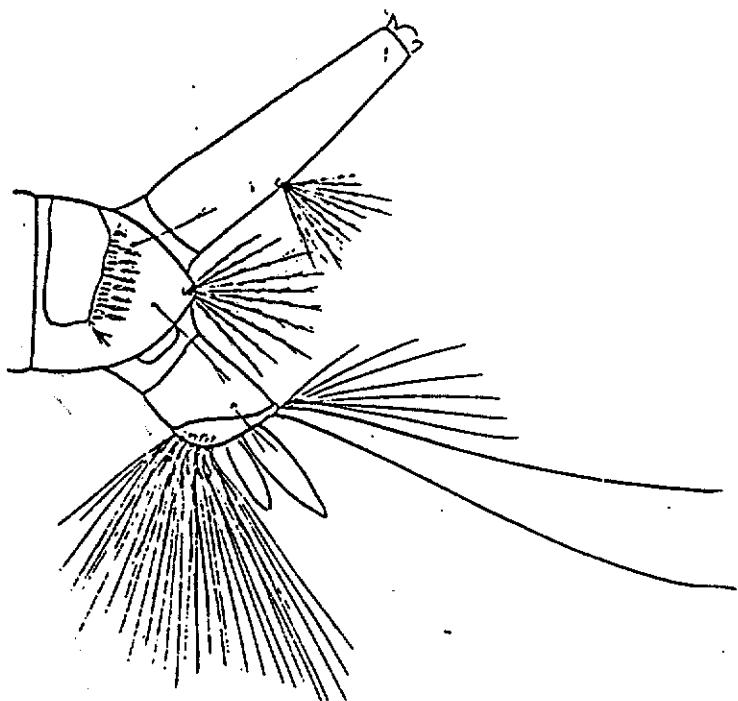


Fig. 2 B

AEDEOMYIA LARVA

1. Only known species in Vietnam (Fig. 1 A & B)..... catasticta

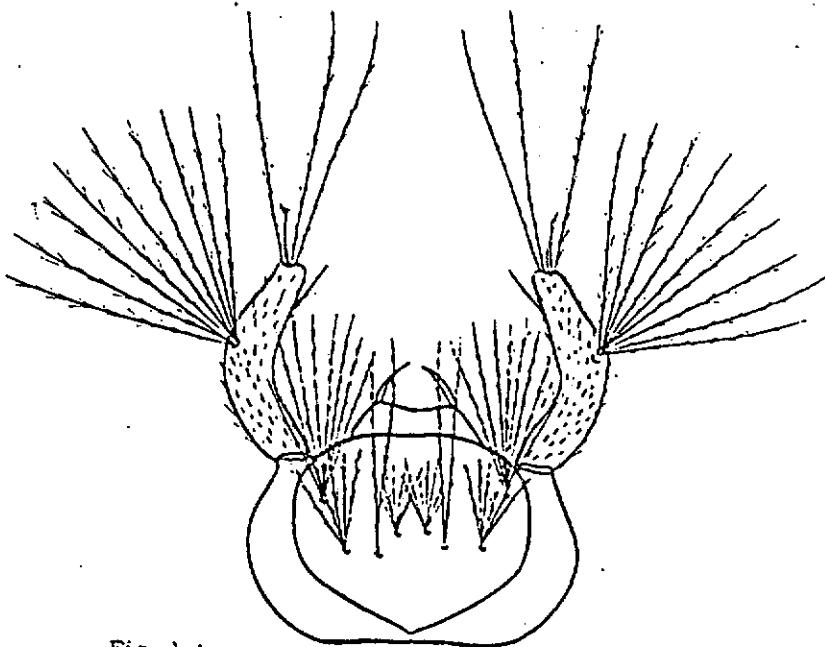


Fig. 1 A

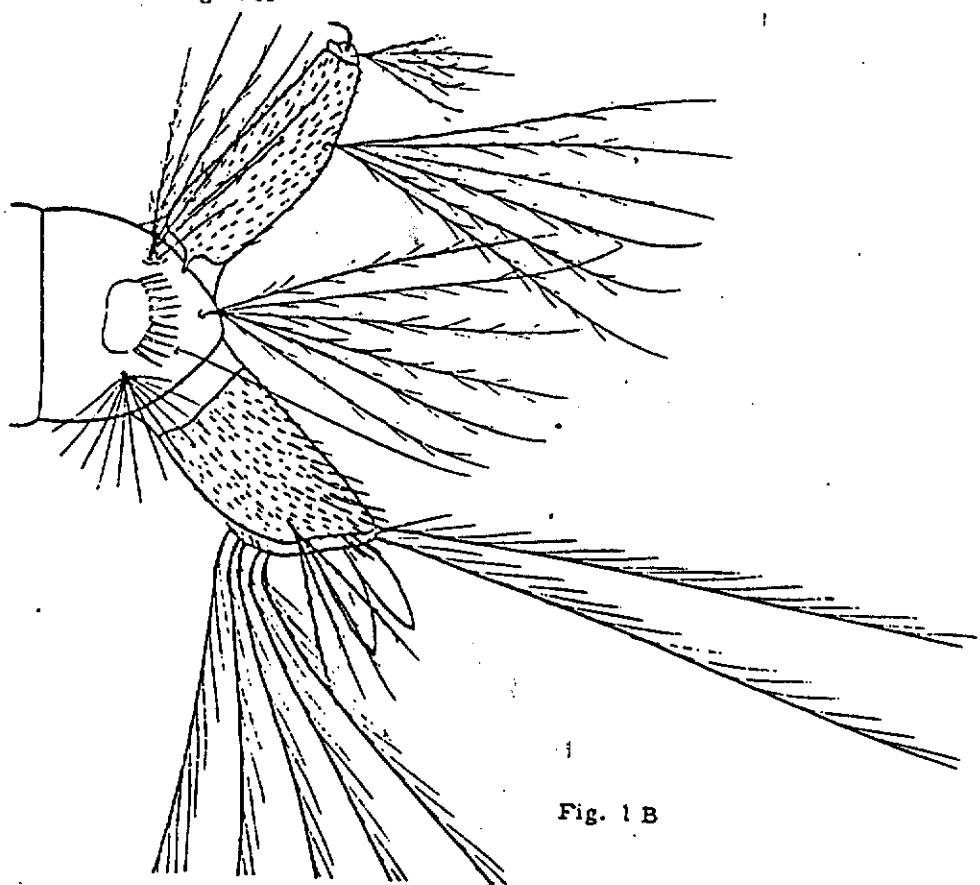


Fig. 1 B

KEY TO HEIZMANNIA LARVAE

- 1. Antennal hair simple (Fig. 1 A) complex
- Antennal hair branched (Fig. 1 B) communis

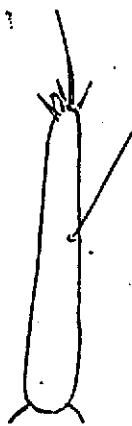


Fig. 1 A

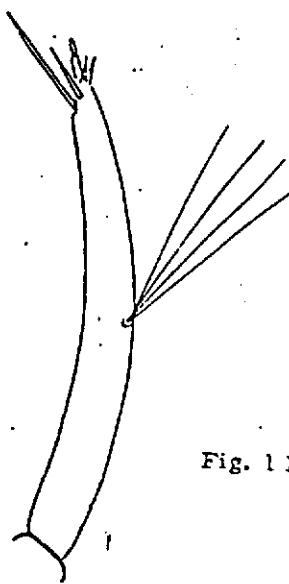
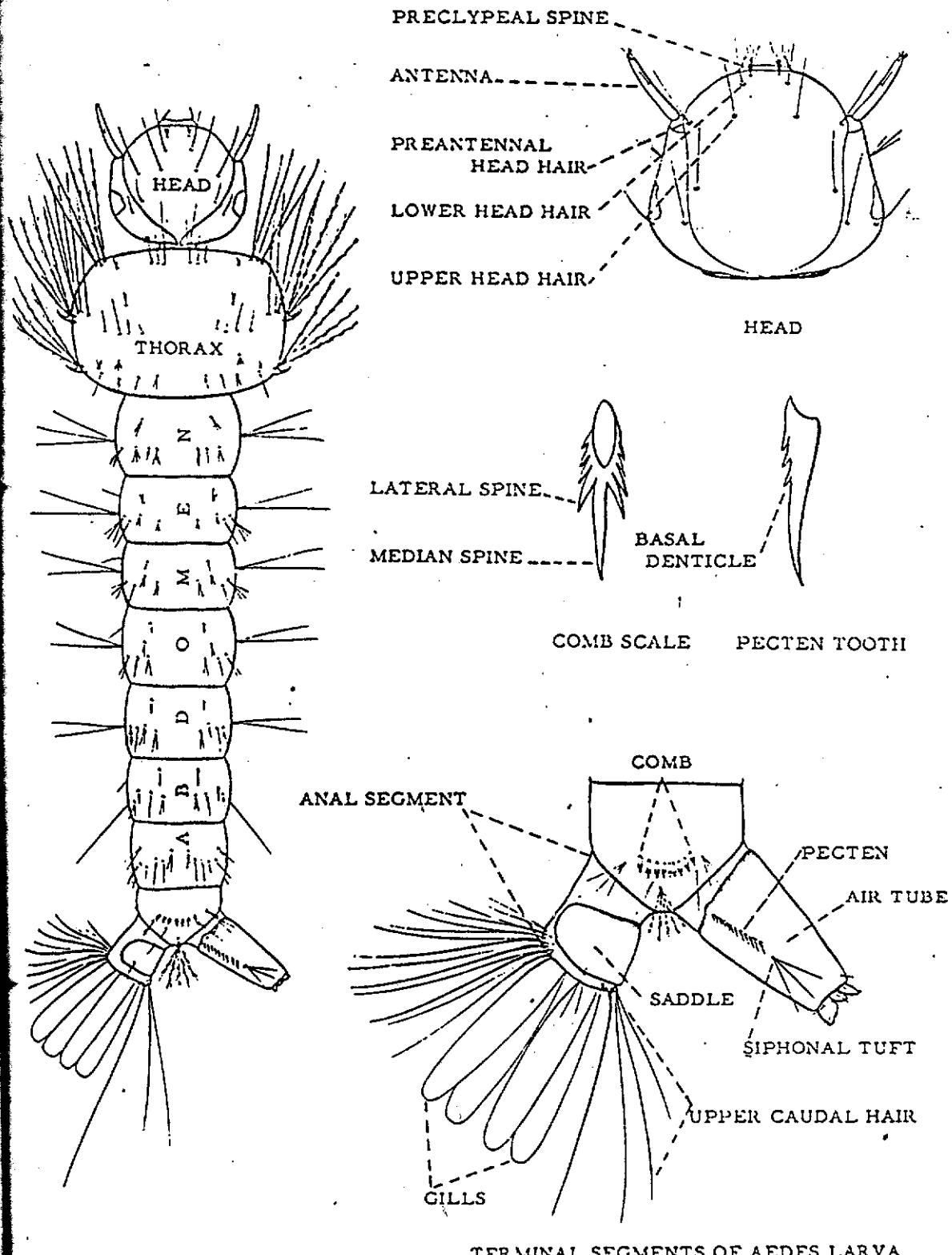


Fig. 1 B

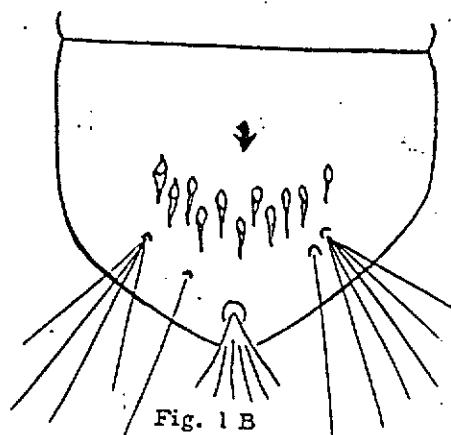
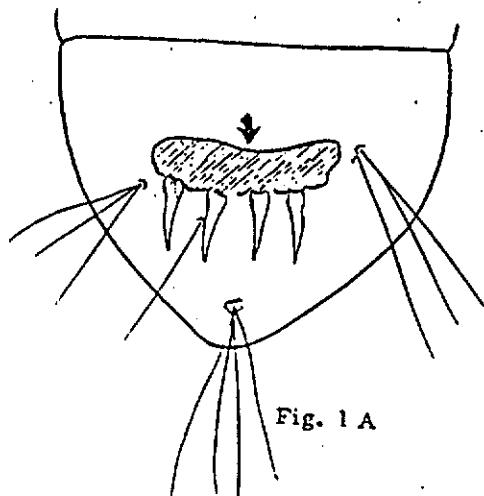
AEDES LARVA



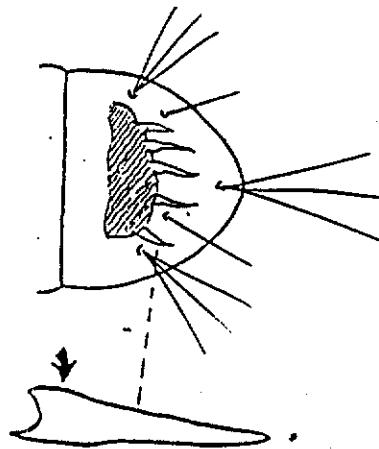
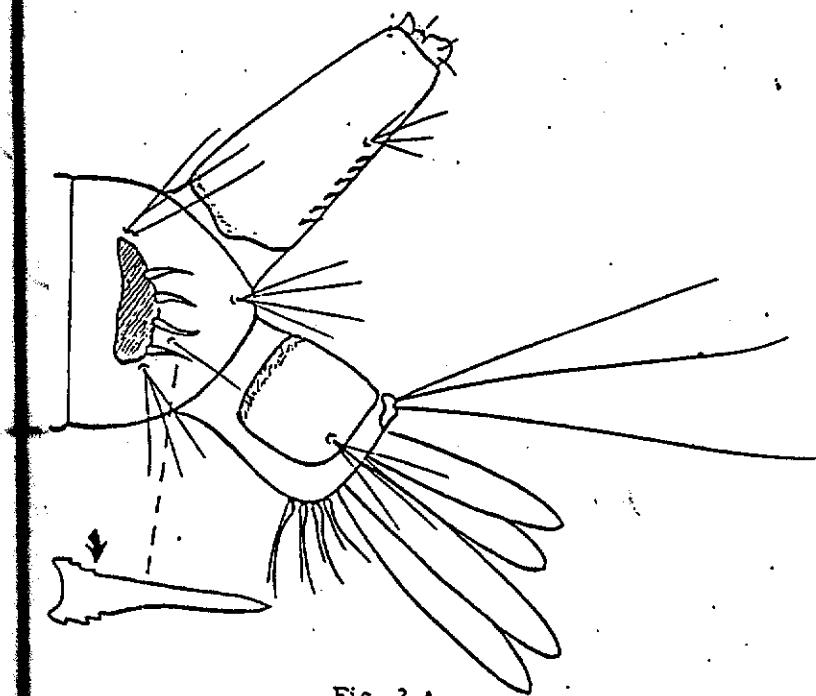
TERMINAL SEGMENTS OF AEDES LARVA

KEY TO AEDES LARVAE

1. Abdominal segment 8 with chitinized plate (Fig. 1 A)..... 2
 Abdominal segment 8 without chitinized plate (Fig. 1 B)..... 4



2. Chitinized plate on abdominal segment 8 with 3-4 comb scales; comb scales with basal denticles (Fig. 2 A)..... desmotes
 Chitinized plate on abdominal segment 8 with 5-6 comb scales; comb scales without basal denticles (Fig. 2 B)..... 3



4 Pecten teeth without lateral denticles (Fig. 3 A).....annandalei

Pecten teeth with lateral denticles (Fig. 3 B).....mediopunctatus

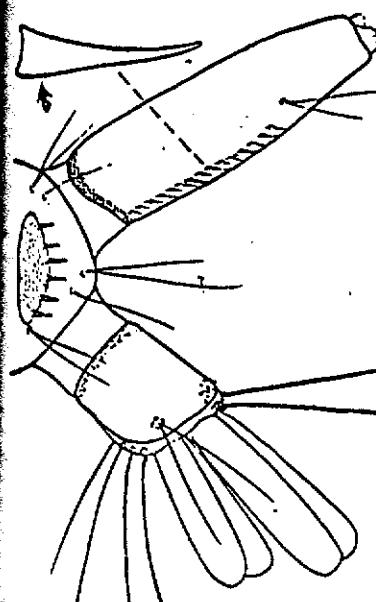


Fig. 3 A

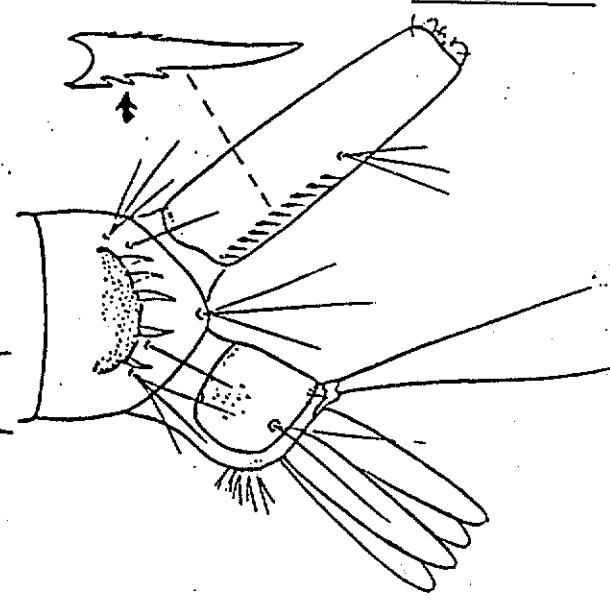


Fig. 3 B

4 Siphonal tuft stout (Fig. 4 A).....elsiae

Siphonal tuft not stout (Fig. 4 B).....5

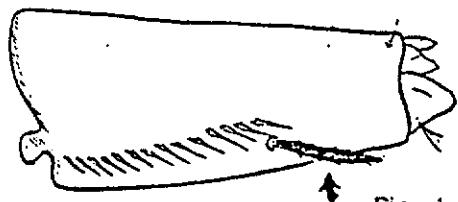


Fig. 4 A

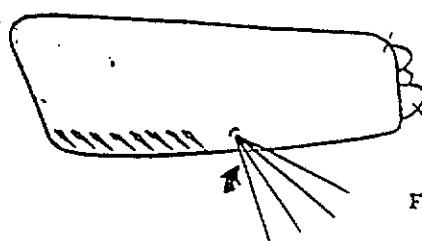


Fig. 4 B

5 Air tube with apical row of stout spines (Fig. 5 A).....coccus

Air tube without apical row of stout spines (Fig. 5 B).....6



Fig. 5 A

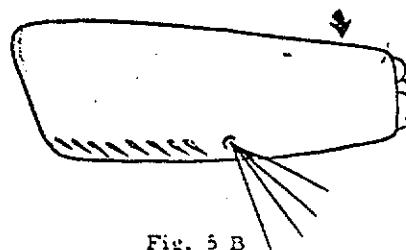


Fig. 5 B

6. Thorax with 4 sets of stout dorsal spines (Fig. 6 A). macfarlanei

Thorax without 4 sets of stout dorsal spines (Fig. 6 B)..... 7

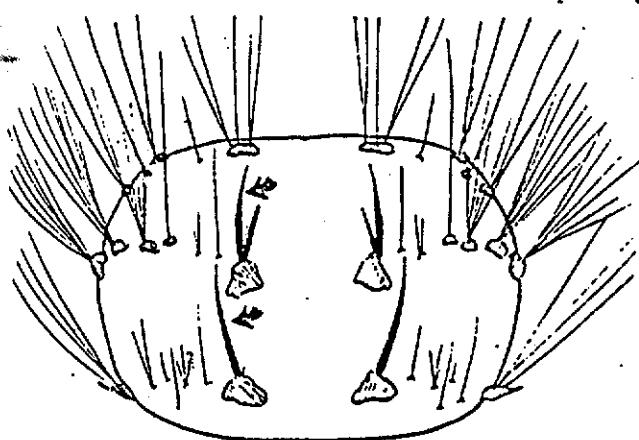


Fig. 6 A

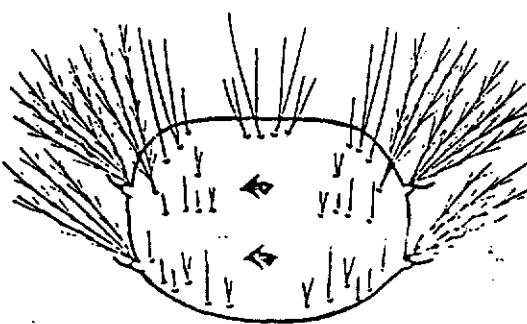


Fig. 6 B

7. Air tube about 5 times as long as basal width (Fig. 7 A)..... 8

Air tube not over 4 times as long as basal width (Fig. 7 B)..... 9



Fig. 7 A

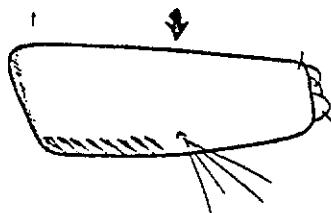


Fig. 7 B

8. Pecten with distal teeth widely spaced (Fig. 8 A). mediolineatus

Pecten with all teeth evenly spaced (Fig. 8 B). niveodes

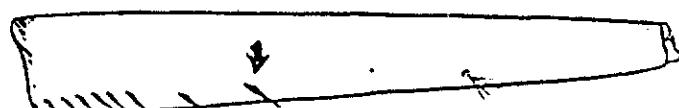


Fig. 8 A

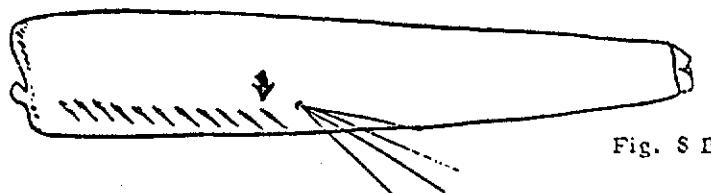


Fig. 8 B

9. Comb scales in single row (Fig. 9 A)..... 10

Comb scales in triangular patch or double row (Fig. 9 B)..... 19

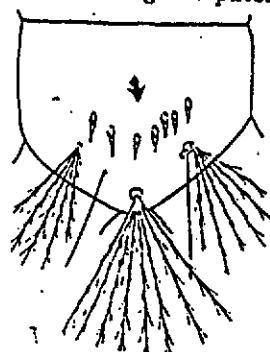


Fig. 9 A

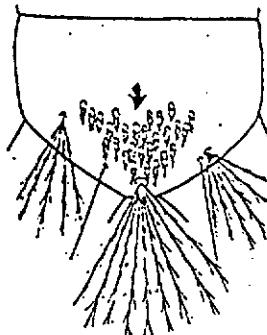


Fig. 9 B

10. Pecten teeth extending to near apex of air tube; siphonal tuft inserted within pecten (Fig. 10 A)..... vittatus

Pecten teeth not extending to near apex of air tube; siphonal tuft inserted beyond pecten (Fig. 10 B)..... 11

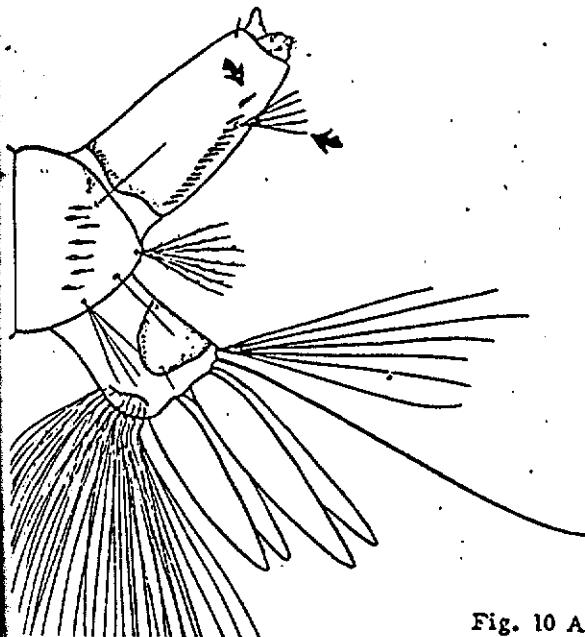


Fig. 10 A

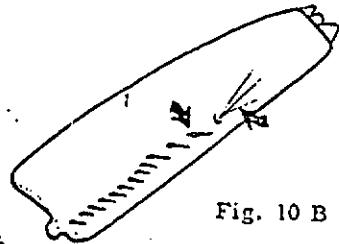


Fig. 10 B

11. Saddle with spines on posterior margin (Fig. 11 A)..... 12

Saddle without spines on posterior margin (Fig. 11 B)..... 14

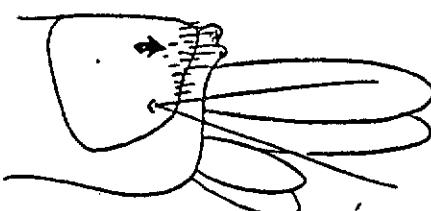


Fig. 11 A

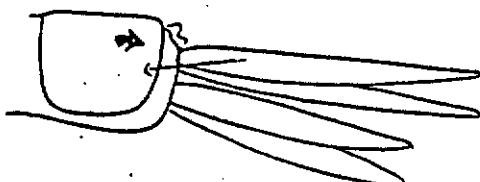


Fig. 11 B

12. Anal segment completely ringed by saddle; distal pecten teeth widely separated (Fig. 12 A) imprimens

Anal segment not completely ringed by saddle; distal pecten teeth not widely separated (Fig. 12 B) 13

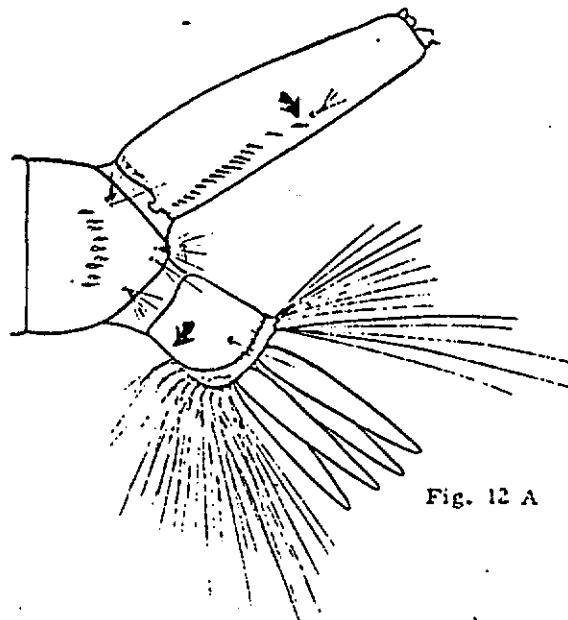


Fig. 12 A

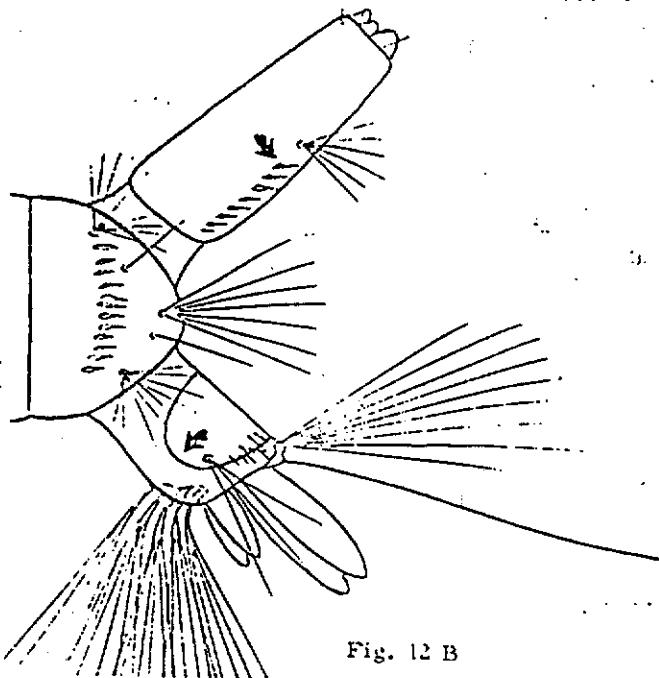


Fig. 12 B

13. Air tube about 2 times as long as basal width; pecten teeth 17-23 (Fig. 13 A) niveus

Air tube about 2 1/2 times as long as basal width; pecten teeth fewer than 10 (Fig. 13 B) albolineatus

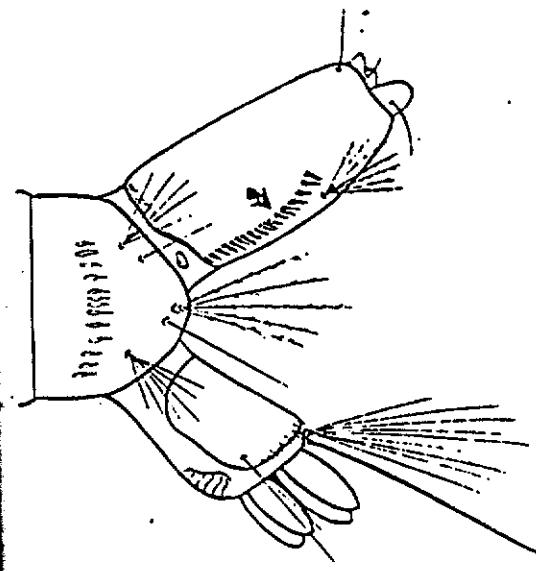


Fig. 13 A

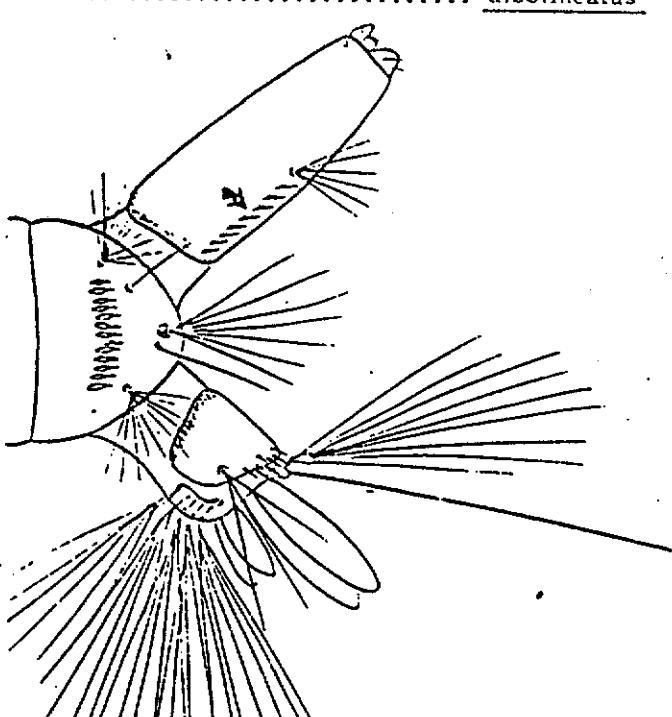


Fig. 13 B

14. Antenna with many spicules (Fig. 14 A).....15

Antenna smooth or with few spicules (Fig. 14 B).....16

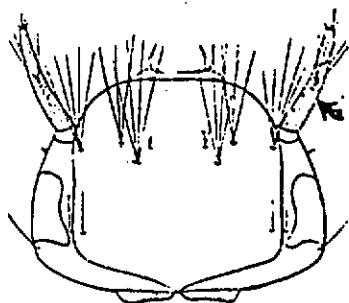


Fig. 14 A

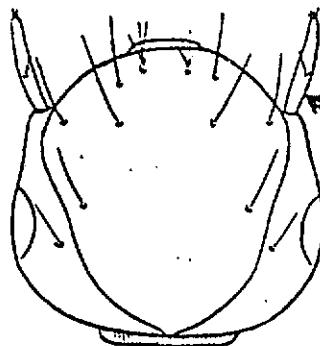


Fig. 14 B

15. Air tube with siphonal tuft about as long as distal pecten tooth (Fig. 15 A)....lineatopennis

Air tube with siphonal tuft about half the diameter of air tube at base (Fig. 15 B)....vexans

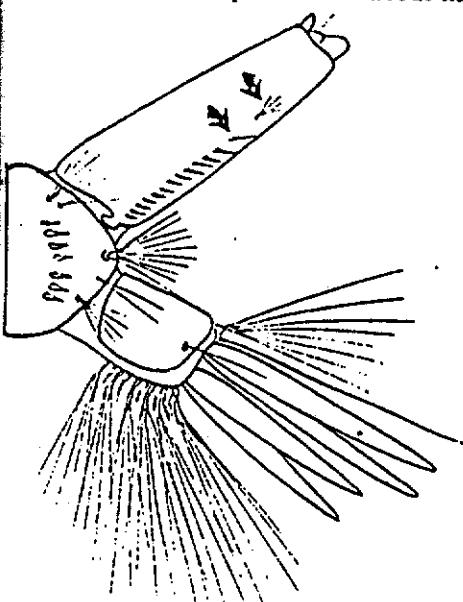


Fig. 15 A

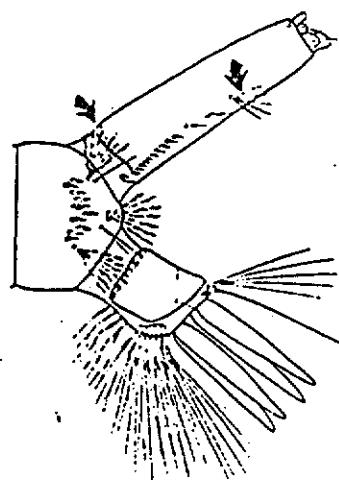


Fig. 15 B

16. Upper, lower, preantennal and antennal hairs all multiple (Fig. 16 A).....17

Upper, lower, preantennal and antennal hairs not all multiple (Fig. 16 B).....18

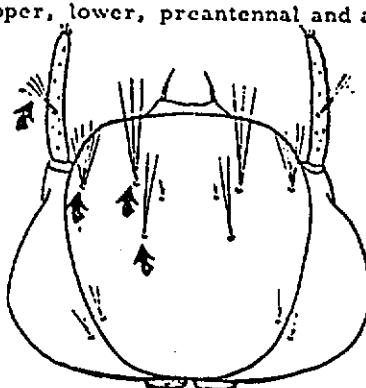


Fig. 16 A

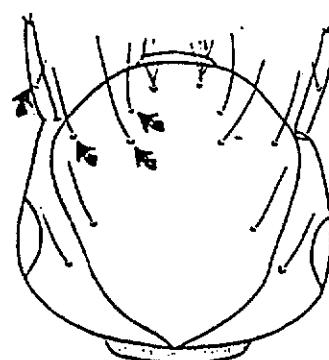


Fig. 16 B

17. Comb scale with prominent median spine (Fig. 17 A)..... dux
 Comb scale with apical fringe; distal pecten tooth with denticles (Fig. 17 B)..... butleri
 Comb scale with apical fringe; distal pecten tooth without denticles (Fig. 17 C)
 andamanensis

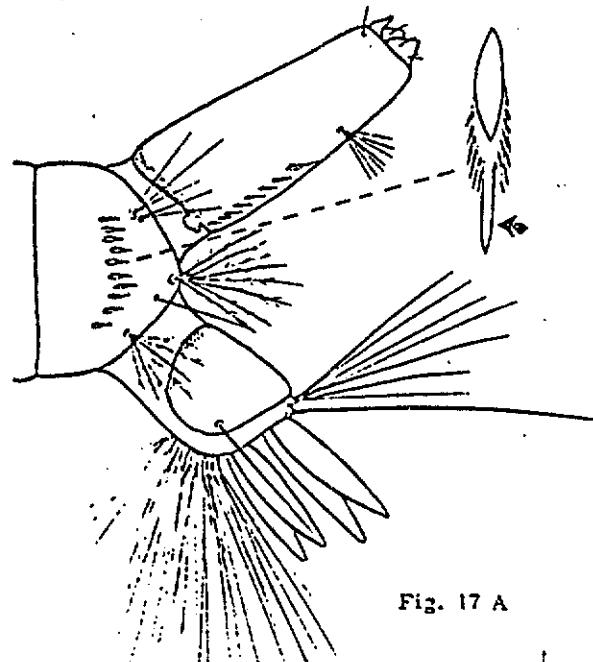


Fig. 17 A

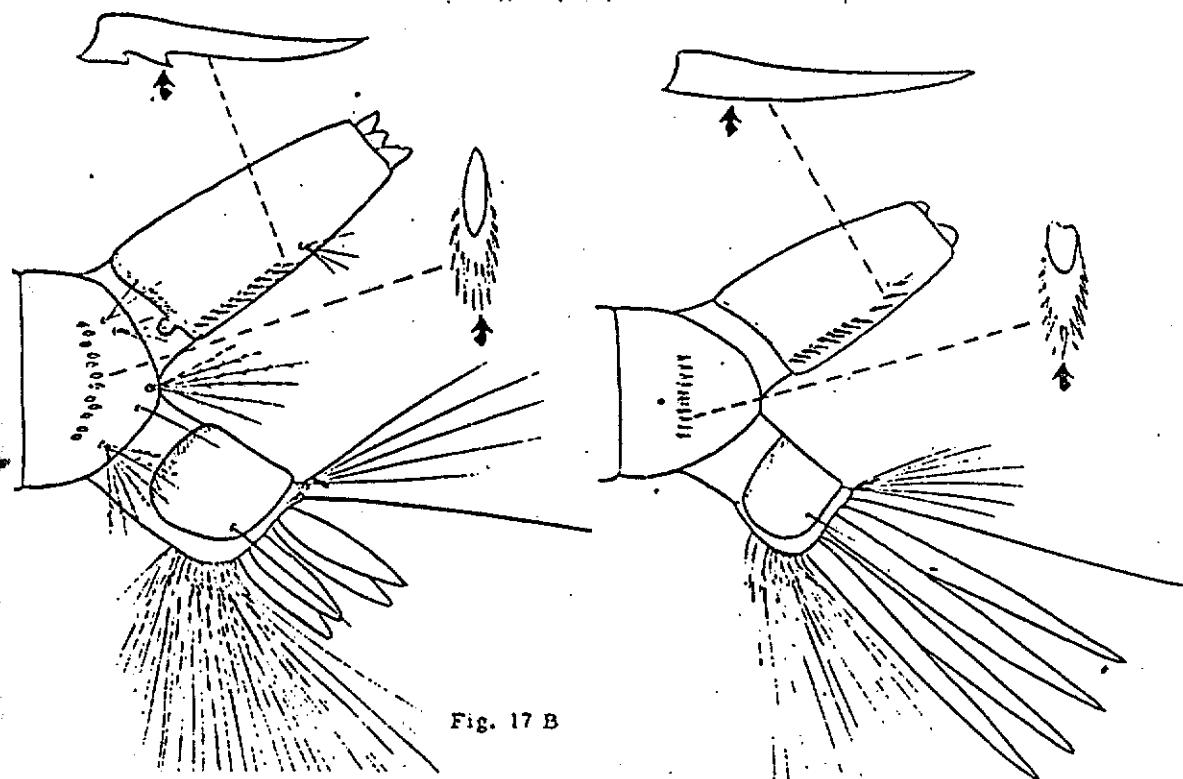


Fig. 17 B

47

Fig. 17 C

18

- Comb scale with stout median and lateral spines (Fig. 18 A)..... aegypti
 Comb scale with fringe (Fig. 18 B)..... pseudoalbopictus and albopictus

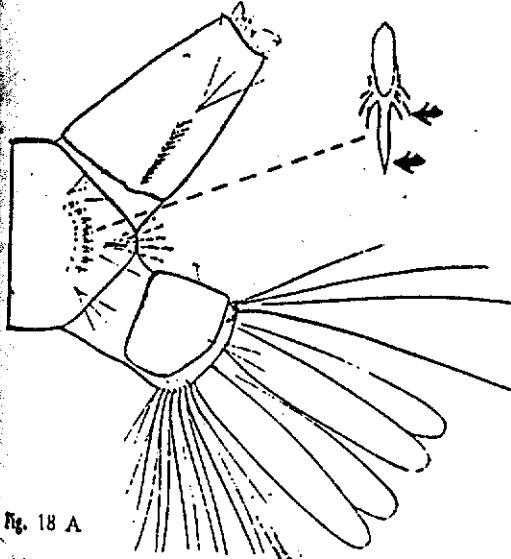


Fig. 18 A

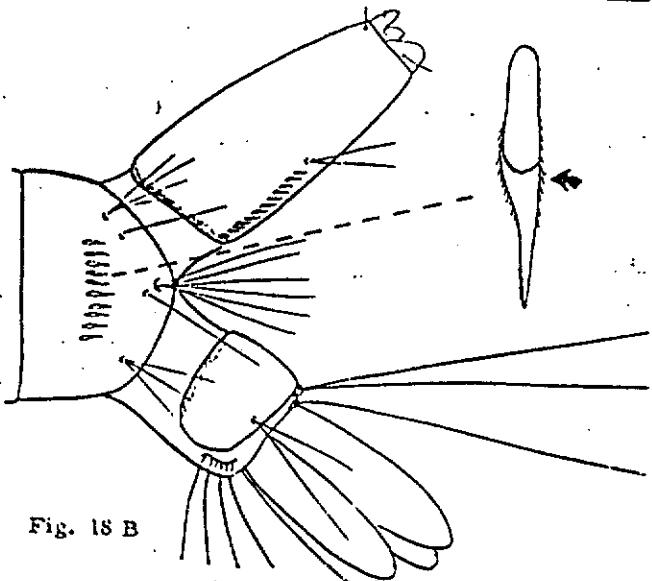


Fig. 18 B

19

- Pecten teeth extending to near apex of air tube (Fig. 19 A)..... 20
 Pecten teeth not extending to near apex of air tube (Fig. 19 B)..... 21

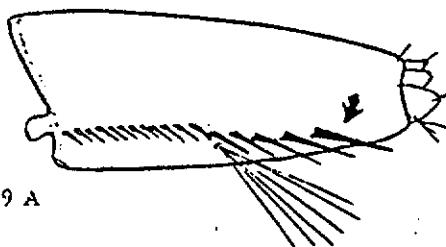


Fig. 19 A



Fig. 19 B

20

- 4-5 pecten teeth between siphonal tuft and apex of air tube (Fig. 20 A)..... saxicola
 2 pecten teeth between siphonal tuft and apex of air tube (Fig. 20 B)..... chrysolineatus

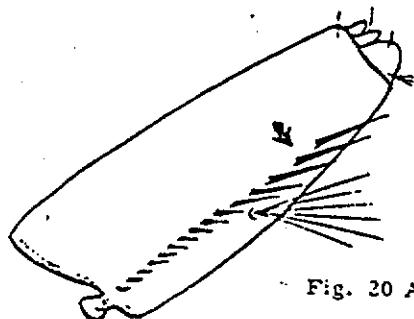


Fig. 20 A

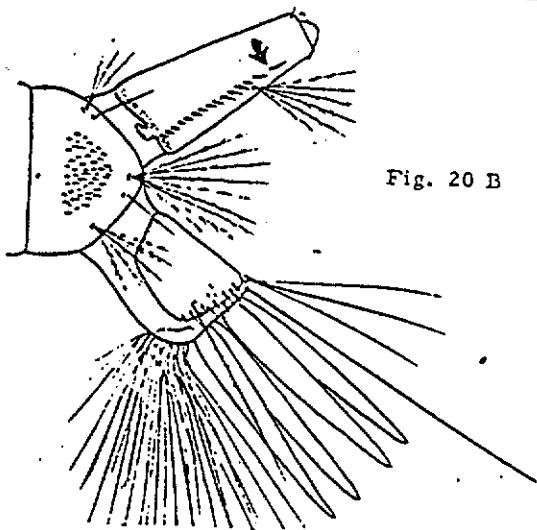


Fig. 20 B

- II. Air tube with siphonal tuft inserted near apex of air tube (Fig. 21 A)..... longirostris
 Air tube with siphonal tuft inserted near middle of air tube (Fig. 21 B)..... 22

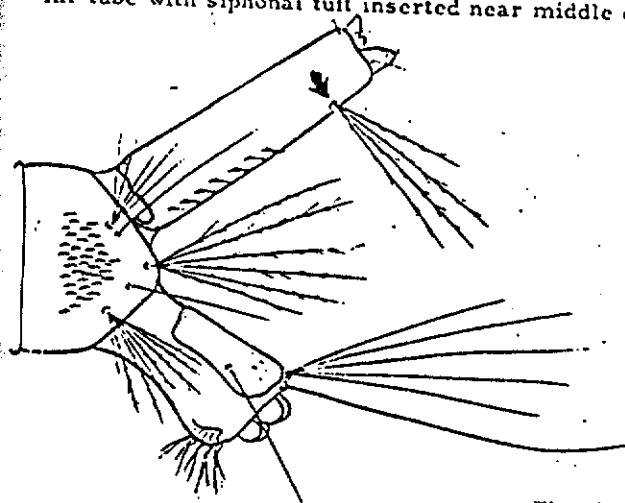


Fig. 21 A

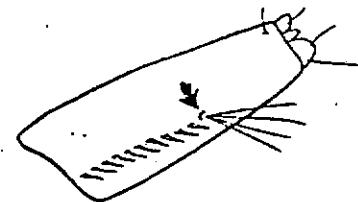


Fig. 21 B

- III. Head with preclypeal spine usually double (Fig. 22 A)..... poicilius
 Head with preclypeal spine single (Fig. 22 B)..... 23*

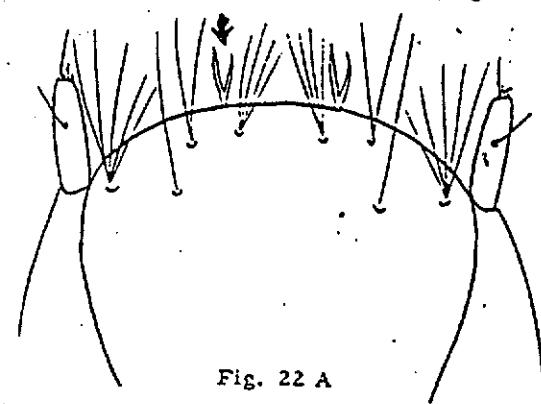


Fig. 22 A

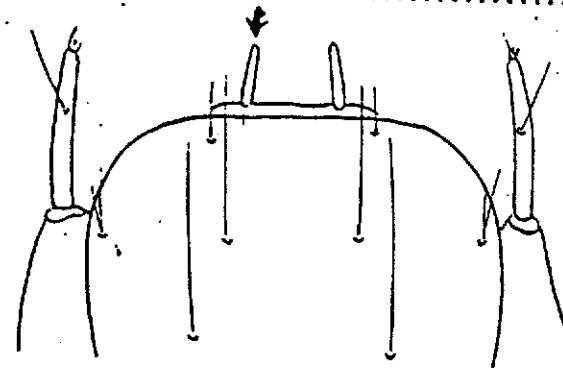


Fig. 22 B

- IV. Head with blunt preclypeal spine (Fig. 23 A)..... 24
 Head with pointed preclypeal spine (Fig. 23 B)..... 25

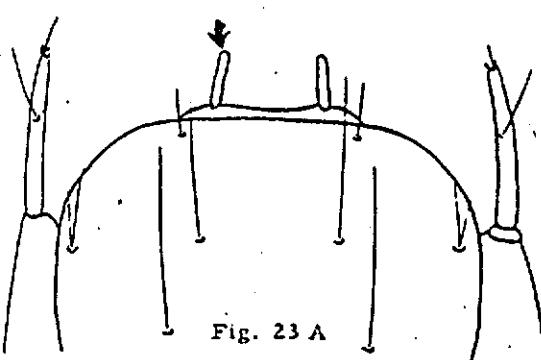


Fig. 23 A

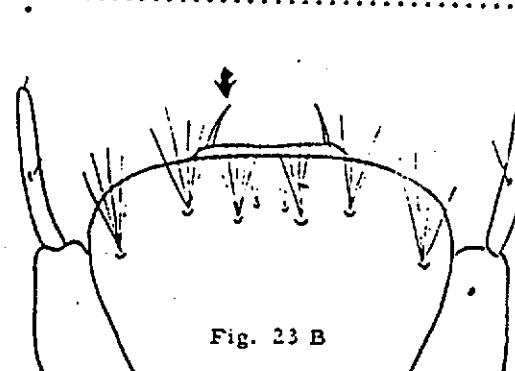


Fig. 23 B

*A. prominens, which is not keyed beyond this point because the status of the preclypeal is unknown, probably keys out with A. assamensis.

