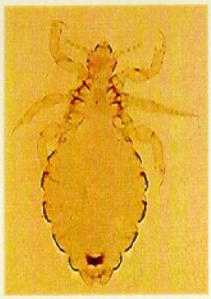
Pictorial Keys

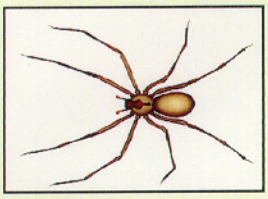
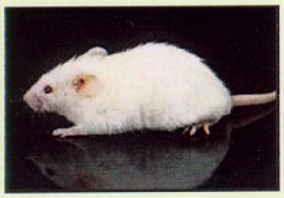
Arthropods, Reptiles, Birds and Mammals of Public Health Significance







U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

PICTORIAL KEYS TO

ANTHROPODS, REPTILES, BIRDS, AND MAMMALS

OF PUBLIC HEALTH SIGNIFICANCE

DEPARTMENT OF HEALTH & HUMAN SERVICES
Centers for Disease Control and Prevention (CDC)
Atlanta, Georgia 30333

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CONTENTS

PUBLIC HEALTH SIGNIFICANCE OF GROUPS INCLUDED IN THE KEY

COMMON NAME	PUBLIC HEALTH SIGNIFICANCE
Ant	bite, sting; infest stored food; damage wood.
Bat	associated with rabies, histoplasmosis and many other diseases.
Bed Bug	cause dermatitis; not known to transmit disease.
Bee, Hornet, etc.	bite and sting; infest stored food; damage wood.
Beetle	infest stored food; infest human intestine: cause dermatitis.
Bird	associated with histoplasmosis, ornithosis and many other diseases.
Book Louse, Psocid	infest stored food.
Caterpillar	sting; infest intestinal tract.
Centipede	venomous bite; infest nasal, intestinal, and urinary tracts.
Chewing Louse	infest domestic birds and mammals.
Cockroach	transmit enteric diseases.
Collembola	infest stored food; used as indicator organisms for pesticide studies.
Copepod	involved in transmission of broad fish tapeworm and guinea worm.
Daddy Long-leg Spider	infest houses; harmless.
Earwig	household pests.
Flea	cause dermatitis; transmit plague, murine typhus, tapeworms.
Fly	some bite; larvae infest human flesh; transmit typhoid, paratyphoid, cholera, bacillary dysentery, infantile diarrhea, amebic dysentery, giardiasis, helminths, trachoma, conjunctivitis, yaws, anthrax, tularemia, African sleeping sickness, leishmaniasis, onchocerciasis, loiasis, bartonellosis, sandfly fever.
Ked or Louse Fly	occasionally bite man.
Kissing Bug	transmit Chagas disease.
Lagomorph	transmit tularemia and many other diseases.
Lobster, Crab, etc.	involved in transmission of oriental lung fluke.
Millipede	exude vesicating venom; infest digestive and urinary tract; intermediate host of tapeworms.
Mite	cause dermatitis; infest human intestine; transmit scrub typhus, rickettsialpox, epidemic hemorrhagic fever.
Mosquito	transmit malaria, encephalitis, yellow fever, dengue, filariasis.
Moth or Butterfly	infest stored food; infest human intestine; some have stinging hairs.
Pseudoscorpion	infest houses; harmless.
Rodent	transmit leptospirosis, lymphocytic choriomeningitis, etc.
Scorpion	sting.
Sea Spider	appearance causes fear; harmless.
Silverfish, Firebrat	infest stored food; transmit enteric diseases.
Snake	venomous bite; secondary infection of bites.
Sowbug, Pillbug	household pests; harmless.
Spider	venomous bite.
Sucking Louse	cause dermatitis; transmit epidemic typhus, trench fever, relaps ing fever.
Sun Spider	non-venomous bite.
Termite	destroy wood; housing deterioration.
Thrips	bite man occasionally.
Tick	cause dermatitis, tick paralysis; transmit spotted fever, relapsing fever, tularemia, Colorado tick fever, Russian spring-summer encephalitis.
Whip Scorpion	appearance causes fear; harmless.

INTRODUCTION

Public health biologists are often responsible for teaching animal identification to personnel (sanitarians, engineers, physicians, veterinarians, etc.) without special training in taxonomy. One of the most successful devices for such training has been the pictorial key. The first U.S. Public Health Service pictorial key was devised by Stanley B. Freeborn and Eugene J. Gerberg (1943) to guide personnel in the identification of anopheline mosquito larvae during our national malaria control program.

After the Centers for Disease Control and Prevention (CDC) was founded (1946) additional keys were developed. At present the CDC utilizes more than 75 such keys in its regular training program. These are the major items incorporated into this booklet. Apropos morphological diagrams are also included.

Precise identification of disease vectors is essential to their efficient control. In using the following keys it should be remembered that only a few of them include all species in a group, and that determinations made using them are only tentative.

The pictorial keys are typical of identification keys found in reference works and scientific papers except that they are arranged as diagrams and are illustrated. After making the first choice offered at the top of each page, follow the black lines or indicated numbers to secondary choices until the correct identification has been made. Note that, in some cases, the identification can be made in the first choice.

Note: The differing formats and typography in this publication were deliberately selected to:

(1) Provide a brood spectrum of taxonomic experience;

(2) Avoid the stultifying effect of monotonous repetition.

ARTHROPODS OF PUBLIC HEALTH IMPORTANCE: KEY TO COMMON CLASSES AND ORDERS

Harold George Scott and Chester J. Stojanovich

1. Three or 4 pairs of walking legs (Fig. 1 A & B).....2

   Five or more pairs of walking legs (Fig. 1 C & D).....33

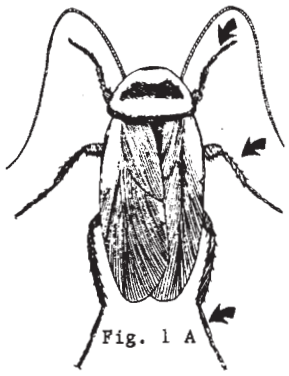


Fig. 1 A

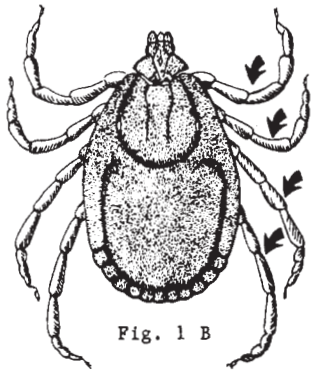


Fig. 1 B

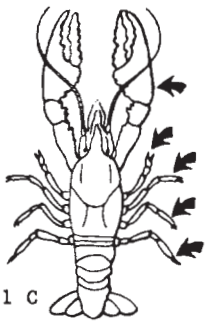


Fig. 1 C

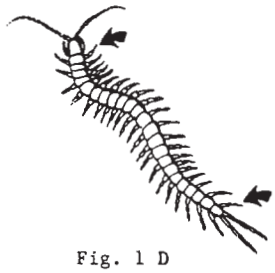


Fig. 1 D

2. Three pairs of walking legs (Fig. 2 A).....3

   Four pairs of walking legs (Fig. 2 B).....25

Fig. 2 A

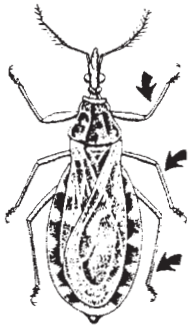
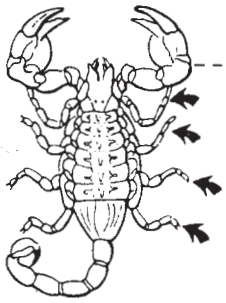


Fig. 2 B



3. Wings present, well developed (Fig. 3 A).....4

   Wings absent or rudimentary (Fig. 3 B & C).....13

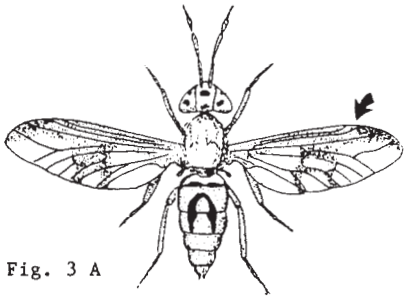


Fig. 3 A

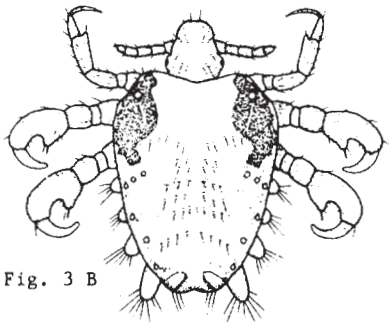


Fig. 3 B

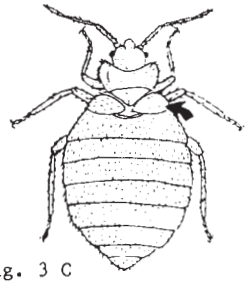


Fig. 3 C

4. With one pair of membranous wings (Fig. 4 A). ORDER DIPTERA.....5

   With two pairs of wings (Fig. 4 B & C).....6

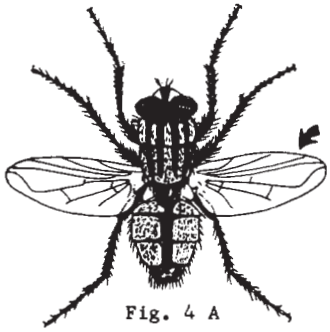


Fig. 4 A

Fig. 4 B

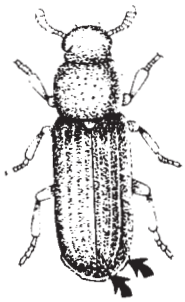


Fig. 4 C

5. Wings with scales (Fig. 5 A). FAMILY CULICIDAE.....MOSQUITO

   Wings without scales (Fig. 5 B). DIPTERA OTHER THAN MOSQUITOES.....FLY

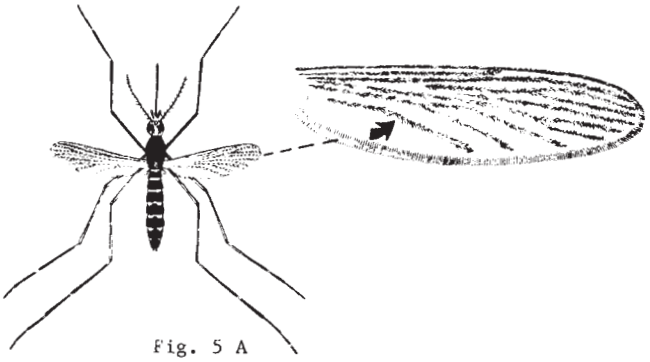


Fig. 5 A

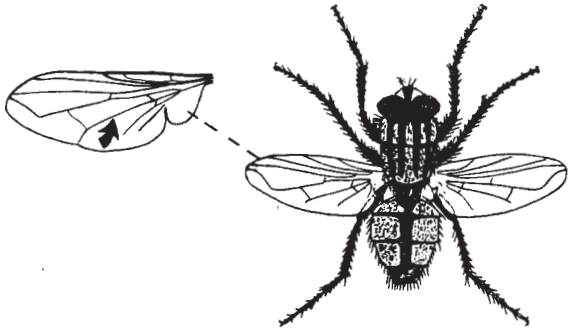


Fig. 5 B

6. Mouthparts adapted for sucking, with elongate proboscis (Fig. 6 A).....7

   Mouthparts adapted for chewing, without elongate proboscis (Fig. 6 B).....9

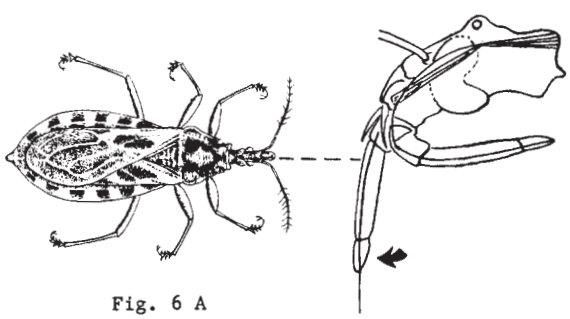


Fig. 6 A

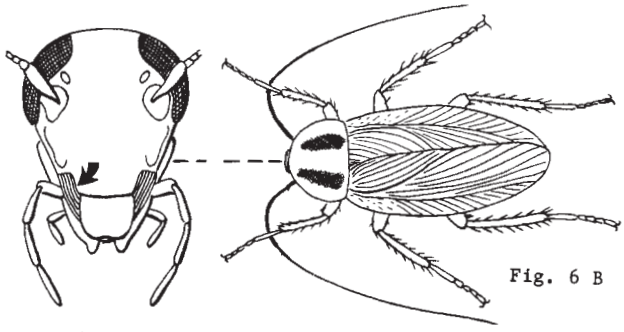


Fig. 6 B

7. Wings densely covered with scales; proboscis coiled (Fig. 7 A). ORDER LEPIDOPTERA.....
.....MOTH OR BUTTERFLY

   Wings not covered with scales; proboscis not coiled (Fig. 7 B).....8

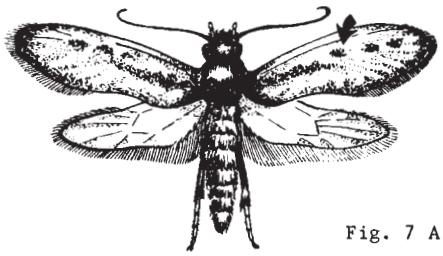


Fig. 7 A

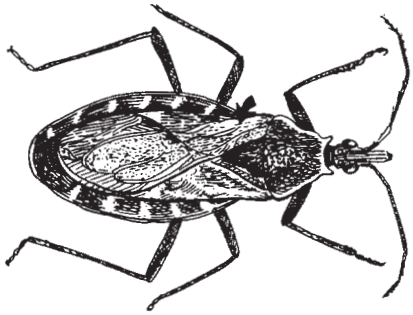


Fig. 7 B

8. Wing with fringe of long hair (Fig. 8 A). ORDER THYSANOPTERA.....THRIPS

   Wing without long hair (Fig. 8 B). ORDER HEMIPTERA.....KISSING BUG

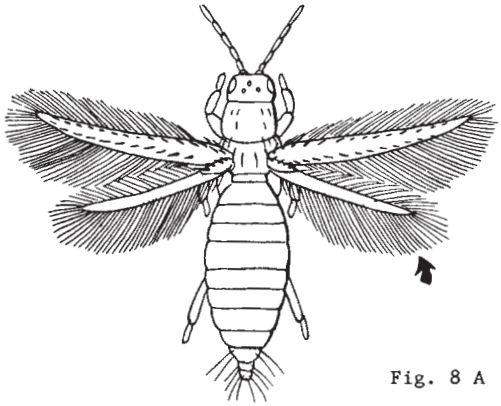


Fig. 8 A

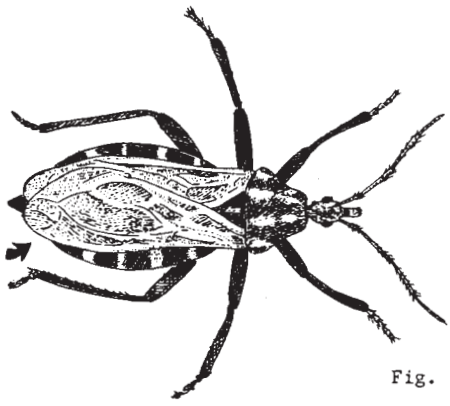


Fig. 8 B

9. Both pair of wings membranous and similar in structure (Fig. 9 A).....10

   Front pair of wings shell-like or leathery, serving as covers for the second pair (Fig. 9 B).....11

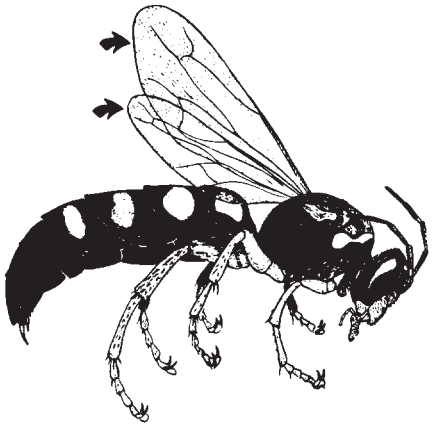


Fig. 9 A

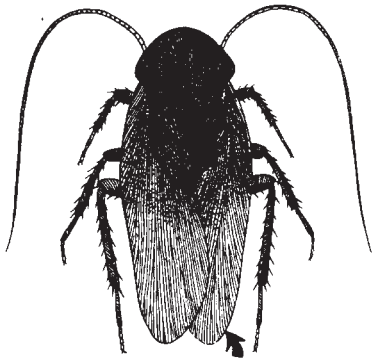


Fig. 9 B

10. Both pairs of wings similar in size (Fig. 10 A). ORDER ISOPTERA.....TERMITE

    Hind wing much smaller than front wing (Fig. 10 B). ORDER HYMENOPTERA.....
    .....BEE, HORNET, WASP, YELLOW JACKET, OR ANT

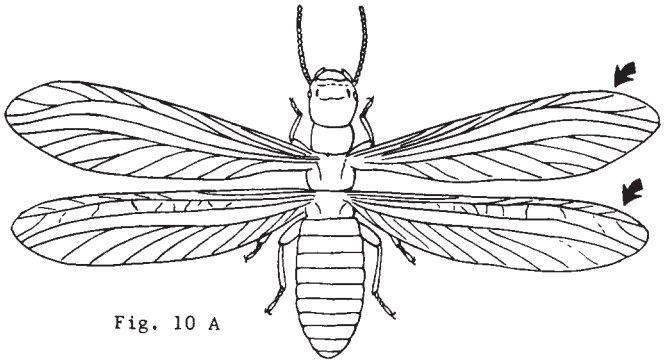


Fig. 10 A

Fig. 10 B

11. Front wings horny or leathery, without distinct veins (Fig. 11 A).....12

    Front wings leathery or paper-like, with distinct veins (Fig. 11 B). ORDER ORTHOPTERA.....COCKROACH

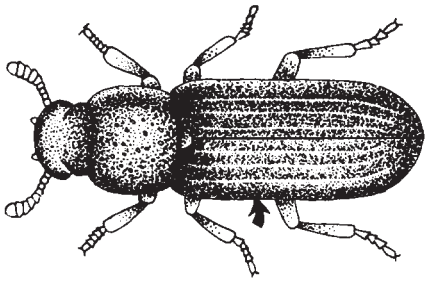


Fig. 11 A

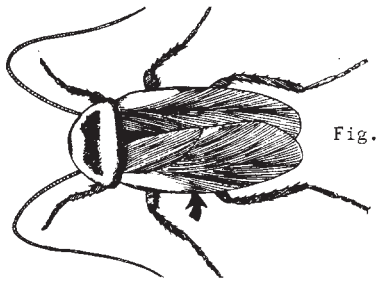


Fig. 11 B

12. Abdomen with prominent cerci; wings shorter than abdomen (Fig. 12 A). ORDER DERMAPTERA.....EARWIG

    Abdomen without prominent cerci; wings covering abdomen (Fig. 12 B). ORDER COLEOPTERA.....BEETLE

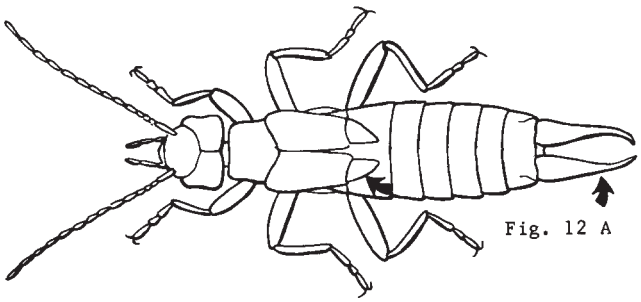


Fig. 12 A

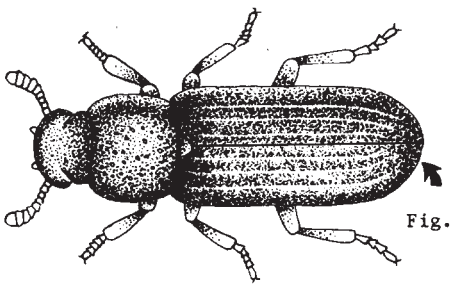


Fig. 12 B

13. Mouthparts with jaws for chewing (Fig. 13 A).....14

Mouthparts with a long beak or stylets for sucking up food (Fig. 13 B).....21

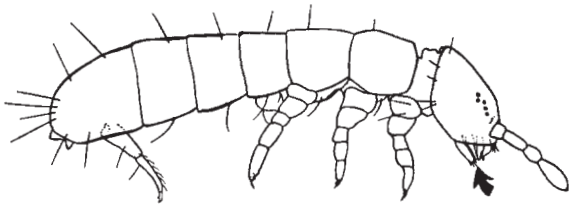


Fig. 13 A

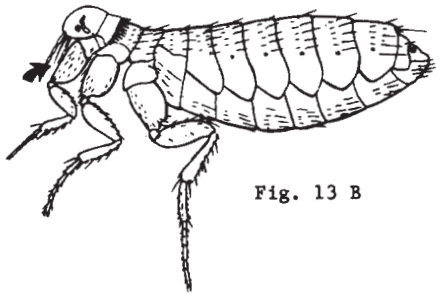


Fig. 13 B

14. With three long terminal tails (Fig. 14 A). ORDER THYSANURA.....SILVERFISH AND FIREBRAT

Without three long terminal tails (Fig. 14 B).....15

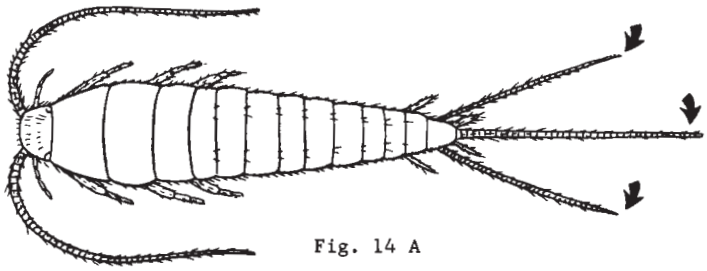


Fig. 14 A

Fig. 14 B

15. Abdomen with prominent pair of cerci (Fig. 15 A). ORDER DERMAPTERA.....EARWIG

Abdomen without prominent pair of cerci (Fig. 15 B).....16

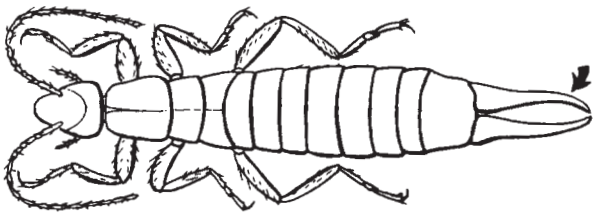


Fig. 15 A

Fig. 15 B

16. With narrow waist (Fig. 16 A). ORDER HYMENOPTERA.....ANT

Without narrow waist (Fig. 16 B).....17

Fig. 16 A

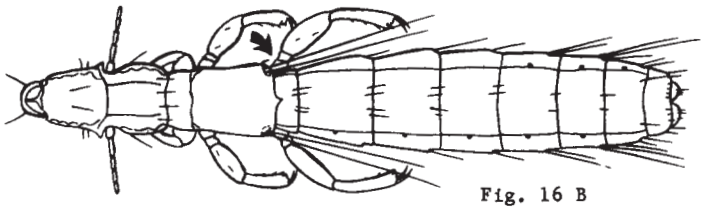


Fig. 16 B

17. Antenna with fewer than 8 segments (Fig. 17 A).....18

Antenna with more than 8 segments (Fig. 17 B).....19

Fig. 17 A

Fig. 17 B

18. Abdomen with 6 or fewer segments (Fig. 18 A). ORDER COLLEMBOLA.....SPRINGTAIL

Abdomen with more than 6 segments (Fig. 18 B). ORDER MALLOPHAGA.....CHEWING LOUSE

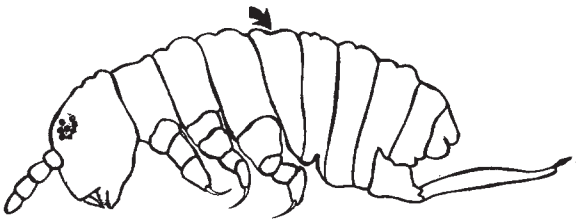


Fig. 18 A

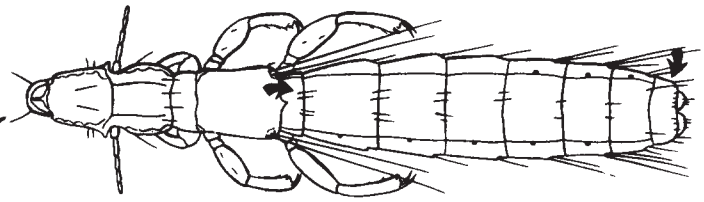


Fig. 18 B

19. Tarsus with 4-5 segments (Fig. 19 A).....20

Tarsus with 1-3 segments (fig. 19 B). ORDER PSOCOPTERA.....BOOK LOUSE OR PSOCID

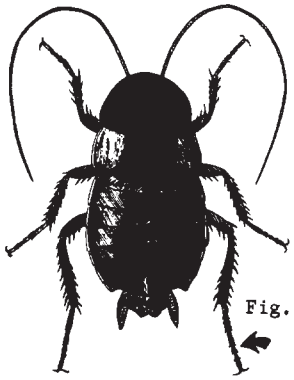


Fig. 19 A

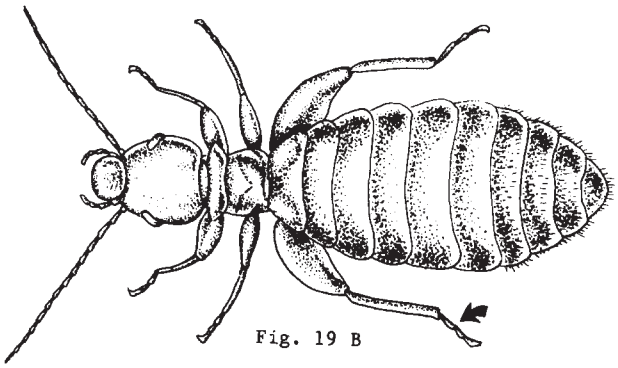


Fig. 19 B

20. Pronotum narrower than head, never covering head (Fig. 20 A). ORDER ISOPTERA.....TERMITE

Pronotum broader than head, often covering head (Fig. 20 B). ORDER ORTHOPTERA.....COCKROACH

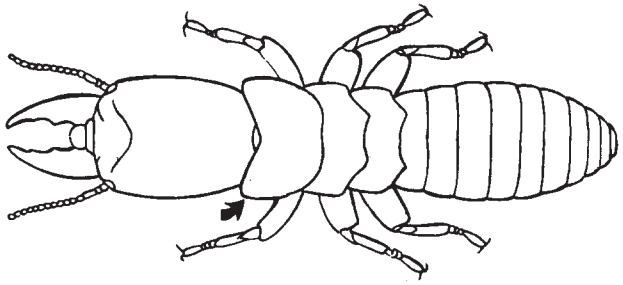


Fig. 20 A

Fig. 20 B

21. Flattened laterally (Fig. 21 A). ORDER SIPHONATERA.....FLEA

Flattened dorso-ventrally (Fig. 21 B).....22

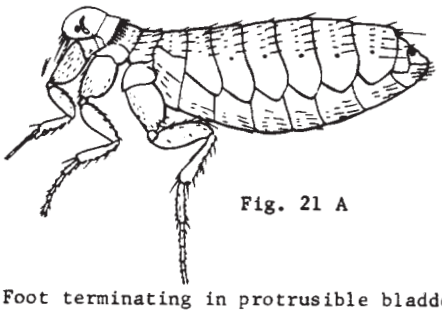


Fig. 21 A

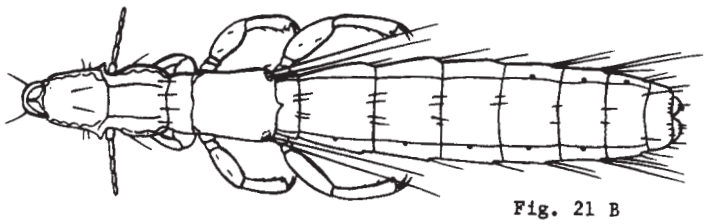


Fig. 21 B

22. Foot terminating in protrusible bladder (Fig. 22 A). ORDER THYSANOPTERA.....THRIPS

Foot not terminating in protrusible bladder (Fig. 22 B).....23

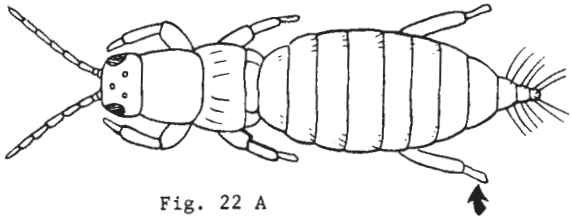


Fig. 22 A

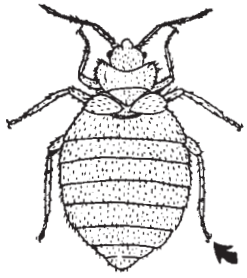


Fig. 22 B

23. Beak jointed (Fig. 23 A). ORDER HEMIPTERA.....BEDBUG

Beak not jointed (Fig. 23 B).....24

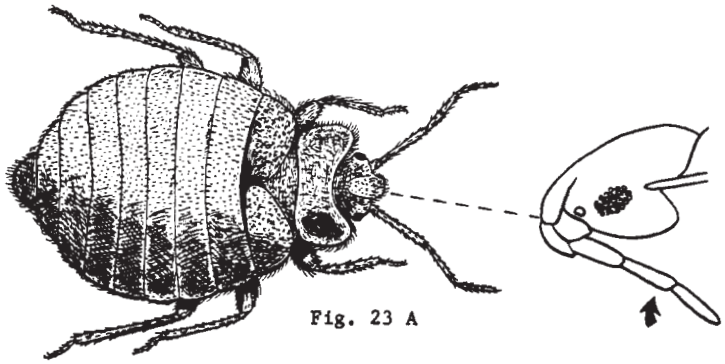


Fig. 23 A

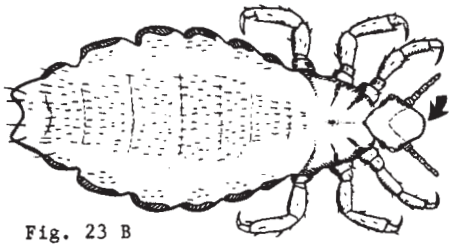


Fig. 23 B

24. Mouthparts retracted into head (Fig. 24 A). ORDER ANOPLURA.....SUCKING LOUSE

Mouthparts not retracted into head (Fig. 24 B). ORDER DIPTERA.....KED OR LOUSE FLY

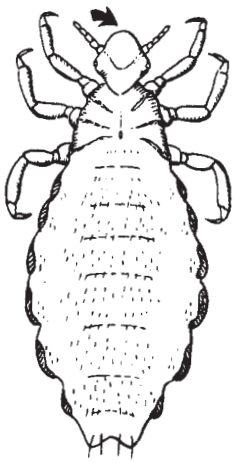


Fig. 24 A

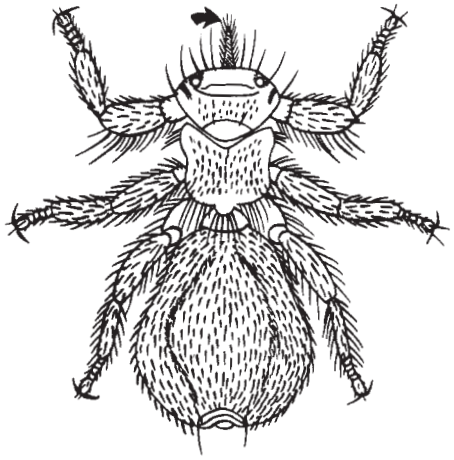


Fig. 24 B

25. Abdomen well-developed (Fig. 25 A). CLASS ARACHNIDA.....26

Abdomen peg-like (Fig. 25 B). CLASS PYCNOGONIDA.....SEA SPIDER

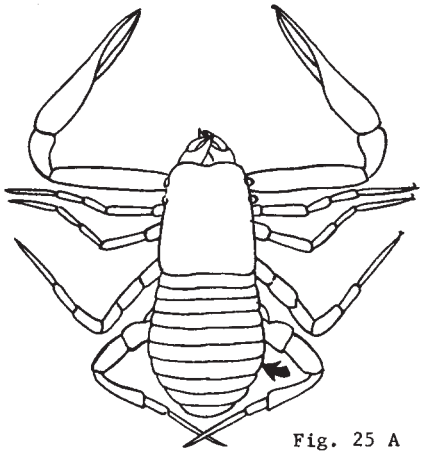


Fig. 25 A

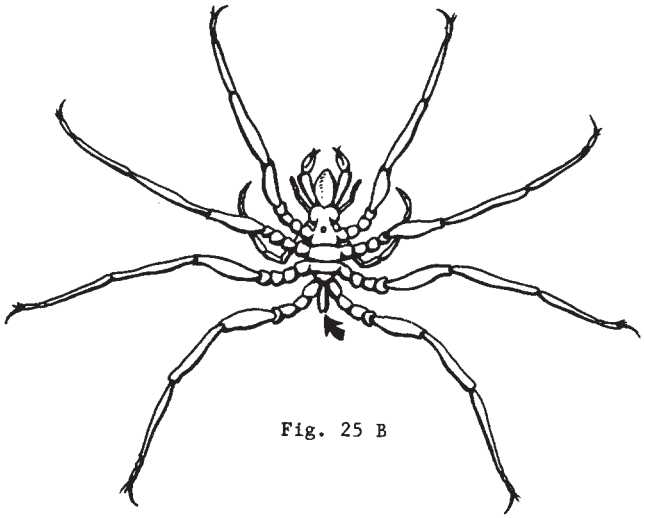


Fig. 25 B

26. Abdomen distinctly segmented (Fig. 26 A).....27

Abdomen not distinctly segmented (Fig. 26 B).....31

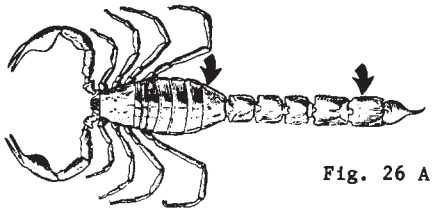


Fig. 26 A

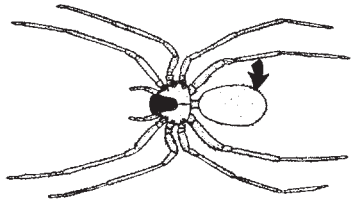


Fig. 26 B

27. Abdomen lengthened to form a long tail (Fig. 27 A).....28

Abdomen not lengthened to form a long tail (Fig. 27 B).....29

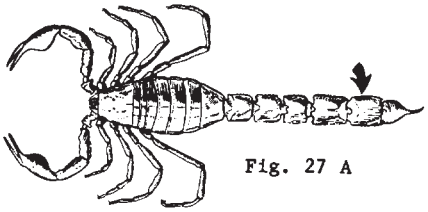


Fig. 27 A

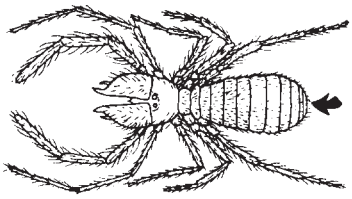


Fig. 27 B

28. Tail with stinger (Fig. 28 A). ORDER SCORPIONIDA.....SCORPION

Tail without stinger (Fig. 28 B). ORDER PEDIPALPIDA.....WHIP SCORPION

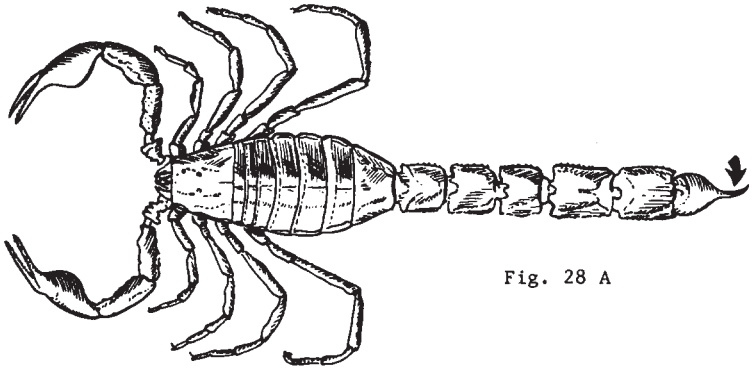


Fig. 28 A

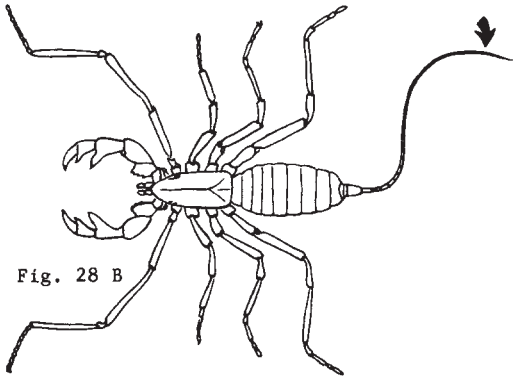


Fig. 28 B

29. With large pincer-like claws (Fig. 29 A). ORDER PSEUDOSCORPIONIDA.....PSEUDOSCORPION

Without large pincer-like claws (Fig. 29 B).....30

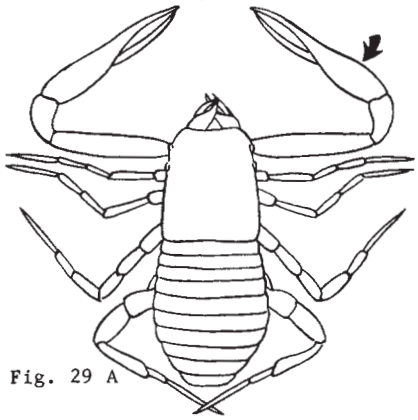


Fig. 29 A

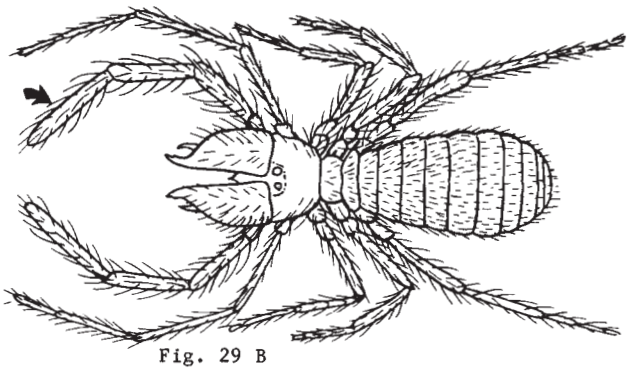


Fig. 29 B

30. Legs not longer than body (Fig. 30 A). ORDER SOLPUGIDA.....SUN SPIDER

Legs much longer than body (Fig. 30 B). ORDER PHALANGIDA.....DADDY LONG-LEG SPIDER

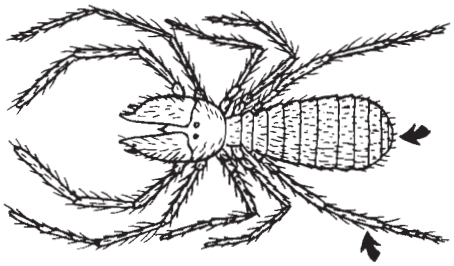


Fig. 30 A

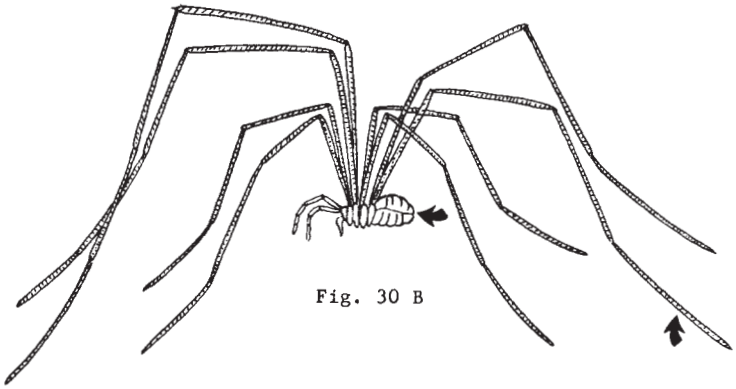


Fig. 30 B

31. Abdomen constricted to form a narrow waist (Fig. 31 A). ORDER ARANEIDA.....SPIDER

Abdomen not constricted (Fig. 31 B).....32

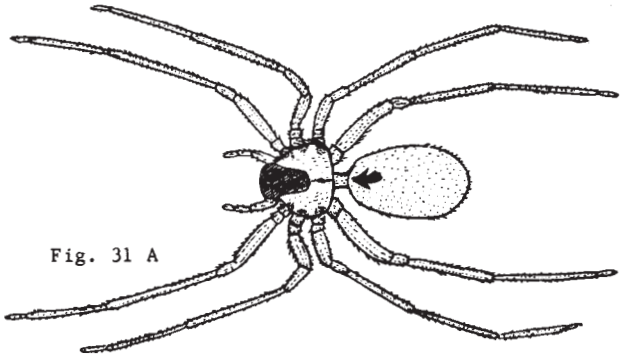
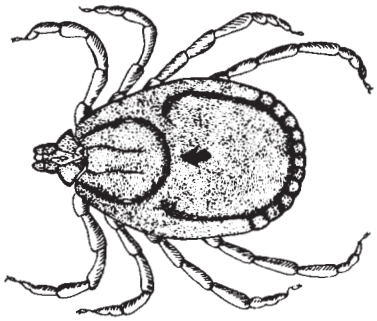


Fig. 31 A

Fig. 31 B



32. Body with long hair; Haller's organ absent (Fig. 32 A). ORDER ACARINA.....MITE

Body without hair or short hair; Haller's organ present (Fig. 32 B). ORDER ACARINA.....TICK

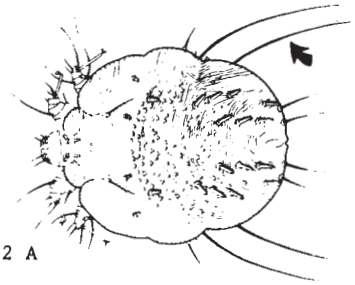


Fig. 32 A

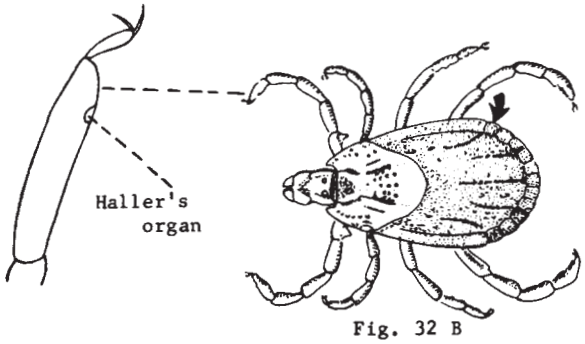


Fig. 32 B

33. Five to 7 pairs of walking legs (Fig. 33 A). CLASS CRUSTACEA.....34

    More than 14 pairs of walking legs (Fig. 33 B).....36

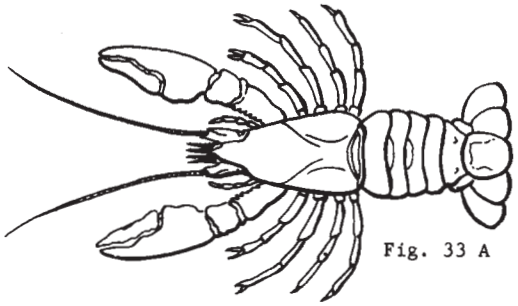


Fig. 33 A

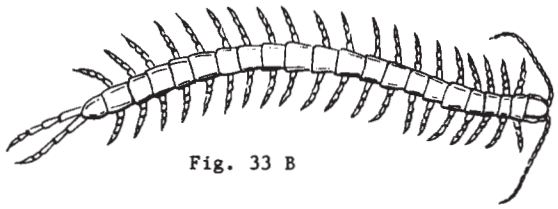


Fig. 33 B

34. Abdomen without appendages (Fig. 34 A). ORDER COPEPODA.....COPEPOD

    Abdomen with appendages (Fig. 34 B).....35

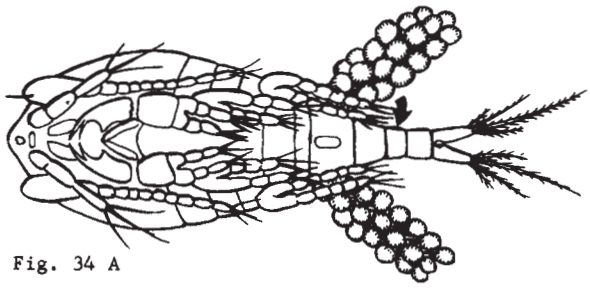


Fig. 34 A

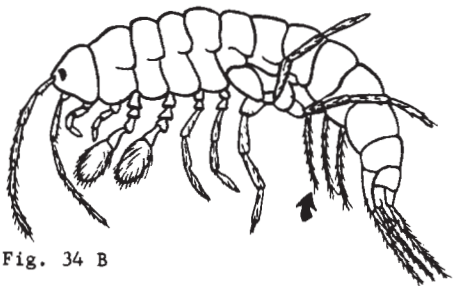


Fig. 34 B

35. Thorax covered with a fused plate; eyes, when present, on movable stalks (Fig. 35 A & B).....
    ORDER DECAPODA.....LOBSTER, CRAB, CRAYFISH, SHRIMP, ETC.

    Thorax not covered with a fused plate; eyes, when present, not on movable stalks (Fig. 35 C & D)...
    ORDER ISOPODA.....SOWBUG, PILLBUG

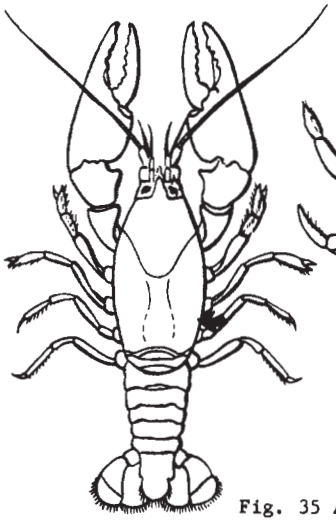


Fig. 35 A

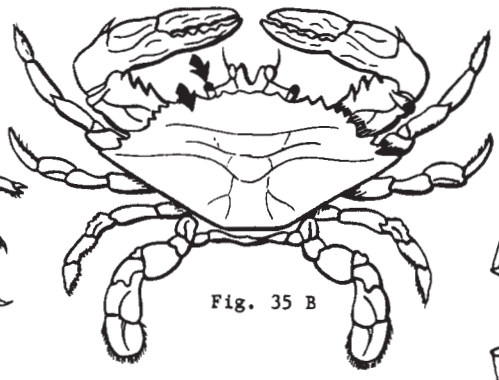


Fig. 35 B

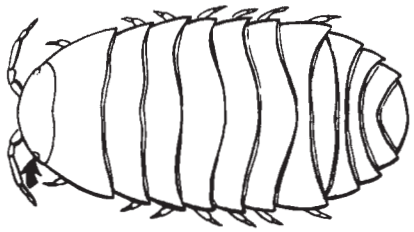


Fig. 35 C

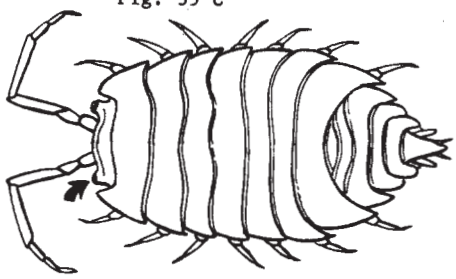


Fig. 35 D

36. One pair of legs per body segment (Fig. 36 A). CLASS CHILOPODA.....CENTIPEDE

    Two pairs of legs per body segment (Fig. 36 B). CLASS DIPLOPODA.....MILLIPEDE

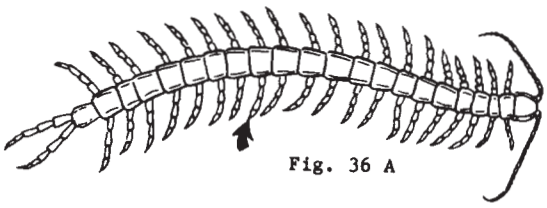


Fig. 36 A

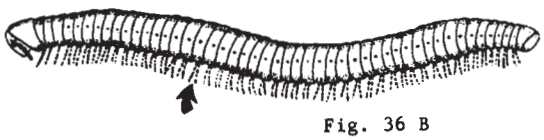
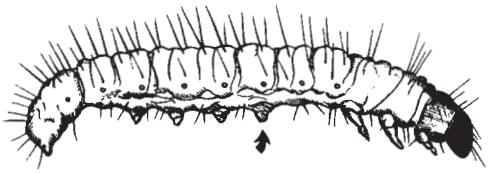


Fig. 36 B

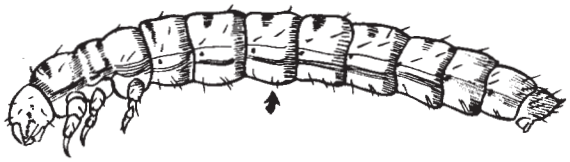
HOUSEHOLD AND STORED-FOOD PESTS: PICTORIAL KEY TO COMMON LARVAE

Chester J. Stojanovich & Harold George Scott

abdominal legs present

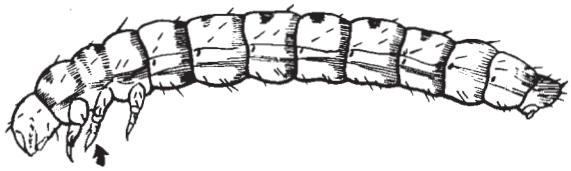


abdominal legs absent



MOTH LARVAE

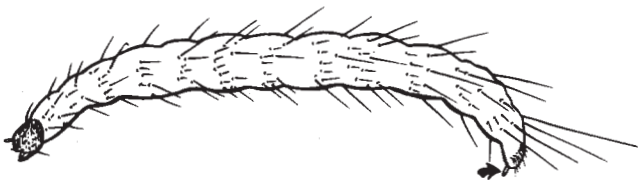
thoracic legs present



thoracic legs absent

BEETLE, BORER & MEALWORM LARVAE

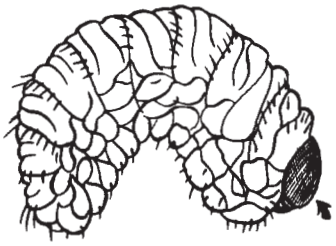
with fleshy lobes at ends of body



without fleshy lobes at ends of body

FLEA LARVAE

head capsule present



head capsule absent

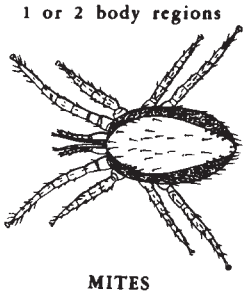
WEEVIL LARVAE

MUSCOID FLY LARVAE

HOUSEHOLD AND STORED-FOOD PESTS: KEY TO COMMON ADULTS

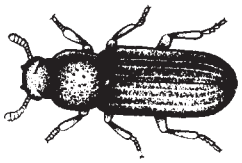
Harold George Scott & Chester J. Stojanovich

1 or 2 body regions



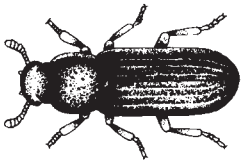
MITES

3 body regions



wings well developed

front wings shell-like



BEETLES—WEEVILS—
BORERS—MEALWORMS

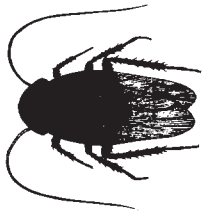
1 pair wings

FLIES

wings with scales

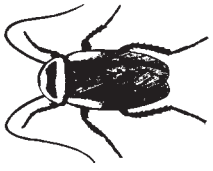
MOTHS

front wings not shell-like



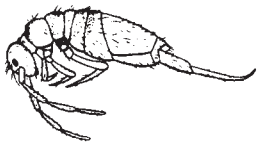
2 pair wings

wings without scales

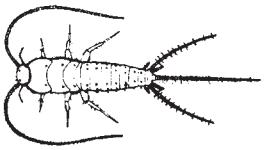


COCKROACHES

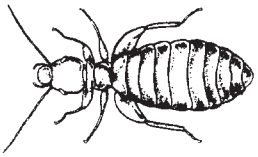
wings reduced or absent



with 3 long tails

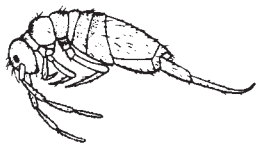


without 3 long tails

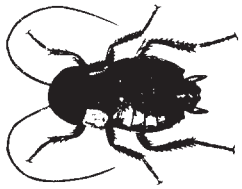


SILVERFISH

antenna 4-7 segmented



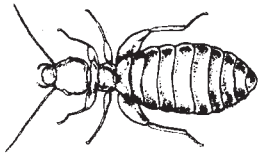
antenna more than 7 segmented



SPRINGTAILS

tarsus 4-5 segmented

tarsus 1-3 segmented

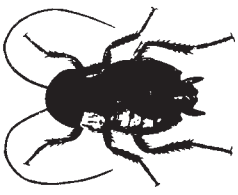


PSOCIDS

with narrow waist

ANTS

without waist



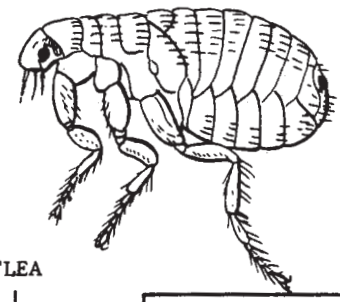
COCKROACHES

ECTOPARASITES OF THE DOG: PICTORIAL KEY TO COMMON SPECIES

Harold George Scott & Chester J. Stojanovich

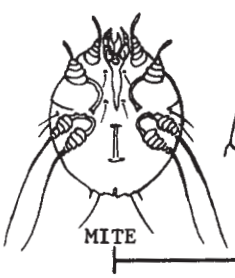
with 6 legs, head definite
flattened laterally — flattened dorsoventrally

with 8 legs, head indefinite
under 4 mm. in length — over 4 mm. in length
Haller's organ absent — Haller's organ present

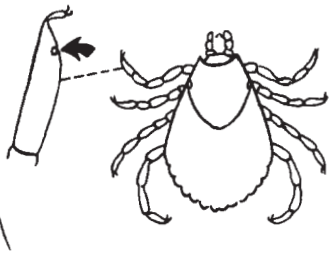


FLEA

LOUSE



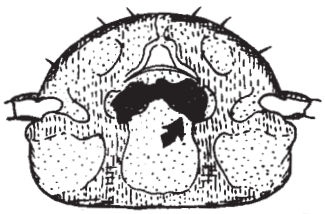
MITE

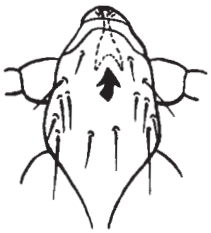


TICK

chewing mouthparts — sucking mouthparts

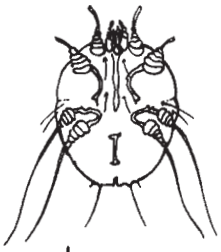
body elongate — body globular





Linognathus setosus
DOG SUCKING LOUSE

Demodex canis
DEMODECTIC MANGE MITE



with 2 claws — with 1 claw

legs short, stubby — legs long, slender

Heterodoxus spiniger
KANGAROO LOUSE

Trichodectes canis
DOG BITING LOUSE

Sarcoptes scabiei canis
SARCOPTIC MANGE MITE

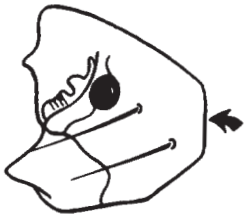
Otodectes cynotis
EAR MITE

genal comb present
spine I short — spine I long

genal comb absent
head squared — head rounded

Ctenocephalides canis
DOG FLEA

Ctenocephalides felis
CAT FLEA



Echidnophaga gallinacea
STICKTIGHT FLEA

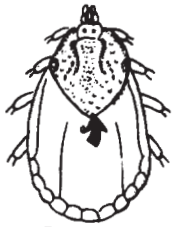
Pulex simulans
FALSE HUMAN FLEA

ornately decorated — inornate

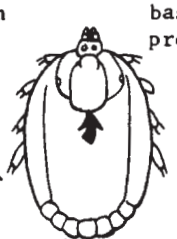
palpi long — palpi short

basis capitulum produced — basis capitulum not produced

Amblyomma americanum
LONE STAR TICK



Dermacentor variabilis
AMERICAN DOG TICK

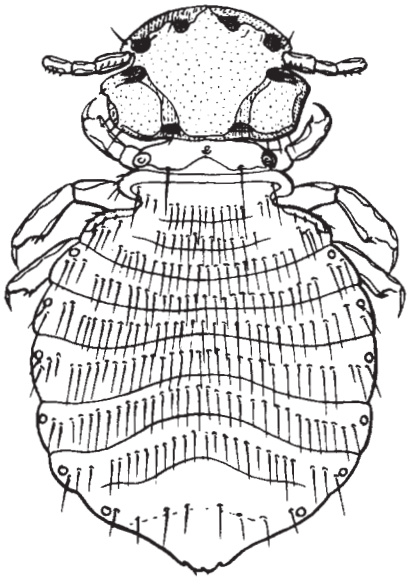


Rhipicephalus sanguineus
BROWN DOG TICK

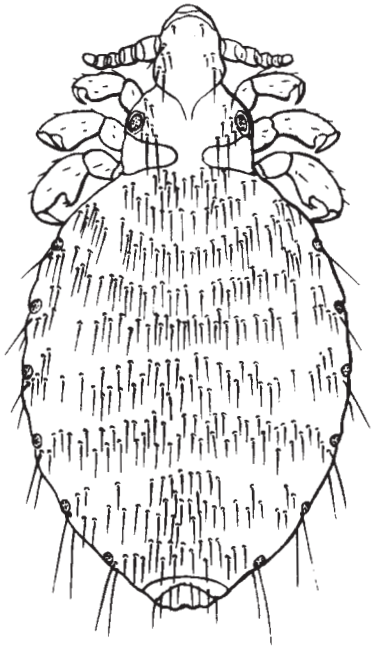
Ixodes scapularis
BLACK-LEGGED TICK

REPRESENTATIVE ECTOPARASITES OF THE DOG

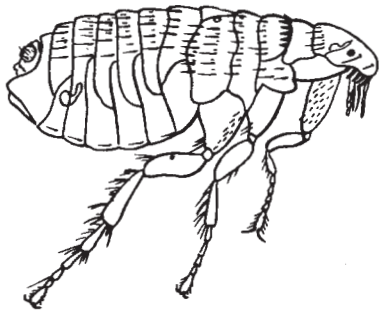
Chester J. Stojanovich



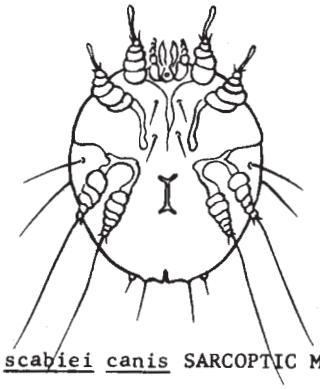
Trichodectes canis DOG BITING LOUSE



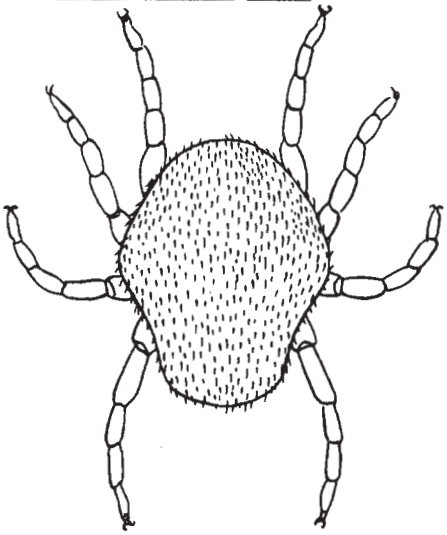
Linognathus setosus DOG SUCKING LOUSE



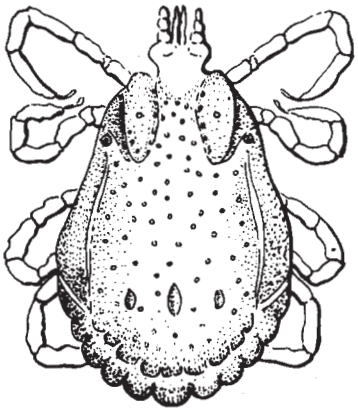
Ctenocephalides felis CAT FLEA



Sarcoptes scabiei canis SARCOPTIC MANGE MITE



Otobius megnini SPINOSE EAR TICK



Rhipicephalus sanguineus BROWN DOG TICK

HUMAN ECTOPARASITES: KEY TO COMMON GROUPS

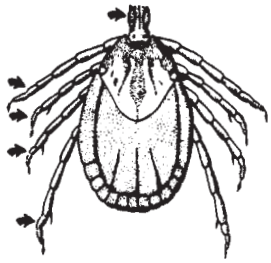
Chester J. Stojanovich and Harold George Scott

legs absent

legs present

head definite
3 pairs of legs

head indefinite
4 pairs of legs



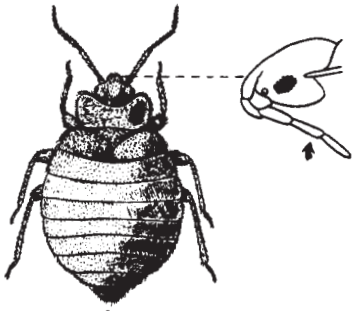
FLY LARVA
Order Diptera

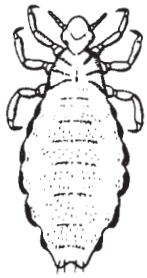
flattened laterally

flattened dorsoventrally

beak jointed

beak not jointed





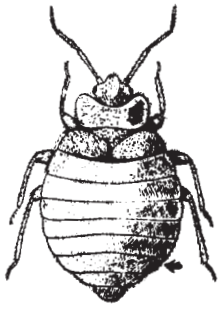
FLEA
Order Siphonaptera

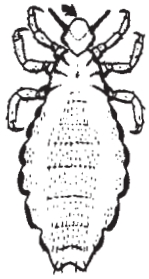
wings present

wings absent

mouthparts projected

mouthparts retracted





KISSING BUG
Order Hemiptera

BED BUG
Order Hemiptera

LOUSE-FLY
Order Diptera

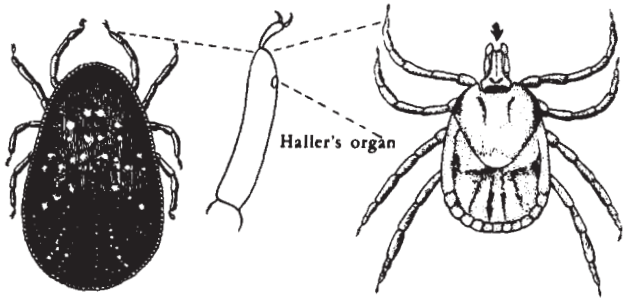
LOUSE
Order Anoplura

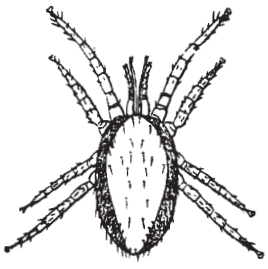
over 4 mm. long; Haller's organ present

under 4mm. long; Haller's organ absent

mouthparts ventral

mouthparts anterior





SOFT TICK
Order Acarina

HARD TICK
Order Acarina

MITE
Order Acarina

CRUSTACEA: KEY TO SOME MAJOR ORDERS

Chester J. Stojanovich and Harold George Scott

1. With abdominal appendages (Fig. 1 A).....2

   Without abdominal appendages (Fig. 1 B).....7

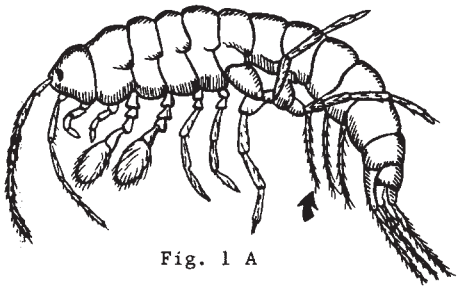


Fig. 1 A

Fig. 1 B

   Carapace present (Fig. 2 A).....3

   Carapace absent (Fig. 2 B).....6

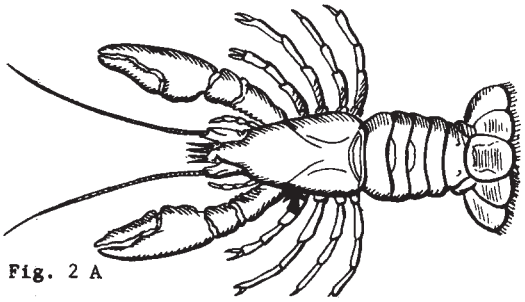


Fig. 2 A

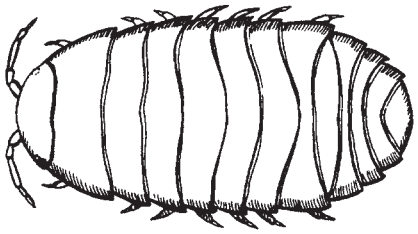


Fig. 2 B

3. With dorsal shield (Fig. 3 A). SHIELD SHRIMP.....Order NOTOSTRACA

   Without dorsal shield (Fig. 3 B).....4

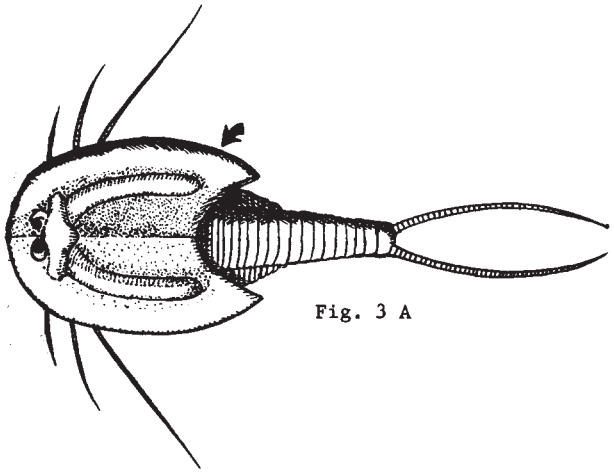


Fig. 3 A

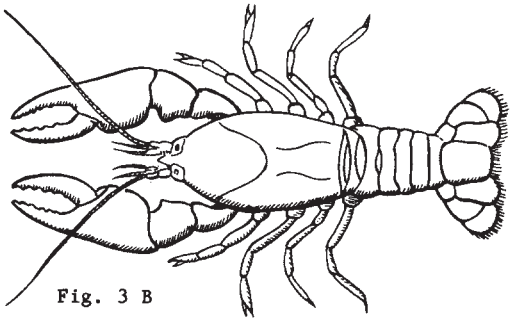
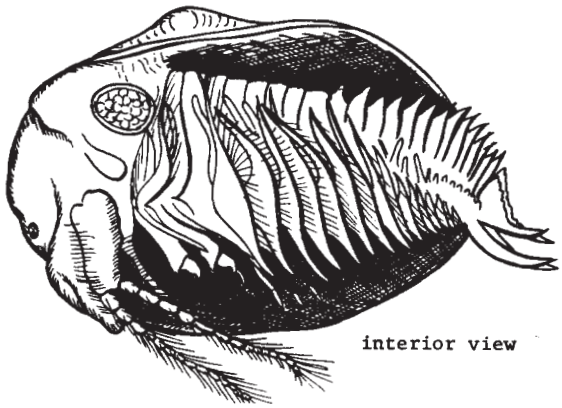


Fig. 3 B

4. With bivalve shell (Fig. 4 A). SHELL SHRIMP.....Order CONCHOSTRACA

   Without bivalve shell (Fig. 4 B).....5

Fig. 4 A



interior view

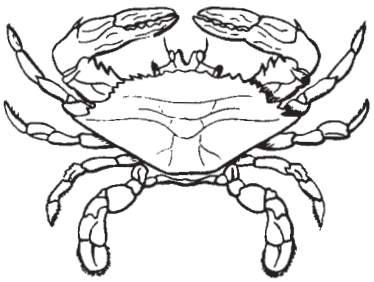


Fig. 4 B

5. First pleopod rudimentary (Fig. 5 A). OPOSSUM SHRIMP.....Order MYSIDACEA

   First pleopod well-developed (Fig. 5 B, C & D). SHRIMP, CRAYFISH, LOBSTERS, CRABS.....
   .....Order DECAPODA

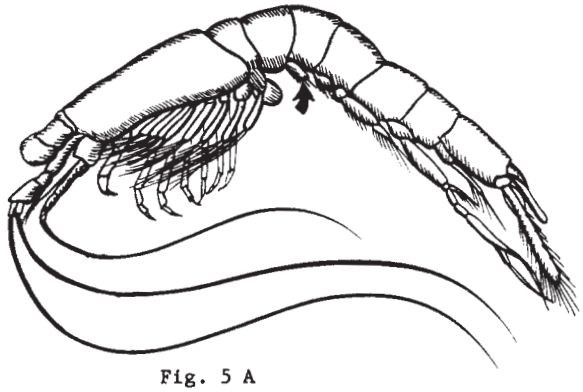


Fig. 5 A

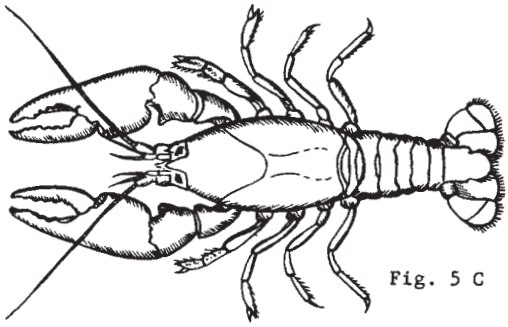


Fig. 5 C

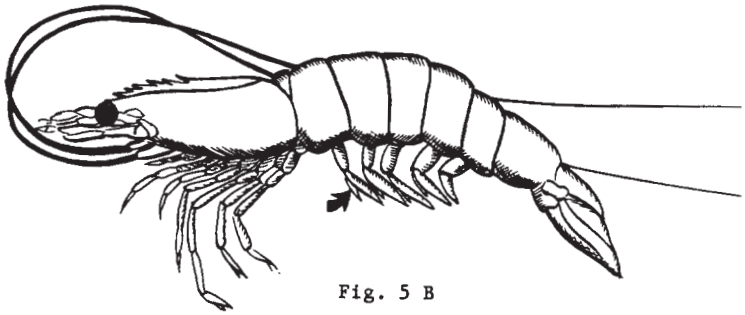


Fig. 5 B

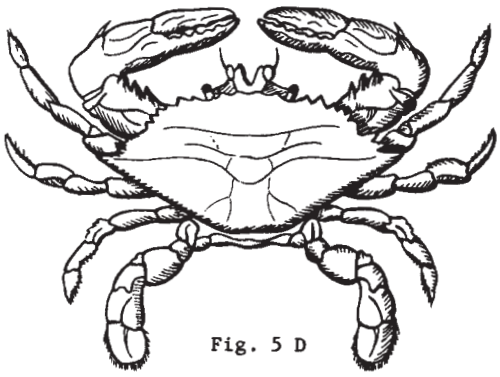


Fig. 5 D

6. Body laterally compressed (Fig. 6 A). SAND FLEAS, ETC.....Order AMPHIPODA

   Body dorso-ventrally compressed (Fig. 6 B). SOWBUGS, PILLBUGS, ETC.....Order ISOPODA

Fig. 6 A

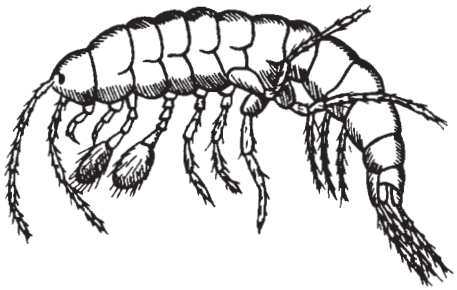
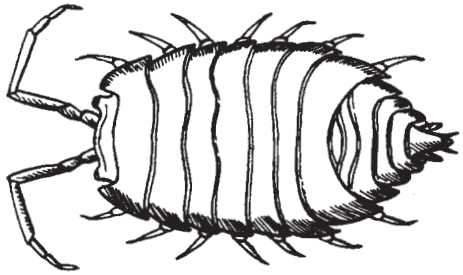


Fig. 6 A



7. Body not completely enlosed in a bivalve shell (Fig. 7 A).....8

Body completely enclosed in a bivalve shell (Fig. 7 B). OSTRACODS..... Order PODOCOPA

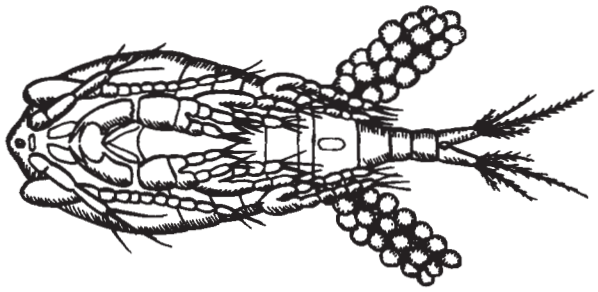


Fig. 7 A

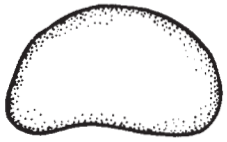
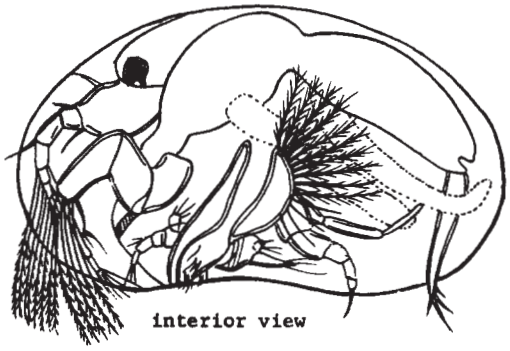


Fig. 7 B



interior view

8. Body segmented (Fig. 8 A).....9

Body not segmented (Fig. 8 B). WATER FLEAS,.....Order CLADOCERA

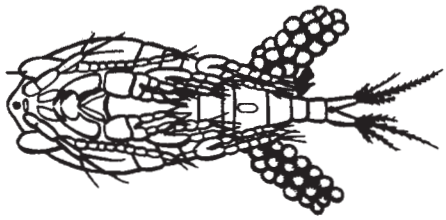


Fig. 8 A

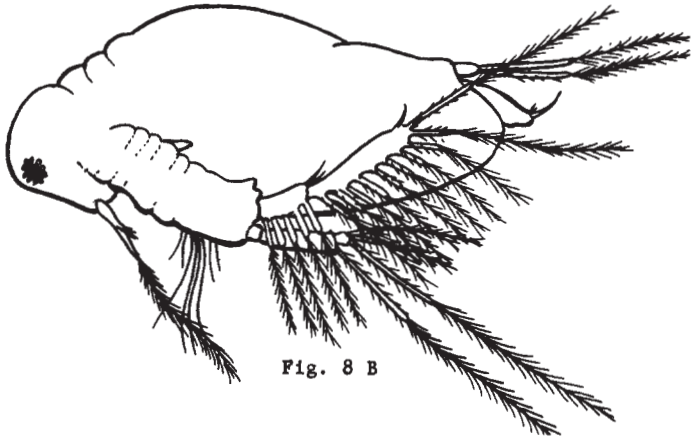


Fig. 8 B

9. Eyes stalked (Fig. 9 A). FAIRY SHRIMP.....Order ANOSTRACA

Eyes not stalked (Fig. 9 B). COPEPODS..... Order EUCOPEPODA

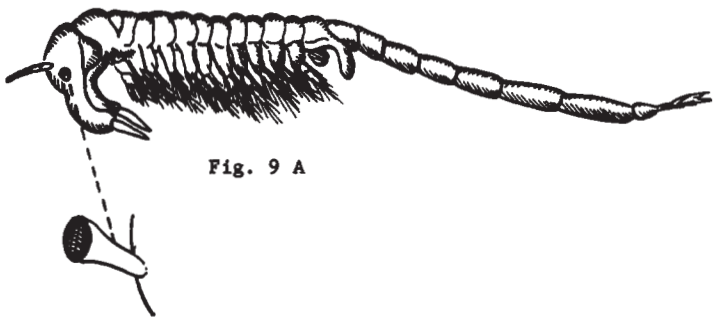


Fig. 9 A

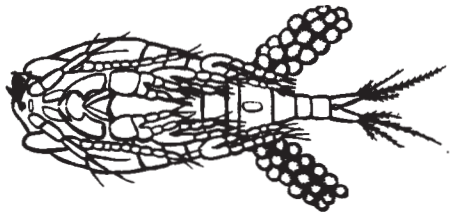


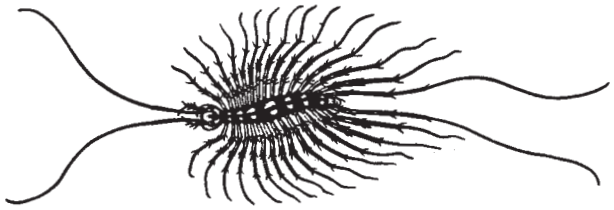
Fig. 9 B

CENTIPEDES: KEY TO SOME IMPORTANT UNITED STATES SPECIES

Harold George Scott

1. 8 dorsal plates: 15 pairs of long legs. . . . EASTERN HOUSE CENTIPEDE, *Scutigera cleoptrata*

   More than 14 dorsal plates. 2



Scutigera cleoptrata

2. 15 pairs of legs (*Lithobius*). 3

   21-23 pairs of legs (*Scolopendra*) 4

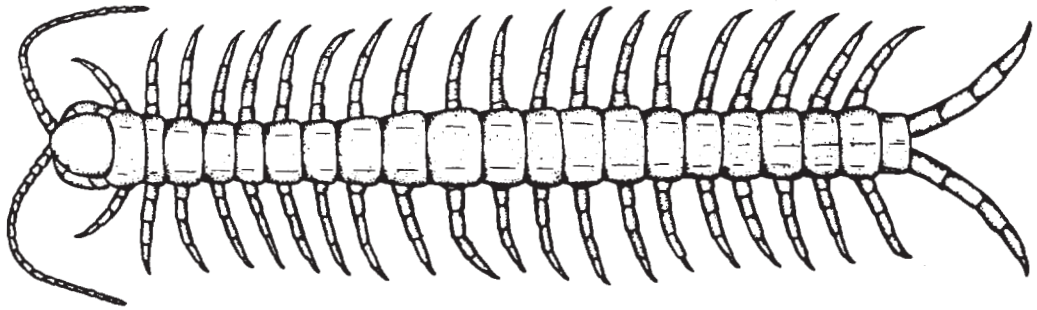
   More than 30 pairs of legs (*Geophilus*) 5

3. Antenna 19-23 segmented . . . . . *Lithobius multidentatus*

   Antenna 33-43 segmented . . . . . *Lithobius forficatus*

4. Anal legs as long as or longer than 3 terminal body segments. . . . . WESTERN HOUSE CENTIPEDE, *Scolopendra heros*

   Anal legs shorter than 3 terminal body segments . . . . . *Scolopendra morsitans*



Scolopendra heros

5. 47-53 pairs of legs. 6

   64-67 pairs of legs. . . . . *Geophilus californicus*

6. With 2 longitudinal black lines . . . . . *Geophilus rubens*

   Without longitudinal black lines . . . . . *Geophilus umbraticus*

MILLIPEDES: KEY TO SOME IMPORTANT UNITED STATES SPECIES

Harold George Scott, Ph.D.