24
Upper caudal hair with 2 branches (Fig. 24 A).....assamensis

Upper caudal hair with 6-8 branches (Fig. 24 B).....khazani

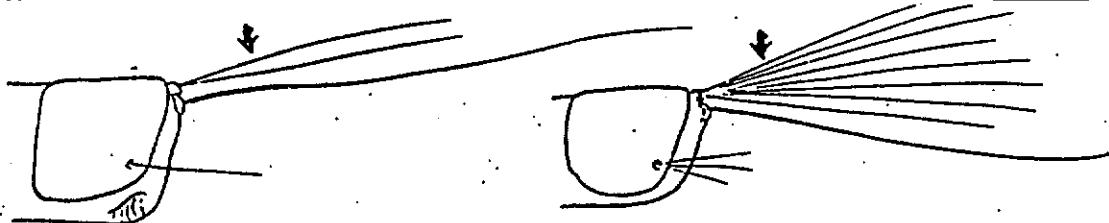


Fig. 24 A

Fig. 24 B

25
Upper and lower head hairs multiple (Fig. 25 A)..... 26

Upper and lower head hairs single (Fig. 25 B)..... 28

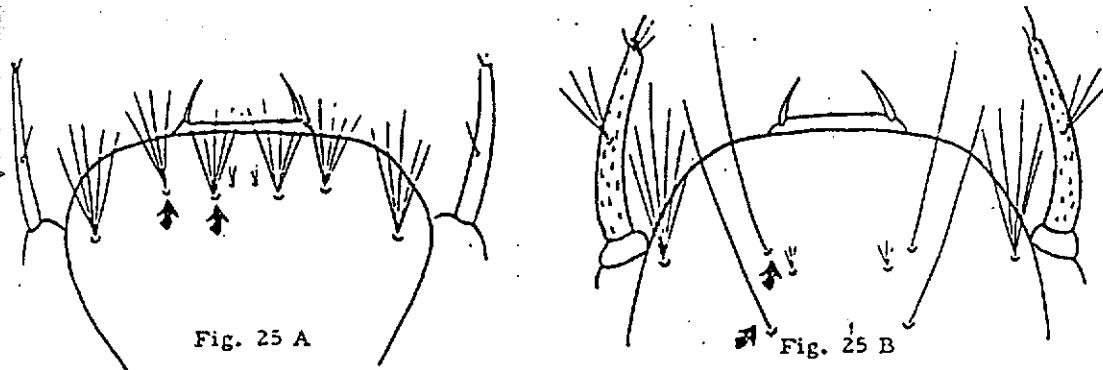


Fig. 25 A

Fig. 25 B

26
Antenna strongly curved (Fig. 26 A).....cancricomes

Antenna not strongly curved (Fig. 26 B)..... 27

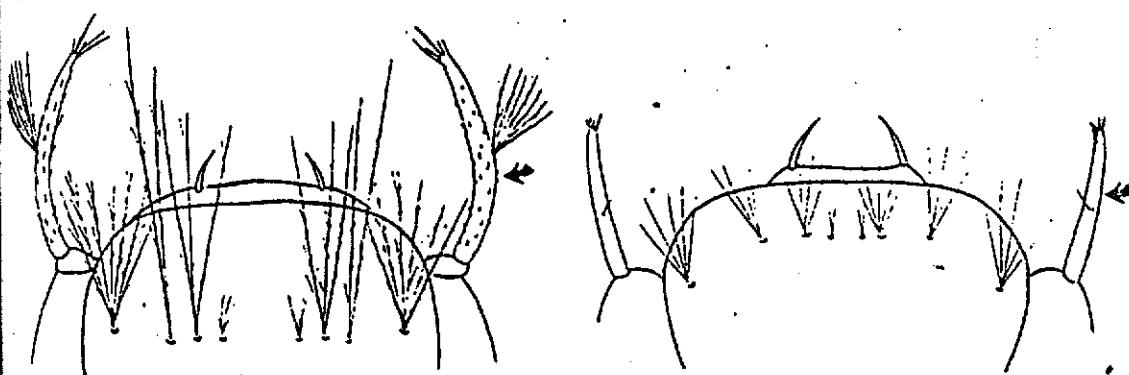


Fig. 26 A

Fig. 26 B

27. Air tube about 3 1/2 times as long as basal width (Fig. 27 A)..... alboscutellatus
 Air tube about 2 times as long as basal width (Fig. 27 B)..... tunkinensis

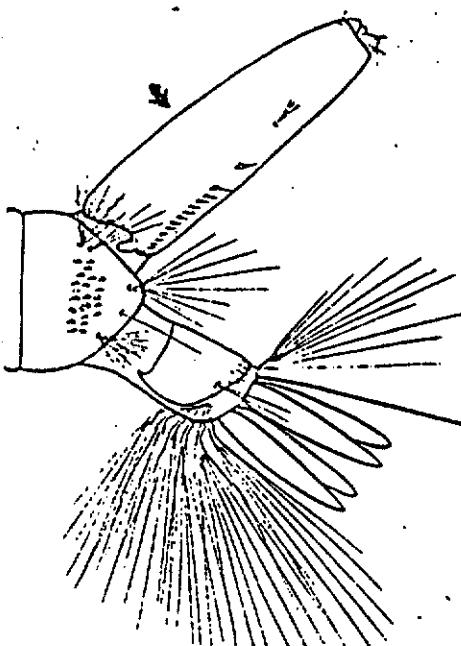


Fig. 27 A

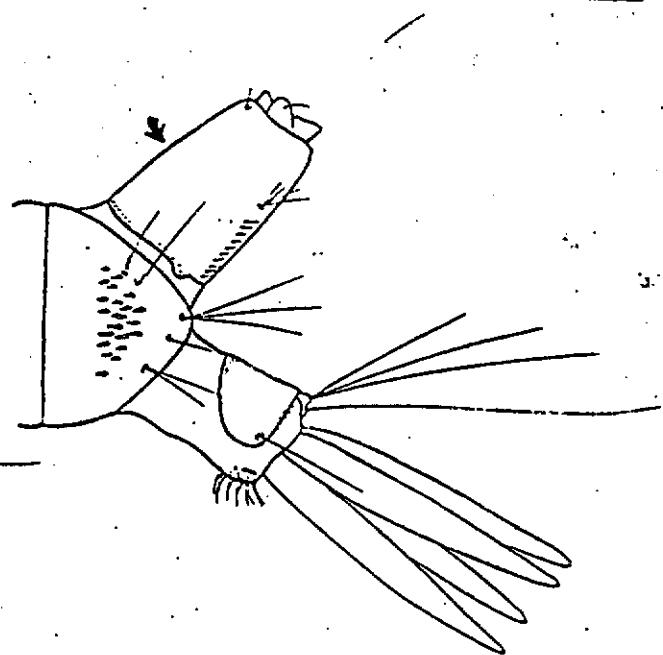


Fig. 27 B

28. Preclypeal spines about as long as antenna (Fig. 28 A)..... amesi
 Preclypeal spines much shorter than antenna (Fig. 28 B)..... 29

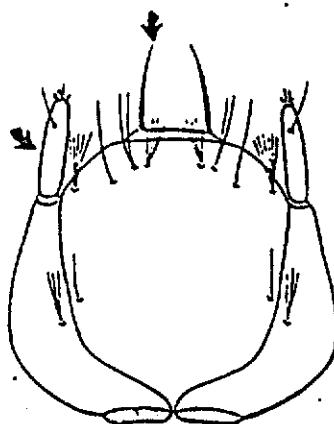


Fig. 28 A

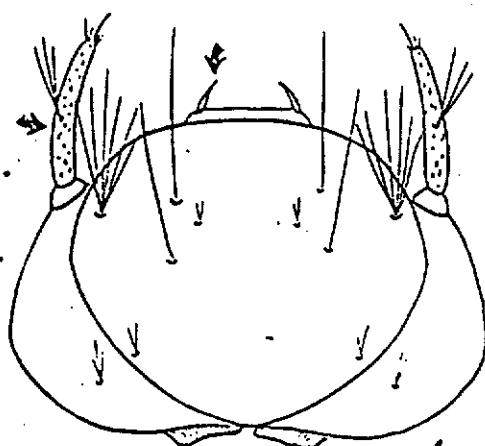
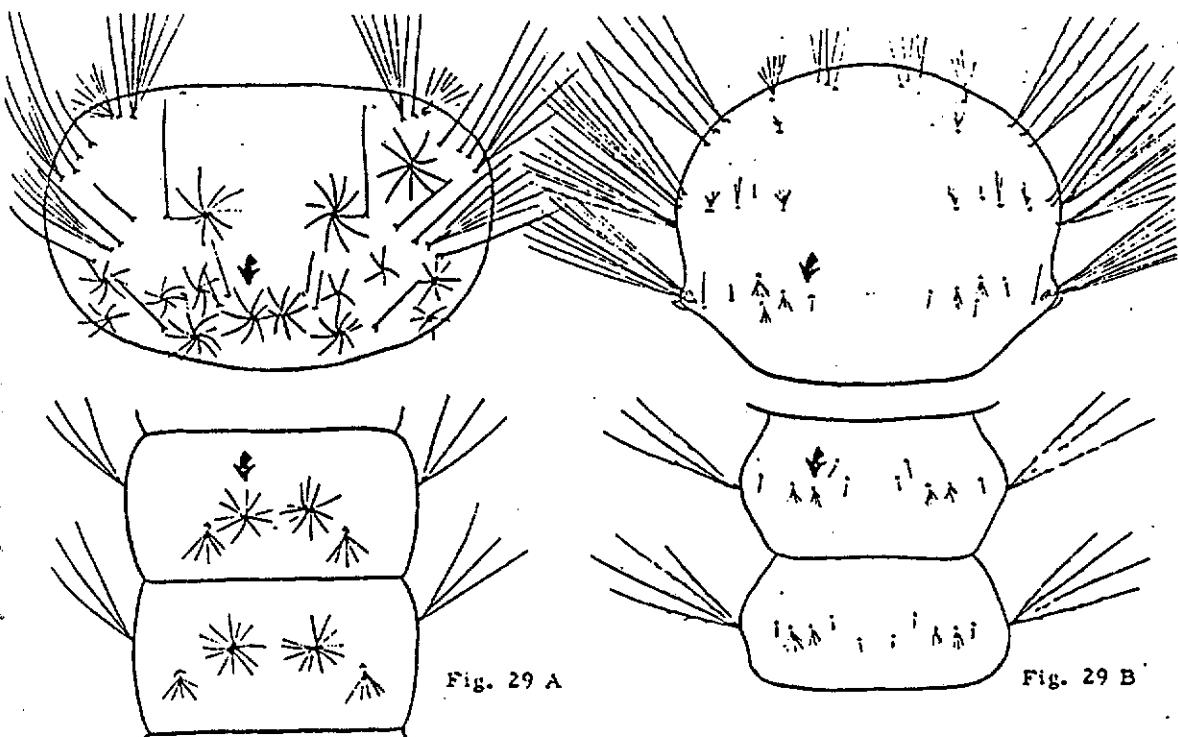
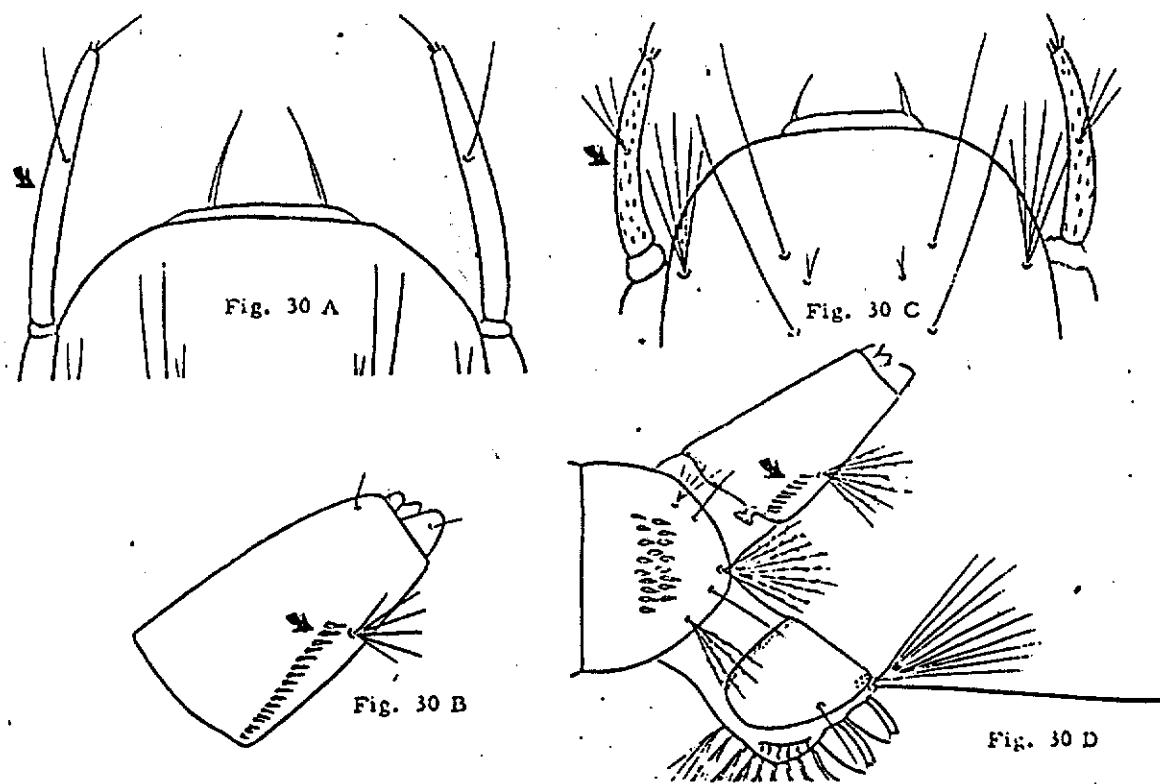


Fig. 28 B

29. Thorax and abdomen with stellate hairs (Fig. 29 A). alongi
 Thorax and abdomen without stellate hairs (Fig. 29 B). 30



30. Antenna smooth; 14-17 pecten teeth (Fig. 30 A & B). gubernatoris
 Antenna spiculate; 5-12 pecten teeth (Fig. 30 C & D). vigilax



KEY TO ARMIGERES LARVAE

1. Comb scale apically frayed (Fig. 1 A)..... 2

Comb scale not apically frayed (Fig. 1 B)..... 4



Fig. 1 A

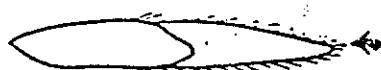


Fig. 1 B

2. Comb scales 5-6 (Fig. 2 A)..... magnus

Comb scales 10 or more (Fig. 2 B)..... 3

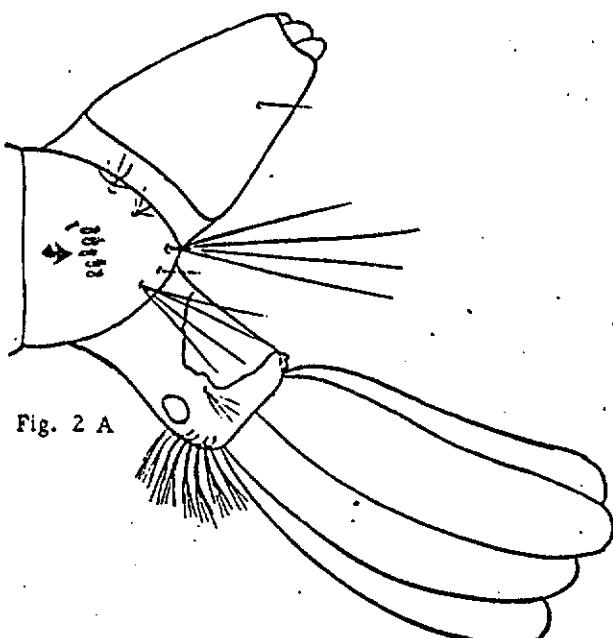


Fig. 2 A

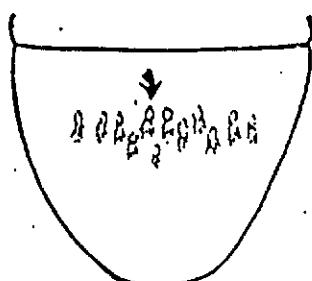


Fig. 2 B

3. Anal segment with large ventral plate (Fig. 3 A)..... flavus

Anal segment without large ventral plate (Fig. 3 B)..... annulitarsis

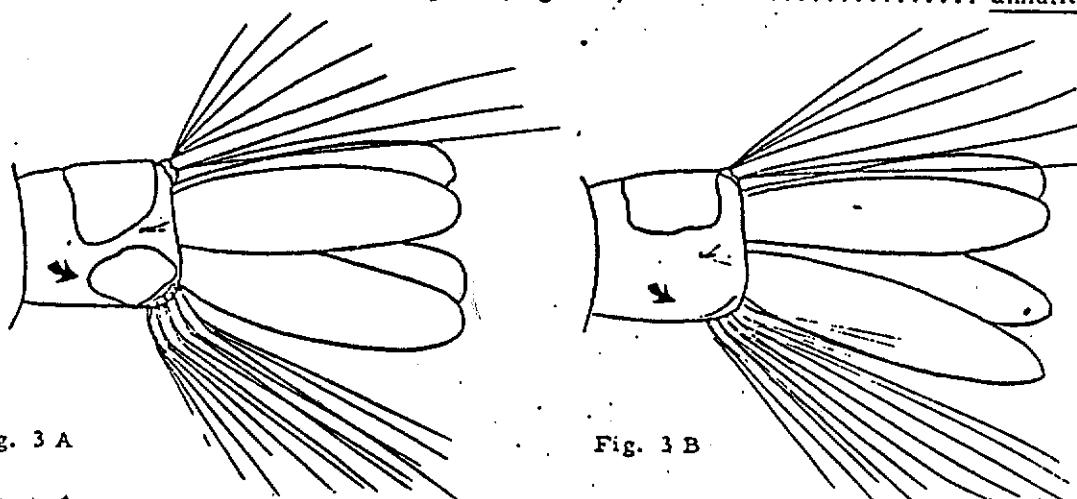


Fig. 3 A

Fig. 3 B

- Comb with about 70 scales (Fig. 4 A)..... longipalpis
- Comb with fewer than 50 scales (Fig. 4 B)..... 5

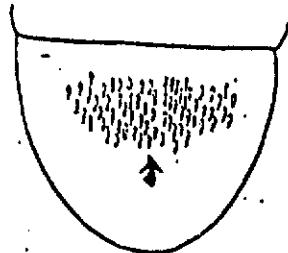


Fig. 4 A

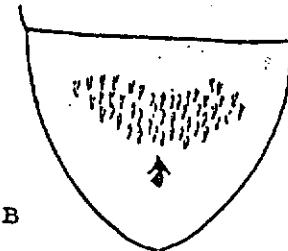


Fig. 4 B

- Abdominal segments 1-5 with prominent tubercles at base of setae (Fig. 5 A)..... 6
- Abdominal segments 1-5 without prominent tubercles at base of setae (Fig. 5 B)..... 7

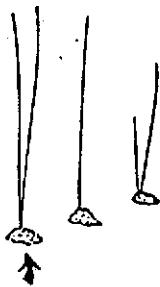


Fig. 5 A



Fig. 5 B

- Hair 5 on abdominal segment 8 finely branched (Fig. 6 A)..... dolichocephalus
- Hair 5 on abdominal segment 8 stout, single or bifid (Fig. 6 B)..... pectinatus

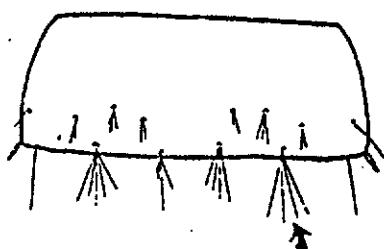


Fig. 6 A

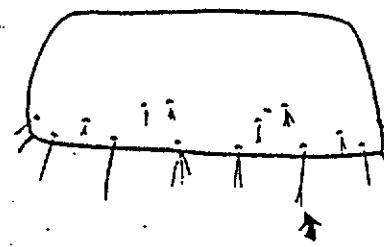


Fig. 6 B

7. Lateral hair simple, stout, inserted on saddle (Fig. 7 A)..... kuchingensis
 Lateral hair multiple, minute, not inserted on saddle (Fig. 7 B)..... 8

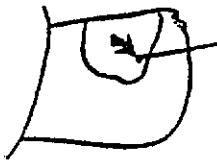


Fig. 7 A

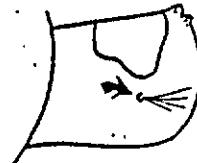


Fig. 7 B

8. Distance between head hairs 5 and 6 twice the distance between head hairs 4 and 6 (Fig. 8 A) durhami
 Distance between head hairs 5 and 6 equal to the distance between head hairs 4 and 6 (Fig. 8 B)..... 9



Fig. 8 A

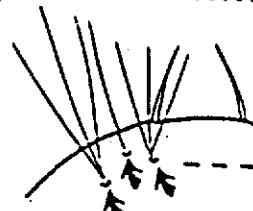
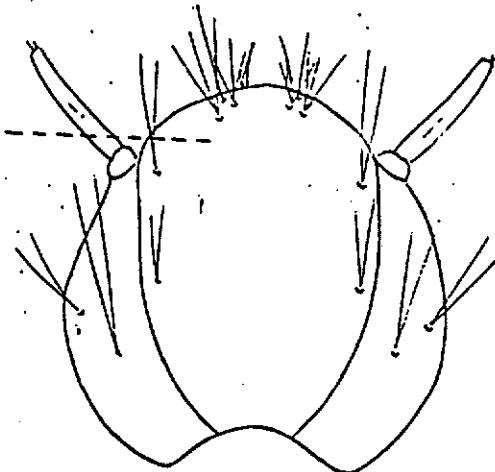


Fig. 8 B



9. Head hair 5 minute, 2-3 branched (Fig. 9 A)..... subalbatus
 Head hair 5 prominent, 3-5 branched (Fig. 9 B)..... aureolineatus

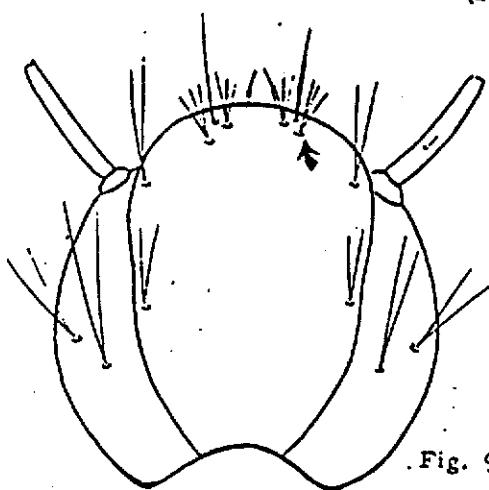


Fig. 9 A

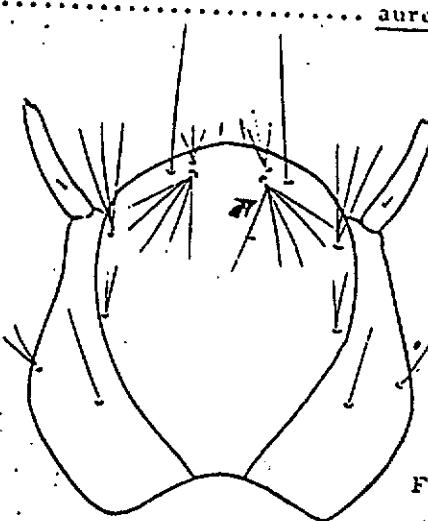
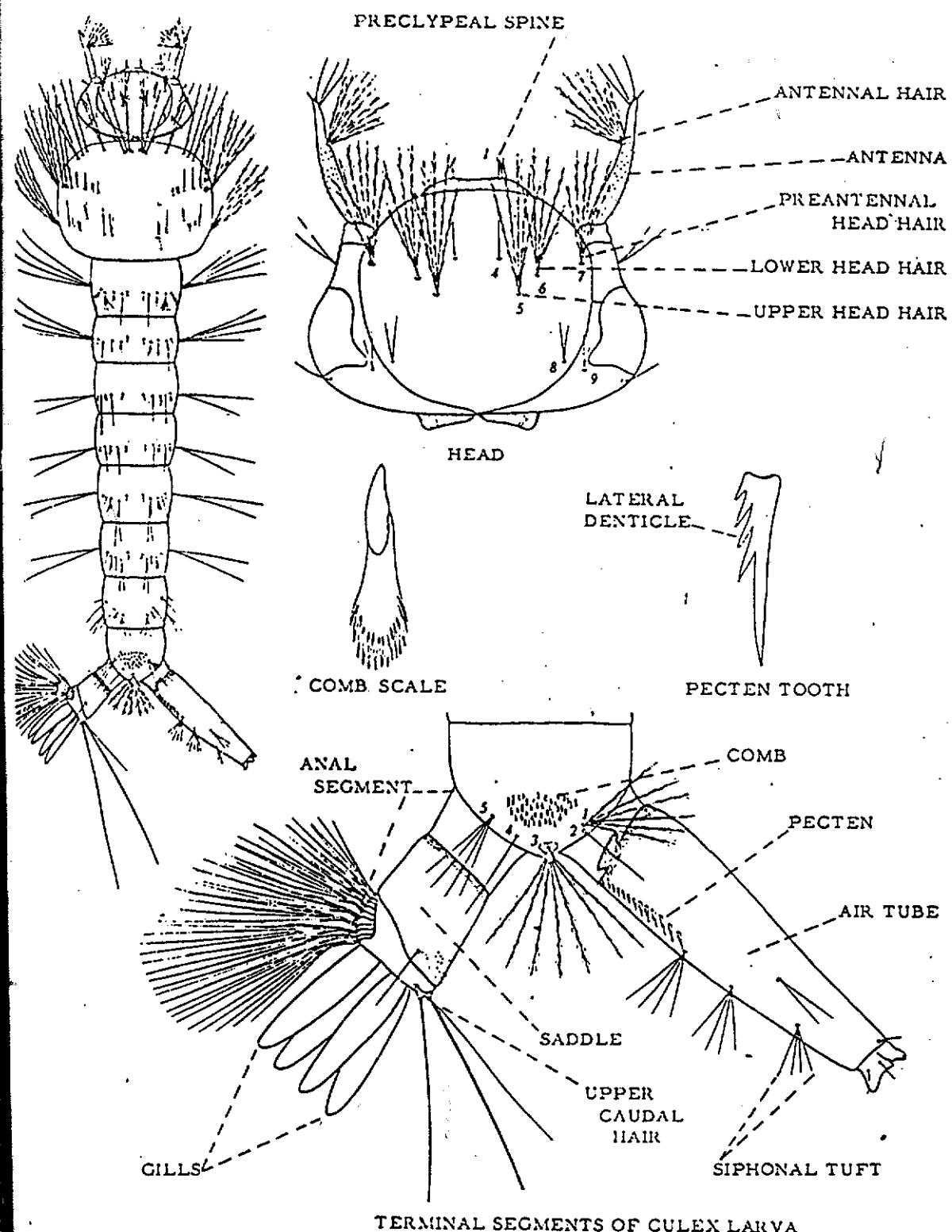


Fig. 9 B

CULEX LARVA



KEY TO CULEX LARVAE

1. Pecten teeth extending to near apex of air tube (Fig. 1 A) fuscanus, vorax, halifaxi and raptor
Pecten teeth not extending to near apex of air tube (Fig. 1 B)..... 2

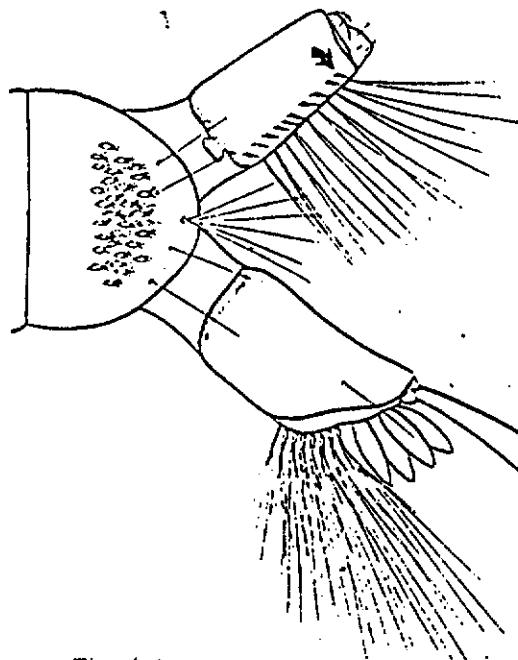


Fig. 1 A

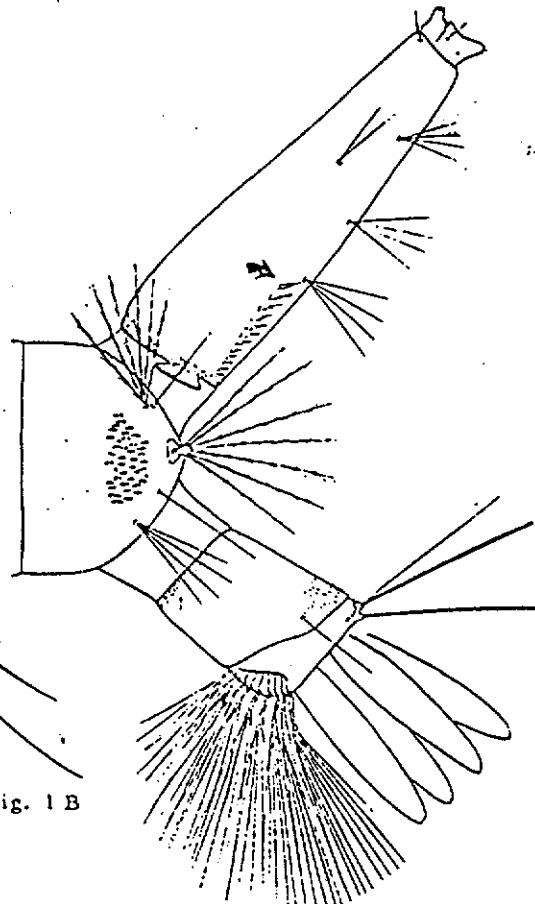


Fig. 1 B

2. Comb scales 4-12 (Fig. 2 A)..... 3
Comb scales 16 or more, usually in a triangular patch (Fig. 2 B)..... 7

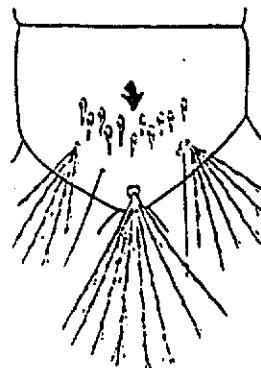


Fig. 2 A

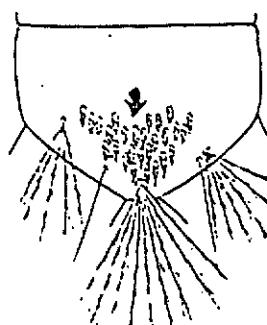
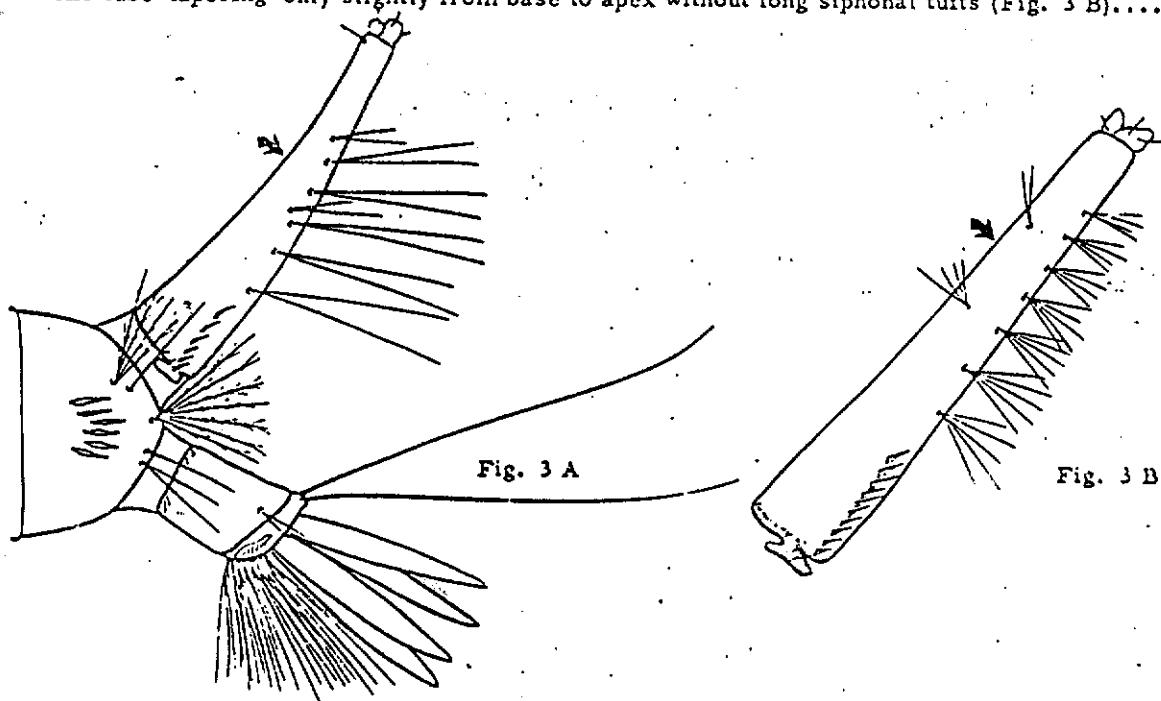
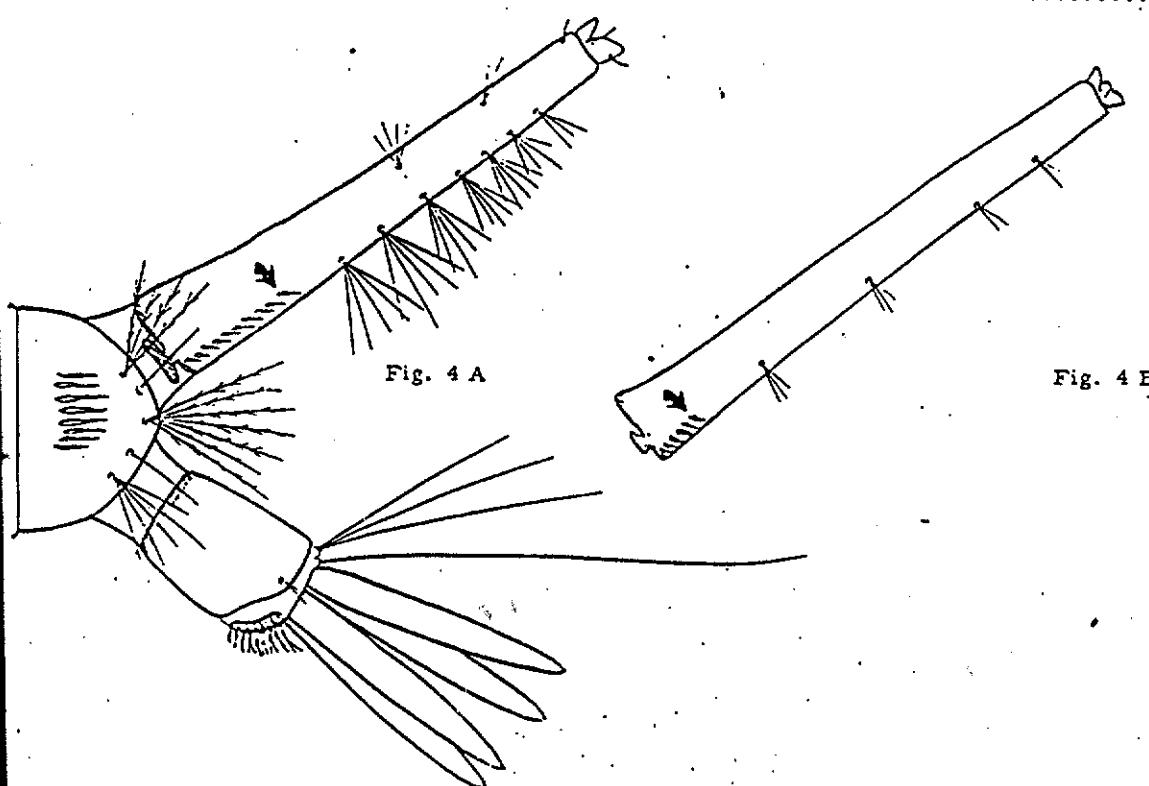


Fig. 2 B

3. Air tube tapering noticeably from base to apex with long siphonal tufts (Fig. 3 A)..... whitmorei
 Air tube tapering only slightly from base to apex without long siphonal tufts (Fig. 3 B).... 4