1. 20-21 body segments 2

   More than 29 body segments 3

2. Legs with basal spines . . . . . *Pleurolomia butleri* (= *Fontaria virginiensis*)

   Legs without basal spines . . . . . *Pseudopolydesmus serratus*

Narceus americanus

3. Body segment 3 with legs . . . . . *Narceus americanus* (= *Spirobolus marginatus*)

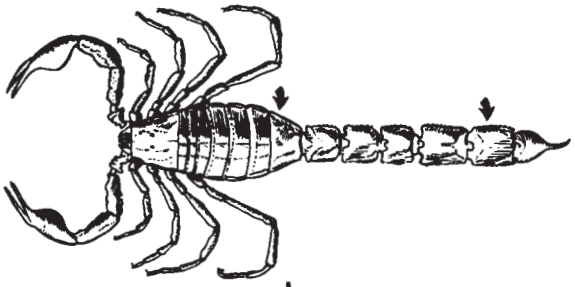
   Body segment 3 without legs . . . . . *Brachyiulus pusillus* (= *Julus virgatus*)

Brachyiulus pusillus

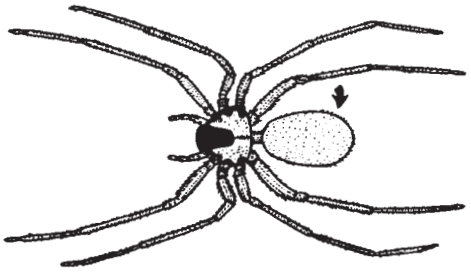
ARACHNIDA: KEY TO COMMON ORDERS OF PUBLIC HEALTH IMPORTANCE

Harold George Scott & Chester J. Stojanovich

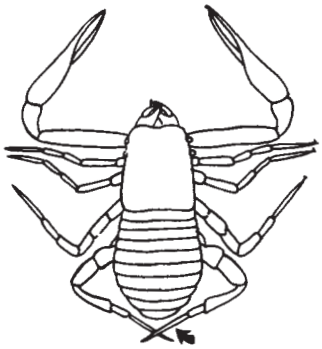
ABDOMEN DISTINCTLY SEGMENTED



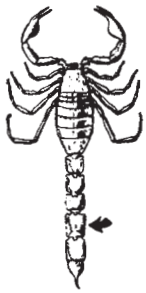
ABDOMEN NOT DISTINCTLY SEGMENTED



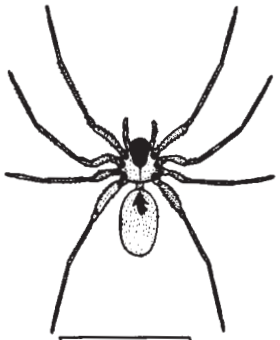
WITHOUT TAIL



WITH TAIL

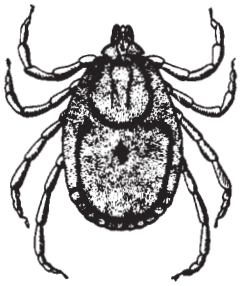


THREAD-WAISTED



ARANEIDA
Spiders

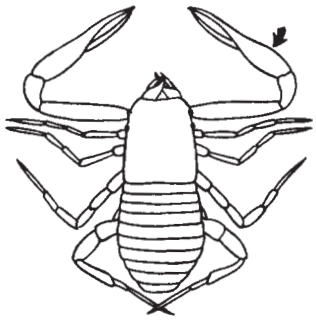
THICK-WAISTED



ACARINA
Ticks and Mites

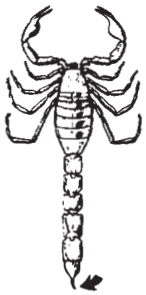
PALPS WITHOUT PINCERS

PALPS WITH PINCERS



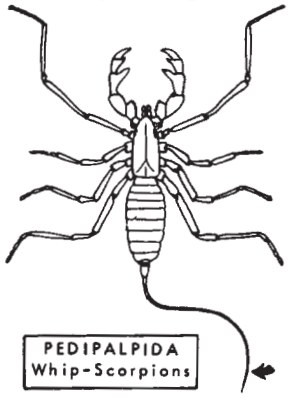
PSEUDOSCORPIONIDA
Pseudoscorpions

WITH STINGER



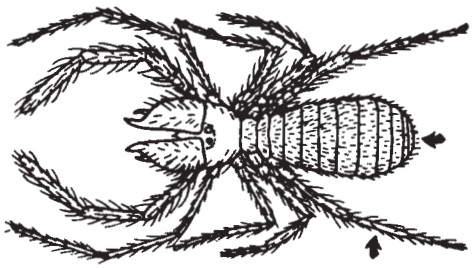
SCORPIONIDA
Scorpions

WITHOUT STINGER



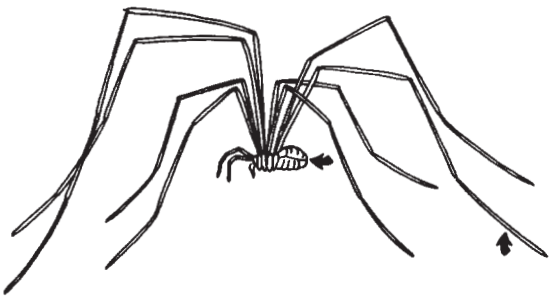
PEDIPALPIDA
Whip-Scorpions

LEGS SHORTER THAN BODY



SOLPUGIDA
Sun Spiders

LEGS MUCH LONGER THAN BODY



PHALANGIDA
Daddy Long-Leg Spiders

SPIDERS: KEY TO SOME IMPORTANT UNITED STATES SPECIES

Harold George Scott & Chester J. Stojanovich

1. Fangs projecting horizontally (Fig. 1 A). (abdomen without tergites; tarsus with claw tufts and 2 claws) ..... Dugesiella hentzi and others, TARANTULAS

   Fangs projecting vertically (Fig. 1 B)..... 2

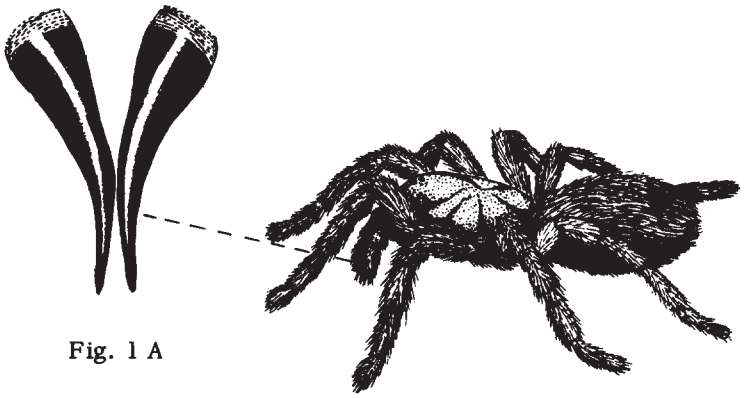


Fig. 1 A

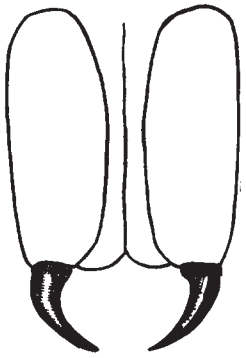


Fig. 1 B

2. Six eyes in 3 pairs; fiddle-shaped marking on cephalothorax (Fig. 2 A)..... Loxosceles reclusa..... BROWN RECLUSE SPIDERS

   Eight eyes (shiny black with red spots; usually with red hourglass on underside of abdomen) (Fig. 2 B). Latrodectus mactans..... BLACK WIDOW SPIDER

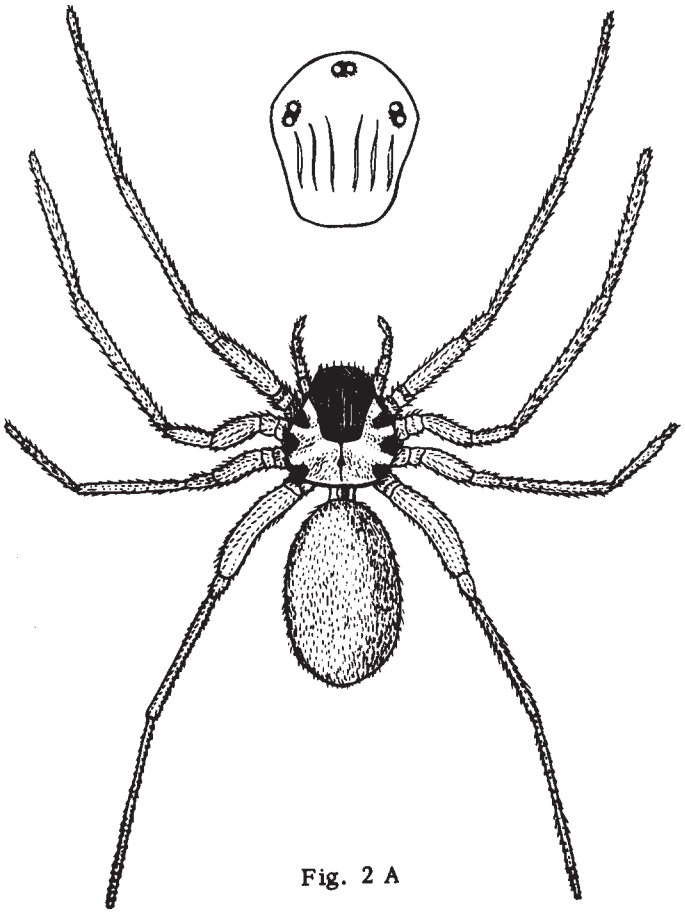


Fig. 2 A

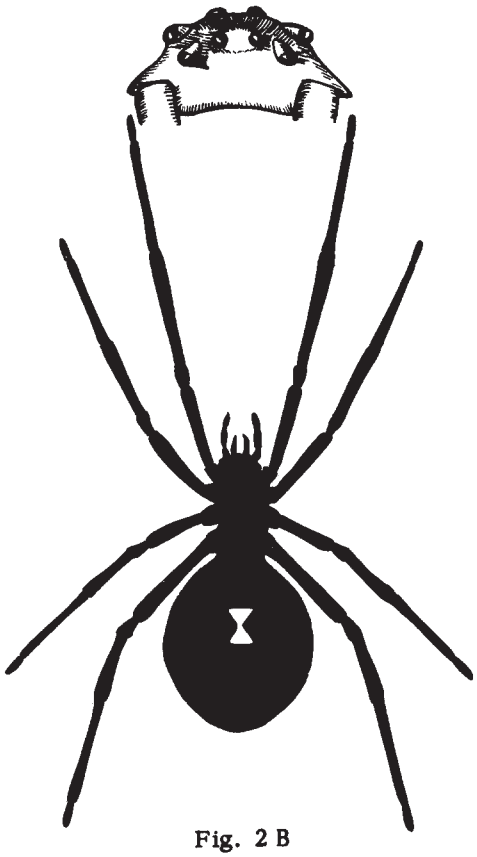
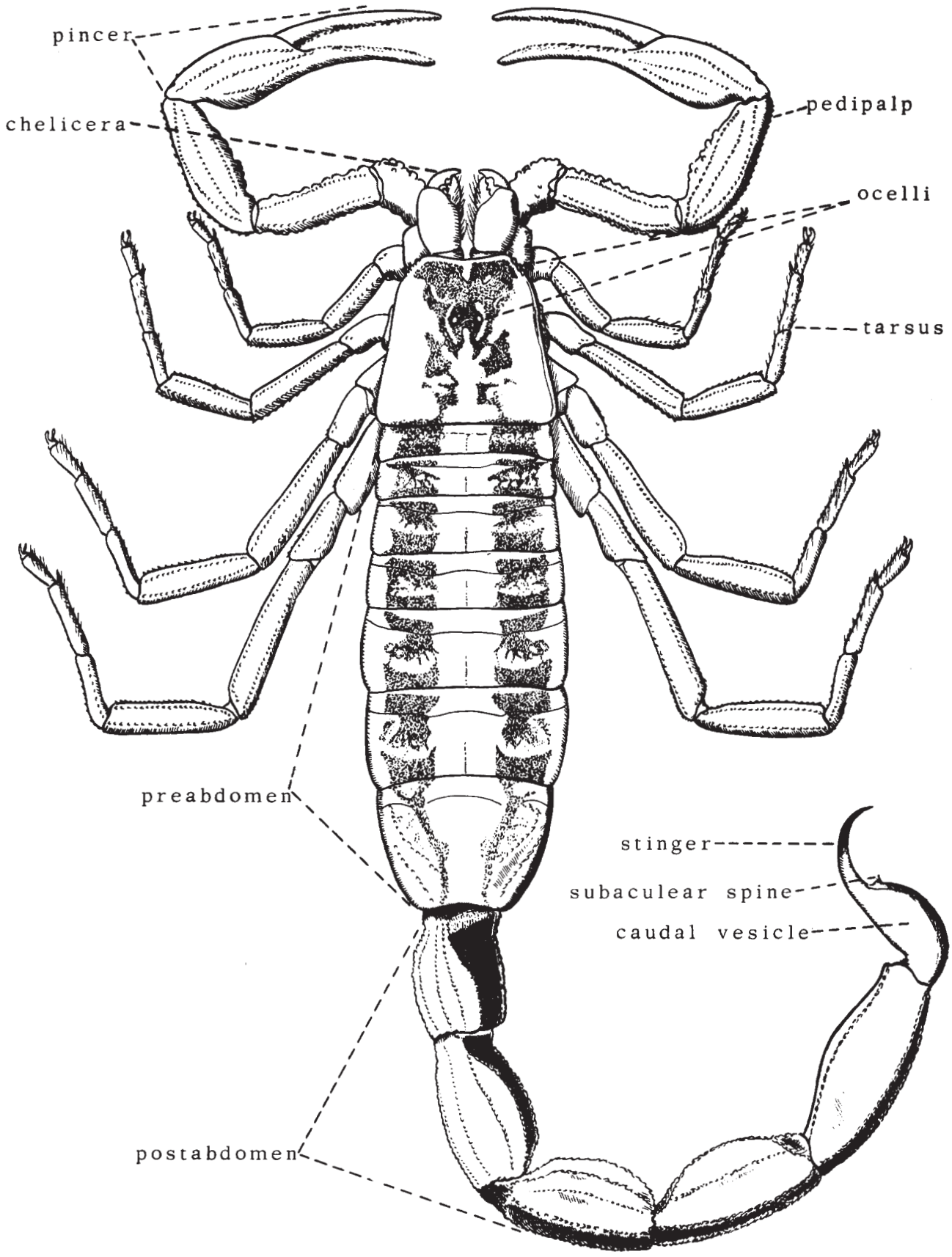


Fig. 2 B

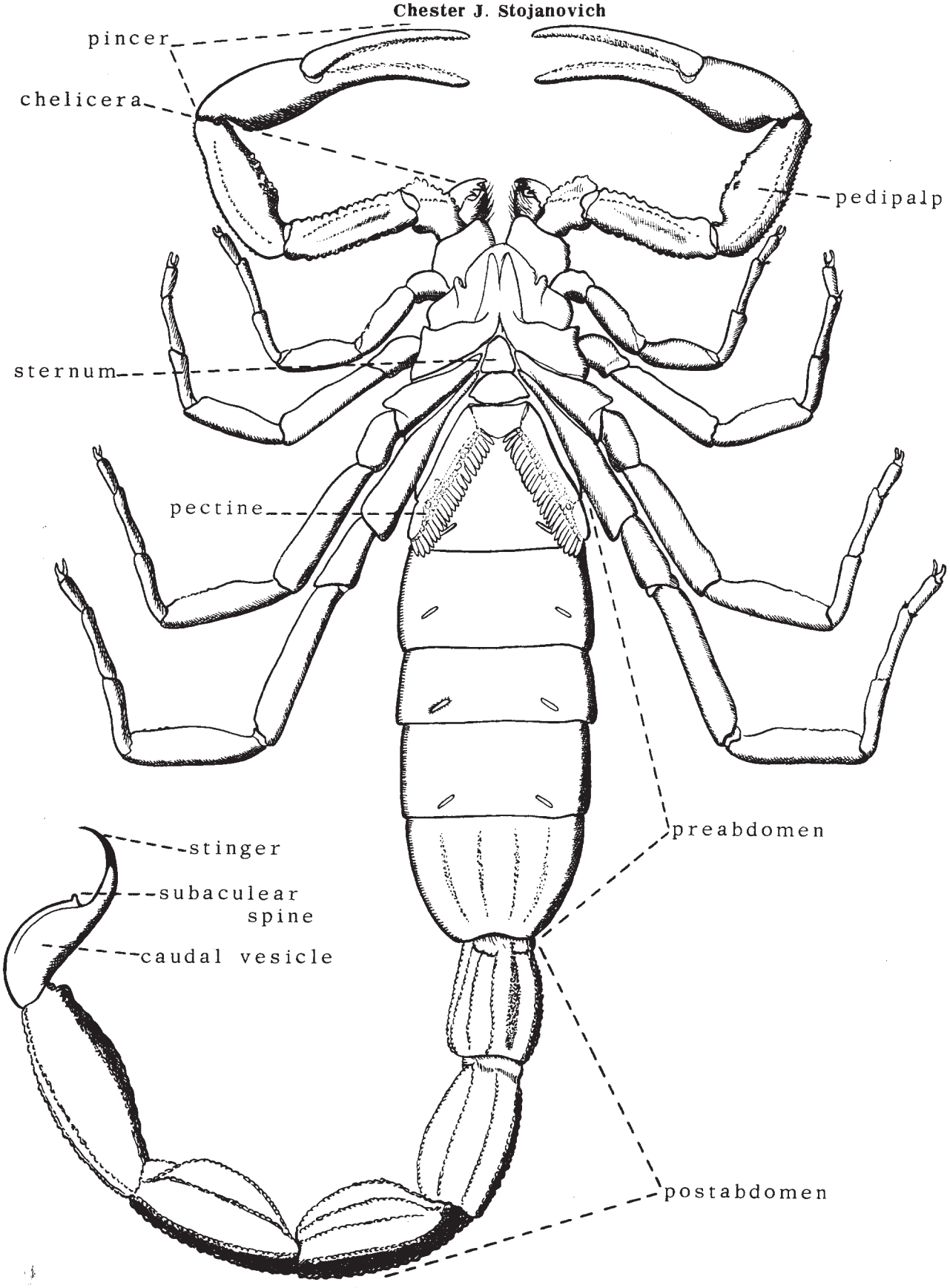
SCORPION DIAGRAM: DORSAL VIEW OF CENTRUROIDES VITTATUS

Chester J. Stojanovich



SCORPION DIAGRAM: VENTRAL VIEW OF CENTRUROIDES VITTATUS

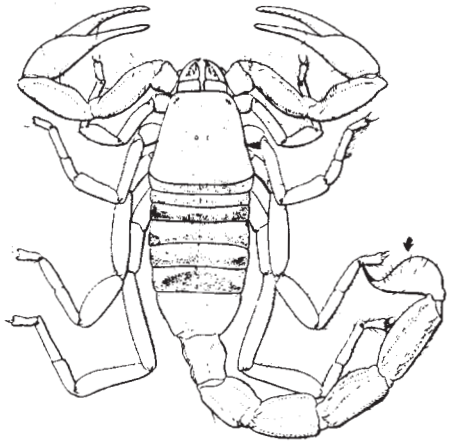
Chester J. Stojanovich



SCORPIONS: PICTORIAL KEY TO SOME COMMON UNITED STATES SPECIES

Chester J. Stojanovich and Harold George Scott

stinger with many setae



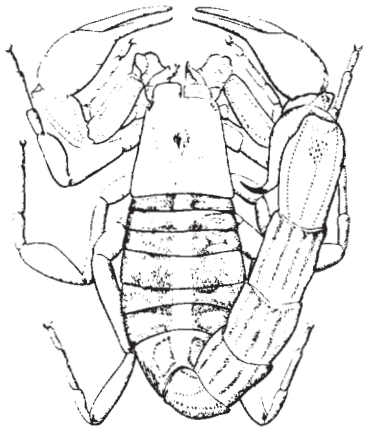
Hadrurus arizonensis
OLIVE HAIRY SCORPION

stinger with few setae

stinger without subaculear tooth

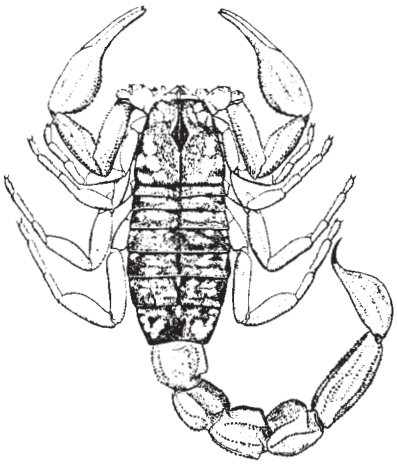
stinger with subaculear tooth

body striped dorsally



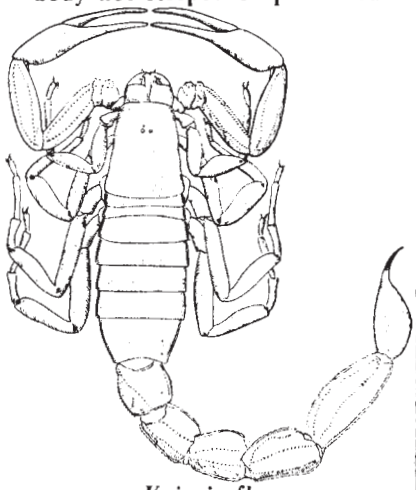
Vejovis spinigerus
STRIPE-TAIL DEVIL SCORPION

body patterned dorsally



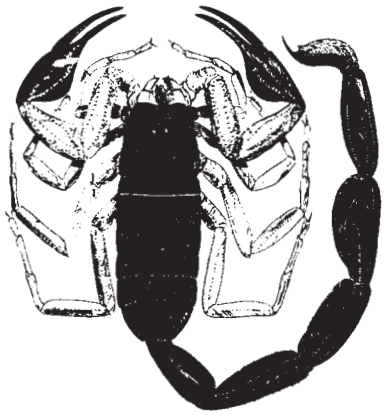
Vejovis carolinianus
SOUTHERN DEVIL SCORPION

body not striped or patterned



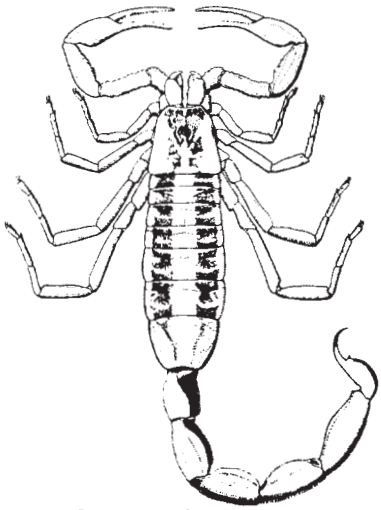
Vejovis flavus
SLENDER DEVIL SCORPION

body black dorsally



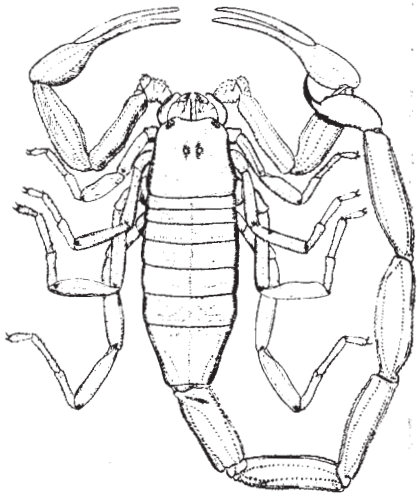
Centruroides gracilis
MARGARITE SCORPION

body striped dorsally



Centruroides vittatus
STRIPE-BACK SCORPION

body yellow dorsally



Centruroides sculpturatus
DEADLY SCULPTURED SCORPION

ACARINA: ILLUSTRATED KEY TO SOME COMMON ADULT FEMALE MITES AND ADULT TICKS

Harry D. Pratt and Chester J. Stojanovich

1. Last segment of first leg with a depression known as Haller's organ; most species with a toothed hypostome on capitulum; size usually over 4 mm. (Fig. 1 A). Ticks 21

   Last segment of first leg without such a depression known as Haller's organ; hypostome not toothed; most species less than 4 mm. long (Fig. 1 B). Mites.....2

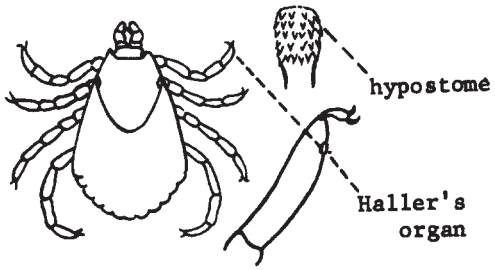


Fig. 1 A

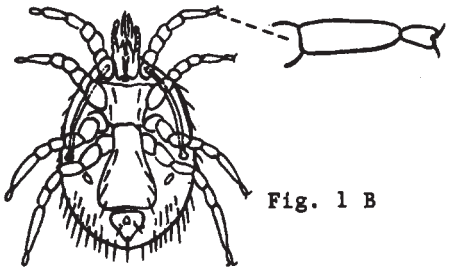


Fig. 1 B

2. Respiratory system with a spiracle on each side opening lateral to the bases of the 3rd or 4th pair of legs, frequently spiracles leading into slender tubes that extend forward laterally to the bases of the 1st or 2nd pairs of legs Fig. 2 A). Mesostigmatid Mites. 3

   Respiratory system without spiracles, or with spiracles opening near bases of the chelicerae (Fig. 2 B).....13

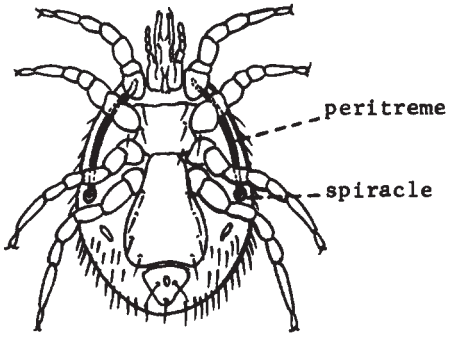


Fig. 2 A

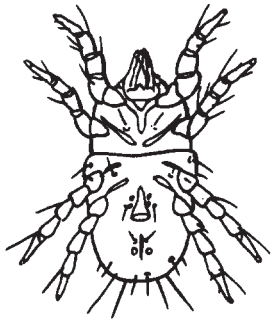


Fig. 2 B

3. Anus surrounded by a plate bearing only 3 setae, one on each side and one behind the anal opening; first tarsus bearing caruncle and claws at tip (Fig. 3 A).....4

   Anus surrounded by a plate bearing more than 3 setae; first tarsus without caruncle and claws (Fig. 3 B)..... Many species of Macrocheles

Fig. 3 A

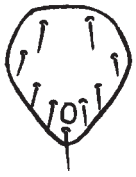


Fig. 3 B

4. Anal opening more than its length behind anterior margin of anal plate; chelicerae strongly narrowed apically, needle-like, movable chela absent or extremely small (Fig. 4 A). Genus Dermanyssus 5

   Anal opening less than its length or about its length, behind anterior margin of anal plate; chelicerae not narrowed apically and needle-like, shear-like, bearing conspicuous shear-like chelae at tip which may or may not bear teeth (Fig. 4 B)..... 7

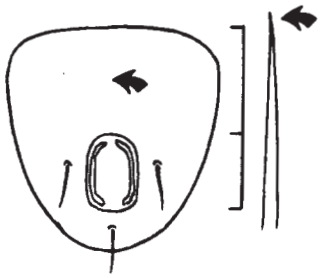


Fig. 4 A

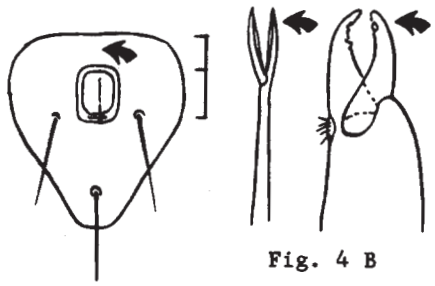


Fig. 4 B

5. Dorsal surface of body with a single plate (Fig. 5 A).....6

   Dorsal surface of body with two plates, a large anterior plate and a small posterior plate (Fig. 5 B). Dermanyssus sanguineus..... HOUSE MOUSE MITE

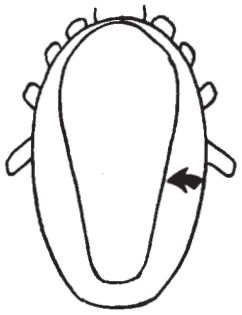


Fig. 5 A

Fig. 5 B

6. Peritreme tube somewhat sinuous and extending anteriorly to a point opposite coxa 2 (Fig. 6 A). Dermanyssus gallinae..... CHICKEN MITE

   Peritreme tube short, extending forward for a distance less than half the diameter of coxa 3 (Fig. 6 B). Dermanyssus americanus..... AMERICAN BIRD MITE

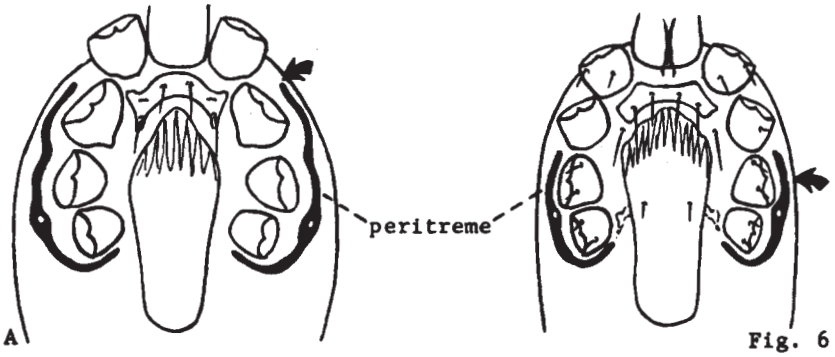


Fig. 6 A

Fig. 6 B

7. Dorsal plate not covering entire dorsal surface of mite; genito-ventral plate typically narrowed posteriorly behind 4th coxae; chelae on chelicerae without teeth or setae (Fig. 7 A). Genus Ornithonyssus 8

   Dorsal plate almost covering entire dorsal surface of mite; genito-ventral plate typically expanded posterior to 4th coxae; one or both chelae of chelicerae with teeth and a seta (Fig. 7 B). Family Laelaptidae 10

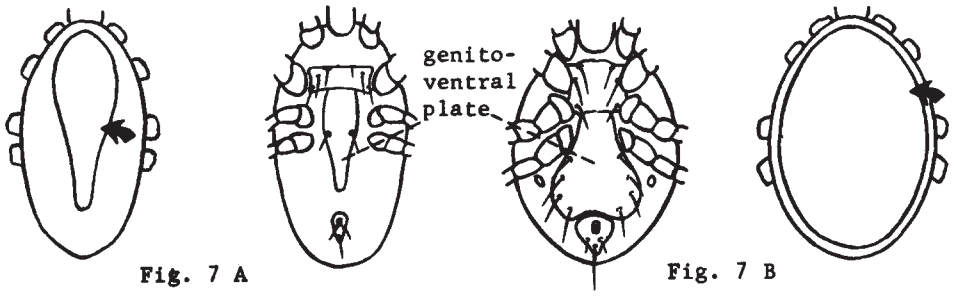


Fig. 7 A Fig. 7 B

8. Sternal plate with anterior and middle pairs of sternal setae on the plate, posterior pair usually just off the plate (Fig. 8 A). On Birds... Ornithonyssus sylviarum ..... NORTHERN FOWL MITE

   Sternal plate with the usual three pairs of setae on the plate (Fig. 8 B) 9

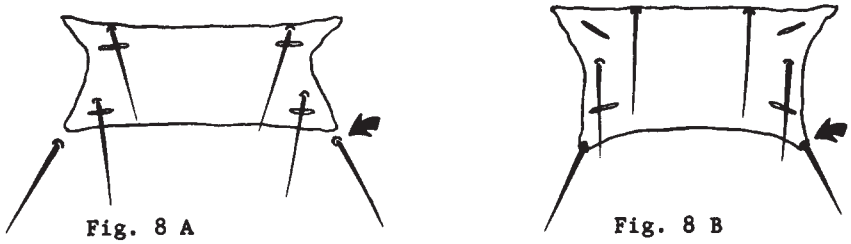


Fig. 8 A Fig. 8 B

9. Dorsal plate narrowed posteriorly; setae in middle dorsal row of plate longer than the distance between their bases (Fig. 9 A). Normally on mammals or man..... Ornithonyssus bacoti ..... TROPICAL RAT MITE

   Dorsal plate broader posteriorly; setae in middle dorsal row of plate much shorter than the distance between their bases (Fig. 9 B). Normally on birds..... Ornithonyssus bursa ..... TROPICAL BIRD MITE

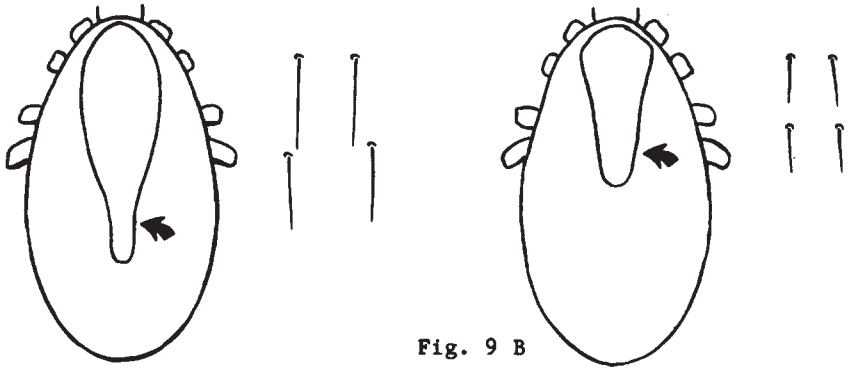


Fig. 9 A Fig. 9 B

10. Genito-ventral plate with many fine setae; anal plate transverse, wider than long (Fig. 10 A). On domestic rats and a wide variety of wild mammals..... Eulaelaps stabularis

Genito-ventral plate with one to four pairs of setae; anal plate longer than wide (Fig. 10 B).....11

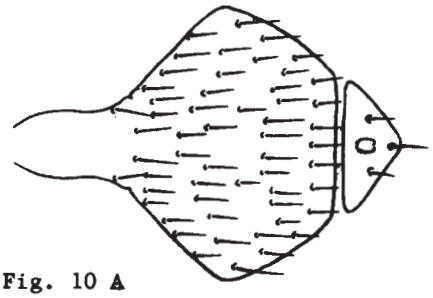


Fig. 10 A

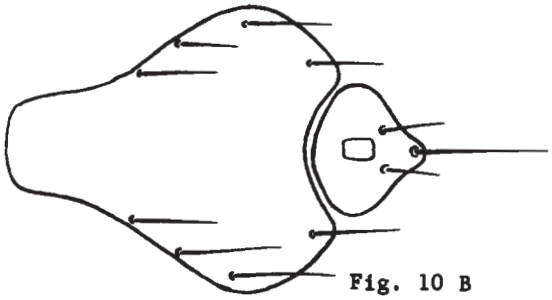


Fig. 10 B

11. Genito-ventral plate with only a single pair of setae (Fig. 11 A). On domestic rats and mice and a wide variety of mammals and birds.....
Haemolaelaps glasgowi.....COMMON RODENT MITE

Genito-ventral plate with four pairs of setae (Fig. 11 B). Normally on domestic rats..12

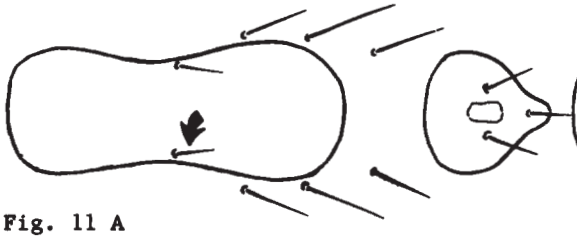


Fig. 11 A

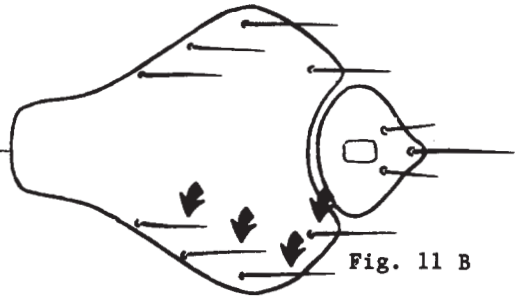


Fig. 11 B

12. Anal plate contiguous with the genito-ventral plate, anterior margin rounded and fitting into a strong concavity in genito-vental plate; larger species averaging 1-2 mm. long. (Fig. 12 A). Echinolaelaps echidninus.....SPINY RAT MITE

Anal plate somewhat separated from genito-ventral plat, anterior margin almost straight with definite anterior-lateral corners; small species averaging 0.5-1 mm long (Fig. 12 B). Laelaps nuttalli.....DOMESTIC RAT MITE

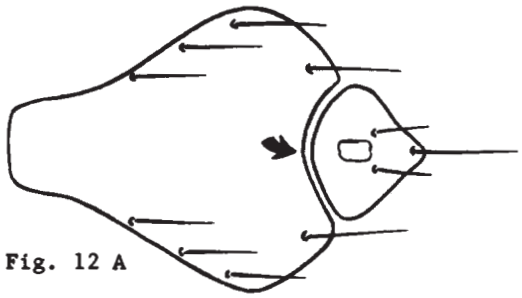


Fig. 12 A

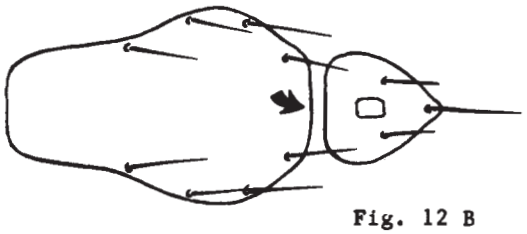


Fig. 12 B

13. First pair of legs very long, much longer than other three pairs; anterior margin of body with four distinct flattened scales and somewhat flattened scales on other dorsal surfaces of body (Fig. 13 A). Plant feeders which invade buildings but do not bite man. Bryobia praetiosa.....CLOVER MITE

First pair of legs not markedly longer than the other three pairs of legs; no flattened scales on body (Fig. 13 B).....14

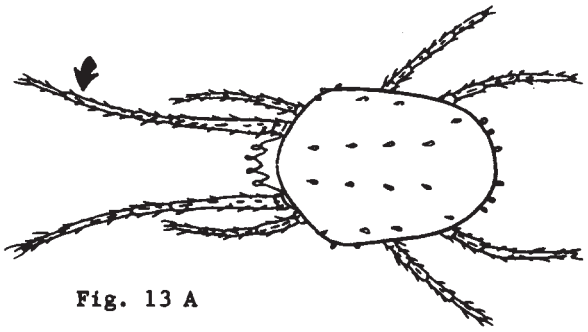


Fig. 13 A

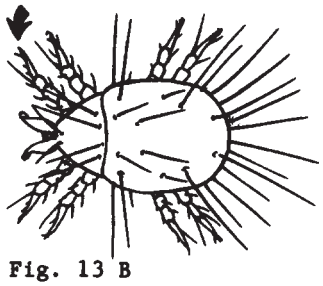


Fig. 13 B

14. Surface of body without fine parallel lines or folds; tarsi without stalked suckers (Fig. 14 A). Adults never true parasites (Cheese or Flour mites).....15

Surface of body with fine parallel lines or folds; tarsi often provided with stalked suckers (Fig. 14 B). Scabies or mange mites parasitic in all stages, chiefly on vertebrates 16

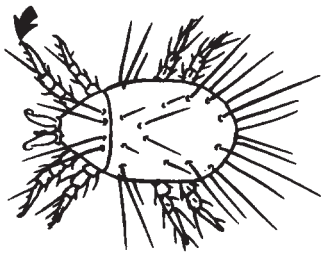


Fig. 14 A

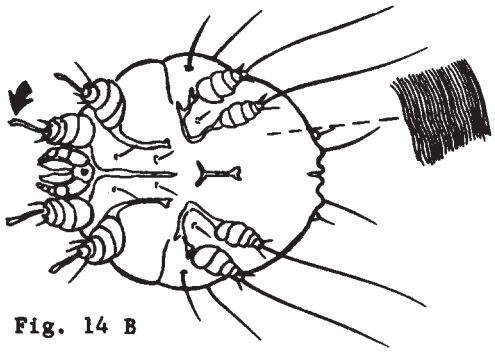


Fig. 14 B

15. Tarsi tapering markedly to tip (Fig. 15 A).....Glycyphagus prunorum

Tarsi not tapering markedly to tip (Fig. 15 B). Many cheese and flour mites which are difficult to separate except with very specialized literature and a reference collection. ..... Genus Tyrophagus, Genus Caloglyphus, Etc.

Fig. 15 A

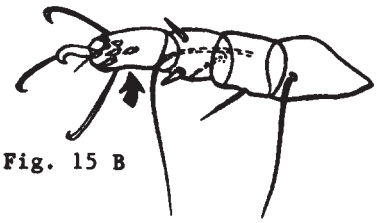


Fig. 15 B

16. Body elongate, somewhat cigar-shaped and prolonged behind; the abdomen somewhat ringed; legs very short, apparently three-segmented; tiny species less than 1 mm. (Fig. 16 A). In hair follicles or sebaceous glands of mammals..... Demodex folliculorum.....PORE OR FOLLICLE MITE

Body not prolonged behind and cigar-shaped (Fig. 16 B). Occasionally female grain itch somewhat balloon-shaped; larger species not found in hair follicle or sebaceous glands of mammals..... 17

Fig. 16 A

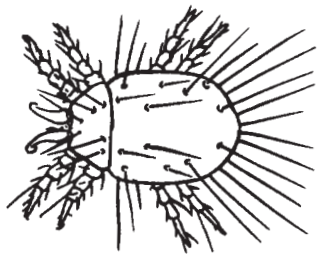


Fig. 16 B

17. A club-shaped or clavate hair between bases of first and second pairs of legs, body divided into cephalothorax and abdomen, the latter often enormously enlarged (Fig. 17 A) Pyemotes ventricosus formerly Pediculoides ventricosus.....STRAW ITCH MITE

Setae on cephalothorax normal, no club-shaped or clavate hair between bases of first and second pairs of legs; no distinct division into cephalothorax and abdomen (Fig. 17 B) 18

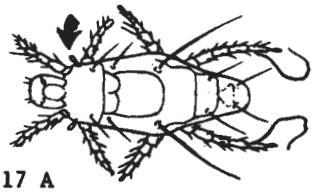


Fig. 17 A

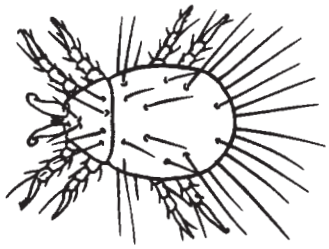


Fig. 17 B

18. Legs short and stubby (Fig. 18 A).....20

Legs longer and more slender (Fig. 18 B).....19

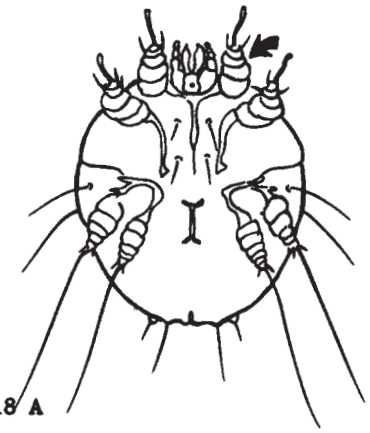


Fig. 18 A

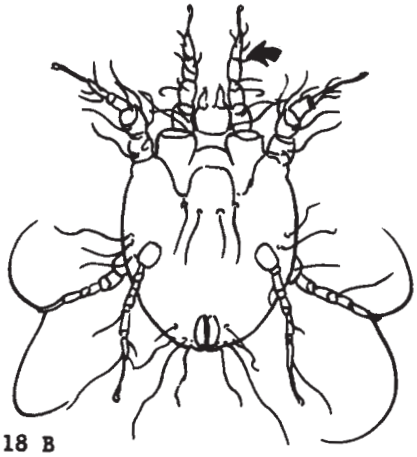


Fig. 18 B

19. Suckers of tarsi with segmented pedicels (Fig. 19 A). Non-burrowing itch mites on mammals in the genus Psoroptes, a common species causing scabs and crusts in the ears of rabbits is the Psoroptes cuniculi ..... RABBIT EAR MITE

    Suckers of tarsi without segmented pedicels (Fig. 19 B)..... ..... Dermatophagoides scheremetewskyi

Fig. 19 A

Fig. 19 B

20. Anal opening on the dorsal surface of the body; dorsal surface of the body with only short, sharp setae (Fig. 20 A).....Notoedres

    Anal opening at tip of body or slightly on ventral side; dorsal surface of body with pointed scales and blunt stout spines (Fig. 20 B). Sarcoptes scabiei..... ..... SCABIES OR MANGE MITE

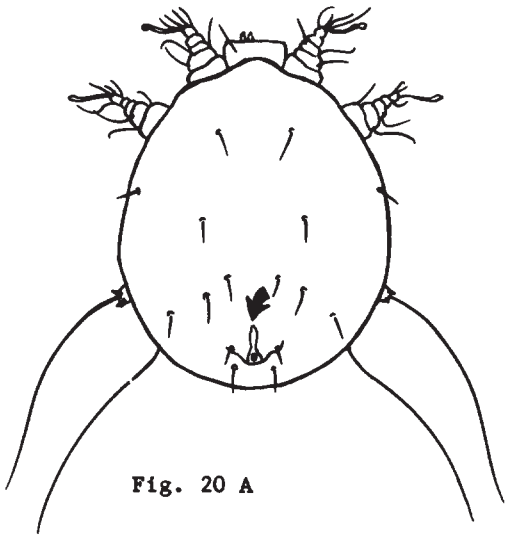


Fig. 20 A

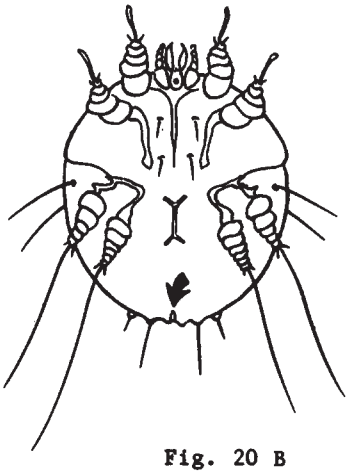


Fig. 20 B

21. Capitulum at anterior end of body, visible from above and below; scutum or dorsal shield present, short in female, long in male (Fig. 21 A & B). Family Ixodidae..HARD TICKS...22

Capitulum on under side of body, hidden by body when seen from above though palpi may project anteriorly; scutum absent (Fig. 21 C & D). Family Argasidae.....SOFT TICKS....31

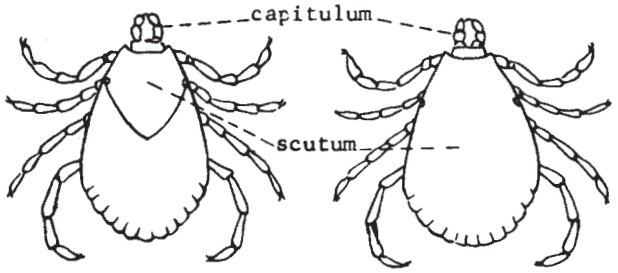


Fig. 21 A

Fig. 21 B

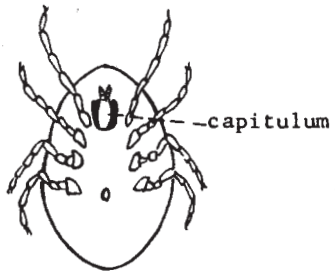


Fig. 21 C

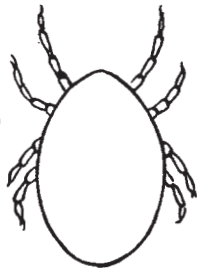


Fig. 21 D

FAMILY IXODIDAE - HARD TICKS

22. Ornate ticks, with some white markings on dorsal shield (Fig. 22 A).....23

Inornate ticks, without white markings on dorsal shield (Fig. 22 B).....28

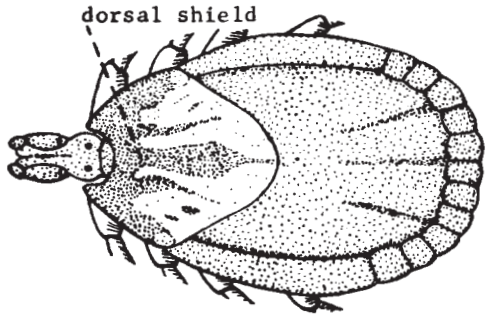


Fig. 2 A

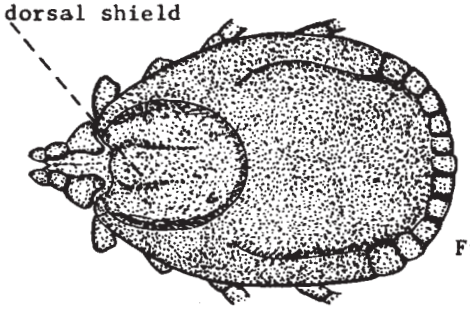


Fig. 2 B

23. Palpi long, much longer than basis capituli; second segment of palpus about twice as long as wide (Fig. 23A). Genus Amblyomma.....24

Palpi short, about as long as basis capituli; second segment of palpus about as long as wide (Fig. 23 B). Genus Dermacentor.....25

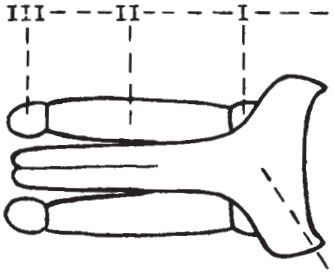


Fig. 23A

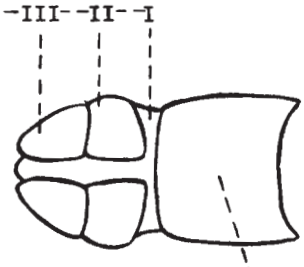


Fig. 23 B

24. Next to last segment of second, third, and fourth pairs of legs without paired terminal spurs; female with a distinct pale marking near posterior end of dorsal shield (Fig. 24 A). Amblyomma americanum.....LONE STAR TICK

Next to last segment of second, third, and fourth pairs of legs with long, paired terminal spurs; female with more diffuse markings on dorsal shield (Fig. 24 B)..... Amblyomma maculatum.....GULF COAST TICK

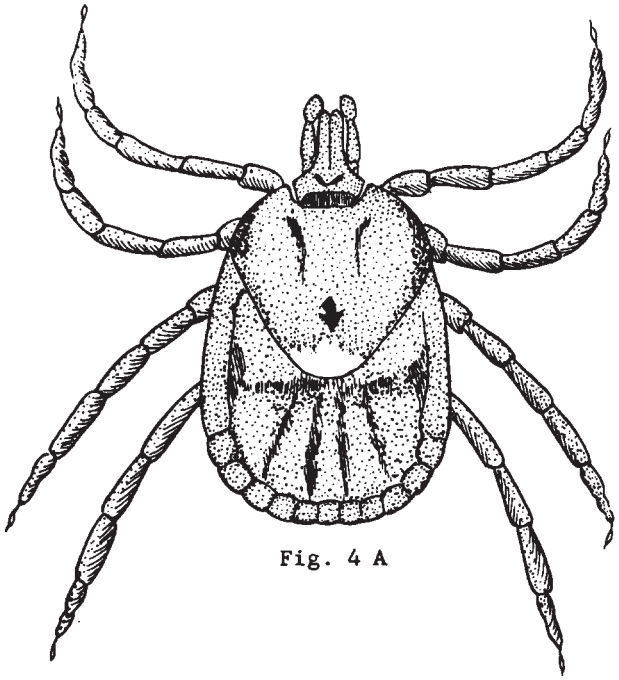


Fig. 4 A

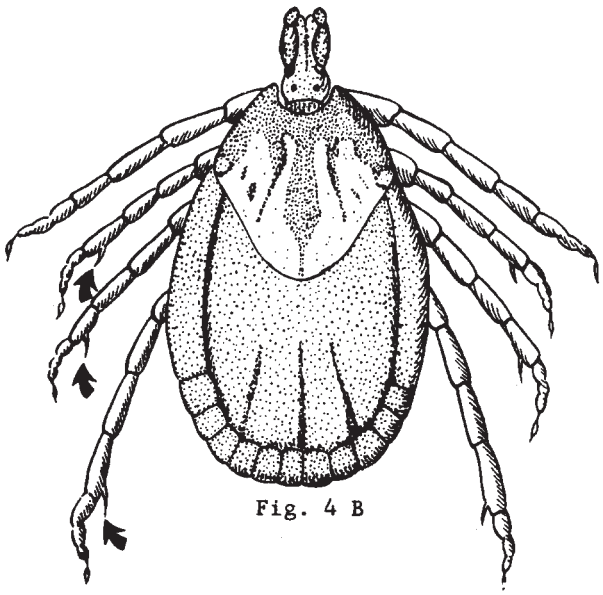


Fig. 4 B

25. Spiracular plate without dorsal prolongation (Fig. 25 A). Dermacentor albipictus..... .....WINTER TICK

Spiracular plate with dorsal prolongation (Fig. 25 B).....26

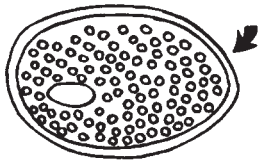


Fig. 25 A

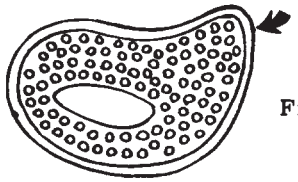


Fig. 25 B

26. Basis capituli with long cornua (Fig. 26 A). Dermacentor occidentalis.PACIFIC COAST TICK

Basis capituli with short cornua (Fig. 26 B)..... 27

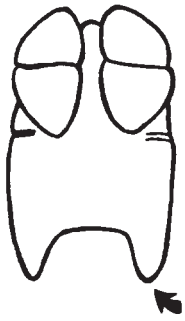


Fig. 26 A

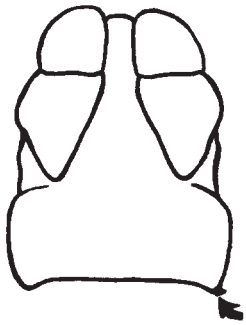


Fig. 26 B

27. Goblets of spiracular plate large and less numerous; Rocky Mountain species. (Fig.27 A) Dermacentor andersoni.....ROCKY MOUNTAIN WOOD TICK

Goblets of spiracular plate very small and numerous; east of the Rocky Mountains and on the Pacific coast. (Fig. 27 B). Dermacentor variabilis.....AMERICAN DOG TICK

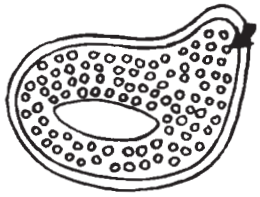


Fig. 27 A

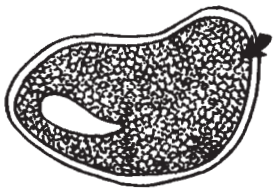


Fig. 27 B

28. Sides of basis capituli laterally produced; distinctly angulate; eyes present on sides of scutum (Fig.28 A & B).....29

Sides of basis capituli not laterally produced; more or less parallel (Fig.28 C); eyes absent.....30

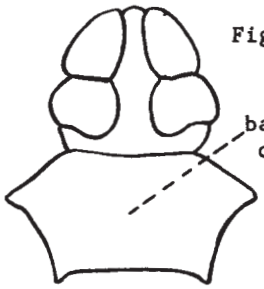


Fig. 28 A

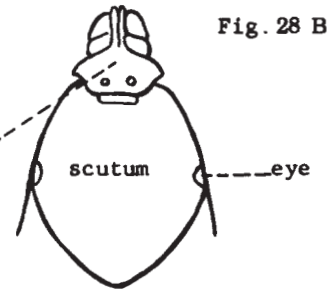


Fig. 28 B

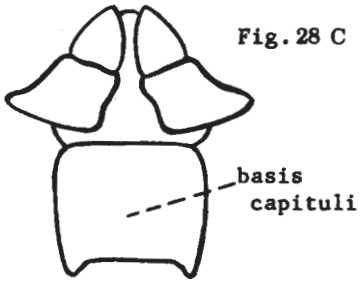


Fig. 28 C

29. Fore coxa deeply cleft; festoons present; easily seen in unengorged specimens; anal groove distinct in unengorged specimens (Fig.29 A). (principally on dogs or in houses) Rhipicephalus sanguineus.....BROWN DOG TICK

Fore coxa not deeply cleft; festoons absent; anal groove indistinct (Fig. 29 B). (On cattle and deer). Boophilus annulatus.....CATTLE TICK

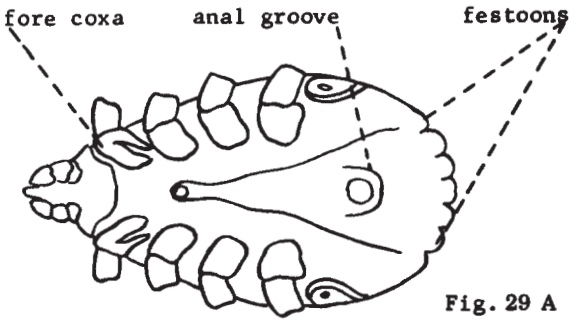


Fig. 29 A

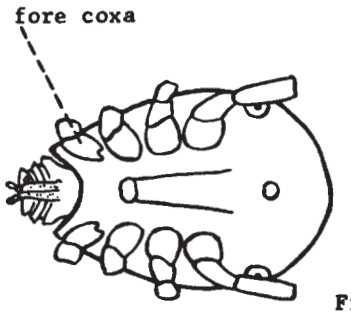


Fig. 29 B

30. Second segment of palpus laterally produced; anal groove behind anus, not attaining posterior margins of body (Fig. 30 A & B). Haemaphysalis leporispalustris.....RABBIT TICK

Second segment of palpus not laterally produced; anal groove extending as an inverted U from in front of anus to posterior margins of body (Fig. 30 C).....Genus Ixodes

Fig. 30 A

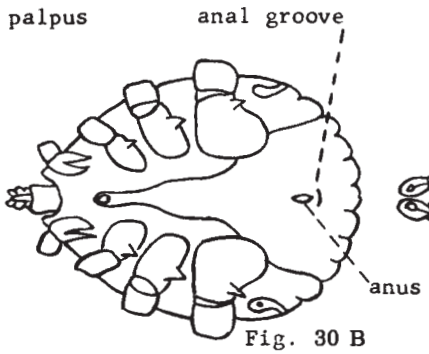


Fig. 30 B

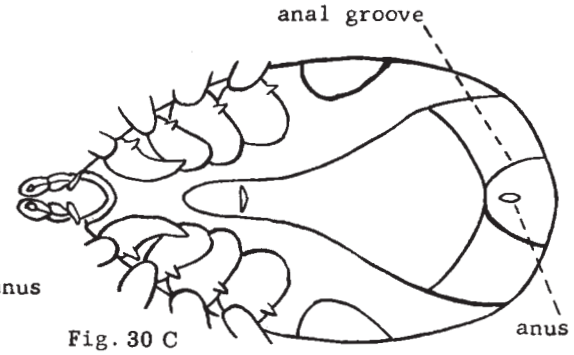


Fig. 30 C

FAMILY ARGASIDAE - SOFT TICKS

31. Margin of body with a definite sutural line separating dorsal and ventral surfaces; dorsal surface with conspicuous "discs" arranged somewhat in radiating lines (Fig. 31 A) Argas persicus.....FOWL TICK

Margin of body lacking definite sutural line, thick and rounded (Fig. 31 B).....32

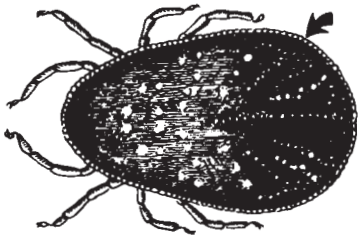


Fig. 31 A

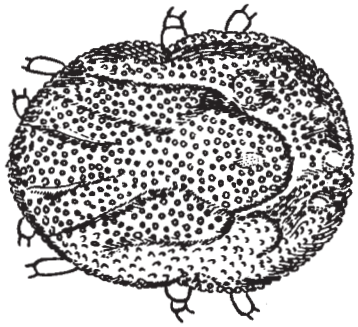


Fig 31 B

32. Hypostome with well-developed teeth (Fig. 32 A); integument not spinose..... Genus Ornithodoros.....33

Hypostome of adult vestigial or without effective teeth; integument of nymph (stage usually seen) spinose (Fig. 32 B). Usually on cattle and horses..... Otobius megnini.....SPINOSE EAR TICK

Fig. 32 A

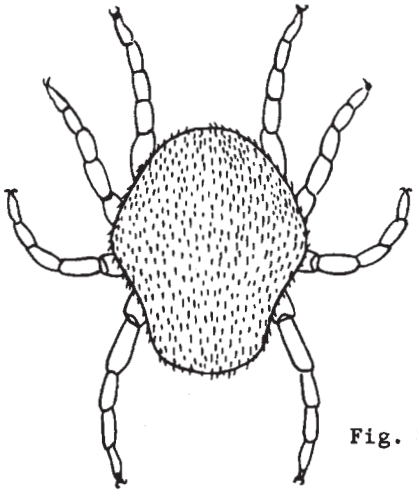


Fig. 32 B

33. Strong dorsal humps absent on all tarsi (Fig. 33 A).....34

Strong dorsal humps present on tarsi of first, second and third legs (Fig. 33 B).....35

Fig. 33

Fig. 33 B

34. Cheeks absent (Fig. 34 A). Ornithodoros hermsi.....HERMS' RELAPSING FEVER TICK

Cheeks present (Fig. 34 B).....Ornithodoros talaje

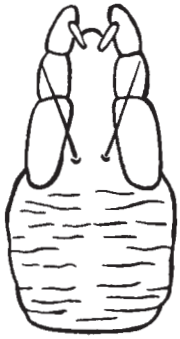


Fig. 34 A

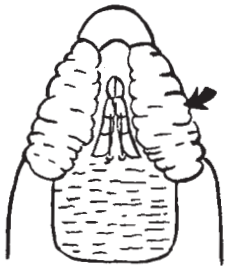


Fig. 34 B

35. Eyes present on sides of body above second and third coxae (Fig. 35 A); tarsus of fourth leg with a prominent, pointed subterminal spur (Fig. 35 B)..... Ornithodoros coriaceus.....PAJAROELLO TICK

Eyes absent; tarsus of fourth leg without such subterminal spur (Fig. 35 C).....15

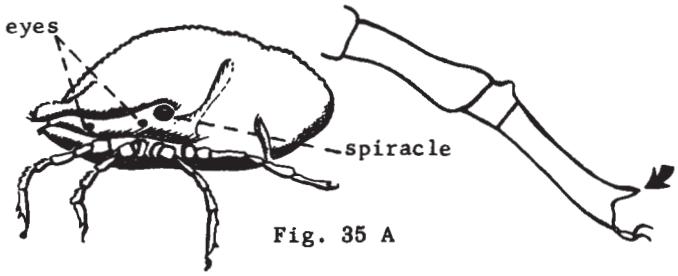


Fig. 35 A

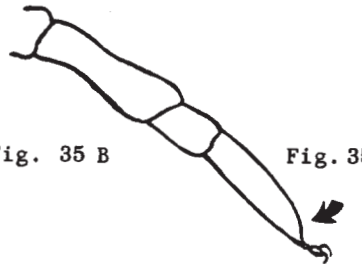


Fig. 35 B

Fig. 35 C

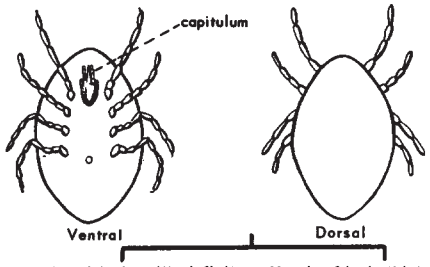
36. Mammillae large, relatively few and not crowded; in mid-dorsal region about 10 per linear mm.; hypostome over 1/2 mm. long. Southeastern United States and Mexico north to Kansas and Florida. Ornithodoros turicata.....RELAPSING FEVER TICK

Mammillae small, crowded, and numerous; in mid-dorsal region about 18 per linear mm.; hypostome less than 1/2 mm. long. Pacific coast and Rocky Mountain states..... Ornithodoros parkeri.....PARKER'S RELAPSING FEVER TICK

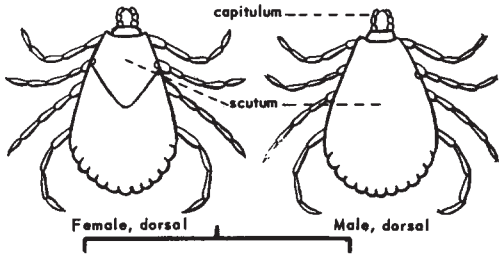
TICKS: KEY TO GENERA IN UNITED STATES

Harry D. Pratt

Capitulum inferior; scutum absent
FAMILY ARGASIDAE – SOFT TICKS



Capitulum anterior; scutum present
FAMILY IXODIDAE – HARD TICKS



Margin of body with definite sutural line.

Margin of body thick, rounded, without definite sutural line.

ARGAS

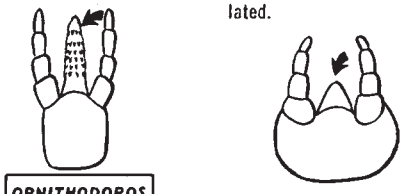
Anal groove either behind anus, indistinct, or absent.

Anal groove in front of anus.

IXODES

Hypostome with well developed teeth, Integument mamillated.

Hypostome vestigial or without effective teeth. Integument tuberculated or granulated.



ORNITHODOROS

Second segment of palpi not laterally produced.

Second segment of palpi laterally produced.

HAEMAPHYSALIS

Integument of adult granular, of nymph (stage usually seen) very spinose. Hypostome of adult vestigial. Usually on cattle, horses, or rabbits.

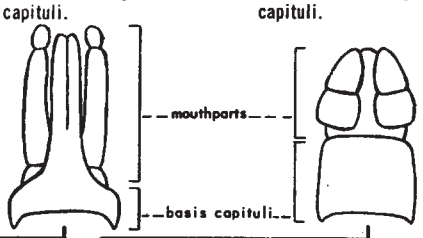
OTOBIUS

Integument of adult and nymph tuberculated. Hypostome of adult scoop-like. Associated with bats.

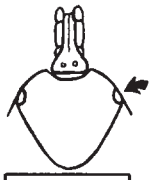
ANTRICOLA

Mouthparts much longer than basis capituli.

Mouthparts as long as basis capituli.



Scutum with eyes

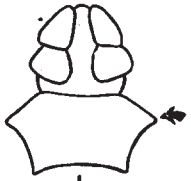


AMBLYOMMA

Scutum without eyes

APONOMMA

Basis capituli laterally produced.



Basis capituli not laterally produced.

Palpi ridged dorsally and laterally.

Festoons absent.

BOOPHILUS

Palpi not ridged.

Festoons present.