4. Pecten teeth extending to 1/3 of air tube (Fig. 4 A)..... pseudovishnui
 Pecten teeth extending to 1/5 of air tube (Fig. 4 B)..... 5



5. Pecten 8-12 (Fig. 5 A) pseudosinensis
 Pecten 1-7 (Fig. 5 B) 6

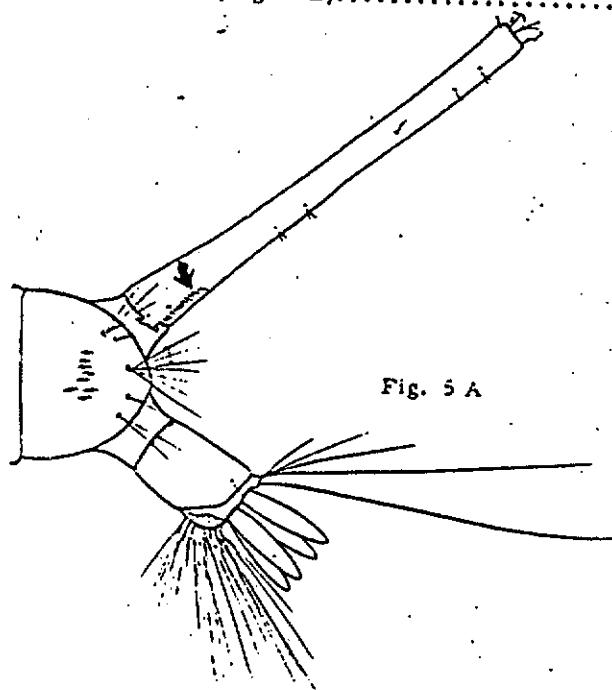


Fig. 5 A

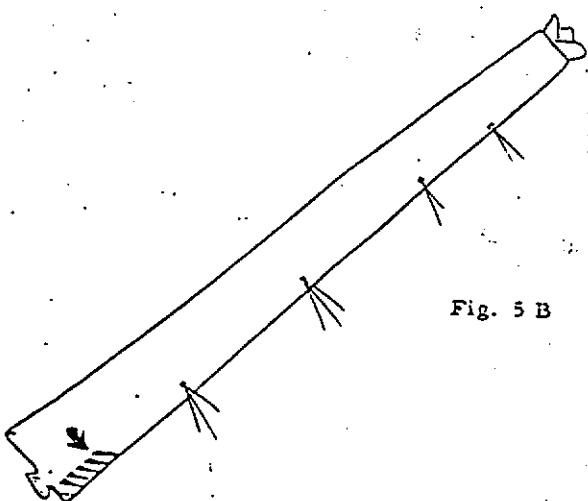


Fig. 5 B

6. Pecten 1-4; siphonal tufts 6 (Fig. 6 A) sinensis
 Pecten 1-7; siphonal tufts 4-5 (Fig. 6 B) bitaeniorhynchus

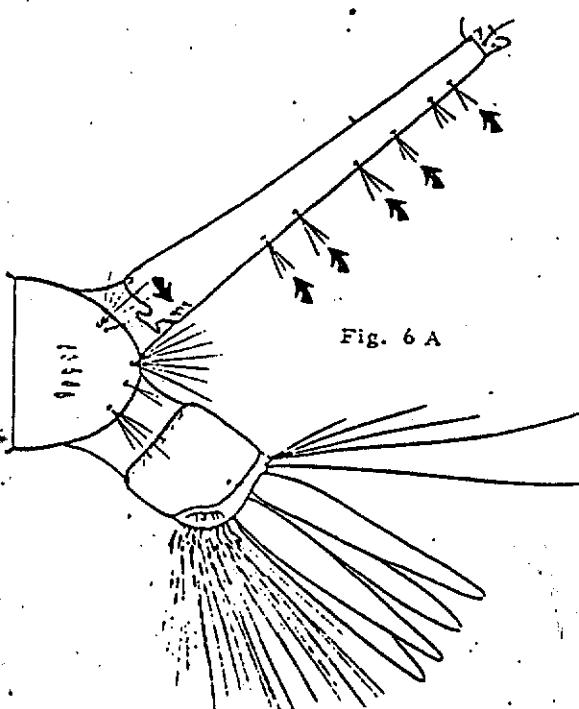


Fig. 6 A

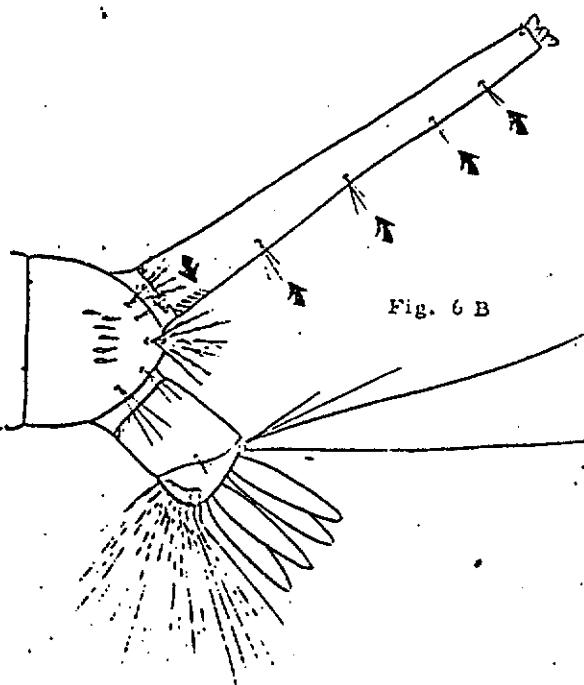


Fig. 6 B

1. Air tube swollen at middle (Fig. 7 A).....8
 2. Air tube not swollen at middle (Fig. 7 B).....10

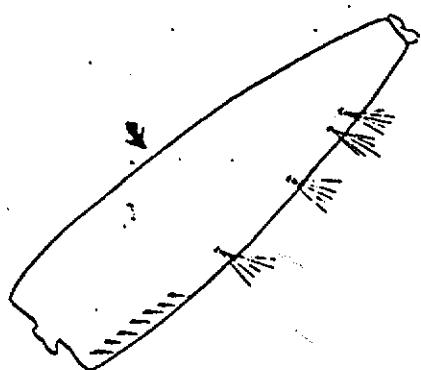


Fig. 7 A

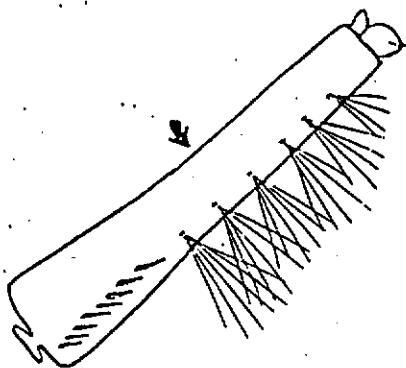


Fig. 7 B

1. Antennal tuft inserted at 2/3 from base (Fig. 8 A).....gelandus.
 Antennal tuft inserted about middle of shaft (Fig. 8 B).....9

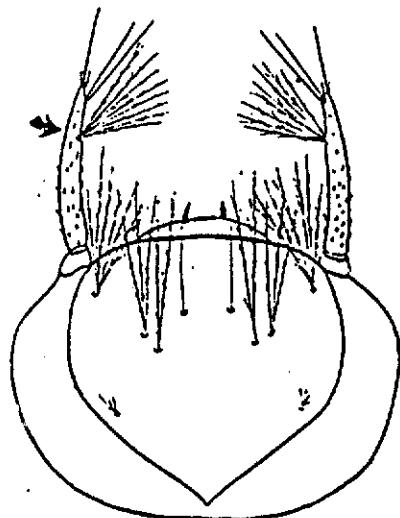


Fig. 8 A

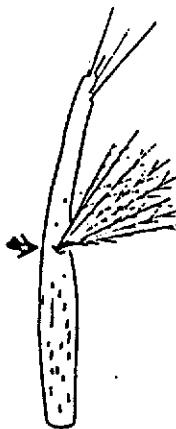


Fig. 8 B

9. Air tube greatly swollen at middle (Fig. 9 A)..... pallidothorax
 Air tube not greatly swollen at middle (Fig. 9 B)..... viridiventer

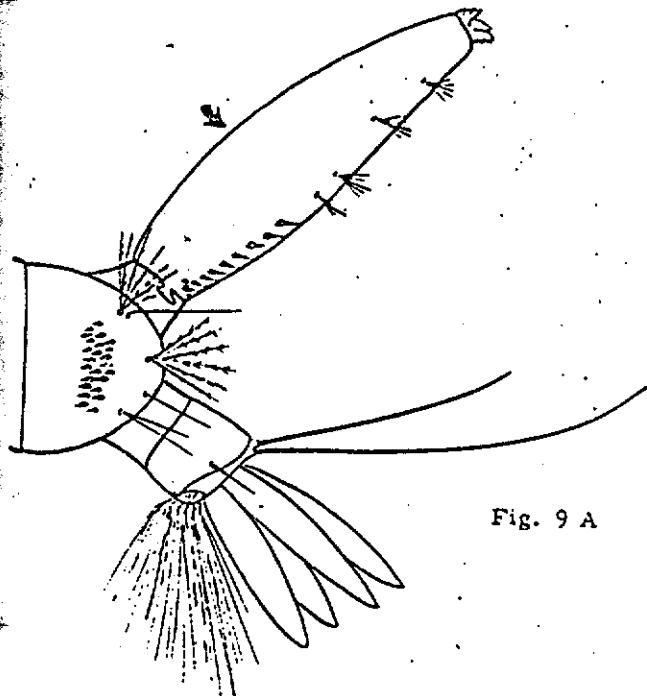


Fig. 9 A

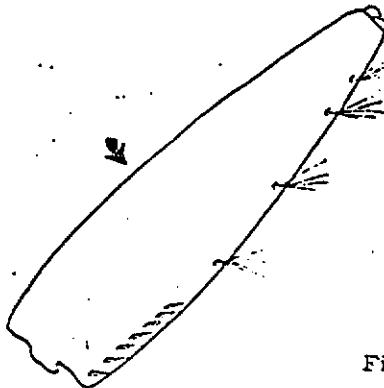


Fig. 9 B

10. Air tube with "false joint" beyond middle (Fig. 10 A)..... nigropunctatus
 Air tube without "false joint" beyond middle (Fig. 10 B)..... 11

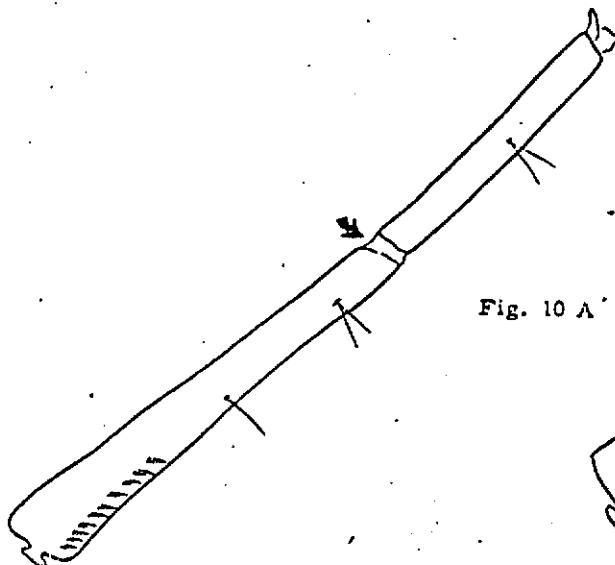


Fig. 10 A

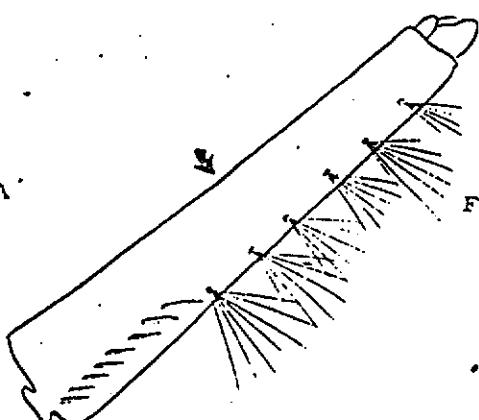


Fig. 10 B

- II. Preclypeal spine stout and rounded at tip (Fig. 11 A).....sitions
 Preclypeal spine tapering or if stout pointed at tip (Fig. 11 B).....12

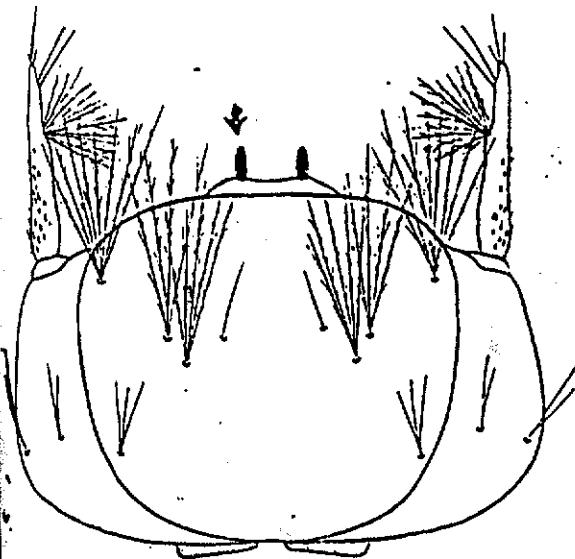


Fig. 11 A

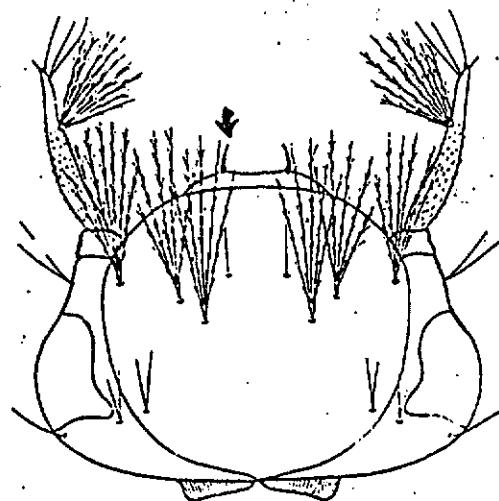


Fig. 11 B

- III. Pecten teeth with 2 sets of denticles (Fig. 12 A).....13
 Pecten teeth with 1 set of denticles (Fig. 12 B).....14



Fig. 12 A



Fig. 12 B

13. Median spine of comb scale about 5 times as long as lateral spines (Fig. 13 A)..... malayi

Median spine of comb scale about as long or slightly longer than lateral spines (Fig. 13 B). khazani

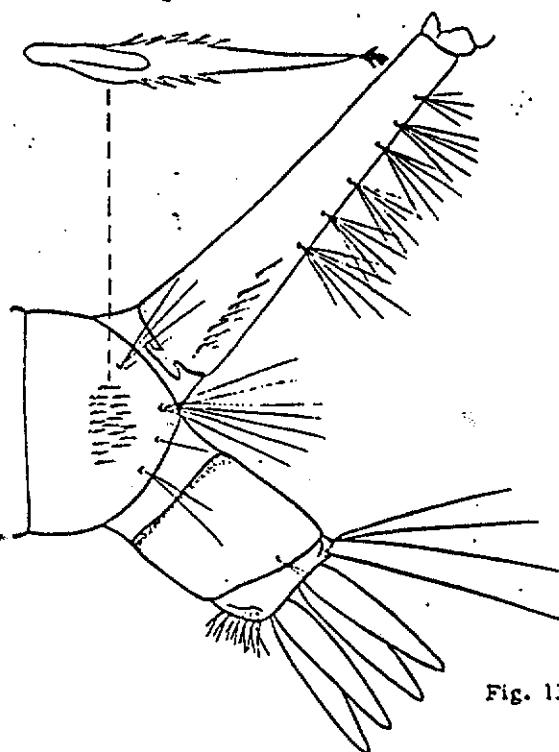


Fig. 13 A

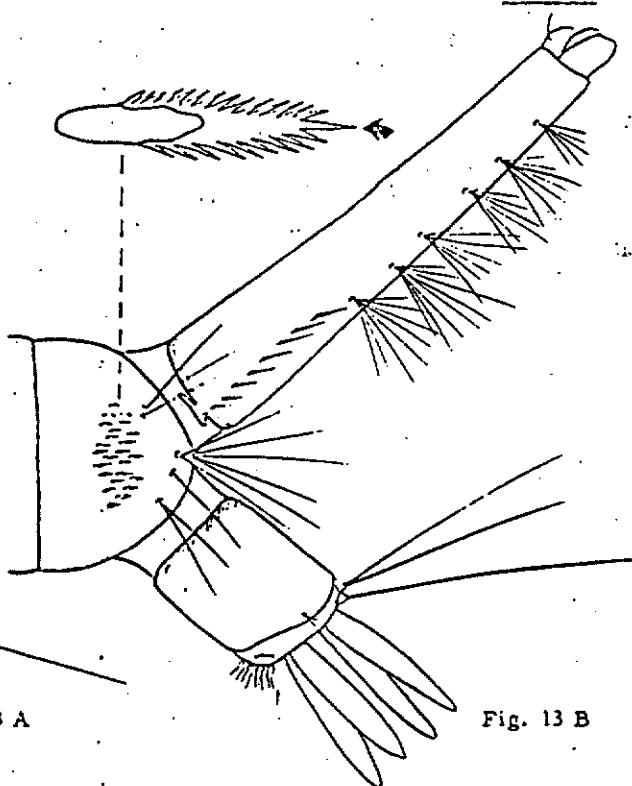


Fig. 13 B

14. Median spine of comb scale at least 2 times as long as lateral spines (Fig. 14 A)..... 15

Median spine of comb scale about as long as lateral spines (Fig. 14 B)..... 16



Fig. 14 A



Fig. 14 B

15. Comb scales surrounded by an area of spicules (Fig. 15 A).....*annulus*
 Comb scales not surrounded by an area of spicules (Fig. 15 B).....*mimeticus*

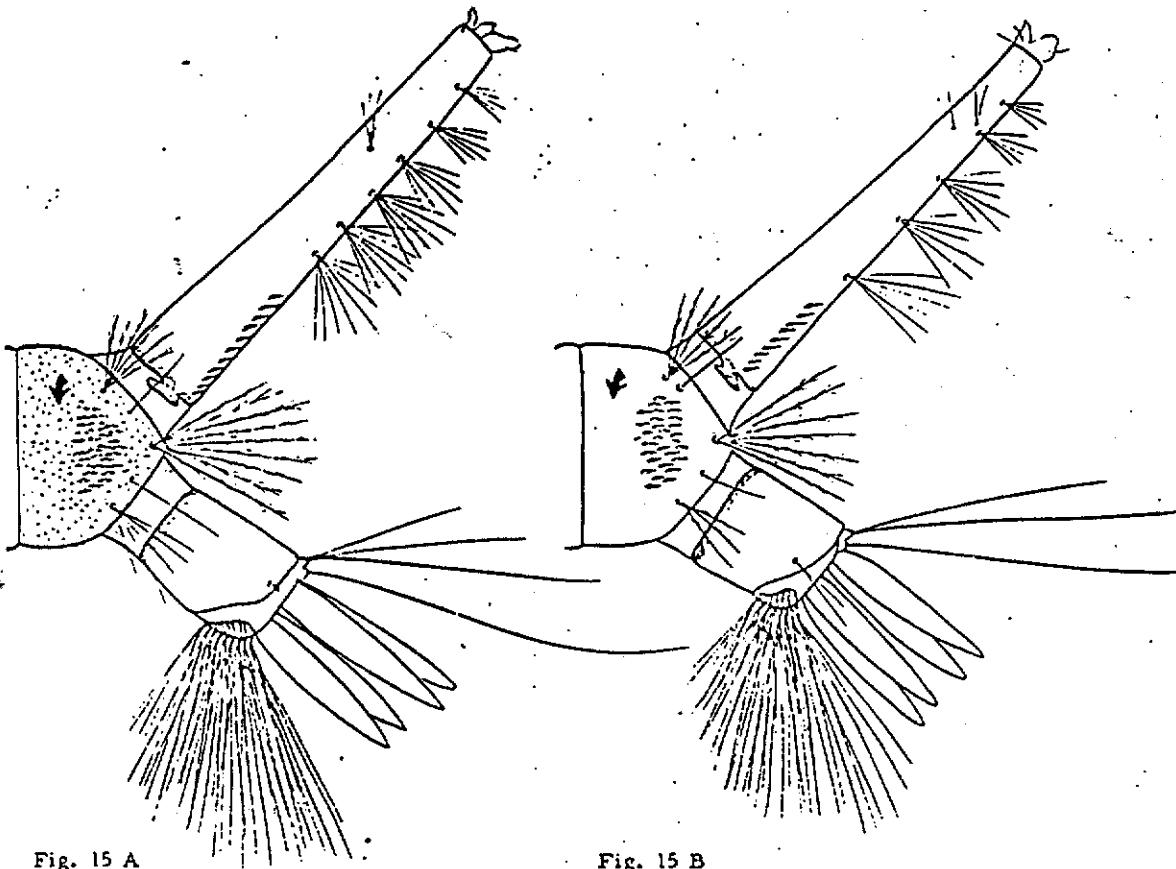


Fig. 15 A

Fig. 15 B

16. Upper and lower head hairs with 5 or more branches (Fig. 16 A).....17
 Upper and lower head hairs with fewer branches (Fig. 16 B).....19

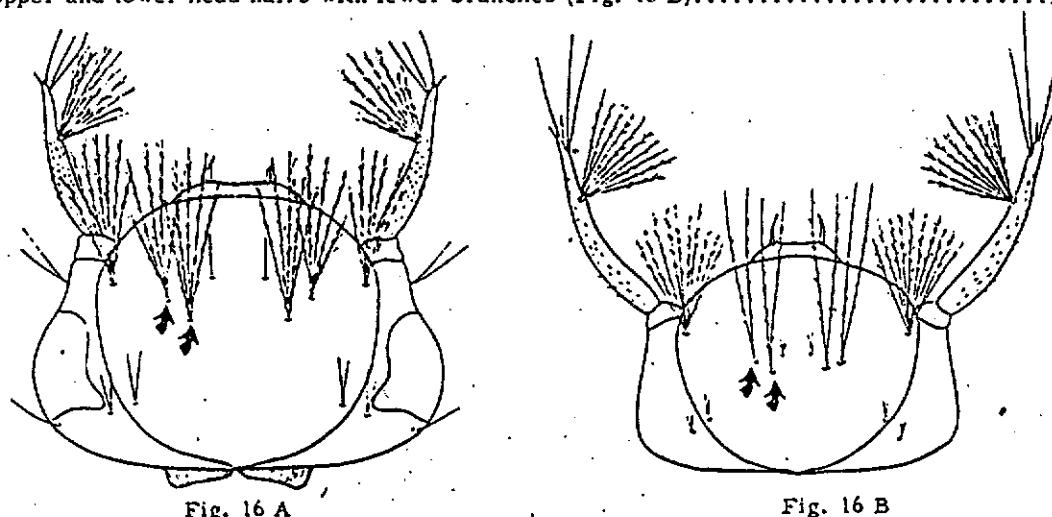


Fig. 16 A

Fig. 16 B

17. Air tube with 3 siphonal tufts; gills 3-4 times longer than saddle (Fig. 17 A)..... fragilis
 Air tube with 4 siphonal tufts; gills not 3-4 times longer than saddle (Fig. 17 B)..... 18

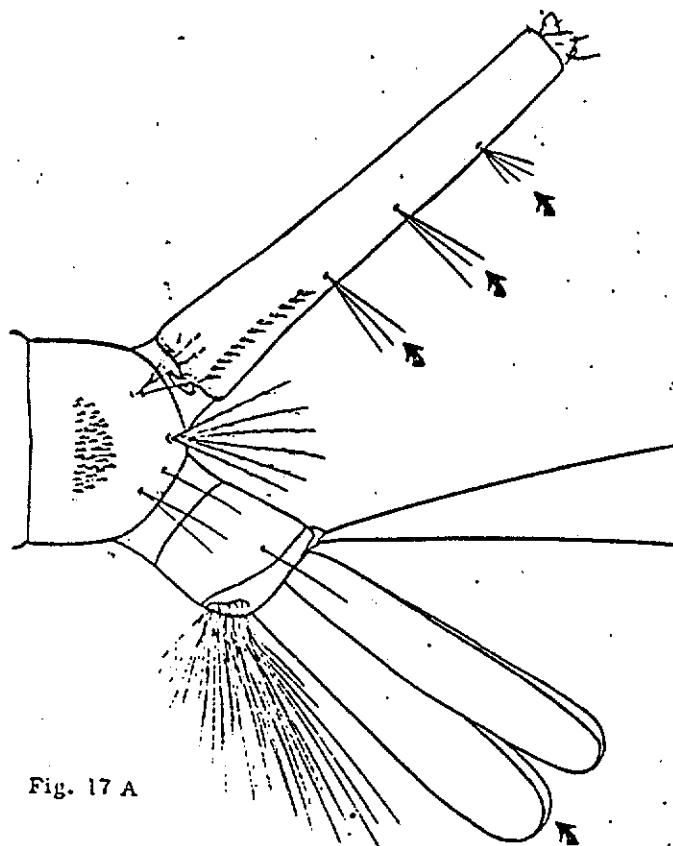


Fig. 17 A

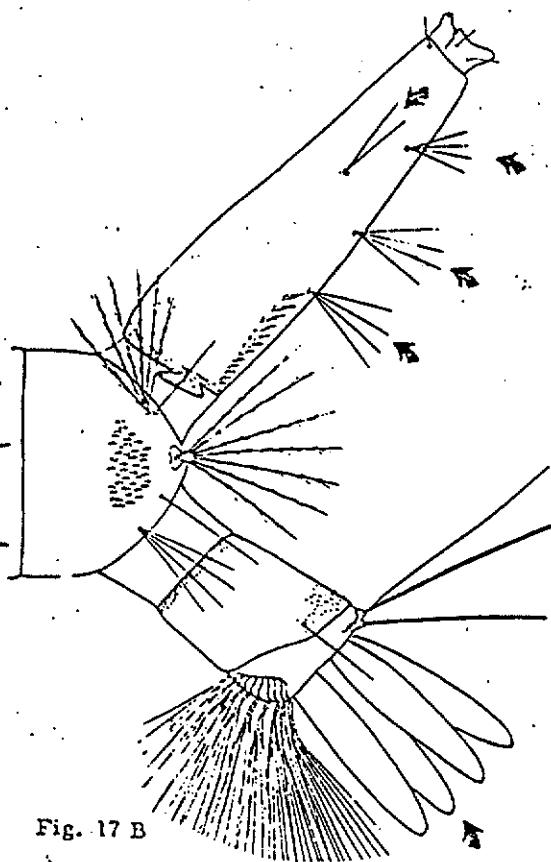


Fig. 17 B

18. Preclypeal spines longer than the distance between their bases (Fig. 18 A); gills rounded at tip..... cinctellus

Preclypeal spines not longer than the distance between their bases (Fig. 18 B); gills not rounded at tip..... quinquefasciatus and pipiens

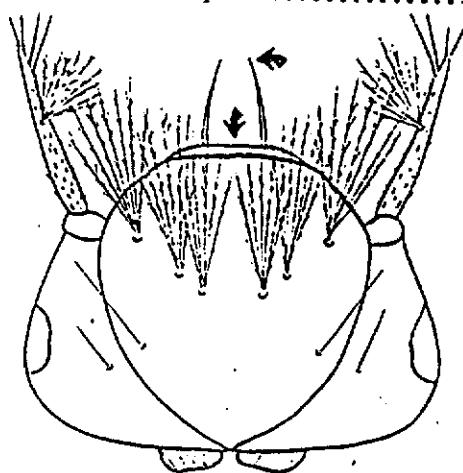


Fig. 18 A

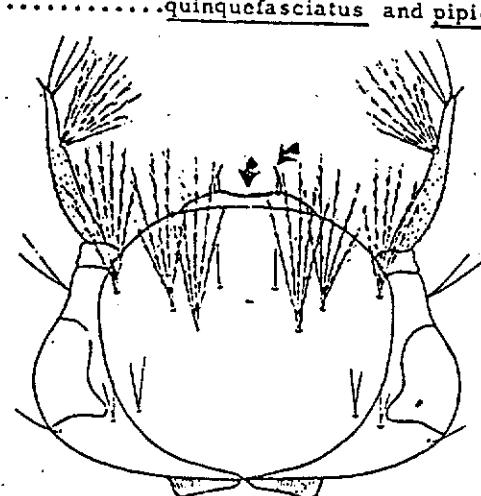


Fig. 18 B

19. Prothoracic hairs 1, 2, and 3 of nearly equal length (Fig. 19 A)..... 20
 Prothoracic hairs 1 and 2 longer than 3 (Fig. 19 B)..... 23

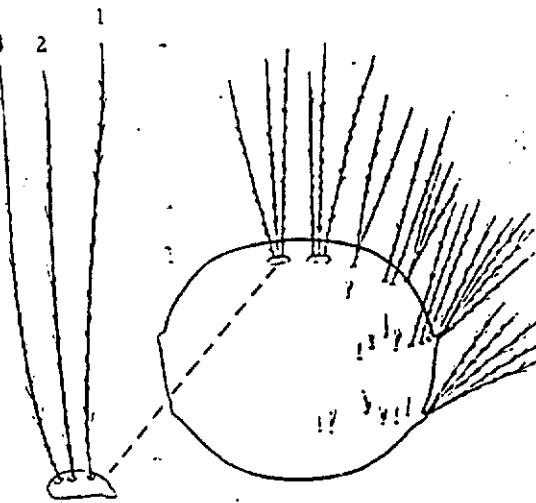


Fig. 19 A

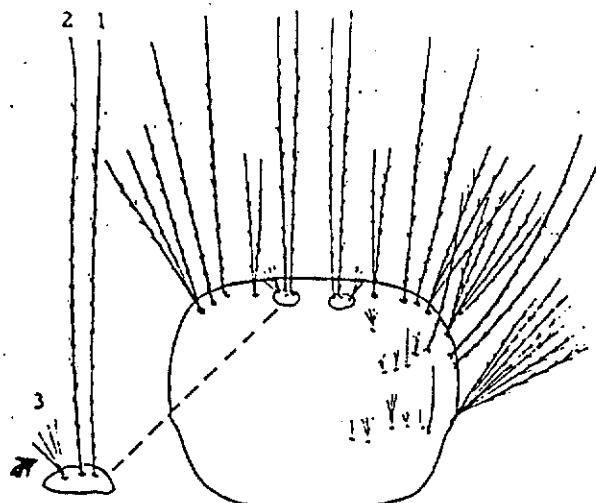


Fig. 19 B

20. Pecten teeth with 3-4 large lateral denticles (Fig. 20 A)..... fuscocephalus
 Pecten teeth with more than 4 lateral denticles (Fig. 20 B)..... 21

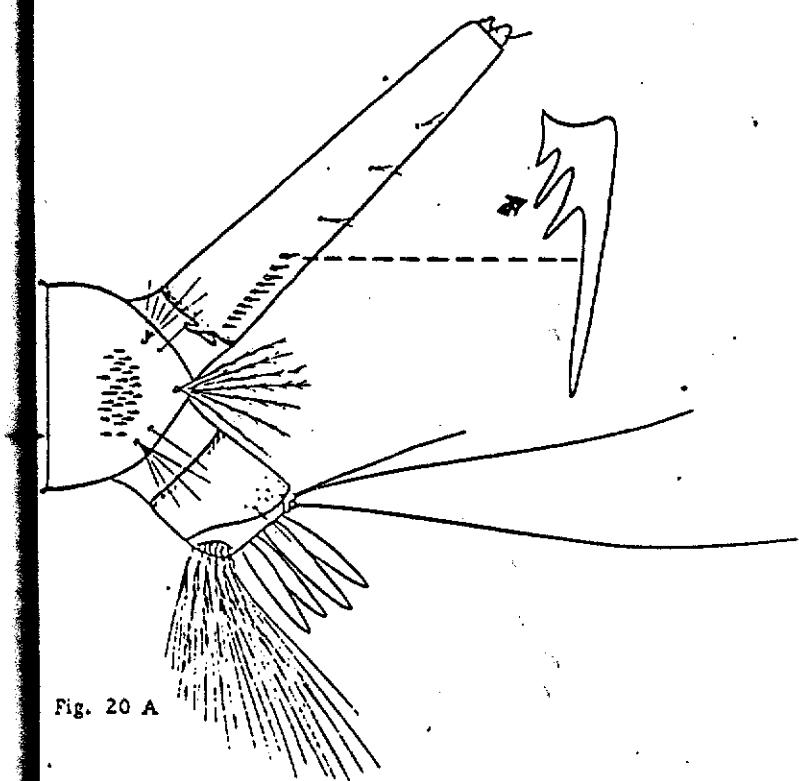


Fig. 20 A



Fig. 20 B

- a. Air tube with 4 pairs of siphonal tufts; comb scale with few but long spines (Fig. 21 A & B) whitei
- Air tube with 5-6 pairs of siphonal tufts; comb scale with many short spines (Fig. 21 C & D) 22

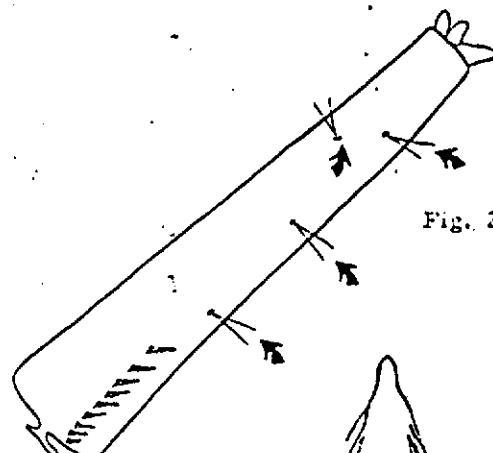


Fig. 21 A

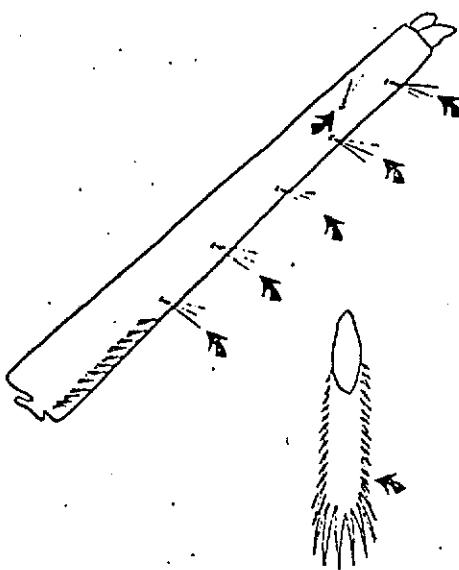


Fig. 21 C

Fig. 21 B

Fig. 21 D

22. Prothoracic hair 4 double (Fig. 22 A) tritaeniorhynchus

- Prothoracic hair 4 single (Fig. 22 B) mimulus

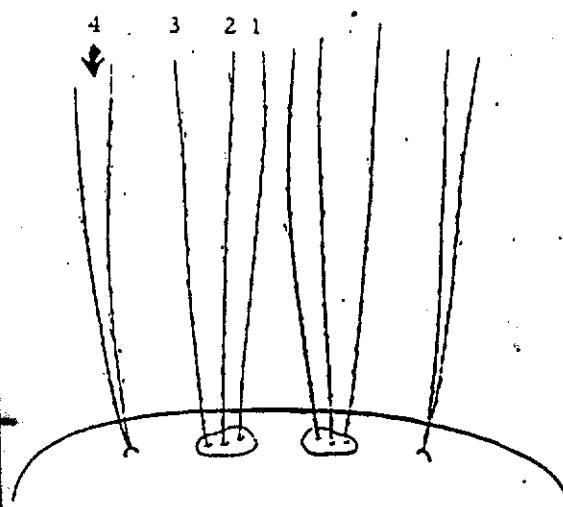


Fig. 22 A

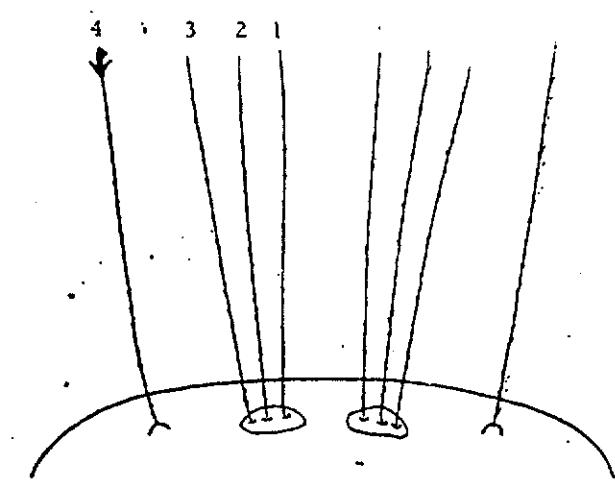


Fig. 22 B

- B. Upper caudal hair single (Fig. 23 A).....brevipalpis
 - Upper caudal hair double or multiple (Fig. 23 B)..... 24



Fig. 23 A



Fig. 23 B

- C. Upper caudal hair with 2 branches (Fig. 24 A)..... 25
 Upper caudal hair with 3 or more branches (Fig. 24 B)..... 26

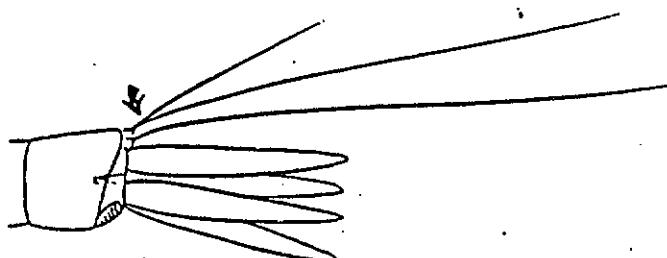


Fig. 24 A



Fig. 24 B

25. Air tube without a dark ring at middle; pecten teeth with lateral denticles extending from near base to near apex (Fig. 25 A)..... bernardi

Air tube with dark ring at middle; pecten teeth with lateral denticles mostly at apical half (Fig. 25 B)..... quadripalpis

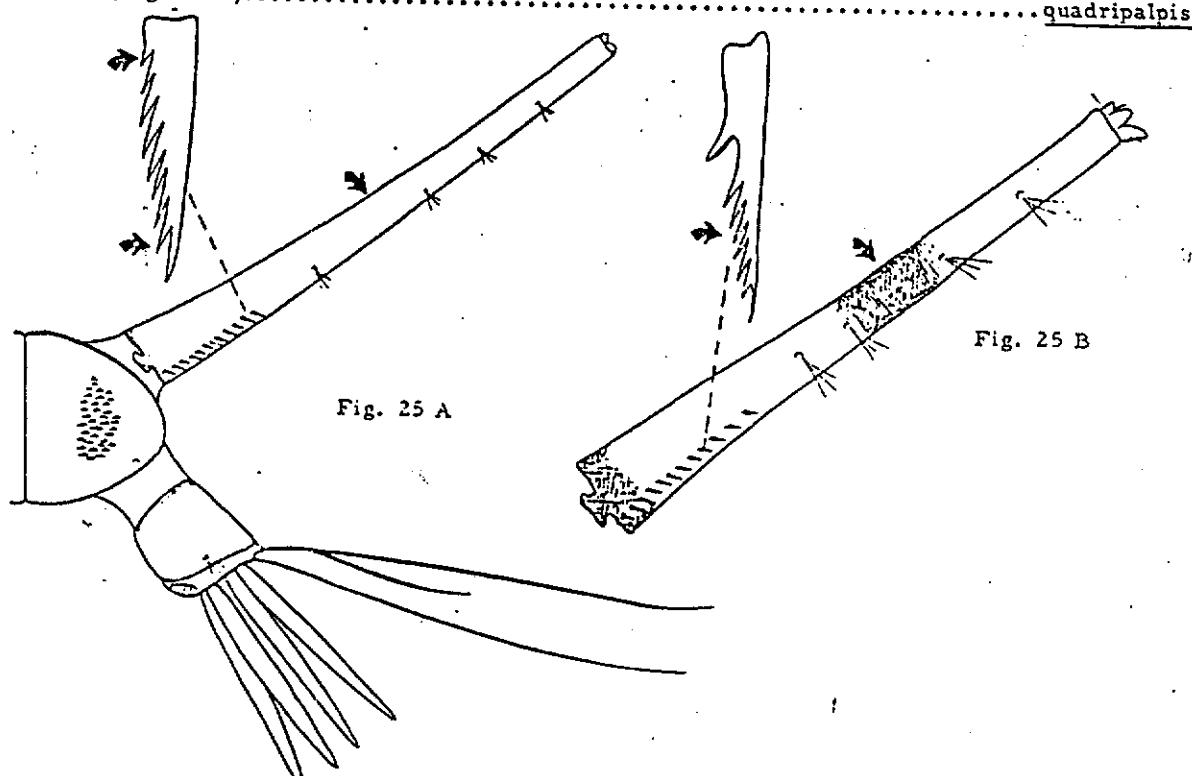


Fig. 25 B

Fig. 25 A

26. Prothoracic hair 3 with 3 or more branches; thorax with spicules (Fig. 26 A).....
..... rubithoracis

Prothoracic hair 3 single or double; thorax without spicules (Fig. 26 B)..... 27

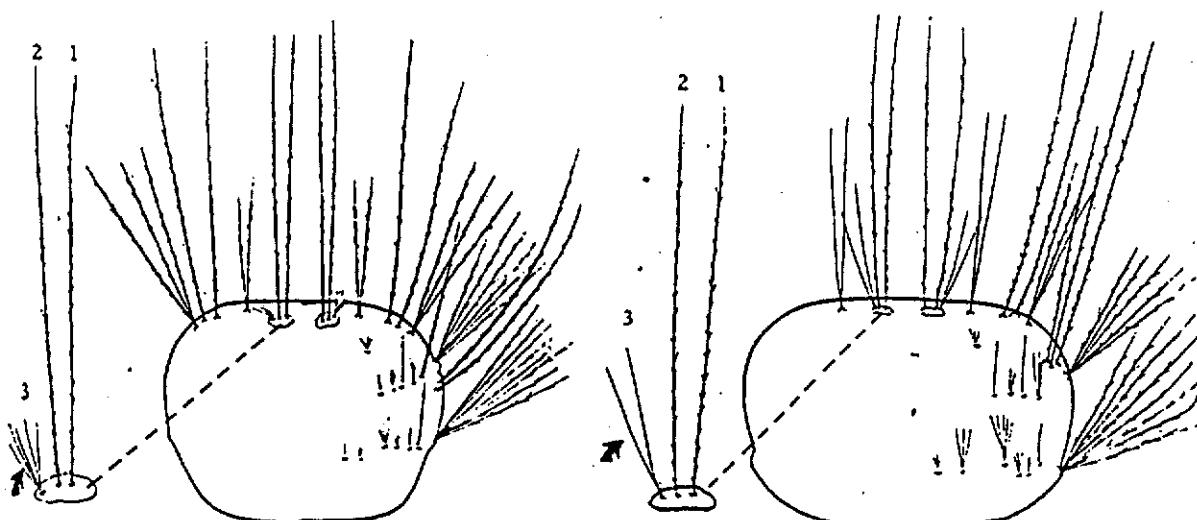


Fig. 26 A

Fig. 26 B

3. Antenna with basal portion dark (Fig. 27 A).....
 Antenna with basal portion light (Fig. 27 B)..... minor

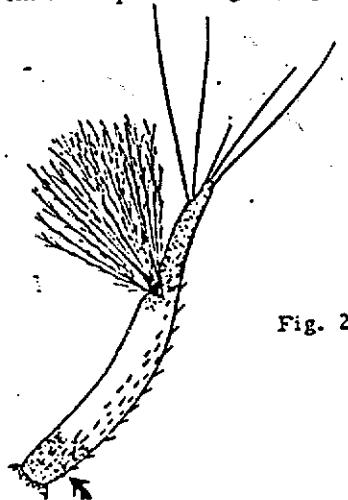


Fig. 27 A

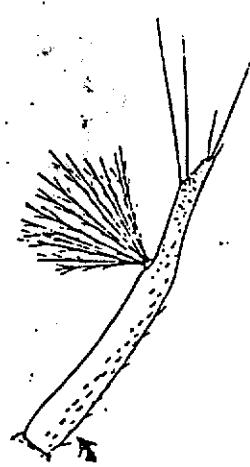


Fig. 27 B

4. Dark ring at middle of air tube, if present, paler than basal ring (Fig. 28 A).... infantulus
 Dark ring at middle of air tube as dark as basal ring (Fig. 28 B)..... minutissimus