RHIPICEPHALUS

Festoons eleven

DERMACENTOR

Festoons seven

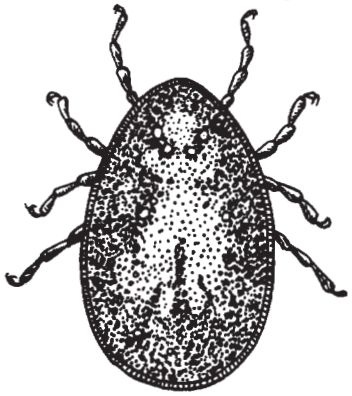
ANOCENTOR
=(OTOCENTOR)

TICKS AND MITES: KEY TO SPECIES COMMONLY INFESTING PIGEONS

Harold George Scott & Chester J. Stojanovich

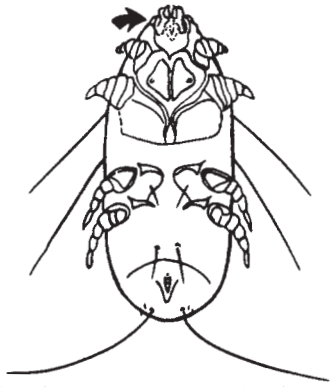
mouthparts ventral

adult 6-9 mm. long



Argas reflexus
PIGEON TICK

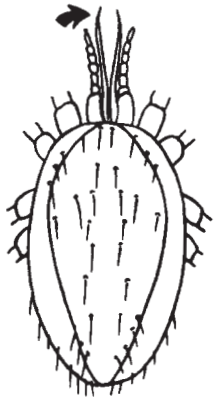
adult 0.25 mm. long



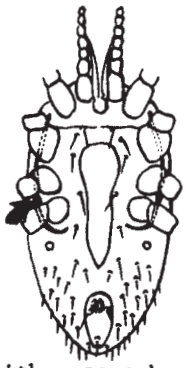
Laminosioptes cysticola
FOWL CYST MITE

mouthparts anterior

under 0.6 mm. long



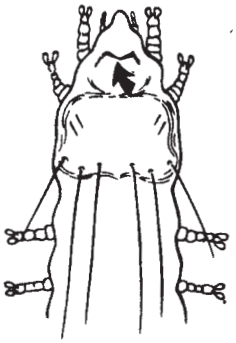
with lateral spiracles



Ornithonyssus bursa
TROPICAL FOWL MITE or
Dermanyssus gallinae
CHICKEN MITE

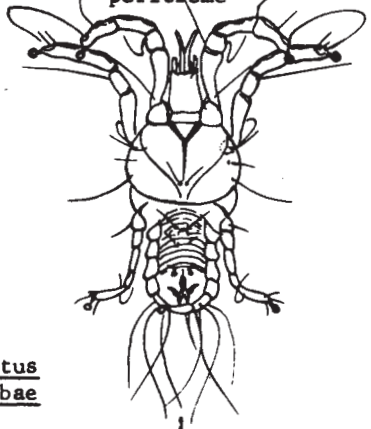
without lateral spiracles

with M-shaped peritreme

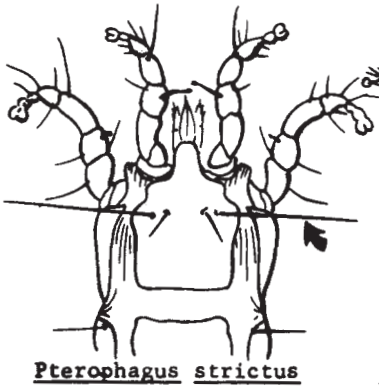


Syringophilus bipectinatus
or Syringophilus columbae
PIGEON QUILL MITES

without M-shaped peritreme



with horizontal setae

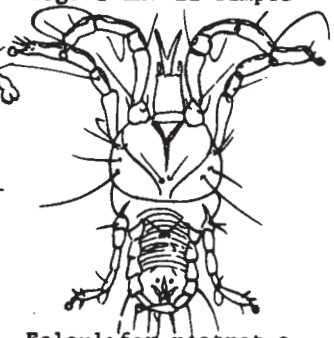


Pterophagus strictus

BODY-FEATHER MITE

without horizontal setae

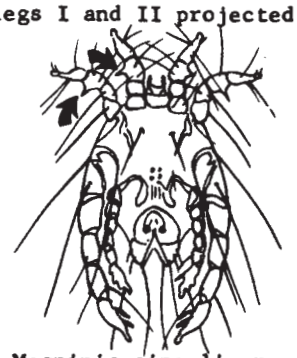
legs I and II simple



Falculifer rostratus

WING-FEATHER MITE

legs I and II projected



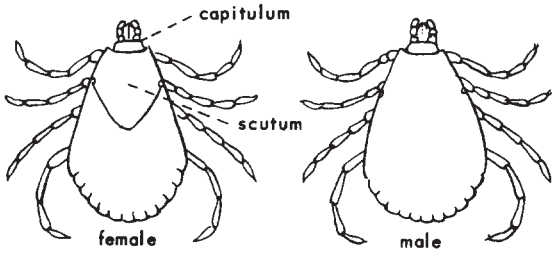
Megninia gingylimerra
or Megninia cubitalis
CONTOUR-FEATHER MITES

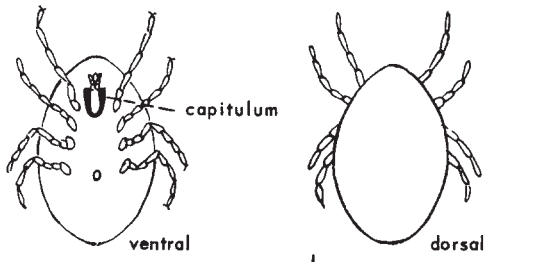
TICKS: PICTORIAL KEY TO SOME COMMON SPECIES

Harry D. Pratt

capitulum visible from above, scutum present, family Ixodidae, HARD TICKS

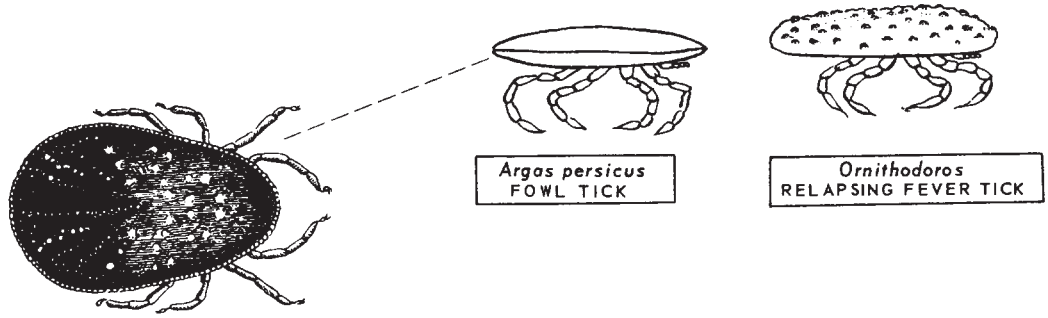
capitulum not visible from above, scutum absent, family Argasidae. SOFT TICKS





sutural line present

sutural line absent

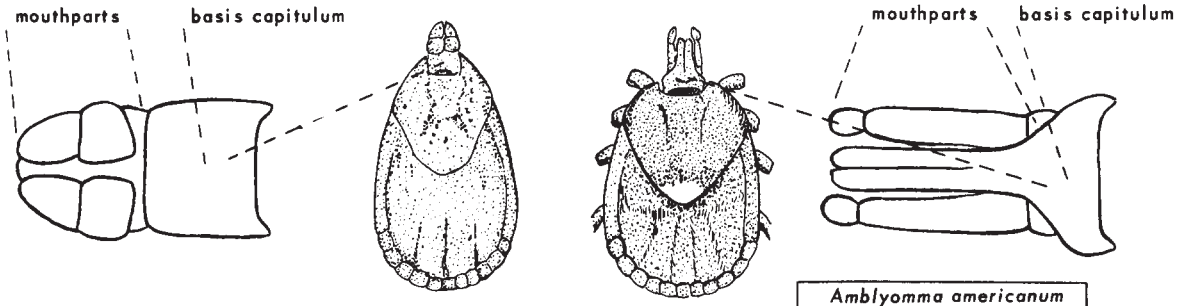


Argas persicus
FOWL TICK

Ornithodoros
RELAPSING FEVER TICK

mouthparts short, about as long as basis capituli

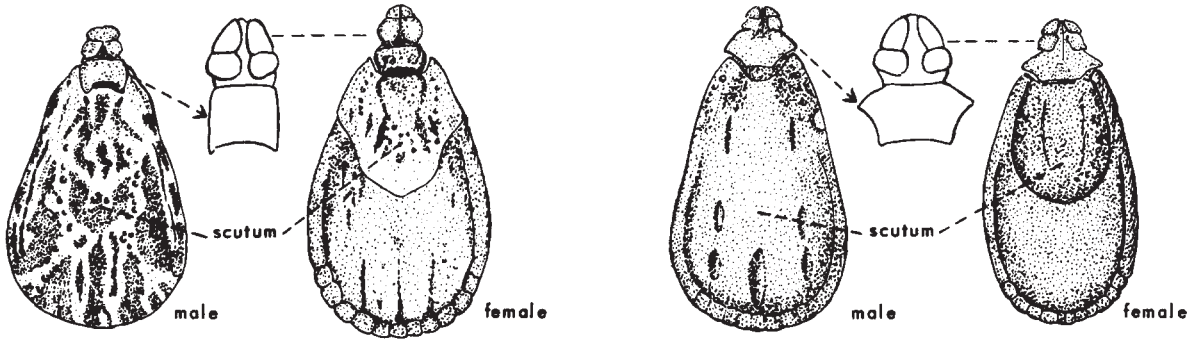
mouthparts much longer than basis capituli white spot on tip of scutum of female



Amblyomma americanum
LONE STAR TICK

scutum with white markings; basis capituli with parallel sides

scutum without white markings; basis capituli produced laterally to form an angle

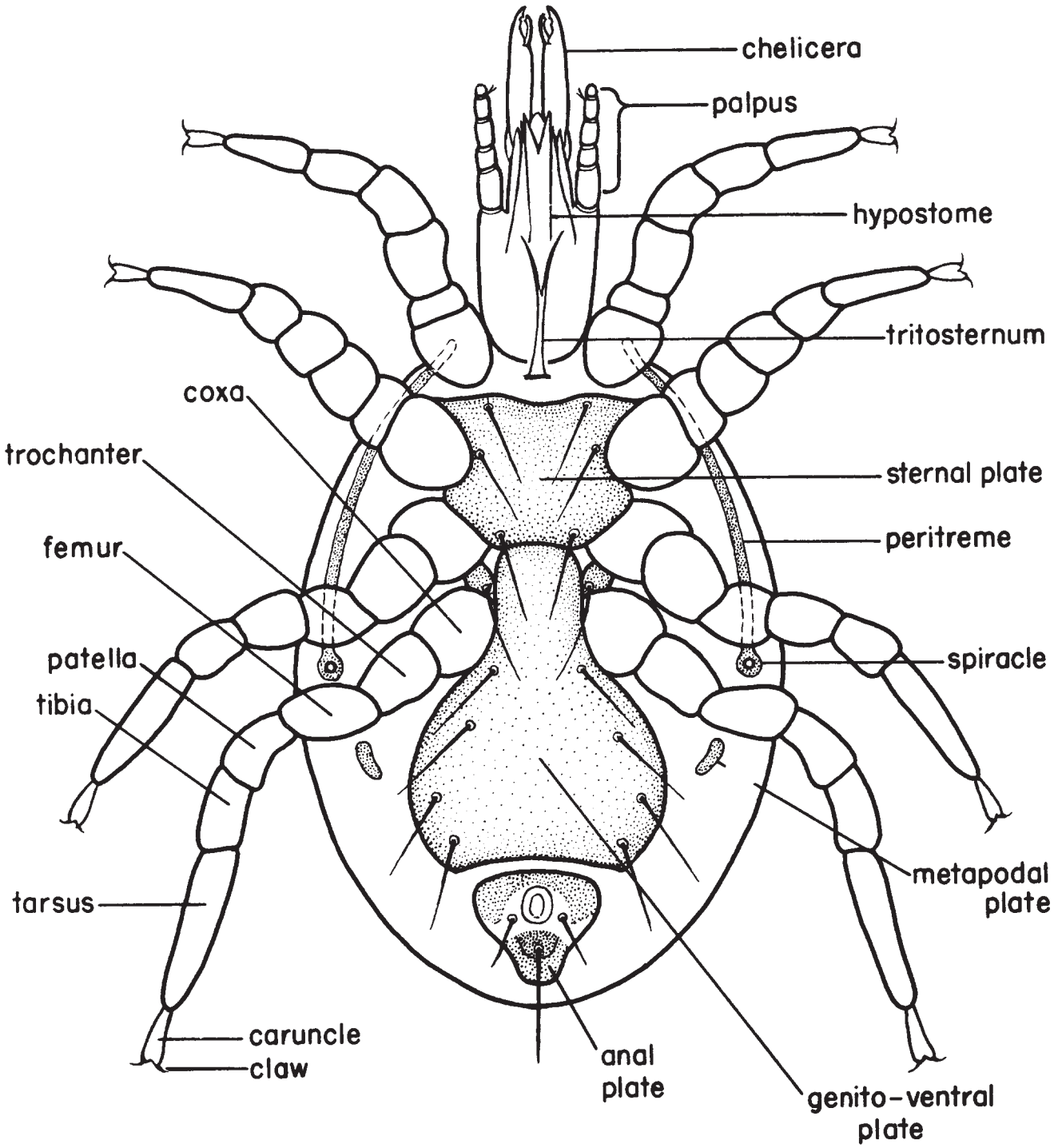


Dermacentor variabilis and *D. andersoni*
AMERICAN DOG TICK AND WOOD TICK

Rhipicephalus sanguineus
BROWN DOG TICK

MITE DIAGRAM WITH STRUCTURES LABELED

Harry D. Pratt



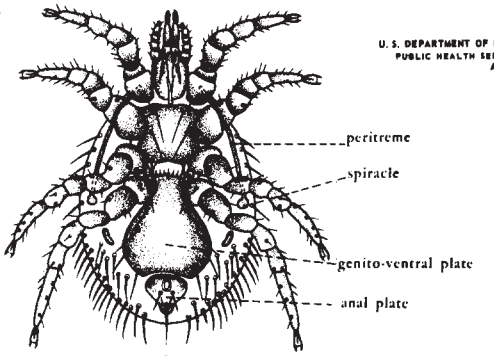
MITES: PICTORIAL KEY TO SOME COMMON SPECIES OF PUBLIC HEALTH IMPORTANCE

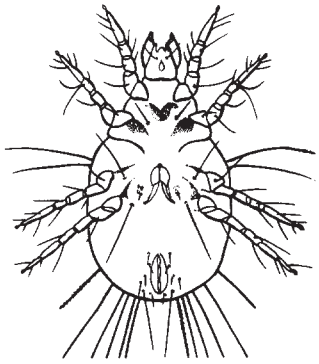
Harold George Scott and Chester J. Stojanovich

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE, Communicable Disease Center
Atlanta, Georgia
1963

with lateral spiracles and peritreme

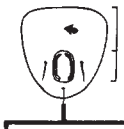
without lateral spiracles or peritreme





anal opening at rear of anal plate

anal opening at front of anal plate

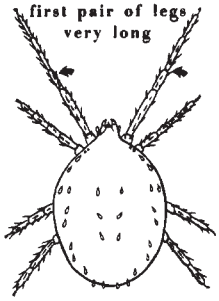


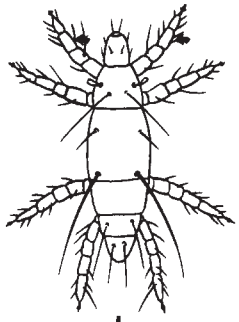
dorsal shield undivided

dorsal shield divided

first pair of legs very long

first pair of legs short

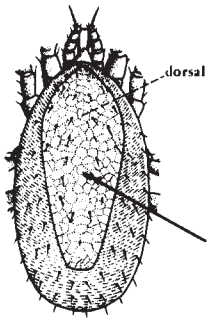


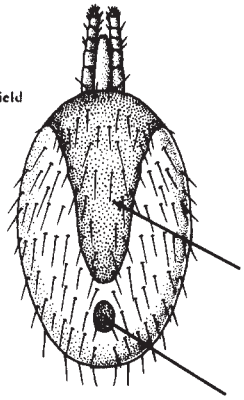


CLOVER MITE
Bryobia praetiosa

with club between legs I & II

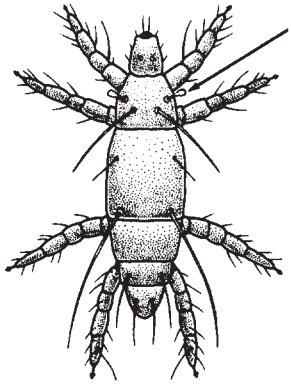
without club between legs I & II

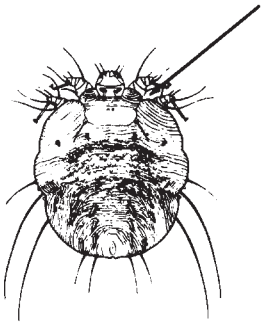




CHICKEN MITE
Dermanyssus gallinae

HOUSE MOUSE MITE
Dermanyssus sanguineus





STRAW ITCH MITE
Pyemotes ventricosus

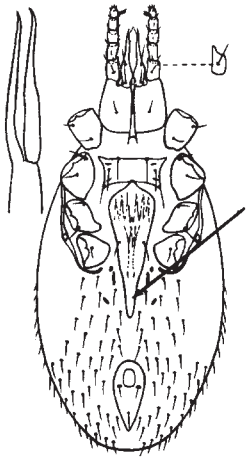
genito-ventral plate narrowed posteriorly

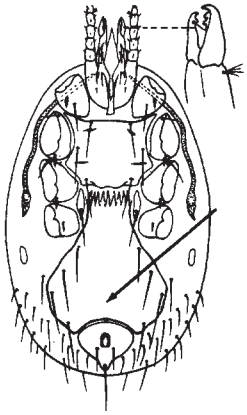
genito-ventral plate expanded posteriorly

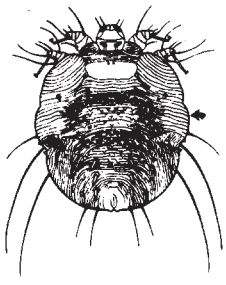
body oval with fine lines

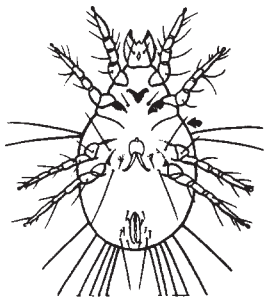
body strongly elongate abdomen with fine lines

body somewhat elongate abdomen without lines









TROPICAL RAT MITE
Ornithonyssus bacoti

SPINY RAT MITE
Echinolaelaps echidninus

ITCH MITE
Sarcoptes scabiei

FOLLICLE MITE
Demodex folliculorum

A CHEESE MITE
Tyrophagus lintneri

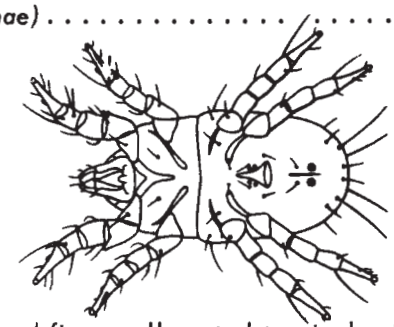
MITES: KEY TO SOME SPECIES COMMONLY INFESTING HOUSEHOLDS AND STORED FOOD

Harold George Scott

1. With club-like hair between bases of legs I and II 5
   Without club-like hair between bases of legs I and II 2

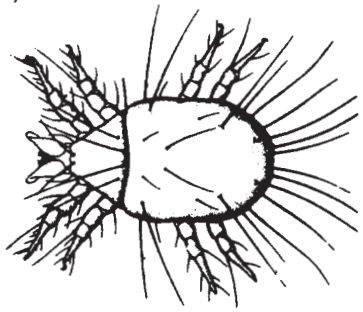
2. Claws, if present, not on stalks (*Glycyphagus domesticus*, formerly . . . . . *Glyciphagus prunorum*) . . . . . SUGAR MITE
   Claws on stalks 3

3. Internal apical hair (on joint between femur I and tibia I) less than three times as long as external apical hair 4
   Internal apical hair (on joint between femur I and tibia I) more than three times as long as external apical hair (*Acarus farinae*, formerly *Tyroglyphus farinae*) . . . . . HAM MITE



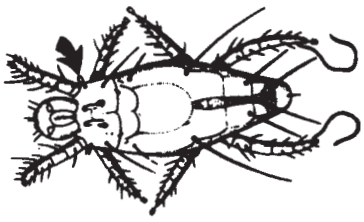
Acarus farinae

4. Tarsus with one stout dorsal and five small ventral terminal spines (*Acarus siro*, formerly *Tyroglyphus siro*) . . . . . GRAIN MITE
   Tarsus with only three small ventral spines (*Tyrophagus castellani*, formerly *Tyroglyphus longior*) . . . . . CHEESE MITE



Tyrophagus castellani

5. Tarsus IV of female ending in claws and a fleshy protuberance; leg IV of male smoothly curved inwards (*Pyemotes ventricosus*, formerly *Pediculoides ventricosus*) . . . . . STRAW ITCH MITE
   Tarsus IV of female ending in two long hairs of unequal length; leg IV of male sharply bent (*Tarsonemus floricolus*) . . . . . FLORICOLUS GRAIN MITE

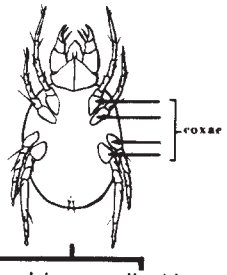


Pyemotes ventricosus

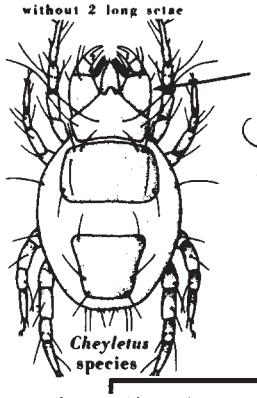
MITES: PICTORIAL KEY TO ADULT FEMALES COMMONLY FOUND ON DOMESTIC RATS IN SOUTHERN UNITED STATES

Harry D. Pratt and Chester J. Stojanovich

first and second coxae widely separated from third and fourth coxae

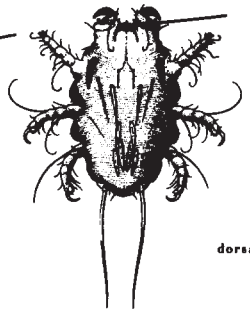


palpi large, with 2 pectinate setae, tip of abdomen without 2 long setae



Cheyletus species

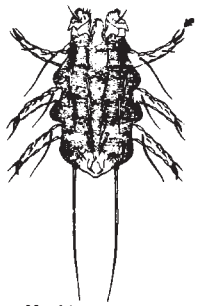
palpi very small, without pectinate setae, tip of abdomen with 2 long setae



second tarsus with two claws

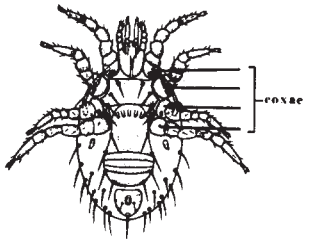
Radfordia ensifera

second tarsus with one claw

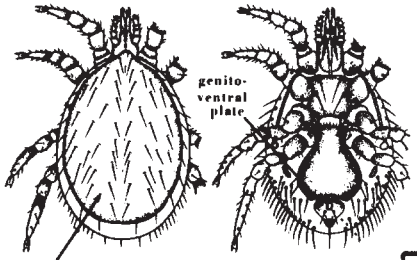


Myobia species

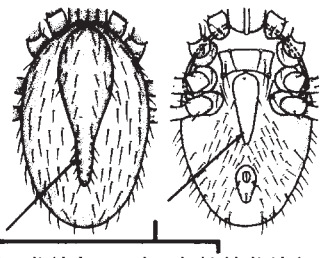
all four coxae set close together



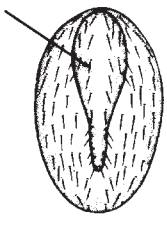
dorsal shield large, genito-ventral plate usually expanded posteriorly



dorsal shield small, genito-ventral plate narrow posteriorly

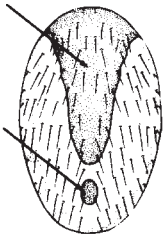


dorsal shield undivided



Ornithonyssis bacoti

dorsal shield divided



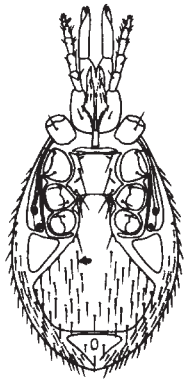
Dermanyssus sanguineus

anal plate with 7 or more setae

Macrocheles species

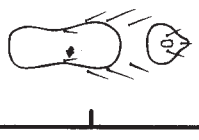
anal plate with 3 setae

genito-ventral plate with many fine setae

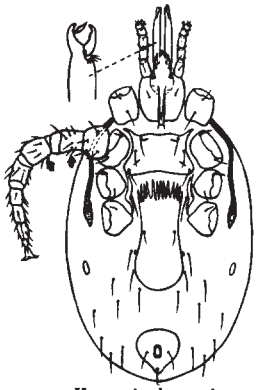


Eulaelaps stabularis

genito-ventral plate with one pair of setae

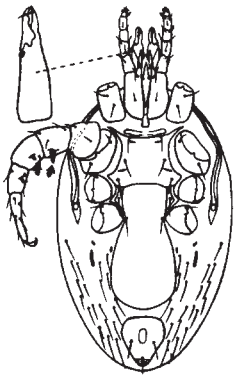


femur and tibia of second leg without stout spines



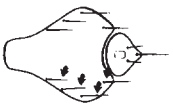
Haemolaelaps glasgowi

femur and tibia of second leg each with a stout spine

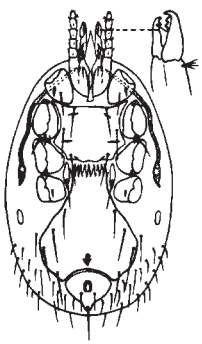


Androlaelaps setosus

genito-ventral plate with four pairs of setae

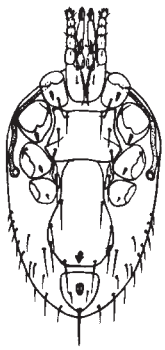


genito-ventral plate concave posteriorly



Echinolaelaps echidninus

genito-ventral plate convex posteriorly



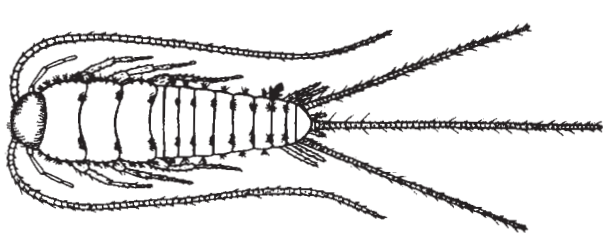
Laelaps nuttalli

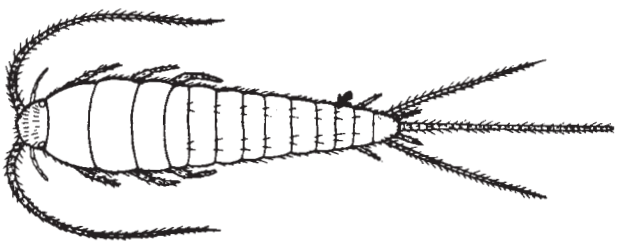
SILVERFISH. PICTORIAL KEY TO DOMESTIC SPECIES

Chester J. Stojanovich and Harold George Scott

setae in tufts
color brown

setae single

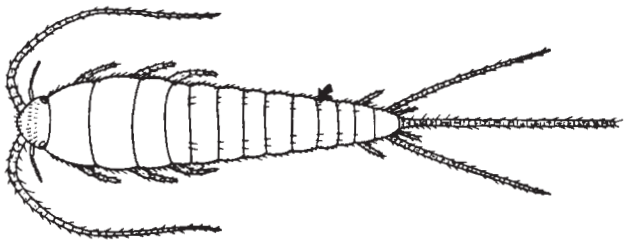


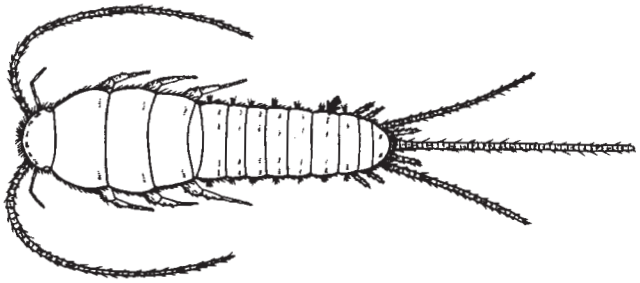


Thermobia domestica
FIREBRAT

without setal combs
color silver

with setal combs

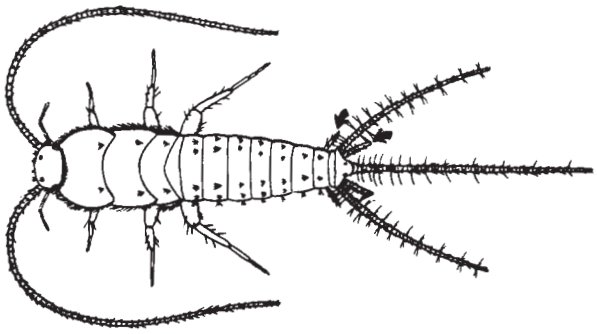


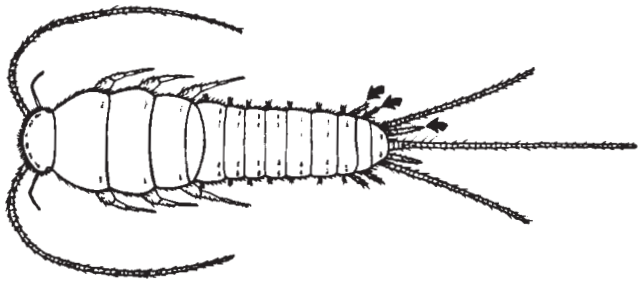


Lepisma saccharina
COMMON SILVERFISH

2 pairs of styli
color gray

3 pairs of styli
color brown



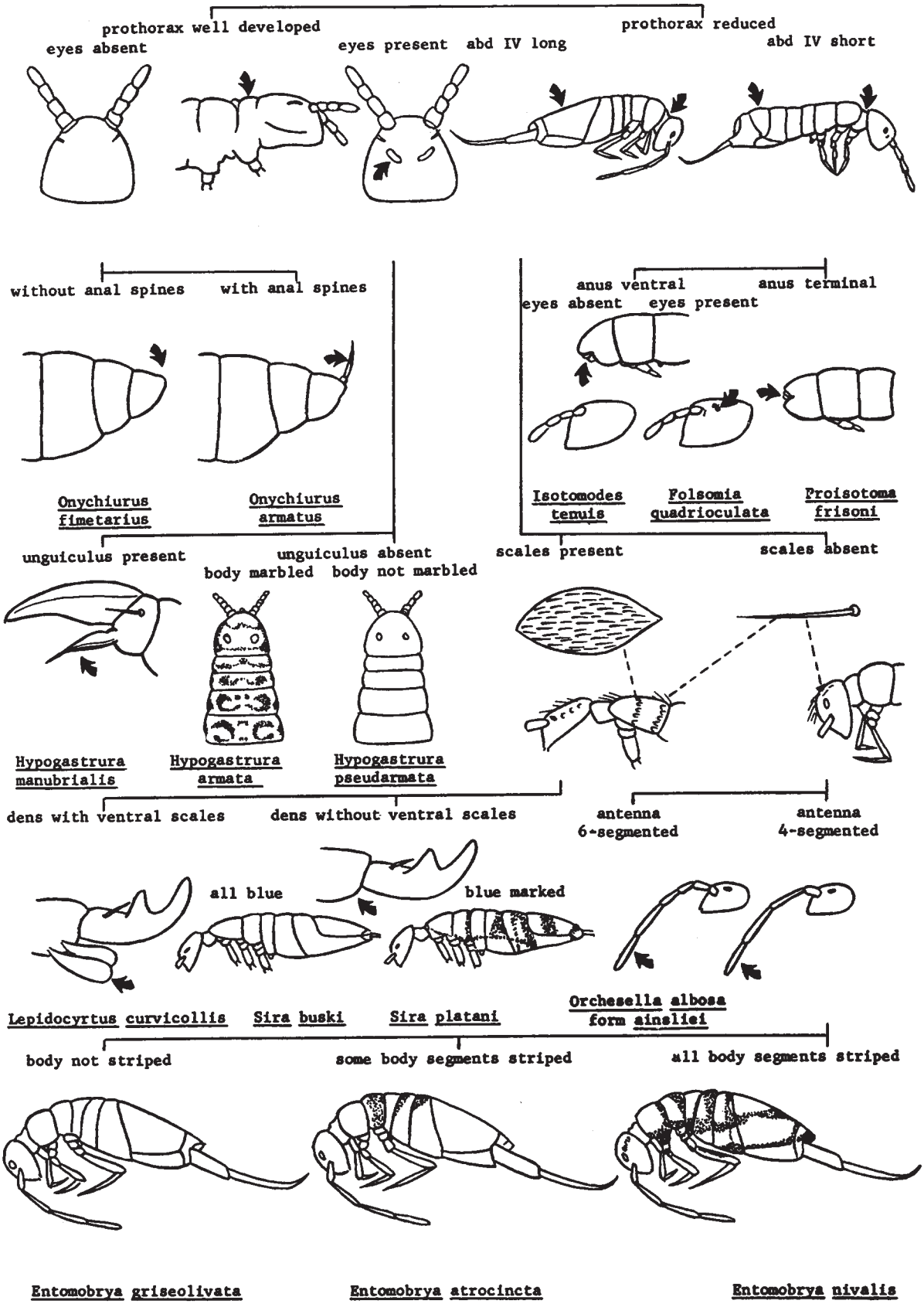


Ctenolepisma urbana
GIANT SILVERFISH
Ctenolepisma longicauda of some authors

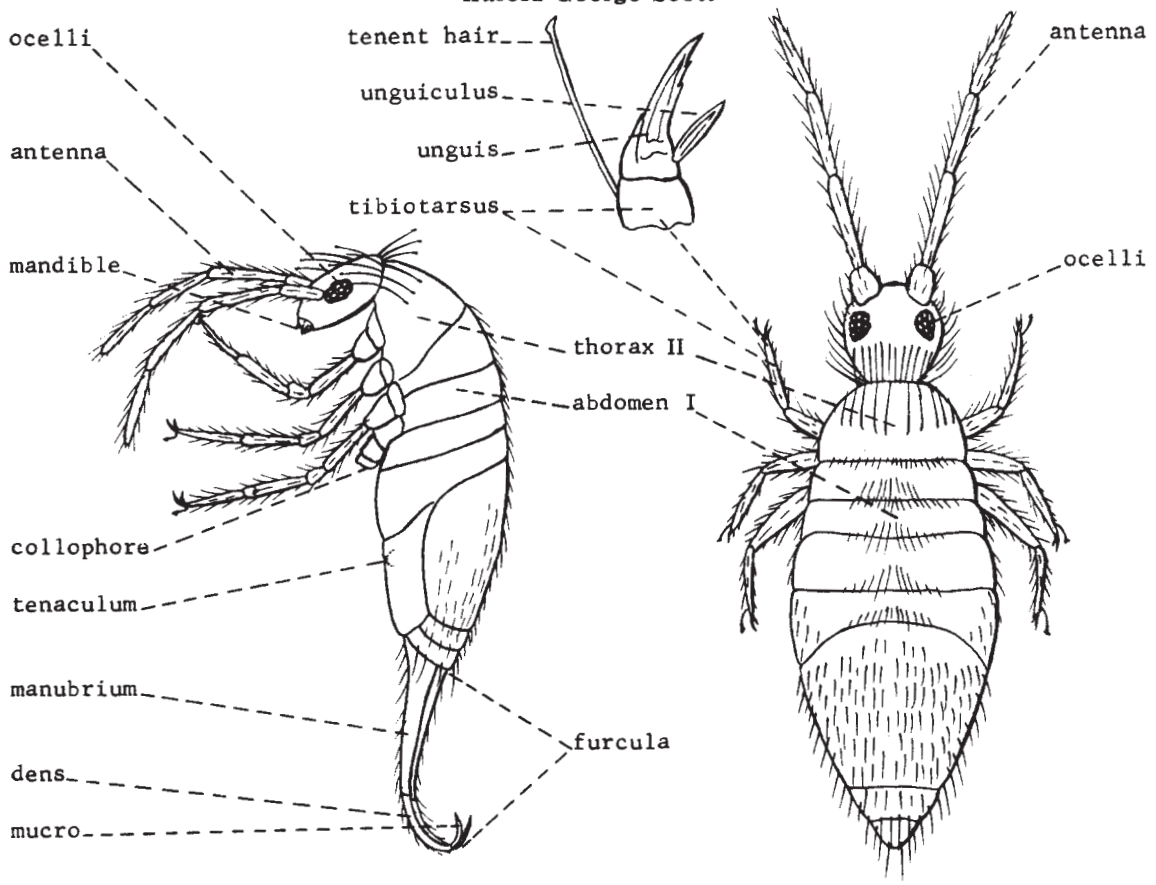
Ctenolepisma quadriseriata
FOUR-LINED SILVERFISH

COLLEMBOLA: PICTORIAL KEY TO COMMON DOMESTIC SPECIES

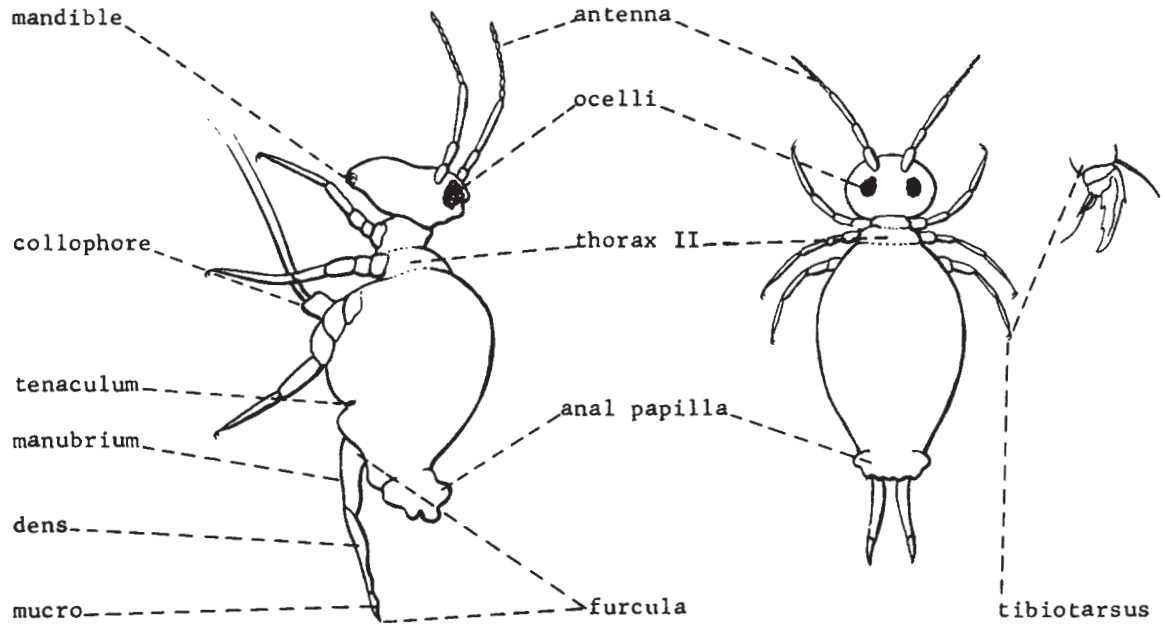
Harold George Scott, and Chester J. Stojanovich



COLLEMBOLA DIAGRAMS
Harold George Scott



SUBORDER ARTHROPLEONA

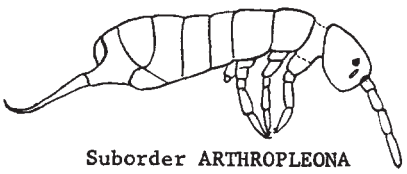


SUBORDER SYMPHYPLEONA

COLLEMBOLA: PICTORIAL KEY TO WORLD SUBFAMILIES

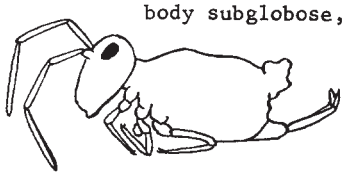
Harold George Scott, Ph.D.

body elongate, segmented



Suborder ARTHROPLEONA

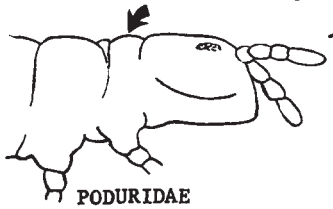
body subglobose, fused



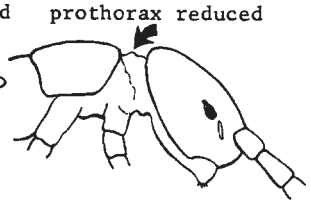
Suborder SYMPHYPLEONA

SMINTHURIDAE

prothorax well developed



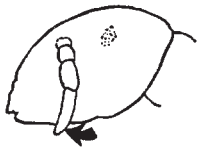
prothorax reduced



PODURIDAE

antenna longer than head

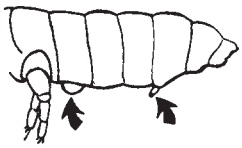
antenna shorter than head



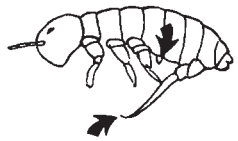
ENTOMOBRYIDAE

NEELINAE

furcula not reaching beyond collophore

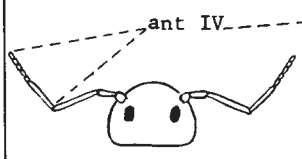


furcula reaching beyond collophore

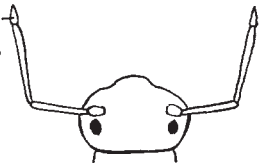


PODURINAE

ant IV subequal to or longer than III

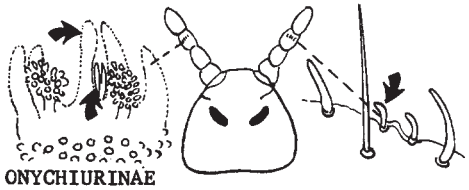


ant IV shorter than III



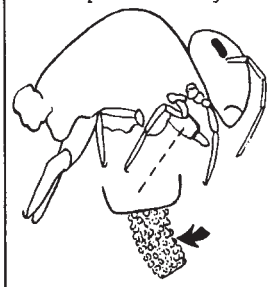
DICYRTOMINAE

ant III sense organ with rods and cones eyes absent



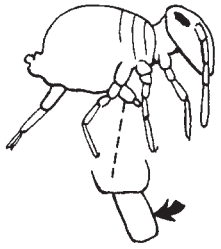
ONYCHIURINAE

thoracic sutures indefinite collophore warty



SMINTHURINAE

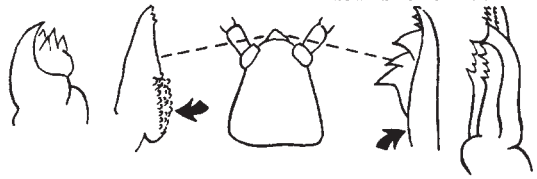
thoracic sutures evident collophore smooth



SMINTHURIDINAE

ant III sense organ with rods only eyes usually present

mandible with molar surface



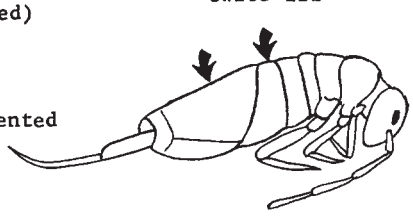
HYPOGASTRURINAE

mandible without molar surface

NEANURINAE

abd IV not twice III (or terminal segments fused)

abd IV at least twice III



ENTOMOBRYINAE

ant III and IV subsegmented

TOMOCERINAE

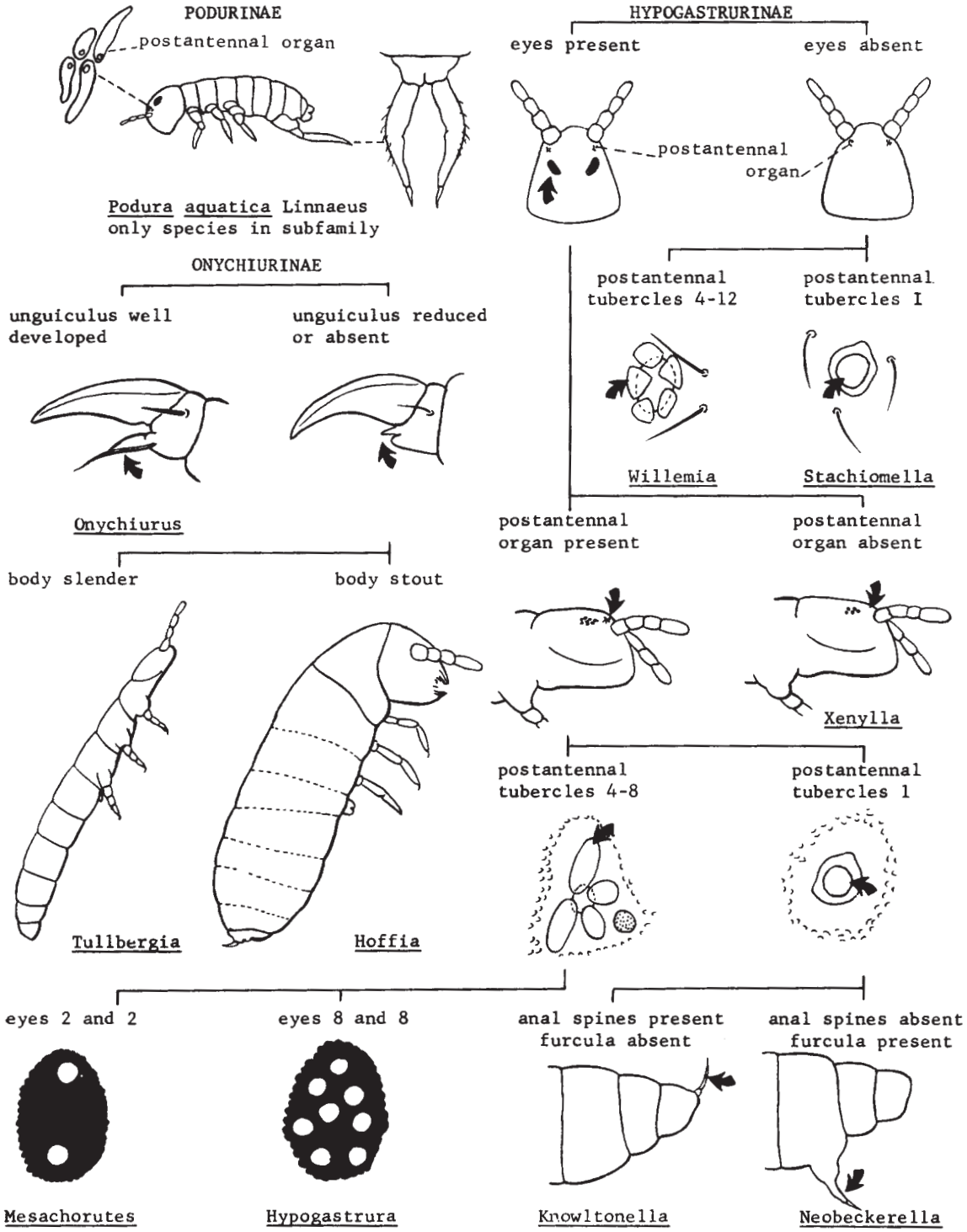
ant III and IV not subsegmented

ISOTOMINAE

COLLEMBOLA: PICTORIAL KEY TO NEARCTIC GENERA

Harold George Scott, Ph.D.

SUBFAMILIES PODURINAE, HYPOGASTRURINAE, AND ONYCHIURINAE

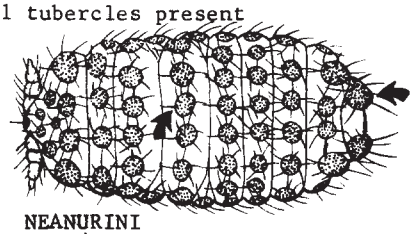


COLLEMBOLA: PICTORIAL KEY TO NEARCTIC GENERA

Harold George Scott, Ph.D.

SUBFAMILY NEANURINAE

abd VI large, bilobed
segmental tubercles present

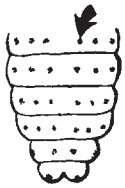


abd VI small, rounded
segmental tubercles absent

NEANURINI

segmental tubercles large

segmental tubercles small



Neanura

anal spines 2

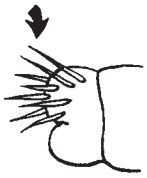
Xenyllodes

Neanurodes

anal spines 3-5

Friesea

anal spines 8



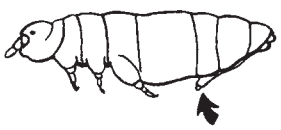
Prospinanura

PSEUDACHORUTINI

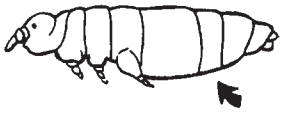
anal spines present

anal spines absent

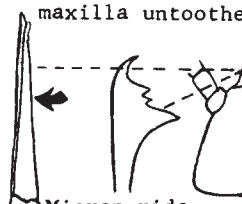
furcula present



furcula absent

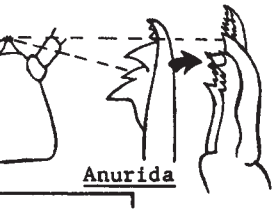


maxilla untoothed



Micranurida

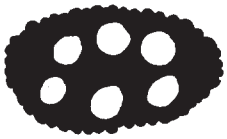
maxilla toothed



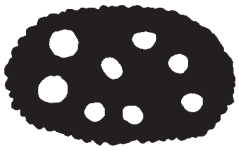
Anurida

eyes 5 and 5

eyes 6 and 6

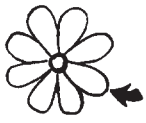


eyes 8 and 8



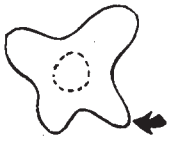
Microgastrura

postantennal tubercles 8



Logacanura

postantennal tubercles 4-5



Odontella

with buccal cone

Brachystomella

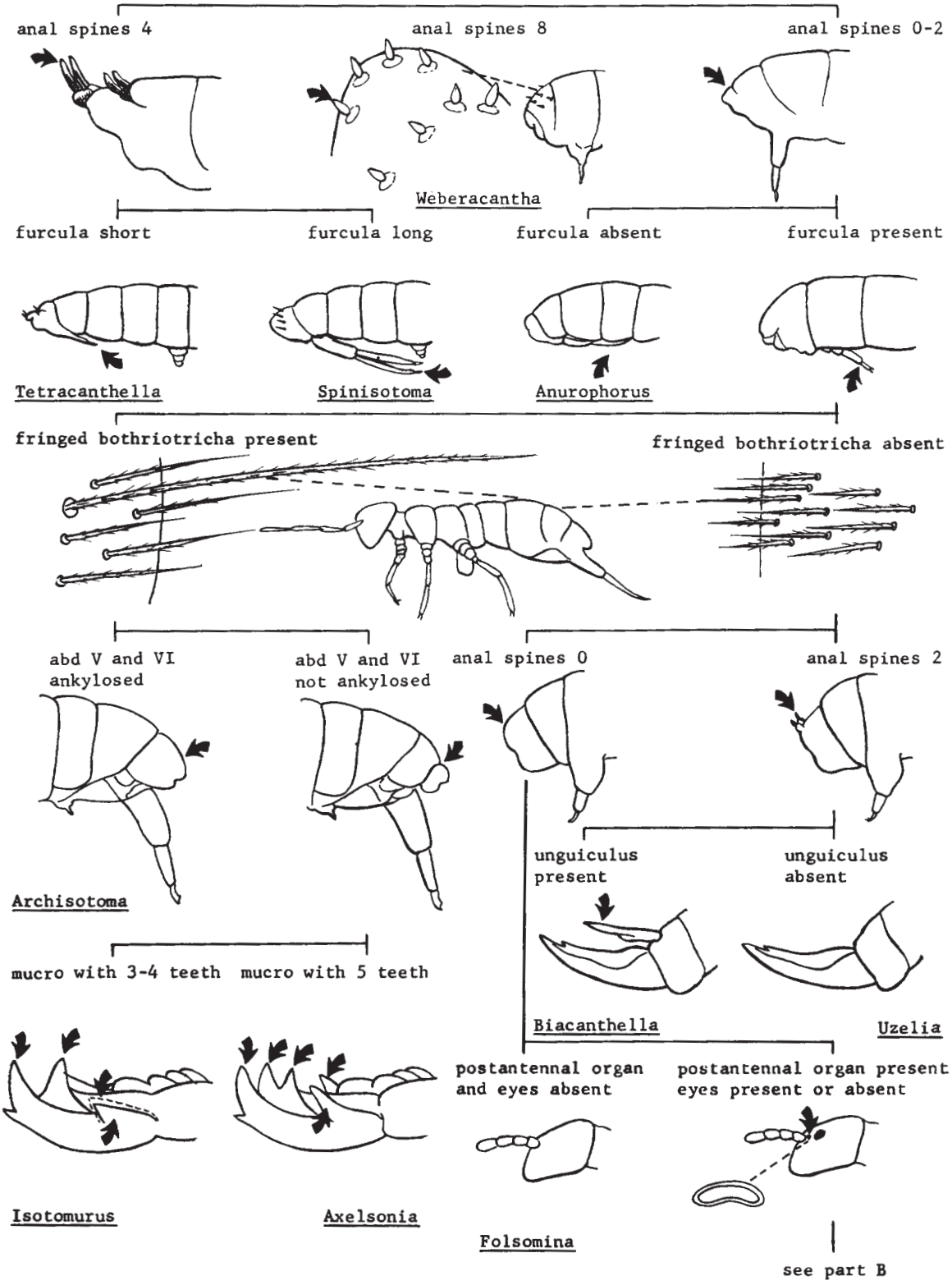
without buccal cone

Pseudachorutes

COLLEMBOLA: PICTORIAL KEY TO NEARCTIC GENERA

Harold George Scott, Ph.D.

SUBFAMILY ISOTOMINAE - Part A

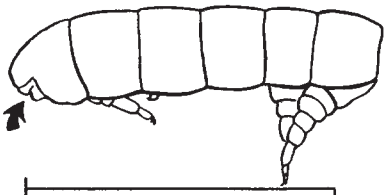


COLLEMBOLA: PICTORIAL KEY TO NEARCTIC GENERA

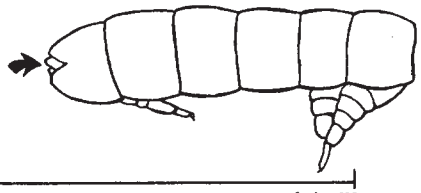
SUBFAMILY ISOTOMINAE - Part B

continued from part A

anus ventral



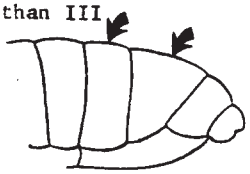
anus terminal



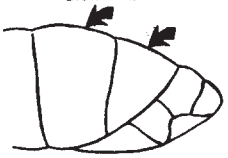
manubrium with hooks

manubrium without hooks

abd IV not shorter than III

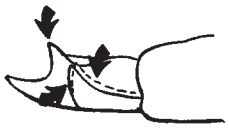


abd IV shorter than III



Isotomodes — **Folsomia**

mucro with 0-3 teeth



mucro with 4 teeth

mucro with 2 teeth

mucro with 3-4 teeth

Proisotoma — **Metisotoma**

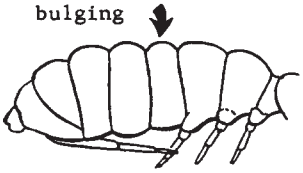
eyes 8 and 8

eyes 2 and 2 to 4 and 4

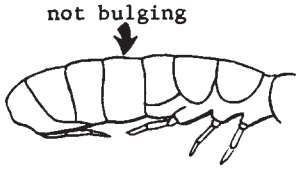
eyes absent

Folsomides — **Micrisotoma**

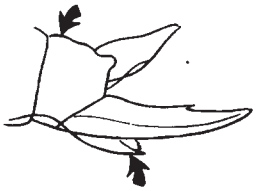
body segments bulging



body segments not bulging



unguis tunicate

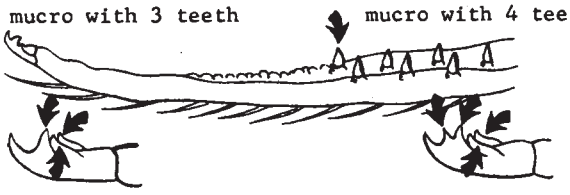


unguis not tunicate

Guthriella — **Isotomina** — **Agrenia**

with dental spines

mucro with 3 teeth



mucro with 4 teeth

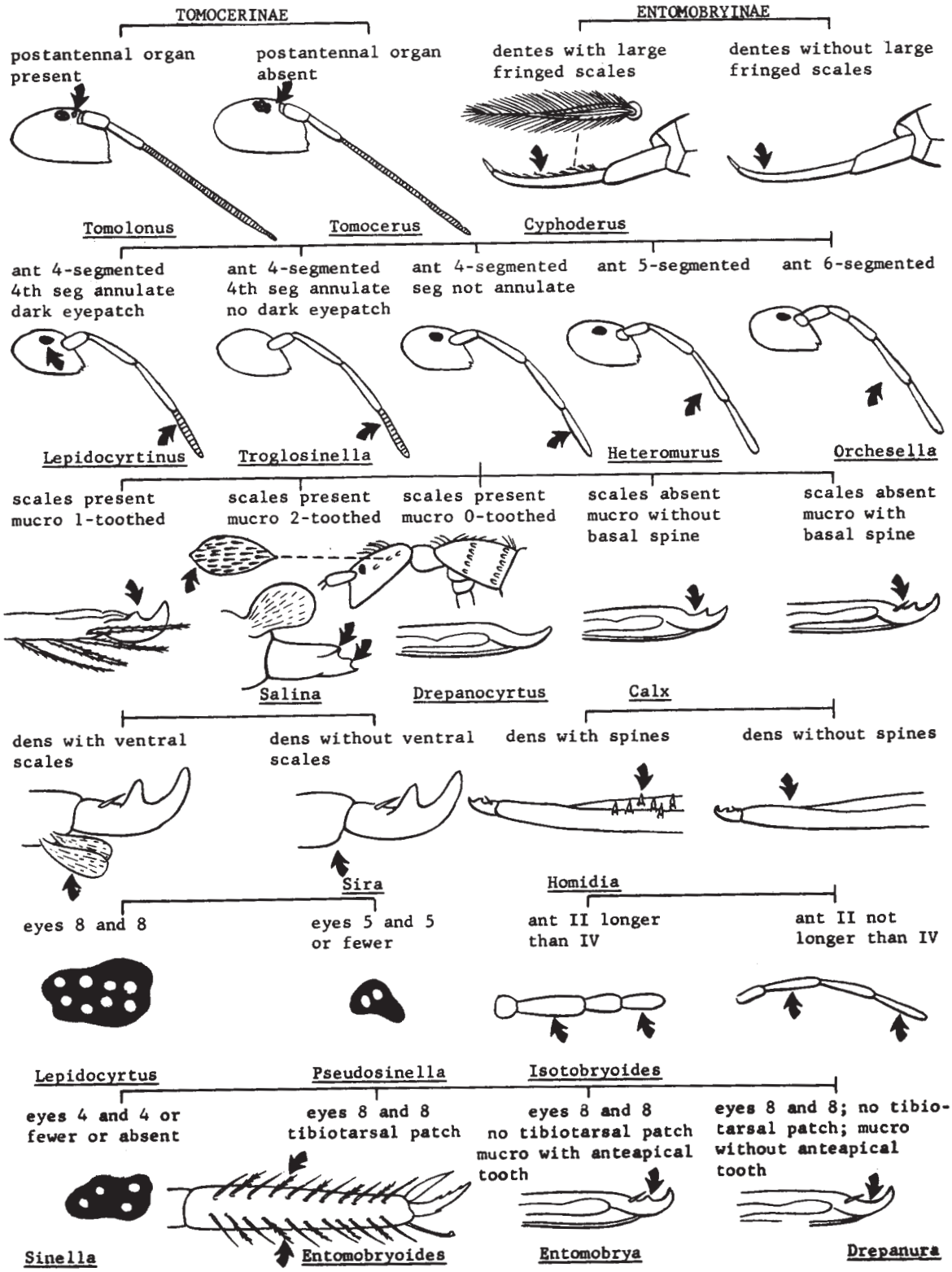
without dental spines

Semicerura — **Tomocerura** — **Isotoma**

COLLEMBOLA: PICTORIAL KEY TO NEARCTIC GENERA

Harold George Scott, Ph.D.

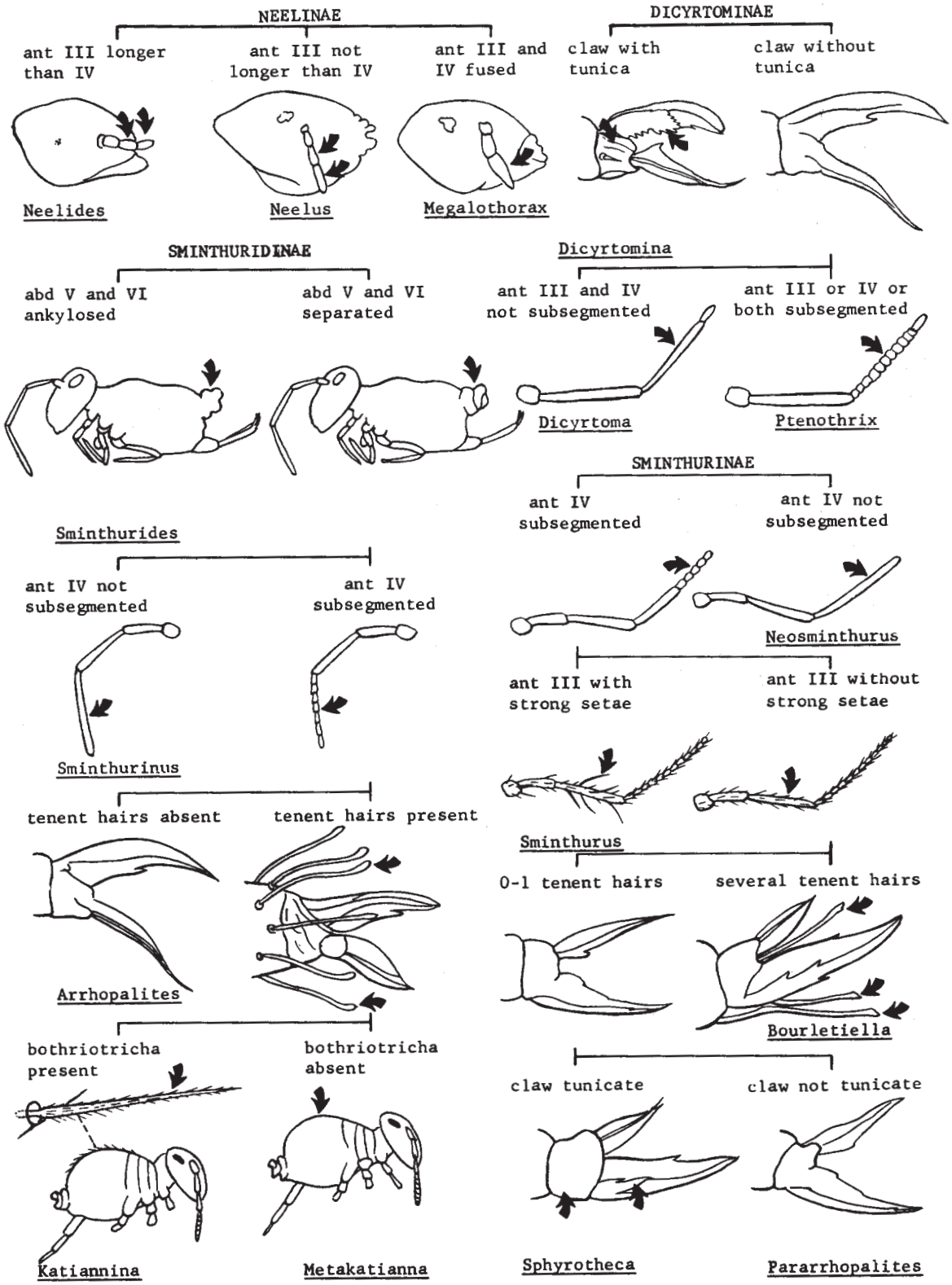
SUBFAMILIES TOMOCERINAE AND ENTOMOBRYINAE



COLLEMBOLA: PICTORIAL KEY TO NEARCTIC GENERA

Harold George Scott, Ph.D.

FAMILY SMINTHURIDAE



COCKROACHES: PICTORIAL KEY TO SOME COMMON SPECIES

Harry D. Pratt

SMALL, ABOUT 5/8" OR SHORTER

PRONOTUM WITH 2 LONGITUDINAL BLACK BARS

GERMAN COCKROACH
(Blattella germanica)

PRONOTUM WITHOUT LONGITUDINAL BLACK BARS

WINGS COVERING ABOUT HALF OF ABDOMEN PRONOTUM ABOUT 1/4 INCH WIDE

WOOD ROACH
(Parcoblatta spp.)

WINGS COVERING NEARLY ALL OF ABDOMEN OR EXTENDING BEYOND. PRONOTUM NARROWER

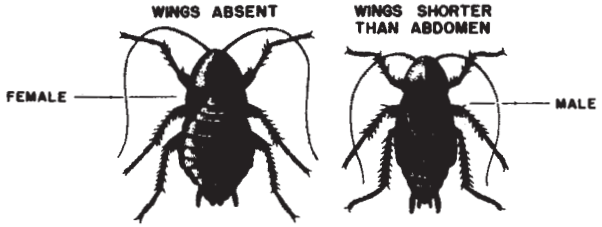
BROWN-BANDED COCKROACH
(Supella supellectilium)

MEDIUM TO LARGE, LONGER THAN 5/8 INCH

WINGS ABSENT, OR SHORTER THAN ABDOMEN

WINGS ABSENT

WINGS SHORTER THAN ABDOMEN



ORIENTAL COCKROACH
(Blatta orientalis)

WINGS COVERING ABDOMEN, OFTEN EXTENDING BEYOND

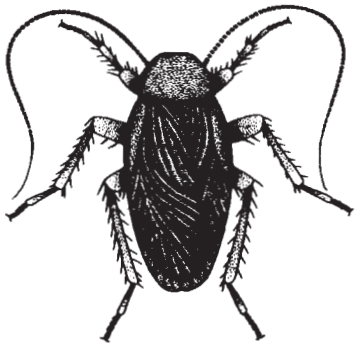
PRONOTUM MORE THAN 1/4 INCH WIDE

PRONOTUM ABOUT 1/4 INCH WIDE WITH PALE BORDER

WOOD ROACH
(Parcoblatta spp.)

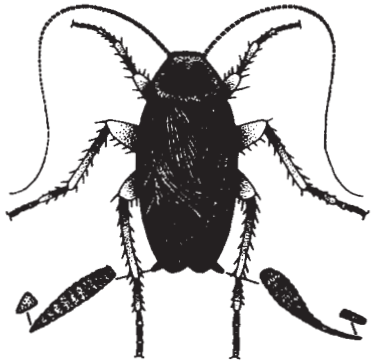
FRONT WING WITHOUT PALE STREAK. PRONOTUM SOLID COLOR, OR WITH PALE DESIGN ONLY MODERATELY CONSPICUOUS

PRONOTUM SOLID DARK COLOR. GENERAL COLOR VERY DARK BROWN TO BLACK.