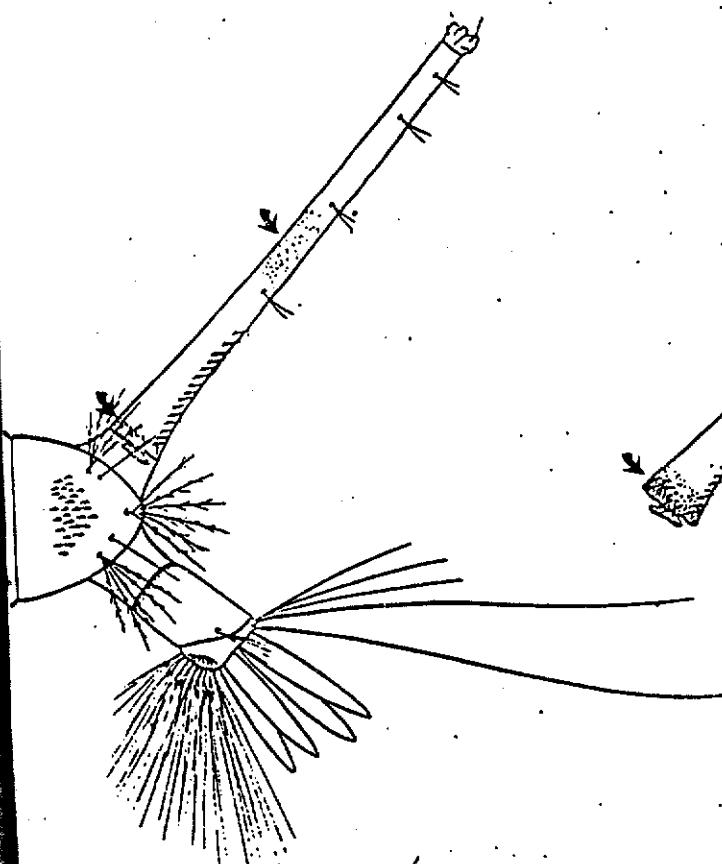


Fig. 28 A

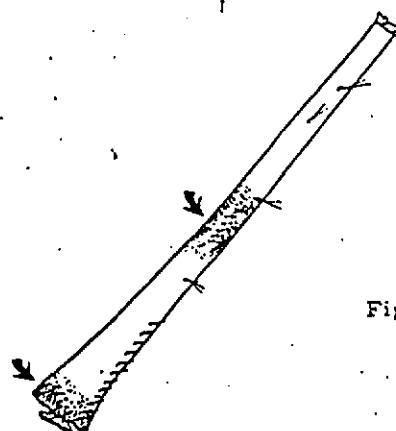


Fig. 28 B

KEY TO FEMALE GENERA

1. Scutellum rounded (Fig. 1 A)..... 2
 Scutellum trilobed (Fig. 1 B)..... 3



Fig. 1 A

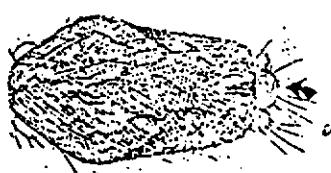


Fig. 1 B

2. Proboscis bent downward (Fig. 2 A), Toxorhynchites page 91
 Proboscis not bent downward (Fig. 2 B), Anopheles page 76

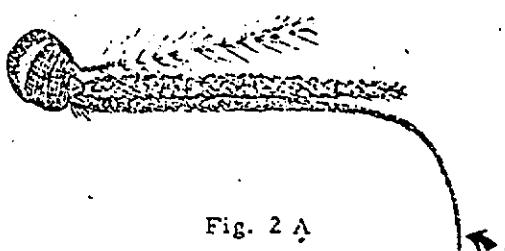


Fig. 2 A



Fig. 2 B

3. Spiracular bristles or scales present (Fig. 3 A)..... 4
 Spiracular bristles or scales absent (Fig. 3 B)..... 6

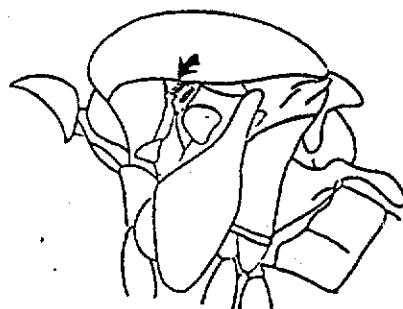


Fig. 3 A

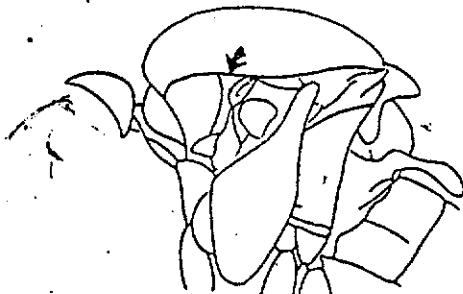


Fig. 3 B

Proboscis with apical part swollen (Fig. 4 A)..... Malaya page 93

Proboscis with apical part not swollen (Fig. 4 B)..... 5

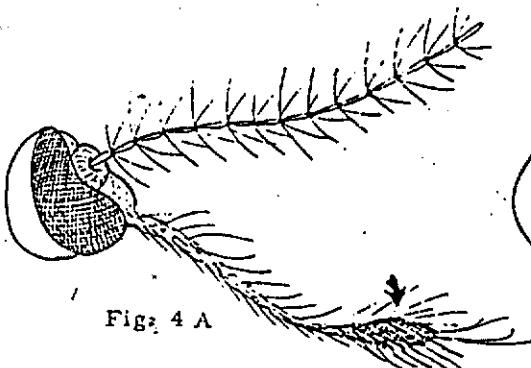


Fig. 4 A

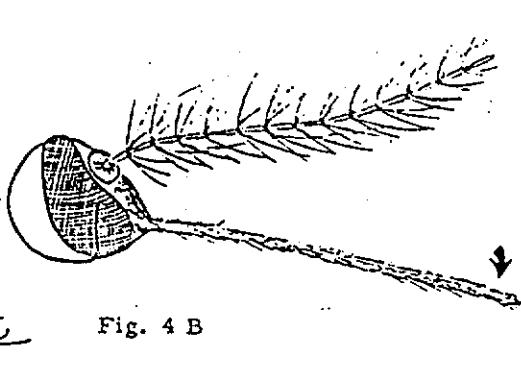


Fig. 4 B

Upper calypter of wing without hairs; vein 6 at wing margin reaching junction of vein 5.1 and 5.2 (Fig. 5 A)..... Topomyia page 94

Upper calypter of wing with hairs; vein 6 at wing margin reaching beyond junction of vein 5.1 and 5.2 (Fig. 5 B)..... Tripterooides page 92

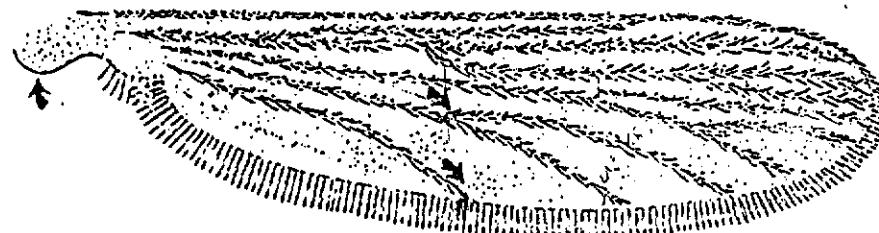


Fig. 5 A



Fig. 5 B

Second marginal cell shorter than its petiole (Fig. 6 A)..... Uranotaenia page 99

Second marginal cell not shorter than its petiole (Fig. 6 B)..... 7



Fig. 6 A



Fig. 6 B

7. Apex of middle and hind femur with tufts of scales (Fig. 7 A)..... Aedeomyia page 105
 Apex of middle and hind femur without tufts of scales (Fig. 7 B)..... 8



Fig. 7 A

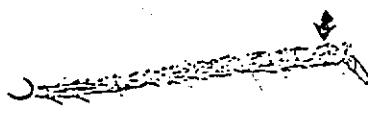


Fig. 7 B

8. Dorsal plumic scales of wing veins forked (Fig. 8 A)..... Hodgesia page 103
 Dorsal plumic scales of wing not forked or not developed (Fig. 8 B)..... 9

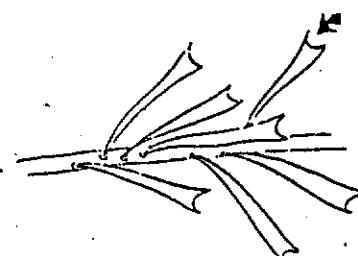


Fig. 8 A

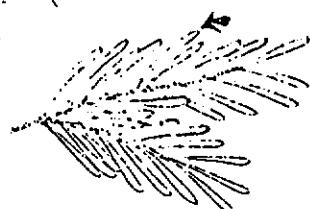


Fig. 8 B

9. Postspiracular bristles absent (Fig. 9 A)..... 10
 Postspiracular bristles present (Fig. 9 B)..... 15

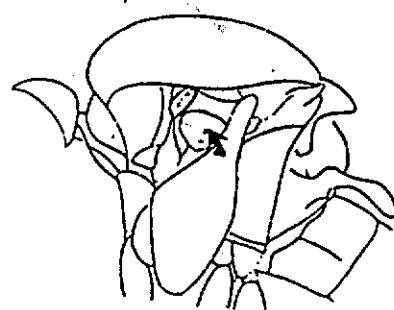


Fig. 9 A

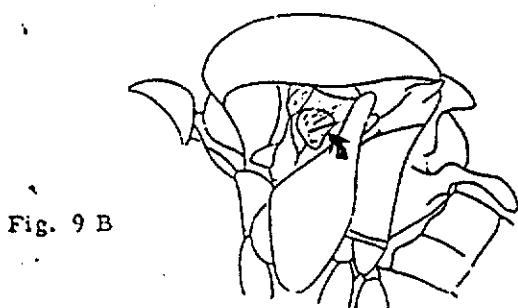


Fig. 9 B

10. Anterior pronotal lobes greatly enlarged (Fig. 10 A)..... Heizmannia page 106
 Anterior pronotal lobes not greatly enlarged (Fig. 10 B)..... 11



Fig. 10 A



Fig. 10 B

1. Proboscis broadened distally (Fig. 11 A)..... Ficalbia page 95
 Proboscis not broadened distally (Fig. 11 B)..... 12

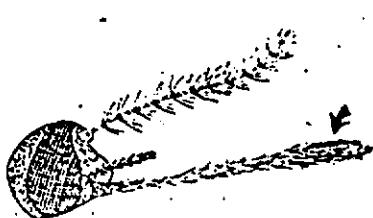


Fig. 11 A

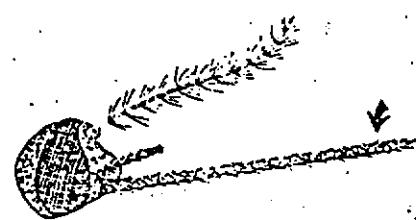


Fig. 11 B

2. Fore tarsus with segment 1 longer than last 4 segments (Fig. 12 A)..... Orthopodonyia page 104
 Fore tarsus with segment 1 shorter than last 4 segments (Fig. 12 B)..... 13

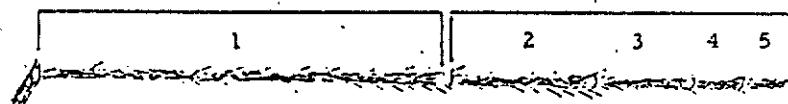


Fig. 12 A

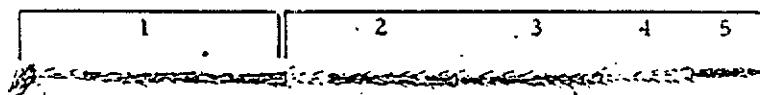


Fig. 12 B

3. Palp nearly 1/2 length of proboscis (Fig. 13 A)..... Armigeres page 118
 Palp less than 1/2 length of proboscis (Fig. 13 B)..... 14

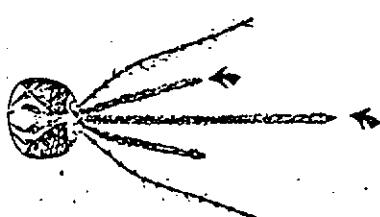


Fig. 13 A



Fig. 13 B

14. Claws of hind leg small and inconspicuous; pulvilli present on all legs (Fig. 14 A).....
..... Culex page 122

Claws of hind leg large and conspicuous; pulvilli absent (Fig. 14 B)..... Mansonia page 96

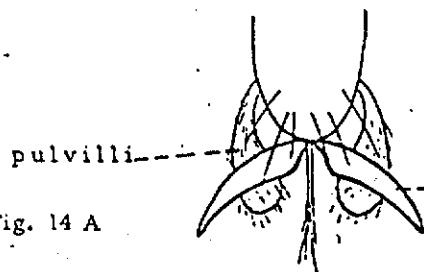


Fig. 14 A

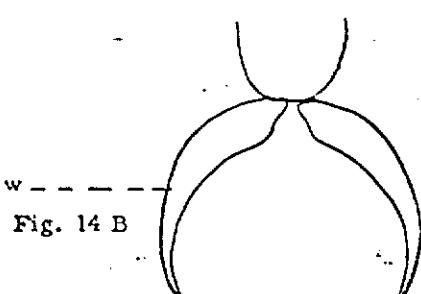


Fig. 14 B

15. Wing scales numerous, broad and asymmetrical (Fig. 15 A)..... Mansonia page 96

Wing scales narrow or if broad not asymmetrical (Fig. 15 B & C)..... 16



Fig. 15 A

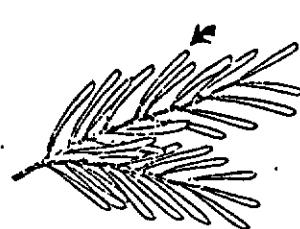


Fig. 15 B



Fig. 15 C

16. Proboscis laterally compressed and curved downward (Fig. 16 A)..... Anopheles page 118

Proboscis not laterally compressed at most only slightly curved downward (Fig. 16 B)....
..... Aedes page 107

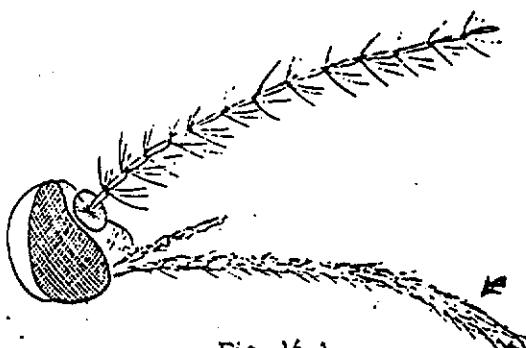
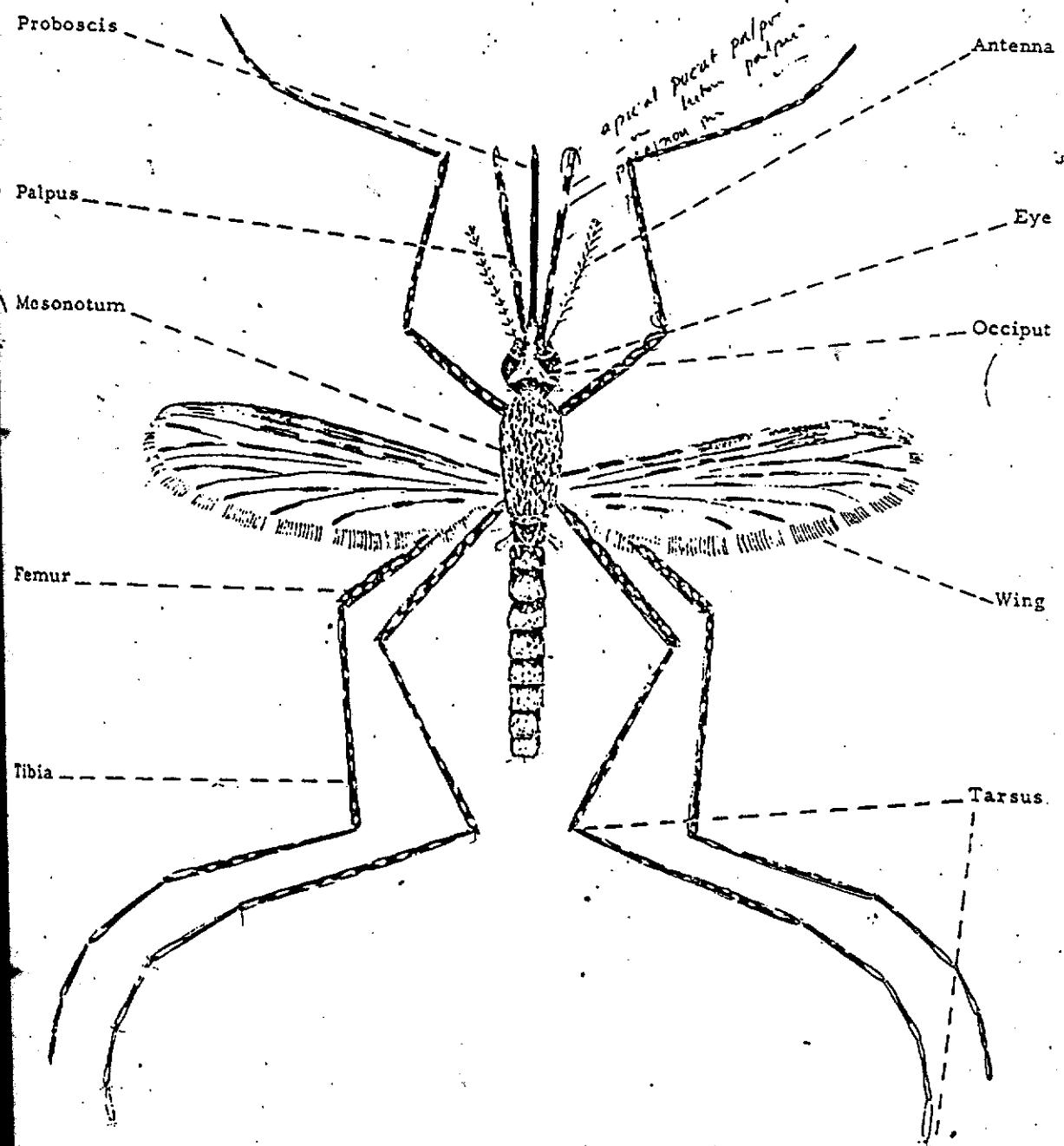


Fig. 16 A

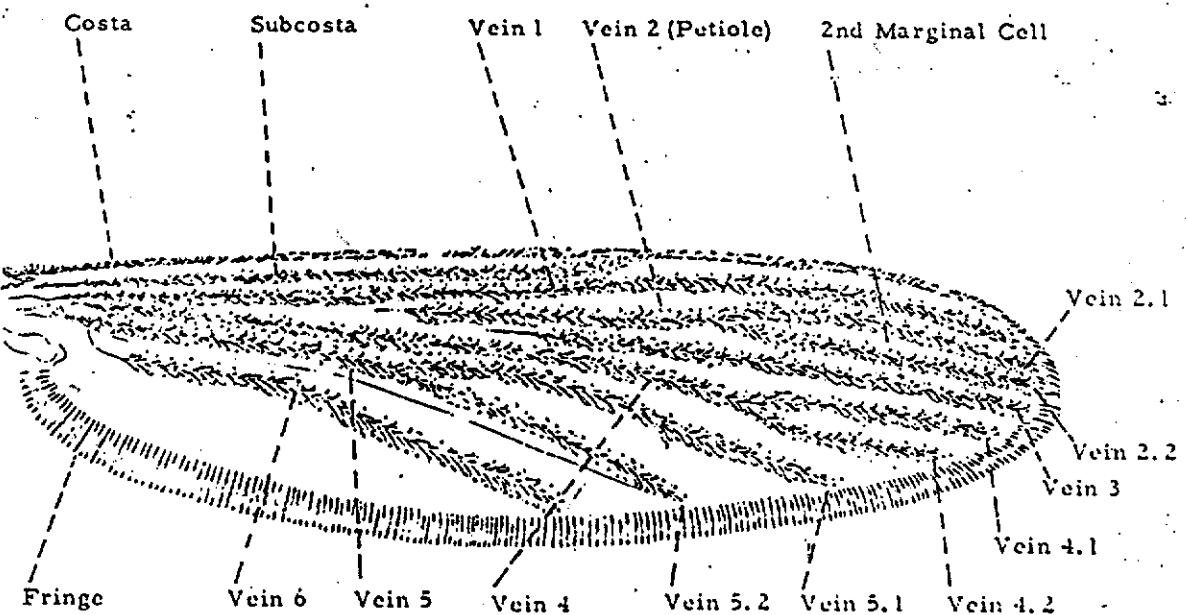


Fig. 16 B

ADULT FEMALE ANOPHELES



WING OF ANOPHELES MOSQUITO



KEY TO FEMALE ANOPHELES

- 1. Wing without areas of pale scales (Fig. 1 A)..... 2
- Wing with areas of pale scales (Fig. 1 B)..... 4

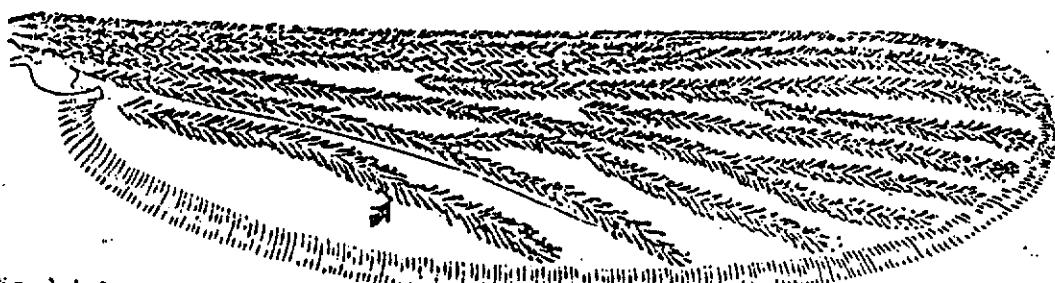


Fig. 1 A

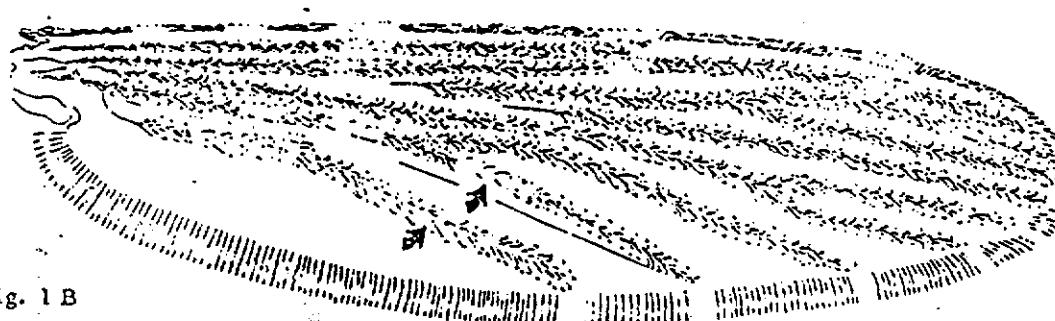


Fig. 1 B

- 2. Upright scales on vertex very narrow and rod-like (Fig. 2 A).....
..... insulæflorum and bengalensis
- Upright scales on vertex not very narrow and rod-like (Fig. 2 B)..... 3

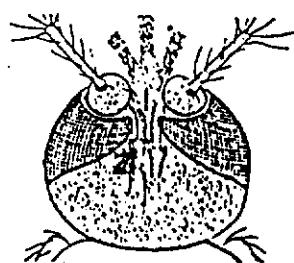


Fig. 2 A

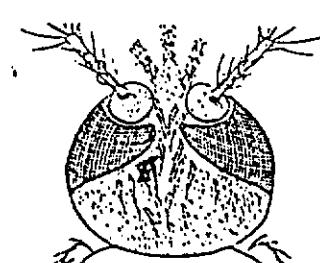


Fig. 2 B

- 3. Palp much shorter than proboscis (Fig. 3 A)..... alongensis
- Palp not much shorter than proboscis (Fig. 3 B)..... sintonoides

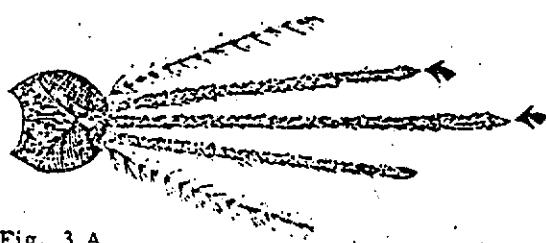


Fig. 3 A

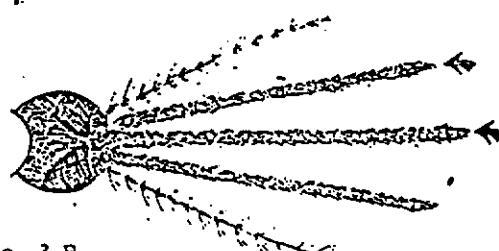


Fig. 3 B

4. Front margin of wing with fewer than 4 dark areas (Fig. 4 A).....5
 Front margin of wing with 4 or more dark areas (Fig. 4 B).....18

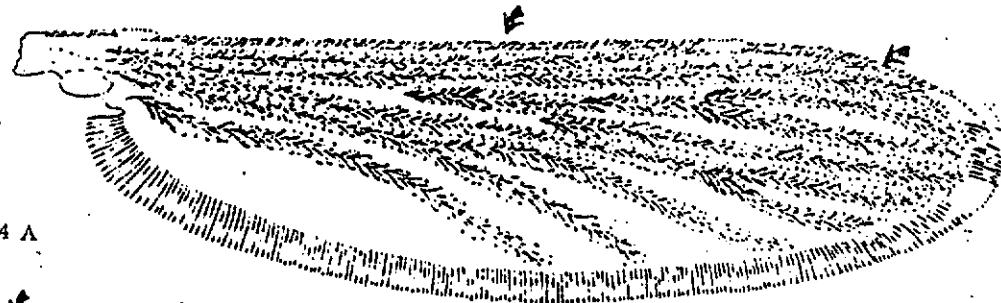


Fig. 4 A



Fig. 4 B

5. Hind femur with large tuft of scales (Fig. 5 A).....6
 Hind femur without large tuft of scales (Fig. 5 B).....7

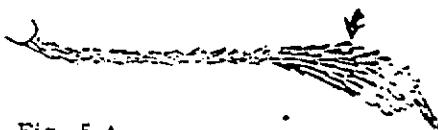


Fig. 5 A

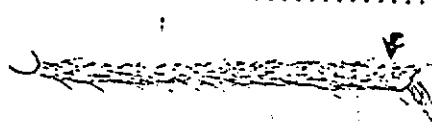


Fig. 5 B

6. Wing with subcostal pale spot (Fig. 6 A).....*annandalei interruptus*
 Wing without subcostal pale spot (Fig. 6 B).....**annandalei annandalei*



Fig. 6 A

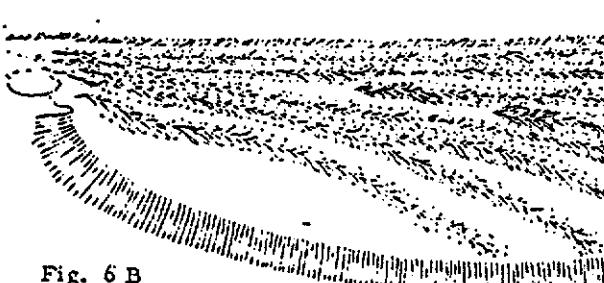


Fig. 6 B

*probably does not occur in Vietnam.

- 1 Hind femur with broad white band near middle (Fig. 7 A).....*lindesayi*
- Hind femur without broad white band near middle (Fig. 7 B).....8



Fig. 7 A

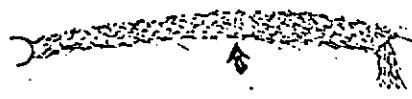


Fig. 7 B

- 1 Palp banded (Fig. 8 A).....9
- Palp not banded (Fig. 8 B).....14

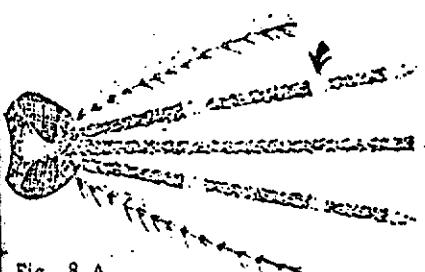


Fig. 8 A



Fig. 8 B

- 1 Femur of middle leg with large pale spot near apex (Fig. 9 A).....*gigas baileyi*
- Femur of middle leg without large pale spot near apex (Fig. 9 B).....10

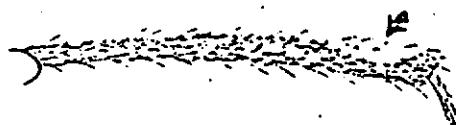


Fig. 9 A



Fig. 9 B

- 1 Hind tarsus with narrow bands (Fig. 10 A).....11
- Hind tarsus with broad bands (Fig. 10 B).....12

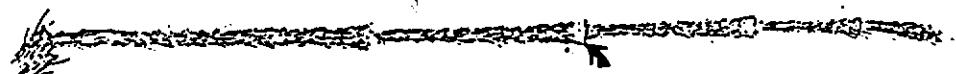


Fig. 10 A

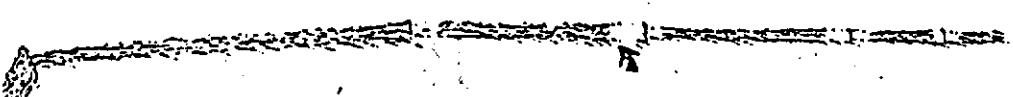


Fig. 10 B

- II. Wing with apical pale area short (Fig. 11 A)..... lesteri
 Wing with apical pale area long (Fig. 11 B)..... sinensis

Fig. 11 A



Fig. 11 B



12. Basal dark area of vein 5 ^{marked} not reaching middle dark area of vein 6; base of costa with pale area (Fig. 12 A)..... indiensis
 Basal dark area of vein 5 reaching middle dark area of vein 6; base of costa dark (Fig. 12 B)..... 13

Fig. 12 A



Fig. 12 B



Pale scales on vein 1 between subcostal and preapical pale areas; mid tarsal bands broad (Fig. 13 A & B)..... peditaeniatus

Pale scales absent on vein 1 between subcostal and preapical pale areas; mid tarsal bands narrow (Fig. 13 C & D)..... nigerrimus

Fig. 13 A

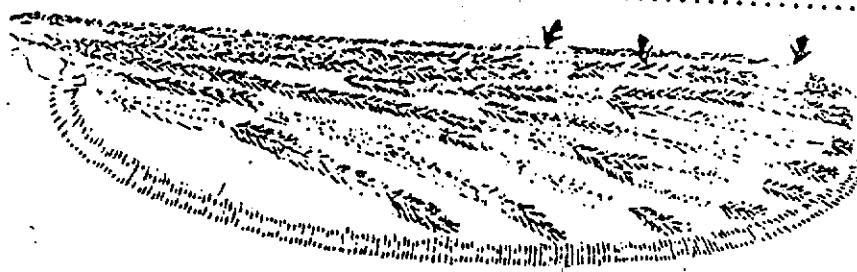


Fig. 13 B

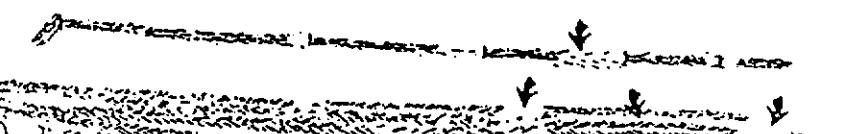
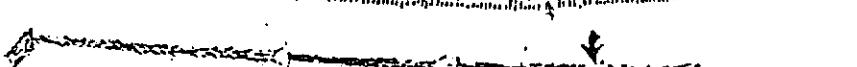


Fig. 13 C



Fig. 13 D



Ventral abdominal segment 7 without tuft of scales (Fig. 14 A)..... 15

Ventral abdominal segment 7 with tuft of scales (Fig. 14 B)..... 16



Fig. 14 A



Fig. 14 B

Hind tarsus with narrow pale bands (Fig. 15 A)..... umbrosus

Hind tarsus entirely dark (Fig. 15 B)..... baezai

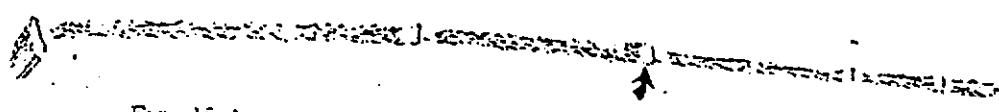


Fig. 15 A

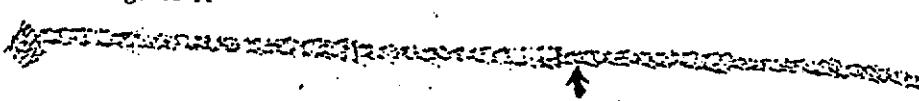


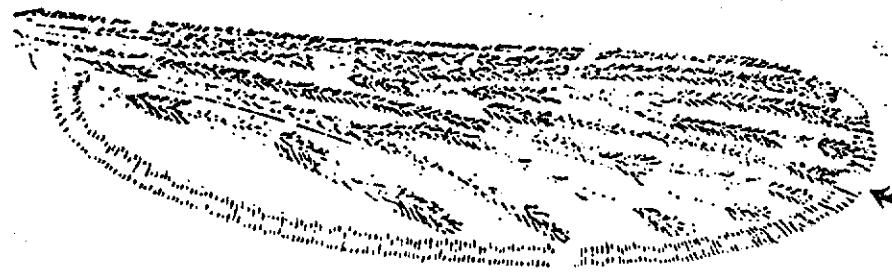
Fig. 15 B

16. Fringe with pale area extending from vein 3 to vein 4.1 (Fig. 16 A)..... barburnbrosus
 Fringe with pale area not extending from vein 3 to vein 4.1 (Fig. 16 B)..... 17

Fig. 16 A



Fig. 16 B



17. Vein 5 with more dark scales than pale scales (Fig. 17 A)..... campestris
 Vein 5 with fewer dark scales than pale scales (Fig. 17 B)..... barbirostris

Fig. 17 A



Fig. 17 B



- Hind tarsus with segment 5 tipped with white or completely white (Fig. 18 A)..... 19
 Hind tarsus with segment 5 entirely dark (Fig. 18 B)..... 29

Fig. 18 A

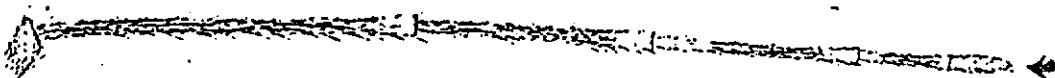
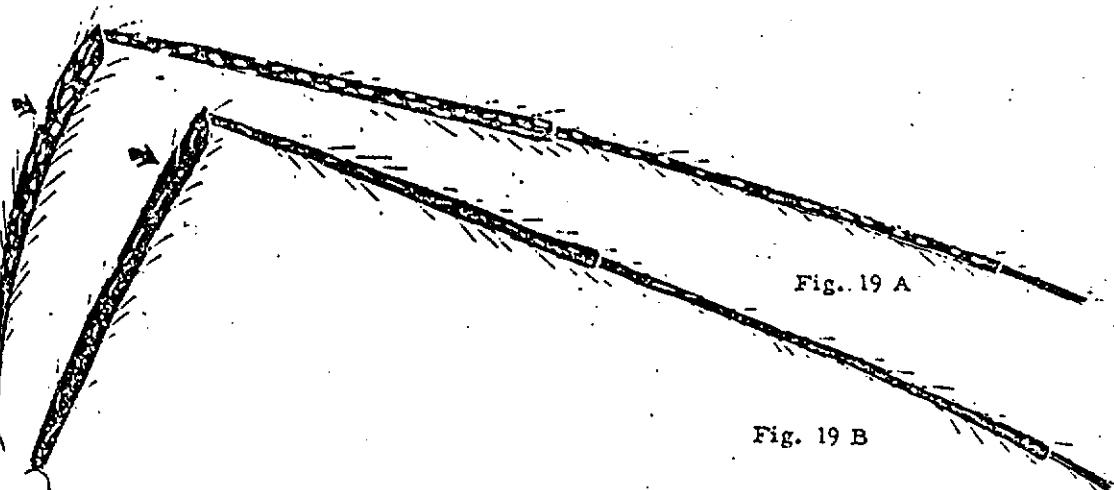


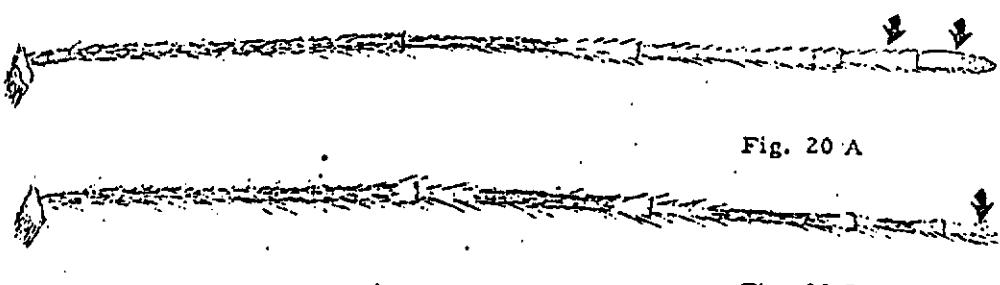
Fig. 18 B



- Legs speckled with white scales (Fig. 19 A)..... 20
 Legs not speckled (Fig. 19 B)..... 26



- At least segments 4 and 5 of hind tarsus entirely pale scaled (Fig. 20 A)..... 21
 Segments 4 and 5 of hind tarsus never both entirely pale scaled (Fig. 20 B)..... 23



- Palp speckled (Fig. 21 A)..... splendidus
 Palp not speckled (Fig. 21 B)..... 22

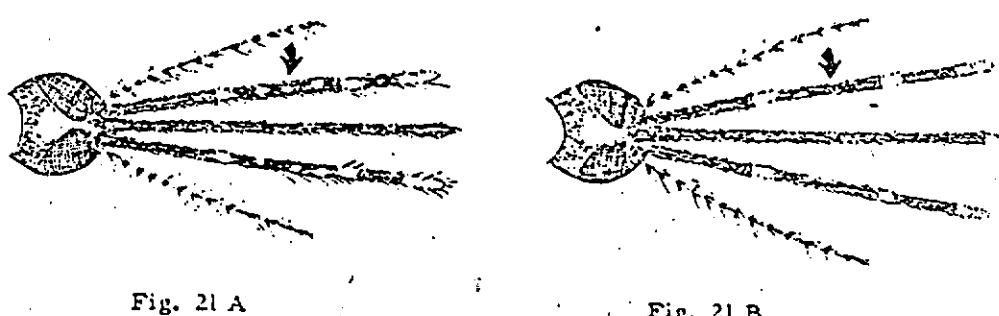


Fig. 21 A

Fig. 21 B

22. Wing with costa mostly pale (Fig. 22 A)..... jamesi

Wing with costa mostly dark (Fig. 22 B)..... ramsayi



Fig. 22 A

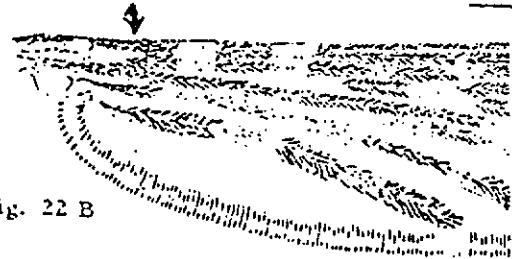


Fig. 22 B

23. Apex of hind tibia and base of first tarsal segment with prominent white band (Fig. 23 A)..... balabacensis

Apex of hind tibia and base of first tarsal segment without prominent white band (Fig. 23 B)..... 24

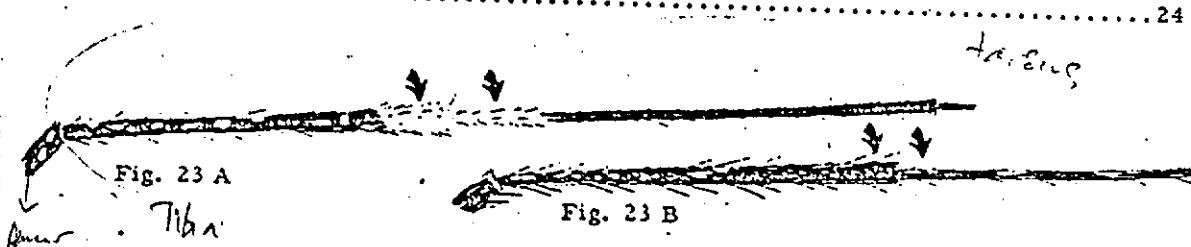


Fig. 23 A

Tibia
Fig. 23 B

24. Ventral surface of abdomen with row of tufts of black scales (Fig. 24 A)..... kochi

Ventral surface of abdomen without row of tufts of black scales (Fig. 24 B)..... 25