SMOKY BROWN COCKROACH
(Periplaneta fuliginosa)

PRONOTUM USUALLY WITH SOME PALE AREA. GENERAL COLOR SELDOM DARKER THAN REDDISH CHESTNUT



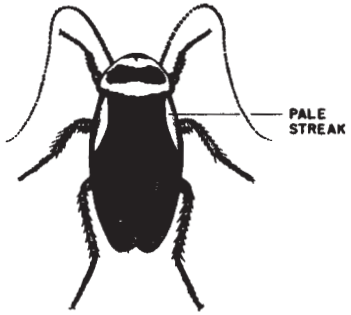
LAST SEGMENT OF CERCUS NOT TWICE AS LONG AS WIDE

BROWN COCKROACH
(Periplaneta brunnea)

LAST SEGMENT OF CERCUS TWICE AS LONG AS WIDE

AMERICAN COCKROACH
(Periplaneta americana)

FRONT WING WITH OUTER PALE STREAK AT BASE. PRONOTUM STRIKINGLY MARKED



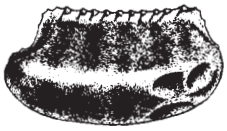
AUSTRALIAN COCKROACH
(Periplaneta australasiae)

COCKROACHES: KEY TO EGG CASES OF COMMON DOMESTIC SPECIES

Harold George Scott, Ph.D. and Margery R. Borom

less than ¼" long
subsegments apparent

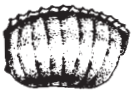
more than ¼" long
subsegments inapparent



with about 16 subsegments
length more than twice width

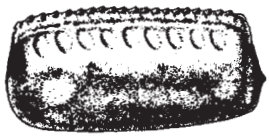
Blatella germanica
GERMAN COCKROACH

with about 8 subsegments
length less than twice width

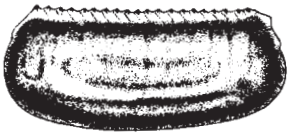


Supella supellectilium
BROWN-BANDED COCKROACH

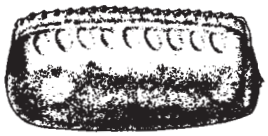
with lateral indentations



without lateral indentations



terminal point strong

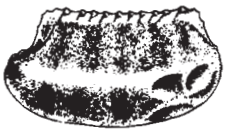


Periplaneta brunnea
BROWN COCKROACH

terminal point weak

Periplaneta fuliginosa
SMOKY-BROWN COCKROACH

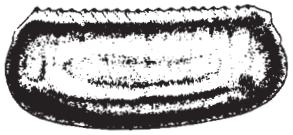
not symmetrical



Blatta orientalis
ORIENTAL COCKROACH

symmetrical

length more than twice width



Periplaneta australasiae
AUSTRALIAN COCKROACH

length less than twice width

Periplaneta americana
AMERICAN COCKROACH

COCKROACHES: KEY TO SOME COMMON SPECIES FOUND IN THE UNITED STATES

Harry D. Pratt & Chester J. Stojanovich

1. Middle and hind femora both with numerous strong spines along the ventral margin (Fig. 1 A)..2

   Middle and hind femora without strong spines along the ventral margin (Fig. 1 B).....12

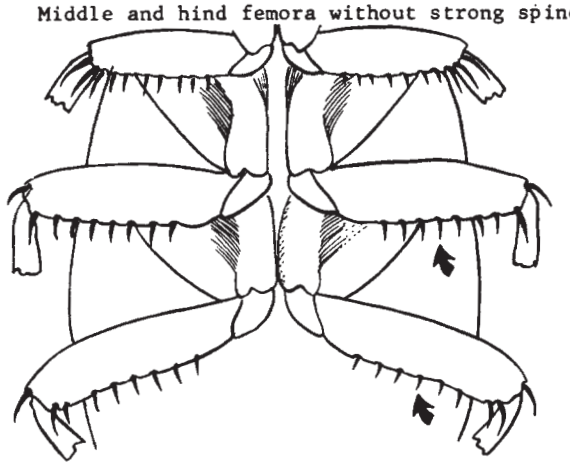


Fig. 1 A

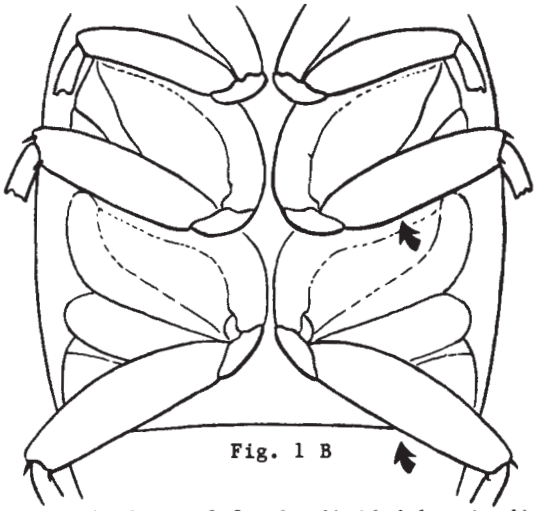


Fig. 1 B

2. Comparatively large species 18 mm. or longer; subgenital plate of female divided longitudinally, valvular (Fig. 2 A); male styli similar, slender, elongate and straight (Fig. 2 B).....3

   Species usually less than 18 mm. long; or, if longer, anterior-ventral margin of front femur with several large stout spines on basal portion, followed by a row of smaller spines (Fig. 2 C); female subgenital plate simple, not divided (Fig. 2 D); male styli variable, frequently modified, asymmetrical, or unequal in size (Fig. 2 E).....8

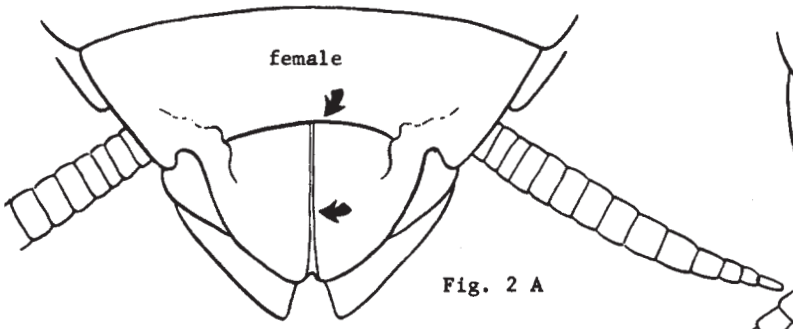


Fig. 2 A

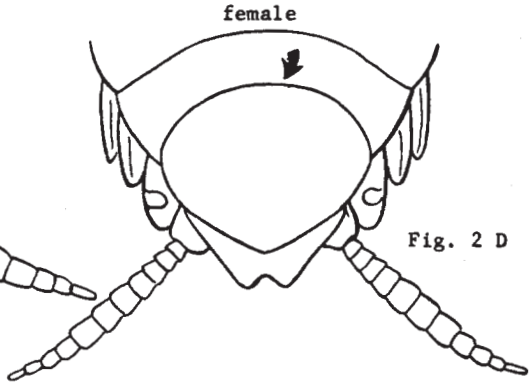


Fig. 2 D

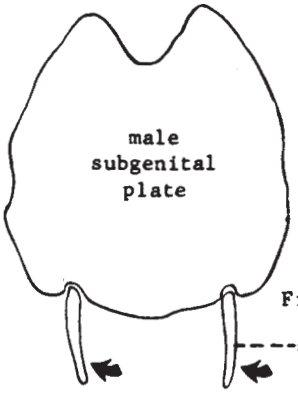


Fig. 2 B

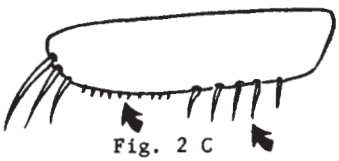


Fig. 2 C

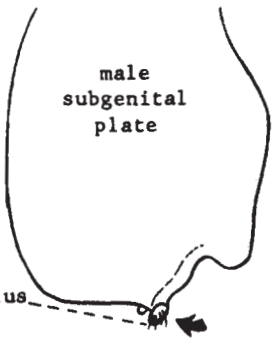


Fig. 2 E

3. Front wing in both sexes extending beyond tip of abdomen (Fig. 3 A).....4

   Front wing in both sexes not reaching tip of abdomen (Fig. 3 B).....7

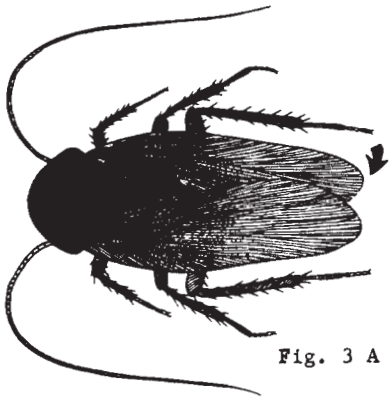


Fig. 3 A

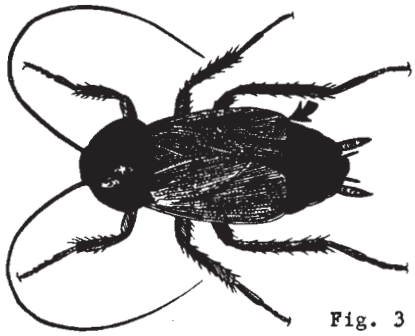


Fig. 3 B

4. Uniformly dark blackish-brown, shining species (Fig. 4 A).....
   .....(Periplaneta fuliginosa) SMOKY BROWN COCKROACH

   Species with some yellowish markings on pronotum or front wing or both (Fig. 4 B).....5

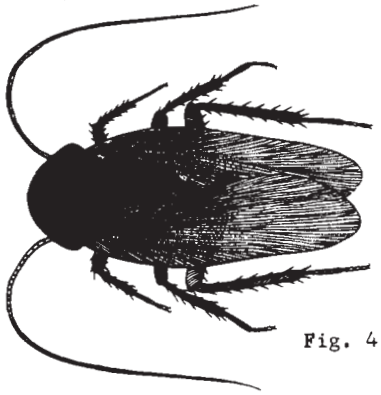


Fig. 4 A

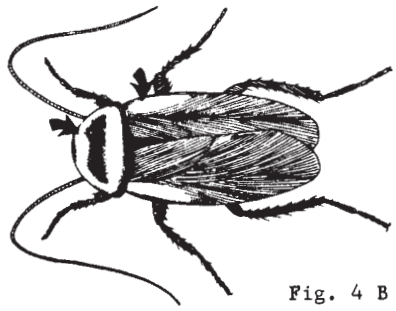


Fig. 4 B

5. Front wing with yellowish stripe; pronotum with yellowish and darker areas very contrastingly marked (Fig. 5 A).....(Periplaneta australasiae) AUSTRALIAN COCKROACH

   Front wing entirely brownish; pronotum with yellowish and darker areas less contrastingly marked (Fig. 5 B).....6

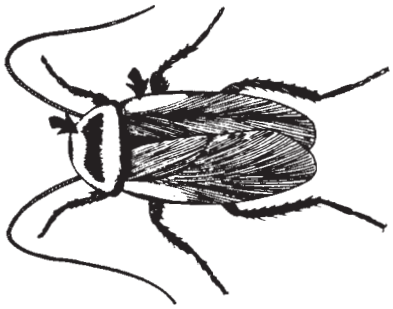


Fig. 5 A

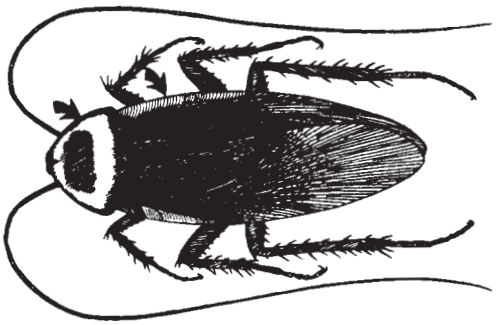


Fig. 5 B

6. Styli very long and slender, longer than space between their bases (Fig. 6 A); cercus long and slender particularly in the male; male supra-anal plate deeply notched (Fig. 6 B).....
.....(Periplaneta americana) AMERICAN COCKROACH

Styli shorter, not as long as space between their bases (Fig. 6 C); cercus stouter and more evenly spindle-shaped; male supra-anal plate truncate or feebly notched (Fig. 6 D).....
.....(Periplaneta brunnea) BROWN COCKROACH

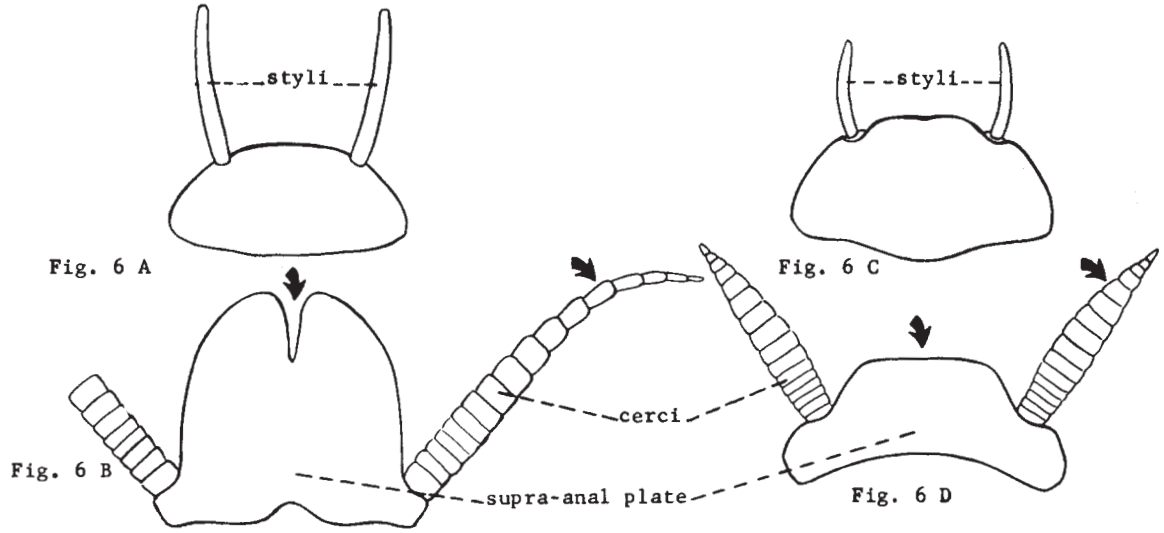


Fig. 6 A

Fig. 6 C

Fig. 6 B

Fig. 6 D

7. Blackish species, 15-27 mm. long; male front wings covering two-thirds of abdomen (Fig. 7 A); female front wings widely separated pads (Fig. 7 B); first segment of hind tarsus longer than segments 2-5 combined, pulvilli of second and third segments small (Fig. 7 C).....
.....(Blatta orientalis) ORIENTAL COCKROACH

Mahogany brownish species, 30-40 mm. long; front wings reduced to short pads, not widely separated (Fig. 7 D); first segment of hind tarsus shorter than segments 2-5 combined, pulvilli of second and third segments large (Fig. 7 E)....(Eurycotis floridana) LARGE FLORIDA COCKROACH

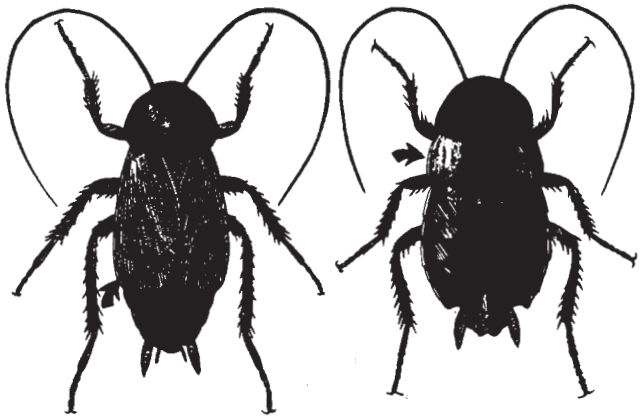


Fig. 7 A

Fig. 7 B

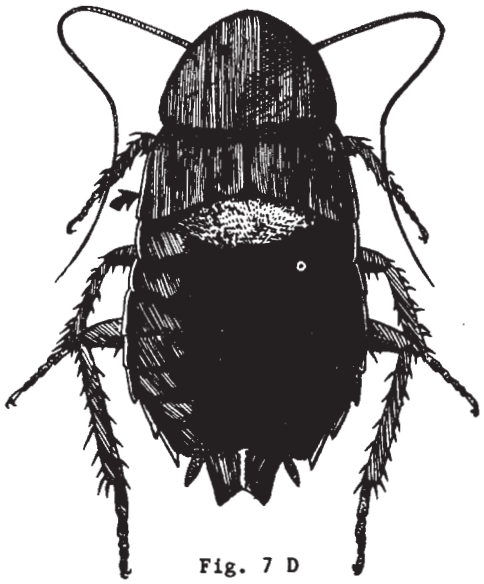


Fig. 7 D

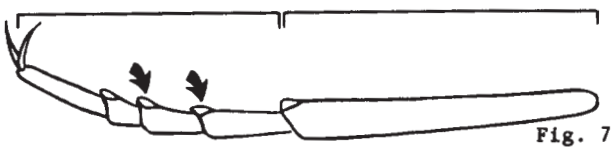


Fig. 7 C

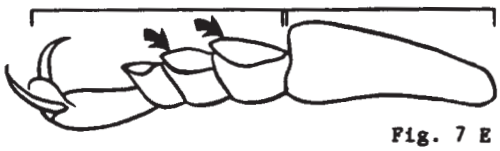


Fig. 7 E

8. Pronotum with two conspicuous longitudinal dark bars on a pale background (Fig. 8 A).....9

   Pronotum variously marked, but without two conspicuous dark longitudinal bars (Fig. 8 B)....10

Fig. 8 A

Fig. 8 B

9. Face pale (Fig. 9 A); male subgenital plate asymmetrical, styli very unequal, short and rounded (Fig. 9 B).....(Blattella germanica) GERMAN COCKROACH

   Face dark; male subgenital plate almost symmetrical, styli somewhat elongate and subequal in size (Fig. 9 C).....(Blattella vaga) FIELD COCKROACH

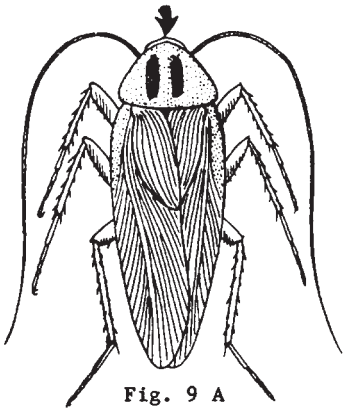


Fig. 9 A

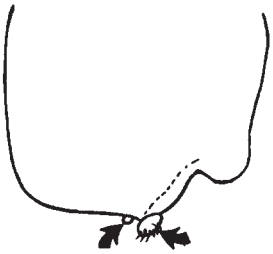


Fig. 9 B

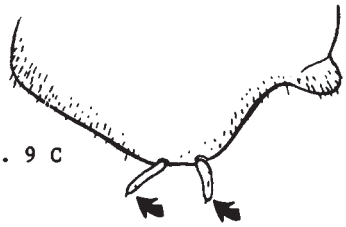


Fig. 9 C

10. Pronotum with a broad dark central stripe; front wings of both sexes appearing to have two transverse brownish bars, some pale specimens showing bars poorly (Fig. 10 A). Width of pronotum usually not exceeding 4.5 mm.....(Supella supellectilium) BROWN-BANDED COCKROACH

    Pronotum and front wings otherwise, or, if pronotum is so marked, its width exceeding 4.5 mm. (Fig. 10 B).....11

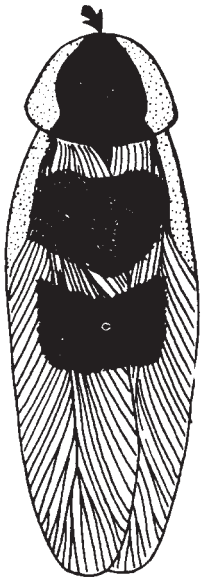


Fig. 10 A

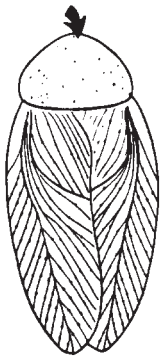


Fig. 10 B

11. Larger species 9-25 mm. or more in length; front wing without small dark spots in winged specimens (Fig. 11 A); claws equal (Fig. 11 B); ventral anterior margin of front femur with 3 long apical spines (Fig. 11 C).....(Parcoblatta species) WOOD COCKROACHES

Small species, 8-9 mm. long; front wing with small dark spots (Fig. 11 D); claws unequal (Fig. 11 E); ventral anterior margin of front femur with 2 long apical spines (Fig. 11 F)... .....(Ectobius pallidus) SPOTTED MEDITERRANEAN COCKROACH

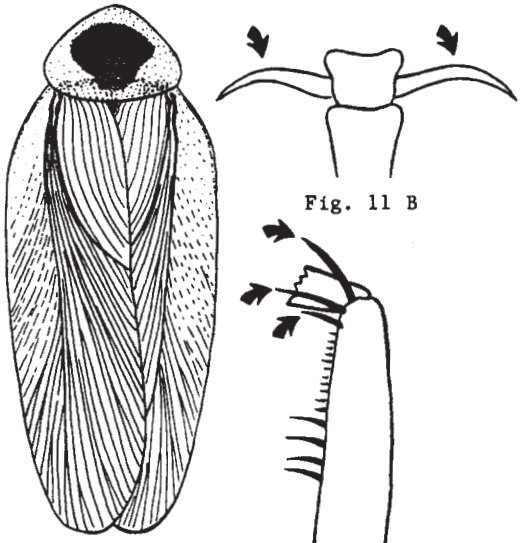


Fig. 11 A

Fig. 11 B

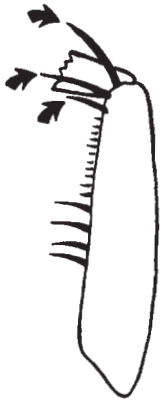


Fig. 11 C

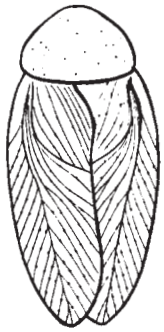


Fig. 11 D

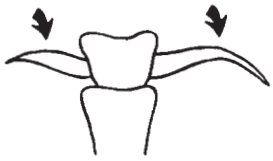


Fig. 11 E

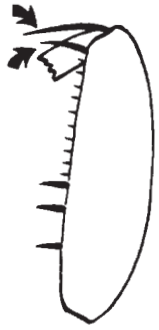


Fig. 11 F

12. Top of eyes close together (Fig. 12 A); general color a nearly uniform greenish; posterior margin of pronotum somewhat angularly produced (Fig. 12 B) (Panchlora nivea) CUBAN COCKROACH

Top of eyes sometimes distant (Fig. 12 C); general color various shades of brown and gray; pronotum usually not angularly produced posteriorly (Fig. 12 D).....13

Fig. 12 A

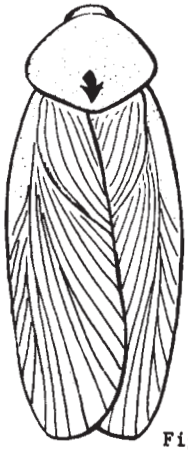


Fig. 12 B

Fig. 12 C

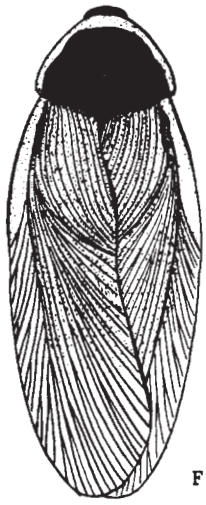


Fig. 12 D

13. Medium sized species, 30 mm. or less in length, including folded wings (Fig. 14 A & B).....14

    Large species 40 mm. or more in length, including folded wings (Fig. 15 A & C).....15

14. Pronotum uniformly blackish except a narrow yellowish band along anterior and lateral margins (Fig. 14 A).....(Pycnoscelus surinamensis) SURINAM COCKROACH

    Pronotum pale with a narrow dark longitudinal submarginal band on each side and irregular brownish blotches on disc (Fig. 14 B).....(Nauphoeta cinerea) CINEREOUS COCKROACH

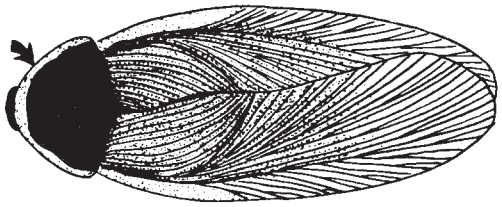


Fig. 14 A

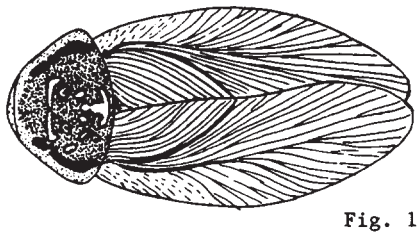


Fig. 14 B

15. Disc or pronotum with shield-like design, sometimes skull-like design (Fig. 15 A); front femur with one or more stout spurs on underside (Fig. 15 B).....
.....(Blaberus giganteus; Blaberus craniifer) GIANT COCKROACH

    Disc of pronotum with shield-like design darkened in outline only, not solid black (Fig. 15 C); front femur with a line of stiff hairs on anterior-ventral margin (Fig. 15 D).....
.....(Leucophaea maderae) MADEIRA COCKROACH

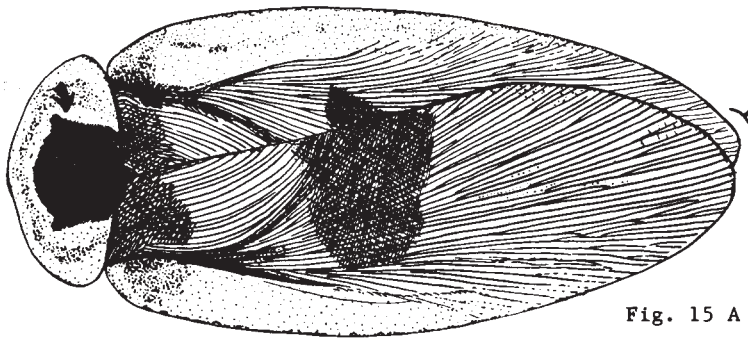


Fig. 15 A

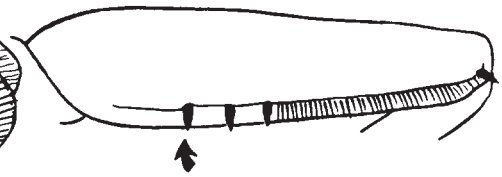


Fig. 15 B

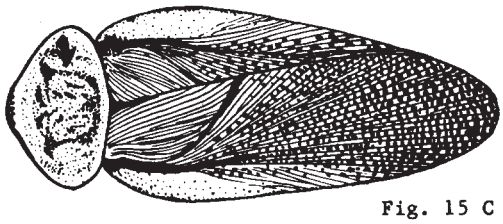


Fig. 15 C

Fig. 15 D

TERMITES: KEY TO SOME COMMON NORTH AMERICAN SPECIES

Harold George Scott

Fig. A - Winged Adult

Fig. B - Soldier

Fig. C - Worker

Key to Winged Adults

1. Radius without branches; fontanel (fig. E) usually present 2
   Radius (fig. D) with branches; fontanel absent 4

2. Tibia (fig. F) slightly to plainly blackish 3
   Tibia entirely pale; Ontario to Guatemala, west to Utah and Arizona
   (*Reticulitermes flavipes*) ..... EASTERN SUBTERRANEAN TERMITE

3. Tibia slightly darkened; length 9 mm.; British Columbia to Baja California, east to Idaho and Sonora
   (*Reticulitermes hesperus*) ..... WESTERN SUBTERRANEAN TERMITE
   Tibia generally darkened; length 9.5- 10 mm.; Oregon and Montana to western Mexico, Missouri, and Texas
   (*Reticulitermes tibialis*) ..... ARID SUBTERRANEAN TERMITE

4. Ocelli (fig. E) present 5
   Ocelli absent; western Canada to Baja California
   (*Zootermopsis angusticollis*) ..... WESTERN ROTTEN-WOOD TERMITE

5. Body yellow to light brown 6
   Body blackish; California to Baja California, east to Arizona and Utah
   (*Kalotermes minor*) ..... WESTERN DRY-WOOD TERMITE

6. Transverse rows of long hairs on tergites; South Carolina to Florida, west to eastern Texas (*Kalotermes snyderi*) ..... EASTERN DRY-WOOD TERMITE
   No transverse rows of hairs on tergites; Arizona and California
   (*Procryptotermes hubbardi*) ..... ARID DRY-WOOD TERMITE

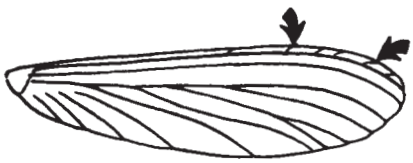


Fig. D - Wing

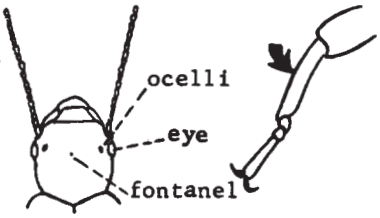


Fig. E - Head

Fig. F - Leg

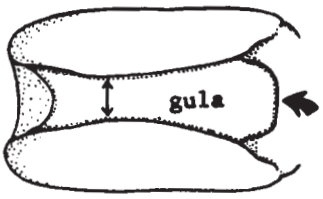


Fig. G - Throat

Key to Soldiers

1. Fontanel (fig. E) present; eyes usually absent 2
   Fontanel absent; eyes (fig. E) present 4

2. Gula (fig. G) not twice as broad in front as in middle ..... ARID SUBTERRANEAN TERMITE
   Gula twice as broad in front as in middle 3

3. Head twice as long as broad ..... WESTERN SUBTERRANEAN TERMITE
   Head less than twice as long as broad ..... EASTERN SUBTERRANEAN TERMITE

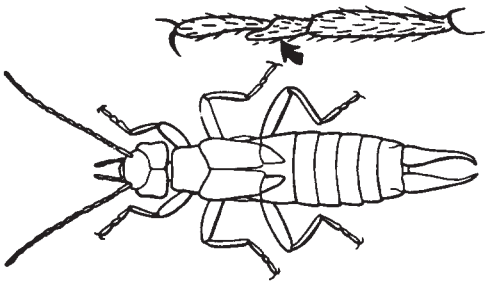
4. Antenna (fig. E) with 23-31 segments 5
   Antenna with 10-20 segments ..... WESTERN ROTTEN-WOOD TERMITE

5. Third antennal segment as long as next 3 combined ..... EASTERN DRY-WOOD TERMITE
   Third antennal segment shorter than next 3 combined ..... WESTERN DRY-WOOD TERMITE
   Third antennal segment as long as next 4 combined ..... ARID DRY-WOOD TERMITE

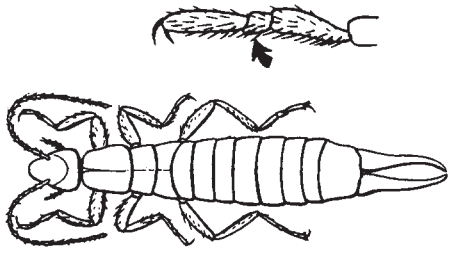
EARWIGS: PICTORIAL KEY TO COMMON DOMESTIC SPECIES

Chester J. Stojanovich and Harold George Scott

tarsus II prolonged beneath III

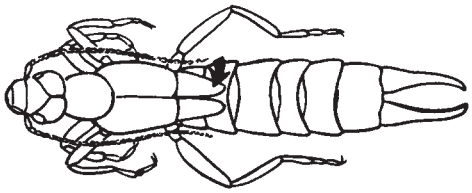


tarsus II not prolonged beneath III

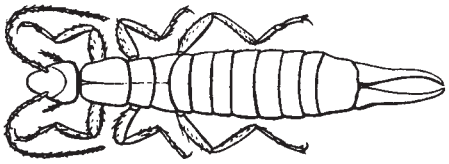


EUROPEAN EARWIG
Forficula auricularia

wings present

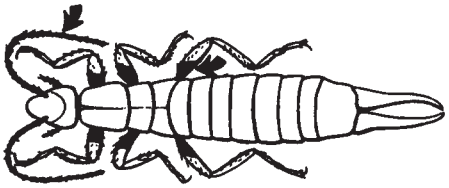


wings absent



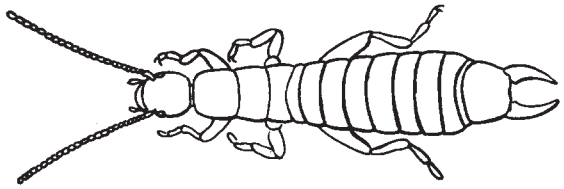
SHORE EARWIG
Labidura riparia

legs and antennae banded



RING-LEGGED EARWIG
Euborellia annulipes

legs and antennae not banded



SEASIDE EARWIG
Anisolabis maritima

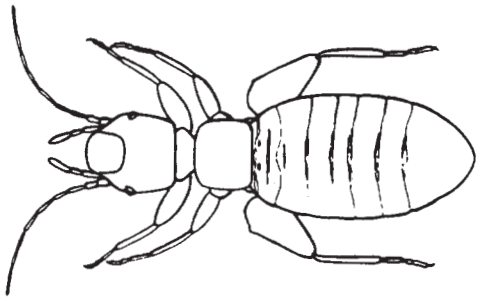
PSOCIDS: KEY TO SOME SPECIES COMMONLY INFESTING STORED FOOD

Harold George Scott and Chester J. Stojanovich

1. Two distinct thoracic segments 2
   Three distinct thoracic segments (*Trogium pulsatorium*) ..... DEATH WATCH

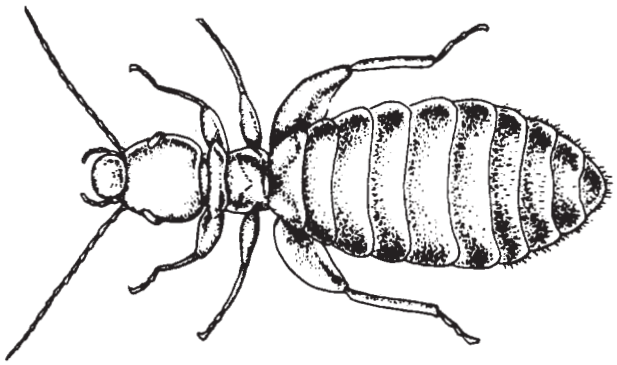
2. Without large pronotal bristles 3
   With large pronotal bristles 4

3. Eye with 7 facets; head and body brown (*Liposcelis bostrychopilus*) ..... BANDED PSOCID
   Eye with 2–4 facets; head brown, body yellow (*Liposcelis paetus*) ..... WAREHOUSE PSOCID



Warehouse Psocid

4. Two to 5 large pronotal bristles (*Liposcelis entomophilus*) ..... GRAIN PSOCID
   One large pronotal bristle (*Liposcelis terricolus*) ..... BOOK LOUSE

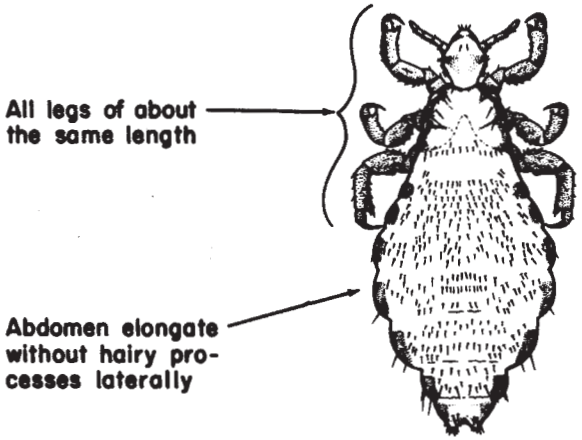


Book Louse

LICE COMMONLY FOUND ON MAN

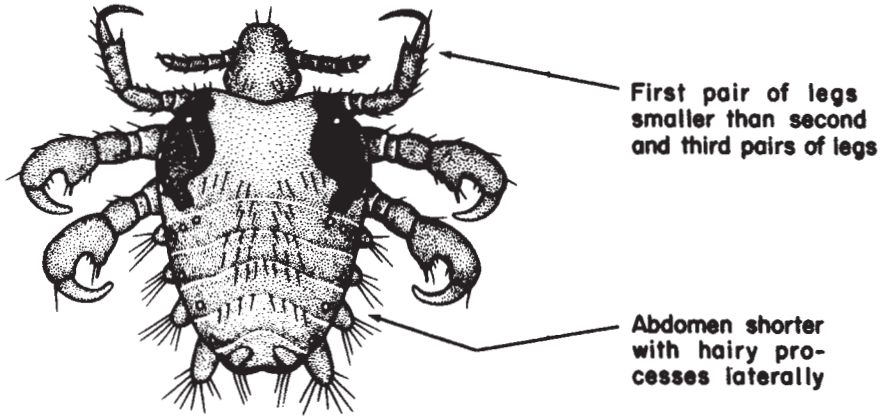
Harry D. Pratt

BODY LOUSE AND HEAD LOUSE



PEDICULUS HUMANUS

CRAB LOUSE



PHTHIRUS PUBIS

ANOPLURA: PICTORIAL KEY TO SPECIES ON DOMESTIC RATS IN SOUTHERN UNITED STATES

Roy F. Fritz and Harry D. Pratt

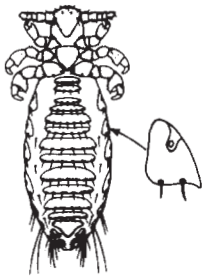
Abdomen with well defined ventral, lateral and dorsal plates

Abdomen with plates poorly defined or absent

ADULTS

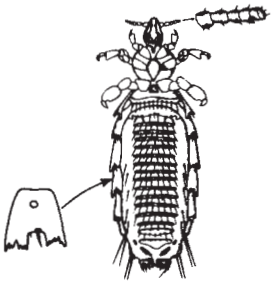
NYMPHS

Lateral plates small, subtriangular. Segment II of antenna as long as wide

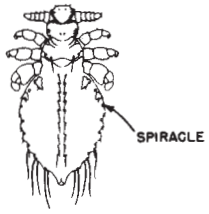


Polyplax spinulosa

Lateral plates large, emarginate posteriorly. Segment II of antenna longer than wide

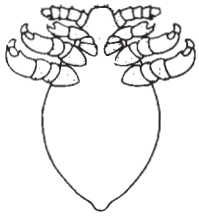


Abdomen with spiracles and two parallel rows of setae



Polyplax spinulosa

Abdomen without spiracles or parallel rows of setae



Hoplopleura spp.

Lateral plates 4-6 with one large and one minute seta

Hoplopleura oenomydis

Lateral plates 4-6 with two large setae

Lateral plates broadly emarginate; Apical processes thorn-like

Hoplopleura hirsuta

Lateral plates narrowly emarginate; Apical processes broad

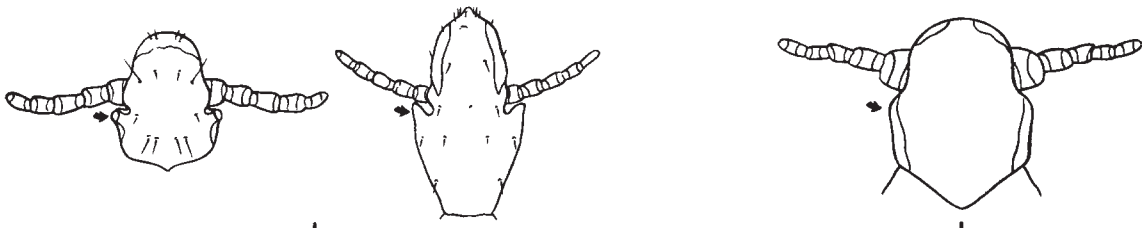
Hoplopleura acanthopus

ANOPLURA: PICTORIAL KEY TO SOME COMMON GENERA OF SUCKING LICE

Chester J. Stojanovich and Harry D. Pratt

with eyes or ocular points

without eyes or ocular points

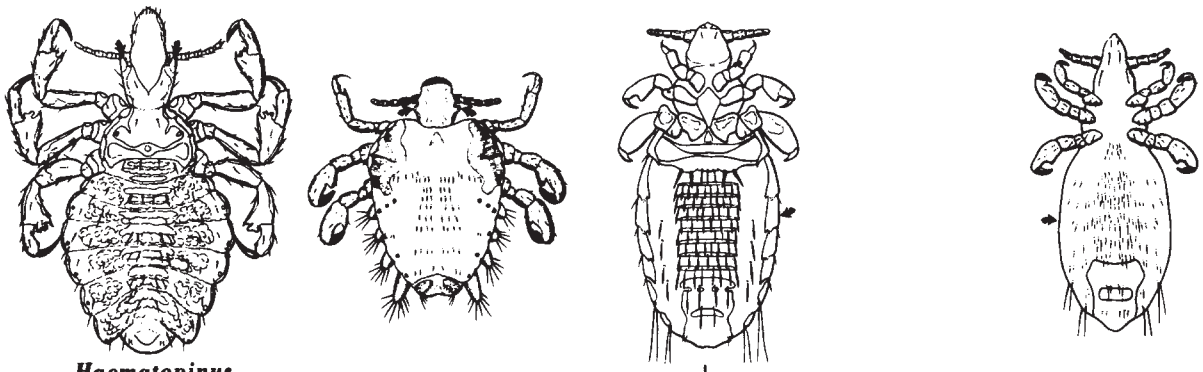


ocular points present, eyes absent

eyes present, ocular points absent

abdomen with lateral plates

abdomen without lateral plates



Haematopinus

without hairy tubercles

with hairy tubercles

sternal plate well-developed

sternal plate narrow or absent

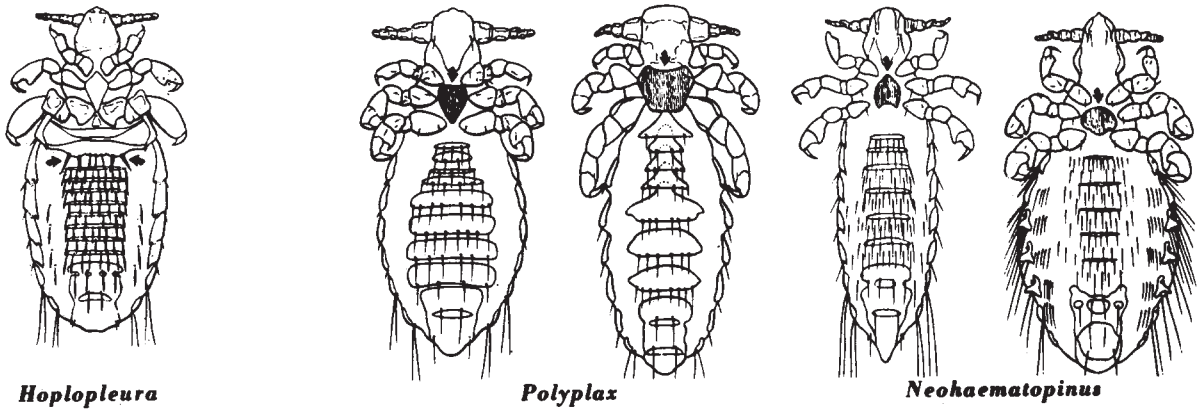
Pediculus ***Pthirus*** ***Solenopotes*** ***Linognathus***

2 groups of 2 or 3 stout spines present at base of abdomen

2 groups of 2 or 3 stout spines absent at base of abdomen

front of sternal plate not rounded

front of sternal plate rounded



Hoplopleura ***Polyplax*** ***Neohaematopinus***

ANOPLURA: KEY TO NORTH AMERICAN SPECIES

Chester J. Stojanovich and Harry D. Pratt

Key to Families of Anoplura

1. Head and thorax more or less thickly covered with setae; in some species the setae are modified into scales (Fig. 1 A). On marine animals.....FAMILY ECHINOPHTHIRIIDAE

   Head and thorax with only a few setae (Fig. 1 B).....2

Fig. 1 A

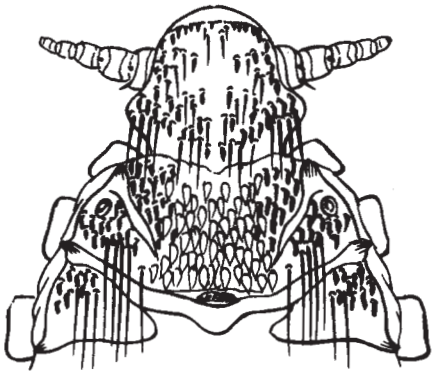
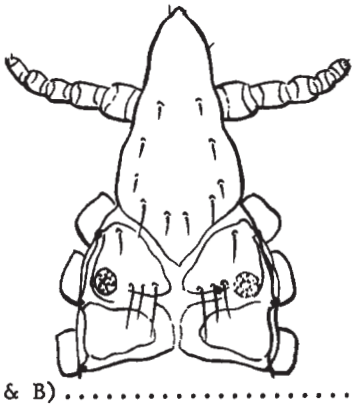


Fig. 1 B



2. Eyes present or with prominent ocular points (Fig. 2 A & B).....3

   Eyes and ocular points absent (Fig. 2 C).....4

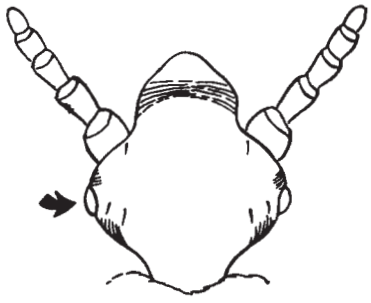


Fig. 2 A

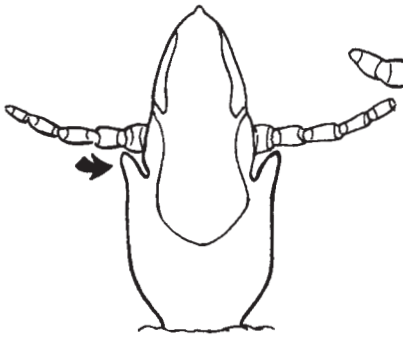


Fig. 2 B

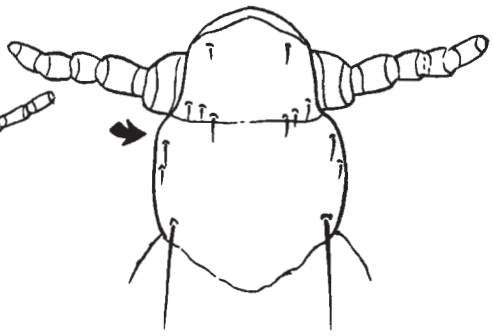


Fig. 2 C

3. Abdomen without irregular sclerotized plates on dorsum and venter (Fig. 3 A). On man. .....FAMILY PEDICULIDAE

   Abdomen with irregular sclerotized plates on dorsum and venter (Fig. 3 B). On hoofed animals.....FAMILY HAEMATOPINIDAE

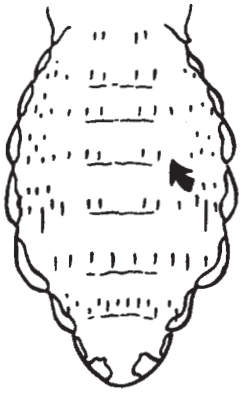


Fig. 3 A

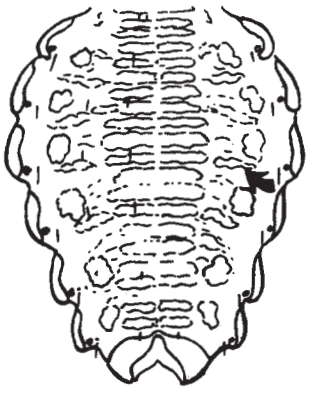


Fig. 3 B

4. Paratergal plates absent (Fig. 4 A). On hoofed animals or carnivores.....
.....FAMILY LINOGNATHIDAE

Paratergal plates present (Fig. 4 B). On rodents and lagomorphs...FAMILY HOPLOPLEURIDAE

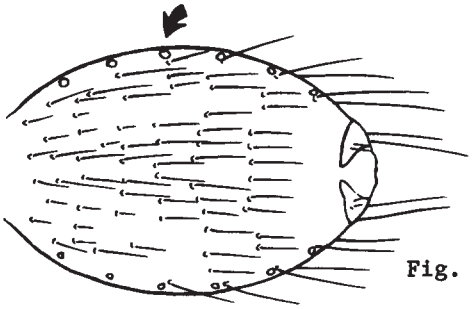


Fig. 4 A

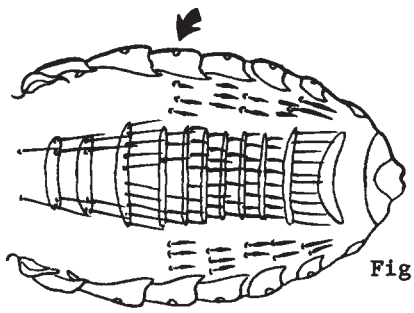


Fig. 4 B

Key to Genera of Echinophthiriidae

1. Antennae four-segmented; abdomen without scale-like setae (Fig. 1 A).....2

Antennae five-segmented; abdomen with scale-like setae (Fig. 1 B).....Antarctophthirus

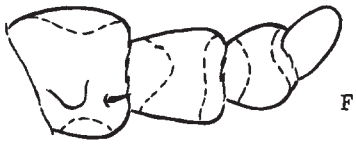


Fig. 1 A

Fig. 1 B

2. Legs all essentially the same size (Fig. 2 A).....Echinophthirius horridus (von Olfers)

Anterior legs small; second and third legs stout (Fig. 2 B).....
.....Proechinophthirus fluctus (Ferris)

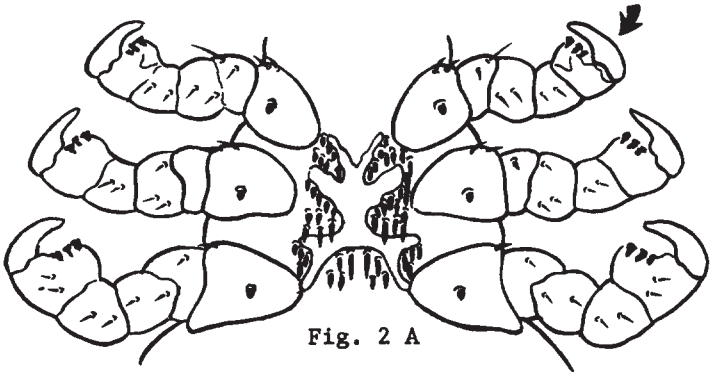


Fig. 2 A

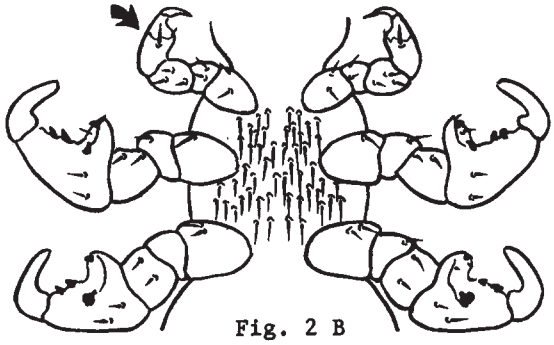


Fig. 2 B

Key to Species of Antarctophthirus

1. Scale-like setae present only on abdomen (Fig. 1 A).*Antarctophthirus callorhini* (Osborn)

   Scale-like setae present on thorax and abdomen (Fig. 1 B).....2

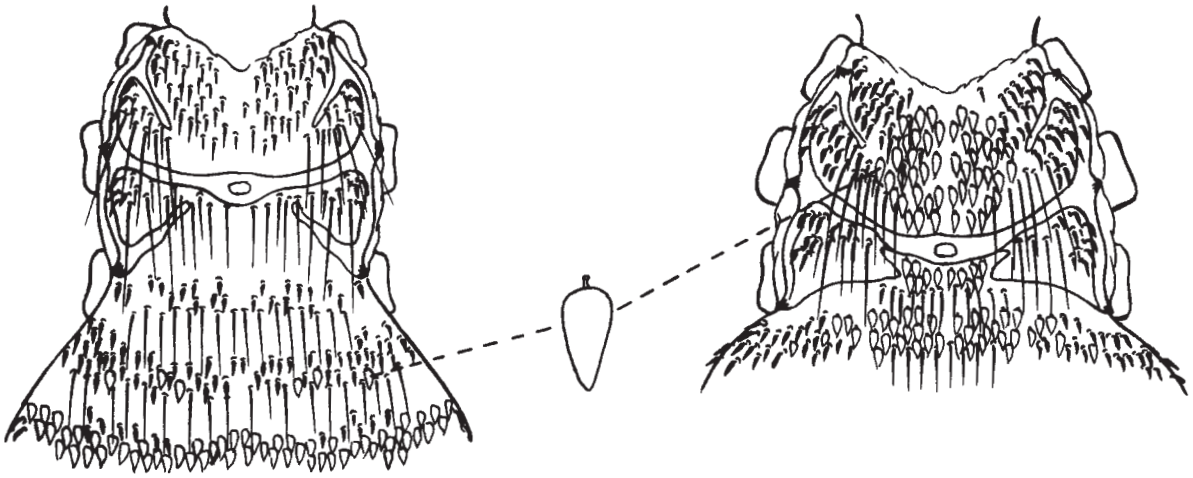


Fig. 1 A

Fig. 1 B

2. Thoracic sternum with a few long setae on posterior border (Fig. 2 A).....
   .....*Antarctophthirus microchir* (Troussart & Neumann)

   Thoracic sternum without long setae on posterior border (Fig. 2 B).....
   .....*Antarctophthirus trichechi* (Bohemann)

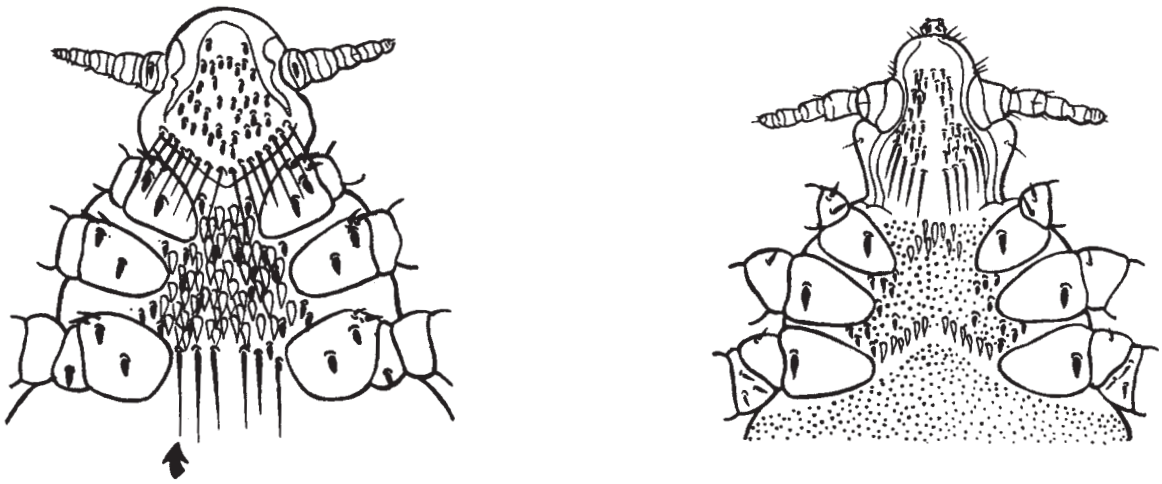


Fig. 2 A

Fig. 2 B

Key to Genera of Haematopinidae

1. Sternal plate of thorax present; eyes absent but with prominent ocular points (Fig. 1 A) .....Haematopinus

   Sternal plate of thorax absent; eyes present (Fig. 1 B). On peccary..... .....Pecaroecus javalii Babcock & Ewing

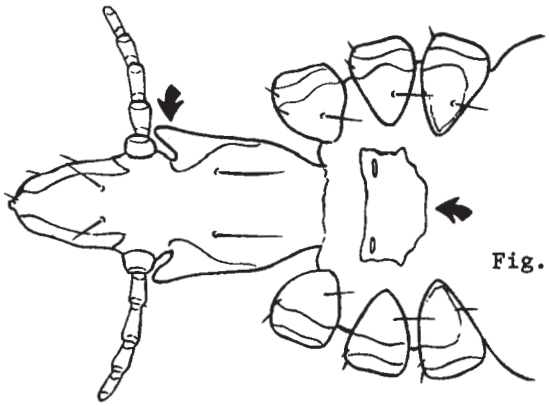


Fig. 1 A

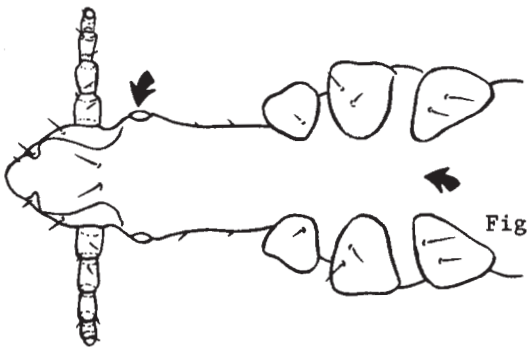


Fig. 1 B

Key to Species of Haematopinus

1. Thoracic sternal plate wider than long, sternal pits on plate (Fig. 1 A). Hog louse.... .....Haematopinus suis (Linnaeus)

   Thoracic sternal plate longer than wide; sternal pits off plate (Fig. 1 B).....2

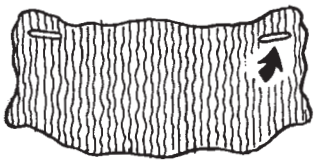


Fig. 2 A

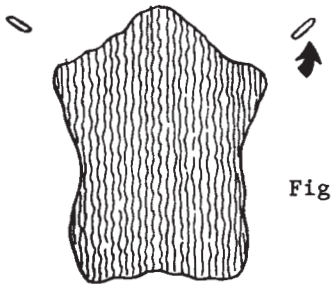


Fig. 2 B

2. Head at least two times as long as wide at ocular points; sternal plate without a median projection (Fig. 2 A & B). On equines. Horse sucking louse..... .....Haematopinus asini (Linnaeus)

   Head not two times as long as wide at ocular points; sternal plate with a median projection (Fig. 2 C & D). On cattle.....3

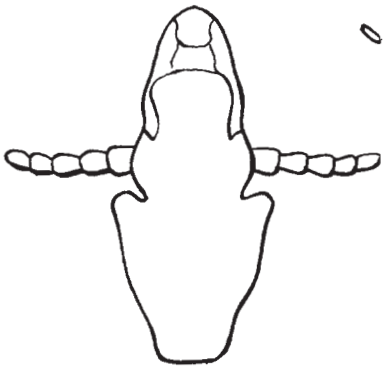


Fig. 2 A

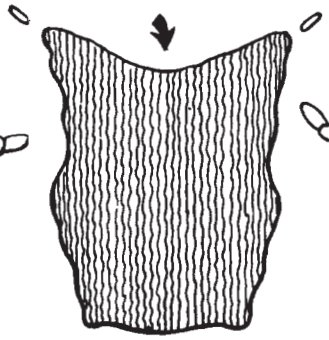


Fig. 2 B

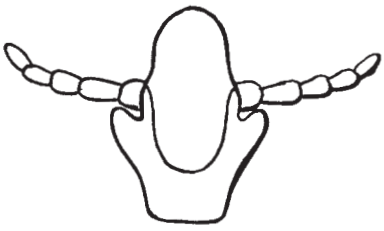


Fig. 2 C

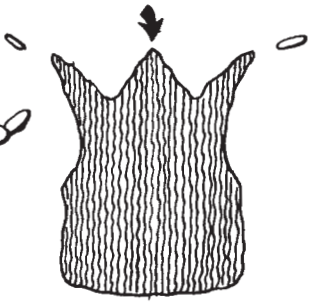


Fig. 2 D

3. Thoracic sternal plate with median projection blunt and rounded; male genital plate with six setae (Fig. 3 A & B). Short-nosed cattle louse.....
.....Haematopinus eurysternus (Nitzsch)

Thoracic sternal plate with median projection more acute and longer; male genital plate with four setae (Fig. 3 C & D). Cattle tail louse.....
.....Haematopinus quadripertusus Fahrenholz

Fig. 3 A

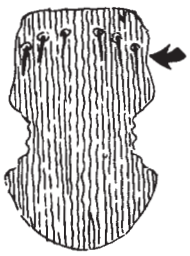


Fig. 3 B

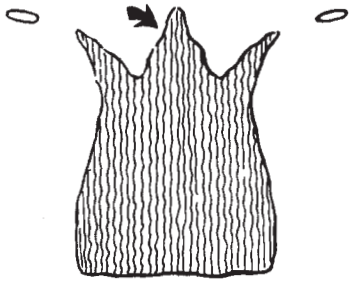


Fig. 3 C

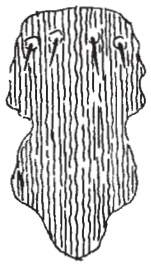


Fig. 3 D

Key to Genera of Hoplopleuridae

1. Paratergal plates very small being merely slightly sclerotized points (Fig. 1 A).....
.....Haemodipsus

Paratergal plates on at least one abdominal segment usually as long as, or at least half as long as, the sternal plate (Fig. 1 B).....2

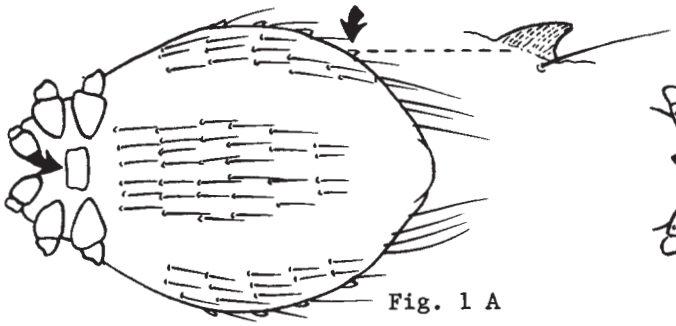


Fig. 1 A

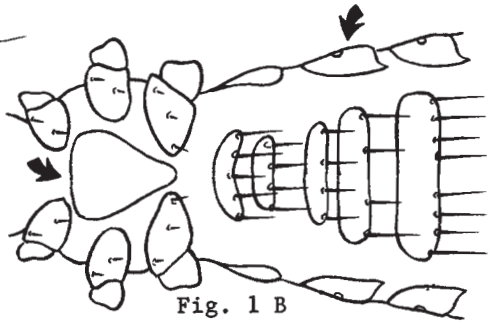


Fig. 1 B

2. First and second pair of legs of the same size and form, both being more slender and smaller than the third pair of legs (Fig. 2 A).....3

First pair of legs smallest of the three pairs; the second pair with stouter claws (Fig. 2 B).....4

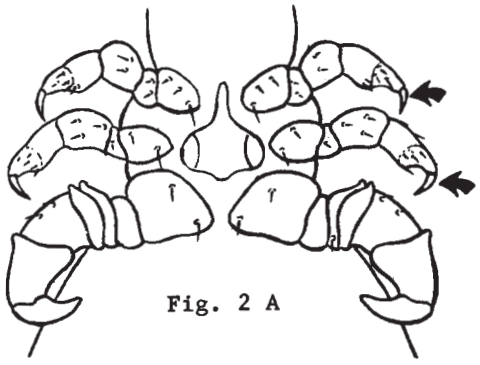


Fig. 2 A

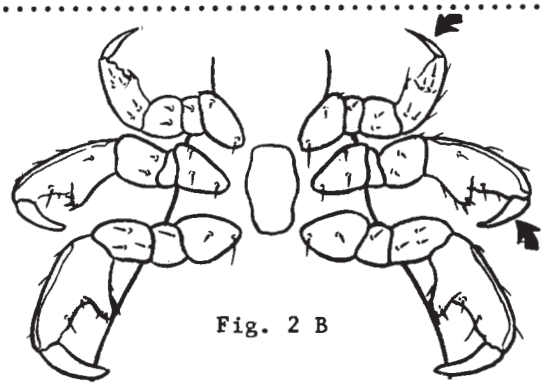


Fig. 2 B

3. A pair of small sclerotized plates present on venter of abdominal segment 2 (Fig. 3 A); antennae and head without hook-like processes.....Enderleinellus

   Sclerotized plates entirely lacking on venter of abdominal segment 2; antennae and head with hook-like processes (Fig. 3 B).....Microphthirus uncinatus (Ferris)

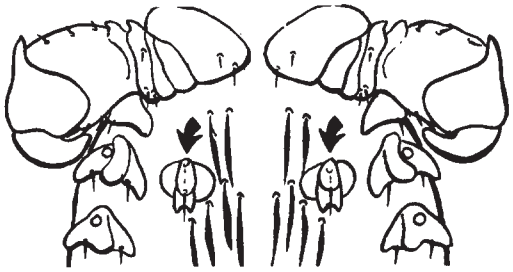


Fig. 3 A

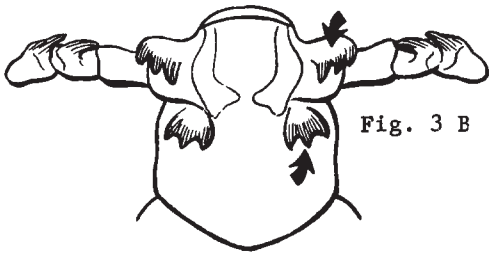


Fig. 3 B

4. Antennae four-segmented (sometimes appearing three-segmented); bladder-like expansions on third leg (Fig. 4 A & B).....Haematopinoides squamosus Osborn

   Antennae five-segmented; bladder-like expansions lacking on third leg (Fig. 4 C).....5

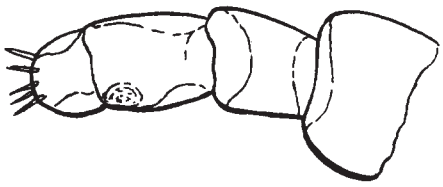


Fig. 4 A

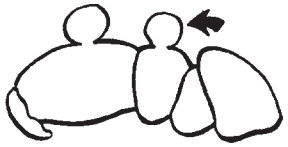


Fig. 4 B

Fig. 4 C

5. First sternite of abdominal segment 3 extended laterally to articulate with its corresponding paratergal plate; this sternite bearing two groups of two or three stout setae (Fig. 5 A).....Hoplopleura

   First sternite of abdominal segment 3 never articulating with paratergal plate (Fig. 5 B).....6

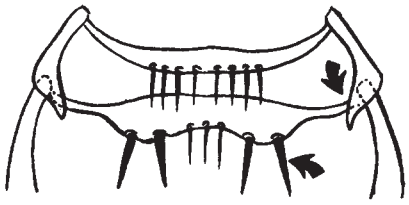


Fig. 5 A

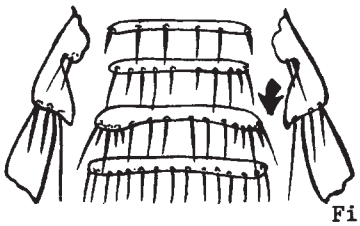


Fig. 5 B

6. Paratergal plate 2 completely divided longitudinally, one plate on the dorsum and the other on the venter of the abdomen (Fig. 6 A).....Fahrenholzia

   Paratergal plate 2 never completely divided to form two distinct plates (Fig. 6 B)....7

Fig. 6 A

Fig. 6 B

7. Sternal plate of thorax usually pointed posteriorly or, if truncate, always associated with a huge enlargement of the first antennal segment (Fig. 7 A & B).....Polyplax

   Sternal plate of thorax usually emarginate posteriorly or sometimes quadrate in shape (Fig. 7 C & D).....Neohaematopinus

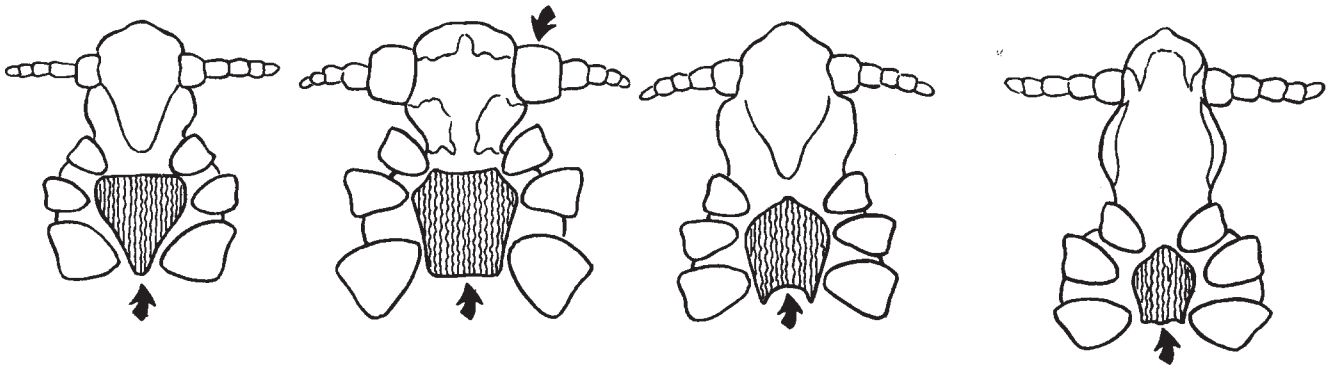


Fig. 7 A Fig. 7 B Fig. 7 C Fig. 7 D

Key to Species of Enderleinellus

1. Paratergal plates present on abdominal segments 2-5 (Fig. 1 A).....2

   Paratergal plates present on abdominal segments 2-6; abdominal sternites and tergites present in both sexes (Fig. 1 B). On Sciurus.....Enderleinellus nitzschi Fahrenholz

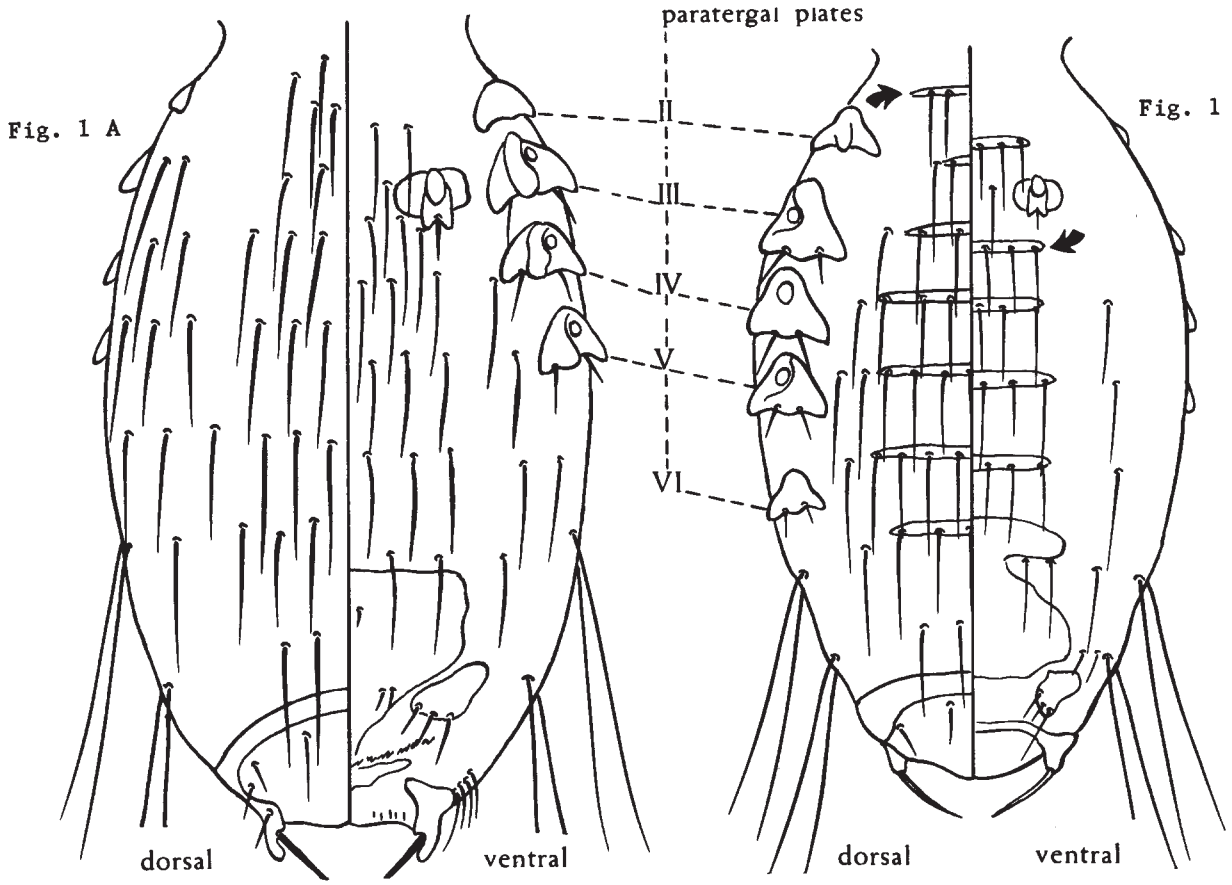


Fig. 1 A Fig. 1 B

2. Paired ventral plates of abdominal segment 2 completely detached from its corresponding paratergal plate; each ventral plate bearing a single seta (Fig. 2 A). On Sciurus....3

   Paired ventral plates of abdominal segment 2 each extending laterally to unite with its corresponding paratergal plate; ventral plates without setae (Fig. 2 B).....5

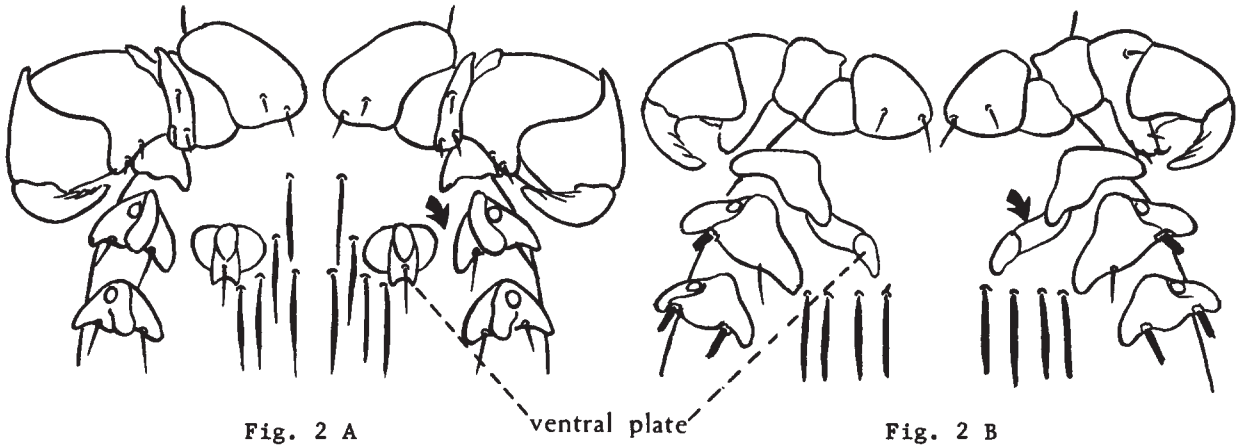


Fig. 2 A

Fig. 2 B

3. Spermatheca present; arms of basal plate apically bilobed (Fig. 3 A & B).....4

   Spermatheca absent; arms of basal plate not apically bilobed (Fig. 3 C)..... .....Enderleinellus kelloggi Ferris

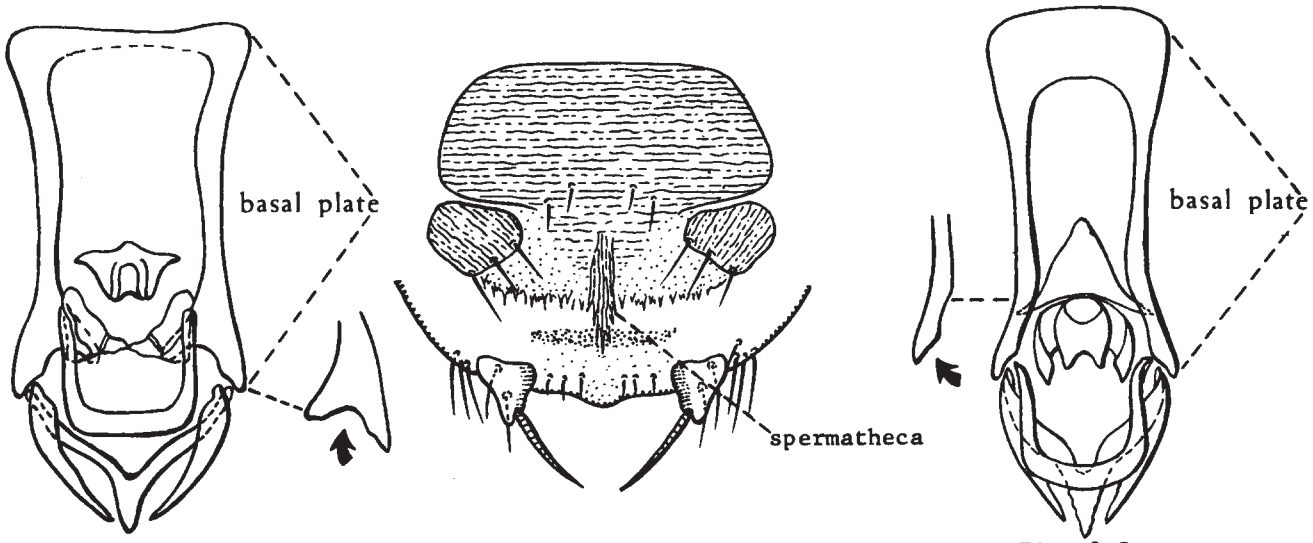


Fig. 3 A

Fig. 3 B

Fig. 3 C

4. Spermatheca a straight slightly tapering tube; arms of basal plate apically bilobed but not expanded (Fig. 4 A & B).....Enderleinellus longiceps (Kellogg & Ferris)

Spermatheca bent and with its ends expanded; arms of basal plate apically expanded and strongly bilobed (Fig. 4 C).....Enderleinellus arizonensis Werneck

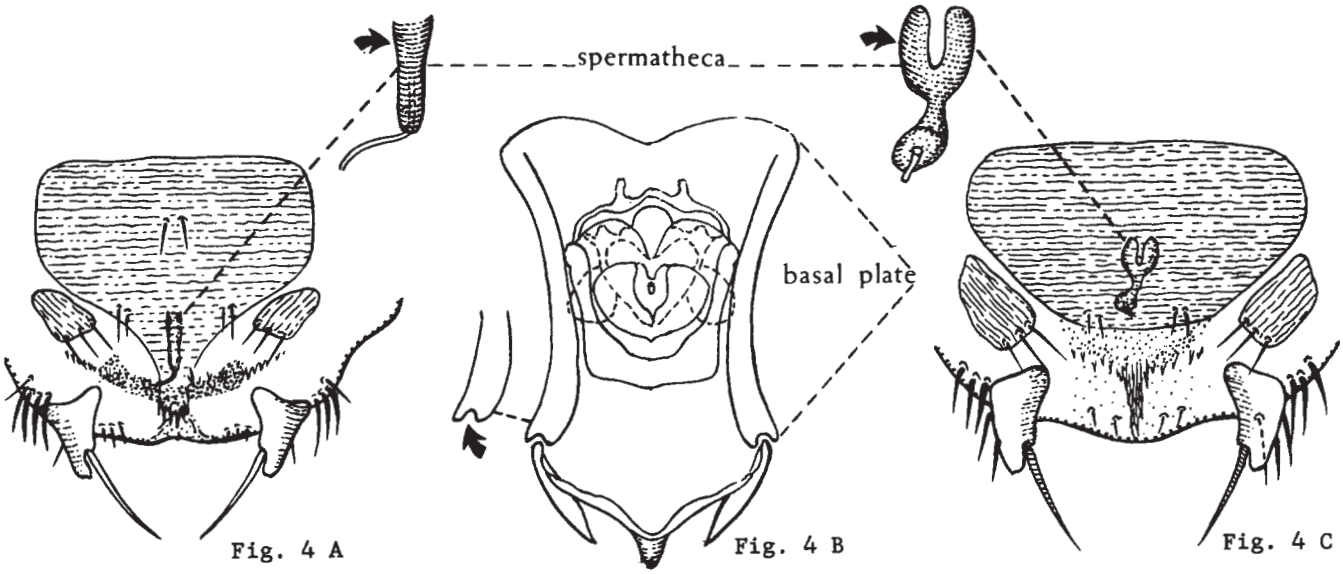


Fig. 4 A Fig. 4 B Fig. 4 C

5. Paratergal plate 5 and lateral margin of abdominal segment 6 without a pair of long setae (Fig. 5 A).....6

Paratergal plates or lateral margins of abdominal segments 4-8 with a pair of long setae (Fig. 5 B). On Marmota.....Enderleinellus marmotae Ferris

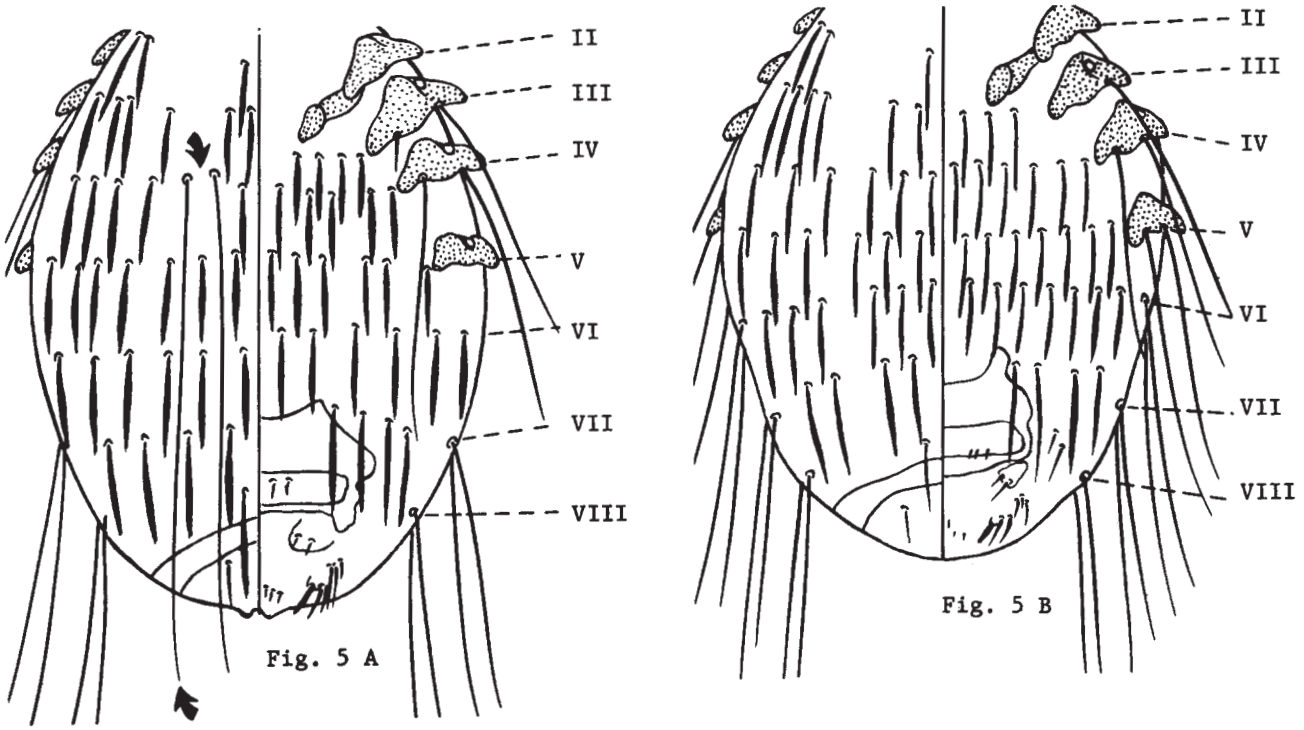


Fig. 5 A Fig. 5 B

6. Female with 2-4 long setae on dorsum of abdominal segment 4 reaching to apex of body (Fig. 5 A). On Citellus and Cynomys.....Enderleinellus osborni (Kellogg & Ferris)

Female without such setae. On Citellus.....Enderleinellus suturalis (Osborn)

Key to Species of Fahrenholzia

1. Paratergal plates present only on abdominal segments 2 to 4 (Fig. 1 A).....2

   Paratergal plates present on at least abdominal segments 2-6 (Fig. 1 B).....6

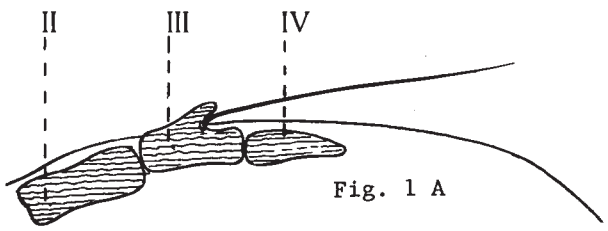


Fig. 1 A

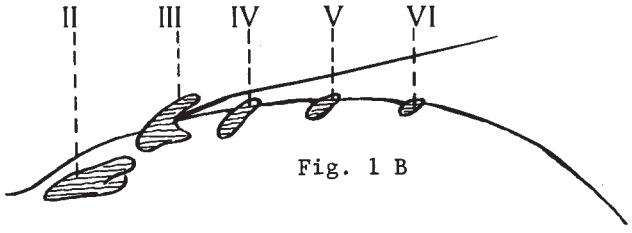


Fig. 1 B

2. Dorsal surface of abdomen with a narrow, sclerotized, median, longitudinal plate between paratergal plates 2 (Fig. 2 A). On Liomys.....3

   Dorsal surface of abdomen without such a plate (Fig. 2 B). On Perognathus and Dipodomys 5

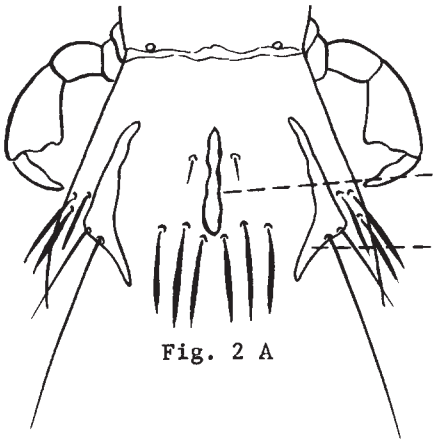


Fig. 2 A

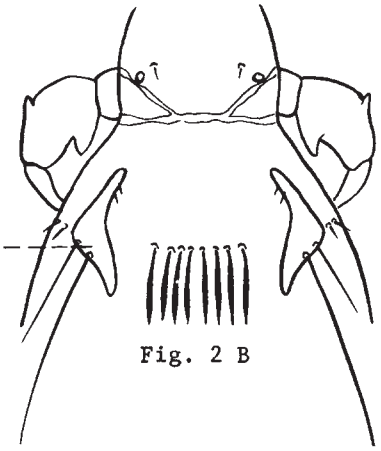


Fig. 2 B

3. Thoracic sternal plate concave on anterior margin; dorsal lobe of paratergal plate 3 pointed apically (Fig. 3 A & B).....Fahrenholzia texana Stojanovich & Pratt

   Thoracic sternal plate convex on anterior margin; dorsal lobe of paratergal plate 3 apically truncate (Fig. 3 C & D).....4

Fig. 3 A

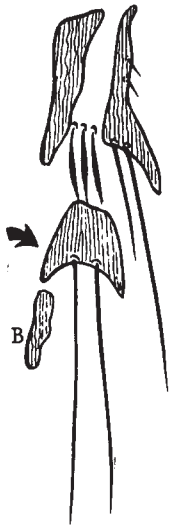


Fig. 3 B

Fig. 3 C

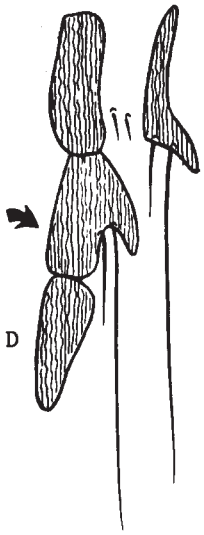


Fig. 3 D

4. Dorsal lobe of paratergal plate 2 with the smaller seta about as long as the plate (Fig. 4 A).....Fahrenholzia ehrlichi Johnson

   Dorsal lobe of paratergal plate 2 with the smaller seta minute, much shorter than the plate (Fig. 4 B).....Fahrenholzia microcephala Ferris

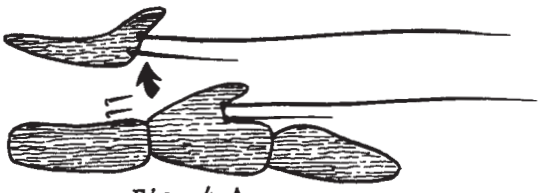


Fig. 4 A

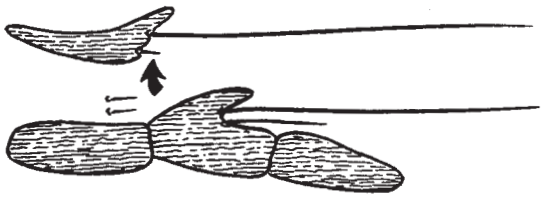


Fig. 4 B

5. Paratergal plates of abdominal segment 2 with a single pair of setae between dorsal and ventral lobes; male genitalia with parameres greatly expanded; female genital plate present (Fig. 5 A, B, & C).....Fahrenholzia pinnata Kellogg & Ferris

   Paratergal plates of abdominal segment 2 with 6 to 8 long setae between dorsal and ventral lobes; parameres of male genitalia not expanded; female genital plate absent (Fig. 5 D & E).....Fahrenholzia reducta Ferris

Fig. 5 A

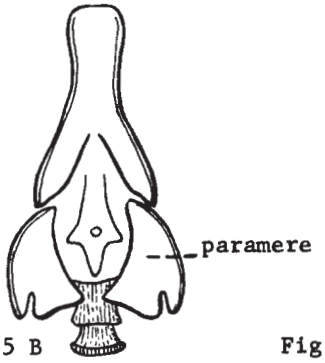


Fig. 5 B

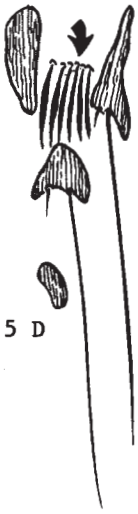


Fig. 5 D

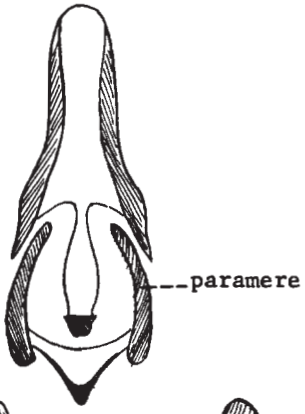


Fig. 5 E

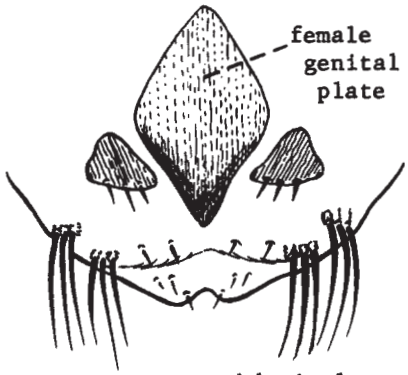


Fig. 5 C

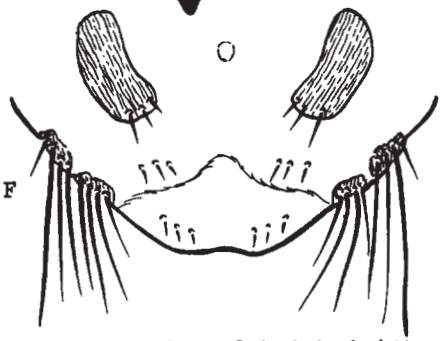


Fig. 5 F

6. Paratergal plates present on abdominal segments 2 to 6; paratergal plate 3 bilobed (Fig. 6 A).....Fahrenholzia zacatecae Ferris

   Paratergal plates present on abdominal segments 2 to 7; paratergal plate 3 not bilobed (Fig. 6 B).....Fahrenholzia tribulosa Ferris

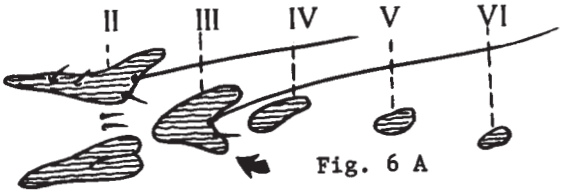


Fig. 6 A

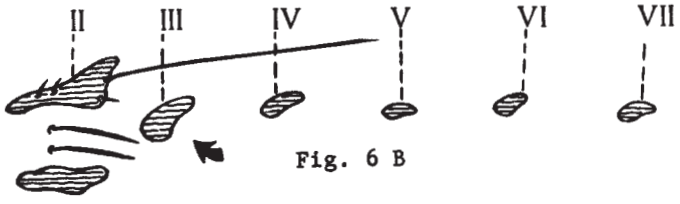


Fig. 6 B

Key to Species of Hoplopleura

1. Third abdominal sternal plate with two groups of two stout setae (Fig. 1 A).....2

   Third abdominal sternal plate with two groups of three stout setae (Fig. 1 B).....
   On Glaucomys.....Hoplopleura trispinosa Kellogg & Ferris

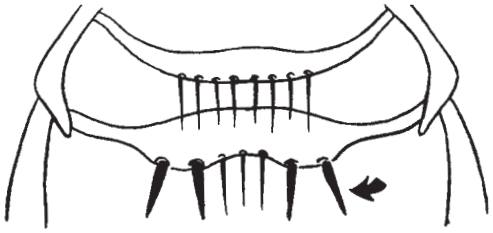


Fig. 1 A

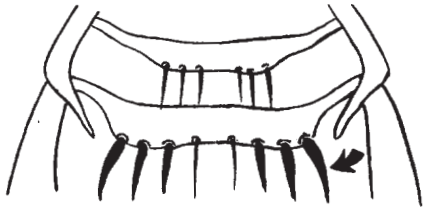


Fig. 1 B

2. Posterior margins of paratergal plates 3-5 with a broad or pointed lobe on each side (Fig. 2 A & B).....3

   Posterior margins of paratergal plates 3-5 with four rounded lobes (Fig. 2 C).....
   On Oryzomys.....Hoplopleura oryzomydis Pratt & Lane

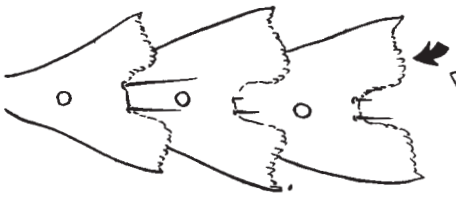


Fig. 2 A

Fig. 2 B

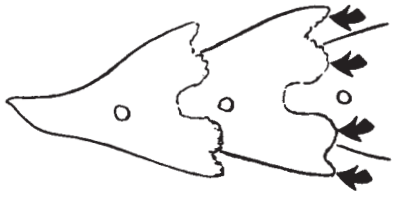


Fig. 2 C

3. Paratergal plates 4 and 5 with broad lobes on posterior margin (Fig. 3 A).....4

   Paratergal plates 4 and 5 with pointed lobes on posterior margin (Fig. 3 B).....7

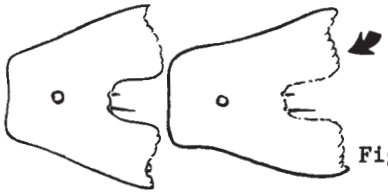


Fig. 3 A

Fig. 3 B

4. Paratergal plates 4 and 5 with one large and one minute seta on posterior margin (Fig. 4 A).....5

   Paratergal plates 4 and 5 with two large setae on posterior margin (Fig. 4 B).....
   On field rodents.....Hoplopleura acanthopus (Burmeister)

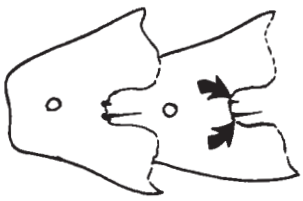


Fig. 4 A

Fig. 4 B

5. Abdomen with setae in some of the membrane between sternal and paratergal plates (Fig. 5 A). On Rattus.....Hoplopleura oenomydis Ferris

   Abdomen without setae in membrane between ends of sternal and paratergal plates (Fig. 5 B).....6

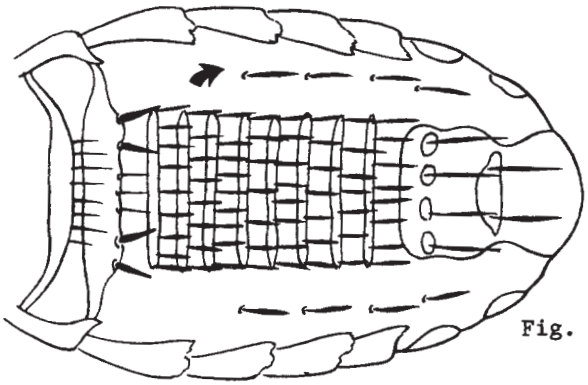


Fig. 5 A

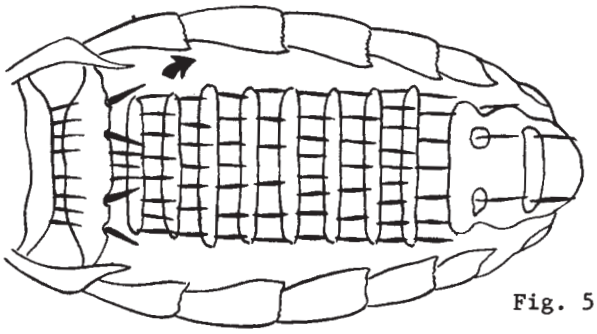


Fig. 5 B

6. Thoracic sternal plate pointed posteriorly (Fig. 6 A). On Peromyscus.....
   .....*Hoplopleura hesperomydis (Osborn) and *Hoplopleura ferrisi Cook & Beer

   Thoracic sternal plate blunt posteriorly (Fig. 6 B). On Onychomys.....
   .....Hoplopleura onychomydis Cook & Beer

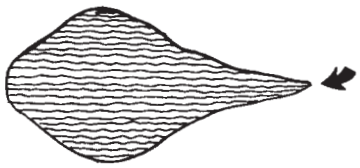


Fig. 6 A

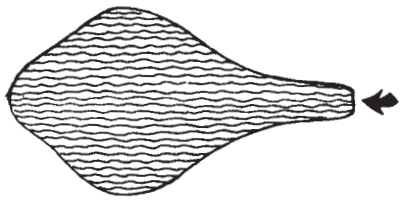


Fig. 6 B

7. Thoracic sternal plate about as long as broad; first sternal plate on abdominal segment 3 with two stout setae usually set close together on each side (Fig. 7 A).....8

   Thoracic sternal plate definitely longer than broad; first sternal plate on abdominal segment 3 with two stout setae more widely spaced on each side (Fig. 7 B).....9

Fig. 7 A

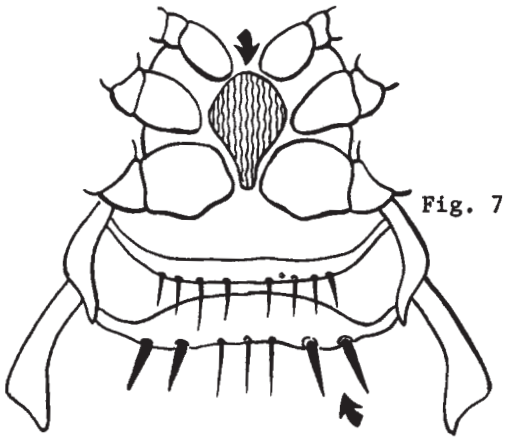


Fig. 7 B

*These species are separated only in the immature stages.

8. Paratergal plate 6 with posterior angles produced into points (Fig. 8 A). On Eutamias .....Hoplopleura arboricola Kellogg & Ferris

   Paratergal plate 6 without points on posterior angles (Fig. 8 B). On Tamias..... .....Hoplopleura erratica (Osborn)

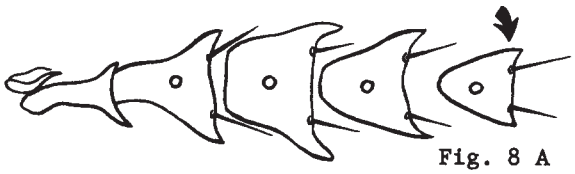


Fig. 8 A

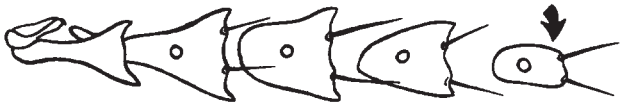


Fig. 8 B

9. Posterior margin of paratergal plate 6 with angles produced to form a deep emargination (Fig. 9 A). On Sciurus.....Hoplopleura sciuricola Ferris

   Posterior margin of paratergal plate 6 with angles not produced to form a deep emargination (Fig. 9 B). On Sigmodon.....10

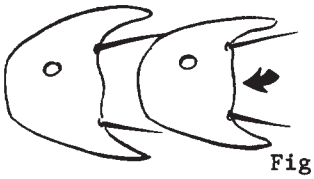


Fig. 9 A

Fig. 9 B

10. Female with paratergal plates 4-6 elongated; male with 11 tergal plates bearing a row of setae (Fig. 10 A & B).....Hoplopleura arizonensis Stojanovich & Pratt

    Female with paratergal plates 4-6 only slightly elongated; male with only 7 tergal plates bearing a row of setae (Fig. 10 C & D).....Hoplopleura hirsuta Ferris

Fig. 10 A

Fig. 10 C

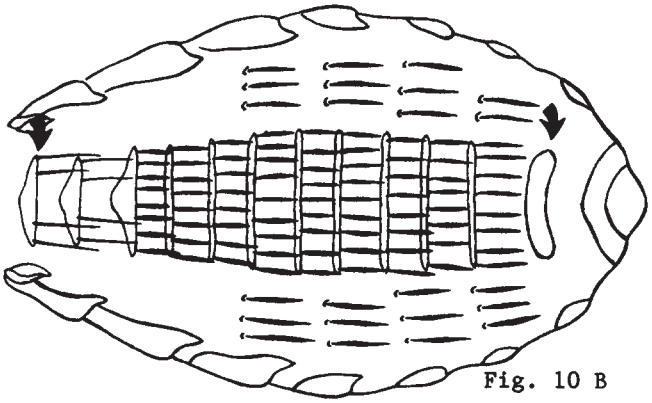


Fig. 10 B

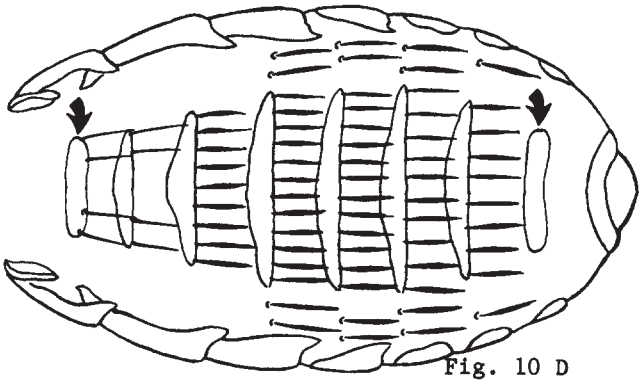


Fig. 10 D

Key to Species of Haemodipsus

1. Thoracic sternal plate almost three times as wide as long (Fig. 1 A). On domestic rabbits (Oryctolagus).....Haemodipsus ventricosus (Denny)

   Thoracic sternal plate hexogonal, being almost as long as wide (Fig. 1 B). On wild rabbits and hares (Sylvilagus and Lepus).....Haemodipsus setoni Ewing

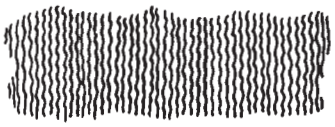


Fig. 1 A

Fig. 1 B

Key to Species of Neohaematopinus

1. Thoracic sternal plate concave on posterior margin (Fig. 1 A).....2

   Thoracic sternal plate somewhat oval, and convex on posterior margin (Fig. 1 B).....11

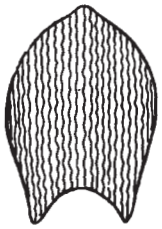


Fig. 1 A

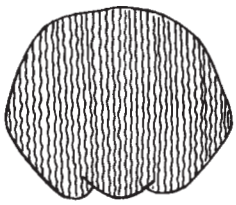


Fig. 1 B

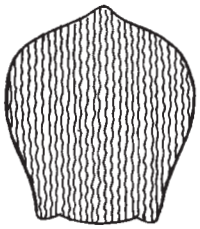


Fig. 1 C

2. Paratergal plates 3 to 6 with three spines on posterior margins (Fig. 2 A).....3

   Paratergal plates 3 to 6 with two spines on posterior margins (Fig. 2 B).....5

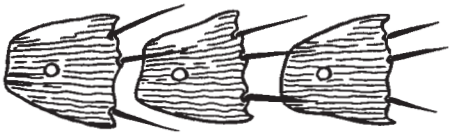


Fig. 2 A

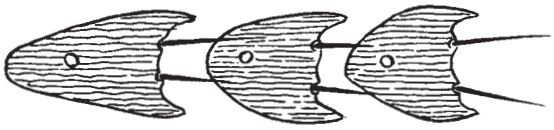


Fig. 2 B

3. Posterior angle of first antennal segment with a stout spine (Fig. 3 A). On Eutamias... .....Neohaematopinus pacificus (Kellogg & Ferris)

   Posterior angle of first antennal segment without a stout spine (Fig. 3 B).....4

Fig. 3 A

Fig. 3 B

4. Abdominal tergal and sternal plates present on each segment in both sexes (Fig. 4 A).... On Citellus tereticaudus.....Neohaematopinus citellinus Ferris

Abdominal tergal and sternal plates absent in the middle segments of female; male with only sternal plates absent (Fig. 4 B). On Citellus spilosoma..... .....Neohaematopinus spilosomae Stojanovich & Pratt

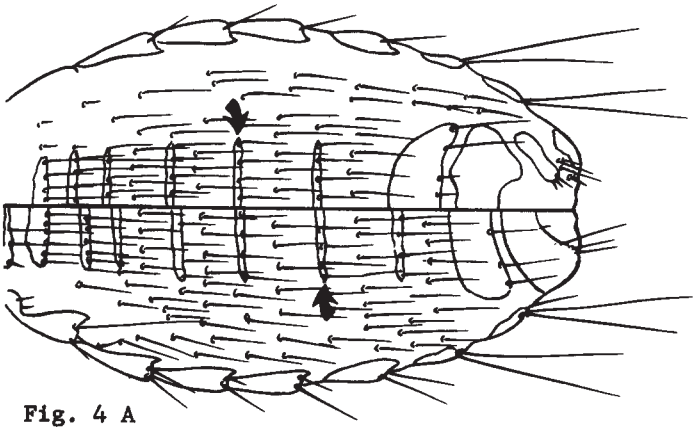


Fig. 4 A

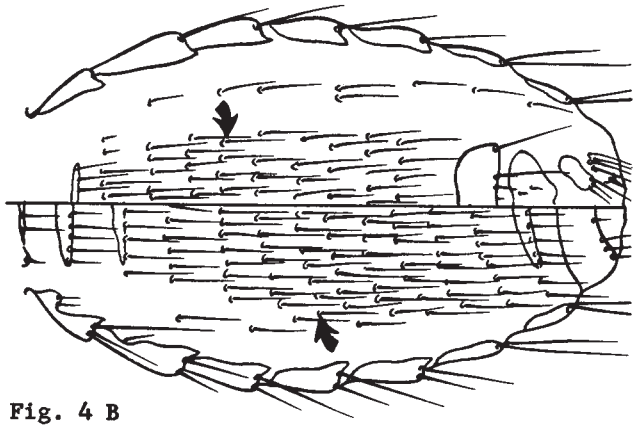


Fig. 4 B

5. First antennal segment prolonged posterio-apically, with stout spine (Fig. 5 A).....6

First antennal segment without such a prolongation (Fig. 5 B).....8

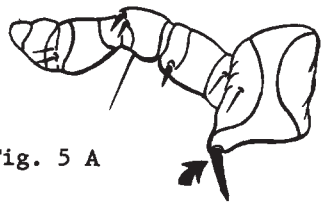


Fig. 5 A

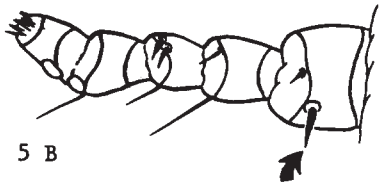


Fig. 5 B

6. Female without sternal and tergal plates on abdominal segments except for the normal terminal and genital segments (Fig. 6 A). On Sciurus griseicolus..... .....Neohaematopinus griseicolus Ferris

Female with sternal and tergal plates on all abdominal segments (Fig. 6 B).....7

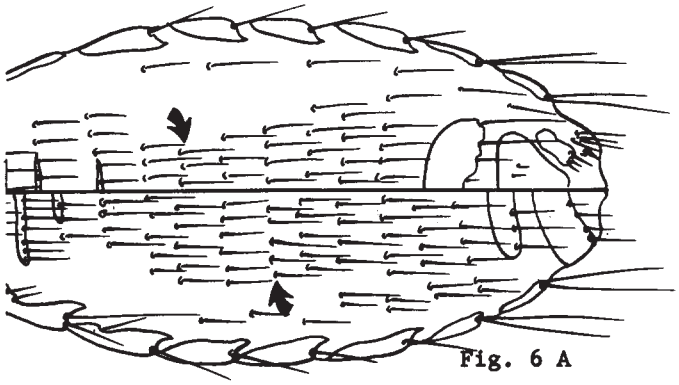


Fig. 6 A

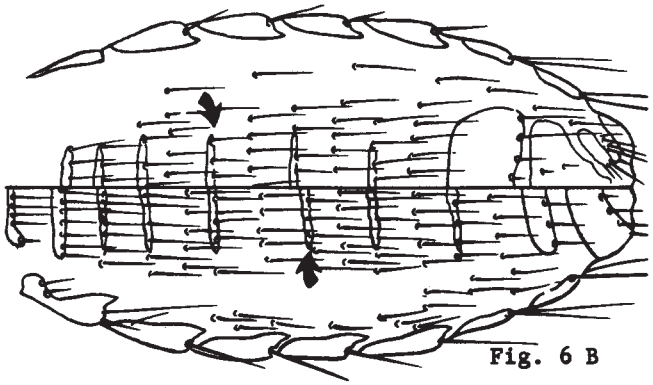


Fig. 6 B

7. Second antennal segment with short spine-like seta on posterior margin (Fig. 7 A)..... On Tamias hudsonicus.....Neohaematopinus semifasciatus Ferris

   Second antennal segment without spine-like seta (Fig. 7 B). On Sciurus niger..... .....Neohaematopinus sciurinus Mjöberg

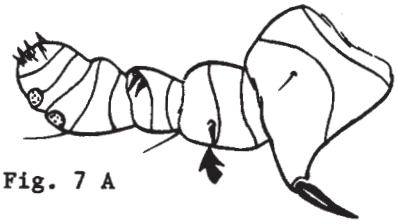


Fig. 7 A

Fig. 7 B

8. Abdominal sternal and tergal plates absent in female; male with only sternal plates absent (Fig. 8 A). On Neotoma cinerea.....Neohaematopinus inornatus Ferris

   Abdominal sternal and tergal plates present in both sexes (Fig. 9 A).....9

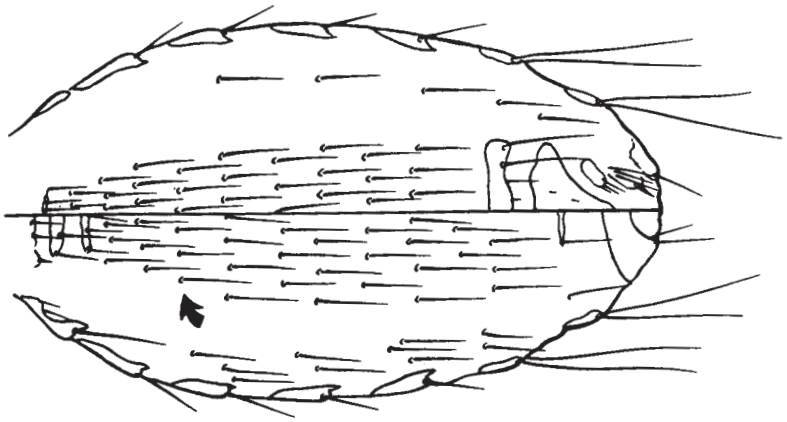


Fig. 8 A

9. A row of setae present on membrane between most of the sternal and tergal plates of abdomen (Fig. 9 A).....10

   Membrane between the abdominal sternal and tergal plates without a row of setae (Fig. 9 B). On Glaucomys.....Neohaematopinus sciuropteri (Osborn)

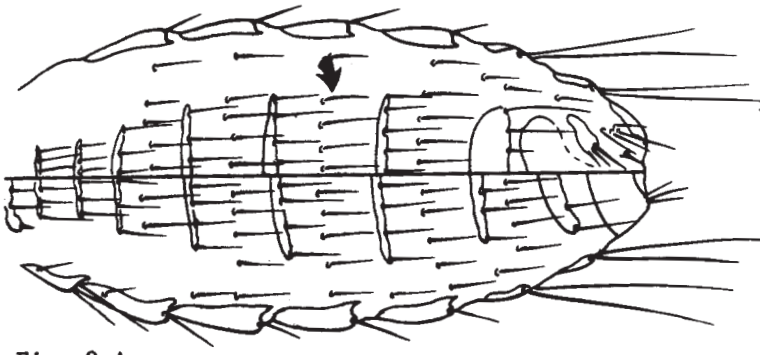


Fig. 9 A

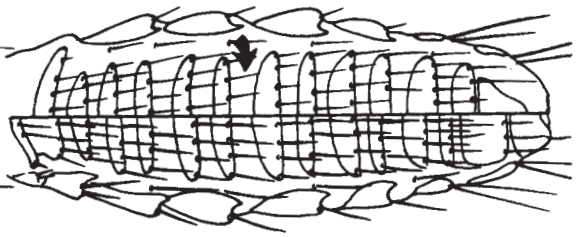


Fig. 9 B

10. First antennal segment with a spine-like seta at the posterio-apical angle (Fig. 10 A)
On Sciurus carolinensis.....Neohaematopinus sciuri Jancke

First antennal segment with a spine-like seta set somewhat away from the margin in the posterio-apical angle (Fig. 10 B). On Neotoma albigula, streatori and micropus.....
.....Neohaematopinus neotomae Ferris

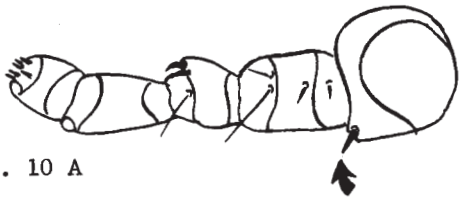


Fig. 10 A

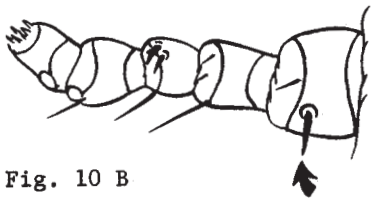


Fig. 10 B

11. Thoracic spiracle small, about one-fourth length of second coxa (Fig. 11 A).....
On Citellus and Cynomys.....Neohaematopinus laeviusculus (Grube)

Thoracic spiracle larger, almost one-half length of second coxa (Fig. 11 B).....
On Marmota.....Neohaematopinus marmotae Ferris

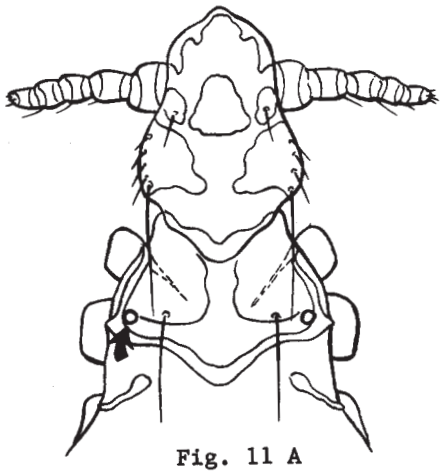


Fig. 11 A

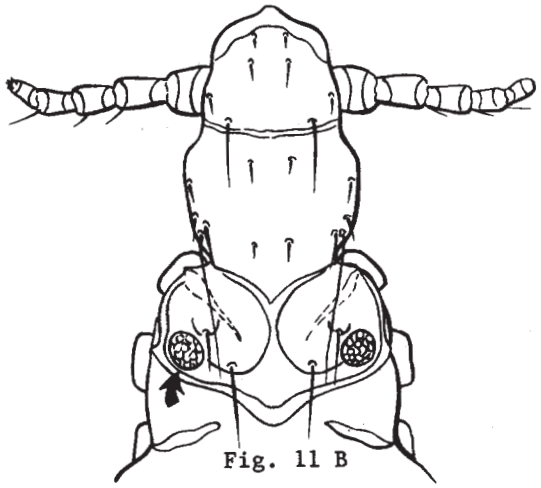


Fig. 11 B

Key to Species of Polyplax

1. Sternal plate of thorax rounded or pointed posteriorly (Fig. 1 A).....2

   Sternal plate of thorax truncate posteriorly (Fig. 1 B). On Peromyscus and Onychomys... .....Polyplax auricularis Ferris

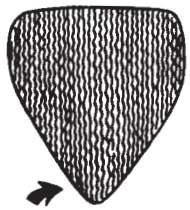


Fig. 1 A

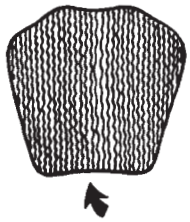


Fig. 1 B

2. Paratergal plate 4 with both setae short or subequal (Fig. 2 A).....3

   Paratergal plate 4 with dorsal seta longer than ventral seta; usually as long or longer than plate (Fig. 2 B). On house mouse.....Polyplax serrata (Burmeister)

Fig. 2 A

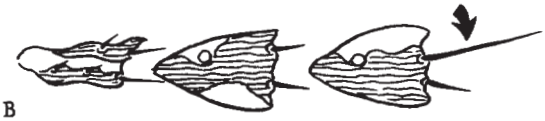


Fig. 2 B

3. Paratergal plates 3-5 with both apical angles produced into points (Fig. 3 A)..... On microtene mice.....4

   Paratergal plates 3-5 with only dorsal apical angle produced into a point (Fig. 3 B).... On Rattus.....Polyplax spinulosa (Burmeister)

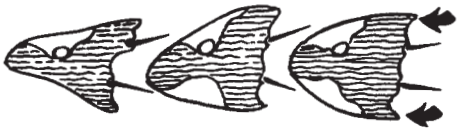


Fig. 3 A

Fig. 3 B

4. First abdominal sternal plate strongly arcuate and with its lateral angles somewhat prolonged (Fig. 4 A).....Polyplax borealis Ferris

   First abdominal sternal plate not arcuate, its posterior margin almost straight and lateral angles not produced (Fig. 4 B).....Polyplax alaskensis Ewing

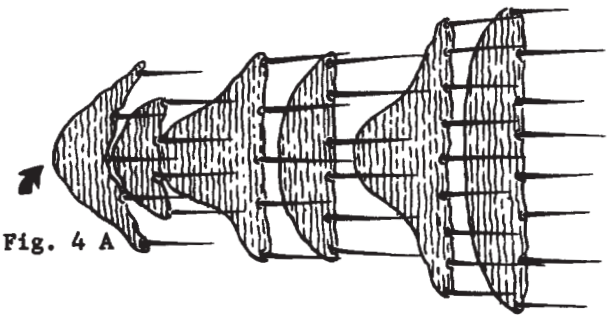


Fig. 4 A

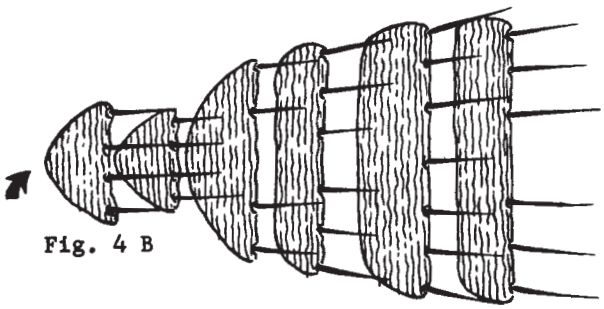


Fig. 4 B

Key to Genera of Linognathidae

1. Sternal plate of thorax at least half as wide as long (Fig. 1 A).....Solenopotes

   Sternal plate of thorax small and slender or completely lacking (Fig. 1 B)..Linognathus

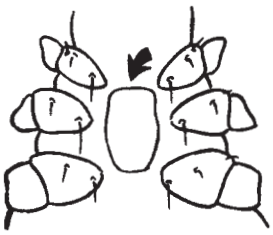


Fig. 1 A

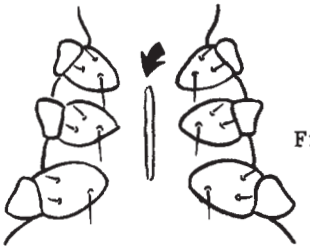


Fig. 1 B

Key to Species of Linognathus

1. Head about as broad as long; antennae almost as long as head (Fig. 1 A).....2

   Head almost twice as long as wide or longer; antennae noticeably shorter than head (Fig. 1 B).....3

Fig. 1 A

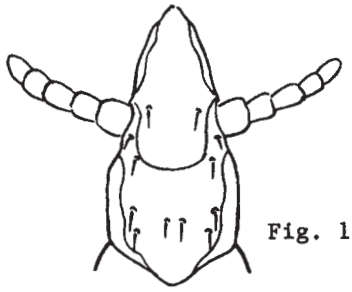


Fig. 1 B

2. Thoracic dorsum with four long setae; head slightly longer than broad (Fig. 2 A). On dogs, foxes and ferrets. Dog sucking louse.....Linognathus setosus (von Olfers)

   Thoracic dorsum with two long setae; head definitely as broad as long (Fig. 2 B)..... Sheep foot louse.....Linognathus pedalis (Osborn)

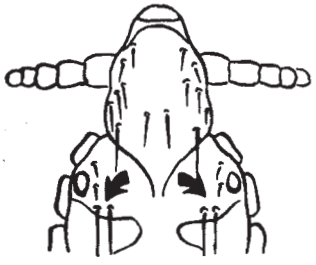


Fig. 2 A

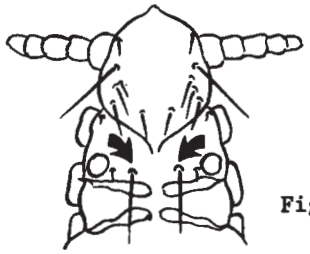


Fig. 2 B

3. Fore head acutely conical and much elongated; female gonopod with a sclerotized hook (Fig. 3 A & B). On cattle. Long-nosed cattle louse.....Linognathus vituli (Linnaeus)

   Fore head rounded (Fig. 3 C); female gonopod rounded or with a slight tooth (Fig. 5 B & C). On sheep and goats.....4

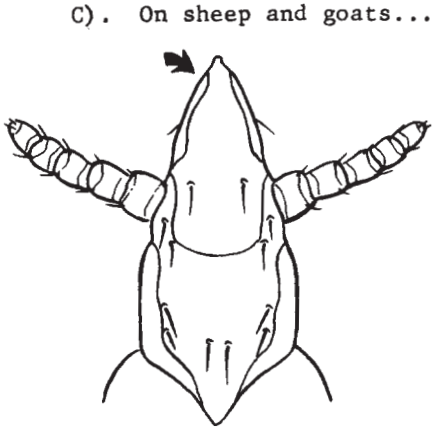


Fig. 3 A

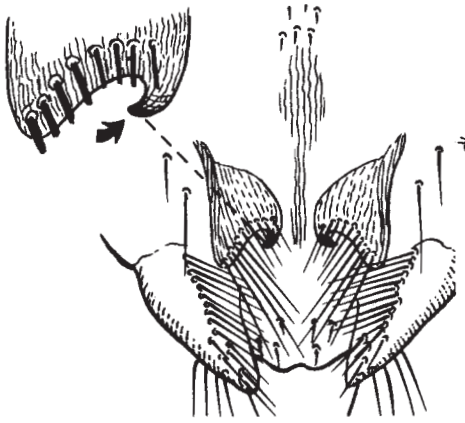


Fig. 3 B

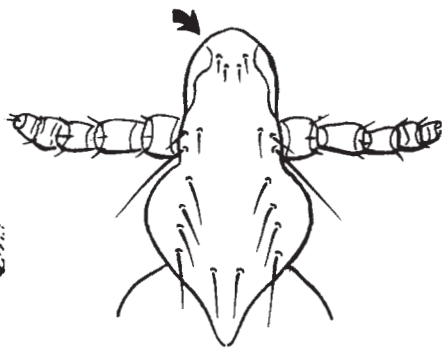


Fig. 3 C

4. Head greatly expanded behind antennae; female gonopod rounded (Fig. 4 A & B). Goat sucking louse.....Linognathus africanus (Kellogg & Paine)

   Head not greatly expanded behind antennae (Fig. 4 C).....5

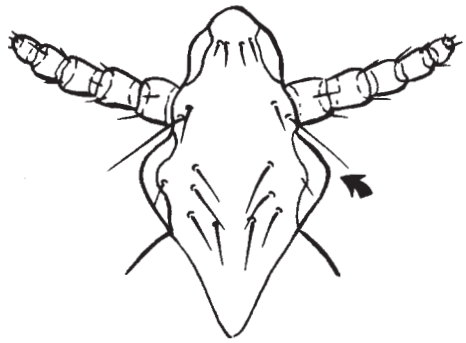


Fig. 4 A

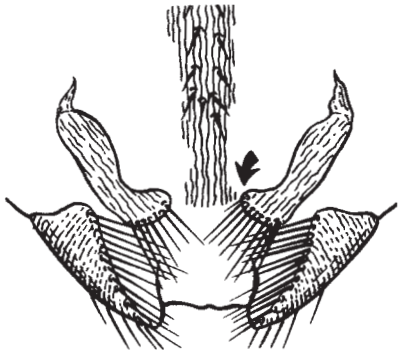


Fig. 4 B

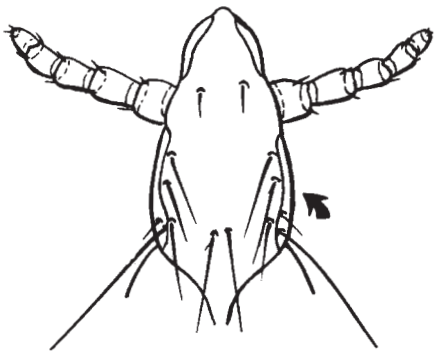


Fig. 4 C

5. Thoracic spiracle large and conspicuous; female gonopod rounded (Fig. 5 A & B). Sheep louse.....Linognathus ovillus (Neumann)

   Thoracic spiracle not large and conspicuous; female gonopod with a slight tooth (Fig. 5 C & D). Goat sucking louse.....Linognathus stenopsis (Burmeister)

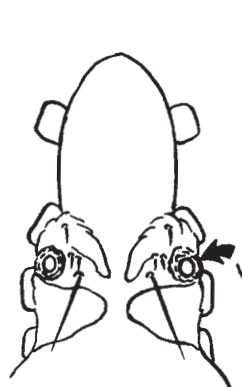


Fig. 5 A

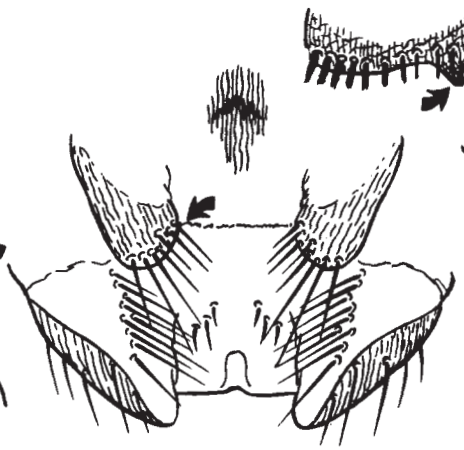


Fig. 5 B

Fig. 5 C

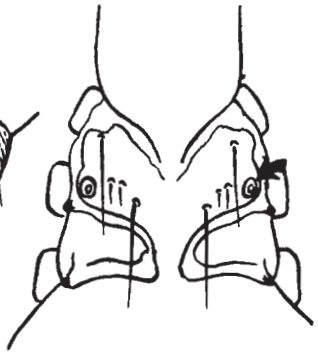


Fig. 5 D

Key to Species of Solenopotes

1. Abdominal spiracles strongly protuberant (Fig. 1 A); female genitalia with apical processes strongly constricted near middle (Fig. 1 B);-male genitalia as in figure 2 E. On cattle. Little blue cattle louse.....Solenopotes capillatus Enderlein

   Abdominal spiracles only slightly protuberant (Fig. 1 C); female genitalia with apical processes not constricted (Fig. 1 D & E); male genitalia as in figures 2 C & D. On deer.....2

Fig. 1 A

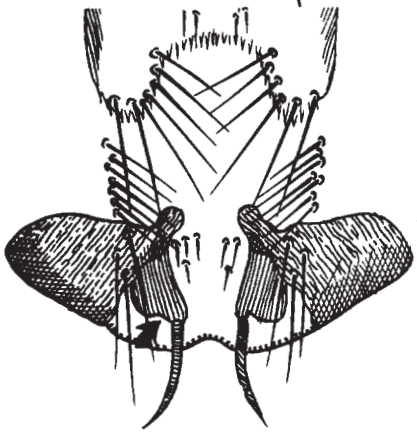


Fig. 1 B (capillatus)

Fig. 1 C

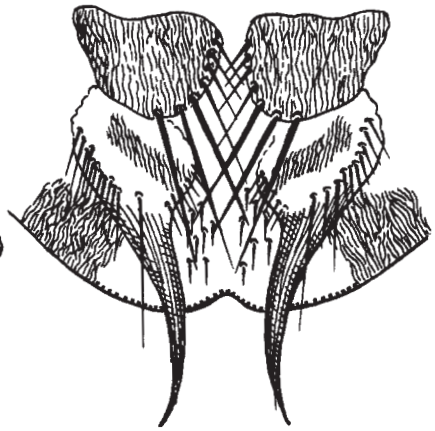


Fig. 1 D (binipilosus)

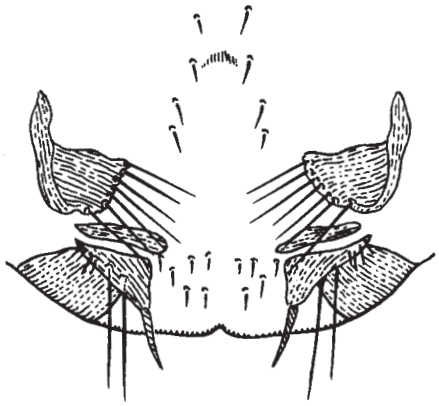


Fig. 1 E (ferrisi)

2. Neck present, head with distinct posterior-lateral angles (Fig. 2 A); female genitalia as in figure 1 E; male genitalia as in figure 2 C.....Solenopotes ferrisi (Fahrenholz)

   Head without distinct posterior-lateral angles (Fig. 2 B); female genitalia as in figure 1 D ; male genitalia as in figure 2 D.....Solenopotes binipilosus (Fahrenholz)

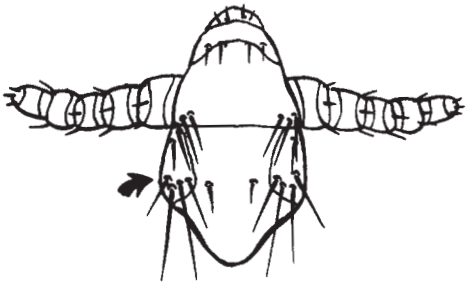


Fig. 2 A

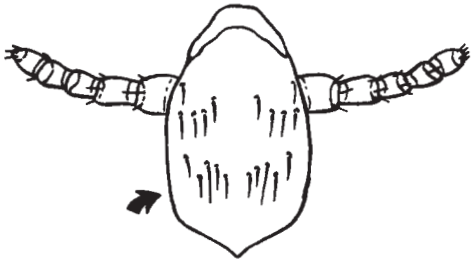


Fig. 2 B

Fig. 2 C (ferrisi)

Fig. 2 D (binipilosus)

Fig. 2 E (capillatus)

Key to Genera of Pediculidae

1. Abdomen much longer than basal width; without hairy tubercles (Fig. 1 A). Head and body louse.....*Pediculus humanus* Linnaeus

   Abdomen about as long as basal width; with hairy tubercles (Fig. 1 B). Crab louse.... .....*Pthirus pubis* (Linnaeus)

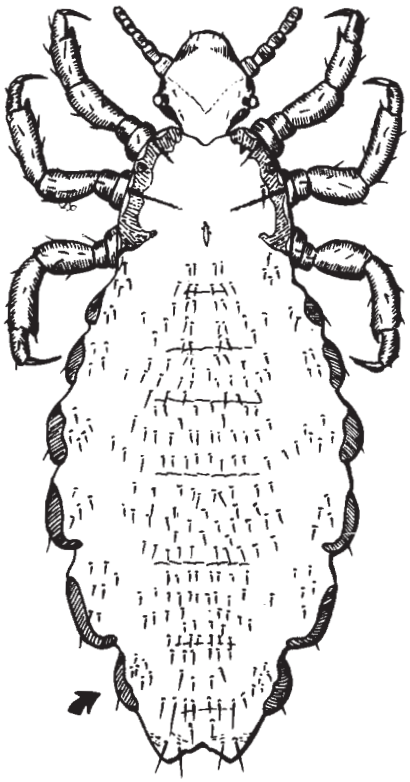


Fig. 1 A

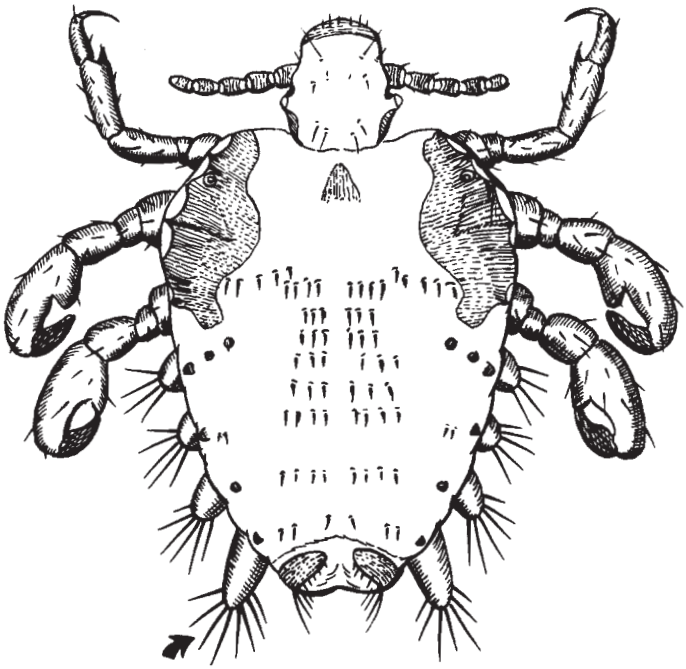
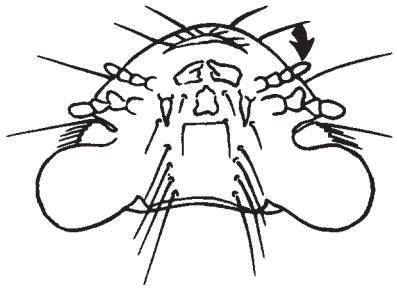


Fig. 1 B

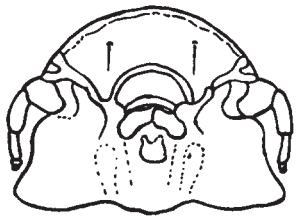
MALLOPHAGA: PICTORIAL KEY TO SPECIES INFESTING PIGEONS

Harold George Scott and Chester J. Stojanovich

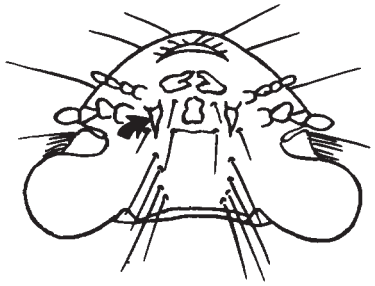
maxillary palps present



maxillary palps absent



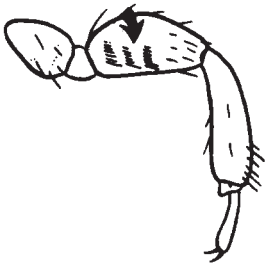
forehead with spines



Hohorstiella lata
LARGE PIGEON BODY LOUSE

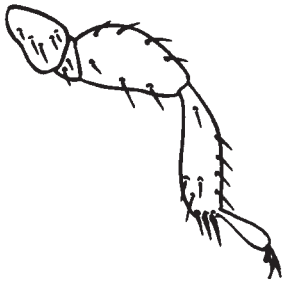
forehead without spines

femur III with comb



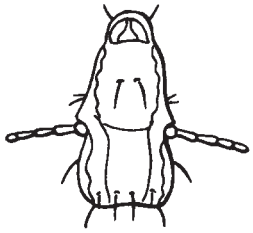
Colpocephalum turbinatum
SMALL PIGEON BODY LOUSE

femur III without comb



Bonomiella columbae
PIGEON VENT LOUSE

head longer than wide



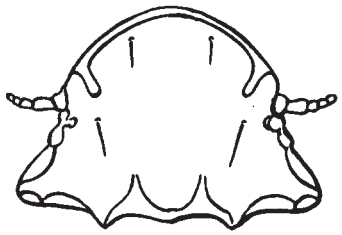
Columbicola columbae
SLENDER PIGEON LOUSE

head wider than long

forehead with spines

Physconelloides zenaidurae
PIGEON HEAD LOUSE

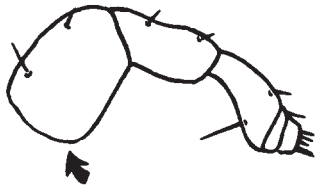
forehead without spines



male basal antennal segment small

Campanulotes bidentatus compar
SMALL PIGEON FEATHER LOUSE

male basal antennal segment large



Coloceras damicorne fahrenholzi
LARGE PIGEON FEATHER LOUSE

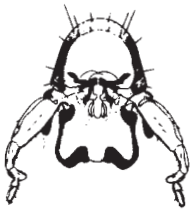
MALLOPHAGA: PICTORIAL KEY TO SOME COMMON SPECIES ON CHICKENS

Chester J. Stojanovich and Harry D. Pratt

antenna 5 segmented

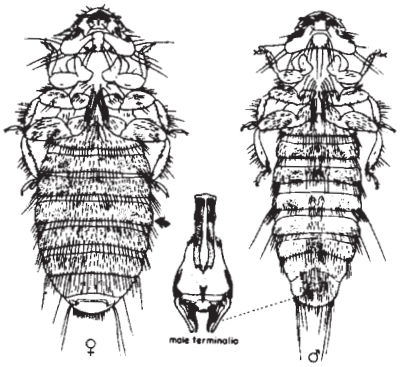
antenna 4 segmented

head longer than wide



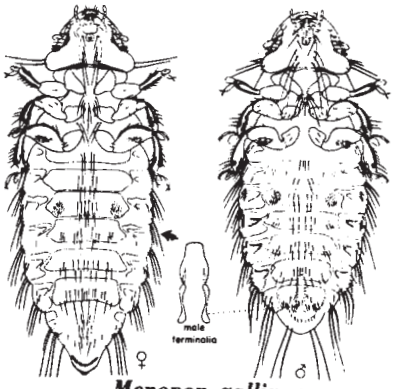
head not longer than wide

abdomen densely covered with setae



Menacanthus stramineus

abdomen not densely covered with setae



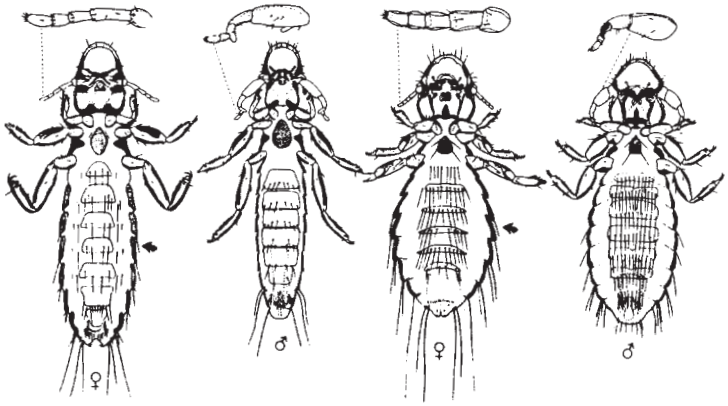
Menopon gallinae

abdomen slender

abdomen oval

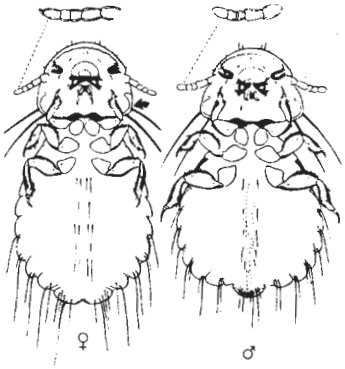
temples not evenly rounded

temples evenly rounded



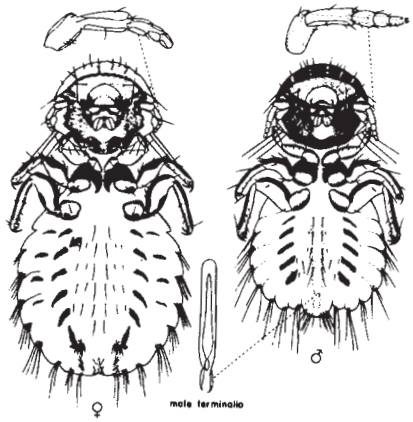
Lipeurus caponis

Cuclutogaster heterographus



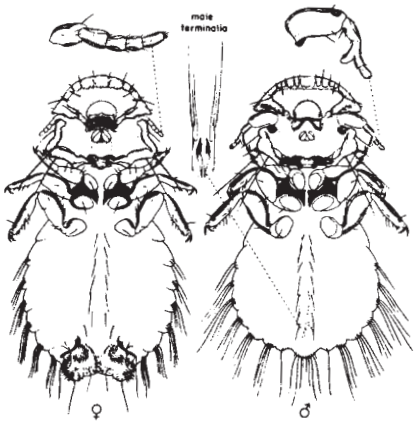
Goniocotes hologaster

abdomen with sclerotized markings



Goniodes gigas

abdomen without sclerotized markings

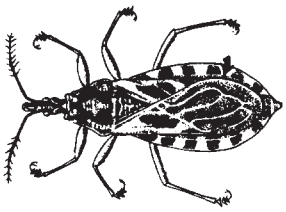


Goniodes dissimilis

BUGS: PICTORIAL KEY TO SOME SPECIES THAT MAY BITE MAN

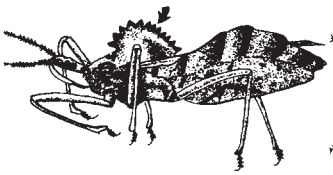
Harry D. Pratt and Chester J. Stojanovich

wings usually well-developed; body elongate-oval



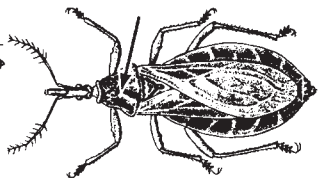
ASSASSIN AND KISSING BUGS–FAMILY REDUVIIDAE

thorax with cog-wheel crest

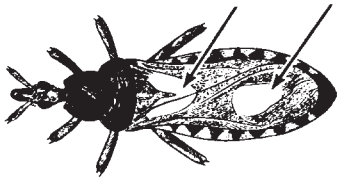


WHEEL BUG
Arilus cristatus

thorax without crest

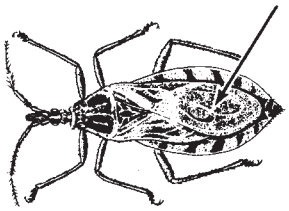


fore-wing with 2 yellow spots

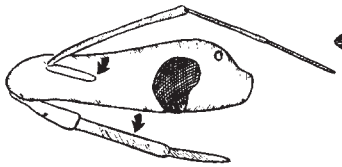


CORSAIR
Rasahus biguttatus

fore-wing dark in U. S. species

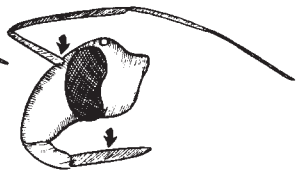


antenna inserted midway between eye and tip of head; beak slender, straight

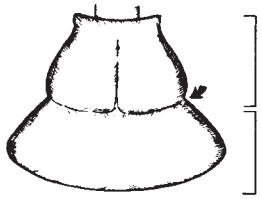


KISSING BUG
Triatoma spp

antenna inserted near eye; beak stout, curved

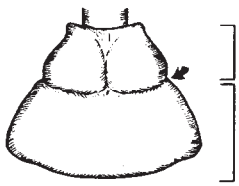


pronotum constricted behind middle



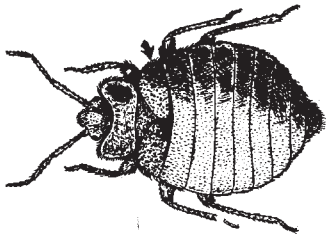
BLACK BUG
Melanolestes picipes

pronotum constricted before middle



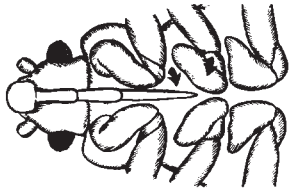
MASKED HUNTER
Reduvius personatus

wings reduced; body broadly-oval



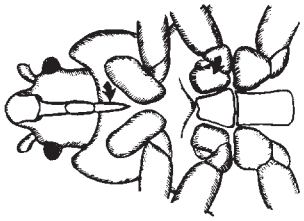
BED BUGS–FAMILY CIMICIDAE

middle coxae nearly touching
beak reaching 2nd coxa



POULTRY BUG
Haematosiphon inodorus

middle coxae widely separated
beak not reaching 2nd coxa

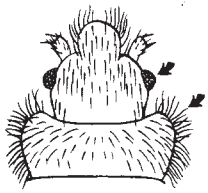


3rd and 4th antennal segments equal

BARN SWALLOW BUG
Oeciacus vicarius

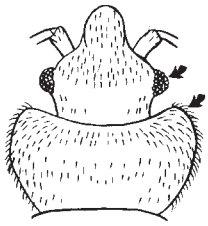
4th antennal segment shorter than 3rd

fringe hairs on pronotum longer than, or equal to, width of eye

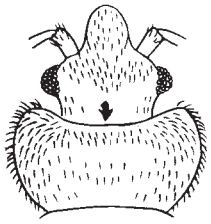


BAT BUGS
Cimex adjunctus E. N. AM.
Cimex pilosellus W. N. AM.

fringe hairs on pronotum shorter than width of eye

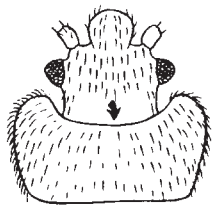


pronotum with anterior margin moderately excavated



TROPICAL BED BUG
Cimex hemipterus
SO. U.S. & TROPICS

pronotum with anterior margin deeply excavated

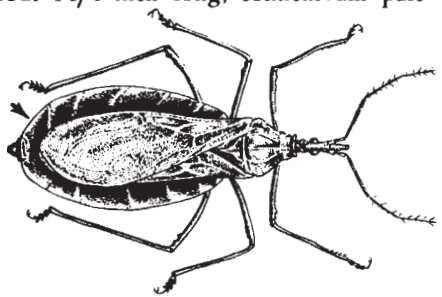


BED BUG
Cimex lectularius
TEMPERATE AREAS

KISSING BUGS: PICTORIAL KEY TO SOME COMMON SPECIES IN THE UNITED STATES

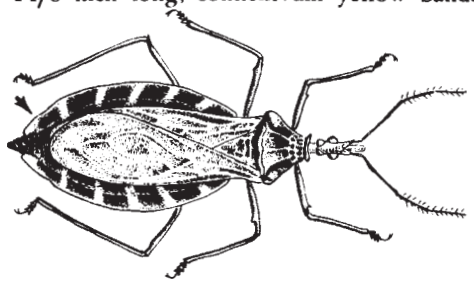
Harold George Scott and Margery R. Borom

about 1-1/4 inch long; connexivum pale



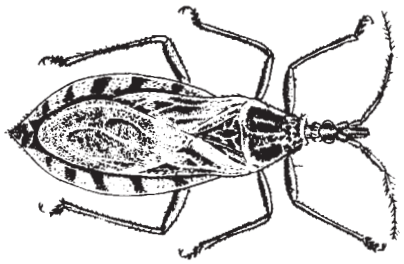
Triatoma recurva

about 1-1/8 inch long; connexivum yellow banded

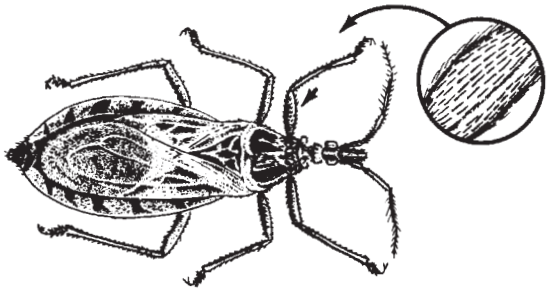


Triatoma gerstaeckeri

less than 1 inch long

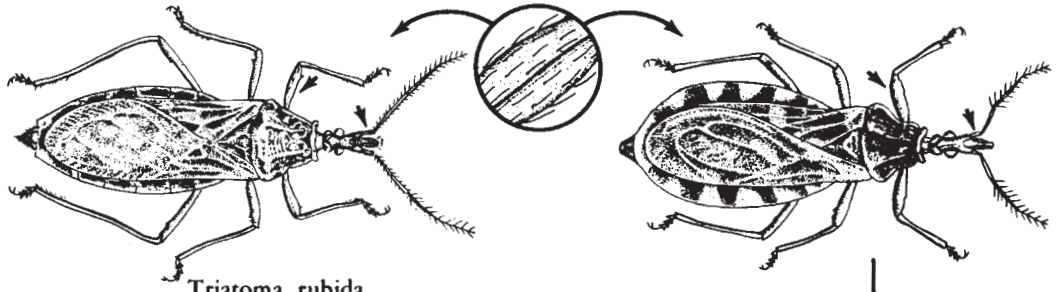


first femur with thick hair



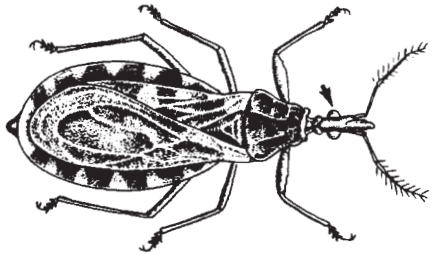
Triatoma lecticularius

first antennal segment long ◄ first femur with sparse hair ► first antennal segment short



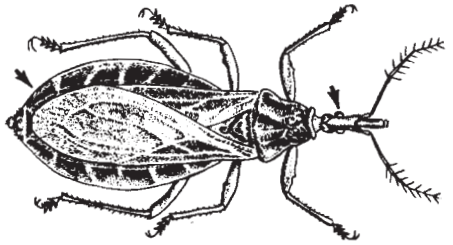
Triatoma rubida

eyes large

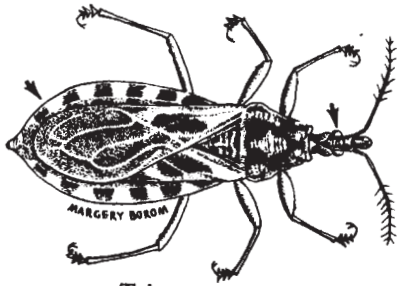


Triatoma sanguisuga

connexivum brown, pale banded or not ◄ eyes small ► connexivum yellow banded



Triatoma protracta



Triatoma neotomae

STINGING CATERPILLARS:
PICTORIAL KEY TO SOME IMPORTANT UNITED STATES SPECIES

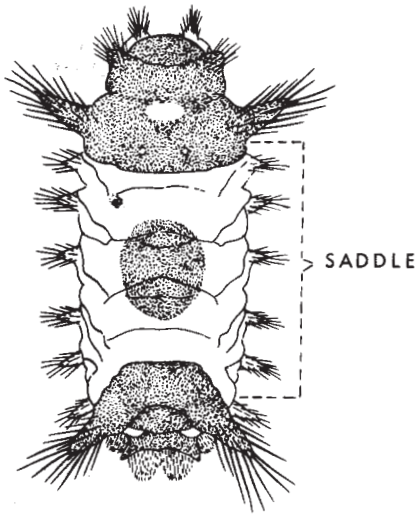
Harold George Scott & Chester J. Stojanovich