Fig. 24 A



Fig. 24 B

25. Palp with 3 pale bands; tarsal bands broad (Fig. 25 A & B)..... maculatus

Palp with 4 pale bands; tarsal bands narrow (Fig. 25 C & D)..... tessellatus

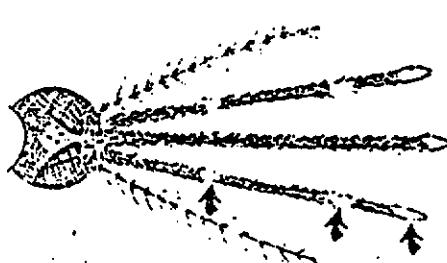


Fig. 25 A



Fig. 25 C

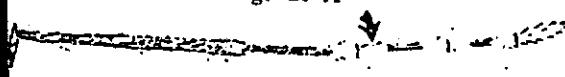


Fig. 25 B

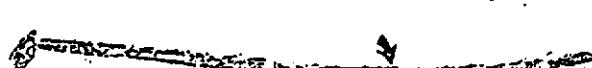


Fig. 25 D

Hind tarsus with segment 5 white (Fig. 26 A).....karwari

Hind tarsus with segments 3, 4 and 5 white (Fig. 26 B)..... 27

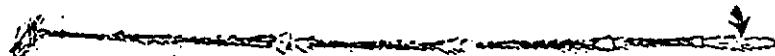


Fig. 26 A

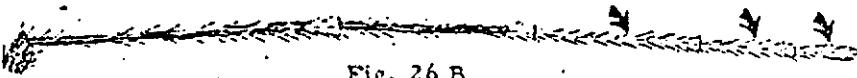


Fig. 26 B

Wing vein 5 mostly dark (Fig. 27 A).....annularis

Wing vein 5 mostly pale (Fig. 27 B)..... 28



Fig. 27 A

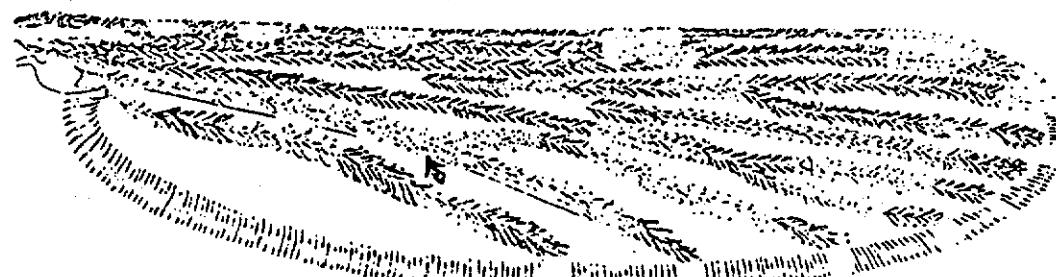


Fig. 27 B

Hind tarsal segment 1 white at apex; ventral surface of abdomen with few or no broad scales (Fig. 28 A & B).....philippinensis

Hind tarsal segment 1 entirely dark; ventral surface of abdomen with scattered, broad scales (Fig. 28 C & D).....pallidus

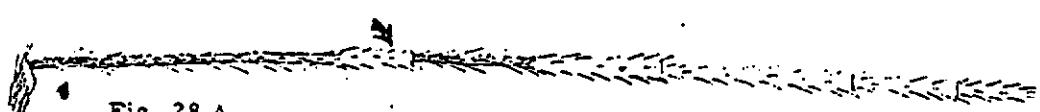


Fig. 28 A

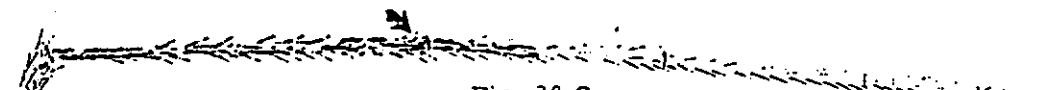


Fig. 28 B



Fig. 28 C



Fig. 28 D

3. Fore tarsus with broad pale bands (Fig. 29 A)..... 30

Fore tarsus usually without bands, if banded with very narrow bands (Fig. 29 B)..... 34

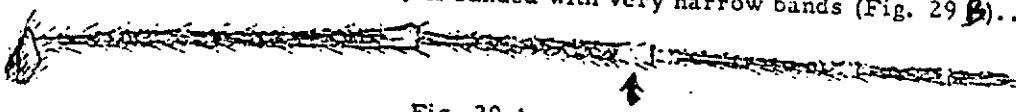


Fig. 29 A

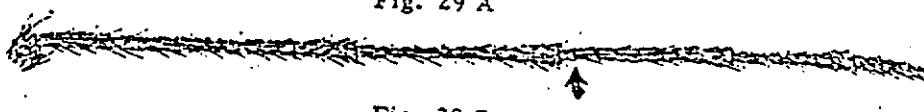


Fig. 29 B

4. Femur and tibia speckled (Fig. 30 A)..... 31

Femur and tibia not speckled (Fig. 30 B)..... 33

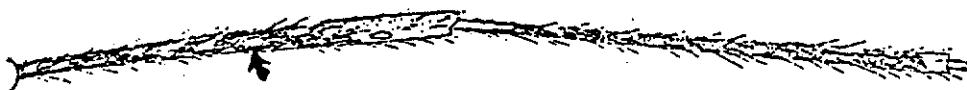


Fig. 30 A

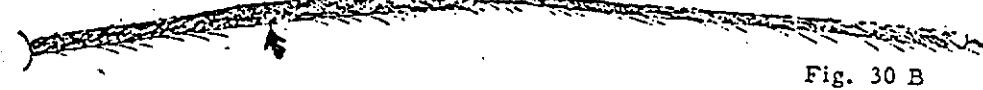


Fig. 30 B

5. Palp with 2 broad apical bands (Fig. 31 A)..... stephensi

Palp with 1 broad apical band (Fig. 31 B)..... 32

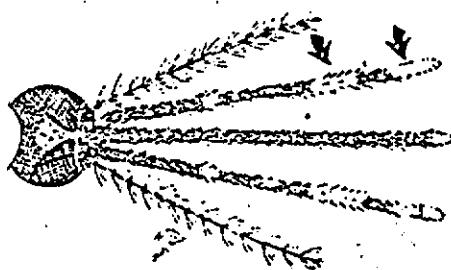


Fig. 31 A

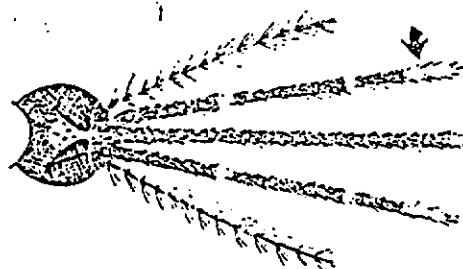


Fig. 31 B

6. Wing with sector pale area on costa absent or not distinct; prehumeral dark spot usually with pale scales (Fig. 32 A)..... litoralis

Wing with sector pale area on costa distinct; prehumeral dark spot without pale scales (Fig. 32 B)..... sundaicus

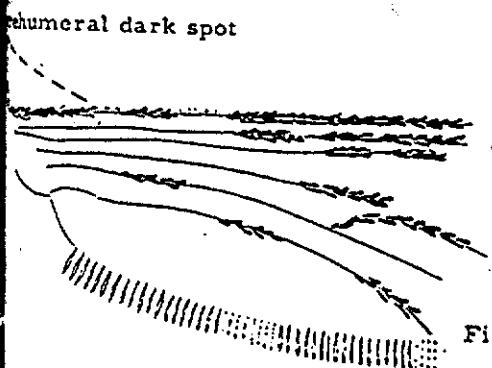


Fig. 32 A

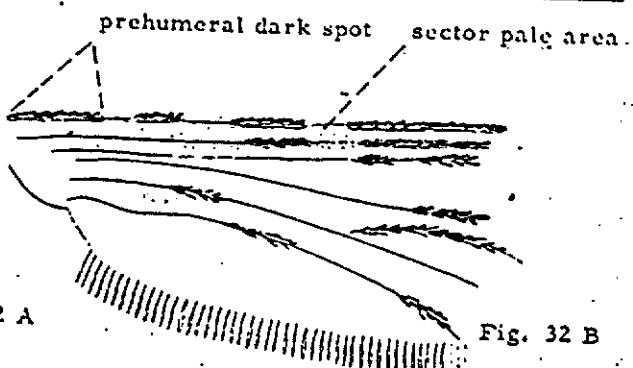


Fig. 32 B

Apical band of palp about as long as preapical dark area (Fig. 33 A)..... subpictus

Apical band of palp longer than preapical dark area (Fig. 33 B)..... vagus

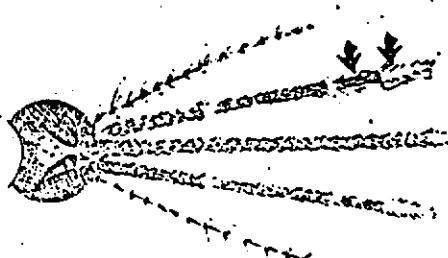


Fig. 33 A

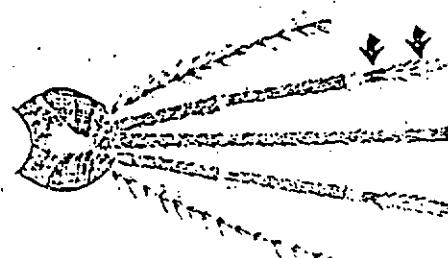


Fig. 33 B

Thorax with distinct scales (Fig. 34 A)..... 35

Thorax without distinct scales (Fig. 34 B)..... 36

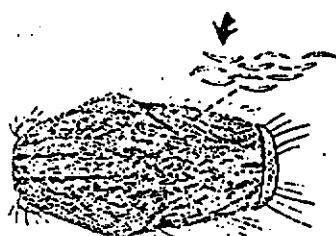


Fig. 34 A

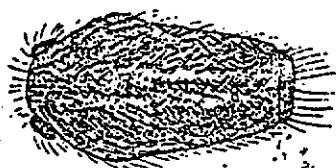


Fig. 34 B

Apical pale band of palp about as long as preapical dark band (Fig. 35 A).....
..... jeyporiensis jeyporiensis

Apical pale band of palp much longer than preapical dark band (Fig. 35 B).....
..... jeyporiensis candidiensis

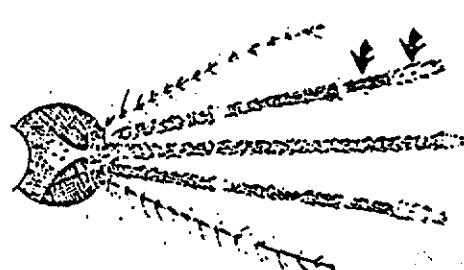


Fig. 35 A

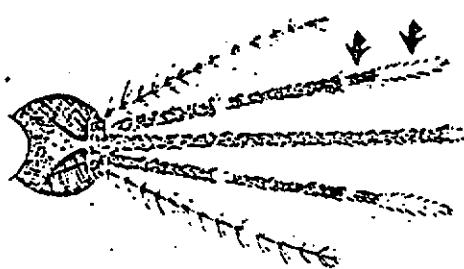


Fig. 35 B

36. Palp with subapical pale band longer than subapical dark band (Fig. 36 A)..... 37
 Palp with subapical pale band shorter than subapical dark band (Fig. 36 B)..... 39

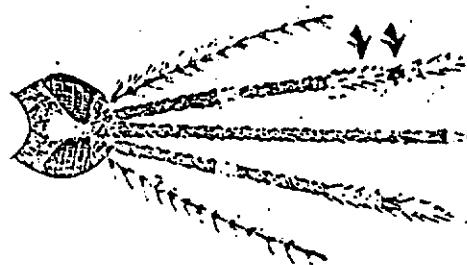


Fig. 36 A

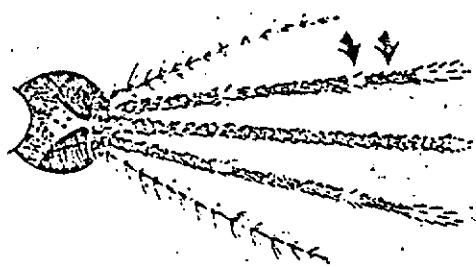


Fig. 36 B

37. Wing with fringe-spot present at vein 6; proboscis pale at apical half (Fig. 37 A & B)....
 aconitus
 Wing with fringe-spot absent at vein 6; proboscis not distinctly pale at apical half
 (Fig. 37 C & D)..... 38

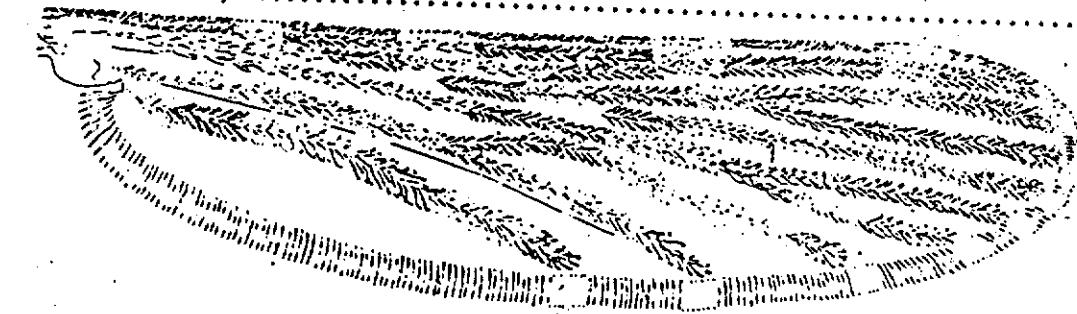


Fig. 37 A

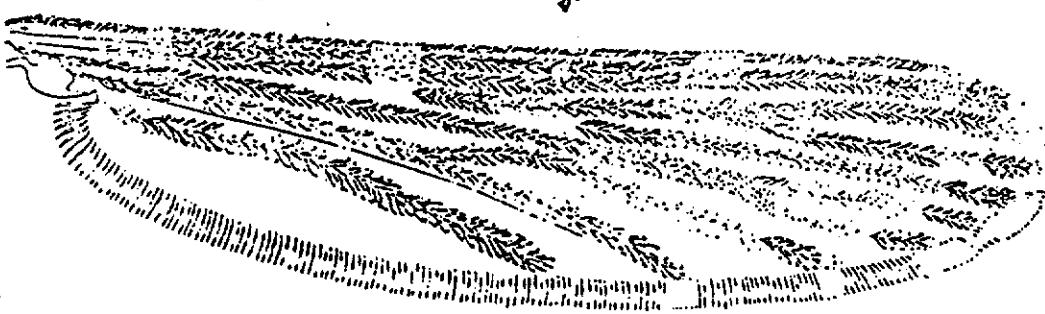


Fig. 37 C

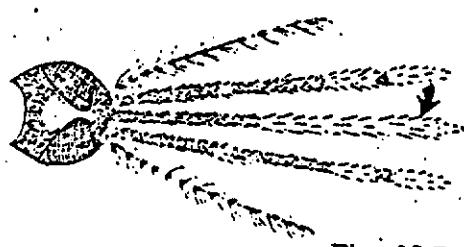


Fig. 37 B

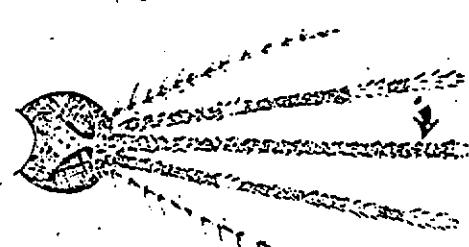


Fig. 37 D

Basal third of costa with pale interruption (Fig. 38 A); proboscis with apical half dark... minimus

Basal third of costa without pale interruption (Fig. 38 B); proboscis with apical half pale varuna

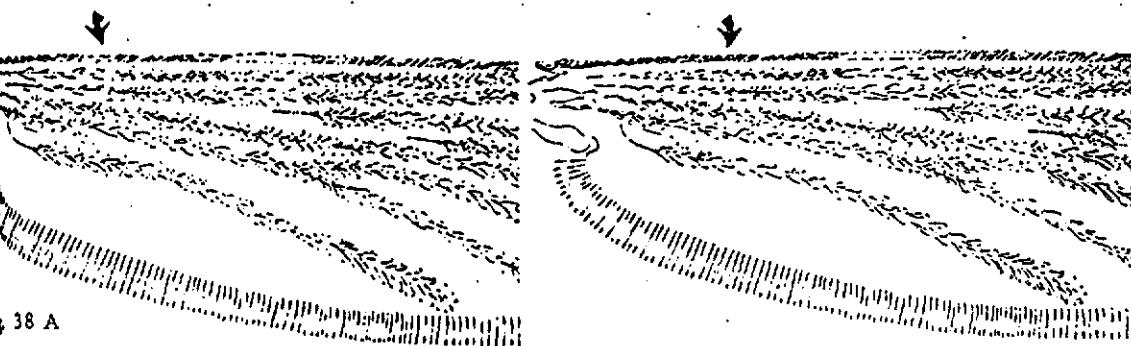


Fig. 38 A

Fig. 38 B

Wing with fringe-spots present at all veins except 6 (Fig. 39 A). fluvialis

Wing with fringe-spots on only 1 or 2 veins (Fig. 39 B). culicifacies



Fig. 39 A

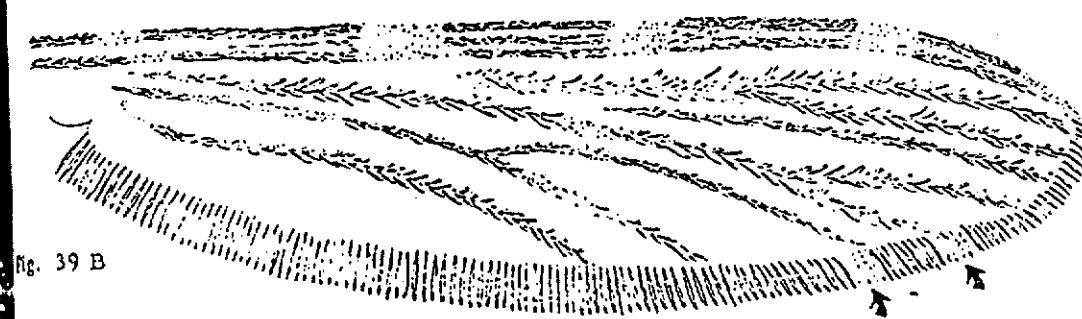


Fig. 39 B

KEY TO FEMALE TOXORHYNCHITES

Tarsal segments 3-5 on all legs entirely white or with pale rings (Fig. 1 A)..... albipes

Tarsal segments 3-5 on fore or hind legs entirely dark (Fig. 1 B)..... 2

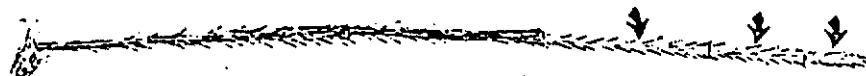


Fig. 1 A

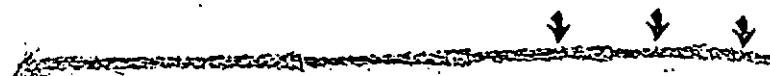


Fig. 1 B

Abdominal segments 6-8 with conspicuous lateral tufts of hairs (Fig. 2 A)..... splendens

Abdominal segments 6-8 without conspicuous lateral tufts of hairs (Fig. 2 B)..... kempi

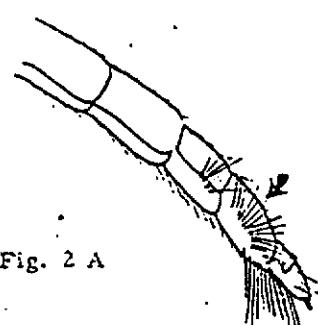


Fig. 2 A

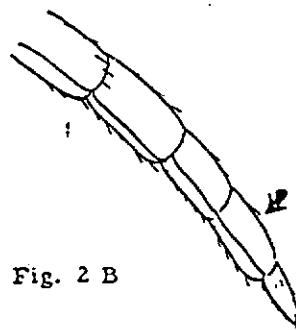


Fig. 2 B

KEY TO FEMALE TRIPTEROIDES

Femur with spots of silvery scales (Fig. 1 A)..... 2

Femur without spots of silvery scales (Fig. 1 B)..... aranoides

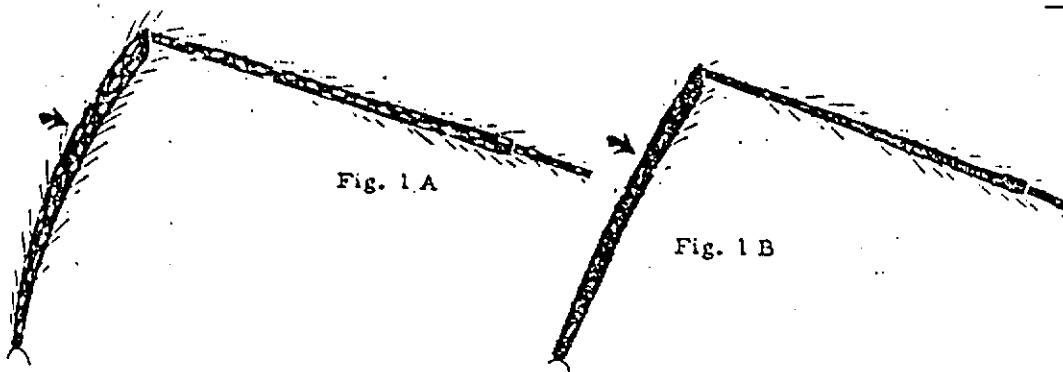


Fig. 1 A

Fig. 1 B

Anterior pronotal lobe with broad, flat, silvery scales (Fig. 2 A)..... similis

Anterior pronotal lobe with brown scales (Fig. 2 B)..... 3

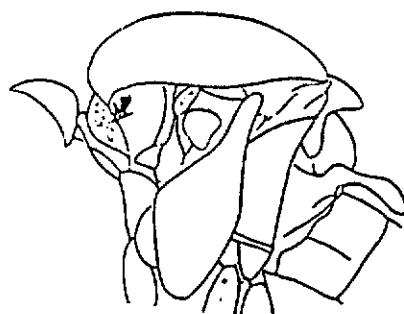
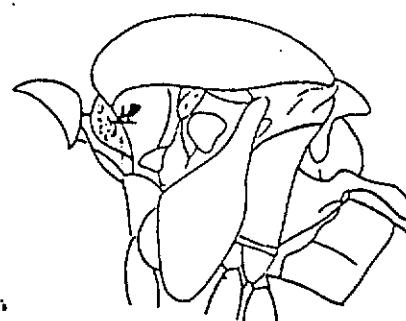


Fig. 2 A

Fig. 2 B



Posterior pronotal lobe with broad, flat, brown scales; mesonotum uniformly golden brown (Fig. 3 A & B)..... proximus

Posterior pronotal lobe with narrow brown scales; mesonotum with a pale U-shaped border (Fig. 3 C & D)..... powelli

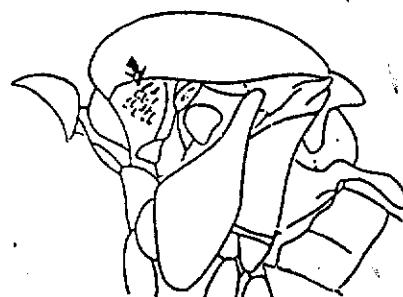


Fig. 3 A

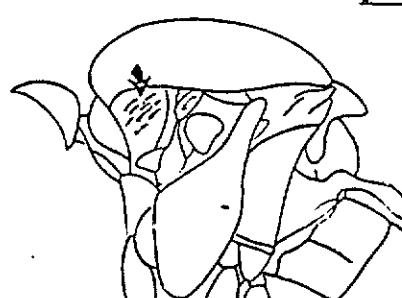


Fig. 3 C



Fig. 3 B

Fig. 3 D



KEY TO FEMALE MALAYA

Glypeus with pale scales; line of pale scales between eyes (Fig. 1 A).....genurostris

Glypeus dark; line of pale scales absent between eyes (Fig. 1 B).....jacobsoni

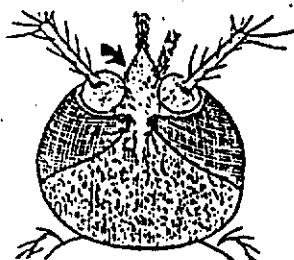


Fig. 1 A

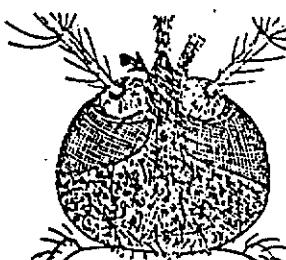


Fig. 1 B

FEMALE TOPOMYIA

Only known species in Vietnam (Fig. 1 A).....gracilis

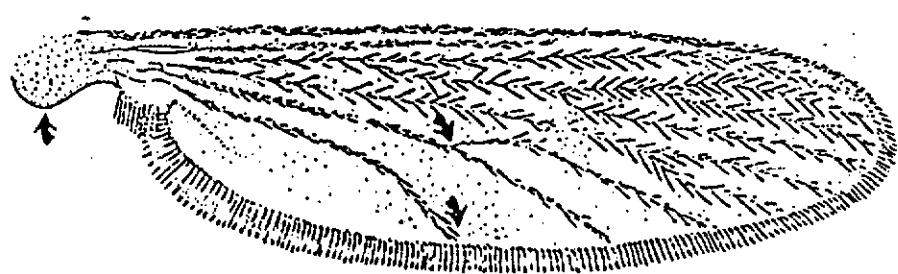


Fig. 1 A

KEY TO FEMALE FICALBIA

1. Second marginal cell of wing about $1/2$ length of its petiole (Fig. 1 A)..... 2
 Second marginal cell of wing as long or longer than its petiole (Fig. 1 B)..... 3

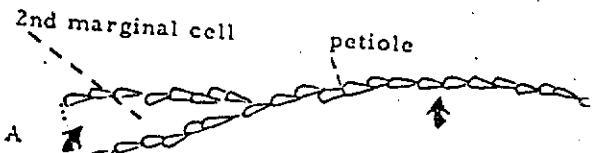


Fig. 1 A

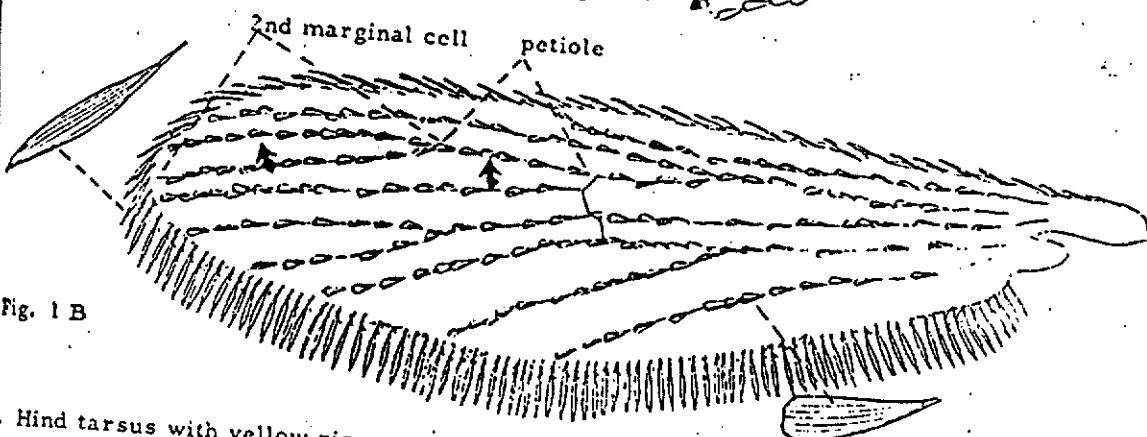


Fig. 1 B

- Hind tarsus with yellow rings, segment 5 entirely yellow (Fig. 2 A)..... chamberlaini
 Hind tarsus without rings, segment 5 entirely dark (Fig. 2 B)..... hybrida

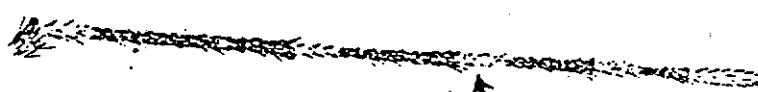


Fig. 2 A

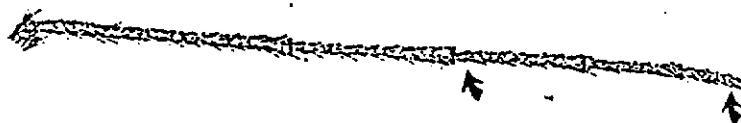


Fig. 2 B

- First flagellar segment of antenna about 3 times as long as second segment (Fig. 3 A).....
 First flagellar segment of antenna not much longer than second segment (Fig. 3 B)
- minima
 luzonensis

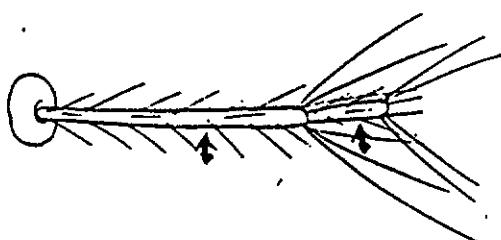


Fig. 3 A

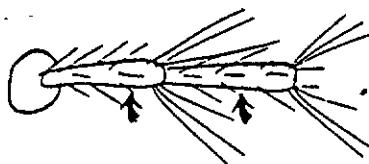


Fig. 3 B

KEY TO FEMALE MANSONIA

1. Wing scales narrow (Fig. 1 A)..... 2
 Wing scales broad (Fig. 1 B)..... 4

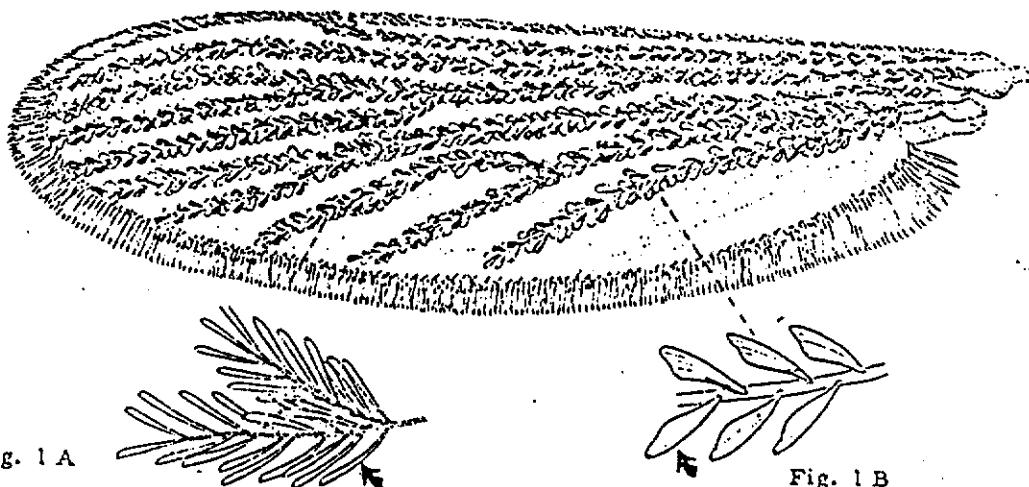


Fig. 1 A

Fig. 1 B

1. Wing scales dark (Fig. 2 A)..... crassipes
 Wing scales yellow (Fig. 2 B)..... 3



Fig. 2 A

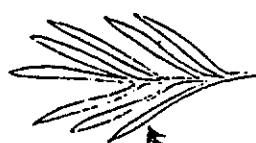


Fig. 2 B

1. Mesonotum with dark markings (Fig. 3 A)..... nigrosignata
 Mesonotum without dark markings (Fig. 3 B)..... ochracea

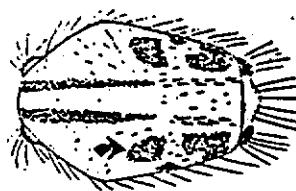


Fig. 3 A

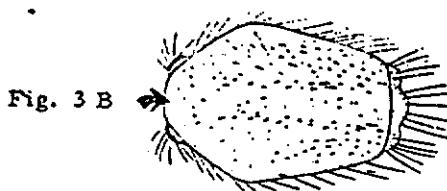


Fig. 3 B

4. Mesonotum with distinct round spots of pale scales (Fig. 4 A)..... 5
 Mesonotum without distinct round spots of pale scales (Fig. 4 B)..... 7

Fig. 4 A

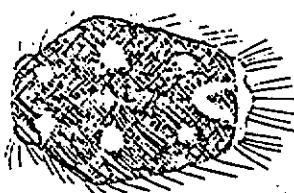
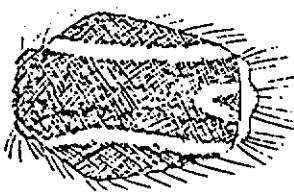


Fig. 4 B



5. Mesonotum with at least 3 distinct round spots of pale scales (Fig. 5 A)..... annulifera
 Mesonotum with 2 distinct round spots of pale scales (Fig. 5 B)..... 6

Fig. 5 A



Fig. 5 B



6. Mesonotum with a patch of flat white scales above wing roots (Fig. 6 A)..... dives,
 Mesonotum without a patch of flat white scales above wing roots (Fig. 6 B)..... bonneae

Fig. 6 A

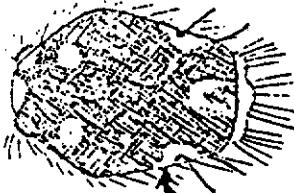


Fig. 6 B



7. Mesonotum with irregular pattern of pale scales (Fig. 7 A)..... annulata
 Mesonotum without irregular pattern of pale scales (Fig. 7 B)..... 8

Fig. 7 A



Fig. 7 B



Mesonotum with pair of longitudinal green lines (Fig. 8 A).....uniformis

Mesonotum with indistinct pale patches (Fig. 8 B).....indiana

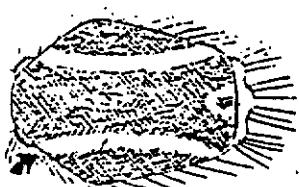


Fig. 8 A

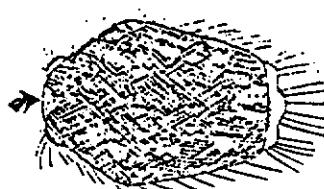


Fig. 8 B

KEY TO FEMALE URANOTAENIA

1. Hind tarsal segments 2-4 with pale basal bands (Fig. 1 A)..... edwardsi
 Hind tarsus entirely dark (Fig. 1 B)..... 2

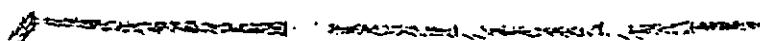


Fig. 1 A

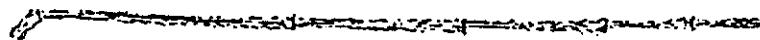


Fig. 1 B

2. Lateral margin of mesonotum in front of wing base with white, creamy, or blue, flat broad scales (Fig. 2 A)..... 3
 Lateral margin of mesonotum in front of wing base with at most only a few pale narrow scales (Fig. 2 B)..... 5

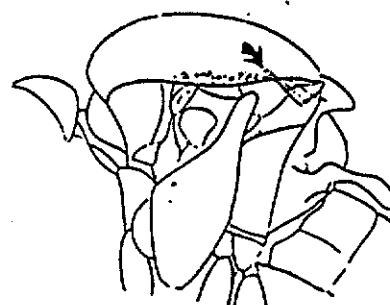


Fig. 2 A

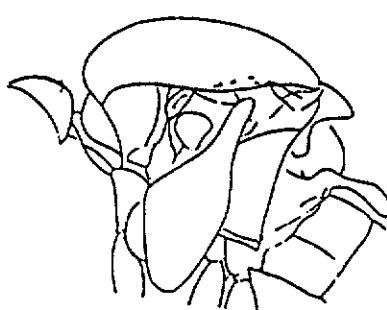


Fig. 2 B

3. Abdominal segments 1-4 banded (Fig. 3 A)..... 4
 Abdominal segments not banded (Fig. 3 B)..... lateralis



Fig. 3 A



Fig. 3 B

Mesonotum with mixture of pale brown, ochreous, and dark brown scales (Fig. 4 A).....
..... macfarlanei

Mesonotum with deep brown scales (Fig. 4 B)..... campestris



Fig. 4 A



Fig. 4 B

Line of bluish-white scales from head to mesepimeron (Fig. 5 A)..... annandalci

No line of bluish-white scales from head to mesepimeron (Fig. 5 B)..... 6

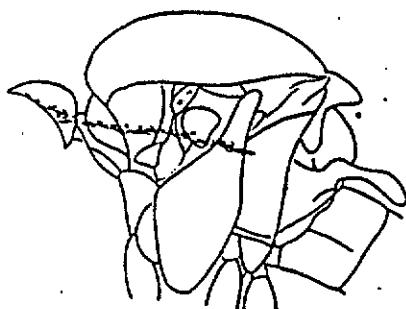


Fig. 5 A

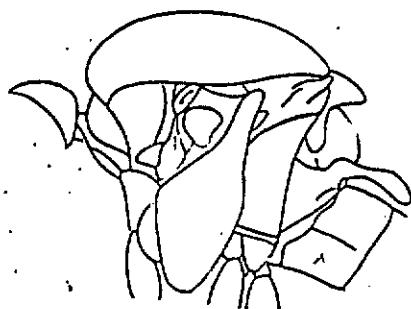


Fig. 5 B

Abdomen with basal pale bands (Fig. 6 A)..... 7

Abdomen without pale bands (Fig. 6 B)..... 9

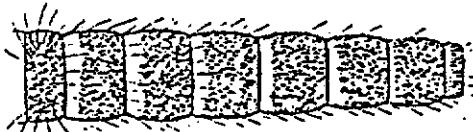


Fig. 6 A



Fig. 6 B

7. Abdominal bands well developed; margin of mesonotum without border of pale scales (Fig. 7 A & B).....8
- Abdominal bands not well developed; margin of mesonotum with border of pale scales (Fig. 7 C & D).....maxima



Fig. 7 A



Fig. 7 C

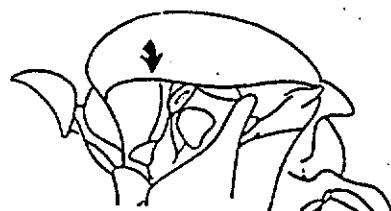


Fig. 7 B

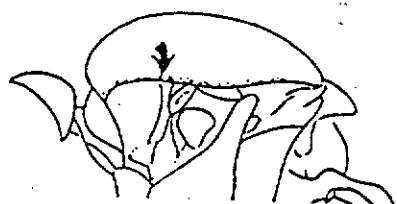


Fig. 7 D

8. Pleuron uniformly pale (Fig. 8 A).....luteola
- Pleuron with dark patches (Fig. 8 B).....bicolor

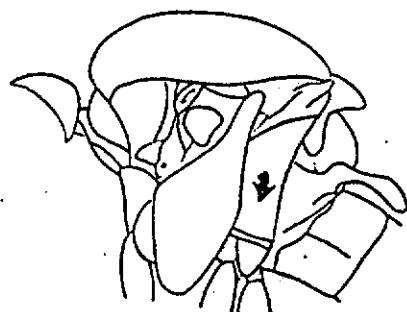


Fig. 8 A

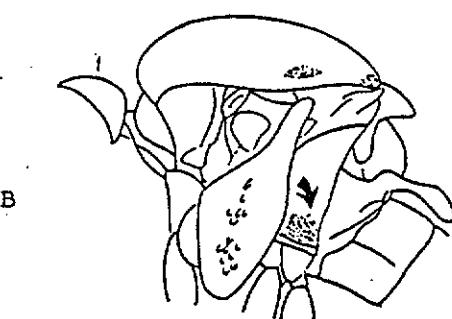


Fig. 8 B

9. Front or lateral margins of mesonotum with few narrow pale scales (Fig. 9 A).....10
- Front or lateral margins of mesonotum without narrow pale scales (Fig. 9 B).....11

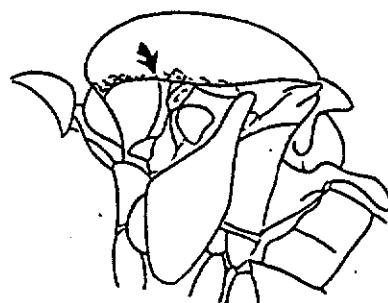


Fig. 9 A

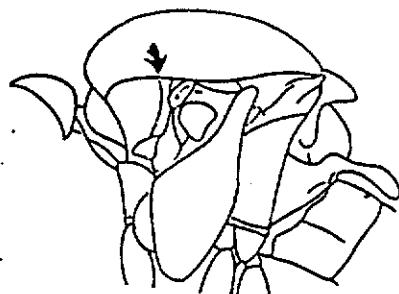


Fig. 9 B

Black spot present in front of wing base (Fig. 10 A)..... bimaculata

Black spot absent in front of wing base (Fig. 10 B)..... maxima

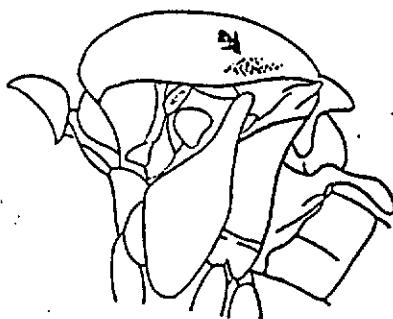


Fig. 10 A

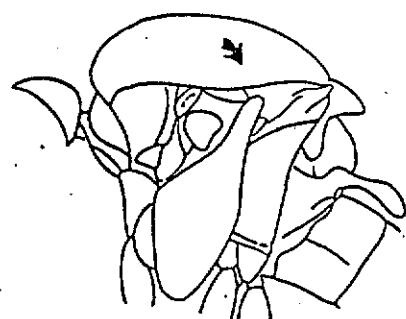


Fig. 10 B

Neuron with dark markings (Fig. 11 A)..... maculipleura

Neuron uniformly pale (Fig. 11 B)..... 12

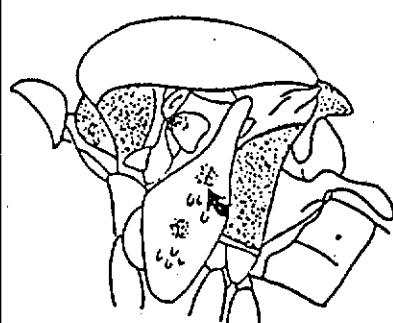


Fig. 11 A



Fig. 11 B

Mesonotum light brown (Fig. 12 A)..... recondita

Mesonotum dark brown (Fig. 12 B)..... obscura

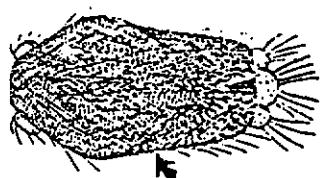


Fig. 12 A

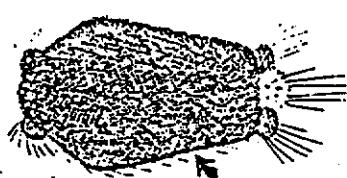


Fig. 12 B

FEMALE HODGESIA

Only known species in Vietnam (Fig. 1 A).....malayi

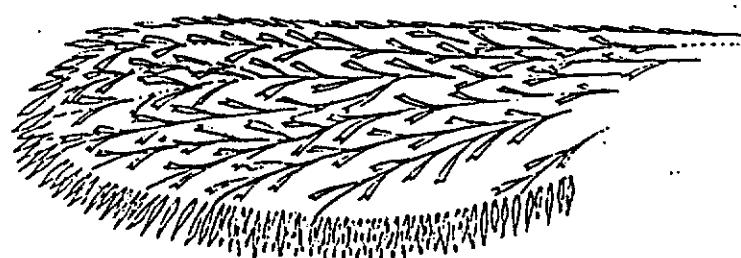


Fig. 1 A

KEY TO FEMALE ORTHOPODOMYIA

Ventral segment 2 pale scaled at base on outer surface (Fig. 1 A)..... albipes

Ventral segment 2 dark at base on outer surface (Fig. 1 B)..... 2

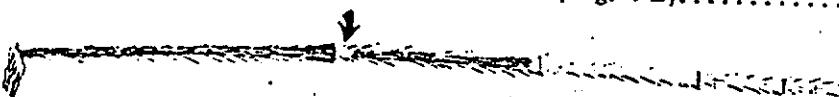


Fig. 1 A

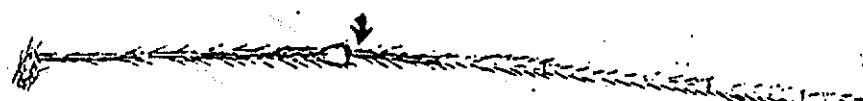


Fig. 1 B

Ventral segments 3-4 with subapical black band (Fig. 2 A)..... anopheloides

Ventral segments 3-5 pale scaled, segment 3 may have subapical black band (Fig. 2 B)..... andamanensis

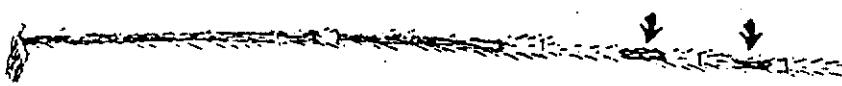


Fig. 2 A

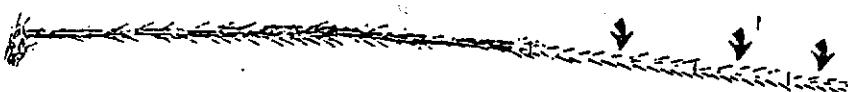


Fig. 2 B

FEMALE AEDEOMYIA

Only known species in Vietnam (Fig. 1 A).....catasticta

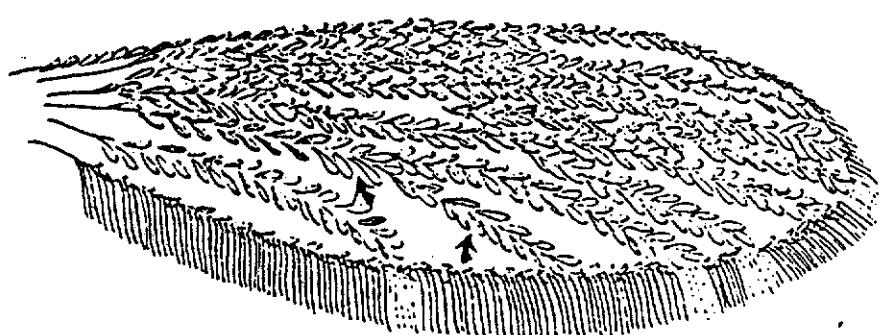


Fig. 1 A

KEY TO FEMALE HEIZMANNIA

Abdominal segments with small lateral pale markings (Fig. 1 A).....complex

Abdominal segments with large lateral pale markings (Fig. 1 B).....communis

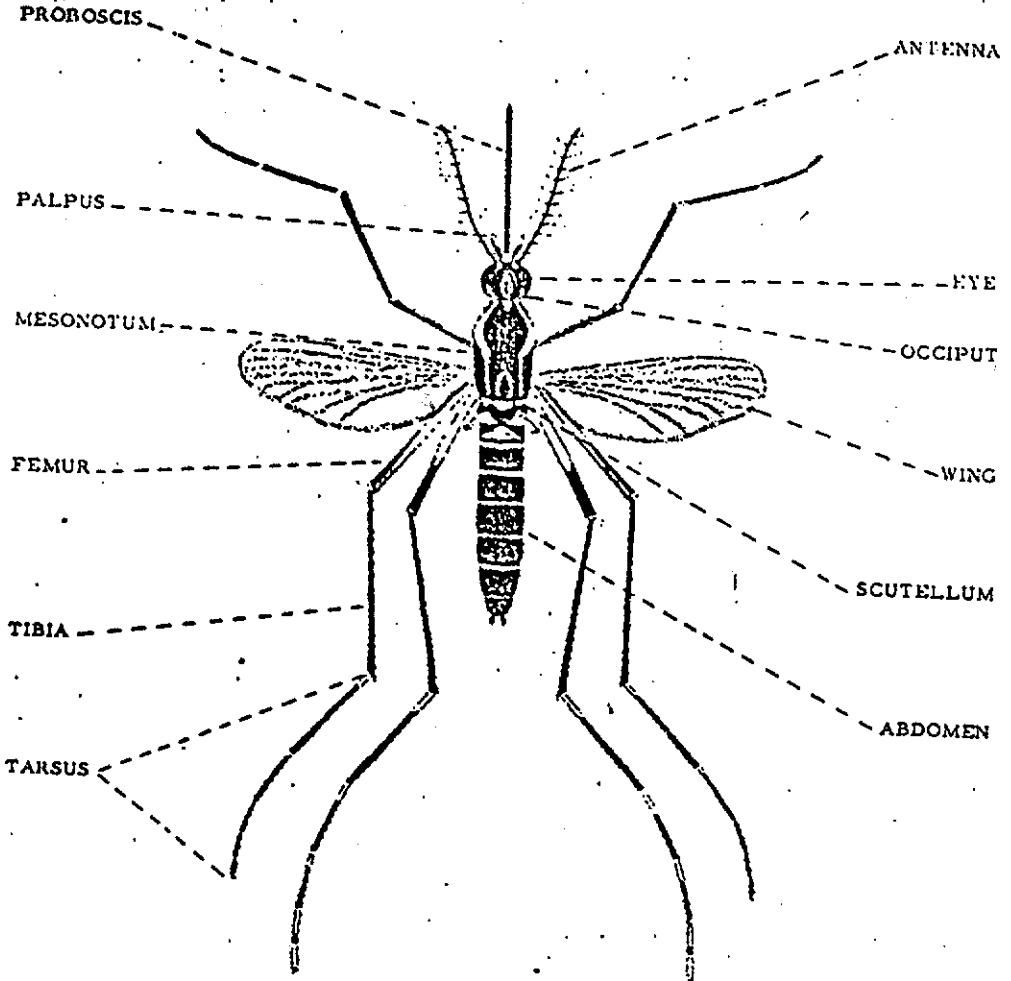


Fig. 1 A

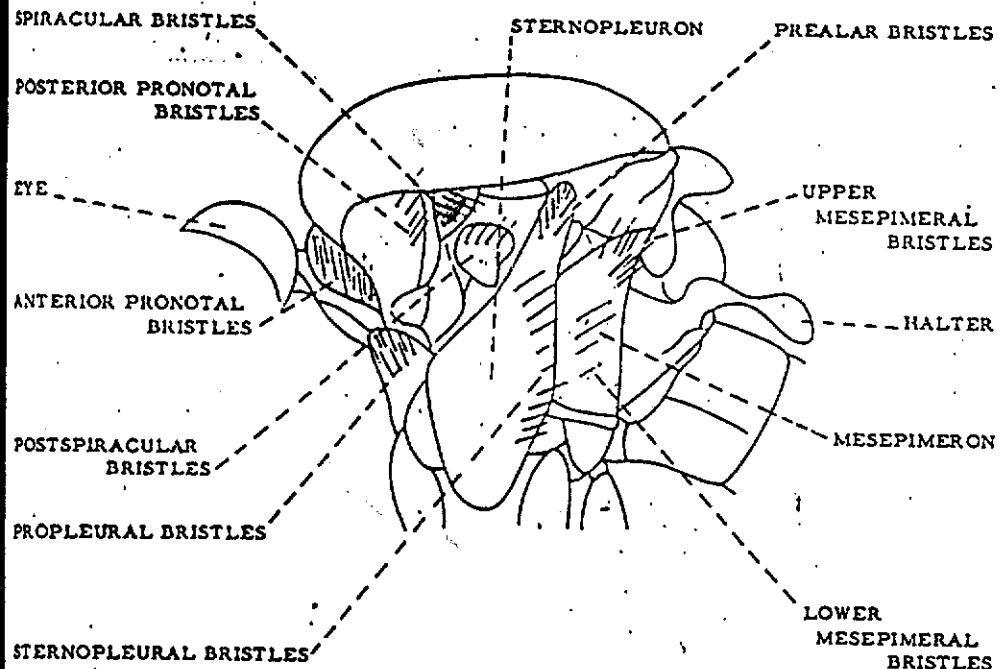


Fig. 1 B

ADULT FEMALE AEDES



LATERAL ASPECT OF MOSQUITO THORAX



KEY TO FEMALE AEDES

Hind tarsus entirely dark (Fig. 1 A)..... 2

Hind tarsus with some pale rings (Fig. 1 B)..... 13



Fig. 1 A

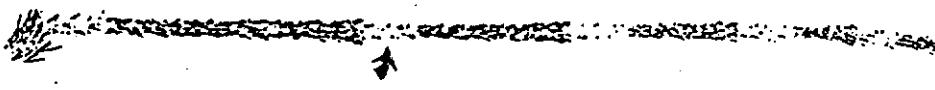


Fig. 1 B

Lower mesepimeral bristles present (Fig. 2 A)..... 3

Lower mesepimeral bristles absent (Fig. 2 B)..... 4

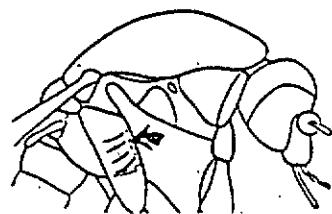


Fig. 2 A



Fig. 2 B

Mesonotum dark (Fig. 3 A)..... cancricomes

Mesonotum with median dark area bordered by yellow scales (Fig. 3 B).... lineatopennis



Fig. 3 A



Fig. 3 B

Segment 1 of hind tarsus as long as or longer than hind tibia (Fig. 4 A)..... longirostris

Segment 1 of hind tarsus shorter than hind tibia (Fig. 4 B)..... 5

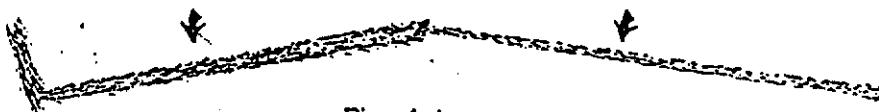


Fig. 4 A

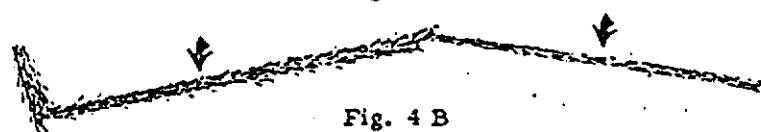


Fig. 4 B

Scutellum with narrow scales (Fig. 5 A)..... 6

Scutellum with broad scales (Fig. 5 B)..... 10

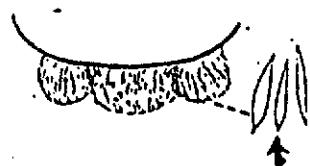


Fig. 5 A

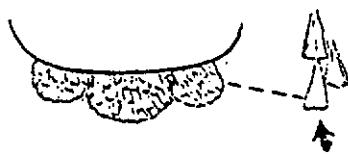


Fig. 5 B

Mesonotum with conspicuous median stripe of golden scales (Fig. 6 A)..... ostentatio

Mesonotum without median stripe of golden scales (Fig. 6 B)..... 7



Fig. 6 A



Fig. 6 B

Abdomen with median stripe of pale, yellowish scales (Fig. 7 A)..... mediolineatus

Abdomen without median stripe of pale scales (Fig. 7 B)..... 8



Fig. 7 A

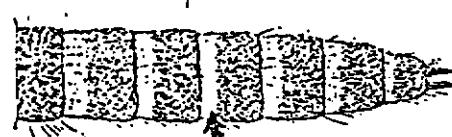
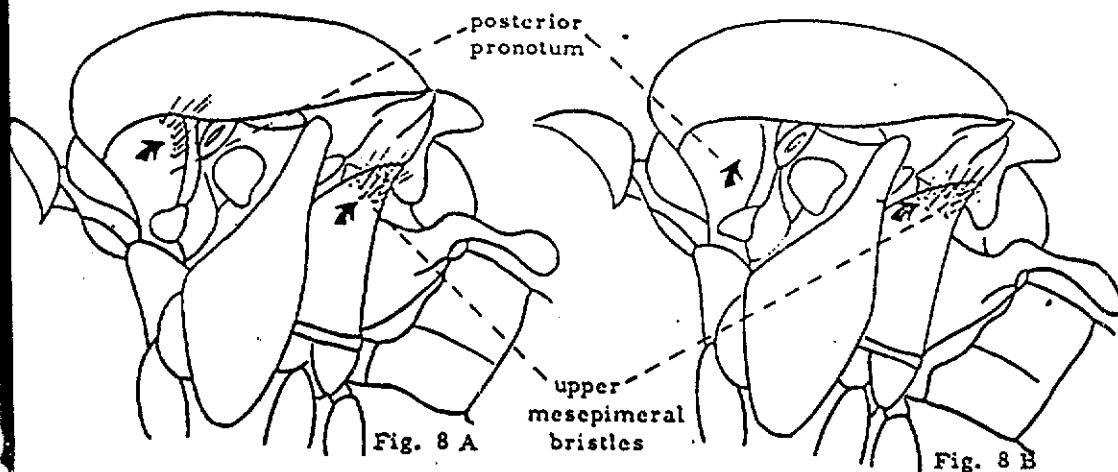


Fig. 7 B

Posterior pronotum bristles 7-8; upper mesepimeral bristles 15 (Fig. 8 A) mesonotum
with golden brown scales andamanensis

Posterior pronotum bare; upper mesepimeral bristles not more than 12 (Fig. 8 B) meso-
notum with dark brown scales 9



g. Upper mesepimeral bristles 3-7 (Fig. 9 A)..... dux

Upper mesepimeral bristles 12 (Fig. 9 B)..... butleri



Fig. 9 A

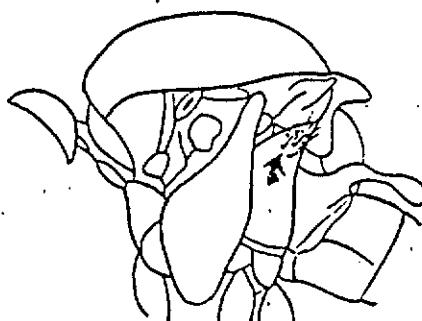


Fig. 9 B

h. Mesonotum with prominent white scaling on anterior portion (Fig. 10 A)..... niveodes and niveus

Mesonotum without prominent white scaling on anterior portion (Fig. 10 B)..... 11



Fig. 10 A



Fig. 10 B

i. Scutellum with prominent broad flat dark scales (Fig. 11 A)..... amesi

Scutellum with broad flat silvery white scales (Fig. 11 B)..... 12



Fig. 11 A

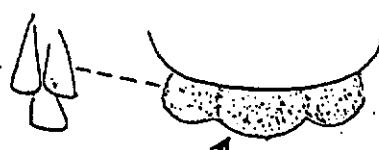


Fig. 11 B

j. Wing with white spot at base of costa; tibia tipped with white scales (Fig. 12 A & B)....
..... albuscutellatus

Wing without white spot at base of costa; tibia not tipped with white scales (Fig. 12 C & D)
..... niveoscutellatum



Fig. 12 A

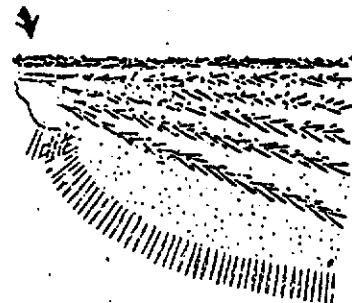


Fig. 12 C

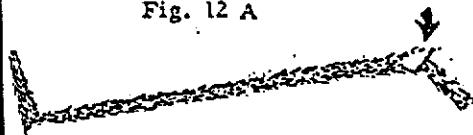


Fig. 12 B



Fig. 12 D

13. Lower mesepimeral bristles present (Fig. 13 A)..... 14
 Lower mesepimeral bristles absent (Fig. 13 B)..... 15

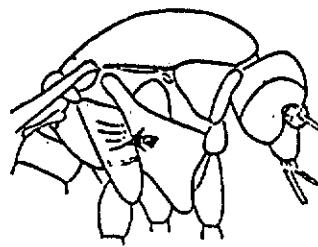


Fig. 13 A

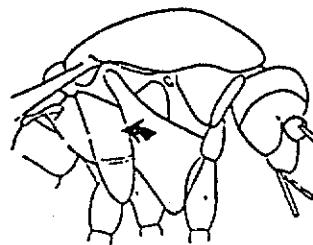


Fig. 13 B

14. All tibia with distinct median white rings; segment 1 of hind tarsus with broad white basal ring (Fig. 14 A & B)..... vittatus
 Fore and mid tibia not ringed medially, hind tibia with a less distinct median ring or absent; segment 1 of hind tarsus with narrow white basal ring (Fig. 14 C & D) langer

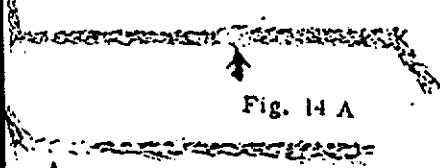


Fig. 14 A

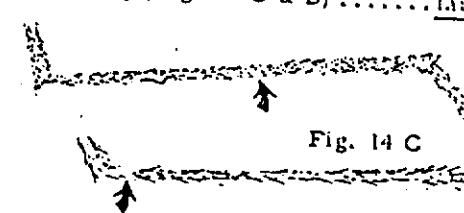


Fig. 14 C

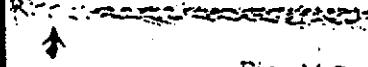


Fig. 14 B

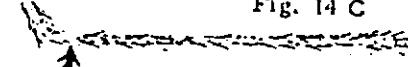


Fig. 14 D

- Proboscis with pale scaling (Fig. 15 A)..... 16
 Proboscis entirely dark (Fig. 15 B)..... 21

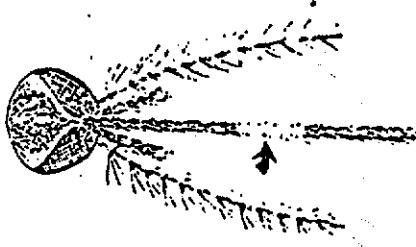


Fig. 15 A

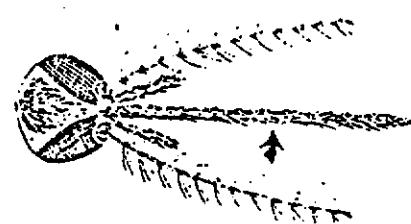


Fig. 15 B

- Wing with dark and pale areas or evenly mixed with dark and pale scales (Fig. 16 A & B).17
 Wing not spotted (Fig. 16 C)..... 18



Fig. 16 A

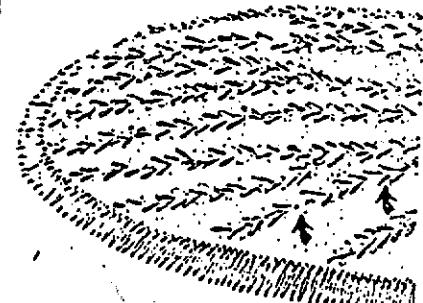


Fig. 16 B

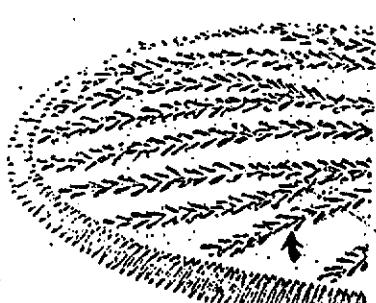


Fig. 16 C

17. Wing with evenly mixed pale and dark scales (Fig. 17 A)..... *taeniorhynchoides*
 Wing with pale and dark areas (Fig. 17 B)..... *poicilius*

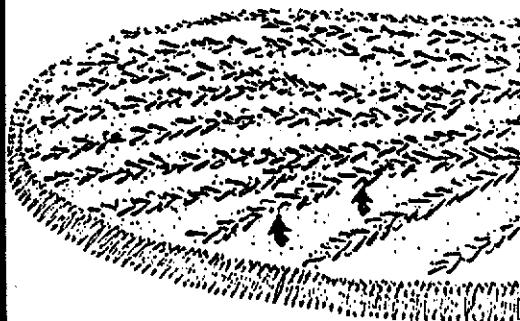


Fig. 17 A

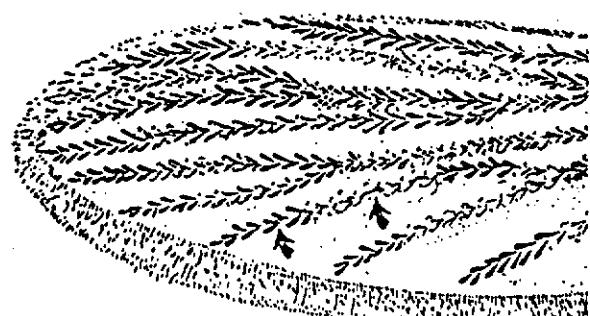


Fig. 17 B

18. Hind tarsus with segments 1-5 ringed (Fig. 18 A)..... 19
 Hind tarsus with segments 1-5 not all ringed (Fig. 18 B)..... 20

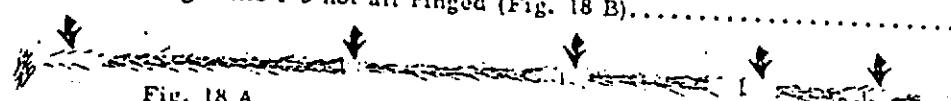


Fig. 18 A

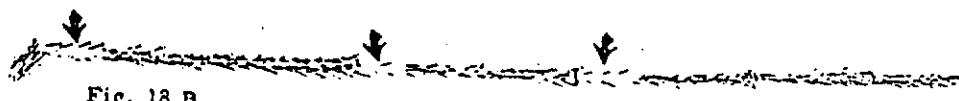


Fig. 18 B

19. Hind tarsus with at least some segments ringed both apically and basally (Fig. 19 A)..... *macfarlanei*
 Hind tarsus with segments ringed basally (Fig. 19 B)..... *vigilax*

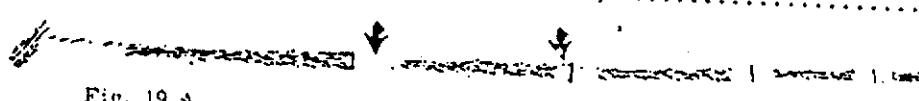


Fig. 19 A

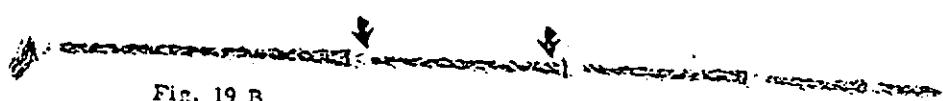


Fig. 19 B

20. Hind tarsus with segments 1-3 ringed basally (Fig. 20 A)..... *chrysolineatus*
 Hind tarsus with segments 1-4 ringed basally, at least 2 of the segments ringed both
 basally and apically (Fig. 20 B)..... *elsiae*

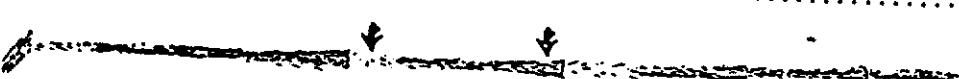


Fig. 20 A

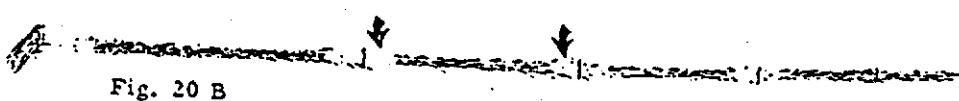


Fig. 20 B

- Palp with pale scales at tip (Fig. 21 A)..... 22
- Palp entirely dark (Fig. 21 B)..... 30



Fig. 21 A

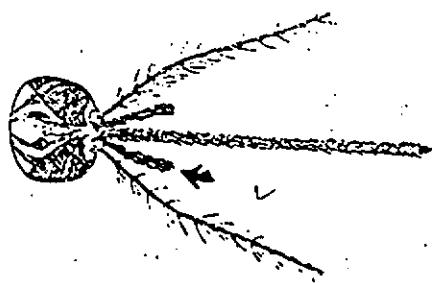


Fig. 21 B

- Mesonotum uniformly colored (Fig. 22 A)..... vexans
- Mesonotum not uniformly colored (Fig. 22 B)..... 23



Fig. 22 A



Fig. 22 B

- Fore, mid and hind tibia ringed at middle (Fig. 23 A)..... desmotes
- Fore, mid and hind tibia not all ringed at middle (Fig. 23 B)..... 24

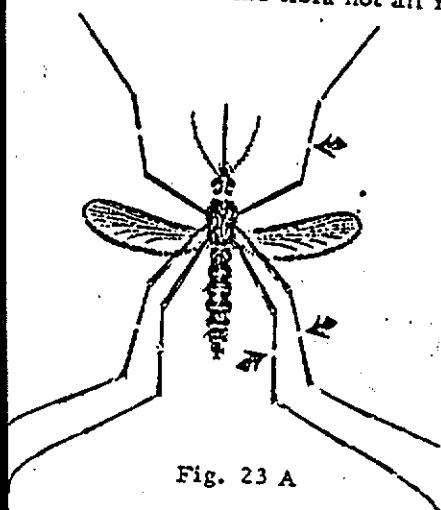


Fig. 23 A

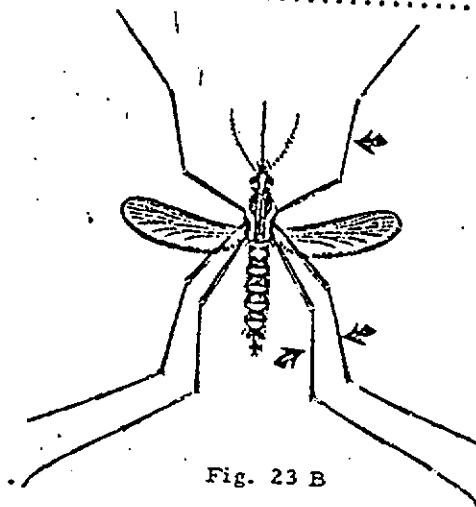


Fig. 23 B

- Mesonotum with lyre-shaped marking (Fig. 24 A)..... aegypti
- Mesonotum without lyre-shaped marking (Fig. 24 B)..... 25



Fig. 24 A



Fig. 24 B

⇒ *aedes albopictus*

25. Mesonotum with median stripe (Fig. 25 A)..... 26
 Mesonotum with anterior pale spot (Fig. 25 B)..... 28



Fig. 25 A



Fig. 25 B

26. Hind tarsus with segment 5 entirely white (Fig. 26 A).... pseudoalbopictus and albopictus
 Hind tarsus with segment 5 entirely dark (Fig. 26 B)..... 27

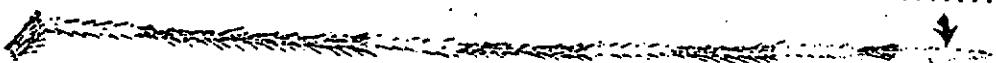


Fig. 26 A

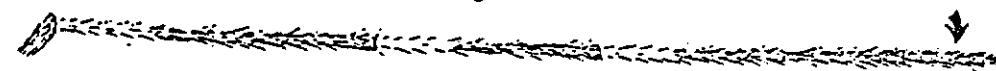


Fig. 26 B

27. Mesonotum with narrow median stripe of pale scales; segment 3 of hind tarsus with pale ring (Fig. 27 A & B)..... saxicola

- Mesonotum with broad median stripe of pale scales; segment 3 of hind tarsus entirely dark (Fig. 27 C & D)..... mediopunctatus



Fig. 27 A



Fig. 27 C

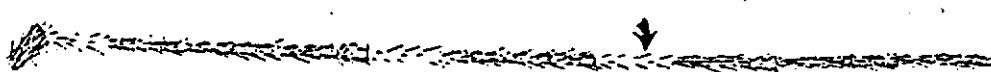


Fig. 27 B

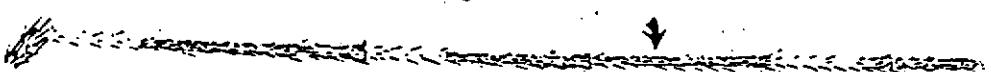


Fig. 27 D

28. Mesonotum with small patch of white scales anteriorly (Fig. 28 A)..... edwardsi

- Mesonotum with large patch of white scales anteriorly (Fig. 28 B)..... 29



Fig. 28 A



Fig. 28 B

- Hind tarsus with segment 5 entirely dark (Fig. 29 A).....annandalei
 Hind tarsus with segment 5 ringed basally (Fig. 29 B).....indosinensis

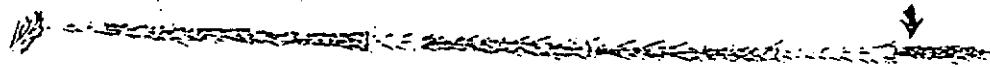


Fig. 29 A

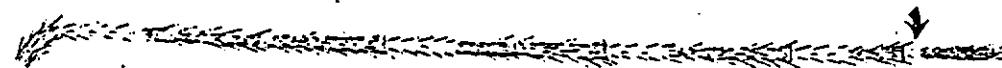


Fig. 29 B

- Mesonotum with patch of white scales anteriorly (Fig. 30 A).....31
 Mesonotum without patch of white scales anteriorly (Fig. 30 B).....34



Fig. 30 A



Fig. 30 B

- Ventral portion of abdomen with outstanding tufts of scales (Fig. 31 A).....32
 Ventral portion of abdomen without outstanding tufts of scales (Fig. 31 B)....gubernatoris

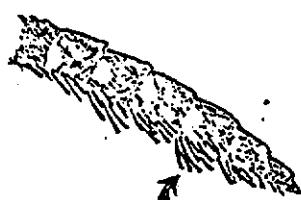


Fig. 31 A

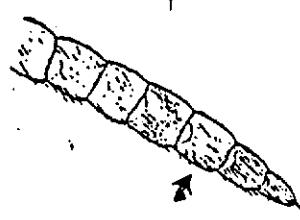


Fig. 31 B

- Posterior pronotal lobe bare (Fig. 32 A).....khazani
 Posterior pronotal lobe with white scales (Fig. 32 B).....33

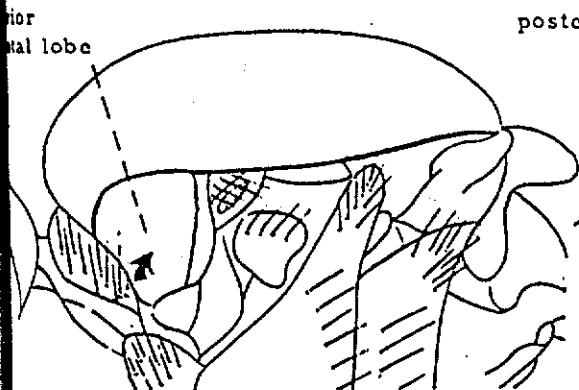


Fig. 32 A

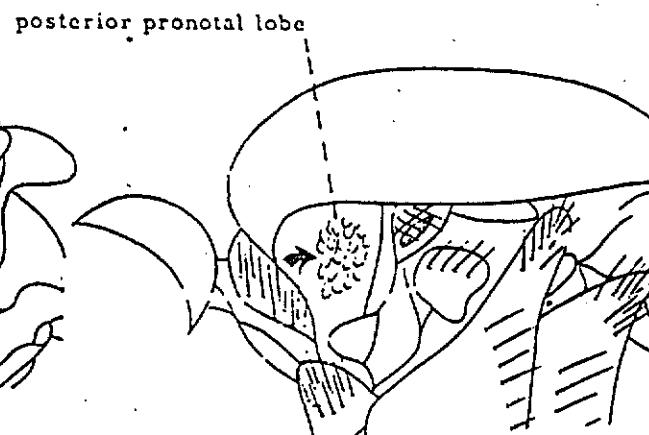


Fig. 32 B

33. Scutellum with scales brownish black (Fig. 33 A).....assamensis
 Scutellum with some white scales on lateral lobes (Fig. 33 B).....prominens



Fig. 33 A



Fig. 33 B

34. Mesonotum with median stripe of pale scales (Fig. 34 A).....albolineatus
 Mesonotum without median stripe of pale scales (Fig. 34 B).....35



Fig. 34 A



Fig. 34 B

35. Pale scales on occiput mostly golden; hind tarsus with segment 1 with broad basal band (Fig. 35 A & B).....imprimens
 Pale scales on occiput mostly white; segment 1 of hind tarsus with narrow basal band (Fig. 35 C & D).....caecus

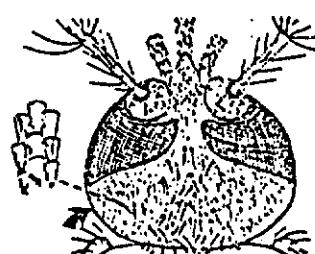


Fig. 35 A

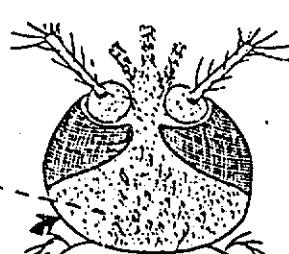


Fig. 35 C

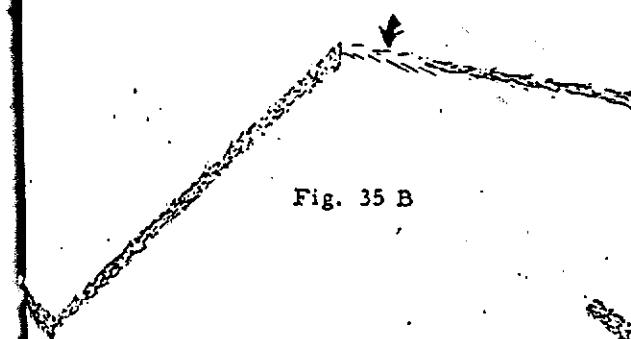


Fig. 35 B

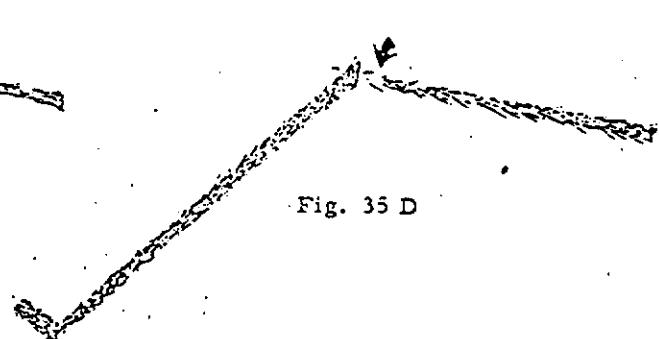


Fig. 35 D

KEY TO FEMALE ARMIGERES

- Up about 1/3 length of proboscis (Fig. 1 A)..... 2
Up about 1/2 length of proboscis (Fig. 1 B)..... 6

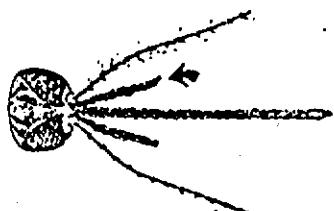


Fig. 1 A

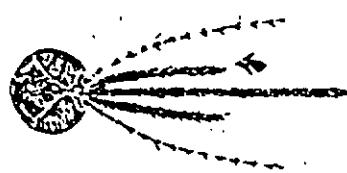


Fig. 1 B

Abdominal sternites 3-6 almost entirely white scaled (Fig. 2 A)..... kuchingensis

Abdominal sternites 3-6 with apical dark band (Fig. 2 B)..... 3

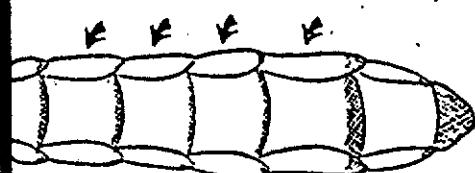


Fig. 2 A

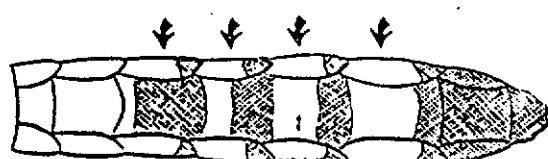


Fig. 2 B

Thorax with pair of median golden lines (Fig. 3 A)..... aureolineatus

Thorax without pair of median golden lines (Fig. 3 B)..... 4



Fig. 3 A



Fig. 3 B

4. Abdominal sternite 7 entirely dark (Fig. 4 A)..... moultoni
 Abdominal sternite 7 with a narrow subapical white band (Fig. 4 B)..... 5

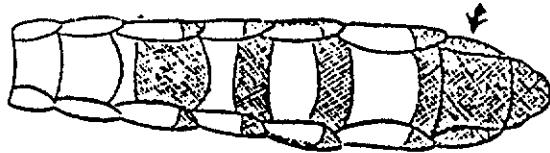


Fig. 4 A

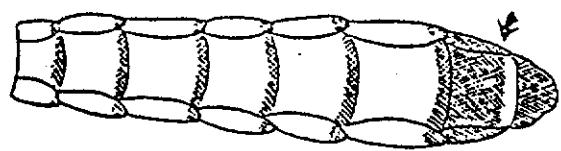


Fig. 4 B

5. Abdominal sternites 3-6 with apical dark bands decreasing in width (Fig. 5 A) .. subalbatus
 Abdominal sternites 3-6 with apical dark bands not decreasing in width (Fig. 5 B) .. durhami

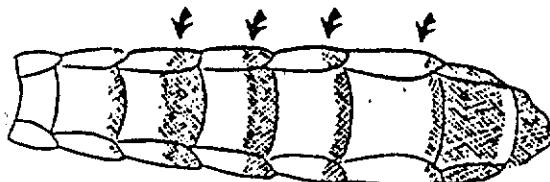


Fig. 5 A

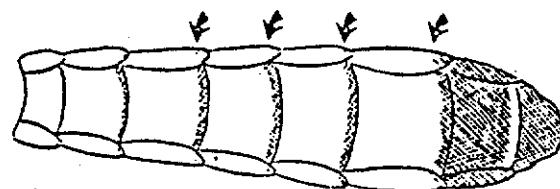


Fig. 5 B

- Postnotum with a tuft of minute setae (Fig. 6 A)..... flavus
 Postnotum without a tuft of minute setae (Fig. 6 B)..... 7

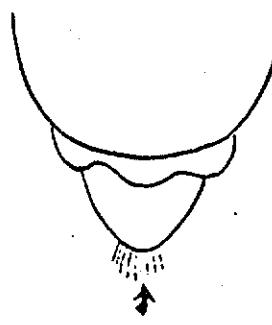


Fig. 6 A

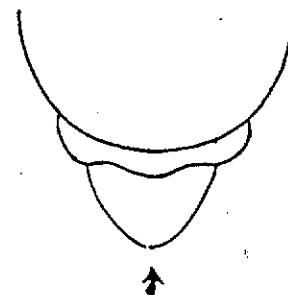


Fig. 6 B

Abdominal tergites with median basal yellow markings (Fig. 7 A).....magnus

Abdominal tergites without median basal markings (Fig. 7 B).....8



Fig. 7 A

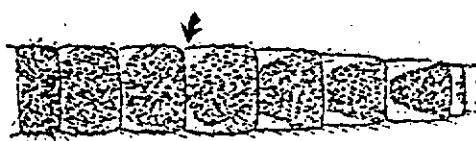


Fig. 7 B

Hind tarsus with pale rings (Fig. 8 A).....9

Hind tarsus entirely dark (Fig. 8 B).....10

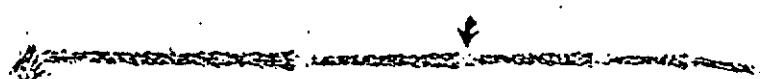


Fig. 8 A

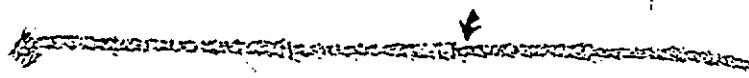


Fig. 8 B

Palp tipped with white; clypeus with scales (Fig. 9 A).....annulitarsis

Palp dark; clypeus without scales (Fig. 9 B).....dolichocephalus

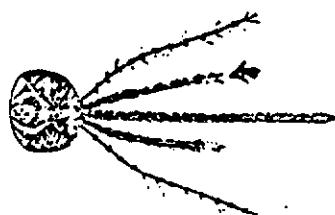


Fig. 9 A

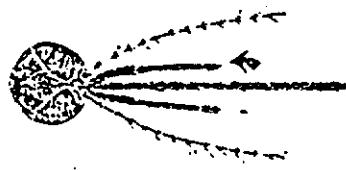


Fig. 9 B

10. Clypeus with flat elliptical scales (Fig. 10 A).....longipalpus
Clypeus bare or with few narrow scales (Fig. 10 B).....11