WITH DORSAL SADDLE

WITHOUT DORSAL SADDLE

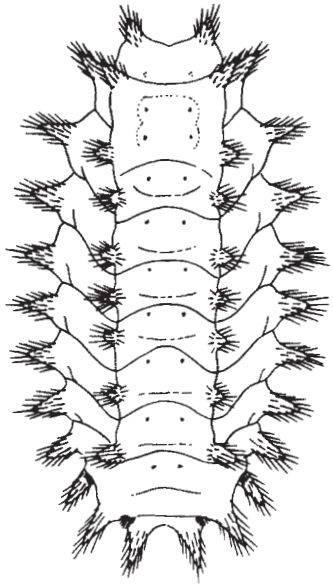
BODY FUR-LIKE

BODY NOT FUR-LIKE



SADDLEBACK CATERPILLAR
Sibine stimulae

PUSS CATERPILLAR
Megalopyge opercularis

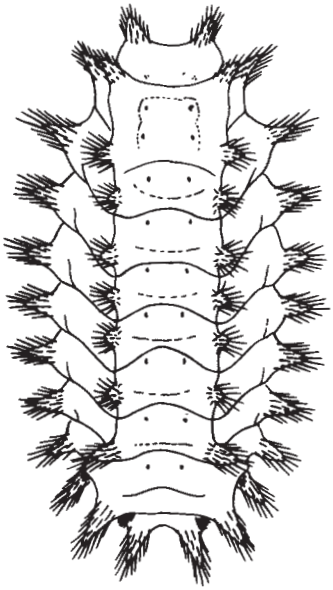


5 PROLEGS

7 PROLEGS

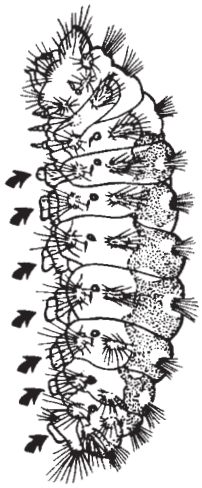
ABOUT 3/4-INCH LONG,
YELLOWISH GREEN

ABOUT 2 INCHES LONG,
RED AND WHITE



A SLUG CATERPILLAR
Euclea chloris

IO MOTH CATERPILLAR
Automeris io



A FLANNEL MOTH CATERPILLAR
Norape cretata

MOTHS: KEY TO SOME SPECIES COMMONLY ASSOCIATED WITH STORED FOOD

Harold George Scott

1. Caterpillars 2
   Adult moths 5

2. Pinkish larvae up to 3/5-inch long living in silken tubes and producing matter webbing in the infested food *(Anagasta kuhniella)* . . . . . MEDITERRANEAN FLOUR MOTH
   Whitish larvae with or without black or orange markings 3

3. Black head and prothorax; orange markings at both ends of the body; living in silken tubes *(Pyralis farinalis)* . . . . . MEAL MOTH
   Without black head and prothorax 4

4. White to greenish-white larvae producing matter webbing in the infested food *(Plodia interpunctella)* . . . . . INDIAN MEAL MOTH
   Whitish; not producing matted webbing; living inside kernels of grain *(Sitotroga cerealella)* . . . . . ANGOUMOIS GRAIN MOTH

5. Wings unicolorous to slightly spotted; long fringe at rear of wings *(Sitotroga cerealella)* . . . . . ANGOUMOIS GRAIN MOTH
   Wings heavily dark marked 6

6. Distal half of front wings dark; basal half light *(Plodia interpunctella)* . . . . . INDIAN MEAL MOTH
   Wings not so marked 7

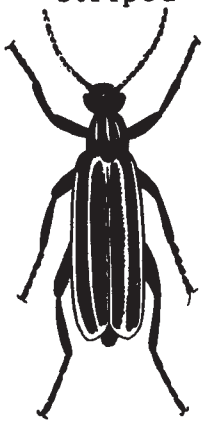
7. Basal and distal thirds of front wings dark; middle portion of front wings light *(Pyralis farinalis)* . . . . . MEAL MOTH
   Front wings pale gray with transverse wavy black markings *(Anagasta kuhniella)* . . . . . MEDITERRANEAN FLOUR MOTH

Angoumois Grain Moth

BLISTER BEETLES: KEY TO SOME COMMON UNITED STATES SPECIES

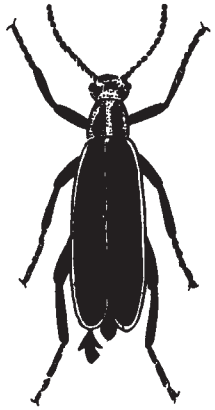
Harold George Scott and Chester J. Stojanovich

striped



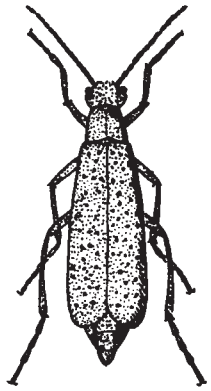
Epicauta vittata
STRIPED BLISTER BEETLE

margined



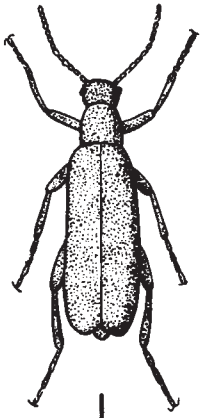
Epicauta pestifera
MARGINED BLISTER BEETLE

spotted

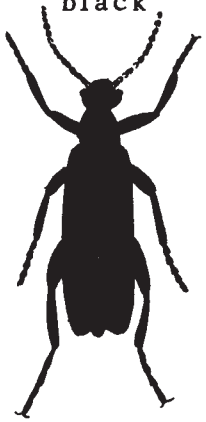


Epicauta cinerea maculata
SPOTTED BLISTER BEETLE

essentially unicolorous

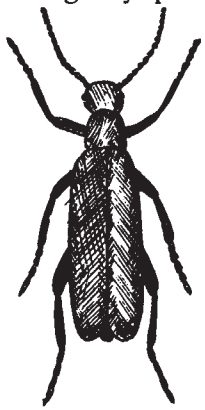


black



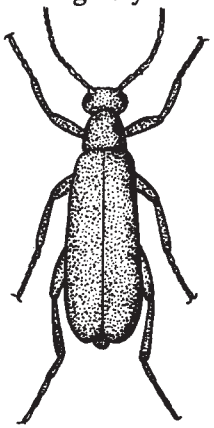
Epicauta pennsylvanica
BLACK BLISTER BEETLE

black with gray pubescense



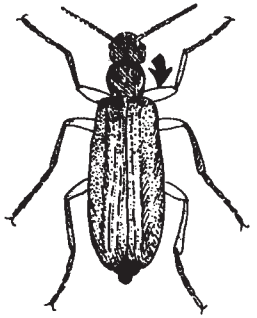
Epicauta cinerea cinerea
CLEMATIS BLISTER BEETLE

gray



Epicauta fabrici
ASH-GRAY BLISTER BEETLE

metallic blue with red-yellow leg bases

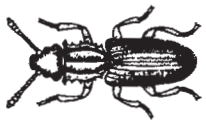


Pomphopoea sayi
SAY BLISTER BEETLE

BEETLES: PICTORIAL KEY TO SOME SPECIES COMMONLY ASSOCIATED WITH STORED FOODS

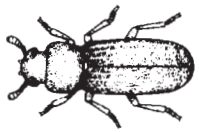
Harry D. Pratt

PRONOTUM WITH 6 TEETH ON EACH SIDE
BEAK ABSENT; SPECIES ABOUT 1/8 INCH LONG



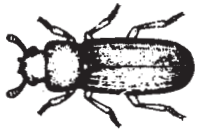
SAW-TOOTHED GRAIN BEETLE
Oryzoephilus surinamensis

PRONOTUM WITHOUT TEETH ON EACH SIDE
BEAK ABSENT



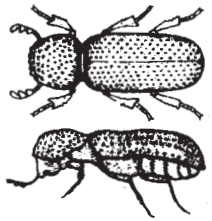
SMALL BROWNISH SPECIES
LESS THAN 1/4 INCH LONG

HEAD VISIBLE FROM ABOVE
1/8 INCH LONG OR MORE

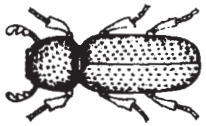


CONFUSED AND RED FLOUR BEETLES
Tribolium confusum AND *castaneum*

HEAD HIDDEN UNDER PRONOTUM
LESS THAN 1/8 INCH LONG

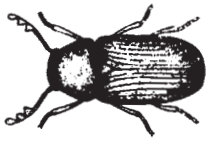


FORE WING WITH ROUGHENED SURFACE



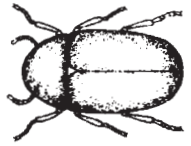
LESSER GRAIN BORER
Rhyzopertha dominica

FORE WING WITH LINES



DRUG STORE BEETLE
Stegobium paniceum

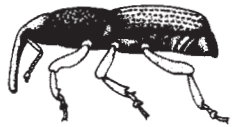
FORE WING SMOOTH



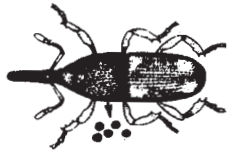
CIGARETTE BEETLE
Lasioderma serricorne

LARGER BLACKISH SPECIES
1/4 TO 3/4 INCH LONG

PRONOTUM WITHOUT TEETH ON EACH SIDE
BEAK PRESENT; SPECIES ABOUT 1/8 INCH LONG

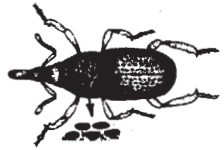


EACH FORE WING WITH 2 PALE SPOTS
PRONOTUM WITH ROUND PUNCTURES



RICE WEEVIL
Sitophilus oryza

EACH FORE WING DARK
PRONOTUM WITH ELONGATE PUNCTURES

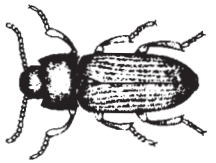


GRANARY WEEVIL
Sitophilus granarius

FLATTENED BEETLES
1/4 TO 1/2 INCH LONG
PRONOTUM SEPARATED BY STRONG
CONSTRICTION FROM BASES OF WINGS

CADELLE
Tenebroides mauritanicus

CONVEX BEETLES
1/2 INCH LONG OR MORE
PRONOTUM NOT SO STRONGLY
SEPARATED FROM BASES OF WINGS



YELLOW MEAL WORM
Tenebrio molitor

STINGING HYMENOPTERA:
PICTORIAL KEY TO SOME COMMON UNITED STATES FAMILIES

Harold George Scott and Chester J. Stojanovich

wings absent

body fur-like
without node

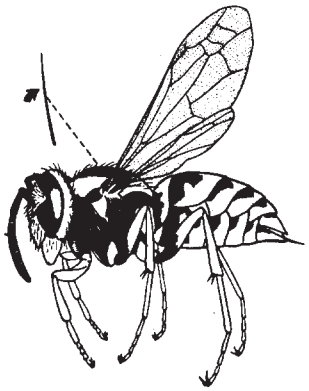
Mutillidae
VELVET ANTS

body not fur-like
with node

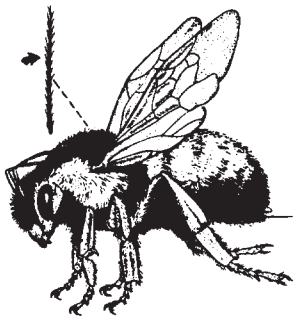
Formicidae
ANTS

wings present

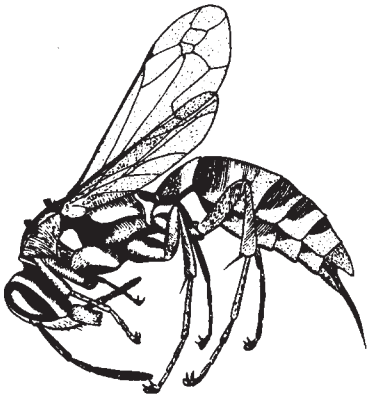
hairs not feathered
(use 20 X magnification)



hairs feathered
(use 20 X magnification)

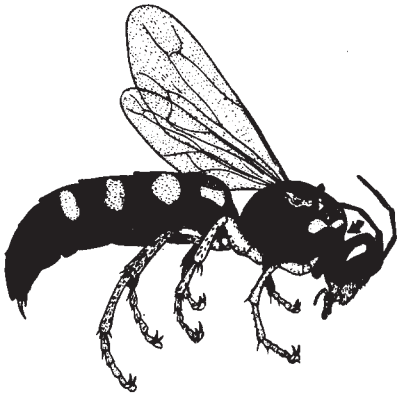


pronotum long, reaching tegula



Vespidae
WASPS, YELLOW JACKETS, HORNETS

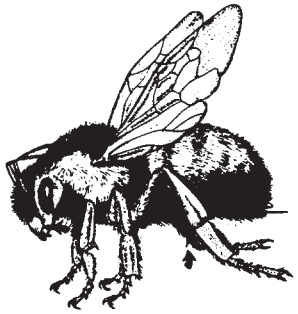
pronotum short, not reaching tegula



Sphecidae
SPHECID WASPS

hind tibia with spurs

eye not reaching mandible



Bombidae
BUMBLE BEES

eye reaching mandible

Andrenidae
SWEAT BEES

hind tibia without spurs

Apidae
HONEY BEES

DIAGRAM OF SOCIAL WASP

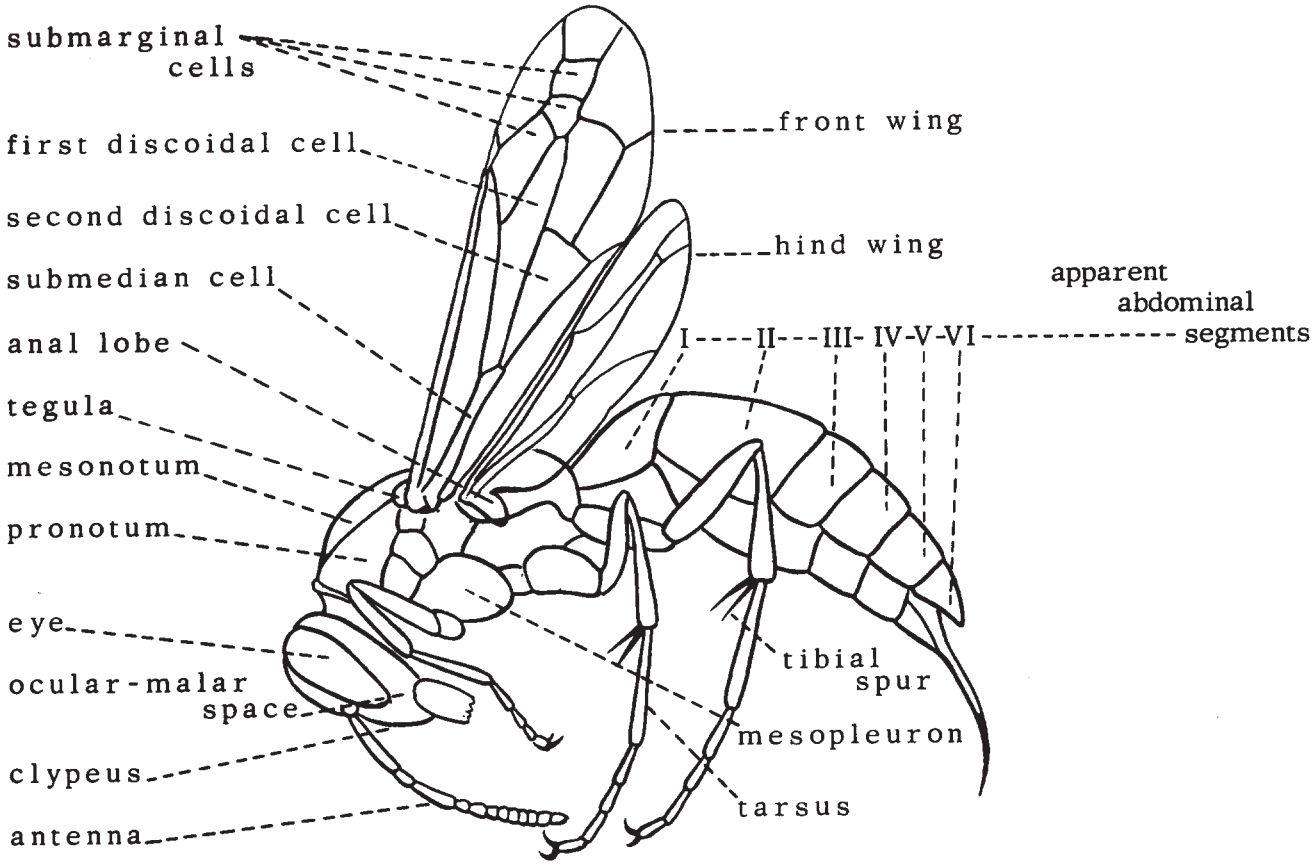
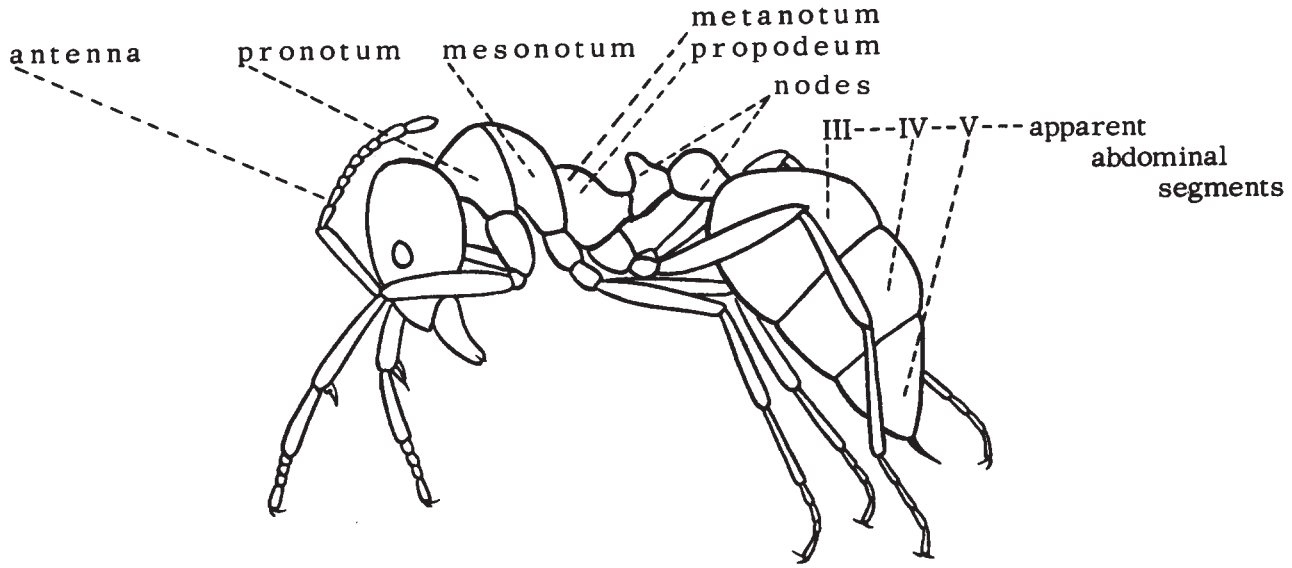


DIAGRAM OF FIRE ANT



HYMENOPTERA: KEY TO SOME COMMON SPECIES WHICH STING MAN

Harry D. Pratt and Chester J. Stojanovich

1. With wings (Fig. 1 A).....2

   Without wings (Fig. 1 B).....32

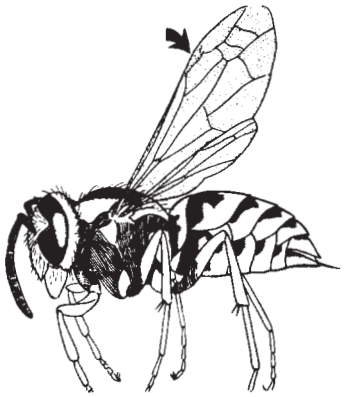


Fig. 1 A

Fig. 1 B

2. First (and sometimes second) segment of the abdomen node-like, clearly separated above and below from rest of abdomen (Fig. 2 A). Nest in ground, wood, or buildings (Family Formicidae).....ANT

   Abdomen with or without some constriction of first abdominal segments, but without true node formation of basal abdominal segments (Fig. 2 B).....3

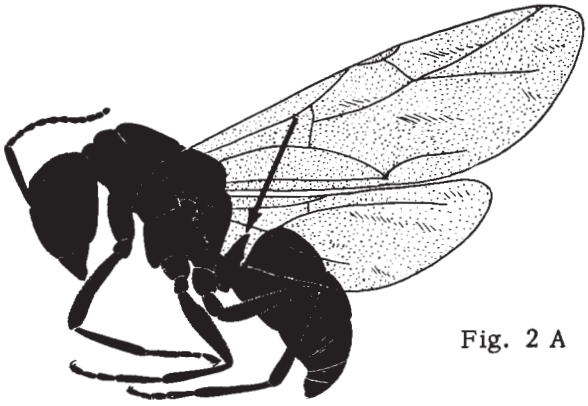


Fig. 2 A

Fig. 2 B

3. All hairs on body simple, unbranched; hind tarsus slender, first segment not broadened or thickened (Fig. 3 A). (Superfamilies Vespoidea and Sphecoidea). Wasps and Hornets..... 4

   At least some hairs on thorax branched or plumose; hind tarsus with first segment broadened and thickened, often densely hairy (Fig. 3 B). (Superfamily Apoidea). Bees..... 27

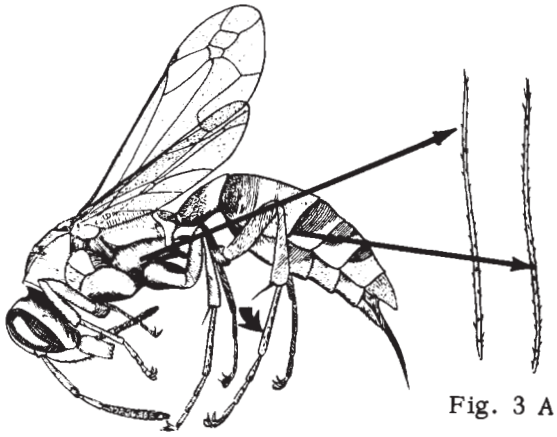


Fig. 3 A

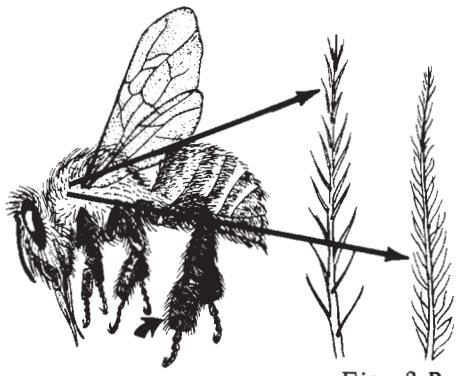


Fig. 3 B

4. Pronotum extending entirely, or almost back, to the tegula (the scale covering base of fore-wing), its hind angles not lobed (Fig. 4 A). (Superfamily Vespoidea).....5

Pronotum shortened, more or less collar-like, not extending back to tegula, its hind angles often produced into lobes (Fig. 4 B). (Superfamily Sphecoidea).....22

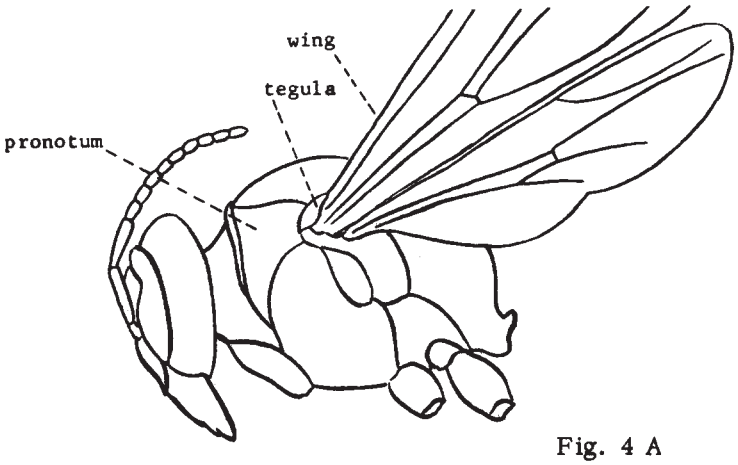


Fig. 4 A

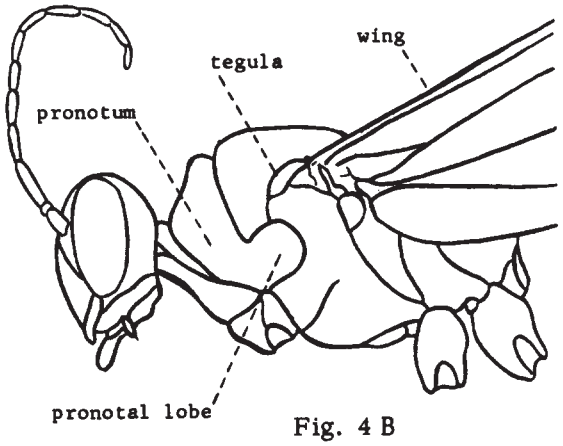


Fig. 4 B

5. Fore wing almost always folded when in repose; first discoidal cell very long, as a rule much longer than the submedian cell (Fig. 5 A). Both solitary and colonial species (Family Vespidae).....6

Fore wing very rarely folded; first discoidal cell shorter than submedian cell (Fig. 5 B). Solitary species.....21

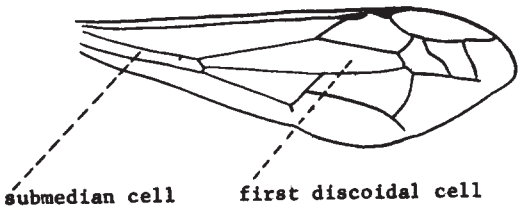


Fig. 5 A

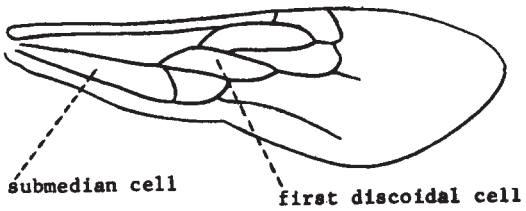


Fig. 5 B

6. One spur at tip of middle tibia; claws bifid, split at tip (Fig. 6 A). (Subfamily Eumeninae)..... Solitary Wasps.....18

Two spurs at tip of middle tibia; claws tapering to point (Fig. 6 B).....7

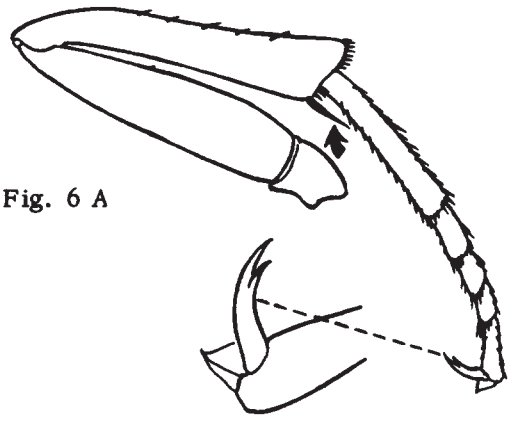


Fig. 6 A

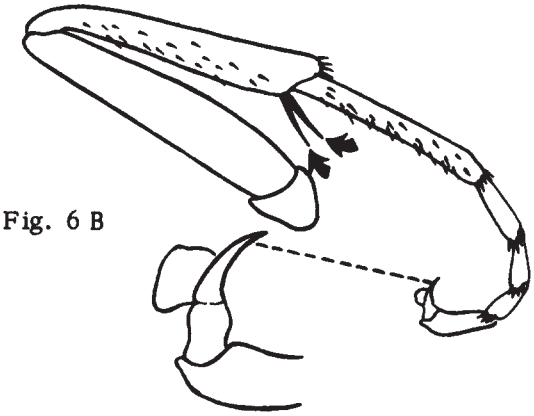


Fig. 6 B

7. Clypeus (upper lip) broadly truncate and more or less notched at apex (Fig. 7 A); hind wing without a lobe at anal angle (Fig. 7 B). (Subfamily Vespinae). Hornets, Yellow Jackets.....8

   Clypeus somewhat pointed at apex (Fig. 7 C); hind wing with a lobe at anal angle (Fig. 7 D)..... (Subfamily Polistinae). Paper Wasps.....15

Fig. 7 A

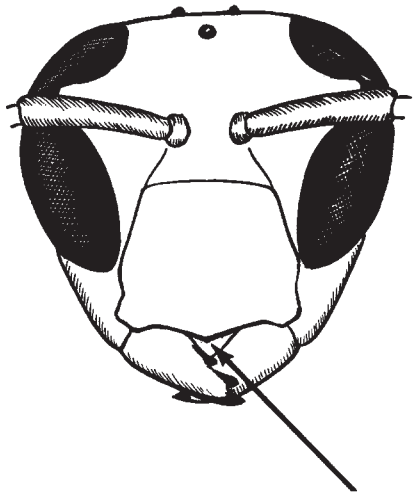


Fig. 7 C

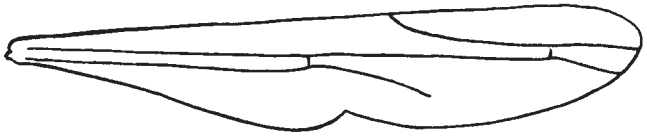


Fig. 7 B

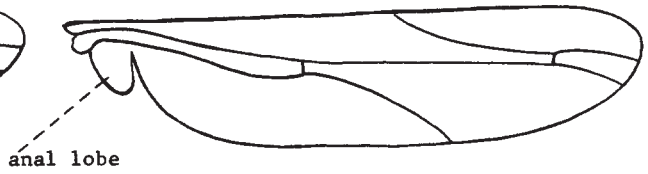


Fig. 7 D

8. Oculo-malar space long, more than half the length of next to last antennal segment; vertical carina on pronotum (Fig. 8 A).....9

   Oculo-malar space short, less than half the length of next to last antennal segment; no vertical carina on pronotum (Fig. 8 B).....11

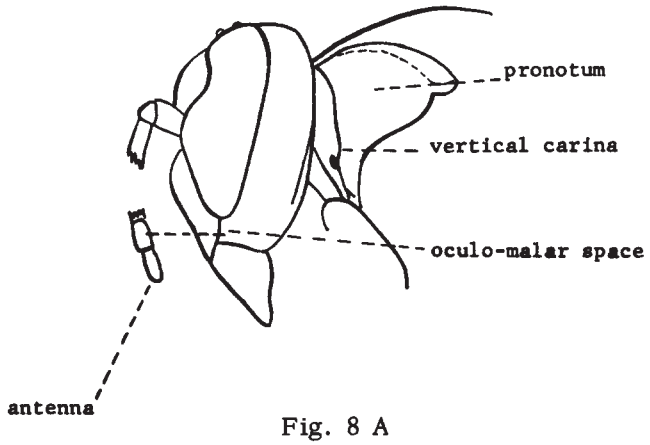


Fig. 8 A

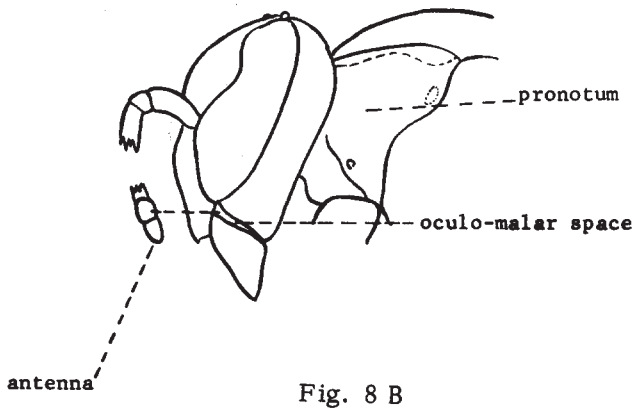


Fig. 8 B

9. Very large species, 20-30 mm. long, extensively reddish-brown; postocellar area of vertex at least as long as ocellar triangle in dorsal view (Fig. 9 A). Builds paper nest in homes or hollow trees. (Vespa crabo germana).....GIANT HORNET

Smaller species, 8-20 mm. long; black species with white, ivory white, or yellowish markings; postocellar area of vertex not as long as ocellar triangle (Fig. 9 B)..... 10

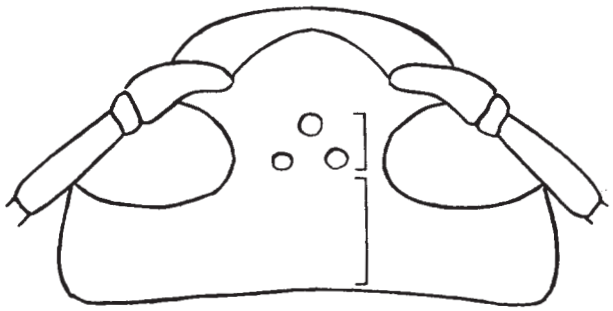


Fig. 9 A

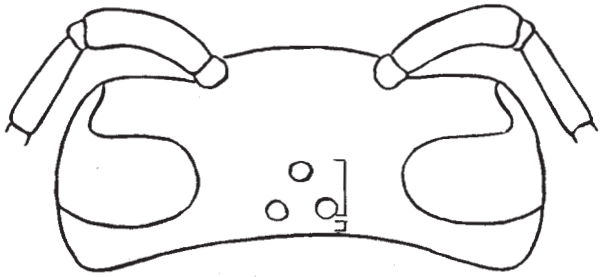
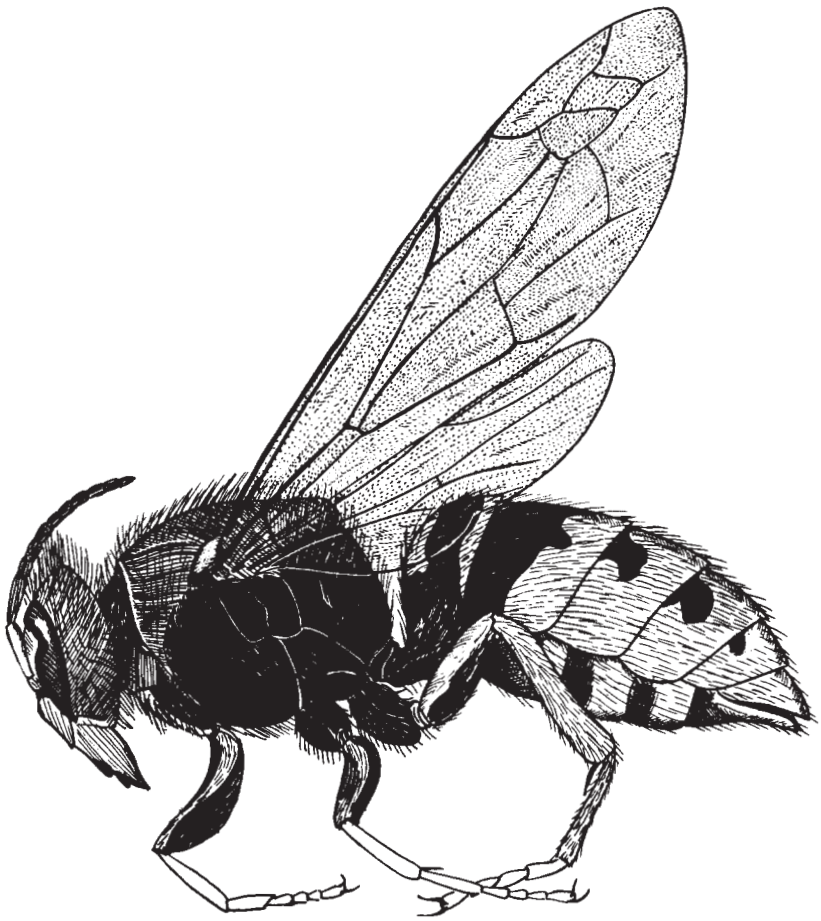


Fig. 9 B



10. Black and white species; first and second abdominal segments entirely black, sometimes with very narrow pale markings at tip of first segments in some males (Fig. 10 A). Builds enclosed globular nests under eaves or in trees. (Vespula maculata).....BALD-FACED HORNET

    Black and yellow species; yellowish posterior margins of first and second abdominal segments deeply notched (Fig. 10 B). Builds globular paper nests under eaves or in trees.....
    (Vespula arenaria)..... A YELLOW JACKET

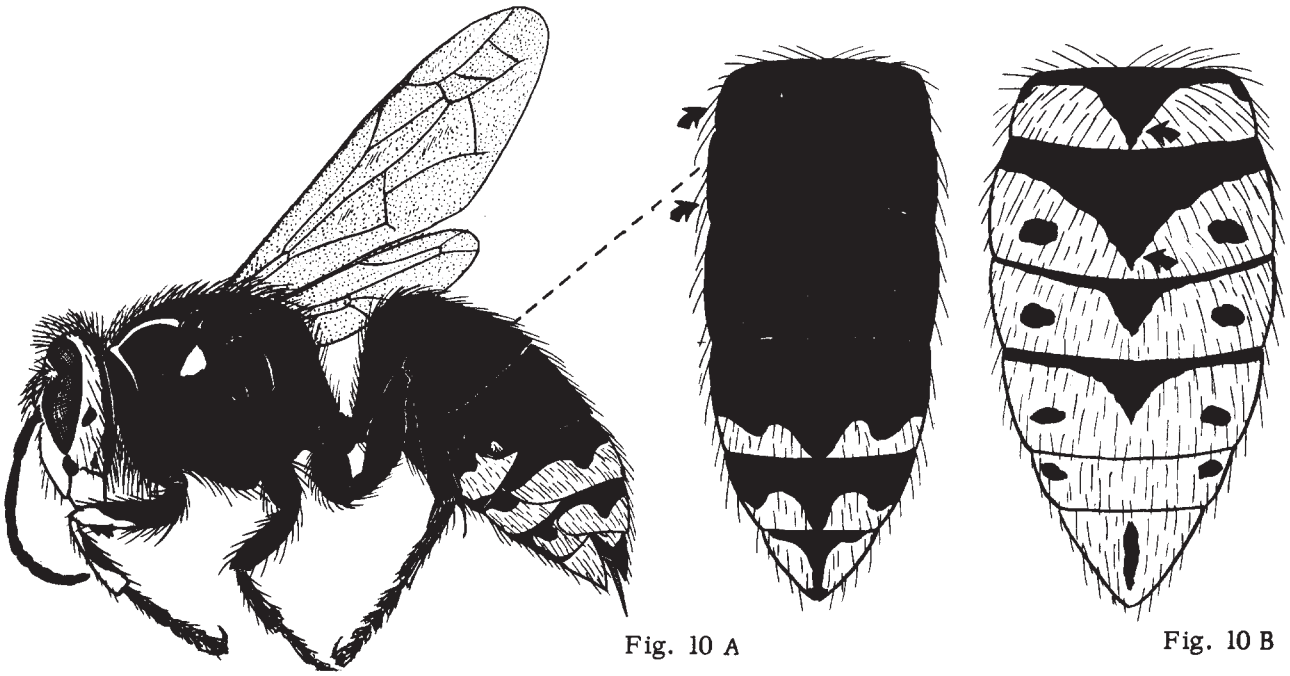


Fig. 10 A

Fig. 10 B

11. Black and white species (Fig. 11 A). Builds paper nest in ground or on trees.....
    (Vespula consobrina).....A HORNET

    Black and yellowish species (Fig. 11 B). All build paper nests in ground.....12

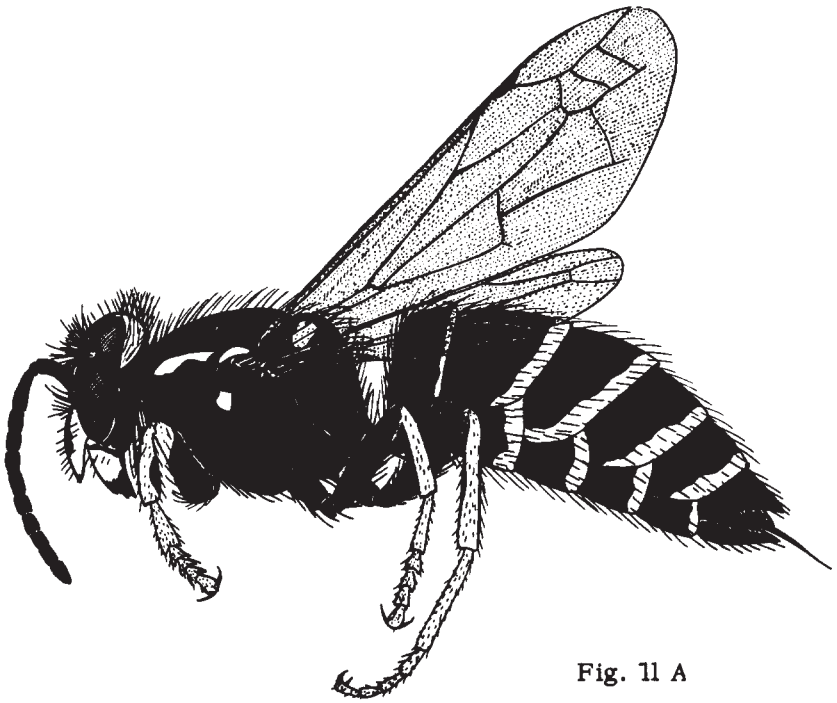


Fig. 11 A

Fig. 11 B

12. Mesonotum with two, broad, longitudinal, curved yellowish stripes reaching almost from front to hind margins (Fig. 12 A). Eastern species (Vespula squamosa). California and Oregon species (Vespula sulphurea).....A YELLOW JACKET

Mesonotum entirely black, or with two short yellowish stripes near scutellum (Fig. 12 B).....13

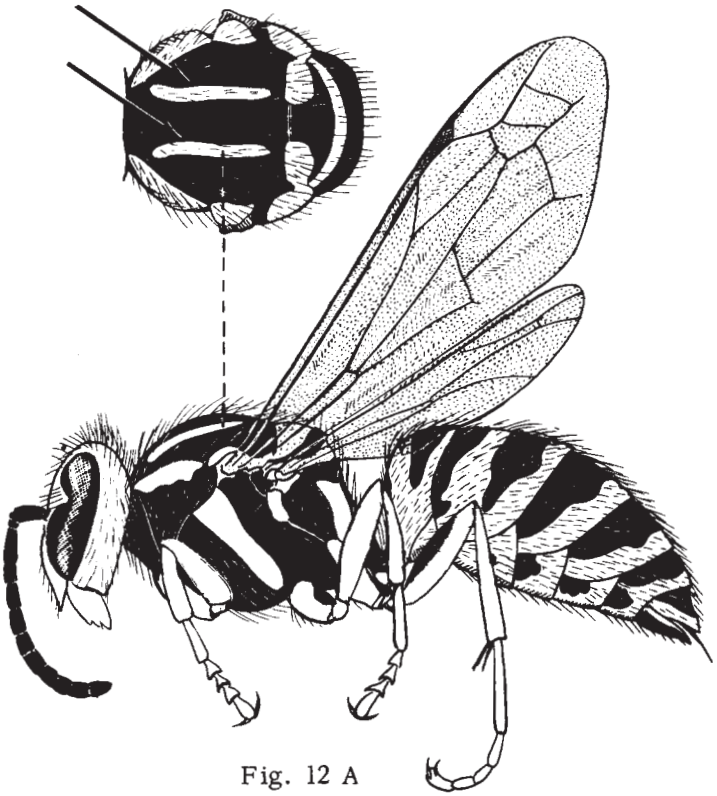


Fig. 12 A

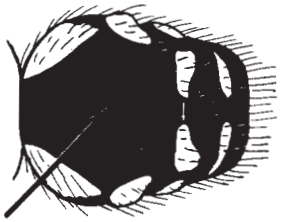


Fig. 12 B

13. Yellowish postero-lateral margins of pronotum usually even, parallel-sided; clypeus with broad, dark, longitudinal stripe, often anchor-shaped (Fig. 13 A & B). Northern species..... (Vespula vulgaris).....A YELLOW JACKET

Yellowish postero-lateral margin of pronotum not parallel-sided; clypeus with short dark median stripe or one or more small dark spots (Fig. 13 C & D).....14

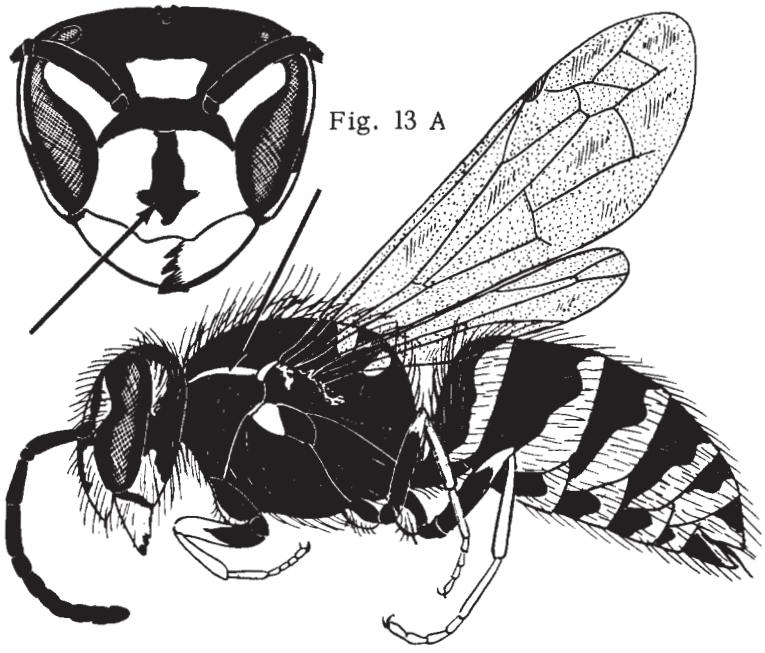


Fig. 13 A

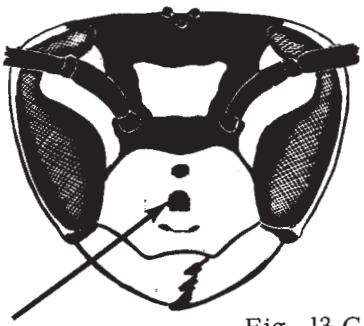


Fig. 13 C

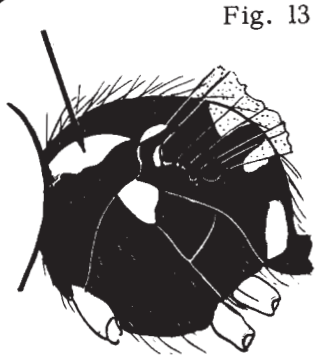


Fig. 13 D

14. First antennal segment largely yellowish in front; eyes encircled by yellowish band on upper three-fourths (Fig. 14 A). Western species (Vespula pennsylvanica)..... A YELLOW JACKET

    First antennal segment largely or entirely blackish; eyes with a blackish area dorsally separating pale anterior and posterior orbital bands (Fig. 14 B). Eastern species (Vespula maculifrons).... ..... A YELLOW JACKET

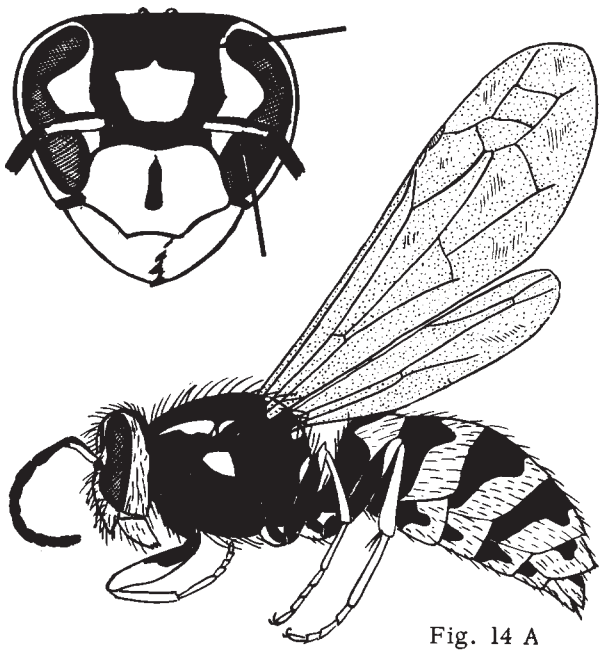


Fig. 14 A

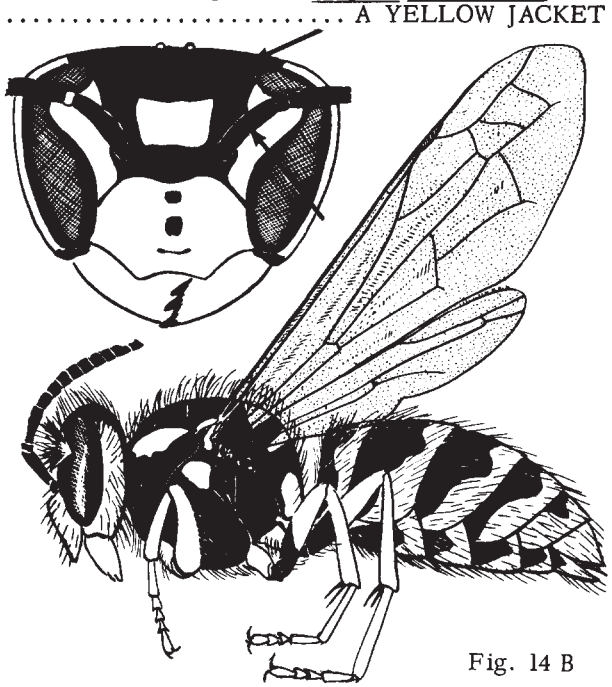


Fig. 14 B

15. Body and all legs entirely or largely orange-colored (Fig. 15 A). Builds paper combs in walls of house or hollow trees. (Polistes rubiginosus).....ORANGE PAPER WASP

    Body with some blackish markings; at least hind tarsi pale-colored (Fig. 15 B)..... 16

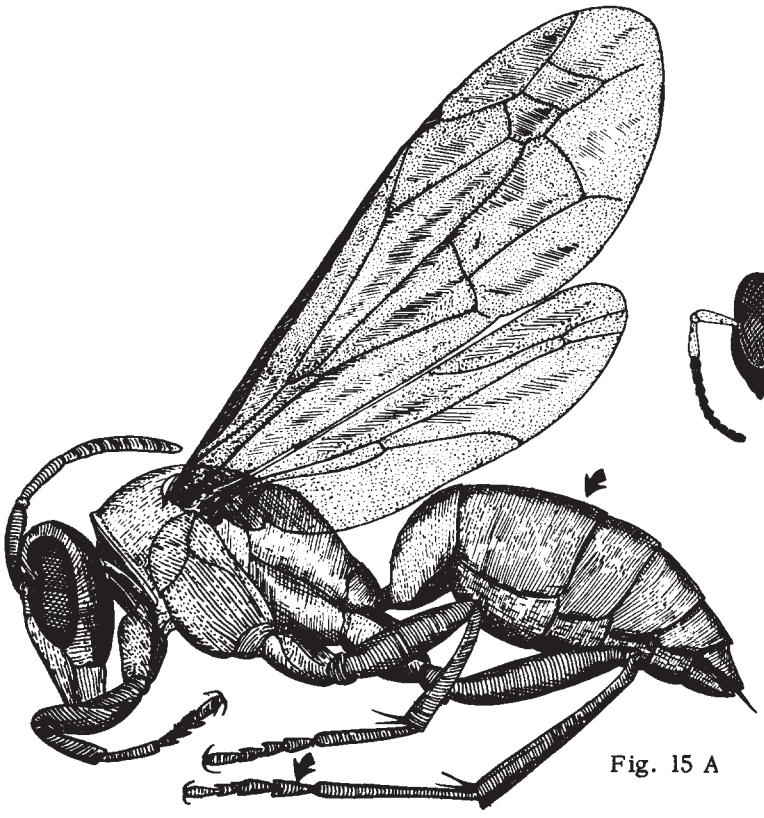


Fig. 15 A

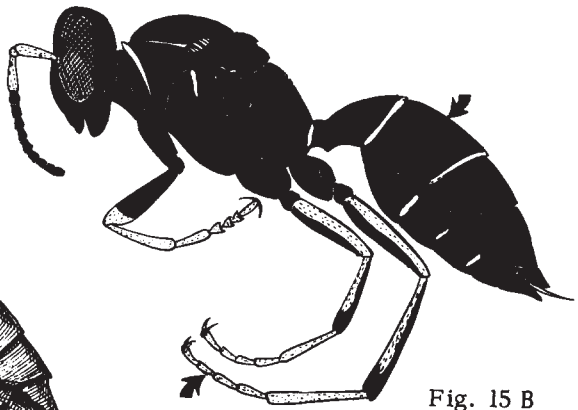


Fig. 15 B

16. Abdominal segments with blackish, yellowish, and reddish markings; mesonotum reddish; a yellowish band behind ocelli (Fig. 16 A). Builds single or double paper combs under eaves or in outbuildings. (Polistes exclamans)..... ZEBRA PAPER WASP

Abdomen largely blackish, with one or more pale bands starting at posterior margin of first or second segment; mesonotum largely blackish; no yellowish band behind ocelli (Fig. 16 B)..... 17

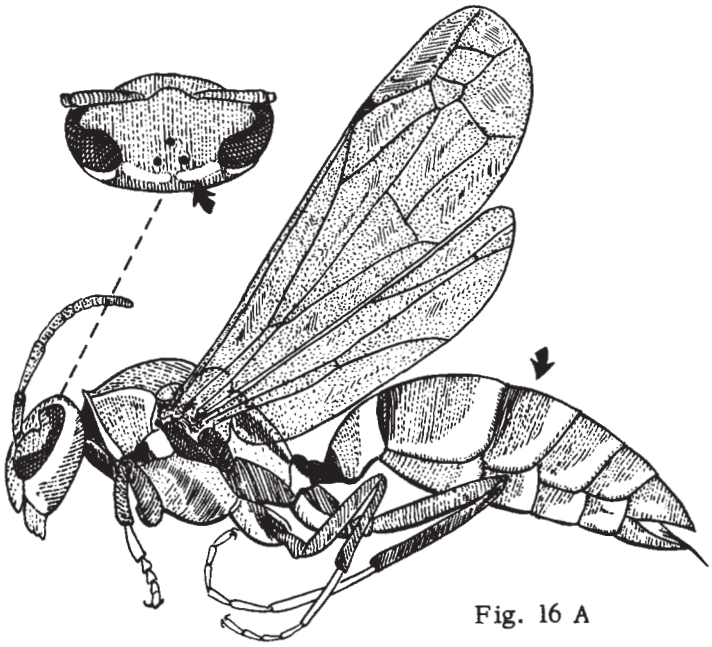


Fig. 16 A

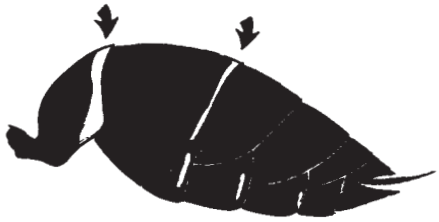


Fig. 16 B

17. Large species 20-25 mm. long, propodeum with coarse transverse striae (Fig. 17 A). Builds paper combs in bushes or trees. (Polistes annularis)..... LARGE PAPER WASP

Medium-sized species, 12-17 mm. long; propodeum with fine striae or essentially smooth (Fig. 17 B). Builds paper combs under eaves or in buildings. (Polistes fuscatus pallipes)..... DARK PAPER WASP

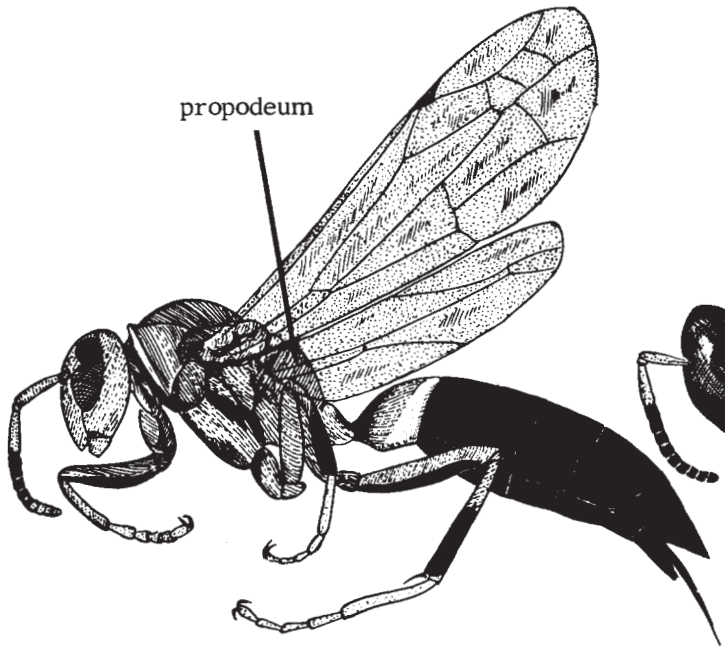


Fig. 17 A

Fig. 17 B

18. Slender species with extremely elongate first abdominal segment (Fig. 18 A). Builds small mud, potter nests provisioned with caterpillars. (Eumenes fraterna)..... POTTER WASP

Stocky species, with stout first abdominal segment (Fig. 18 B). Nest in holes in ground or wood, or old mud-dauber nests provisioned with caterpillars. (Odynerus species and Monobia species) ..... SOLITARY WASPS

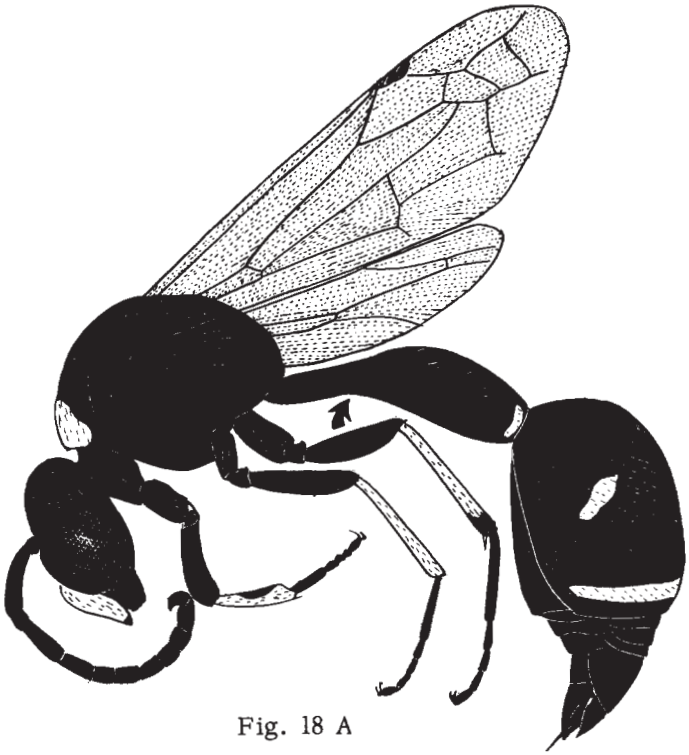


Fig. 18 A

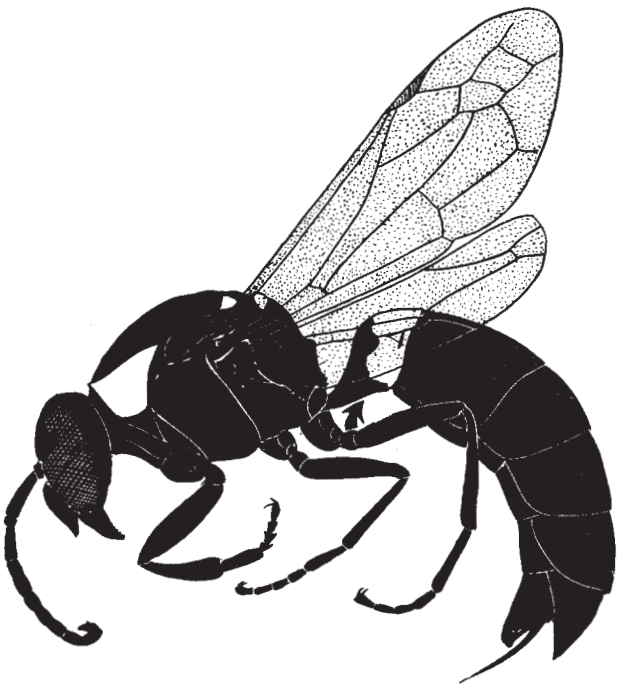


Fig. 18 B

19. Mesopleuron divided by an oblique suture into upper and lower parts (Fig. 19 A). Usually nest in holes in ground provisioned with spiders or tarantulas (Family Psammocharidae)..... ..... SPIDER AND TARANTULA WASPS

Mesopleuron not divided by such an oblique suture (Fig. 19 B)..... 20

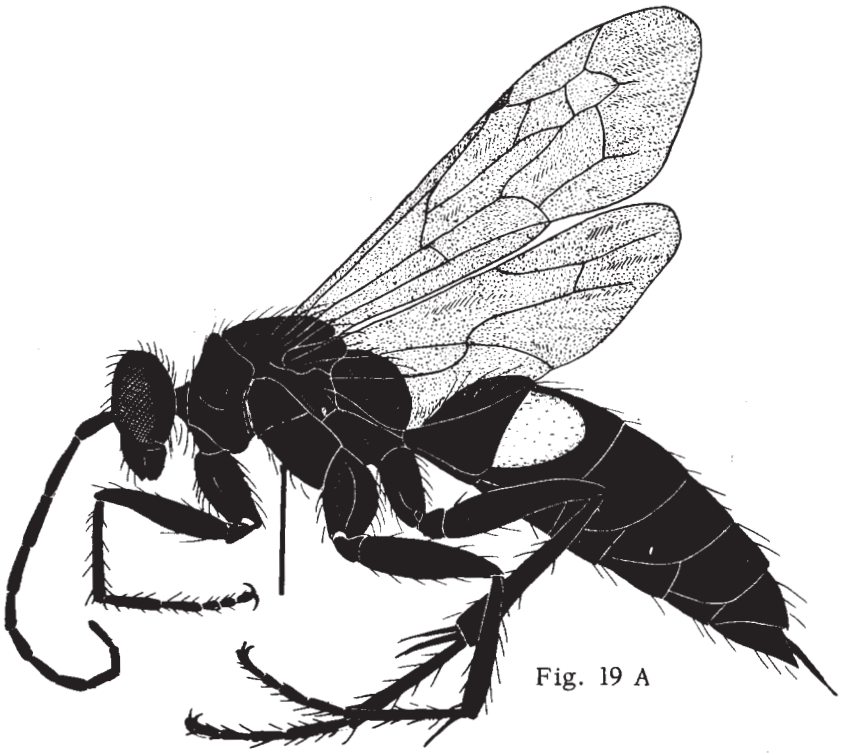


Fig. 19 A

Fig. 19 B

20. Bases of middle and hind coxae not covered by plates (Fig. 20 A). Parasites of other wasps and bees nesting in ground..... VELVET ANTS

Bases of middle, and sometimes hind, coxae covered by plates (Fig. 20 B)..... 21

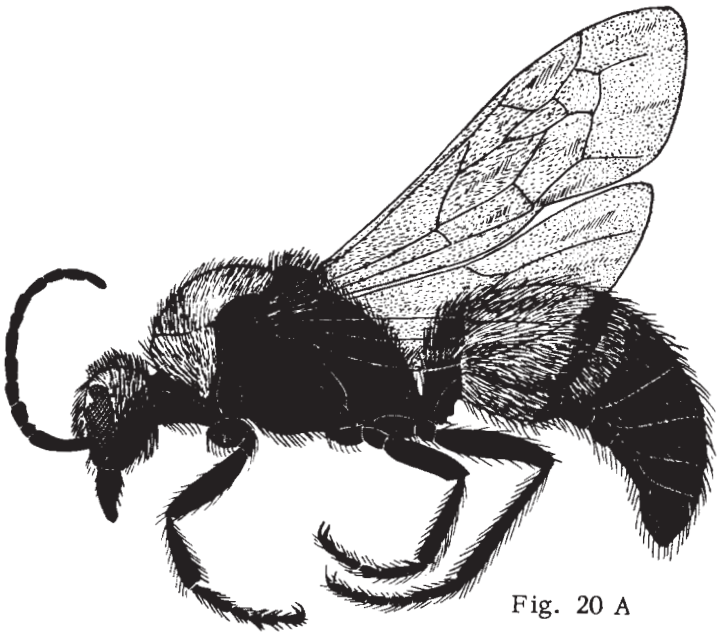


Fig. 20 A

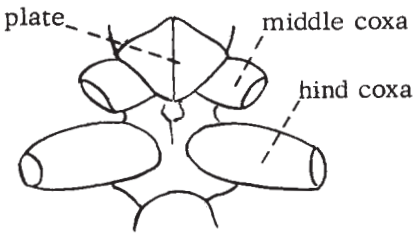


Fig. 20 B

21. Wing membrane beyond cells with wrinkles; inner margin of eye with a sinus; bases of middle and hind coxae covered by plates (Fig. 21 A & B). Male with three spines at tip of abdomen..... (Family Scoliidae)..... SCOLIID WASPS

Wing membrane beyond cells without wrinkles; inner margin of eye essentially straight; bases of middle coxae covered by plates (Fig. 21 C & D). Male with a single upturned spine at tip of abdomen. (Family Tiphiidae)..... TIPHIID WASPS

Fig. 21 B

Fig. 21 D

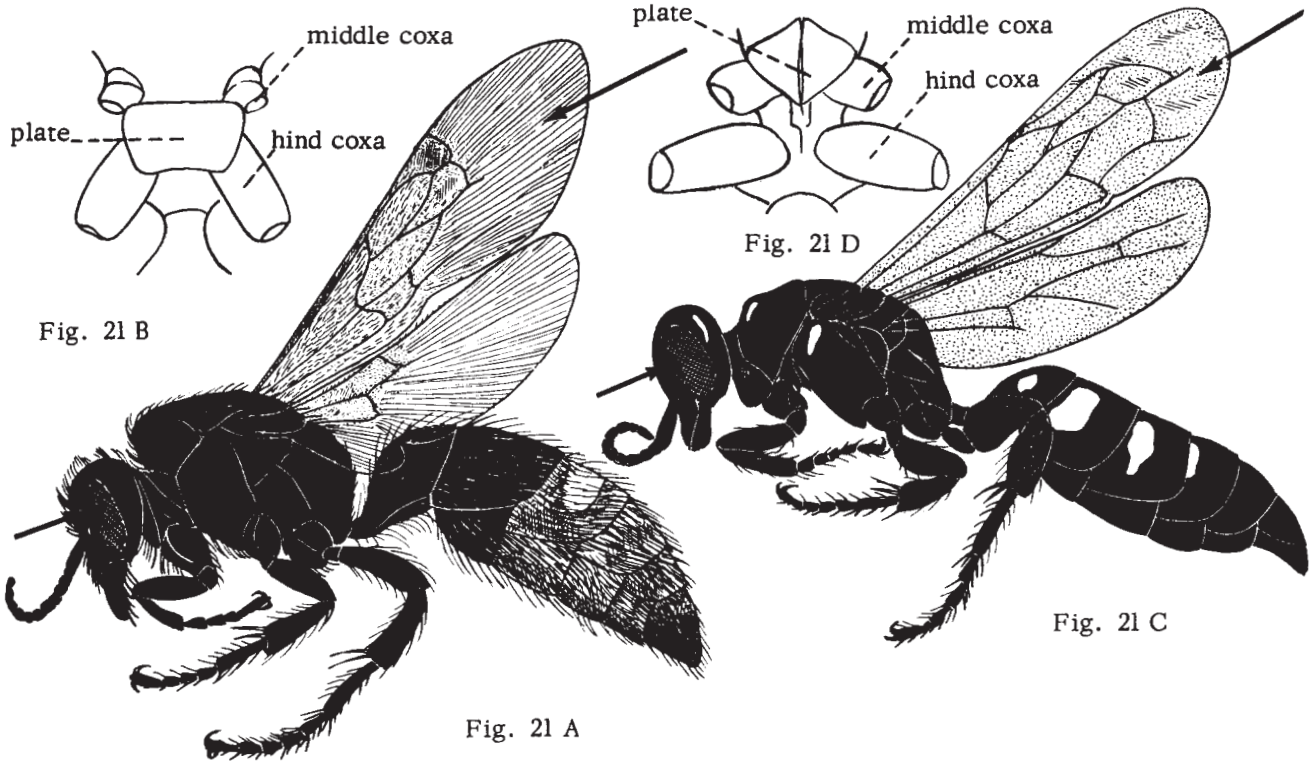


Fig. 21 A

Fig. 21 C

22. Very large species, 30 mm. long or more; first abdominal segment broad and sessile (Fig. 22 A) Nest in holes in ground provisioned with cicadas. (Sphecius speciosus).....CICADA KILLER

Smaller species, less than 25 mm. long; first abdominal segment longer and more slender (Fig. 22 B).....23

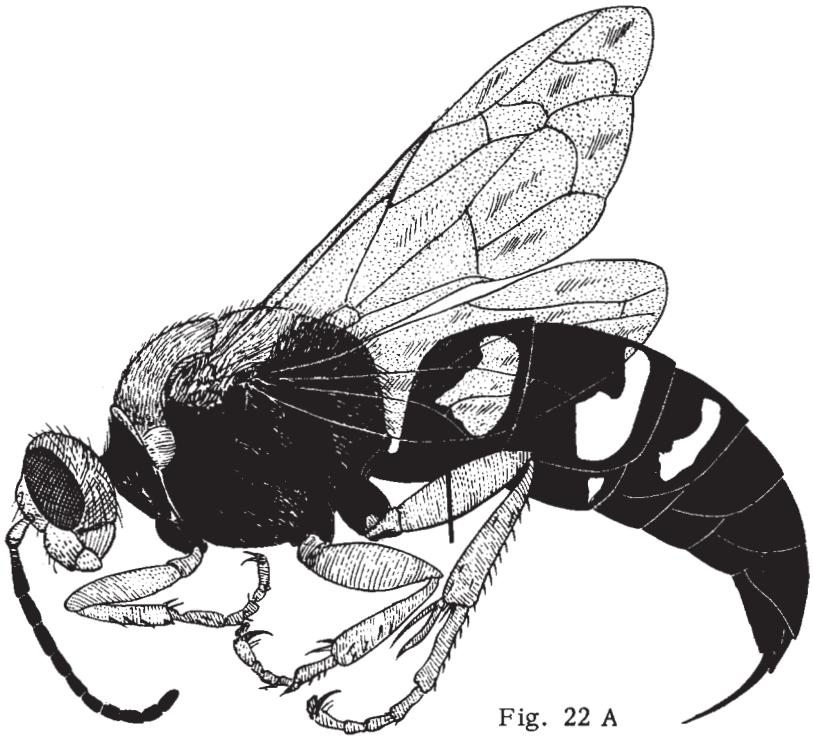


Fig. 22 A

Fig. 22 B

23. Eyes with deep sinus on inner side; one or two clearly defined submarginal cells; dark species with whitish tarsus (Fig. 23 A). Builds organ-pipe mud nests. (Trypoxylon species)..... .....PIPE ORGAN MUD-DAUBER

Eyes nearly straight on inner side; three well-defined submarginal cells; metallic blue, or species with some pale markings on abdomen (Fig. 23 B & C).....24

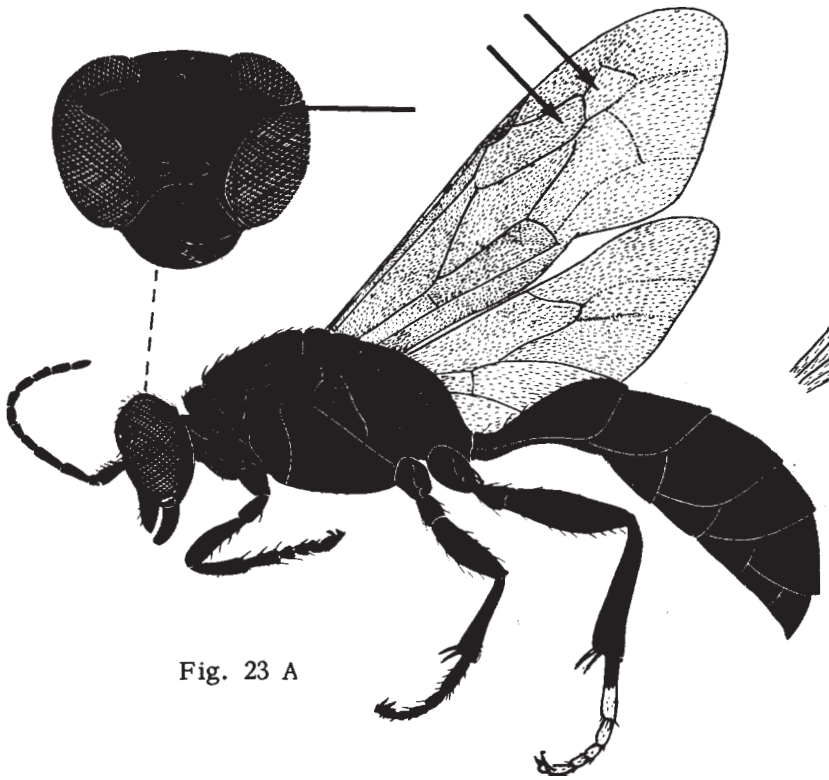


Fig. 23 A

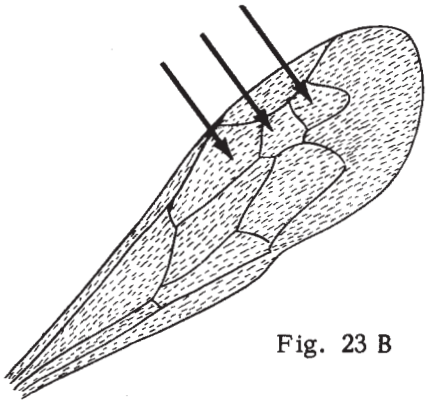


Fig. 23 B

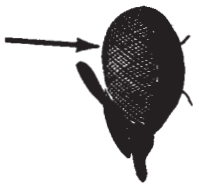


Fig. 23 C

24. Petiole of abdomen two-segmented (Fig. 24 A). Nest in holes in ground. (Sphex species) ..... SOLITARY WASP

Petiole of abdomen one-segmented (Fig. 24 B)..... 25

Fig. 24 A

Fig. 24 B

25. Bright metallic-bluish species (Fig. 25 A). Builds mud nests provisioned with spiders..... (Chalybion californicum)..... BLUE MUD-DAUBER

Darker species with yellowish or orange markings (Fig. 25 B)..... 26

Fig. 25 A

Fig. 25 B

26. Dark species with yellowish markings (Fig. 26 A). Builds mud nests provisioned with spiders.. (Sceliphron caementarium).....COMMON MUD-DAUBER

Dark hairy species with orange markings (Fig. 26 B). Nest in holes in ground..... (Chlorion ichneumonea).....ORANGE THREAD-WAISTED WASP

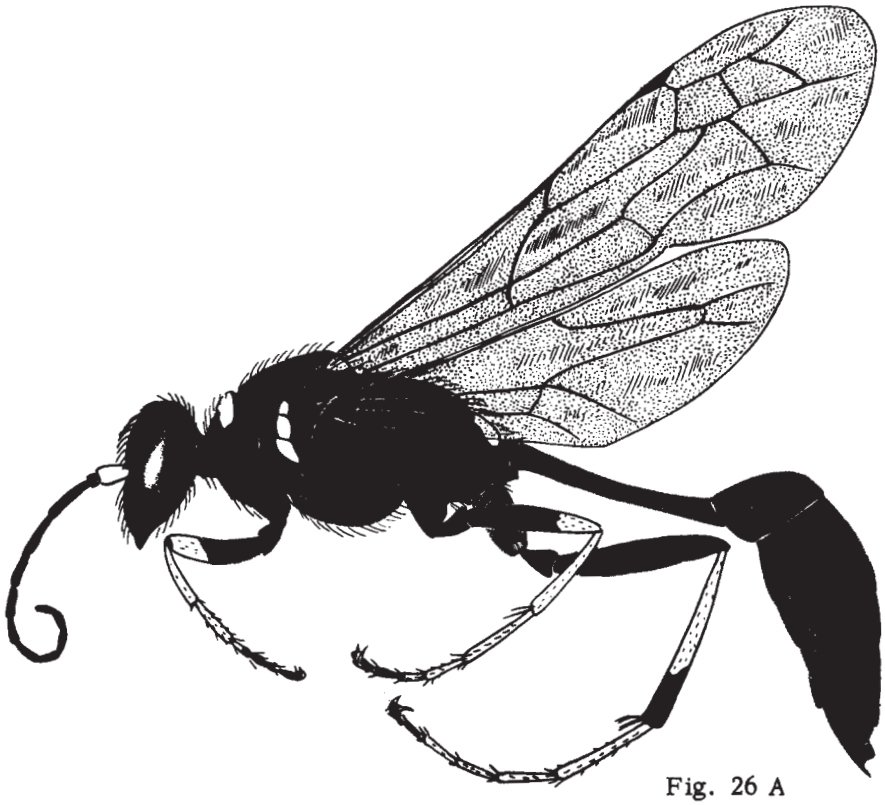


Fig. 26 A

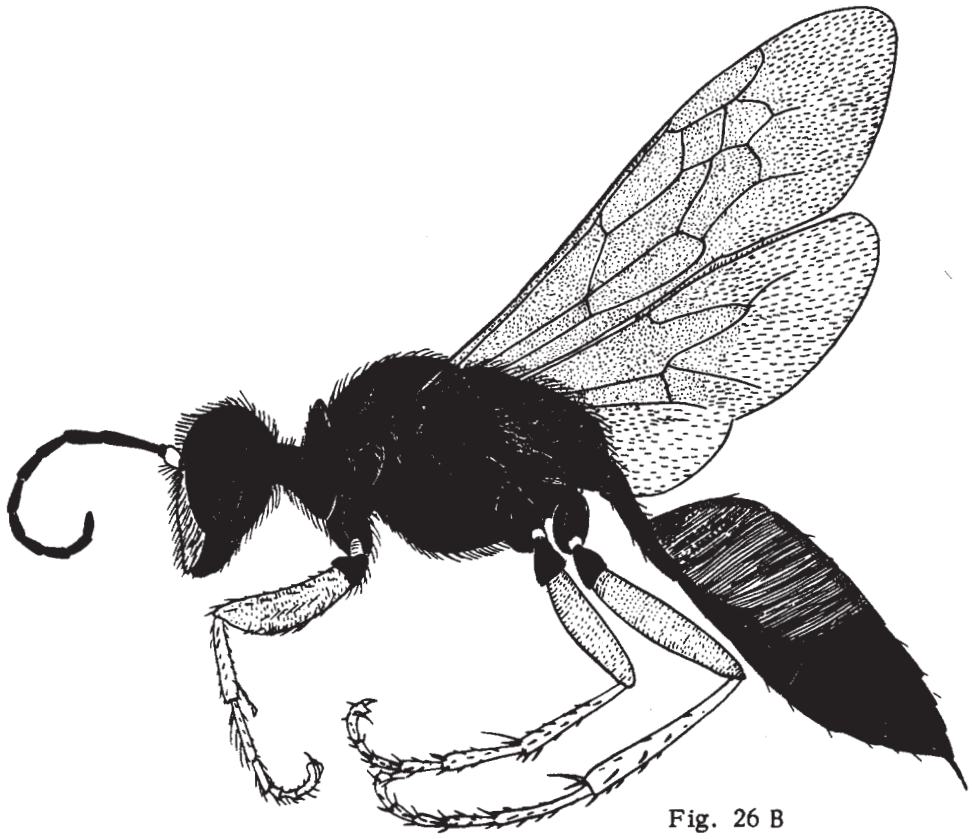


Fig. 26 B

27. Hind tibia without spurs (Fig. 27 A). Colony builds wax combs in bee hives, in houses, and in trees. (Apis mellifera) ..... HONEY BEE

Hind tibia with one or two spurs (Fig. 27 B) 28

Fig. 27 A

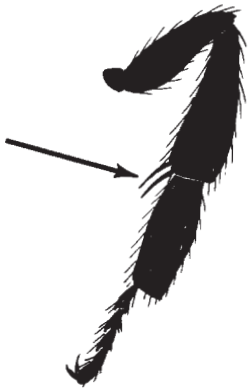


Fig. 27 B

28. Oculo-malar space longer than second segment of antenna; large hairy species with contrasting blackish and yellowish (sometimes reddish) pile (Fig. 28 A). Colony builds wax combs in nests in ground or logs, often in old mouse nests. (Family Bombidae; Bombus sp.) ..... BUMBLEBEES

Oculo-malar space short, eye reaching (or nearly reaching) base of mandible (Fig. 28 B) 29

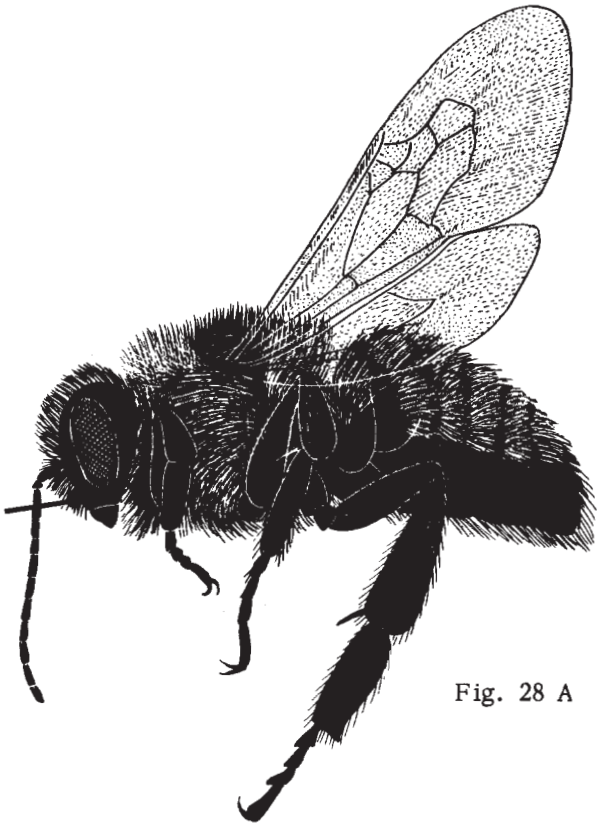


Fig. 28 A

Fig. 28 B

29. Very large species 15-25 mm. long with shiny bluish, nearly hairless upper abdomen; second submarginal cell strongly narrowed anteriorly (Fig. 29 A). Nest in holes bored in wood. (Xylocopa virginica) ..... CARPENTER BEE

Smaller species 2-14 mm. long, usually with some hairs on upper surface of abdomen, shiny greenish species; second submarginal cell not narrowed anteriorly (Fig. 29 B & C) 30

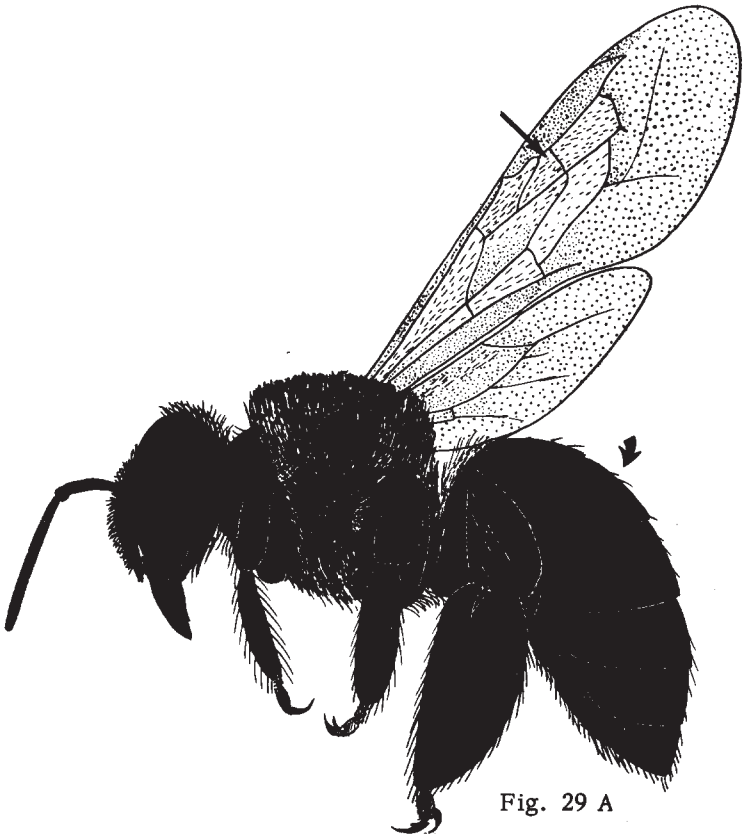


Fig. 29 A

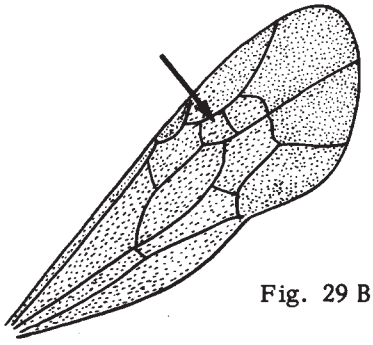


Fig. 29 B

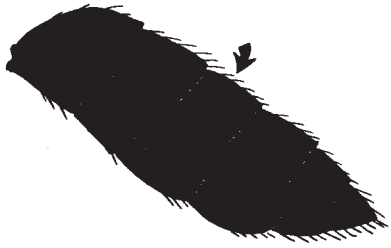


Fig. 29 C

30. Fore-wing with two submarginal cells; abdomen of female with dense hairy patches on underside (Fig. 30 A). Builds nest out of leaves in tree holes (Megachile species)... LEAFCUTTER BEES

Fore-wing with three submarginal cells; abdomen without dense hairy patches on underside (Fig. 30 B & C) 31

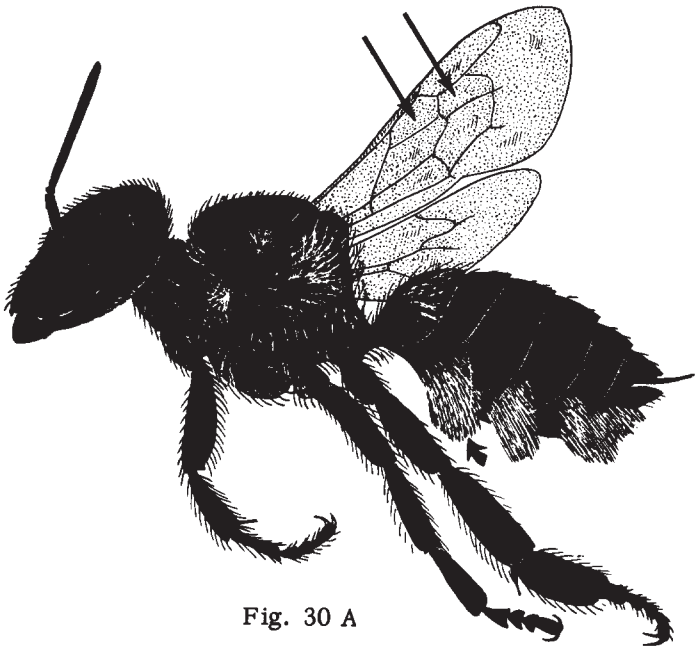


Fig. 30 A

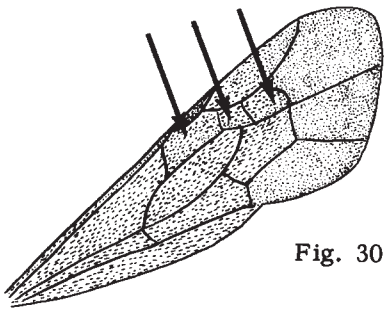


Fig. 30 B

Fig. 30 C

31. Shiny greenish species (Fig. 31 A). Nest in ground. (Augochlora species)..... METALLIC SOLITARY BEES

Duller species (Fig. 31 B). Nest in ground. (Halictus and Andrena species)....SOLITARY BEES

Fig. 31 A

Fig. 31 B

32. First (and sometimes second) segment of abdomen node-like (Fig. 32 A). Build colony nests in ground, under stones, in wood, or in buildings (Family Formicidae).....ANTS

First and second segments of abdomen not node-like (Fig. 32 B)..... 33

Fig. 32 A

Fig. 32 B

33. Larger species 3-25 mm. long, usually with definite dark and reddish or orange-colored hairs (Fig. 33 A). Parasites of ground-nesting bees and wasps (Family Mutillidae)...VELVET ANTS

Smaller species 1-2 mm. long, with few sparse hairs; body various shades yellowish to brownish (Fig. 33 B). Parasites of wood-boring beetles (Family Bethylidae, Scleroderma species... .....PARASITIC WASPS

Fig. 33 A

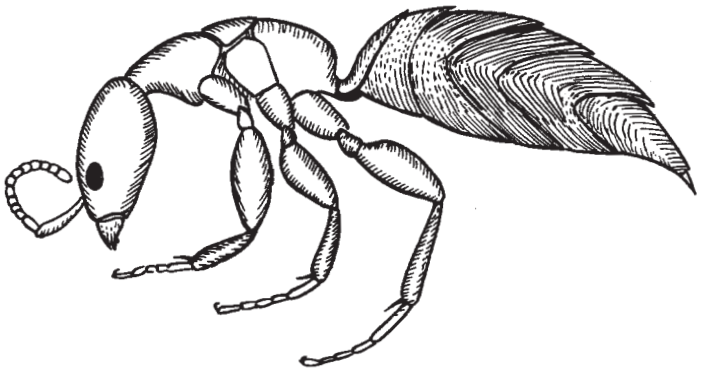


Fig. 33 B

ANTS: KEY TO SOME COMMON SPECIES

Harold George Scott

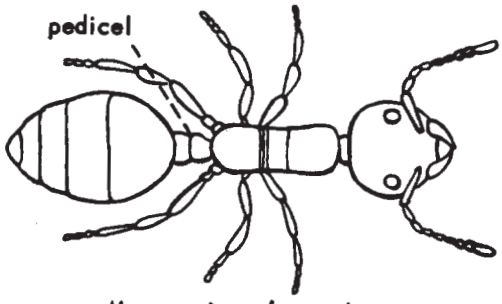
1. Pedicel ("waist") 1-segmented 2
   Pedicel 2-segmented 4

2. Petiole (scale on pedicel) poorly developed, hidden beneath abdomen (*Tapinoma sessile*) ..... ODOROUS HOUSE ANT
   Petiole well-developed, erect, not hidden beneath abdomen 3

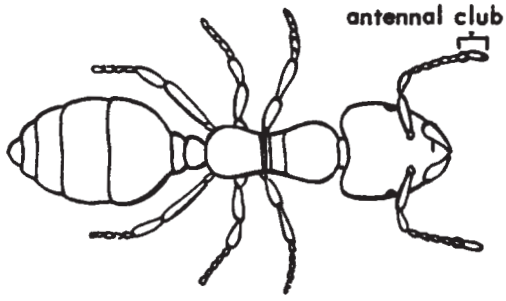
3. Tip of abdomen without circlet of hairs (*Iridomyrmex humilis*) ..... ARGENTINE ANT
   Tip of abdomen with circlet of hairs (*Camponotus herculeanus pennsylvanicus*) ..... BLACK CARPENTER ANT

4. Head and thorax with numerous spines (*Atta texana*) ..... TEXAS LEAF-CUTTING ANT
   Head and thorax spineless or with 1 pair of spines on the posterior thorax 5

5. Thorax and head covered with "fingerprints"; posterior thorax with single pairs of spines (*Tetramorium caespitum*) ..... PAVEMENT ANT
   Thorax and head without "fingerprints"; posterior thorax without spines 6



Monomorium pharaonis



Solenopsis molesta

6. Antennal club 2-segmented 8
   Antennal club 3-segmented 7

7. Shiny-black (*Monomorium minimum*) ..... LITTLE BLACK ANT
   Yellowish-red (*Monomorium pharaonis*) ..... PHARAOH ANT

8. House infesting ants (*Solenopsis molesta*) ..... THIEF ANT
   Outdoor mound-building ants 9

9. Mandibles strongly incurved (*Solenopsis geminata*) ..... TROPICAL FIRE ANT
   Mandibles not strongly incurved 10

10. Dorsal surface of head with large coarse, scattered punctures (*Solenopsis saevissima* var. *richteri*) ..... IMPORTED FIRE ANT
    Dorsal surface of head without punctures (*Solenopsis xyloni*) ..... SOUTHERN FIRE ANT

DIPTERA: PICTORIAL KEY TO PRINCIPAL FAMILIES OF PUBLIC HEALTH IMPORTANCE

H. R. Dodge

Antennae of 3 segments or the apical segments more or less fused

Antennae of 10 or more distinct segments, usually elongate

4 or 5 posterior cells

Not more than 3 posterior cells (Antennae 3 segmented)

Antennae short, of 10-11 segments. Posterior veins fine

SIMULIIDAE

Antennae 12-16 segmented, elongate. Posterior veins not unusually fine

3rd vein with 3A long, 3B ending behind wing tip

Abdomen flattened - *TABANIDAE*
Abdomen cylindrical - *RHAGIONIDAE*

3rd vein with 3A short, 3B ending before wing tip

STRATIOMYIDAE

A. Costa ending before wing tip.
B. Wing veins reduced.
C. Vestiture of wing very sparse.

HELEIDAE (=CERATOPOGONIDAE)

Wing with costa continued around apex and veins numerous, thickly clad with hairs or scales

A. 2nd antennal segment with seam.
B. Mesonotal suture complete

A. 2nd antennal segment without seam.
B. Mesonotal suture incomplete or absent

Wing with cross veins at about the middle

CULICIDAE

Wing without cross veins beyond the basal third

PSYCHODIDAE

Hypopleura bare, or with sparse, fine hairs

MUSCIDAE

Hypopleura with a row of strong bristles

Hypopleura with long, usually dense hairs. Mouthparts vestigial

Postscutellum undeveloped
CUTEREBRIDAE

Postscutellum large, swollen (See fig. for *TACHINIDAE* below)
OESTRIDAE

Oral vibrissae usually present. (Small flies rarely retained by a 16-mesh screen)

Oral vibrissae absent. (Size usually larger, or with prominent ovipositor in female)

Postscutellum undeveloped

Postscutellum large, swollen

LARVAEVORIDAE (=TACHINIDAE)

(Spurious vein absent. Anal cell not nearly reaching margin of wing)

A. Spurious vein present.
B. Anal cell nearly reaches wing margin.

SYRPHIDAE

A. Anal cell short.
B. Female ovipositor prominent

Anal cell absent

EPHYDRIDAE

Usually four notopleural bristles

Only two notopleural bristles

SARCOPHAGIDAE

CALLIPHORIDAE

(Mouthparts well developed, functional)

Clypeus broad

Clypeus narrow (Body shining black)

Mouthparts vestigial

OTITIDAE (=ORTALIDAE)

LONCHAEIDAE

GASTEROPHILIDAE

Body dull to moderately shining

Body strongly shining, usually black

(Antennae apparently 2-segmented. Palpi not large and bristly. Posterior veins strong, with cross veins)

(Wing vein 5 without slight irregularity. Anal vein present)

A. Antennae apparently 1-segmented.
B. Palpi large, bristly. C. Posterior veins fine, without cross veins

PHORIDAE

A. Mouthparts thick, fleshy. B. 1st hind tarsal segment broad

BORBORIDAE

A. Mouthparts not thick and fleshy. B. 1st hind tarsal segment long, slender

DROSOPHILIDAE

A. Vein 5 with slight irregularity.
B. Anal vein absent

CHLOROPIDAE

A. Abdomen broad basally.
B. Front leg only slightly shorter than hind leg.

PIOPHILIDAE

A. Abdomen tapered basally.
B. Front leg usually much shorter than hind leg

SEPSIDAE

DOMESTIC FLIES: PICTORIAL KEY TO COMMON SPECIES IN THE U.S.

H. R. Dodge

Thorax and abdomen dull, grey or brown to black

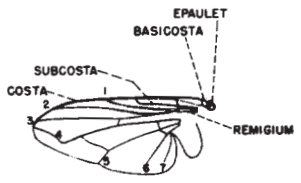
- 4th vein angled
  - Thorax dark, with 4 black stripes (Sides of abdomen usually pale) — *Musca domestica* (The house fly)
  - Thorax gray, with 3 black stripes (Abdomen checkered, with tip usually red, the sides never pale) — *Sarcophaga* spp.
- 4th vein curved
  - Proboscis elongate, stiff, non-retractile, blood-sucking. Thorax with pale spot behind head — *Stomoxys calcitrans* (The stable fly)
  - Proboscis normal, retractile. Tip of scutellum more or less pale — *Muscina*
    - Legs in part reddish-brown — *M. stabulans*
    - Legs wholly black — *M. assimilis*
- 4th vein straight
  - 6th vein short — *Fannia* spp.
  - 6th vein continued faintly to wing margin — *Hylemya; Paregle* and others

Thorax dull; abdomen blue or green

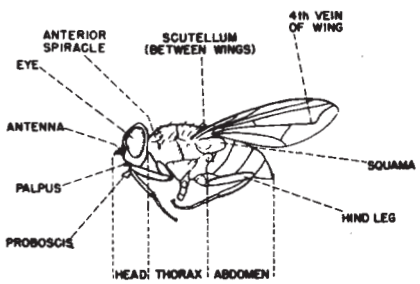
- Squamae pale; abdomen strongly shining — *Cynomyopsis cadaverina*
- Squamae dark, with hind margin of lower lobe pale; abdomen pollinose* — *Calliphora* spp.

Thorax and abdomen shining, metallic or black

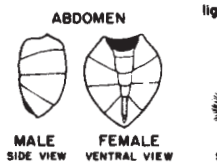
- 4th vein sharply angled
  - Head yellow below; thorax dark striped; Anterior spiracle white — *Callitroga*
    - Middle thoracic stripe abbreviated; wing yellowish-brown at base — *C. hominivorax* (= *americana*) (The screw-worm fly)
    - Thoracic stripes of equal length; wing grayish-brown at base — *C. macellaria* (Secondary screw-worm fly)
  - Head dark below; thorax not striped
    - Squamae white or partly so
      - Anterior spiracle blackish; Dorsal thoracic bristles strong — *Phaenicia* and allies
        - Abdomen strongly shining not pollinose dorsally;* males with squamae partly darkened, eyes close set
          - Front margin of thorax entirely shining or with occasional traces of pollinosity* — Antennae and palpi black or blackish — *Bufolucilia silvarum*; Antennae and palpi reddish — *P. coeruleiviridis*
          - Front margin of thorax uniformly pollinose * — Antennae reddish — *P. eximia*; Antennae black — *Lucilia illustris*
        - Abdomen pollinose dorsally;* males with squamae white, eyes moderately separated
          - Body usually green; Male genital segments concealed; female without variegated pollinosity ventrally on abdomen* — *P. sericata*
          - Body usually bronzy; Male genital segments conspicuous, hairy; female with variegated pollinosity ventrally on abdomen* (readily visible when viewed in certain light) — *P. cuprina cuprina* (= *pallescens*)
      - Anterior spiracle reddish; Dorsal thoracic bristles reduced — *Phormia regina* (The black blow fly)
    - Squamae uniformly dark — *Protophormia terrae-novae*
- 4th vein straight — *Ophyra*
  - Body bluish-black; palpi black — *O. leucostoma*
  - Body bronzy-black; palpi reddish — *O. aenescens*



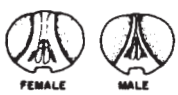
NO'S 1-7 ARE THE "LONGITUDINAL WING VEINS" USUALLY REFERRED TO AS "VEINS"



THORACIC STRIPES AND POLLINOSITY ARE BEST OBSERVED IN POSTERO-DORSAL VIEW



USUAL DIFFERENCE IN INTEROCULAR SPACE OF MALE AND FEMALE FLIES



ANTERIOR VIEW

*"POLLINOSE" REFERS TO A WHITISH DUSTING OF A SURFACE CAUSED BY MICROSCOPIC HAIRS

DOMESTIC FLIES: PICTORIAL KEY TO COMMON SPECIES

Harold George Scott and Margery R. Borom

thorax dull, abdomen dull

thorax dull, abdomen shiny

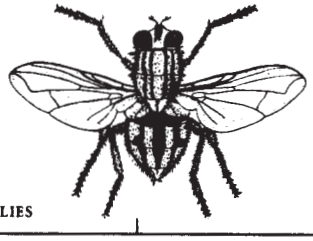
Calliphora spp. and Cynomyopsis spp.
BLUE BOTTLE FLIES

thorax shiny, abdomen shiny

small (about 1/5-inch long)
4 thoracic stripes, indistinct

Fannia spp.
LESSER HOUSE FLIES

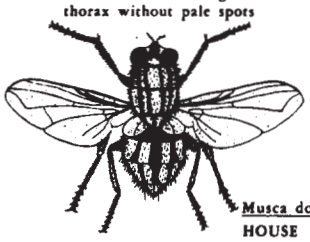
medium-size (about ¼-inch long)
4 thoracic stripes, often indistinct



large (usually over 1/3-inch long)
3 distinct thoracic stripes
abdomen with red tip

Sarcophaga spp.
FLESH FLIES

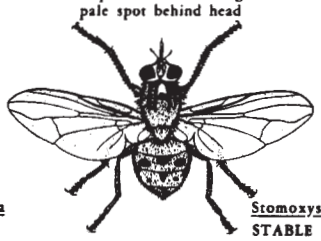
thoracic stripes distinct
sides of abdomen pale
erect when resting
thorax without pale spots



Musca domestica
HOUSE FLY

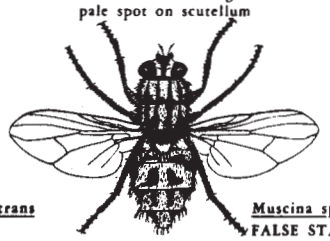
thoracic stripes indistinct
sides of abdomen dark

"squats" when resting
pale spot behind head



Stomoxys calcitrans
STABLE FLY

erect when resting
pale spot on scutellum



Muscina spp.
FALSE STABLE FLIES

color black
medium-size (¼-inch long)

Ophyra spp.
DUMP FLIES

color dark blue
large (1/3-inch long)

Phormia regina
BLACK BLOW FLY

color green to bronze

color green

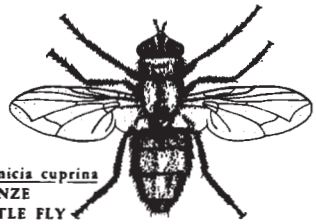
3 thoracic stripes

Cochliomyia macellaria
SECONDARY
SCREW WORM FLY

without thoracic stripes

Phaenicia sericata
GREEN
BOTTLE FLY

color bronze
without thoracic stripes



Phaenicia cuprina
BRONZE
BOTTLE FLY

DOMESTIC FLIES: PICTORIAL KEY TO COMMON SPECIES IN SOUTHERN U.S.

H. R. Dodge

Body dull, grey or brown to black

4th vein angled

Thorax dark, with 4 black stripes (Sides of abdomen usually pale)

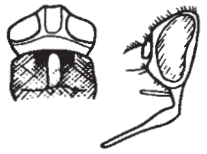
MUSCA DOMESTICA
The housefly

Thorax grey, with 3 black stripes (Abdomen checkered, with tip usually red, the sides never pale)

SARCOPHAGA SPP.

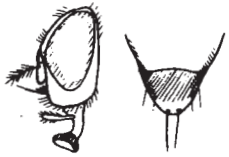
4th vein curved

Proboscis elongate, stiff, non-retractile, blood-sucking. Thorax with pale spot behind head



STOMOXYS CALCITRANS
The stable fly

Proboscis normal, retractile. Tip of scutellum more or less pale



MUSCINA
Legs in part reddish-brown
M. STABULANS

Legs wholly black
M. ASSIMILIS

4th vein straight

FANNIA SPP.
HYLEMYA SPP.

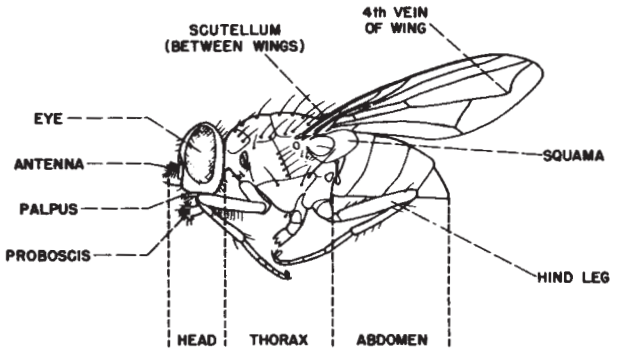
Body bicolored: thorax dark, abdomen metallic

Scutellum with 3 pairs of marginal bristles (Squamae ash grey)

CYNOMYOPSIS CADAVERINA

Scutellum with 4-5 pairs of marginal bristles (Squamae dark, with pale hind margin of lower lobe)

CALLIPHORA SPP.

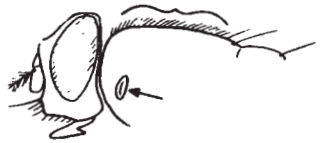


Body shining, metallic or black

4th vein sharply angled

Thorax not striped. Head dark below, never yellow

Anterior spiracle red. Dorsal thoracic bristles reduced



PHORMIA REGINA

Body wholly shining, blue-green
P. CAERULEIVIRIDIS

4th vein straight

OPHYRA

Body bluish-black; palpi black
O. LEUCOSTOMA

Body bronzy-black; palpi red
O. AENESCENS

Thorax black-striped. Head yellow below
CALLITROGA MACELLARIA
The secondary screw-worm fly

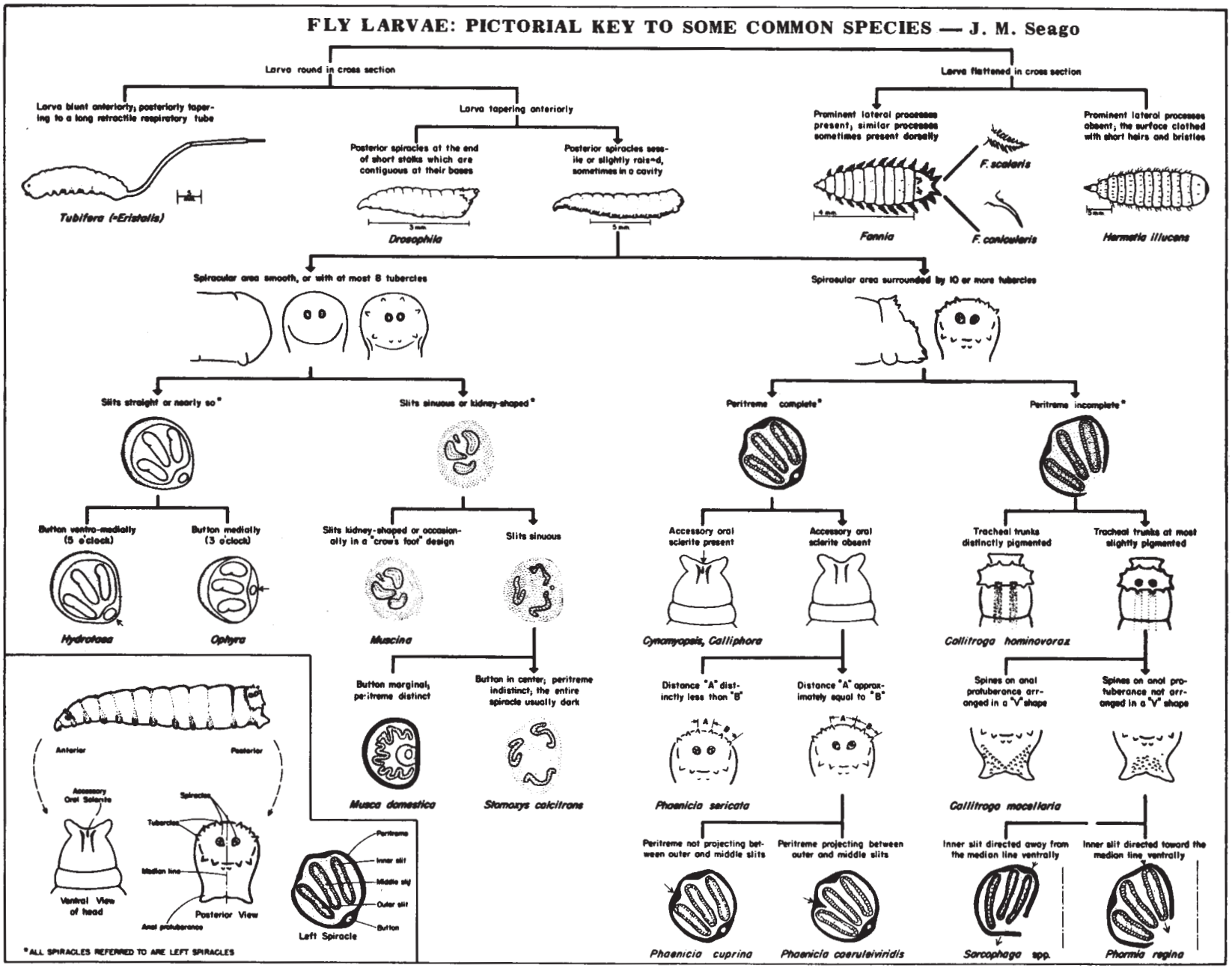
Anterior spiracle dark. Dorsal thoracic bristles strong

PHAENICIA

Body with whitish pollen, most evident on front margin of thorax. Body color usually green
P. SERICATA

Body color usually bronzy
P. PALLESCENS

FLY LARVAE: PICTORIAL KEY TO SOME COMMON SPECIES — J. M. Seago



FLY LARVAE: KEY TO SOME SPECIES OF PUBLIC HEALTH IMPORTANCE

Chester J. Stojanovich – Harry D. Pratt – Elwin E. Bennington

1. Larva with a definite, hard, sclerotized head capsule (Fig. 1 A).....2

   Larva without a definite, hard, sclerotized head capsule (Fig. 1 B).....3

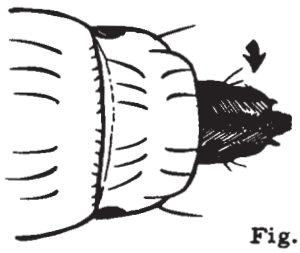


Fig. 1 A

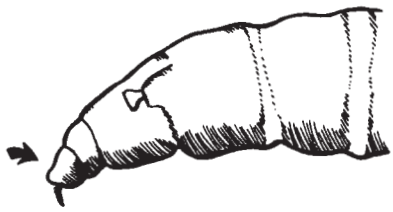


Fig. 1 B

2. Body flattened; large larvae 12-20 mm. long (Fig. 2 A)... (Hermetia illucens) SOLDIER FLY

   Body cylindrical with spiracles opening in a tubular segment at posterior end of body, last segment modified into a sclerotized air tube (Fig. 2 B).....
   .....(Genus Psychoda & allies) FILTER FLIES

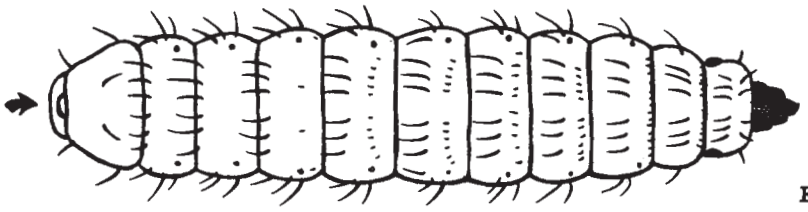


Fig. 2 A

Fig. 2 B

3. Body with spine-like dorsal and lateral processes on each segment; posterior spiracles on small elevations (Fig. 3 A).....(Genus Fannia)...4

   Body smooth, or with short spines, but no long lateral processes (Fig. 3 B)..... 5

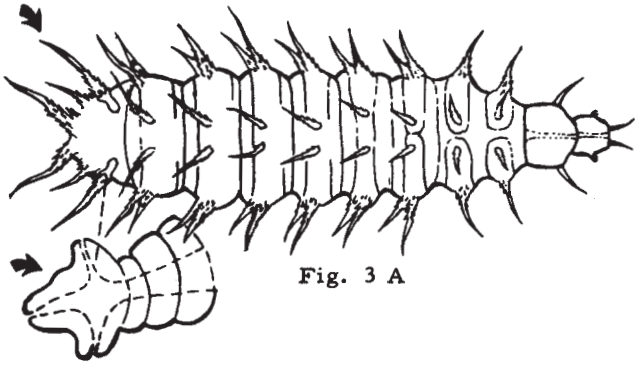


Fig. 3 A

Fig. 3 B

4. Processes branched or feathery (Fig. 4 A)..... (Fannia scalaris) LATRINE FLY

   Processes without branches, spiny (Fig. 4 B).. (Fannia canicularis) LESSER HOUSE FLY

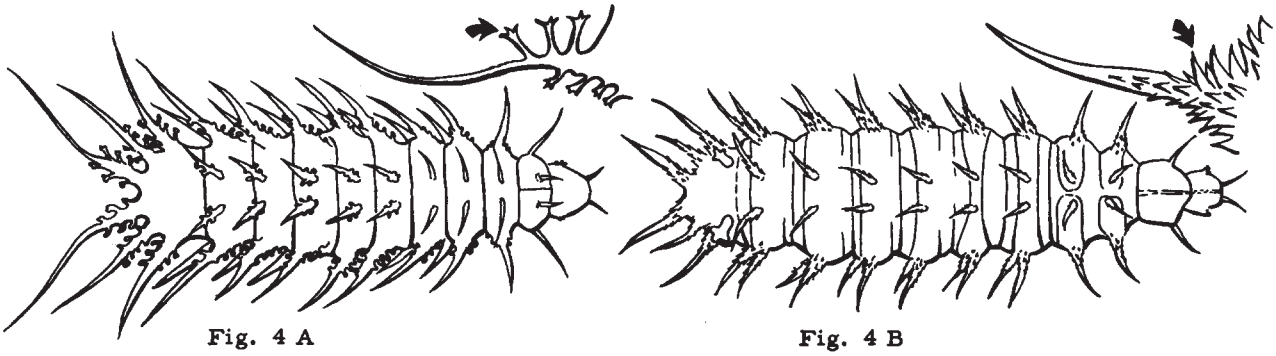


Fig. 4 A

Fig. 4 B

5. . Posterior spiracles on peg-like tubercles or cones; smaller larvae, usually 6-9 mm. long (Fig. 5 A)..... 6

   Posterior spiracles not on peg-like tubercles; larger larvae, usually 9-18 mm. long (Fig. 5 B)..... 7

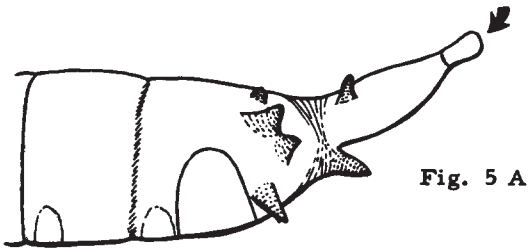


Fig. 5 A

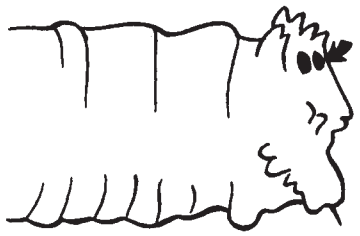


Fig. 5 B

6. Posterior spiracles at ends of long tubercles (Fig. 6 A)..... ..... (Genus Drosophila) VINEGAR FLIES

   Posterior spiracles on short cones, last segment with short finger-like lateral process (Fig. 6 B).....(Piophila casei) CHEESE SKIPPER

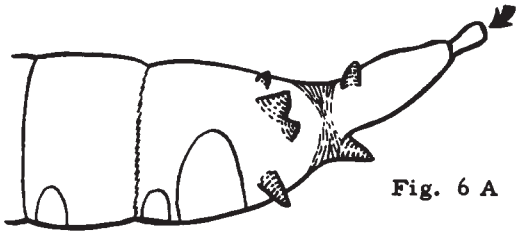


Fig. 6 A

Fig. 6 B

7. Posterior end of body extended to form a tail (Fig. 7 A)..... (Eristalis tenax) RAT-TAILED MAGGOT

   Body swollen or tapered posteriorly, but never extended into a tail like process (Fig. 7 B).. 8

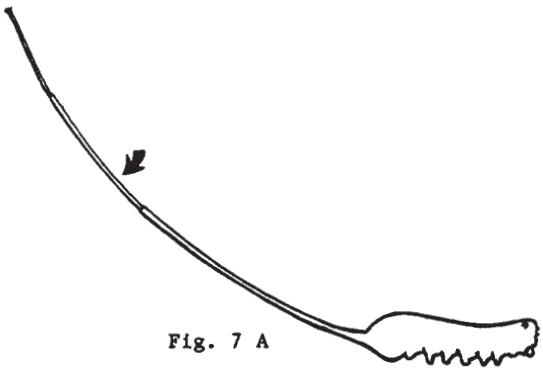


Fig. 7 A

Fig. 7 B

8. Peritreme present, with 3 distinct slits (Fig. 8 A).....9

   Peritreme absent; or if present without 3 distinct slits (Fig. 8 B & C)..... 23

Fig. 8 A 

Fig. 8 B 

Fig. 8 C 

9. Slits of posterior spiracles straight (Fig. 9 A).....10

   Slits of posterior spiracles strongly sinuous (Fig. 9 B).....22

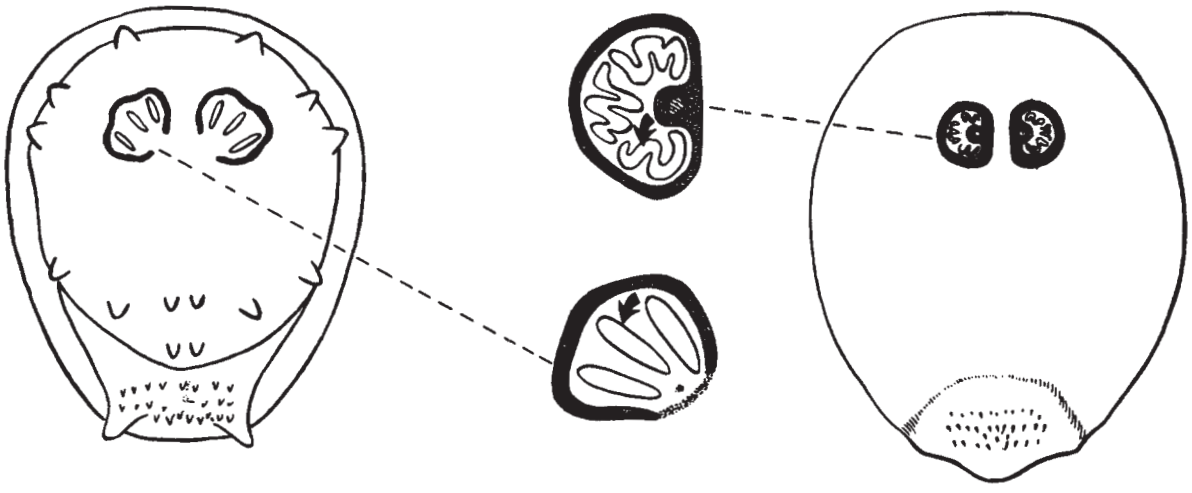


Fig. 9 A

Fig. 9 B

10. Dorsal and ventral arms of cephaloskeleton almost equal (Fig. 10 A); peritreme with two non-sclerotized areas away from the button (Fig. 10 B).. (Genus Ophyra) DUMP FLY

Dorsal arm of cephaloskeleton longer than ventral arm (Fig. 10 C); peritreme complete or with one weakly sclerotized area (Fig. 10 D & E)..... 11

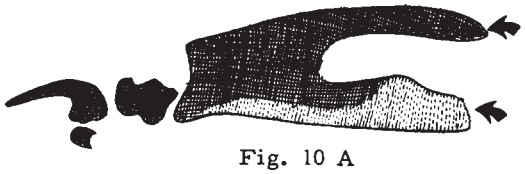


Fig. 10 A

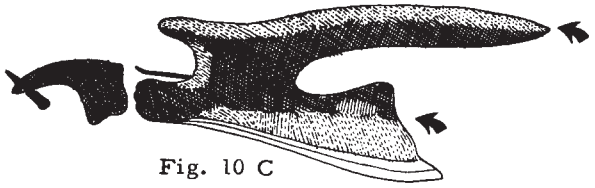


Fig. 10 C

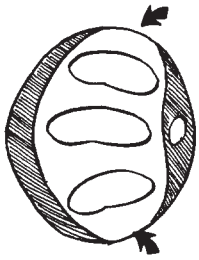


Fig. 10 B

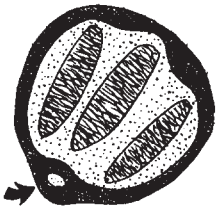


Fig. 10 D

Fig. 10 E

11. Posterior spiracles with peritreme complete, sometimes weak in area of button (Fig. 11 A) 12

Posterior spiracles with peritreme incomplete, not enclosing a sometimes ill-defined button (Fig. 11 B)..... 16

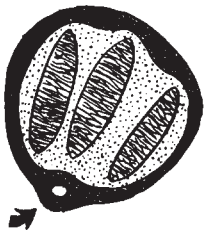


Fig. 11 A

Fig. 11 B

12. Spiracular plate and button heavily sclerotized; accessory oral sclerite present (Fig. 12 A & B)..... 13

Spiracular plate and button not heavily sclerotized; accessory oral sclerite absent (Fig. 12 C & D)..... 14

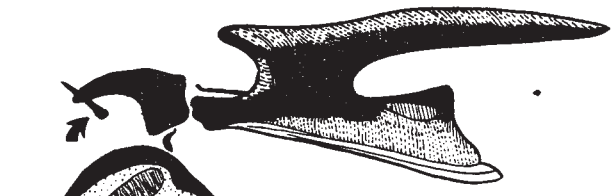


Fig. 12 A

Fig. 12 B

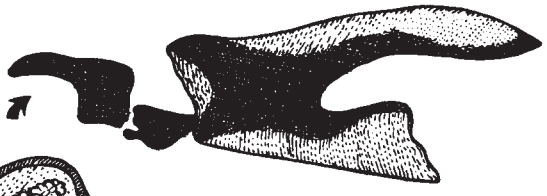


Fig. 12 C

Fig. 12 D

13. Mandibular sclerite with tooth longer than greatest width of basal portion (Fig. 13 A)..... ..... (Calliphora vicina) A BLUE BOTTLE FLY

Mandibular sclerite with tooth only as long as greatest width of basal portion (Fig. 13 B).. .....(Cynomyopsis cadaverina) A BLUE BOTTLE FLY

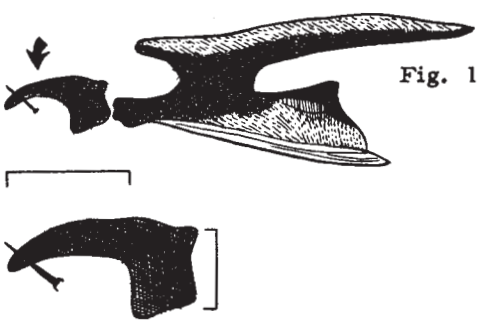


Fig. 13 A

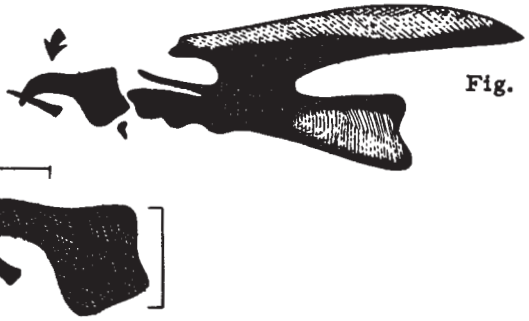


Fig. 13 B

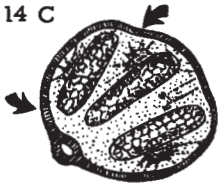
14. Peritreme thick with rounded or sharp projections which extend inward toward spiracular slits (Fig. 14 A); cephaloskeleton as in figure 14 B..... .....(Phaenicia caeruleiviridis) A GREEN BOTTLE FLY

Peritreme thin, usually with no projections or if present only slightly sclerotized (Fig. 14 C).....15

Fig. 14 A

Fig. 14 B

Fig. 14 C



15. At least one of the prothoracic spiracles with 8 or more openings (Fig. 15 A); peritreme and cephaloskeleton as in figures 15 B & C..(Phaenicia sericata) A GREEN BOTTLE FLY

At least one of the prothoracic spiracles with 6 or less openings (Fig. 15 D); peritreme and cephaloskeleton as in figures 15 E & F..... (Syn. P. pallescens).....(Phaenicia cuprina)A BRONZE BOTTLE FLY

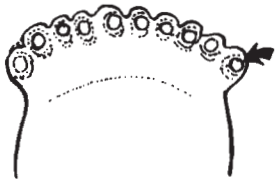


Fig. 15 A

Fig. 15 B

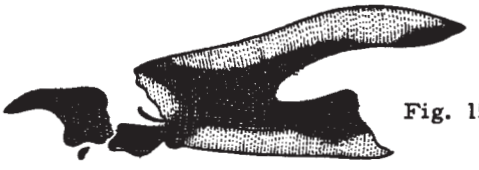


Fig. 15 C

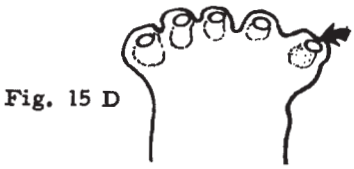


Fig. 15 D

Fig. 15 E

Fig. 15 F

16. Spiracular slits not pointing toward opening in peritreme (Fig. 16 A).....17

Spiracular slits pointing toward opening in peritreme (Fig. 16 B).....18

Fig. 16 A

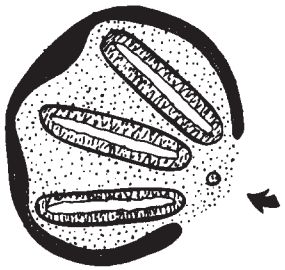


Fig. 16 B

17. Very large size, about 20 mm. long; mandibular sclerite as in figure 17 A.....
.....(Sarcophaga clitellivora or S. bullata) A FLESH FLY

Smaller size, about 10 mm. long; mandibular sclerite as in figure 17 B.....
..... (Sarcophaga haemorrhoidalis) A FLESH FLY

Fig. 17 A

Fig. 17 B

18. At least one of the prothoracic spiracles with 9 or less openings (Fig. 18 A).....19

At least one of the prothoracic spiracles with 10 or more openings (Fig. 18 B).....20

Fig. 18 A

Fig. 18 B

19. Mandibular sclerite with tooth longer than width of basal portion (Fig. 19 A).....
.....(Wohlfahrtia opaca) A FLESH FLY

Mandibular sclerite with tooth only as long as greatest width of basal portion (Fig. 19 B)..
..... (Wohlfahrtia vigil) A FLESH FLY

Fig. 19 A

Fig. 19 B

20. Button indistinct or absent; walls of slits with lateral swellings (Fig. 20 A).....21

Button present; walls of slits without lateral swellings (Fig. 20 B).....
.....(Phormia regina) BLACK BLOW FLY

Fig. 20 A

Fig. 20 B

21. Tracheal trunks pigmented (Fig. 21 A).....
.....(Cochliomyia hominivorax) PRIMARY SCREW-WORM

Tracheal trunks not pigmented (Fig. 21 B).....
.....(Cochliomyia macellaria) SECONDARY SCREW-WORM

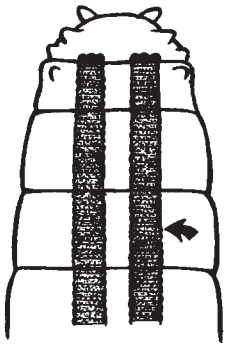


Fig. 21 A

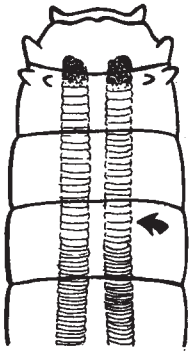


Fig. 21 B

22. Peritreme thick (Fig. 22 A).....(Musca domestica) HOUSE FLY

Peritreme thin (Fig. 22 B).....(Haematobia irritans) HORN FLY

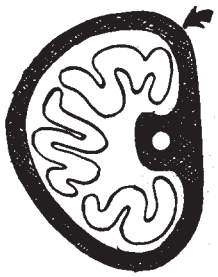


Fig. 22 A

Fig. 22 B

23. Small or slender, round larvae, usually less than 13 mm. long, tapering anteriorly (Fig. 23 A).....24

Large, robust larvae, over 15 mm long, with very stout spines (Fig. 23 B)..... 26

Fig. 23 A

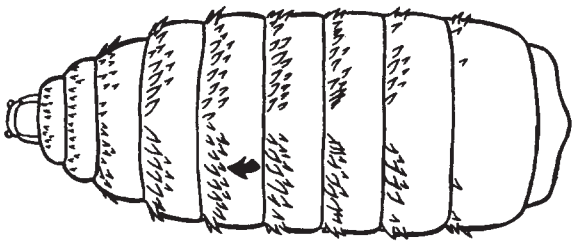


Fig. 23 B

24. Button centrally located (Fig. 24 A)..... (Stomoxys calcitrans) STABLE FLY

Button not centrally located (Fig. 24 B).....25

Fig. 24 A

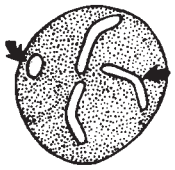


Fig. 24 B

25. Slits of posterior spiracles strongly sinuous (Fig. 25 A)..... (Musca autumnalis) FACE FLY

Slits of posterior spiracles not strongly sinuous (Fig. 25 B).....
.....(Genus Mucina) FALSE STABLE FLY

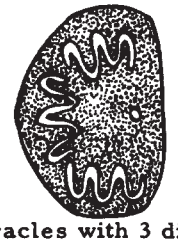


Fig. 25 A

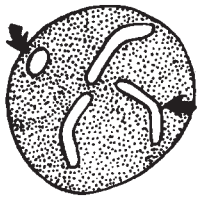


Fig. 25 B

26. Posterior spiracles with 3 distinct slits (Fig. 26 A).....27

Posterior spiracles without 3 distinct slits (Fig. 26 B).....28

Fig. 26 A

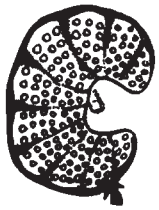


Fig. 26 B

27. Spiracular slits straight and sunken in deep cavity (Fig. 27 A); body shape as in figure 27 B. .....(Genus Dermatobia) HUMAN BOT FLY

Spiracular slits curved and at most in shallow cavity (Fig. 27 C); body shape as in figure 27 D.....(Genus Gasterophilus) HORSE BOT FLY

Fig. 27 A

Fig. 27 C

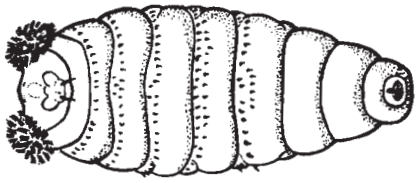


Fig. 27 B

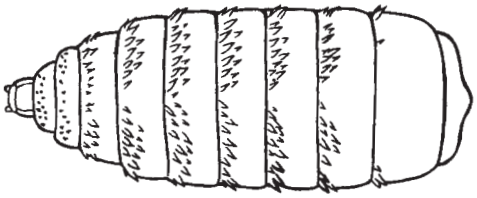


Fig. 27 D

28. Each spiracle divided into several plates (Fig. 28 A)..... ..... (Genus Cuterebra) RABBIT AND RODENT BOT FLY

Each spiracle not divided into several plates (Fig. 28 B).....29

Fig. 28 A

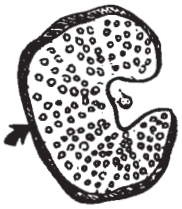


Fig. 28 B

29. Button centrally located (Fig. 29 A).....(Oestrus ovis) SHEEP BOT FLY

Button not centrally located (Fig. 29 B).....30

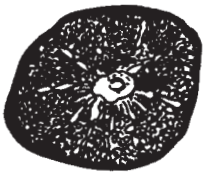


Fig. 29 A

Fig. 29 B

30. Opening toward button narrow (Fig. 30 A).... (Hypoderma bovis) NORTHERN CATTLE GRUB

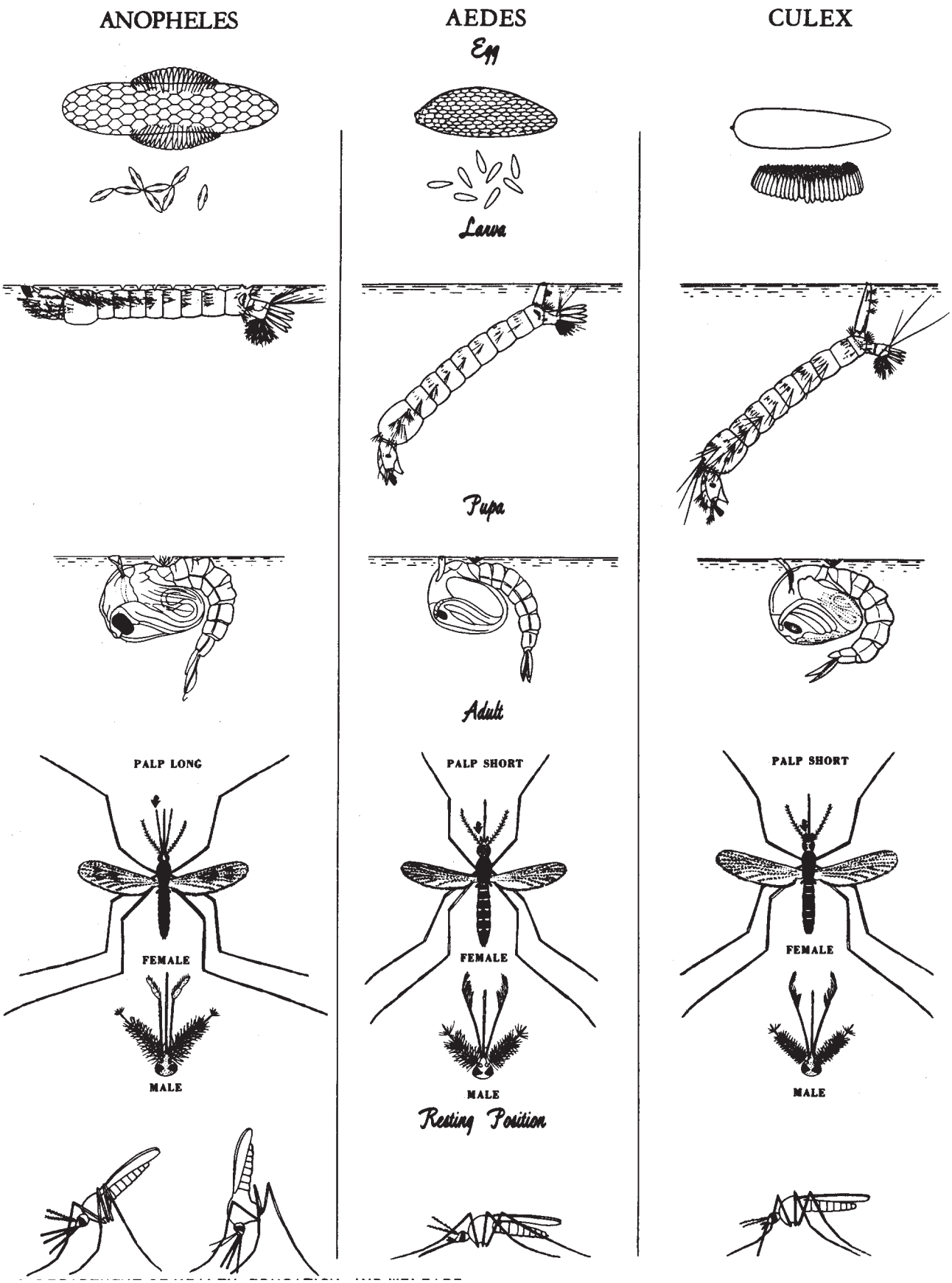
Opening toward button wide (Fig. 30 B).....(Hypoderma lineatum) CATTLE GRUB

Fig. 30 A

Fig. 30 B

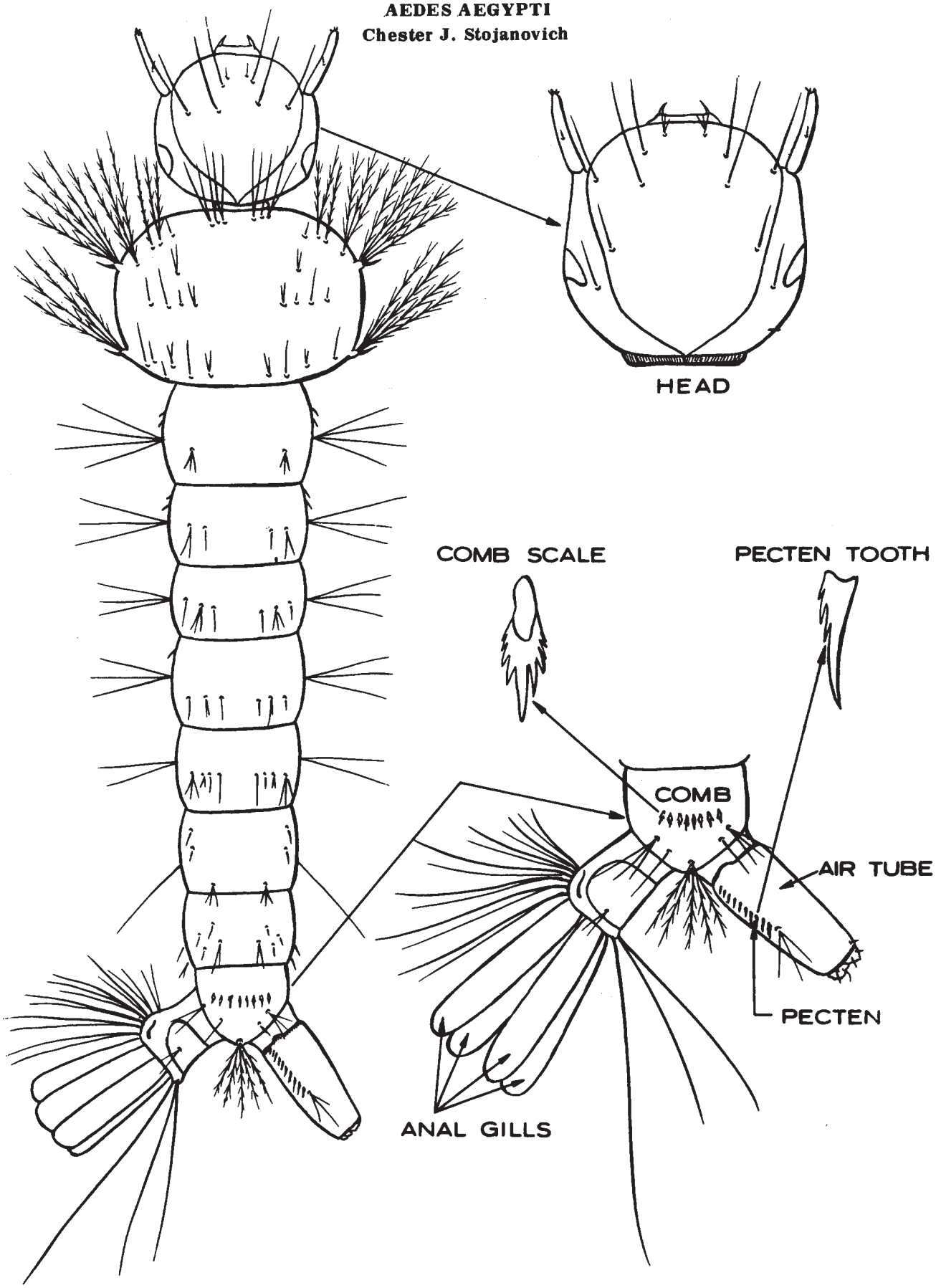
MOSQUITOES: CHARACTERISTICS OF ANOPHELINES AND CULICINES

Kent S. Littig and Chester J. Stojanovich



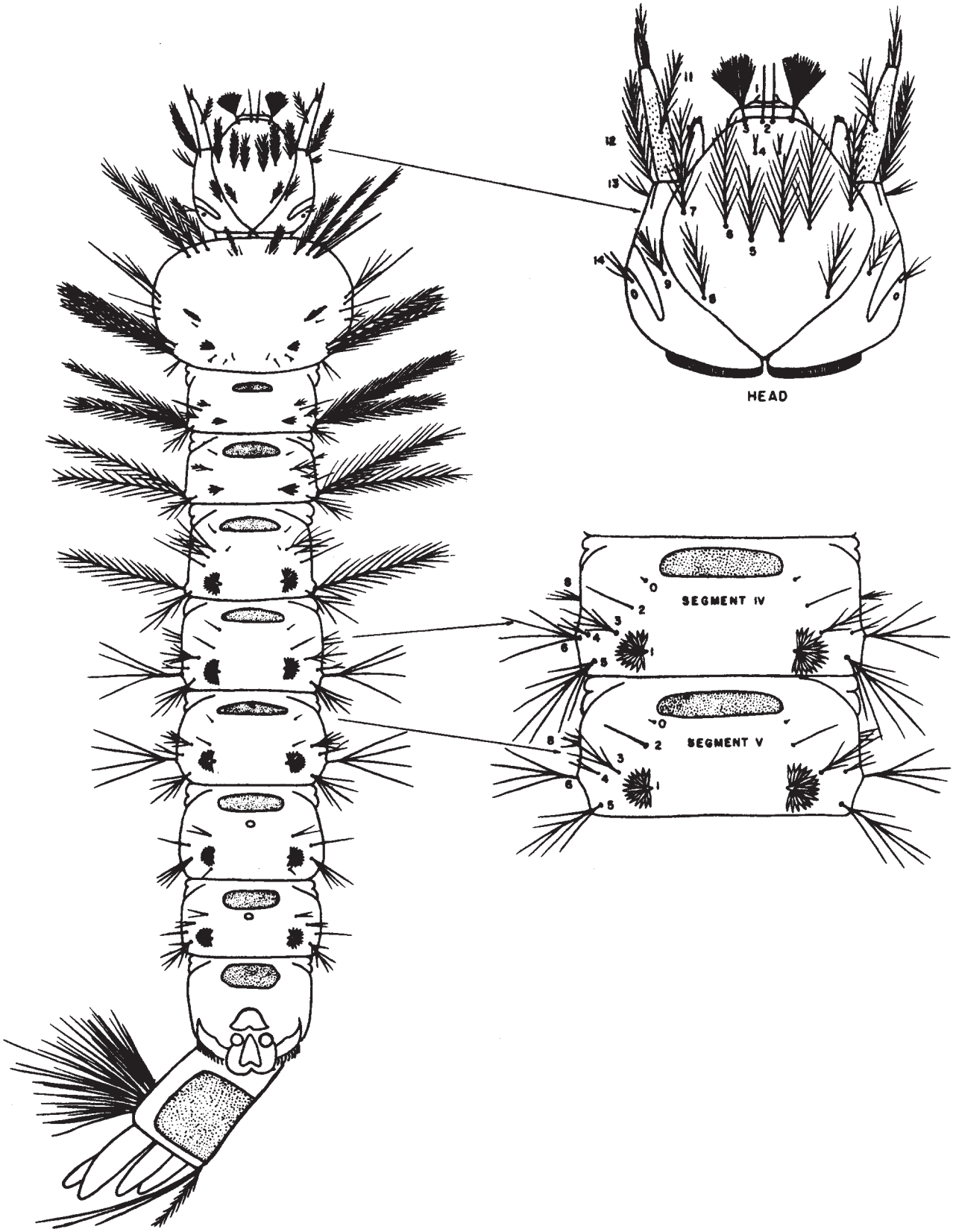
AEDES AEGYPTI

Chester J. Stojanovich



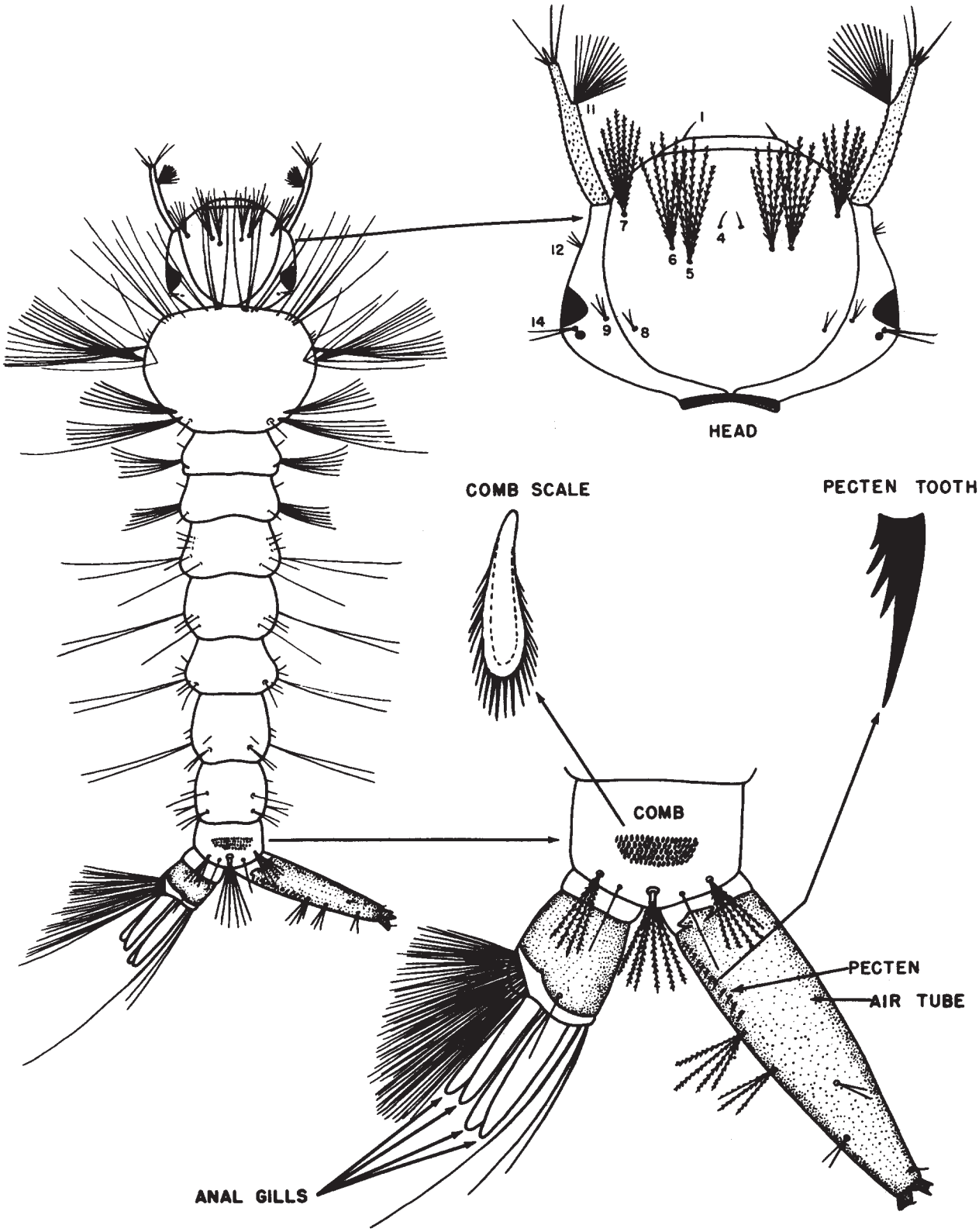
ANOPHELES QUADRIMACÚLATUS

Harry D. Pratt



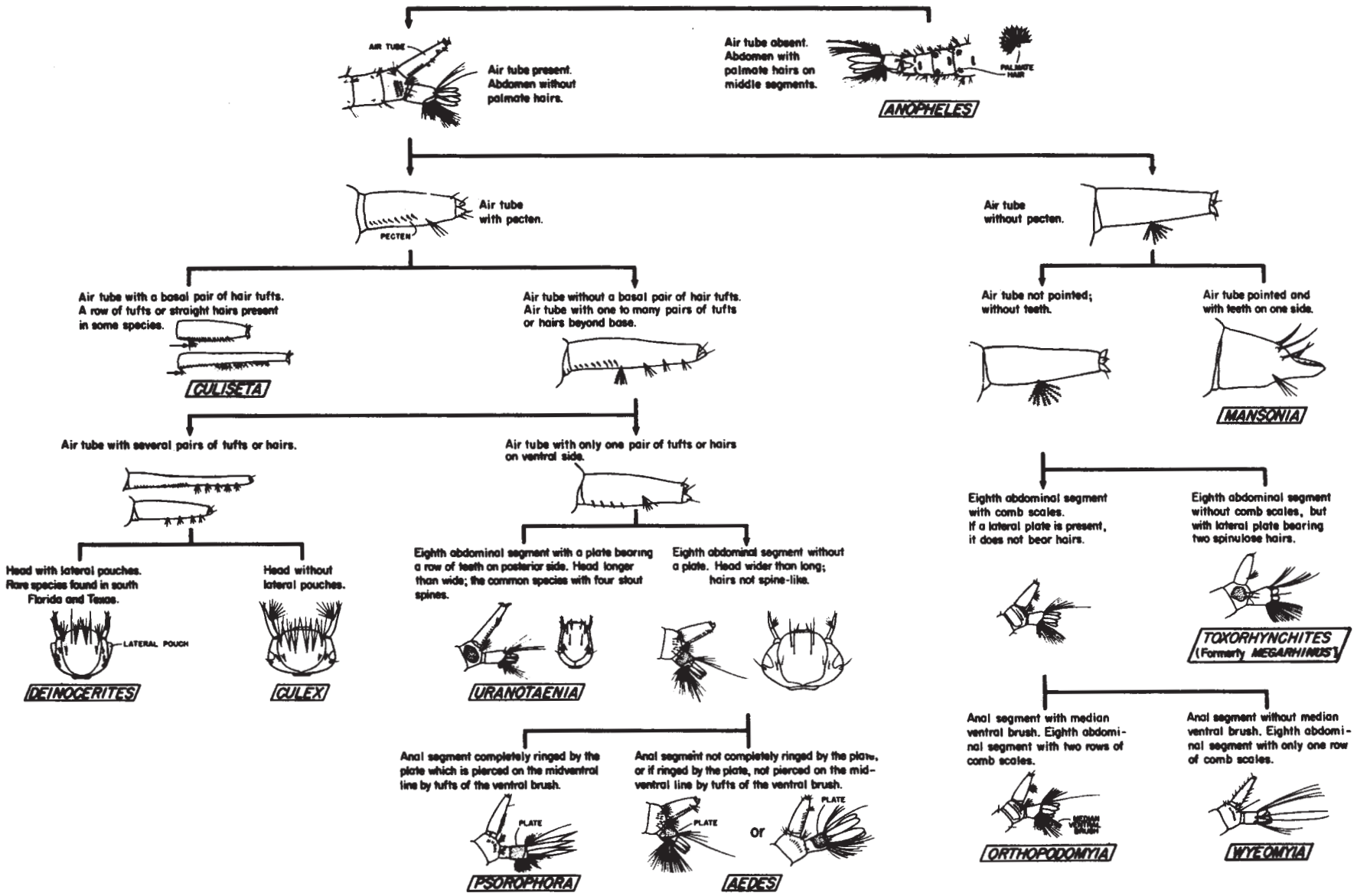
CULEX QUINQUEFASCIATUS

Harry D. Pratt



MOSQUITOES: PICTORIAL KEY TO U.S. GENERA OF LARVAE

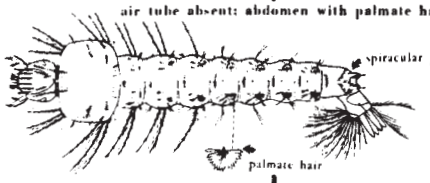
Harry D. Pratt



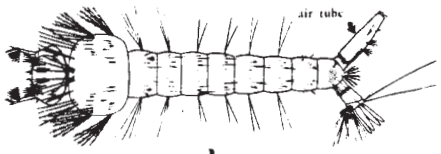
MOSQUITOES: PICTORIAL KEY TO SOME COMMON LARVAE OF THE UNITED STATES

Chester J. Stojanovich and Harry D. Pratt

air tube absent; abdomen with palmate hairs



air tube present; abdomen without palmate hairs

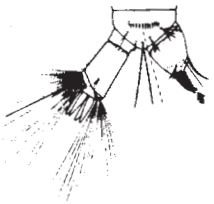


outer clypeal hair densely branched

outer clypeal hair simple

air tube not pointed

air tube pointed



Mansonia perturbans

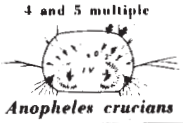
spiracular plate without tails

Anopheles franciscanus

spiracular plate with 2 tails

Anopheles pseudopunctipennis

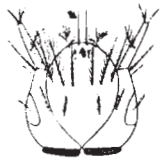
hairs 0 and 2 on abdominal segments 4 and 5 multiple



Anopheles crucians

hair 0 rudimentary or absent, hair 2 single or double

inner clypeal hairs separated by at least width of a basal tubercle



Anopheles quadrimaculatus

inner clypeal hairs separated by less than width of a basal tubercle

4 tergal plates on 4th and 5th segments — *Anopheles freeborni*

2 tergal plates on 4th and 5th segments — *Anopheles punctipennis*

air tube with a basal pair of hair tufts

air tube without a basal pair of hair tufts

air tube with several hairs or hair tufts on each side

air tube with 1 hair or hair tuft on each side

air tube with 8 to 16 pairs of multiple tufts

Culiseta melanura

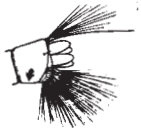
air tube with one pair of hair tufts lateral hair of saddle longer than saddle

Culiseta inornata

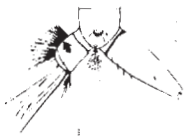
air tube with one pair of hair tufts lateral hair of saddle shorter than saddle

Culiseta incidens

saddle not pierced by tufts of ventral brush

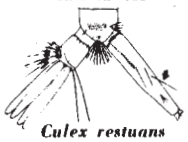


saddle pierced by anterior tufts of ventral brush



Psorophora confinnis

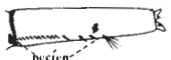
antenna with tuft in middle; air tube with 3 single hairs on each side



Culex restuans

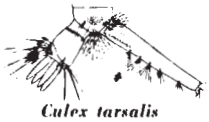
antenna with tuft beyond middle; air tube with several hairs or hair tufts on each side

one or more pecten teeth widely spaced



all pecten teeth evenly spaced

tufts of air tube in a straight line



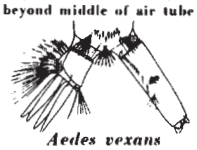
Culex tarsalis

tufts of air tube not in a straight line

pecten extending beyond middle of air tube

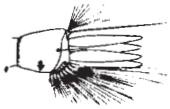
Aedes nigromaculis

pecten not extending beyond middle of air tube

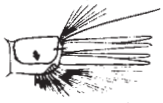


Aedes vexans

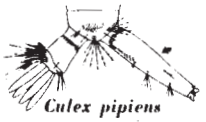
anal segment completely ringed by saddle



anal segment not ringed by saddle

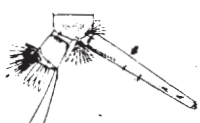


air tube 3 to 5 times as long as wide



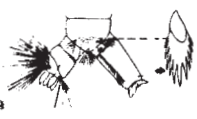
Culex pipiens

air tube 6 or more times as long as wide



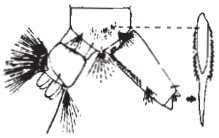
Culex quinquefasciatus

comb scale rounded apically



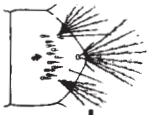
Aedes taeniorhynchus

comb scale thorn-like

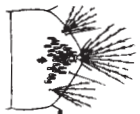


Aedes sollicitans

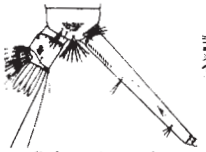
comb scales in a single row



comb scales in a patch

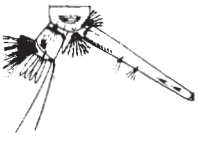


lateral hair of saddle single



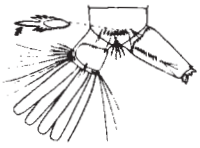
Culex nigripalpus

lateral hair of saddle double



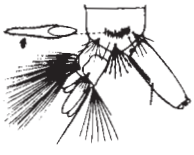
Culex salinarius

comb scale with lateral spines



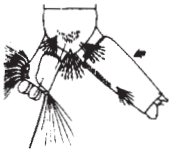
Aedes aegypti

comb scale with fringe



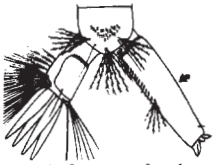
Aedes triseriatus

air tube about 2 times as long as wide



Aedes dorsalis

air tube about 3 to 4 times as long as wide

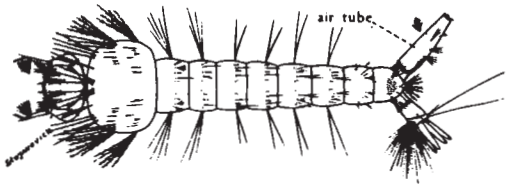


Aedes canadensis

MOSQUITOES: PICTORIAL KEY TO SOME COMMON LARVAE OF WESTERN UNITED STATES

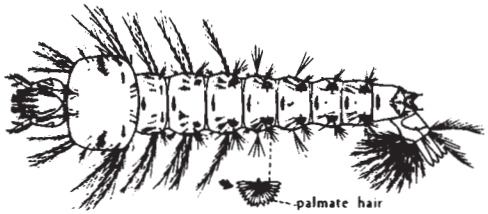
Harry D. Pratt

Air tube present at tip of abdomen; palmate hairs absent on middle abdominal segments.