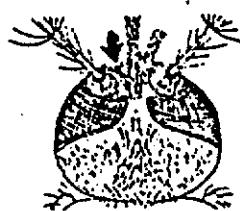


Fig. 10 A

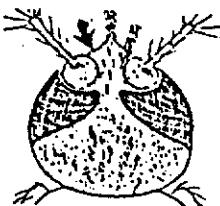


Fig. 10 B

11. Mesonotum produced over head (Fig. 11 A).....cingulatus
Mesonotum not produced over head (Fig. 11 B).....pectinatus

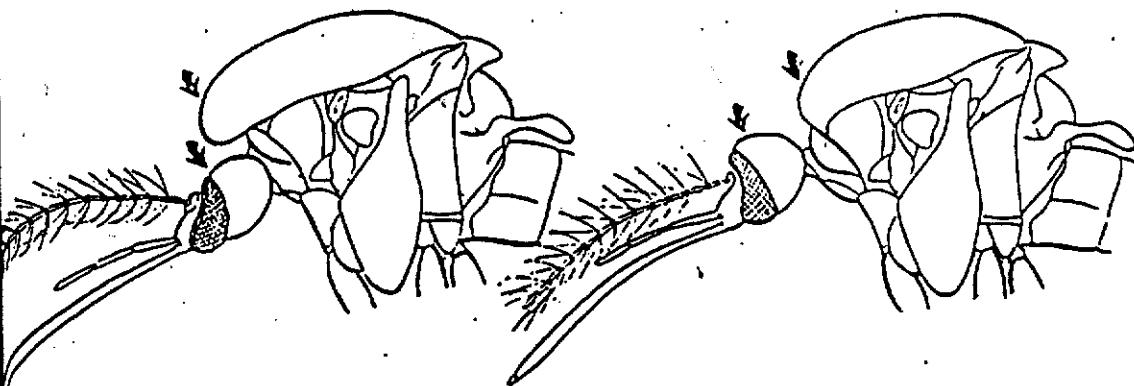
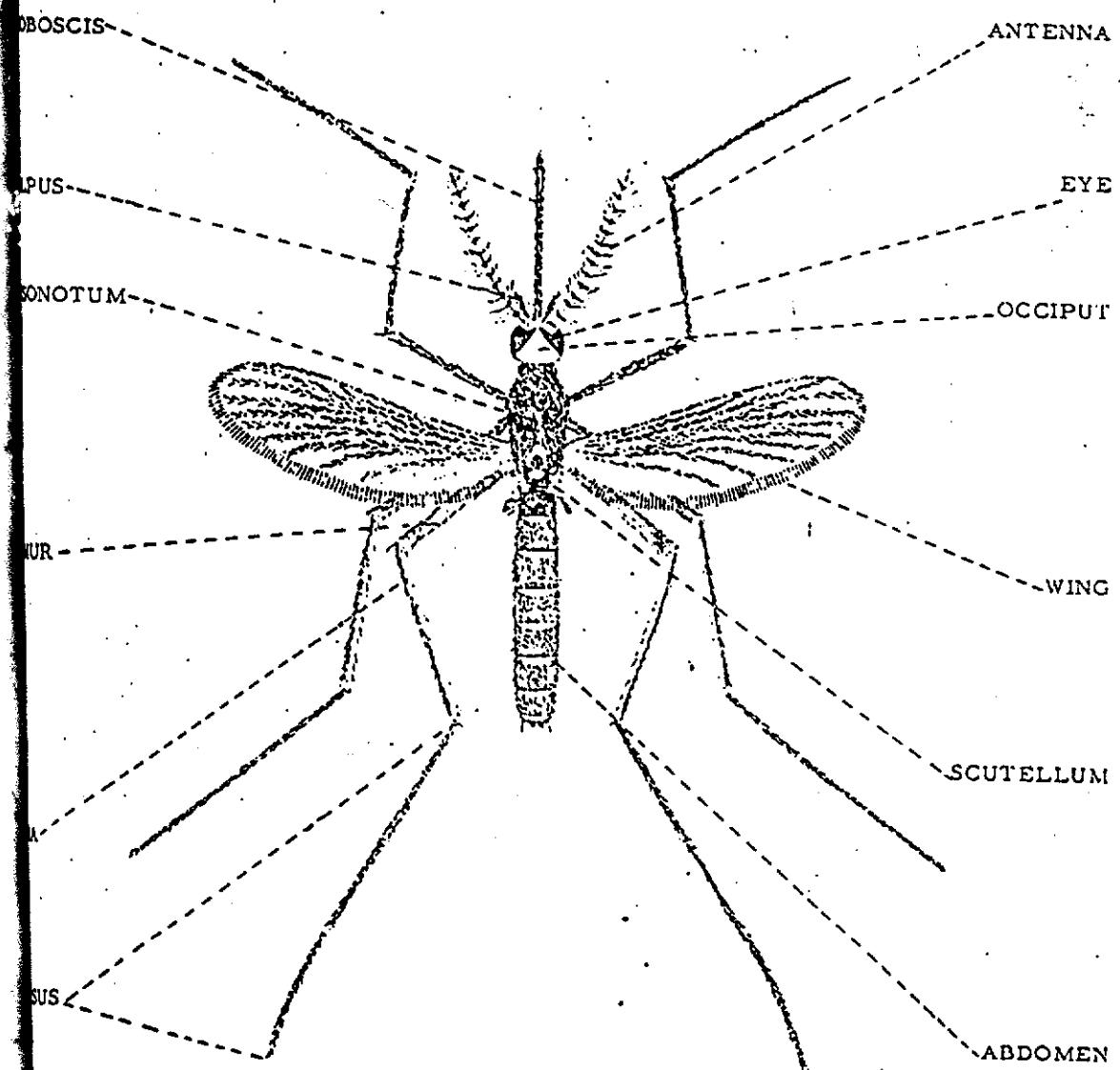


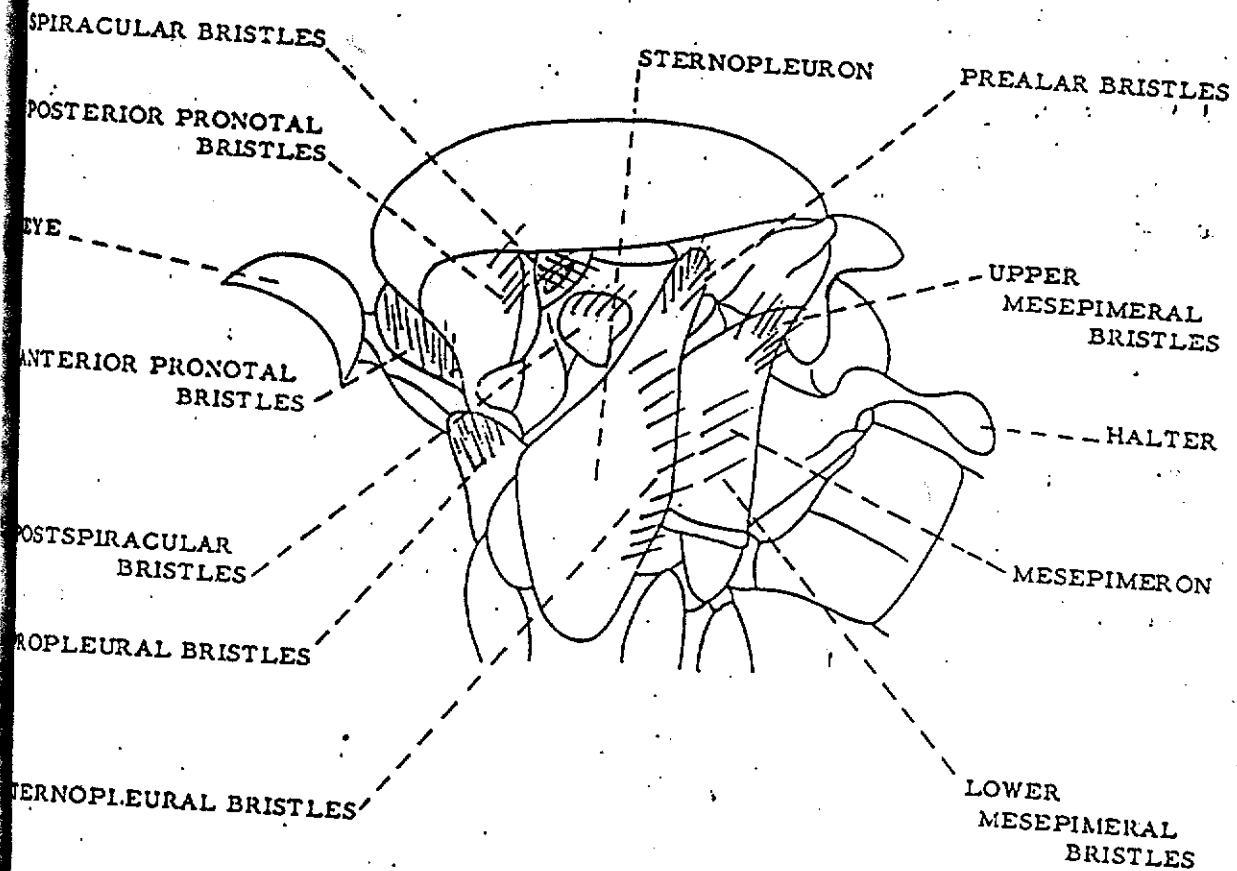
Fig. 11 A

Fig. 11 B

ADULT FEMALE CULEX



LATERAL ASPECT OF MOSQUITO THORAX



KEY TO FEMALE CULEX

- Proboscis with pale median ring (Fig. 1 A)..... 2
 Proboscis entirely dark (Fig. 1 B)..... 16

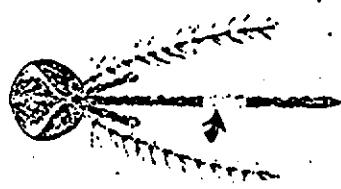


Fig. 1 A

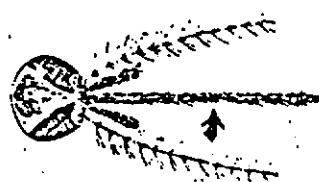


Fig. 1 B

- With 4 lower mesepimeral bristles (Fig. 2 A)..... 3
 With 3 or fewer lower mesepimeral bristles (Fig. 2 B)..... 6



Fig. 2 A

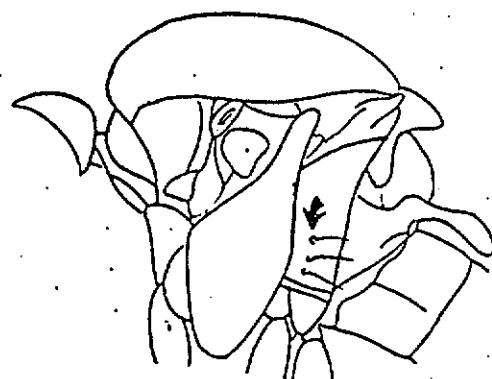


Fig. 2 B

- Apical half of hind femur with line of pale scales to tip (Fig. 3 A) 4
 Apical half of hind femur without line of pale scales to tip (Fig. 3 B)..... 5

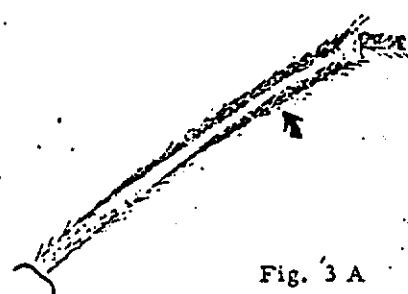


Fig. 3 A

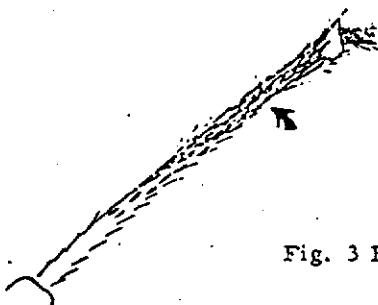


Fig. 3 B

Abdominal segments 2-4 entirely dark, 5-8 entirely yellow scaled or with broad apical bands (Fig. 4 B)..... raptor
Abdominal segments 2-4 entirely dark, 5-8 entirely yellow scaled or with broad apical bands (Fig. 4 B)..... fuscanus

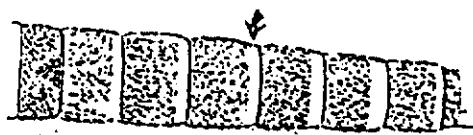


Fig. 4 A

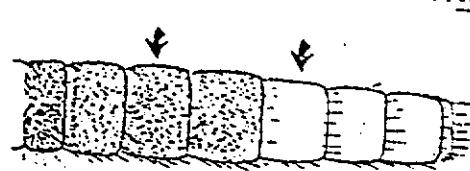


Fig. 4 B

Abdominal segments with pale apical bands (Fig. 5 A)..... vorax
Abdominal segments entirely dark or with lateral pale markings or with very narrow pale bands (Fig. 5 B)..... halifaxi

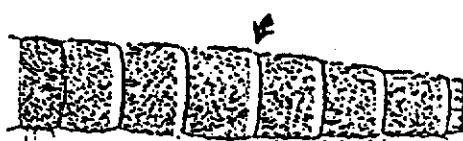


Fig. 5 A



Fig. 5 B

Wing with pale areas (Fig. 6 A)..... 7
Wing without pale areas (Fig. 6 B)..... 8



Fig. 6 A

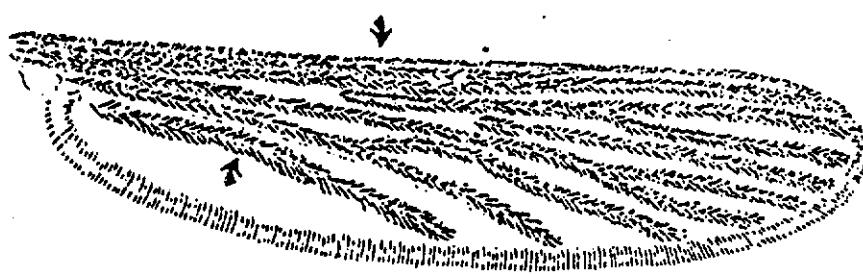


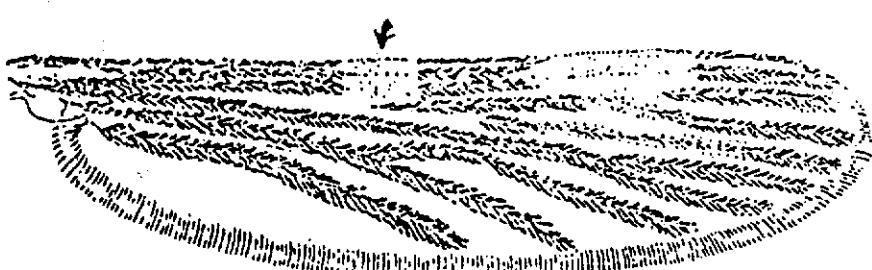
Fig. 6 B

7 First pale area covering costa and subcosta (Fig. 7 A)..... mimeticus

First pale area covering costa, subcosta and vein 1 (Fig. 7 B)..... mimulus



7 A



7 B

8 Wing scales mixed pale and dark (Fig. 8 A)..... bitacniorhynchus

Wing scales dark (Fig. 8 B)..... 9



8 A



8 B

- D Abdominal segments with apical bands (Fig. 9 A).....pseudosinensis and sinensis
 Abdominal segments with basal bands (Fig. 9 B).....10



Fig. 9 A



Fig. 9 B

- D Mesonotum covered with white scales for the greater anterior part (Fig. 10 A).....11
 Mesonotum uniformly brown with pattern of golden scales (Fig. 10 B).....12



Fig. 10 A



Fig. 10 B

- E Abdomen with T-shaped bands on most segments; mesonotum with posterior margin of white scales sharply defined (Fig. 11 A & B).....gelidus
 Abdomen without T-shaped bands on most segments; mesonotum with posterior margin of white scales not sharply defined (Fig. 11 C & D).....whitmorei



Fig. 11 A



Fig. 11 C



Fig. 11 B



Fig. 11 D

- (3) Hind femur with dark stripe of scales on dorsal border (Fig. 12 A)..... pseudovishnui
 Hind femur without dark stripe of scales on dorsal border (Fig. 12 B)..... 13

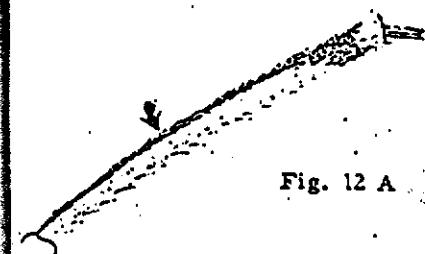


Fig. 12 A

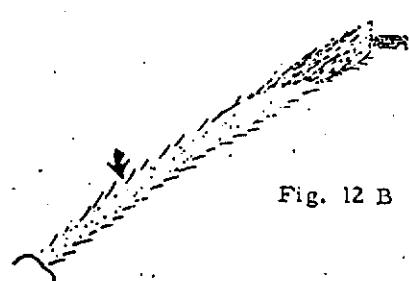


Fig. 12 B

- (3) Proboscis on ventral surface with pale scales extending to base (Fig. 13 A)..... tritaeniorhynchus
 Proboscis on ventral surface without pale scales extending to base (Fig. 13 B)..... 14

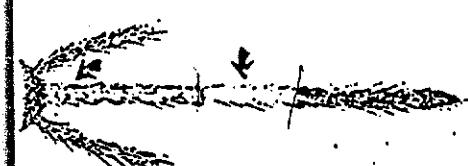


Fig. 13 A

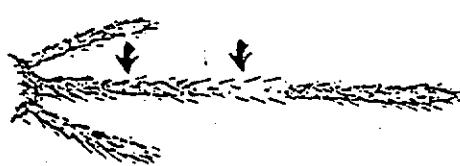


Fig. 13 B

- (4) Hind femur speckled with pale and dark scales (Fig. 14 A)..... 15
 Hind femur uniformly colored (Fig. 14 B)..... annulus

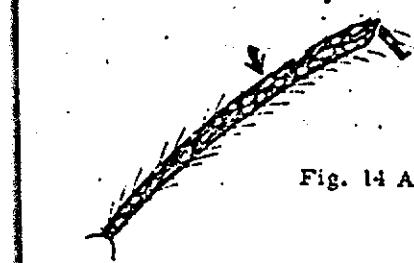


Fig. 14 A



Fig. 14 B

- (5) Occiput with upright scales all dark (Fig. 15 A)..... sitchens
 Occiput with upright scales pale medially, dark posteriorly and laterally (Fig. 15 B)..... whitei

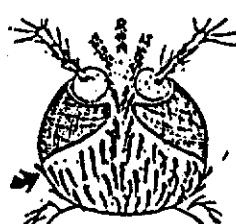


Fig. 15 A

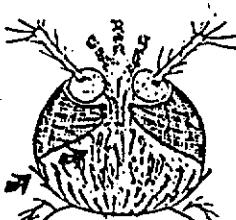


Fig. 15 B

16. Mesonotum with well developed acrostichal bristles (Fig. 16 A)..... 17
 Mesonotum without well developed acrostichal bristles (Fig. 16 B)..... 21

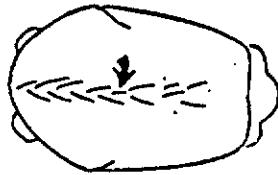


Fig. 16 A



Fig. 16 B

17. Lower mesepimeral bristles absent, only short hairs present at middle of mesepimeron (Fig. 17 A)..... brevipalpis
 Lower mesepimeral bristles present (Fig. 17 B)..... 18

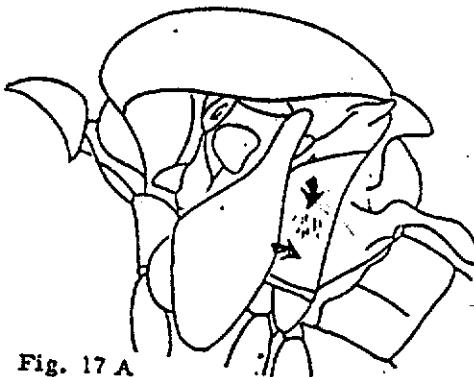


Fig. 17 A

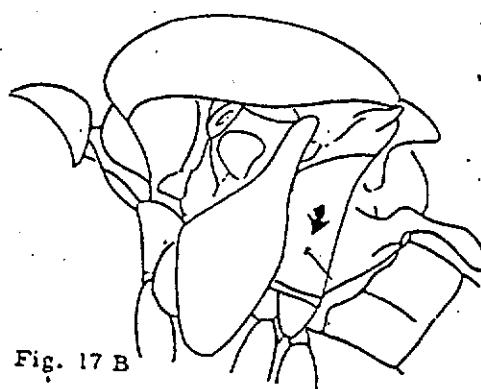


Fig. 17 B

18. Upper and lower sternopleuron and middle mesepimeron with distinct scale patches (Fig. 18 A)..... 19
 Upper and lower sternopleuron and middle mesepimeron without distinct scale patches (Fig. 18 B)..... 20

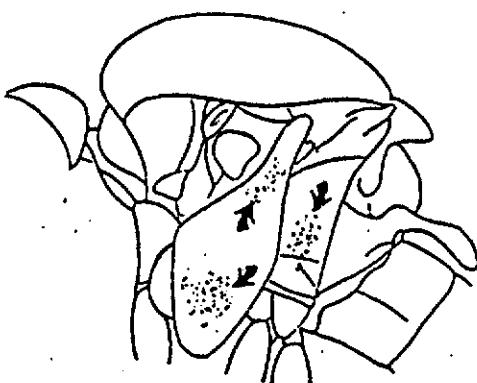


Fig. 18 A

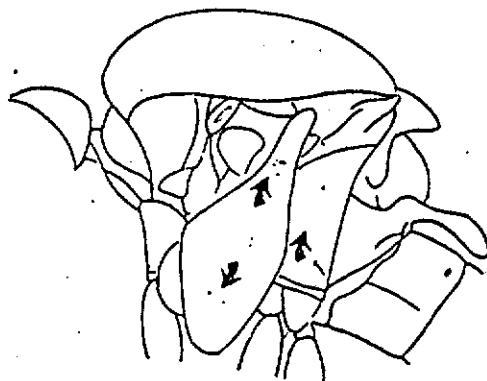


Fig. 18 B

Abdomen banded (Fig. 19 A).....pipiens and quinquefasciatus

Abdomen not banded (Fig. 19 B).....fuscocephalus

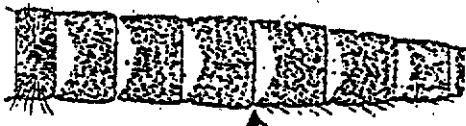


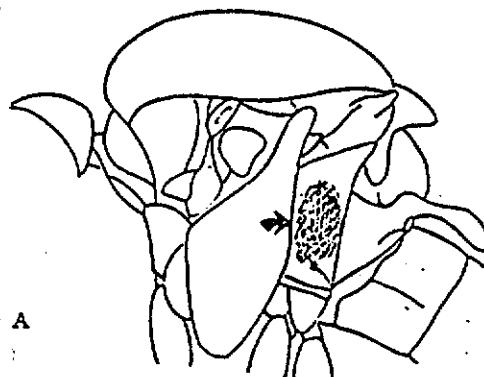
Fig. 19 A



Fig. 19 B

Dark area covering most of mesepimeron (Fig. 20 A).....khazani

Dark area covering upper part of mesepimeron (Fig. 20 B).....malayi



20 A

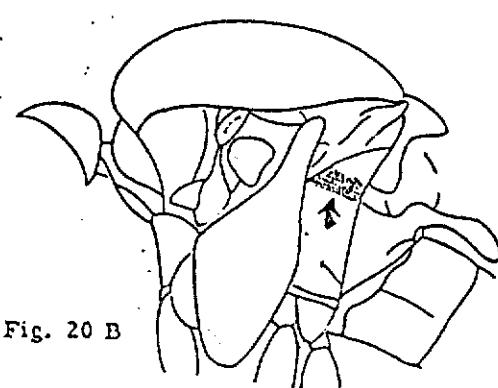


Fig. 20 B

Mesonotum with dense scaling, smooth appearance (Fig. 21 A)..... 22

Mesonotum with sparse scaling, rough appearance (Fig. 21 B)..... 24



Fig. 21 A



Fig. 21 B

Abdomen banded (Fig. 22 A)..... 23

Abdomen not banded (Fig. 22 B).....fragilis

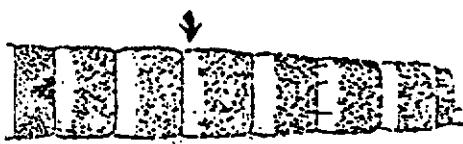


Fig. 22 A

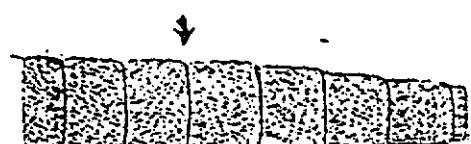


Fig. 22 B

- Mesepimeron and sternopleuron with black spot (Fig. 23 A)..... nigropunctatus
 Dark longitudinal stripe extending from anterior pronotal lobe to sternopleuron (Fig. 23 B)..... viridiventer and pallidothorax

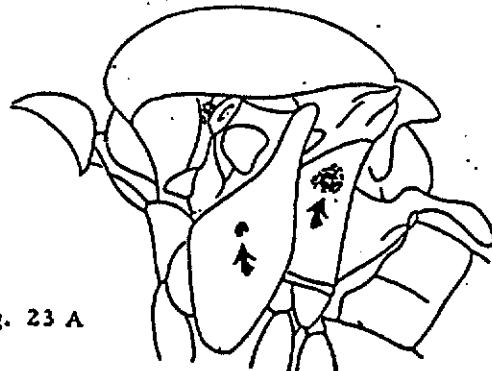


Fig. 23 A

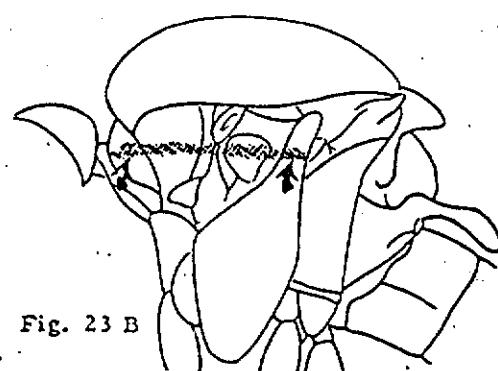


Fig. 23 B

- Abdomen banded (Fig. 24 A)..... 25

- Abdomen not banded (Fig. 24 B)..... 26



Fig. 24 A



Fig. 24 B

- Mesonotum greenish (Fig. 25 A)..... ! infantulus

- Mesonotum reddish brown (Fig. 25 B)..... cinctellus



Fig. 25 A



Fig. 25 B

- Mesonotum bronzy (Fig. 26 A)..... rubithoracis

- Mesonotum with brownish black scales (Fig. 26 B)..... minutissimus and minor



Fig. 26 A



Fig. 26 B

BIONOMICS

The ecology of Vietnamese mosquitoes is known even less than their taxonomy. The following statements are based, for the most part, on few collections and abbreviated ecological data. Workers are, therefore, advised to use this information with caution and judgement.

Aedes aegypti (Linnaeus, 1757)

Eggs: Laid singly along water line.

Larvae: In small artificial containers, tree holes, rotholes; quickly drop to bottom upon being disturbed and may remain there several minutes.

Adults: Readily feed on man; daytime biters but will attack in artificial light and even in darkness; flight range short, usually a few hundred feet, rarely up to one-half mile. Reported common in houses in Saigon and Haiphong.

Disease relationships: Primary vector of DENGUE and CHIKUNGUNYA FEVER; found naturally infected with *Wuchereria bancrofti* (BANCROFTIAN FILARIASIS), but not *Brugia malayi* (MALAYAN FILARIASIS); can transmit FOWLPOX, RABBIT MYXAMATOSIS, and four BIRD MALARIAS (*Plasmodium cathemerium*, *P. gallinaceum*, *P. lophurae*, *P. relictum*).

Aedes albolineatus (Theobald, 1904)

Eggs: Probably laid singly on sides of container.

Larvae: In rot holes, axils of sago and taro, coconut shells and husks, bamboo stumps; less frequently in fallen leaves, artificial containers, rockholes (?), jungle pools (?), and lagoons (?).

Adults: Not attracted to and not known to bite man; frequently abundant.

Disease relationships: Probably none.

Aedes albopictus (Skuse, 1894)

Eggs: Laid singly at or near water line.

Larvae: In small artificial containers much like *Aedes aegypti*; quickly drop to bottom upon being disturbed; also in tree holes, bamboo, leaf axils, rock pools, *Nepenthes* pitchers.

Adults: Eager daytime biters of man, not as common in houses as *Aedes aegypti*; flight range short, rarely up to one-third mile. Reported common in houses at Saigon and Haiphong.

Disease relationships: Primary vector of DENGUE and CHIKUNGUNYA FEVER; secondary vector of JAPANESE "B" ENCEPHALITIS; primary vector of *Dirofilaria immitis* (TROPICAL EOSINOPHILIA). Can be infected with two BIRD MALARIAS (*Plasmodium gallinaceum*, *P. lophurae*). Refractory to infection with *Brugia malayi* (MALAYAN FILARIASIS) and *Wuchereria bancrofti* (BANCROFTIAN FILARIASIS).

Aedes alboscutellatus (Theobald, 1905)

✓ Eggs: Probably laid singly on ground which will be flooded later.

Larvae: In ground pools (stream pools, fresh-water rock pools, road ruts, jungle pools), swamp margins, flooded jungle, and permanent shaded stagnant ditches.

Adults: Eager daytime biters of man; commonest in densely shaded woods; taken in carabao bait traps, light traps.

Disease relationships: Uninvestigated.

les elongi Galliard and Ngu, 1947

Eggs: Probably laid singly on ground which will be flooded later.

Larvae: No data.

Adults: Undescribed.

Disease relationships: No data.

les amesi (Ludlow, 1903)

Eggs: Probably laid singly just above low-water line of "container."

Larvae: In axils, stumps and rot holes of nipa palms; in coconut shells.

Adults: In margins of mangrove areas; around humans; in vegetation, and entrances of crab holes.

Disease relationships: Uninvestigated.

les andamanensis Edwards, 1922

Eggs: Probably laid singly on ground which will be flooded later.

Larvae: No data.

Adults: No data.

Disease relationships: No data.

les annandalei (Theobald, 1910)

Eggs: Highly resistant to drying; about 73 laid per batch, singly on sides of treeholes.

Larvae: In tree rot cavities.

Adults: Multiple generations, feed readily on warm-blooded mammals.

Disease relationships: No data.

les assamensis (Theobald, 1908)

Eggs: Probably laid singly on sides of rot holes.

Larvae: In rot holes.

Adults: No data.

Disease relationships: No data.

les butleri Theobald, 1901

Eggs: Probably laid singly on ground which will be flooded later.

Larvae: In mangrove swamp; brackish pools, fresh-water puddles and pools, pot holes, crab holes.

Adults: No data.

Disease relationships: No data.

les caecus (Theobald, 1901)

Eggs: Probably laid singly on ground which will be flooded later.

Larvae: In open jungle pools, buffalo wallows.

Adults: No data.

Disease relationships: No data.

Aedes concricomes Edwards, 1922

Eggs: Probably laid singly on ground which will be flooded later.
Larvae: No data.
Adults: No data.
Disease relationships: No data.

Aedes chrysolineatus (Theobald, 1907)

Eggs: Probably laid singly along low-water mark of rot holes or rock holes.
Larvae: In rot holes; rock holes of mountain streams.
Adults: Feed on horses.
Disease relationships: No data.

Aedes desmotes (Giles, 1904)

Eggs: Probably laid singly inside bamboo stumps.
Larvae: In bamboo stumps.
Adults: Resting on grass, hovering about humans.
Disease relationships: No data.

Aedes dux Dyar and Shannon, 1925

Eggs: Probably laid singly on ground which will be flooded later.
Larvae: In fresh and brackish semipermanent stagnant puddles and hoofprints.
Adults: In light traps.
Disease relationships: No data.

Aedes edwardsi (Barraud, 1923)

Eggs: Probably laid singly on sides of tree holes and leaf axils.
Larvae: Undescribed.
Adults: Probably not attracted to man.
Disease relationships: Probably none.

Aedes elisae (Barraud, 1923)

Eggs: Probably laid singly along low-water mark at rock pools and rot holes.
Larvae: In rock pools and rot holes.
Adults: No data.
Disease relationships: No data.

Aedes gubernatoris (Giles, 1901)

Eggs: Probably laid singly along low-water mark of rock pools and rot holes.
Larvae: In rot holes, possibly rock pools.
Adults: No data.
Disease relationships: No data.

Aedes imprimens (Walker, 1861)

Eggs: Laid singly, not cemented to objects.
Larvae: In temporary, shaded, leafy ground pools and puddles; flooded jungle; buffalo wallows;
"can survive comparatively long periods out of water."
Adults: Eager daytime biters of man in forested areas; bite through thick clothing; bite painful;
powerful agile fliers, difficult to capture; abundant after start of isolated rainy periods; males
in deep jungle.
Disease relationships: Major pest; limited dissections for larval filariae all negative.

Aedes indosinensis (Borel, 1928)

Eggs: Probably laid singly on ground which will be flooded later.
Larvae: Undescribed.
Adults: No data.
Disease relationships: No data.

Aedes khasani Edwards, 1922

Eggs: Probably laid singly at low-water mark of rot holes.
Larvae: In rot holes.
Adults: No data.
Disease relationships: No data.

Aedes laniger (Wiedemann, 1821)

Eggs: Probably laid singly on ground which will be flooded later.
Larvae: Undescribed.
Adults: No data.
Disease relationships: No data.

Aedes lineatopennis (Ludlow, 1905)

Eggs: Laid on dry ground; eggs hatch in groups after first flooding so that a continual supply of larvae is furnished a breeding place; dry periods mark the interval between generations.
Larvae: In temporary rain-filled grassy and marshy ground pools and puddles; also hoofprints.
Adults: Feed habitually on man; appear about one week after heavy rains; taken in light traps.
Disease relationships: Low-potential vector of *Brugia malayi* (MALAYAN FILARIASIS) and *Fuchereria bancroftii* (BANCROFTIAN FILARIASIS). Vector of SOUTH AFRICAN HORSE SICKNESS, and BLUETONGUE of sheep.

Aedes longirostris (Leicester, 1908)

Eggs: Probably laid singly on ground which will be flooded later.
Larvae: In brackish water of swamps and near the beach; crab holes, rock pools, containers, depressions in fallen logs.
Adults: Have been collected resting in crab holes.
Disease relationships: No data.

Aedes macfarlanei (Edwards, 1914)

Eggs: Probably laid singly along low-water mark of rock pools.
Larvae: In stream bed rock pools.
Adults: No data.
Disease relationships: No data.

Aedes mediolineatus (Theobald, 1901)

Eggs: Probably laid singly on overgrown ground pools.
Larvae: Overgrown ground pools in dense swamps or marsh edges; areas where no free water is apparent until surface is depressed; borrow pits; never reported in large numbers; live larvae purplish-pink.
Adults: No data.
Disease relationships: No data.

Aedes mediopunctatus (Theobald, 1905)

Eggs: Probably laid singly inside bamboo.
Larvae: In bamboo.
Adults: Feed on man; in open woods.
Disease relationships: No data.

Aedes niveodes Barraud, 1934

Eggs: Probably laid singly inside rot holes and bamboo.
Larvae: In rot holes and bamboo.
Adults: No data.
Disease relationships: No data.

Aedes niveus (Ludlow, 1903)

Eggs: Probably laid singly along low-water mark of rot holes, bamboo stumps and rock holes.
Larvae: In rot holes and bamboo stumps; possibly rock holes.
Adults: Feed on horses.
Disease relationships: No data.

Aedes ostentatio (Leicester, 1908)

Eggs: Probably laid singly on ground which will be flooded later.
Larvae: Undescribed.
Adults: Vicious daytime biters of man; in densely shaded areas near rivers.
Disease relationships: No data.

Aedes poicilius (Theobald, 1903)

Eggs: Probably laid singly in leaf axils, tree holes.
Larvae: In axils of plants (banana, abaca, pandanus, crinum); holes in banana trees.
Adults: No data.
Disease relationships: No data.

Aedes prominens (Barraud, 1923)

Eggs: Probably laid singly in rot holes, bamboo.
Larvae: In rot holes, bamboo.
Adults: No data.
Disease relationships: No data.

Aedes pseudoalbopictus (Borel, 1928)

Eggs: Probably laid singly on areas which will be flooded later.
Larvae: No data.
Adults: No data.
Disease relationships: No data.

Aedes sexicola Edwards, 1922

Eggs: Probably laid singly on ground which will be flooded later.
Larvae: In unshaded stream bed rock holes free of visible vegetation and exposed to sun; perhaps rot holes.
Adults: No data.
Disease relationships: No data.

Aedes taeniorhynchoides (Christophers, 1911)

Eggs: Probably laid singly on ground which will be flooded later.
Larvae: Undescribed.
Adults: No data.
Disease relationships: No data.

Aedes tonkinensis Galliard and Ngu, 1947

Eggs: Probably laid singly along low-water mark of rocky excavations.
Larvae: In rocky excavations.
Adults: Undescribed.
Disease relationships: No data.

Aedes vexans (Meigen, 1830)

Eggs: Deposited on ground in shallow areas subject to inundation.
Larvae: In fresh water free of filamentous algae over a layer of decaying vegetation; in temporary grassy ground pools, puddles, ponds, ditches, and hoof marks following rain.
Adults: Feed readily on man as well as flower nectar; bite highly irritating; flight range up to 30 miles.
Disease relationships: Primary vector of *Dirofilaria immitis* (TROPICAL EOSINOPHILIA); secondary vector of JAPANESE "B" ENCEPHALITIS; vector of FOWLPOX.

Aedes vigilax (Skuse, 1889)

Eggs: 70-80 deposited on soil subject to tidal inundation; distributed inland by tides.
Larvae: In unshaded, shallow, brackish (or acid or rusty), temporary pools (tidal pools, mangrove swamps, salt marshes, rock pools), nipa palm leaf bases.
Adults: Readily bite man and domestic animals day and night, especially at sunset; where mosquito populations are large, females are aggressive, and seek out man; where populations are small, females seldom bite man except near breeding sites; flight range may exceed 50 miles.
Disease relationships: Primary vector of *Wuchereria bancrofti* (BANCROFTIAN FILARIASIS) and SINDBIS FEVER.

Aedes vittatus (Bigot, 1861).

Eggs: Probably laid singly at low-water mark of pools, containers, and wells.
Larvae: Primarily in rock pools without vegetation; also in containers, canoes, hoofprints, wells; can withstand warmer water than many other *Aedes*.
Adults: No data.
Disease relationships: Refractory to infection with *Wuchereria bancrofti* (BANCROFTIAN FILARIASIS).

Culex catosticta Knab, 1909

Eggs: Uninvestigated but probably laid in rafts.
Larvae: Along grassy banks of coastal lagoons; anchored in masses of algae; drop quickly to bottom upon being disturbed.
Adults: Uninvestigated.
Disease relationships: Uninvestigated.

Anopheles aconitus Donitz, 1902

Eggs: Female deposits up to 117 eggs singly on water surface.

Larvae: Found usually in open, clear, slowly moving water such as rice fields, fresh-water pools with grassy edges, pools with aquatic vegetation and shade, arms of lakes, pools in creeks and river beds, clean tanks with grassy edges, and roadside storm-water drains.

Adults: Common in houses; feed readily on man and buffalo; usually at moderate altitudes up to 2,800 feet; breed throughout year.

Disease relationships: Secondary vector of MALARIA in the highlands.

Anopheles alopensis Venhuis, 1940

Eggs: Probably laid singly on surface of water in rock holes and caves.

Larvae: In clear water of rock holes and caves where little light penetrates; difficult to raise to adults in captivity.

Adults: Uninvestigated.

Disease relationships: Probably none.

Anopheles annandalei annandalei Prashad, 1918

Eggs: Probably laid singly in tree holes.

Larvae: In tree holes, usually in deep forest; easily raised to adults in captivity.

Adults: No data.

Disease relationships: No data.

Anopheles annandalei interruptus Puri, 1929

Eggs: Probably laid singly in tree holes.

Larvae: In tree holes, usually in deep forest; easily raised to adults in captivity.

Adults: Uninvestigated.

Disease relationships: Uninvestigated.

Anopheles annularis Van der Wulp, 1884 ✓

Eggs: Probably laid singly on water surface.

Larvae: In clean, weed-grown, stagnant water such as lake or stream margins, or pools, tanks, moats, borrow pits, canal backwaters, drains, and wells with vegetation. Overwinter as either larvae or adults; found up to 5,000 feet.

Adults: Feed nocturnally primarily on cattle, also bite man, buffalo, pigeon and sparrow; common in cattle sheds, also rest among bushes and grass tufts and less commonly in houses; powerful flier; attracted to light; collected up to 7,000 feet.

Disease relationships: Hospitable to MALARIA plasmodia in laboratory but not considered a significant vector in nature.

Anopheles baezoi Gator, 1933

Eggs: Probably laid singly on water of brackish pools and swamps.

Larvae: In stagnant, brackish pools and swamps with decaying vegetation under shade along coast; restricted to narrow coastal belt.

Adults: Feed readily on man and domestic animals; rest during day on nipa palm fronds; may be found in houses but rare in cattle sheds.

Disease relationships: Doubtful vector of MALARIA.

Anopheles balabacensis Baisas, 1936

Eggs: Probably laid singly on water surface.

Larvae: In miscellaneous clear pools with a layer of leaves and/or fine silt on the bottom, usually under shade including bomb craters, wheel ruts and natural pools.

Adults: Feed readily on man and cattle; rest in houses; flight range at least one-half mile; occupy deep jungle and forest as well as open, lighted shaded or sunny situations; shy; fly late at night.

Disease relationships: Secondary vector of MALARIA in the highlands.

Anopheles barbirostris Van der Wulp, 1884 ✓

Eggs: Deposited on water surface or on wet floating leaves; up to 300 eggs per female.

Larvae: In deep, stagnant, vegetation-filled, shaded water such as lake margins, swamps, sluggish streams (rivers, irrigation channels), ponds, borrow pits, brick-field pits, rice fields, and wells.

Adults: Common in houses; feed readily on man and cattle in forest shade in daytime; most common during and immediately after rainy season; lowland mosquito; flight range under one-half mile.

Disease relationships: Primary vector of *Brugia malayi* (MALAYAN FILARIASIS). Secondary vector of *Brugia pahangi* (TROPICAL EOSINOPHILIA). Refractory to *Wuchereria bancrofti* (BANCROFTIAN FILARIASIS).

Anopheles barbumbrosus Strickland and Chowdhury, 1927

Eggs: Probably laid singly on water surface.

Larvae: Typically in grass-fringed streams running through narrow strips of grazing land between jungle clad hills; also in slowly running water, springs, jungle rice fields, partially shaded stagnant water, unshaded grassy ravines, and clear streams after these emerge from jungle shade.

Adults: No data.

Disease relationships: Some have been found naturally infected with MALARIA.

Anopheles bengalensis Puri, 1930

Eggs: Probably laid singly on water surface.

Larvae: In forest and jungle in small streams, seepage springs and pools, tea drains, swamps, marshes, channels, rivers, rock pools, and wells.

Adults: Shy, only rarely entering houses; feed on cattle and on man in jungle shade.

Disease relationships: No data.

Anopheles campestris Reid, 1963

Eggs: Probably laid singly on suitable water.

Larvae: In water of broad alluvial plains along coasts and river deltas.

Adults: Feed readily on man.

Disease relationships: Primary vector of *Brugia malayi* (MALAYAN FILARIASIS) and secondary vector of *Brugia pahangi* (TROPICAL EOSINOPHILIA). Refractory to infection with *Wuchereria bancrofti* (BANCROFTIAN FILARIASIS).

Anopheles culicifacies Giles, 1901

Eggs: Laid singly on suitable water; present continuously on water surface.

Larvae: In clean fresh water as irrigation channels, pools in sandy river beds, rainwater, shallow tanks, grassy borrow pits, fallow rice fields, and wells.

Adults: Feed readily on man and cattle at dusk; frequent houses, cow sheds, and privies; rest in holes, among dung cakes, and in chaff; usually a lowland species, but recorded up to 7,500 feet.

Disease relationships: Relation to MALARIA confused, but not considered a significant vector in Vietnam.

Anopheles fluviatilis James, 1902

Eggs: Probably laid singly on water surface.
Larvae: In pools, stream beds, slow-flowing water with vegetation, springs, irrigation leaks, edges of swamps, lake margins, drains, ponds and tanks.
Adults: Feed readily on man; rest in houses and cow sheds; recorded up to 7,500 feet altitude; strong flier, flight range more than one-half mile.
Disease relationships: Important MALARIA vector in India but not so considered in Vietnam.

Anopheles gigas baileyi Edwards, 1929

Eggs: Probably laid singly on pool surface.
Larvae: In small pools cut off from a main stream or formed by springs or leaks; especially pools of which the depth is comparatively great as compared with the area; less common in clear rocky pools and perennial springs.
Adults: Occasionally found in cattle sheds and houses; rarely bite man; flight range up to 20 miles.
Disease relationships: No data.

Anopheles indiensis Theobald, 1901

Eggs: Probably laid singly on water surface.
Larvae: In shallow water bearing emergent vegetation.
Adults: Feed on many types of vertebrates, especially man, cattle, hog.
Disease relationships: Readily infected with *Wuchereria bancrofti*, *Brugia malayi* and *Dirofilaria immitis* but rapid development of calcified cysts around dead worms indicates poor vector potential.

Anopheles insulaeflorum (Swellengrebel and Swellengrebel de Graaff, 1919)

Eggs: Probably laid singly on water surface.
Larvae: In forest and jungle streams, seepage springs and shaded pools, tea drains, swamps, marshes, channels, rivers, rock pools, and wells.
Adults: Shy, rarely enter houses; feed in jungle shade on cattle and man.
Disease relationships: No data.

Anopheles jamesi Theobald, 1901

Eggs: Probably laid singly on water surface.
Larvae: In interstices of *Cyperus* and *Salvinia* in lakes, rain pools and ponds with grass, pools in river beds, springs, and surface wells.
Adults: Rest in houses and stables.
Disease relationships: Apparently refractory to MALARIA.

Anopheles jeyporensis condidensis Koidzumi, 1921

Eggs: Probably laid singly on water surface.
Larvae: In grassy streams, flowing water associated with rice cultivation, grassy lake edges, and swamps.
Adults: Feed readily on man, biting fiercely in open toward evening; rest in houses and cattle sheds.
Disease relationships: Primary vector of highland MALARIA. Possible vector of *Wuchereria bancrofti* (BANCROFTIAN FILARIASIS).

Aedes jeyporiensis jeyporiensis James, 1902

Eggs: Probably laid singly on water surface.

Larvae: In grassy streams, flowing water associated with rice cultivation, grassy lake edges, and swamps.

Adults: Feed readily on man, biting fiercely in open toward evening; rest in houses and cattle sheds.

Disease relationships: Apparently refractory to MALARIA.

Aedes karwari James, 1903

Eggs: Probably laid singly on water surface.

Larvae: Especially in water over rock rather than earth; open pools, swamps, springs, seepage, weedy tanks, slow streams, and weedy drains.

Adults: Feed on man and cattle; rest in houses and cow sheds.

Disease relationships: Rarely involved in MALARIA transmission.

Aedes kochi Donitz, 1901 ✓

Eggs: Probably laid singly on water surface.

Larvae: In small shallow, often muddy, collections of water in the open; small pools, stagnant drains, buffalo wallows, hoof marks, fallow rice fields; less commonly in jungle drains and artificial containers.

Adults: Feed on man and cattle; rest in houses, stables, cow sheds and in the jungle.

Disease relationships: Rare vector of MALARIA.

Aedes lesteri Baisas and Hu, 1936

Eggs: Probably laid singly on water surface.

Larvae: In rice fields; shallow water bearing emergent vegetation.

Adults: Feed on many types of vertebrates, especially man, cattle, hog.

Disease relationships: Readily infected with *Wuchereria bancrofti*, *Brugia malayi* and *Dirofilaria immitis* but rapid development of calcified cysts around dead worms indicates poor vector potential.

Aedes lindsoyi Giles, 1900

Eggs: Probably laid singly on pool surface.

Larvae: In small clear pools in rocky beds of mountain torrents; also in artificial rock-lined pools and ditches.

Adults: Feed freely on man through day and at dusk near larval habitat; rest among rocks and boulders, occasionally in houses; commonly over 4,000 feet elevation.

Disease relationships: If involved in MALARIA transmission, its role is probably strictly local.

Aedes littoralis King, 1932

Eggs: Probably laid singly on brackish water.

Larvae: In salt-water fish ponds, salt beds, marshes, and lagoons, especially amid algae.

Adults: Feed readily in evening (rarely in daylight) on man as well as other mammals; rest in houses under furniture and in dark corners.

Disease relationships: Based upon limited studies, not considered significant MALARIA vector.

Anopheles maculatus Theobald, 1901

Eggs: Up to 300 eggs laid in batches of about 63 on water surface.

Larvae: Primarily in small pools along margins of fast-flowing streams and rivers with grassy edges, springs, seepage, borrow pits, lake margins, rice fields, polluted water, hoof marks and artificial containers.

Adults: Feed readily on man and cattle at night and by artificial light; enter houses but leaves immediately after feeding; easily light-trapped.

Disease relationships: Secondary vector of MALARIA in the highlands.

Anopheles minimus Theobald, 1901

Eggs: Float about emergent vegetation in the margins of slow-moving streams; eggs laid singly on water in shade.

Larvae: In highland slow-running, shaded streams and irrigation channels with grassy edges, swamp margins, borrow pits, paddy fields, and spring seepage; along coast in sand-dune seepage.

Adults: Feed readily on man; rest in houses and cattle sheds; characteristic of secondary (non-virgin) highland jungle but also found in coastal sand-dune seepage areas; reported common in houses at Haiphong but not Saigon.

Disease relationships: Primary vector of highland MALARIA; secondary vector of coastal MALARIA (in sand-dune seepage areas); primary vector of BANCROFTIAN FILARIASIS.

Anopheles nigerrimus Giles, 1900

Eggs: Probably laid singly on water surface.

Larvae: In unshaded, shallow rice fields, lakes, grassy pools, swamps, borrow pits, and grassy stream or ditch margins; occasionally in shaded or brackish water.

Adults: Feed readily at dusk and in night on man and other mammals; sometimes feed by day, even in full sunshine; uncommon in houses and cattle sheds.

Disease relationships: Considered rarely, if ever, to transmit MALARIA. Some positive records represent confusion between this species and *Anopheles sinensis*.

Anopheles pallidus Theobald, 1901

Eggs: Probably laid singly on water surface.

Larvae: In lake margins, weedy ditch and pond edges; rice fields and irrigation associated with rice fields; shallow, static ground pools.

Adults: Rest in houses, cow sheds and especially stables; flight range at least one-half mile.

Disease relationships: Considered an unlikely vector of human MALARIA.

Anopheles pedtaeniatus (Leicester, 1908)

Eggs: Probably laid singly on water surface.

Larvae: In shallow water bearing emergent vegetation.

Adults: Feed on many types of vertebrates, especially man, cattle, and hog.

Disease relationships: Readily infected with *Wuchereria bancrofti*, *Brugia malayi* and *Dirofilaria immitis* but rapid development of calcified cysts around dead worms indicates poor vector potential.

aphelos philippinensis Ludlow, 1902

Eggs: Probably laid singly on water surface.

Larvae: In rice fields; rush-swamp, weedy tanks, shaded lake margins, ends of inundated ponds, weedy borrow pits, and weedy stream edges.

Adults: Rest in houses, cattle sheds and stables.

Disease relationships: Varies in regard to its relationships to MALARIA, not considered a significant vector in Vietnam.

aphelos ramsayi Covell, 1927

Eggs: No data.

Larvae: In rice fields; in association with *Pistia* grasses; pools containing algae; grassy tanks, permanent pools, swamps with clear standing water in which long grass grows abundantly.

Adults: Found in houses and cow sheds.

Disease relationships: Probably not involved in human MALARIA, although it has been found naturally infected and suspected of being involved in some outbreaks in Malaya.

aphelos sinensis Wiedemann, 1928

Eggs: Laid singly on suitable water; 115-225 eggs per female.

Larvae: In unshaded rice fields, lakes, grassy pools, swamps, borrow pits, grassy stream or ditch edges; occasionally in brackish or shaded water. Populations higher when algal surface mat present.

Adults: Readily feed on man and buffalo at night; rest in houses in large numbers; one of commonest mosquitoes in Vietnam; flight range about 1 mile; reported common in houses at Saigon and Haiphong.

Disease relationships: Primary vector of MALARIA in delta and coastal areas. Primary vector of MALAYAN FILARIASIS and BANCROFTIAN FILARIASIS.

aphelos sintonoides Ilo, 1938

Eggs: Uninvestigated.

Larvae: In highland tree holes.

Adults: No data.

Disease relationships: Uninvestigated.

aphelos splendidus Koidzumi, 1920

Eggs: Probably laid singly on water surface.

Larvae: In pools, ponds, and tanks with algae and vegetation; river beds; jungle streams; and marshy lake margins.

Adults: Found in small numbers in houses, privies, and cow sheds; feed on man, cattle.

Disease relationships: Considered unsuitable as human MALARIA vector.

aphelos stephensi Liston, 1901

Eggs: Probably laid singly on water surface; eggs then lie in the surface film in straps of 12 or 50.

Larvae: In clean water of shaded and exposed river and stream pools, sluggish creeks, drains, irrigation channels, wells, cisterns, and artificial containers; occasionally in sewage and brackish waters; larvae sink upon being disturbed and remain down for long periods.

Adults: Feed readily on man; rest commonly in houses, barracks, and cow sheds; secretive and difficult to find.

Disease relationships: A possible vector of MALARIA in large cities.

Aopheles subpictus Grassi, 1899

Eggs: Probably laid singly on water surface; can withstand drying for several days.
Larvae: In polluted or brackish temporary water of excavations and hollows especially during monsoons; borrow and brick pits; buffalo wallows, drains, leaks, cement sumps, fish ponds, garden furrows, roof gutters and less commonly rice fields, irrigation channels, wells, weedy lake margins, moats, and sluggish rivers.
Adults: Feed readily on many mammals including man; rest in houses, privies, barracks, stables, and cow sheds; reported common in houses at Saigon and Haiphong.
Disease relationships: Experimentally infective with MALARIA but its role in transmission undelineated.

Aopheles sundaeicus Rosenwaldt, 1926

Eggs: Probably laid singly on brackish water.
Larvae: In coastal brackish water as salt marshes.
Adults: Readily bite man and cattle; rest in houses and cow sheds; flight range up to 3 miles.
Disease relationships: Primary vector of MALARIA in delta and coastal areas.

Aopheles tessellatus Theobald, 1901

Eggs: Probably laid singly on water surface.
Larvae: In shaded dirty stagnant water; ground pools shaded by low emergent vegetation; reedy swamps; rice fields; occasionally found in brackish water.
Adults: Readily bite cattle, man and buffalo; rest in houses and cow sheds.
Disease relationships: Secondary vector of MALARIA in delta and coastal areas.

Aopheles umbrosus Theobald, 1903

Eggs: Probably laid singly on water surface.
Larvae: In shaded coastal pools of acid water; shaded "peaty" pools and marshes; stagnant forest pools; wet-ground water-pockets between tree roots in flat-land valley forest; and dirty slow-running brooks in virgin forest; prefer but do not require shade; larvae secrete themselves in small deep pockets.
Adults: Readily feed on man and cattle; abundant in houses near jungles; strong flier.
Disease relationships: Possible jungle vector of MALARIA in the lowlands.

Aopheles vagus Donitz, 1902 ✓

Eggs: Probably laid singly on water surface; may survive drying if kept moist for 8 days; up to 273 eggs per batch.
Larvae: In pools, borrow pits, drains, shallow rain-filled puddles, hoof marks, grassy swamps, and rice fields (both fallow and cultivated).
Adults: Readily bite man and cattle; abundant in houses and cattle sheds; rest inside railroad cars and small boats.
Disease relationships: Considered primary vector of MALARIA in delta and coastal areas despite some evidence it is not a good vector.

Aopheles varuna Iyengar, 1924

Eggs: Probably laid singly on water surface.
Larvae: In wells, stagnant ponds and ditches and roadside storm-water; water with uniformly moderate temperature.
Adults: Rest in houses and cattle sheds; readily feed on man and cattle.
Disease relationships: While a major highland MALARIA vector elsewhere, not considered important in Vietnam.

Migera annulitarsis (Leicester, 1908)

Eggs: Probably laid singly above water line in small containers.
Larvae: Probably in small containers of water.
Adults: Apparently vicious biters, attacking man both in day and at dusk.
Disease relationships: Uninvestigated.

Migera aureolineatus (Leicester, 1908)

Eggs: Probably laid singly above water line in small containers.
Larvae: Probably in small containers of water.
Adults: Apparently vicious biters, attacking man both in day and at dusk.
Disease relationships: Uninvestigated.

Migera cingulatus (Leicester, 1908)

Eggs: Uninvestigated.
Larvae: Undescribed.
Adults: Apparently vicious biters, attacking man both in day and at dusk.
Disease relationships: Uninvestigated.

Migera dolichocephalus (Leicester, 1908)

Eggs: Probably laid singly above water line in small containers.
Larvae: Probably in small containers of water.
Adults: Apparently vicious biters, attacking man both in day and at dusk.
Disease relationships: Uninvestigated.

Migera durhami (Edwards, 1917)

Eggs: Probably laid singly above water line in small containers.
Larvae: Probably in small containers of water.
Adults: Apparently vicious biters, attacking man both in day and at dusk.
Disease relationships: Uninvestigated.

Migera flavus (Leicester, 1908)

Eggs: Laid on legs of female; larvae escape when female dips leg into water.
Larvae: In foul water of bamboo stumps.
Adults: Apparently vicious biters, attacking man both in day and at dusk.
Disease relationships: Uninvestigated.

Migera kuchingensis Edwards, 1915

Eggs: Probably laid singly above water line in small containers.
Larvae: Probably in small containers of water.
Adults: Apparently vicious biters, attacking man both in day and at dusk.
Disease relationships: Uninvestigated.

Migera longipalpis (Leicester, 1904)

Eggs: Probably laid singly above water line in small containers.
Larvae: Probably in small containers of water.
Adults: Apparently vicious biters, attacking man both in day and at dusk.
Disease relationships: Uninvestigated.

Armigeres magnus (Theobald, 1908)

Eggs: Probably laid singly above water line in small containers.
Larvae: In water of bamboo stumps.
Adults: Apparently vicious biters, attacking birds and man both in day and at dusk.
Disease relationships: Possible vector of *Plasmodium gallinaceum* (A BIRD MALARIA).

Armigeres moultoni Edwards, 1914

Eggs: Uninvestigated.
Larvae: Undescribed.
Adults: Apparently vicious biters attacking man both in day and at dusk.
Disease relationships: Uninvestigated.

Armigeres pectinatus (Edwards, 1914)

Eggs: Probably laid singly above water line in small containers.
Larvae: Probably in small containers of water.
Adults: Apparently vicious biters, attacking man both in day and at dusk.
Disease relationships: Uninvestigated.

Armigeres subalbatus (Coquillett, 1908)

Eggs: Probably laid singly above water line in small containers.
Larvae: In fecally contaminated water of small containers.
Adults: Apparently vicious biters, attacking man both in day and at dusk. Reported common in houses at Saigon and Haiphong.
Disease relationships: Primary vector of *Brugia pahangi* (MALAYAN FILARIASIS). Possible vector of *Plasmodium gallinaceum* (A BIRD MALARIA).

Alex annulus Theobald, 1901

✓ Eggs: Probably laid in rafts on hyacinth ponds.
Larvae: In hyacinth ponds, transient pools without vegetation.
Adults: No data.
Disease relationships: No data.

Alex bernardi (Borel, 1926)

Eggs: Probably laid in rafts.
Larvae: No data.
Adults: Undescribed.
Disease relationships: No data.

Alex bitaeniorhynchus Giles, 1901

Eggs: Laid in durable, crescent-shaped rafts; larva escapes by forcing off an operculum at lower end of egg.
Larvae: In rice paddies, hyacinth ponds, streams, pools and other shallow water, apparently always with filamentous green algae (*Spirogyra*) upon which the larvae feed. Upon disintegration of the algae, larval populations decrease.
Adults: Common in buildings; with characteristic diurnal "drooping" stance, erect nocturnal stance; rest in low-growing vegetation, caves, and on damp rocks; feed on man at night; occasionally during day.
Disease relationships: Primary vector of SINDHIS FEVER, secondary vector of JAPANESE "B" ENCEPHALITIS. Apparently refractory to *Brugia malayi* (MALAYAN FILARIASIS) and, based on limited sampling, to *Tuchereria bancrofti* (BANCROFTIAN FILARIASIS).

Alex brevipalpis (Giles, 1902)

Eggs: Probably laid in rafts on water in tree holes, bamboos, containers.
Larvae: In tree holes, bamboos and occasionally in artificial containers.
Adults: No data.
Disease relationships: No data.

Alex cinctellus Edwards, 1922

Eggs: Probably laid in rafts on swamps.
Larvae: In fresh-water swamps under jungle shade.
Adults: No data.
Disease relationships: No data.

Alex fragilis Ludlow, 1903

Eggs: Probably laid in rafts on water in containers, shells, pools.
Larvae: In domestic containers, shells, pools with algae.
Adults: Feed readily on man.
Disease relationships: Uninvestigated.

Alex fusconotus Wiedemann, 1820

Eggs: Probably laid in rafts on water of pools, ponds, containers.
Larvae: In clear pools and ponds; large and small simple containers; pig feeding troughs.
Adults: Reported common in houses at Saigon but not at Haiphong.
Disease relationships: Although occasionally found infected, not considered a suitable vector of *Wuchereria bancrofti* (BANCROFTIAN FILARIASIS). Limited dissections have revealed no infections with *Brugia malayi* (BANCROFTIAN FILARIASIS). Possible vector of *Plasmodium cathemerium* (A BIRD MALARIA).

Alex fuscocephalus Theobald, 1907

Eggs: Probably laid in rafts on ground pools.
Larvae: In ground pools, borrow pits, puddles, irrigation ditches, hyacinth ponds, and patches of swampy ground containing shallow pools.
Adults: Taken in houses; feed readily on man.
Disease relationships: Primary vector of *Wuchereria bancrofti* (BANCROFTIAN FILARIASIS). Apparently refractory to *Brugia malayi* (MALAYAN FILARIASIS).

Alex gelidus Theobald, 1901

Eggs: Probably laid in rafts on suitable water.
Larvae: In streams, hyacinth ponds, transient pools with vegetation, and possibly foul pools.
Adults: Rest in houses, cattle sheds, and tents; feed readily on man; reported common in houses at Saigon but not at Haiphong.
Disease relationships: Primary vector of *Wuchereria bancrofti* (BANCROFTIAN FILARIASIS), CHIKUNGUNYA FEVER and CETAII VIRUS. Apparently refractive to *Dirofilaria immitis* (DOG HEARTWORM) and *Brugia malayi* (MALAYAN FILARIASIS).

Alex halifaxi Theobald, 1903

Eggs: Probably laid in rafts on suitable water.
Larvae: In ground pools and artificial containers; muddy pools in direct sun; carnivorous, eating insect larvae and nymphs including larvae of other species of mosquitoes.
Adults: Taken in houses; rarely bite man.
Disease relationships: Uninvestigated.

Culex infantulus Edwards, 1922

Eggs: Deposited in rafts.

Larvae: In rain barrels and similar containers, seepage pools, stream pools, with much vegetation, rock pools; shaded jungle pools.

Adults: Rest on damp vegetation and rocks along stream often near larval habitat; not reported biting man.

Disease relationships: No data.

Culex khazani Edwards, 1922

Eggs: Probably laid in rafts.

Larvae: No data.

Adults: No data.

Disease relationships: No data.

Culex malayi (Leicester, 1908)

Eggs: Probably laid in rafts on grassy pools.

Larvae: In grassy pools and other accumulations of shallow water; shaded jungle pools.

Adults: Rest on tree trunks and moist stream banks; feeding habits unstudied.

Disease relationships: Uninvestigated.

Culex mimeticus Noe, 1899

Eggs: Probably laid in rafts on suitable water.

Larvae: In shallow-water stream pools, springs, artificial containers and ground pools, especially rice paddies, residual pools in main river beds.

Adults: Not known to bite man.

Disease relationships: No data.

Culex mimulus Edwards, 1915

Eggs: Probably laid in rafts on group pools, in containers.

Larvae: In ground pools, especially shaded jungle pools; marsh along jungle fringe; large and small simple containers.

Adults: No data.

Disease relationships: Based upon limited sampling, apparently refractory to *Brugia malayi* (MALAYAN FILARIASIS).

Culex minor (Leicester, 1908)

Eggs: Probably laid in rafts on water in bamboo, rock pools, tree holes.

Larvae: In bamboo stumps, rock pools, and tree holes.

Adults: No data.

Disease relationships: No data.

Culex minutissimus (Theobald, 1907)

Eggs: Probably laid in rafts on suitable water.

Larvae: No data.

Adults: No data.

Disease relationships: Limited dissections have revealed no infections with *Brugia malayi* (MALAYAN FILARIASIS).

Culex nigropunctatus Edwards, 1926

Eggs: Probably laid in rafts on water of containers, pools.
Larvae: In large simple domestic containers, transient pools.
Adults: No data.
Disease relationships: No data.

Culex pallidothorax Theobald, 1905

Eggs: Deposits about 100 long gray straight eggs (0.8mm long) in a circular mass.
Larvae: In rot holes, domestic containers, pit latrines, shallow wells, shallow-water rock pools; sometimes in foul water.
Adults: Rest in caves and on damp rocks; occasionally enter houses; only occasionally bite man.
Disease relationships: Has been found naturally infected with *Wuchereria bancroftii* (BANCROFTIAN FILARIASIS), but is not considered a likely vector due to its disinclination to bite man.

Culex pipiens Linnaeus, 1758

Taxonomic note: The problems involved in the taxonomy of this polytypic species are the subject of much current entomological controversy. For purposes of this paper, *Culex pipiens* and *Culex quinquefasciatus* are treated as a singly species and considered the same as *Culex fatigans*.

Eggs: 2-4 rafts laid at night.
Larvae: In polluted water, drains, cess pools, latrines, shallow wells, ditches, ground pools, artificial containers.
Adults: Readily attack man, feed at night, rest near man, flight range up to four miles, usually about one mile; reported common in houses at Saigon and Haiphong.
Disease relationships: Primary vector of *Wuchereria bancroftii* (BANCROFTIAN FILARIASIS) and *Brugia malayi* (MALAYAN FILARIASIS). Primary vector of *Dirofilaria immitis* (TROPICAL EOSINOPHILIA). Secondary vector of JAPANESE "B" ENCEPHALITIS. Probable vector of four BIRD MALARIAS (*Plasmodium relictum*, *Plasmodium elongatum*, *Plasmodium cathermerium*, *Plasmodium lophurae*). CHIKUNGUNYA FEVER virus has been isolated from this species, but laboratory transmission experiments have been negative.

Culex pseudosinensis Colless, 1955

Eggs: Probably laid in rafts on water of stream margin.
Larvae: In grassy margins of flowing streams just inside the jungle fringe; among submerged filamentous algae.
Adults: No data.
Disease relationships: No data.

Culex pseudovishnui Colless, 1957

Eggs: Probably laid in rafts on hyacinth ponds.
Larvae: In hyacinth ponds.
Adults: No data.
Disease relationships: No data.

Culex quadripalpis (Edwards, 1914)

Eggs: Probably laid in rafts on ground pools.
Larvae: In pot holes and other small ground pools, chiefly in mangrove tidal areas, but also away from the coast.
Adults: Undescribed.
Disease relationships: No data.

Culex quinquefasciatus Say, 1823

See *Culex pipiens* for discussion.

Culex raptor (Edwards, 1922)

Eggs: Probably laid in rafts on suitable water.

Larvae: No data.

Adults: No data.

Disease relationships: No data.

Culex rubithoracis (Leicester, 1908)

Eggs: Probably laid in rafts on hyacinth ponds.

Larvae: In hyacinth ponds.

Adults: No data.

Disease relationships: No data.

Culex sinensis Theobald, 1903

Eggs: Probably laid in rafts on suitable water.

Larvae: In shallow water of rice fields, large weedy pools, and stream bed pools.

Adults: Rest on damp rocks in shade; feed readily on man and horse; feed mainly in early part of night, frequent in houses.

Disease relationships: Low-potential vector of *Wuchereria bancrofti* (BANCROFTIAN FILARIASIS).

Culex sitiens Wiedemann, 1828

Eggs: Probably laid in rafts on suitable water.

Larvae: In brackish ground pools along the coast; artificial containers; wells; brackish water in obstructed streams; occasionally in fresh water.

Adults: Feed readily on man; rest on vegetation in woods; reported common from houses in Saigon and Haiphong.

Disease relationships: Possible vector of *Wuchereria bancrofti* (BANCROFTIAN FILARIASIS) and based upon small sampling, of *Brugia malayi* (MALAYAN FILARIASIS).

Culex tritaeniorhynchus Giles, 1901

Eggs: Probably laid in rafts on suitable water.

Larvae: In shallow water, particularly of large marshes; also in rice fields, hyacinth ponds, streams, creeks, swamps, puddles; can occur in brackish as well as fresh water.

Adults: Feed on larger mammals, rarely birds at night, enter buildings during first hour of darkness and feed on man anytime during night.

Disease relationships: Primary vector of JAPANESE "B" ENCEPHALITIS, CHIKUNGUNYA FEVER, SINDBIS FEVER, and CETAH VIRUS. Low-potential vector of *Wuchereria bancrofti* (BANCROFTIAN FILARIASIS). Largely refractory to infection with *Dirofilaria immitis* (TROPICAL EOSINOPHILIA) although a few infected adults have been collected in the wild. Apparently refractory to *Brugia malayi* (MALAYAN FILARIASIS). This species is host for the gregarine parasite *Lankesteria culicis* (does not infect vertebrates).

Culex viridiventer Giles, 1901

Eggs: Probably laid in rafts on suitable water.

Larvae: No data.

Adults: Undescribed.

Disease relationships: No data.

Culex vorax (Edwards, 1892)

Eggs: Probably laid in rafts on suitable water.
Larvae: In turbid domestic water which is not highly polluted; ground pools, and rarely rock holes; also shaded jungle pools; predatory, feeding on aquatic insect larvae and nymphs including those of other species of mosquitoes, especially *Culex quinquefasciatus*.
Adults: Rest on damp rocks and in low-growing vegetation; feed to a limited degree on man.
Disease relationships: Low-potential vector of *Wuchereria bancrofti* (BANCROFTIAN FILARIASIS) and *Brugia malayi* (MALAYAN FILARIASIS).

Culex whitsei Barraud, 1923

Eggs: Probably laid in rafts on jungle pools.
Larvae: In shaded jungle pools.
Adults: No data.
Disease relationships: No data.

Culex whitmorei (Giles, 1904)

Eggs: Probably laid in rafts on suitable water.
Larvae: In shallow water; can live in brackish water.
Adults: No data.
Disease relationships: Apparently refractory to *Brugia malayi* (MALAYAN FILARIASIS).

Culex chamberlaini (Ludlow, 1904)

Eggs: Unstudied
Larvae: In permanent ground pools and ponds, usually with abundant vegetation, often among *Pistia*; grassy swamps.
Adults: Apparently do not bite man.
Disease relationships: Probably none.

Culex hybrida (Leicester, 1908)

Eggs: Unstudied.
Larvae: In ground pools, always with *Pistia*.
Adults: Apparently do not bite man.
Disease relationships: Probably none.

Culex luzonensis (Ludlow, 1905)

Eggs: Unstudied.
Larvae: In ponds with *Pistia* but larvae with free surface habits; tin cans; larvae purplish pink.
Adults: Apparently do not bite man.
Disease relationships: Probably none.

Culex minima (Theobald, 1901)

Eggs: Irregular masses of 15-33 eggs cemented to underside of leaves overhanging water.
Larvae: In association with "water lettuce" (*Pistia*).
Adults: Apparently do not bite man.
Disease relationships: Probably none.

Culex tizmanni communis (Leicester, 1908)

Eggs: No data.
Larvae: In bamboos; at edges of jungle streams.
Adults: No data.
Disease relationships: No data.

Hermannia complex (Theobald, 1910)

Eggs: No data.

Larvae: In rot holes and bamboo stumps.

Adults: Reported biting man in shade on hillside.
Disease relationships: No data.

Hodgesia malayi Leicester, 1908

Eggs: Uninvestigated.

Larvae: In grassy edges of marshes with soft bottoms; in elephant tracks.

Adults: Uninvestigated but probably take blood; tiny mosquitoes easily missed during biting collections.

Disease relationships: Uninvestigated.

Malaya genurostris Leicester, 1908

Eggs: Uninvestigated.

Larvae: In water of plant cavities and leaf axils, especially axils of banana, pineapple, and taro; remain submerged fastened to bottom with hook much of time; cuticular respiration occurs.

Adults: Feed on regurgitated droplets "stolen" from ants; vibrate like crane flies when they alight.

Disease relationships: Probably none.

Malaya jacobsoni (Edwards, 1930)

Eggs: Uninvestigated.

Larvae: In water of plant cavities and leaf axils, especially water in leaf bases of large species of Arum; remain submerged attached to bottom with hooks much of time; cuticular respiration occurs.

Adults: Feed on regurgitated droplets "stolen" from ants; vibrate like crane flies when they alight.

Disease relationships: Probably none.

Msonia annulata Leicester, 1908

Eggs: No data.

Larvae: Attached to roots of aquatic plants in the forest verge where open swamp and forest meet.

Adults: Feed on wide variety of mammals including man in open shortly after dusk; rest under dead leaves; enter houses only to feed.

Disease relationships: Good host for semiperiodic *Brugia malayi* (MALAYAN FILARIASIS) and for *Brugia puhangi* (TROPICAL EOSINOPHILIA). Secondary host for *Dirofilaria immitis* (TROPICAL EOSINOPHILIA).

Msonia annulifera (Theobald, 1901)

Eggs: Rosettes of about 123 eggs cemented to edges of *Pistia* leaves just below water surface.

Larvae: Attached to roots of aquatic plants in the forest verge where open swamp and forest meet; small pools; large ponds with water lettuce.

Adults: Feed readily on man as well as a wide variety of mammals in open shortly after dusk; rest under dead leaves; enter houses only to feed; reported common in houses at Haiphong but not Saigon; taken in light traps.

Disease relationships: Primary vector of *Brugia malayi* (MALAYAN FILARIASIS).

Onsonia bonnense Edwards, 1930

Eggs: No data.

Larvae: In swamp-forest attached to rootlets, pneumatophores of trees, rattans and palms; also attached to roots of aquatic plants in the forest verge where open swamp and forest meet.

Adults: Feed on wide variety of mammals including man in open shortly after dusk; rest under dead leaves; enter houses only to feed.

Disease relationships: Good host for semiperiodic *Brugia malayi* (MALAYAN FILARIASIS); secondary host for *Dirofilaria immitis* (TROPICAL EOSINOPHILIA).

Onsonia crassipes (Van der Wulp, 1881)

Eggs: Probably laid in rafts on water surface.

Larvae: In open swamp dominated by the grasses *Isachne globosa* and *Panicum amplexicaule* to the roots of which the larvae are fastened. They are collected by setting an open cylinder over the plants and pressing it down in the mud. The water is then baled out of the cylinder and sieved. Plants are also searched for attached larvae.

Adults: Feed on wide variety of mammals and birds but rarely man; rest under leaves 1-3 feet from ground; attracted to light; taken sweeping low vegetation.

Disease relationships: Probably none.

Onsonia dives (Schaefer, 1868)

Eggs: No data.

Larvae: In swamp-forest attached to rootlets, pneumatophores of trees, rattans and palms; also attached to roots of aquatic plants in the forest verge where open swamp and forest meet.

Adults: Feed on wide variety of mammals including man in open shortly after dusk; rest under dead leaves; enter houses only to feed; reported common in houses at Haiphong but not Saigon.

Disease relationships: Good host for semiperiodic *Brugia malayi* (MALAYAN FILARIASIS); secondary host for *Dirofilaria immitis* (TROPICAL EOSINOPHILIA).

Onsonia Indiana Edwards, 1930

Eggs: Rosettes of eggs cemented to edges of *Pistia* leaves just below water surface.

Larvae: Attached to roots of aquatic plants in the forest verge where open swamp and forest meet.

Adults: Feed readily on man as well as wide variety of mammals in open shortly after dusk; rest under dead leaves; enter houses only to feed; taken in light traps.

Disease relationships: Primary vector of *Brugia malayi* (MALAYAN FILARIASIS).

Onsonia nigrosignata (Edwards, 1917)

Eggs: No data.

Larvae: In swamp-forest attached to rootlets, pneumatophores of trees, rattans and palms; also attached to roots of aquatic plants in the forest verge where open swamp and forest meet.

Adults: Feed on wide variety of mammals and birds but rarely man; rest under leaves 1-3 feet from ground.

Disease relationships: Possible vector of *Dirofilaria immitis* (TROPICAL EOSINOPHILIA).

Mansonia ochracea (Theobald, 1903)

Eggs: No data.

Larvae: Attached to the roots of aquatic plants in the forest verge where open swamp and forest meet; in open swamp dominated by the grasses *Isachne globosa* and *Panicum amplexicaule* to the roots of which the larvae are fastened; and in swamp-forest attached to rootlets, pneumatophores of trees, rattans, and palms.

Adults: Feed on wide variety of mammals and birds but rarely man; rest under leaves 1-3 feet from ground; taken in light traps.

Disease relationships: Probably none.

Mansonia uniformis (Theobald, 1901)

Eggs: In circular cushion-like masses attached to the ventral side of leaves of aquatic plants.

Larvae: In open swamp dominated by the grasses *Isachne globosa* and *Panicum amplexicaule* to the roots of which the larvae are fastened. Also, in the forest verge where open swamp and forest meet. They are collected by setting an open cylinder over the plants and pressing it down in the mud. The water is then baled out of the cylinder and sieved. Plants are also searched for attached larvae.

Adults: Feed readily on man as well as wide variety of mammals in open shortly before dusk; rest under dead leaves; enter houses only to feed. Reported common in houses at Saigon but not at Haiphong; taken in light traps.

Disease relationships: Primary vector of *Wuchereria bancrofti* (BANCROFTIAN FILARIASIS), *Brugia malayi* (MALAYAN FILARIASIS), *Brugia pahangi* (TROPICAL EOSINOPHILIA) and CHIKUNGUNYA FEVER.

Orthopodomyia albipes Leicester, 1904

Eggs: No data.

Larvae: In bamboo stumps.

Adults: No data.

Disease relationships: No data.

Orthopodomyia andamanensis Barraud, 1934

Eggs: No data.

Larvae: In rot holes, bamboo stumps, packing boxes.

Adults: No data.

Disease relationships: No data.

Orthopodomyia anopheloides (Giles, 1903)

Eggs: No data.

Larvae: In rot holes, and bamboo stumps.

Adults: Rest on trees.

Disease relationships: No data.

Topomyia gracilis Leicester, 1908

Eggs: No data.

Larvae: In water of axillary cavities of taro and pandanus and floral cavities of *Rafflesia*.

Adults: In jungle near streams in total shade; rest under shadowed roots and on trees; taken in sweep nets and battery-operated light traps.

Disease relationships: No data.

Toxorhynchites albipes (Edwards, 1922)

Eggs: Probably laid singly on water surface.
Larvae: Predaceous on small aquatic animals.
Adults: Probably feed on nectar, not blood.
Disease relationships: Probably none. Not reported biting man.

Toxorhynchites kempfi (Edwards, 1921)

Eggs: Probably laid singly on water surface.
Larvae: Predaceous on small aquatic animals; in bamboo stumps.
Adults: Probably feed on nectar, not blood.
Disease relationships: Probably none. Not reported biting man.

Toxorhynchites splendens (Wiedemann, 1819)

Eggs: Float singly on water surface until they hatch about 2 days after deposition; cannot withstand desiccation.
Larvae: Predaceous on small aquatic animals; in water-filled plant cavities including rot holes, leaf axils, and pitchers; also artificial containers.
Adults: Rest on tree trunks and bamboo stems; do not take blood; feed on nectar.
Disease relationships: Probably none. Probably never bite, but taken occasionally in biting collections.

Tipteroides aranoides (Theobald, 1901)

Eggs: No data.
Larvae: In water of bamboo stumps, tree holes and *Nepenthes* pitchers; teak log holes; other small containers.
Adults: Near larval sites; feed during daylight on blood of any vertebrate-including man invading their highland haunts - sometimes enter houses; taken with sweep nets in shade; rest under houses and on damp trees.
Disease relationships: No data.

Tipteroides powelli (Ludlow, 1909)

Eggs: No data.
Larvae: In water of bamboo stumps and rot holes; other small containers.
Adults: Near larval sites; daylight feeders on many vertebrates; sometimes in houses; rest on trees; taken with sweep nets.
Disease relationships: No data.

Tipteroides proximus (Edwards, 1915)

Eggs: No data.
Larvae: Probably similar to *T. aranoides* and *T. powelli*.
Adults: Probably similar to *T. aranoides* and *T. powelli*.
Disease relationships: No data.

Tipteroides similis (Leicester, 1908)

Eggs: No data.
Larvae: Possibly in water of bamboo although larva incompletely described.
Adults: Near larval sites; feed on blood of any vertebrate invading their haunts; sometimes enter houses; taken in sweep nets.
Disease relationships: No data.

Uranotaenia unrandalei Barraud, 1926

Eggs: In rafts.

Larvae: In highland forest streams; shady pools in stream bed; stagnant ponds and marshes.

Adults: Rest on moist earthen walls and grass overhanging streams; apparently do not bite man.

Disease relationships: Probably none.

Uranotaenia bicolor Leicester, 1908

Eggs: Uninvestigated.

Larvae: Undescribed.

Adults: Rest on moist earthen walls and grass overhanging streams; apparently do not bite man.

Disease relationships: Probably none.

Uranotaenia bimaculata Leicester, 1908

Eggs: Black, length about 0.6mm; about 50 per batch deposited singly on water.

Larvae: In rot holes, bamboo, crockery; rarely in rock holes.

Adults: Rest on moist earthen walls and grass overhanging streams; do not seem to bite man.

Disease relationships: Probably none.

Uranotaenia campestris Leicester, 1908

Eggs: No data.

Larvae: In streams and rock springs; algae pools, lotus-filled moats.

Adults: Rest on moist earthen walls and grass overhanging streams; apparently do not bite man; taken in light traps.

Disease relationships: Probably none.

Uranotaenia edwardsi Barraud, 1926

Eggs: Uninvestigated.

Larvae: Undescribed.

Adults: Rest on moist earthen walls and grass overhanging streams; apparently do not bite man; taken in light traps.

Disease relationships: Probably none.

Uranotaenia hongoyi Caillard and Ngu, 1947

Eggs: No data.

Larvae: No data.

Adults: Undescribed.

Disease relationships: Probably none.

Uranotaenia lateralis Ludlow, 1905

Eggs: Uninvestigated.

Larvae: In slightly brackish pools in sunlit areas; crabholes; stagnant pools or swamps with nipa palms.

Adults: Rest on moist earthen walls and grass overhanging streams; adult bionomics essentially uninvestigated; apparently do no bite man.

Disease relationships: Probably none.

Uranotaenia luteola Edwards, 1934

Eggs: Uninvestigated.

Larvae: Undescribed.

Adults: Rest on moist earthen walls and grass overhanging streams; apparently do not bite man.
Disease relationships: Probably none.

Uranotaenia macfarlanei Edwards, 1914

Eggs: In rafts.

Larvae: In pools near streams; highly secretive; in roadside ditches with grass; stagnant ditch pools; muddy puddles.

Adults: Rest on moist earthen walls and grass overhanging streams; apparently do not bite man.
Disease relationships: Probably none.

Uranotaenia maculipennis Leicester, 1908

Eggs: Uninvestigated.

Larvae: Undescribed.

Adults: Rest on moist earthen walls and grass overhanging streams; apparently do not bite man; collected in sweep nets.

Disease relationships: Probably none.

Uranotaenia maxima Leicester, 1908

Eggs: In rafts.

Larvae: In rock pools at edge of streams; highly secretive.

Adults: Rest on moist earthen walls and grass overhanging streams; apparently do not bite man.
Disease relationships: Probably none.

Uranotaenia obscura Edwards, 1915

Eggs: No data.

Larvae: In axils of taro.

Adults: Rest on moist earthen walls and grass overhanging streams; apparently do not bite man.
Disease relationships: Probably none.

Uranotaenia recondita Edwards, 1922

Eggs: No data.

Larvae: In tree holes; muddy puddles deep in woods.

Adults: Rest on moist earthen walls; trees, holes in ground and grass overhanging streams; apparently do not bite man; taken in light traps.

Disease relationships: Probably none.