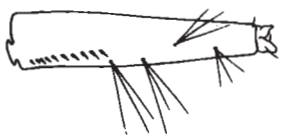
CULICINE MOSQUITOES

Air tube absent at tip of abdomen; palmate hairs present on middle abdominal segments.



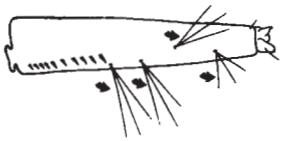
WESTERN MALARIAL MOSQUITO
Anopheles freeborni

Air tube with several tufts on each side.
GENUS *Culex*



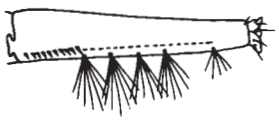
Air tube with 5 or more tufts on each side.

Air tube with 4 tufts on each side.



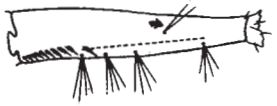
HOUSE MOSQUITO
Culex pipiens

All tufts on each side inserted in a straight line.



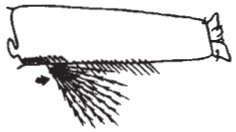
ENCEPHALITIS MOSQUITO
Culex tarsalis

One or more tufts on each side out of line.

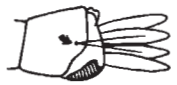


Culex peus

Air tube with a tuft at base on each side.
GENUS *Culiseta*

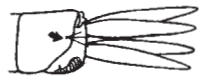


Lateral hair of anal segment as long as, or longer than, anal segment; stout.



Culiseta inornata

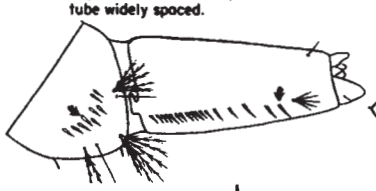
Lateral hair of anal segment shorter than anal segment; fine.



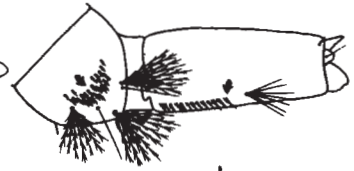
Culiseta incidens

Air tube with a tuft beyond base on each side.
GENUS *Aedes*

5–14 comb scales on 8th abdominal segment; last tooth of pecten on air tube widely spaced.



20–50 comb scales on 8th abdominal segment; last tooth of pecten on air evenly spaced.



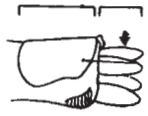
Pecten teeth extend to about middle of air tube.

Aedes vexans

Pecten teeth extend much beyond middle of air tube.

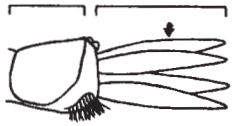
Aedes nigromaculis

Anal gills shorter than anal segment.



Aedes dorsalis

Anal gills longer than anal segment.

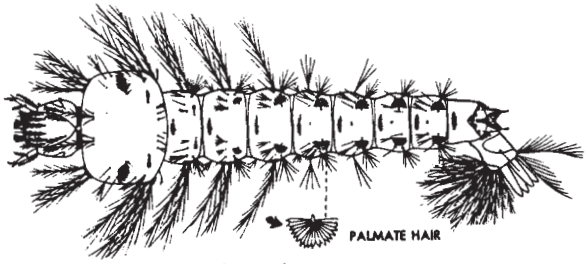


Aedes sticticus

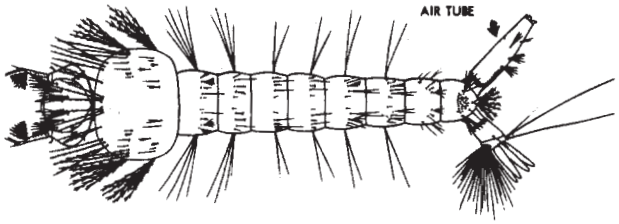
MOSQUITOES: PICTORIAL KEY TO SOME LARVAE COMMONLY FOUND IN ARTIFICIAL CONTAINERS

Harry D. Pratt and Chester J. Stojanovich

AIR TUBE ABSENT, PALMATE HAIRS PRESENT

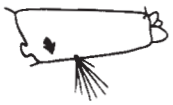


AIR TUBE PRESENT, PALMATE HAIRS ABSENT



Anopheles species

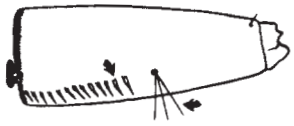
AIR TUBE WITH PECTEN ABSENT



8TH SEGMENT WITH PLATE BEARING HAIRS

8TH SEGMENT WITH TWO ROWS OF COMB SCALES

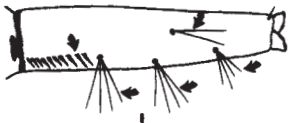
AIR TUBE SHORT, PECTEN PRESENT ONE VENTRAL TUFT ON EACH SIDE



COMB SCALE WITH LONG MEDIAN SPINE, THORAX WITH LATERAL THORN-LIKE SPINES

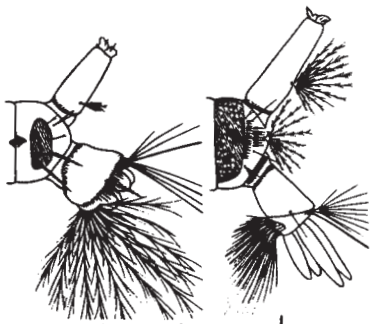
COMB SCALE FRINGED, THORAX WITHOUT THORN-LIKE SPINES

AIR TUBE LONG, PECTEN PRESENT SEVERAL HAIRS OR HAIR TUFTS ON EACH SIDE



ANTENNA UNIFORM IN SHAPE, AIR TUBE WITH SINGLE HAIRS

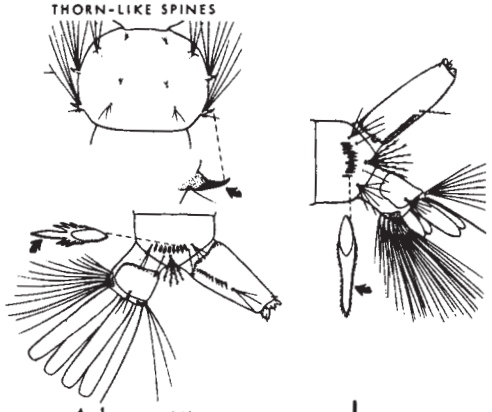
ANTENNA CONSTRICTED, AIR TUBE WITH SEVERAL MULTIPLE HAIR TUFTS



Toxorhynchites rutilus

8TH SEGMENT WITH PLATE, AIR TUBE WITH A LARGE TUFT

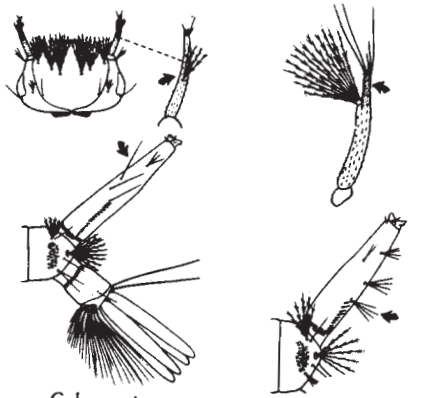
8TH SEGMENT WITHOUT PLATE, AIR TUBE WITH A SMALL TUFT



Aedes aegypti

AIR TUBE WITH HAIR TUFT INSERTED BEYOND PECTEN

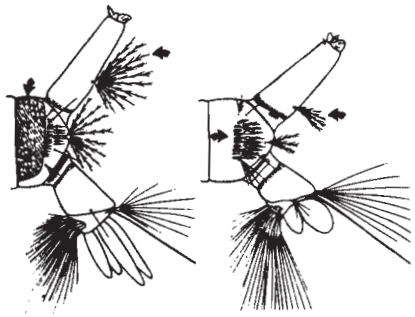
AIR TUBE WITH HAIR TUFT INSERTED WITHIN PECTEN



Culex restuans

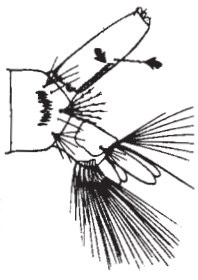
AIR TUBE 3-5 TIMES AS LONG AS WIDE AT BASE

AIR TUBE 6 OR MORE TIMES AS LONG AS WIDE AT BASE

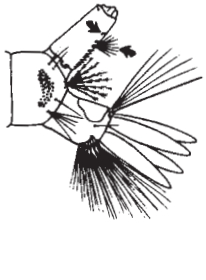


Orthopodomyia signifera

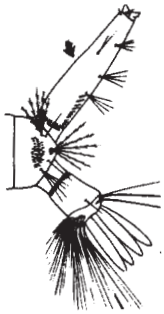
Orthopodomyia alba



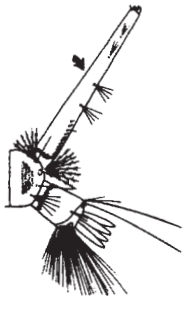
Aedes triseriatus



Aedes atropalpus



Culex quinquefasciatus



Culex salinarius

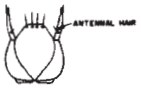
MOSQUITOES: PICTORIAL KEY TO ANOPHELINE LARVAE OF THE UNITED STATES

Stanley B. Freeborn and Eugene J. Gerberg

Outer clypeal hairs simple; feathered, or sparsely branched

Outer clypeal hairs densely branched

Inner clypeal hairs simple; antennal hair single or double



Outer clypeal hairs feathered or sparsely branched; antennal hair always many-branched

Inner clypeal hairs separated by less than width of basal tubercles

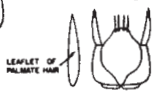
Inner clypeal hairs separated by width of basal tubercles

Antenna bare; frontal head hairs short and simple

BARBERI
(Tree holes of eastern half of U.S.)

Antenna spiculated; frontal head hairs long and branched

Outer and inner clypeal hairs equidistant. Slightly feathered leaflets of palmate hairs with smooth margins.

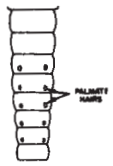


ALBIMANUS
(Lower Rio Grande Valley, Texas and South Florida)

Outer and inner clypeal hairs sparsely branched at tip, inners close. Leaflets of palmate hairs with notched margins.

ATROPOS
(Salt water of Gulf and Atlantic Coasts)

5 or 6 pairs of well-developed palmate hairs (on segs II or III to VII)



Only 3 pairs of well-developed palmate hairs. (on segs IV, V and VI)

Occipital hairs with 5 or less branches; brackish water breeder

Occipital hairs with 6 or more branches, fresh water breeder

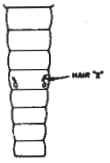
Posterior margin of spiracular plate with tails

PSEUDOPUNCTIPENNIS
(South Central U.S. west to Texas)

Posterior margin of spiracular plate without tails

FRANCISCANUS
(Southwestern U.S.)

Hair "2" on 4th seg. usually triple



GEORGIANUS
(Southeastern U. S.)

Hair "2" on 4th seg. usually single

BRADLEYI
(Atlantic and Gulf Coasts)

Hair "2" on 4th seg. usually single

QUADRIMACULATUS
(Eastern half of U.S)

Hair "0" on 4th segment large and multiple

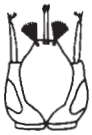
CRUCIANS
(Eastern U.S.)

Hair "0" on 4th segment small, single, or wanting

Hair "2" on 4th seg. usually simple

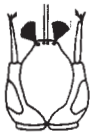
Hair "2" on 4th seg. with two or more branches

Inner clypeal hairs slightly feathered at tips



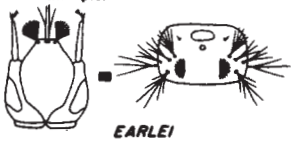
WALKERI
(Eastern U.S.)

Inner clypeal hairs bare



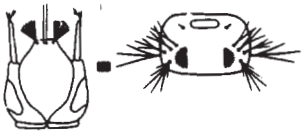
OCCIDENTALIS
(Northwestern U.S. and Pacific Coast)
PUNCTIPENNIS
(All U.S.)

Inner clypeal hairs typically forked or branched at tip. Hair "2" on 4th seg. usually multiple.



EARLEI
(North Central and Northeastern U.S.)

Inner clypeal hairs bare. Hair "2" on 4th seg. usually double.



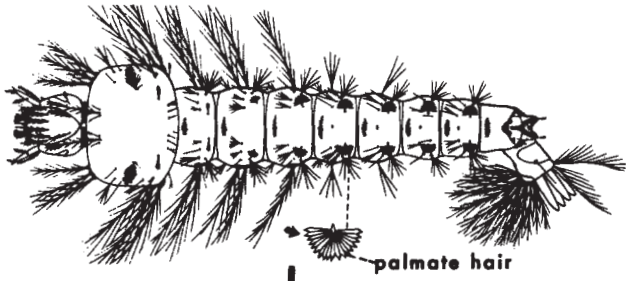
PUNCTIPENNIS
(All U.S.)
FREEBORNI
(Western U.S.)

MOSQUITOES: PICTORIAL KEY TO SOME LARVAE OF FLORIDA COMMONLY FOUND IN CONTAINERS

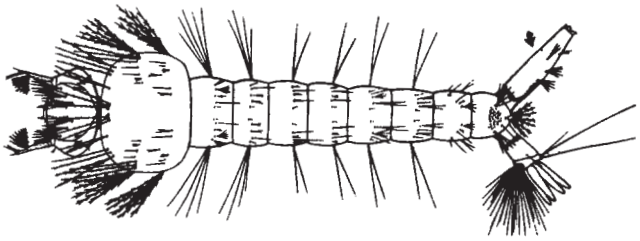
Chester J. Stojanovich and Harry D. Pratt

PART I

air tube absent; abdomen with palmate hairs



air tube present; abdomen without palmate hairs



hairs 0 and 2 on abdominal segments 4 and 5 multiple

Anopheles crucians

hair 0 rudimentary or absent, hair 2 single or double

inner clypeal hairs separated by less than width of a basal tubercle

Anopheles punctipennis

inner clypeal hairs separated by at least width of a basal tubercle

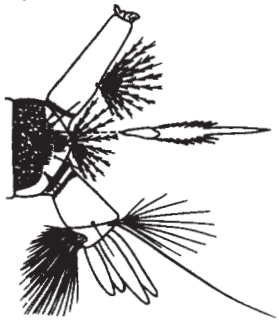
Anopheles quadrimaculatus

air tube without pecten

air tube with pecten

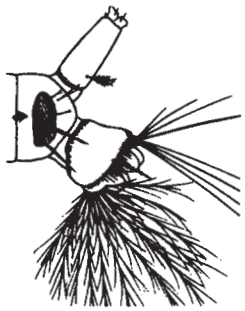
SEE PART II

comb scales present on 8th abdomial segment



Orthopodomyia signifera

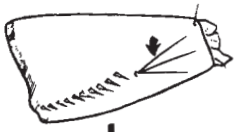
comb scales absent on 8th abdominal segment



Toxorhynchites rutilus

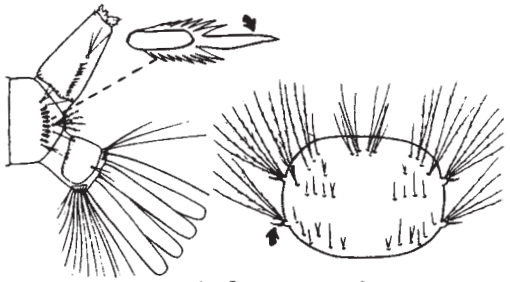
PART II

air tube with one hair or tuft on each side



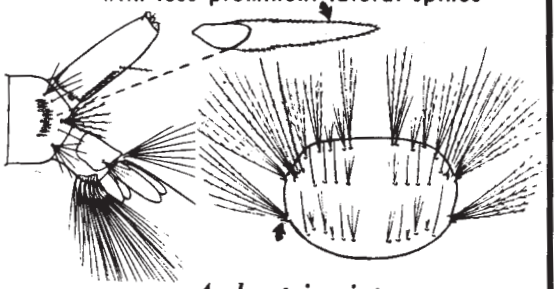
air tube with several hairs or tufts on each side

comb scales with a strong median spine, thorax with prominent lateral spines



Aedes aegypti

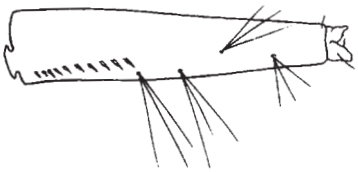
comb scales with a fringe, thorax with less prominent lateral spines



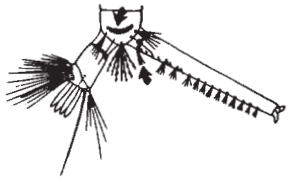
Aedes triseriatus

air tube at least 6 times as long as wide

air tube 3-5 times as long as wide

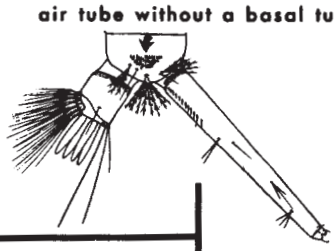


comb scales in a single row air tube with a basal tuft

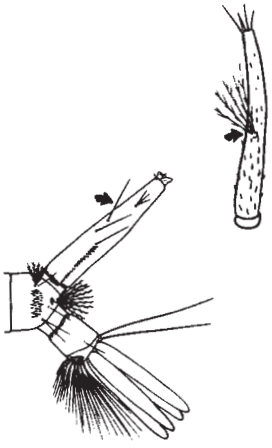


Culiseta melanura

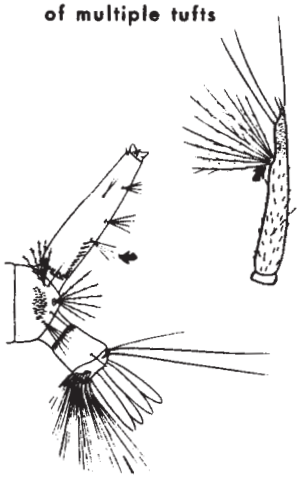
comb scales in a patch, air tube without a basal tuft



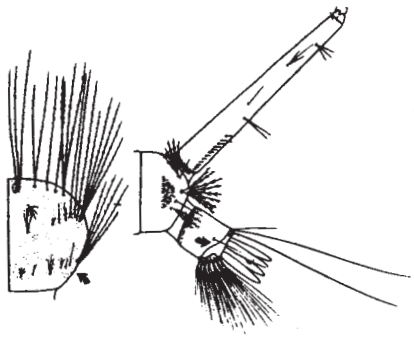
antenna with tuft inserted at middle air tube with 3 pairs of long single hairs



antenna with tuft inserted beyond middle air tube with 4 pairs of multiple tufts

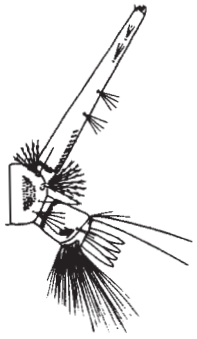


thorax with spicules, lateral hair of saddle single



Culex nigripalpus

thorax without spicules, lateral hair of saddle double



Culex salinarius

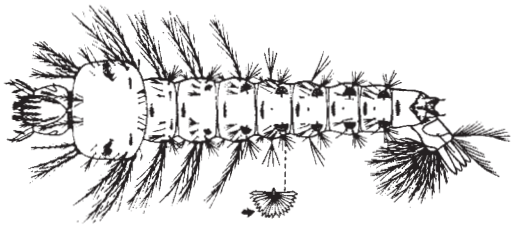
Culex restuans

Culex quinquefasciatus

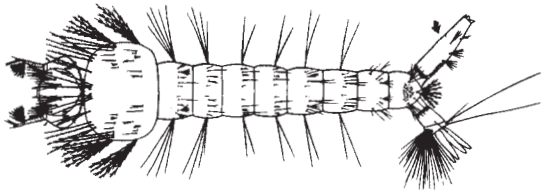
MOSQUITOES: PICTORIAL KEY TO SOME COMMON LARVAE OF PUERTO RICO FOUND IN CONTAINERS

Harry D. Pratt and Chester J. Stojanovich

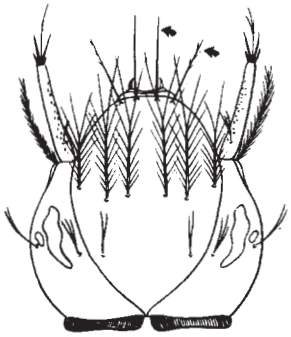
air tube absent, abdomen with palmate hairs



air tube present, abdomen without palmate hairs



outer clypeal hair not densely branched inner clypeal hairs separated by at least width of basal tubercle



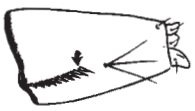
Anopheles albimanus

outer clypeal hair densely branched inner clypeal hairs separated by less than width of basal tubercle

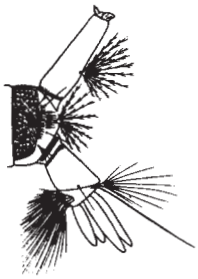
Anopheles grabhamii

air tube without pecten

air tube with pecten

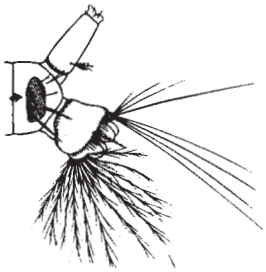


comb scales present on 8th abdominal segment



Orthopodomyia signifera

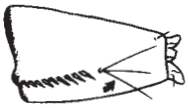
comb scales absent on 8th abdominal segment



Toxorhynchites portoricensis

air tube with several tufts on each side

air tube with one tuft on each side

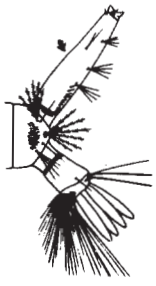


air tube 3-5 times as long as wide thorax without spicules

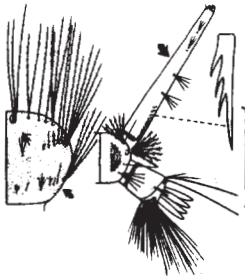
air tube at least 6 times as long as wide thorax with spicules

thorax with stellate hairs thorax without prominent lateral spines saddle with posterior spines

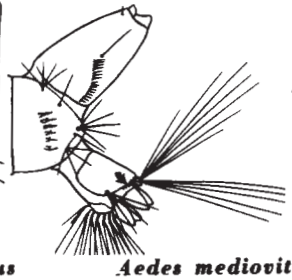
thorax without stellate hairs thorax with prominent lateral spines saddle without posterior spines



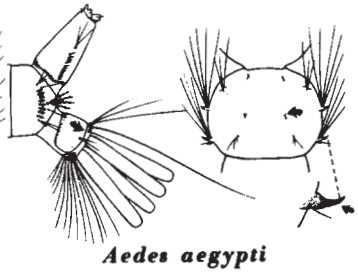
Culex quinquefasciatus



Culex nigripalpus

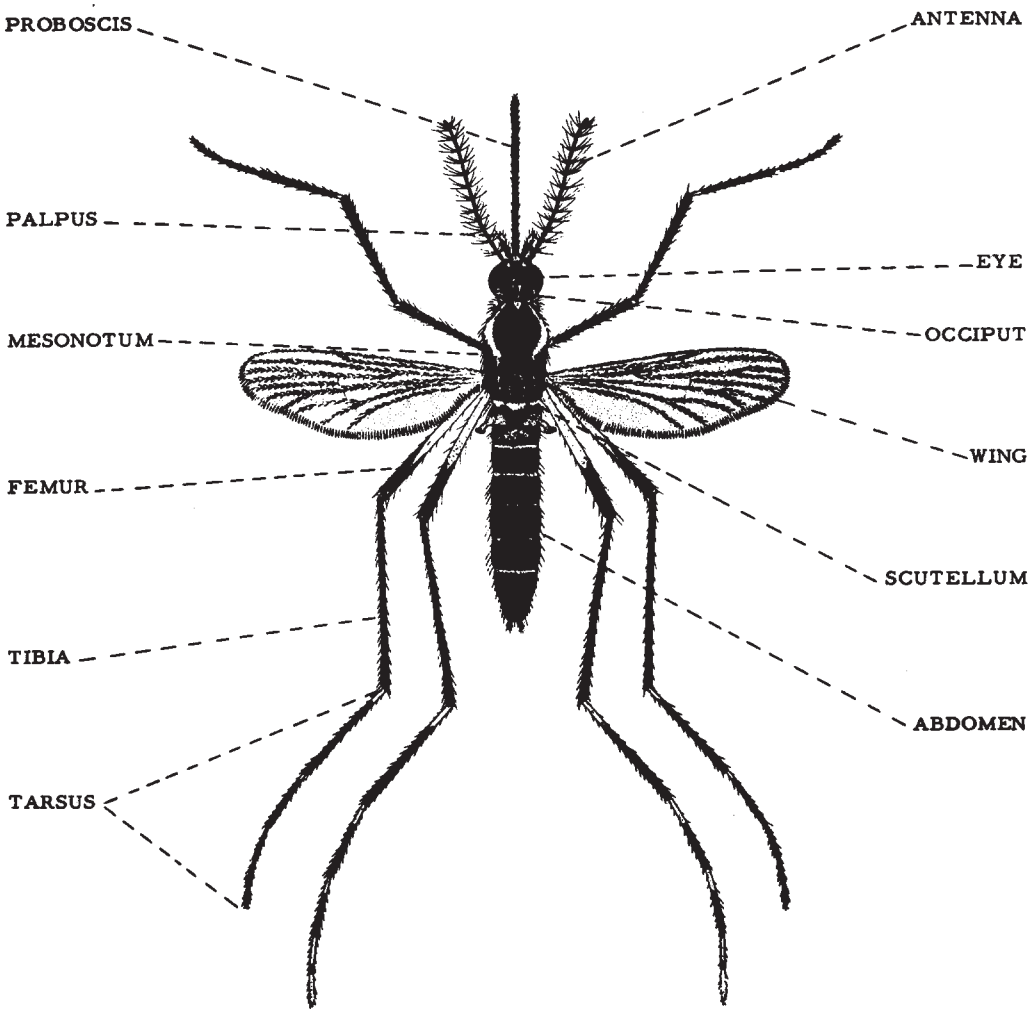


Aedes mediovittatus



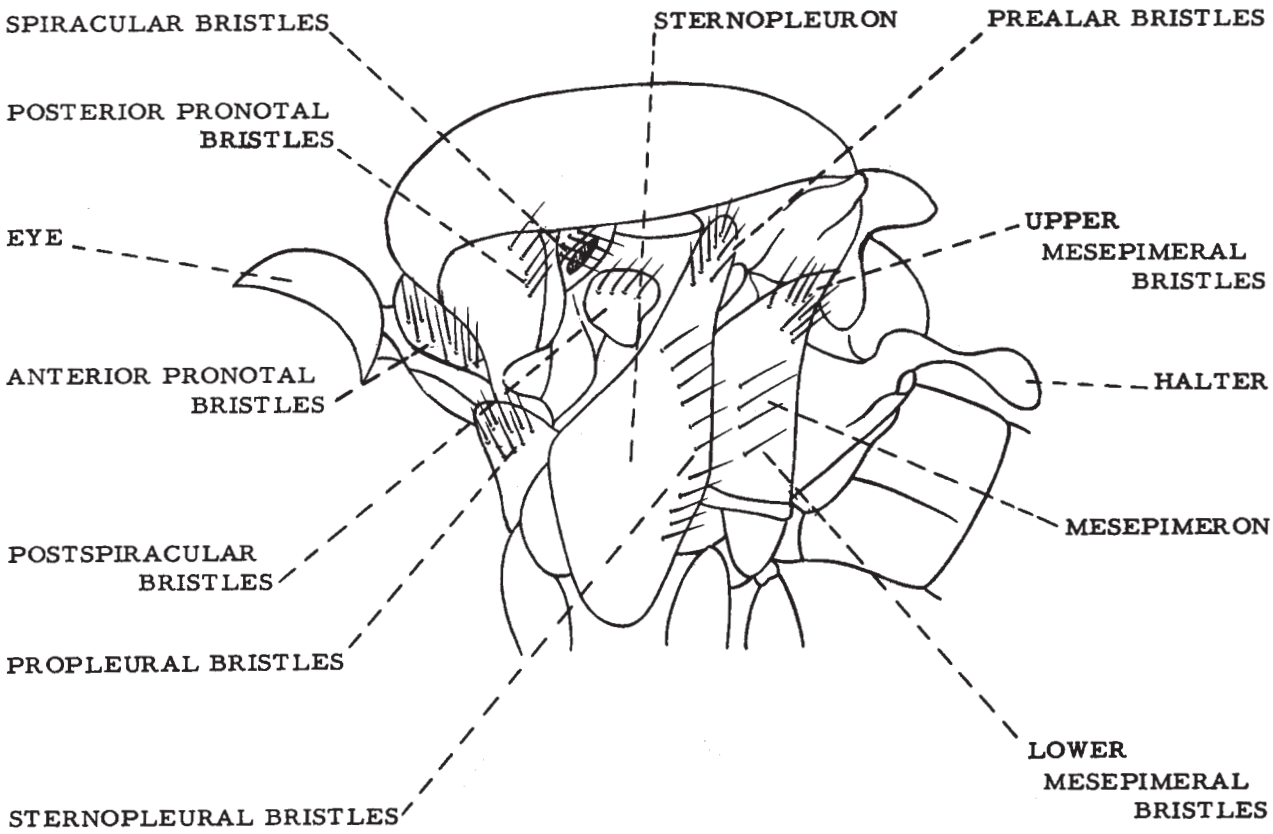
Aedes aegypti

MOSQUITO DIAGRAM – ADULT FEMALE AEDES
Chester J. Stojanovich and Harold George Scott



MOSQUITO DIAGRAM – LATERAL ASPECT OF MOSQUITO THORAX

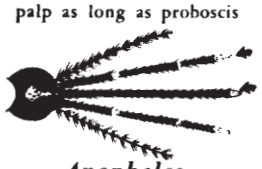
Chester J. Stojanovich



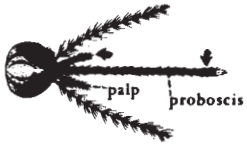
MOSQUITOES: PICTORIAL KEY TO UNITED STATES GENERA OF ADULTS (FEMALE)

Harry D. Pratt and Chester J. Stojanovich

palp as long as proboscis



palp much shorter than proboscis



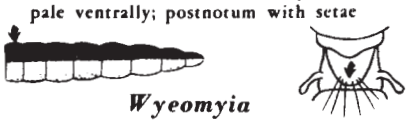
Anopheles

proboscis stout on basal half, outer half tapered and strongly turned downward

Toxorhynchites
Formerly ***Megarhinus***

proboscis slender and never curved downward

abdominal scales dark dorsally and pale ventrally; postnotum with setae



Wyeomyia

abdominal tergites with pale bands or lateral spots; postnotum without setae

wing with second marginal cell less than half as long as its petiole

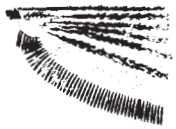
Uranotaenia

wing with second marginal cell at least as long as its petiole

abdomen blunt

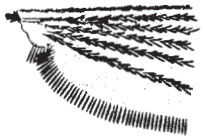
abdomen pointed

base of subcosta with row of bristles on under side



Culiseta

base of subcosta without row of bristles on under side



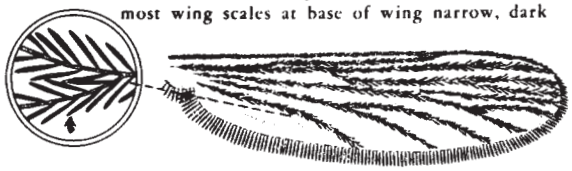
dorsal segments of abdomen with pale scales apically, or if absent, hind tibia with long, erect scales

Psorophora

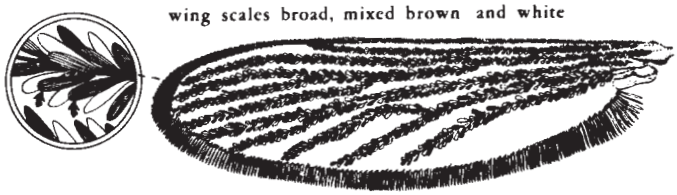
dorsal segments of abdomen with pale scales basally, hind tibia without erect scales

Aedes

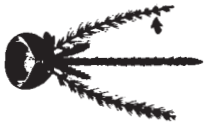
most wing scales at base of wing narrow, dark



wing scales broad, mixed brown and white

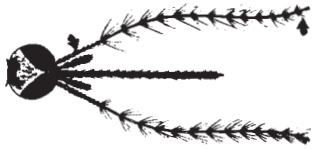


antenna not longer than proboscis, first flagellar segment about as long as following segments



Culex

antenna much longer than proboscis, first flagellar segment as long as next two segments



Deinocerites

mesonotum with fine longitudinal lines of white scales

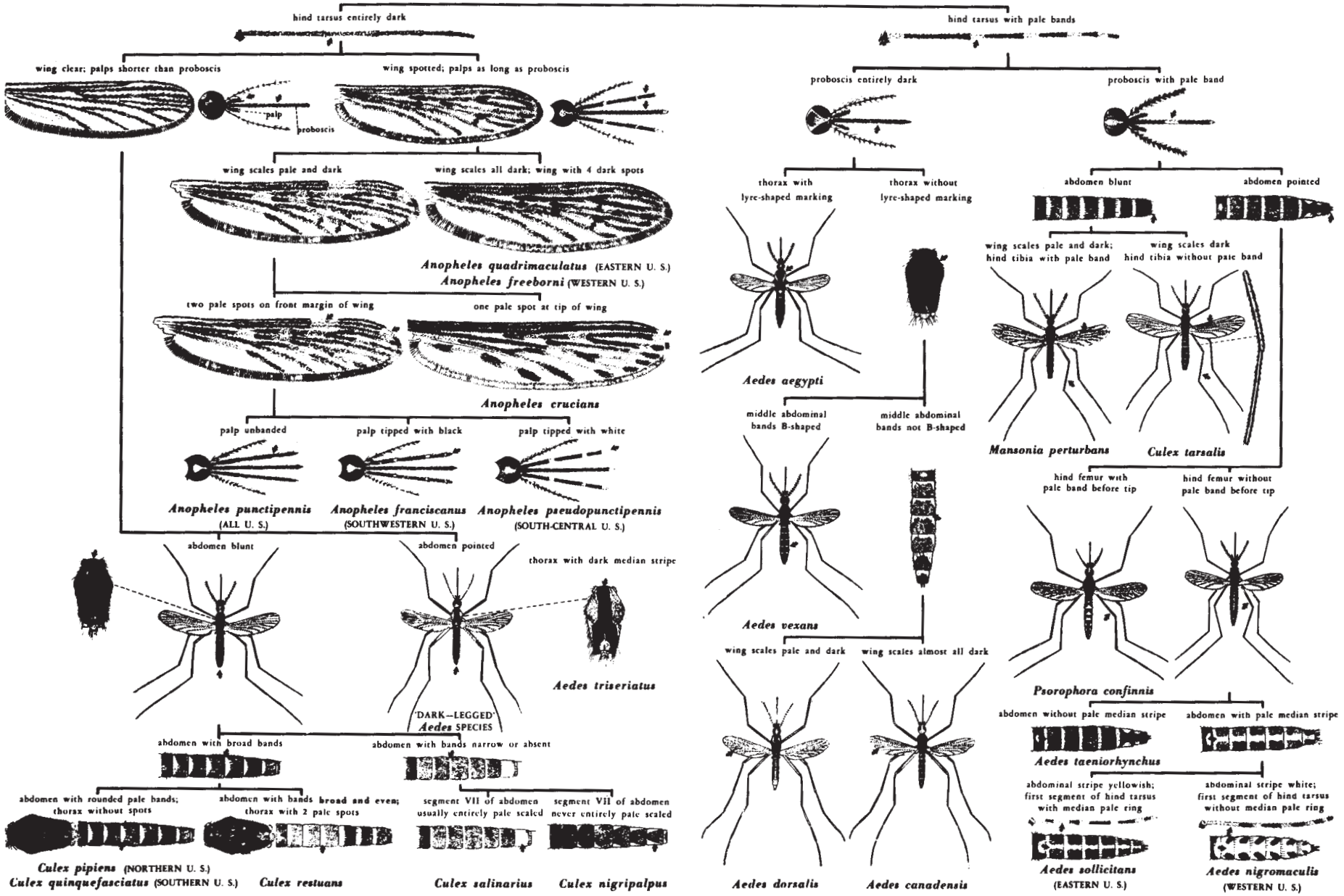
Orthopodomyia

mesonotum without lines of white scales

Mansonia

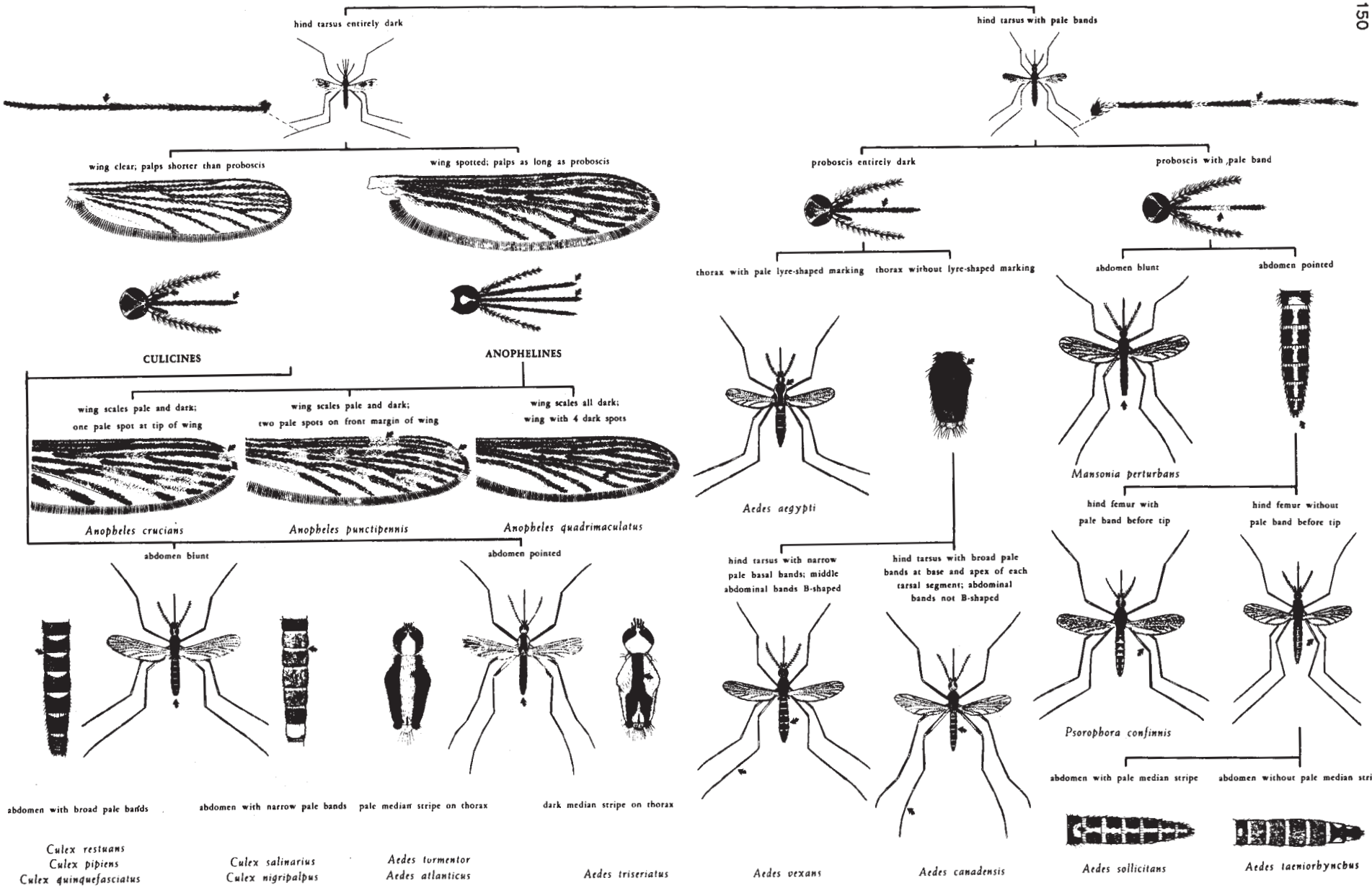
MOSQUITOES: PICTORIAL KEY TO SOME COMMON ADULTS (FEMALE) OF THE UNITED STATES

Harry D. Pratt and Chester J. Stojanovich



MOSQUITOES: PICTORIAL KEY TO SOME ADULTS (FEMALE) IN EASTERN UNITED STATES

Harry D. Pratt and Chester J. Stojanovich



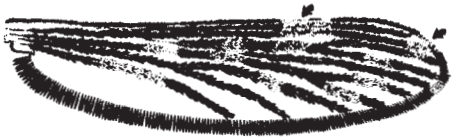
MOSQUITOES: PICTORIAL KEY TO SOME COMMON ADULTS (FEMALE) OF WESTERN UNITED STATES

Harry D. Pratt and Chester J. Stojanovich

wing spotted; palps longer than proboscis

wing clear; palps shorter than proboscis

wing scales pale and dark



wing scales all dark and with 4 dark spots

Anopheles punctipennis

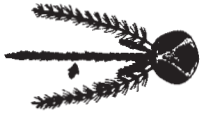
Anopheles freeborni

abdomen blunt

abdomen pointed

proboscis with pale band

proboscis without pale band



hind tarsus entirely dark

hind tarsus with pale bands

Aedes sticticus

narrow pale line on middle of hind femur and often on tibia

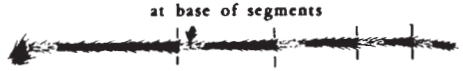
underside of hind femur pale

Culex tarsalis

Culex peus

hind tarsus with pale bands at both ends of some segments

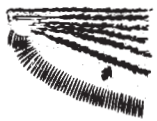
hind tarsus with pale bands at base of segments



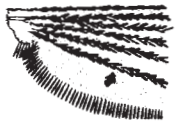
wing spotted

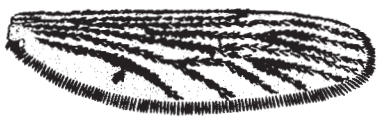
wing not spotted

wing with anal vein more than one-half dark scaled



wing with anal vein more than one-half pale scaled





Aedes melanimon

Aedes dorsalis

Culiseta incidens

abdomen without definite bands

abdomen with broad pale bands

middle abdominal bands B-shaped

abdomen with pale median stripe

Culiseta inornata

Culex pipiens

Aedes vexans

Aedes nigromaculis

MOSQUITOES: PICTORIAL KEY TO SOME ADULTS COMMONLY ASSOCIATED WITH AEDES AEGYPTI

Harry D. Pratt and Chester J. Stojanovich

PROBOSCIS CURVED, LARGE MOSQUITOES WITH BRILLIANT GREENISH TO PURPLISH COLOR

Toxorhynchites rutilus

PROBOSCIS STRAIGHT, SMALLER MOSQUITO USUALLY WITH BLACKISH OR BROWNISH COLOR

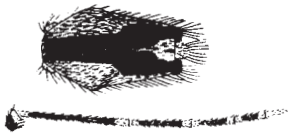
HIND TARSI WITH PALE BANDS

HIND TARSI WITHOUT PALE BANDS

MESONOTUM WITH LYRE-SHAPED MARKING, HIND TARSI WITH PALE BASAL BANDS

Aedes aegypti

MESONOTUM WITH DARK, BROAD, MEDIAN STRIPE, HIND TARSI WITH PALE BASAL AND APICAL BANDS



Aedes atropalpus

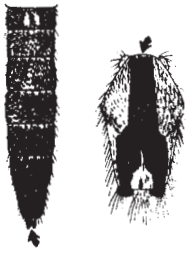
MESONOTUM WITH PARALLEL LINES, HIND TARSI WITH PALE BASAL AND APICAL BANDS

Orthopodomyia species

SCUTELLUM SADDLE-SHAPED, ABDOMEN WITHOUT SCALES OR PALE BANDS

SCUTELLUM TRI-LOBED, ABDOMEN WITH SCALES AND USUALLY WITH PALE BANDS

MESONOTUM WITH BROAD DARK MEDIAN STRIPE ABDOMEN POINTED



Aedes triseriatus

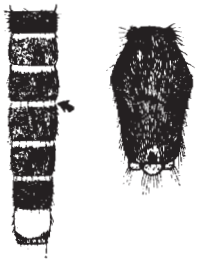
MESONOTUM WITH TWO PALE SPOTS AND FINE COPPERY SCALES; ABDOMEN BLUNT WITH BASAL PALE BANDS ALMOST STRAIGHT

Culex restuans

MESONOTUM ALMOST UNIFORM, SCALES COARSE AND BRASSY; ABDOMEN BLUNT WITH PALE BASAL BANDS ROUNDED

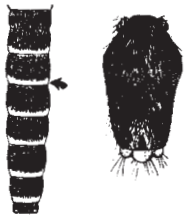
Culex quinquefasciatus

MESONOTUM ALMOST UNIFORM, SCALES FINE AND COPPERY; ABDOMEN BLUNT WITH BASAL PALE BANDS NARROW



Culex salinarius

MESONOTUM ALMOST UNIFORM, SCALES FINE AND COPPERY; ABDOMEN BLUNT WITH APICAL PALE BANDS



Culex territans

WING UNIFORMLY DARK

Anopheles barberi

WING DARK WITH FOUR WELL-DEFINED DARK SPOTS

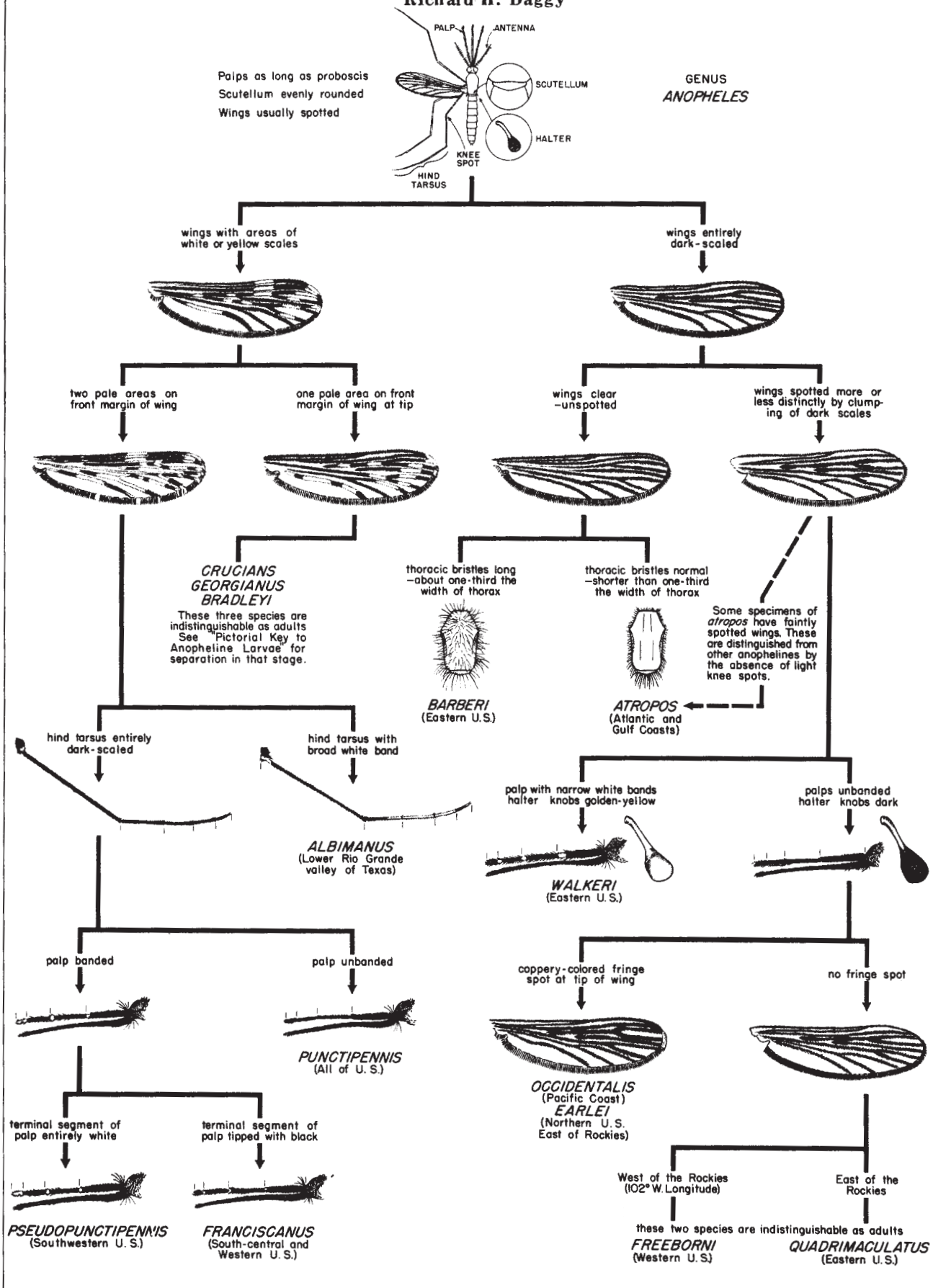
Anopheles quadrimaculatus

WING WITH PATCHES OF DARK AND PALE SCALES

Anopheles punctipennis

MOSQUITOES: PICTORIAL KEY TO ADULT FEMALE ANOPHELINES OF UNITED STATES

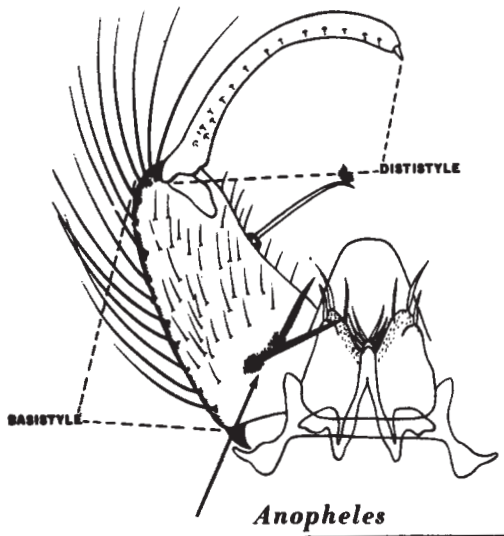
Richard H. Daggy



MOSQUITOES: PICTORIAL KEY TO UNITED STATES GENERA BASED ON MALE GENITALIA PART I

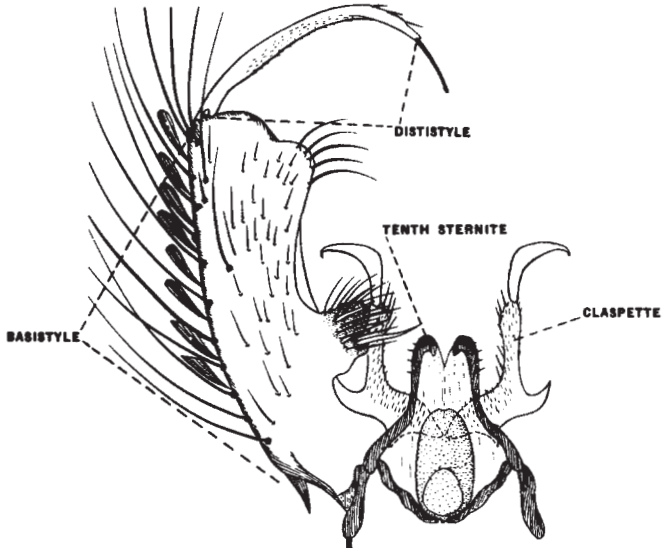
Chester J. Stojanovich

basistyle about equal in length to dististyle and with 1-2 stout setae near base



Anopheles

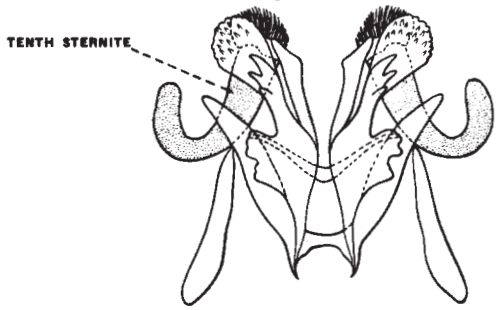
basistyle usually much shorter than dististyle, without 1-2 stout setae near base



claspettes present 'absent only in *Aedes aegypti* as shown below'

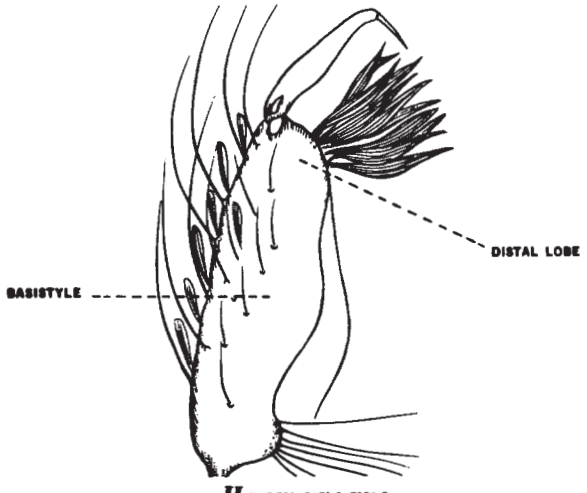
Aedes aegypti

claspette absent



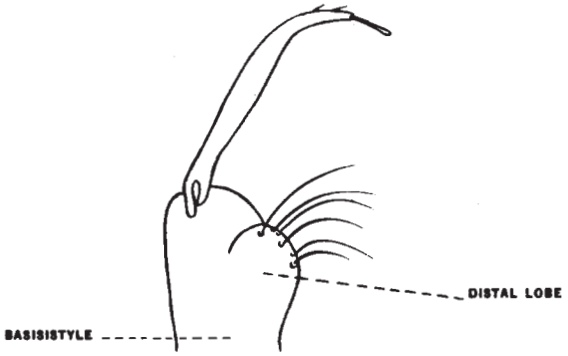
SEE PART II SECTION II

distal lobe of basistyle with leaf-like scales



Haemogogus

distal lobe when present without leaf-like scales



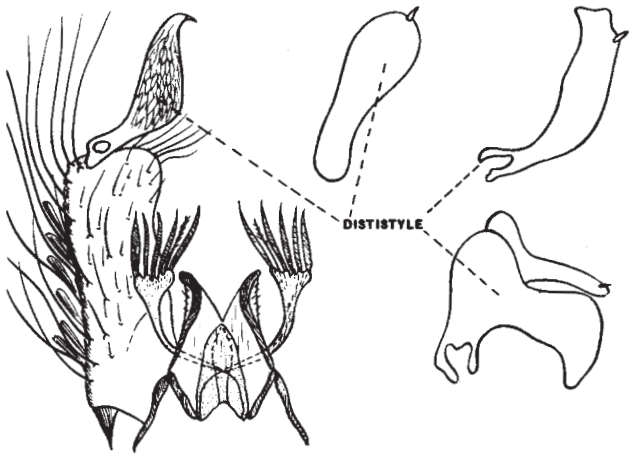
SEE PART II SECTION I

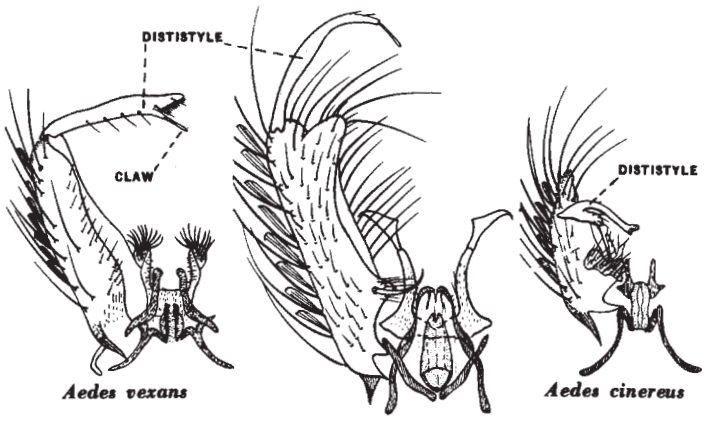
PART II

PART II SECTION I

dististyle not slender but variously shaped as shown below

dististyle slender 'exceptions being
Aedes cinereus with dististyle furcate at base and
Aedes vexans with claw of dististyle not inserted at tip



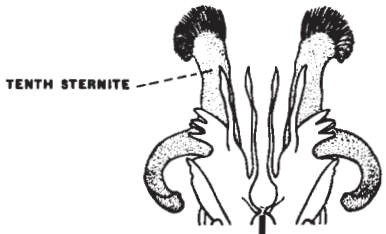


Aedes vexans *Aedes cinereus*

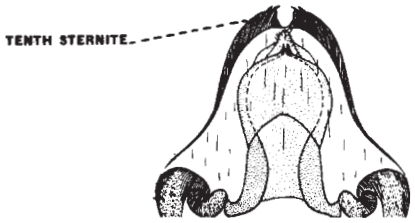
Psorophora *Aedes*

PART II SECTION II

tenth sternite crowned with teeth or tuft of spines

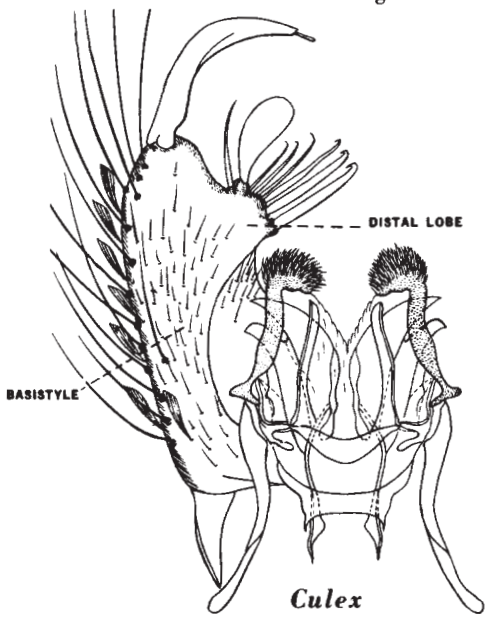


tenth sternite simple or with few teeth



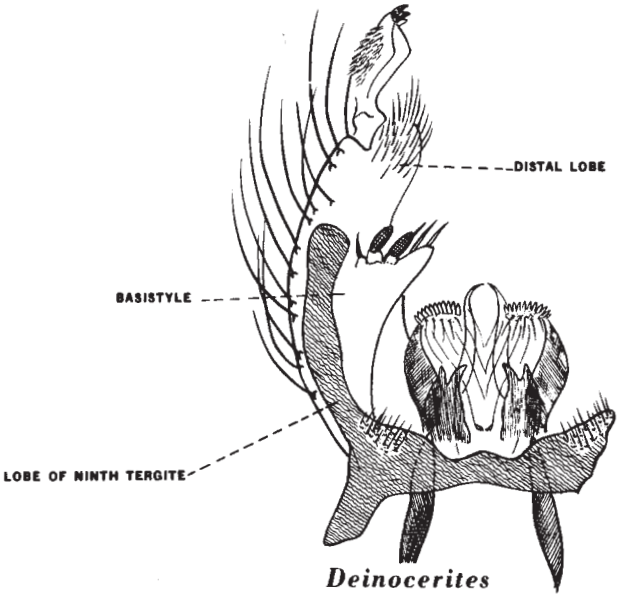
SEE PART III

distal lobe of basistyle with leaf-like scales or rods
lobe of ninth tergite short



Culex

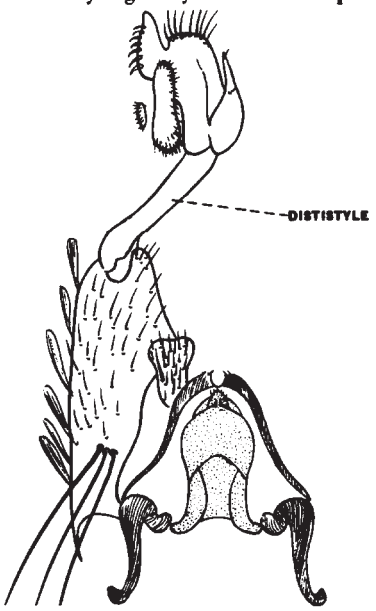
distal lobe of basistyle without leaf-like scales or rods
lobe of ninth tergite half as long as basistyle



Deinocerites

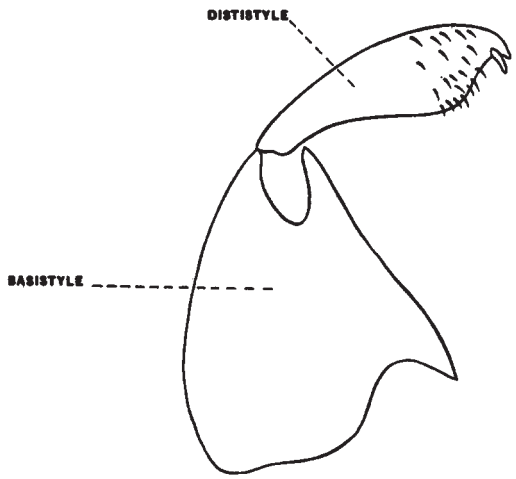
PART III

dististyle greatly modified at apex

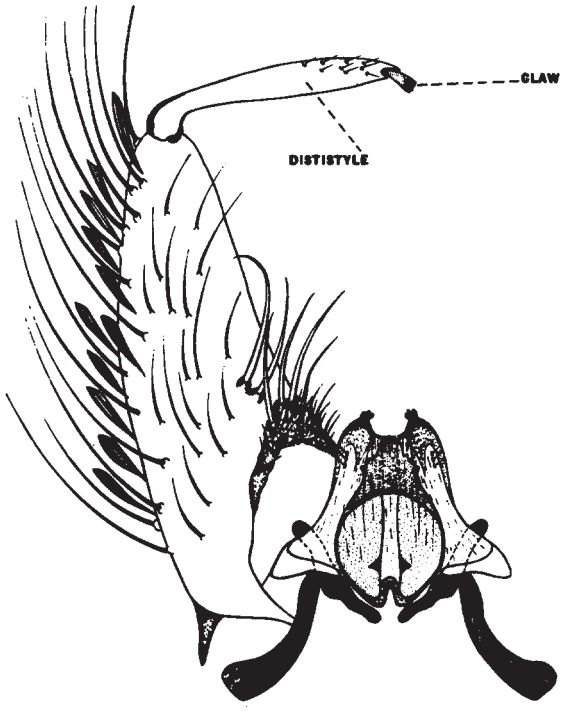


Wyeomyia

dististyle not greatly modified at apex

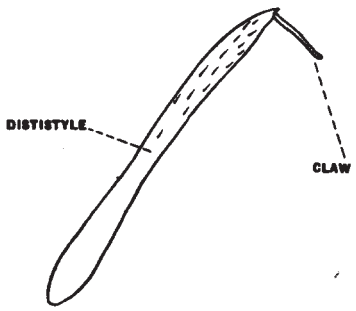


claw of dististyle comb-like



Orthopodomyia

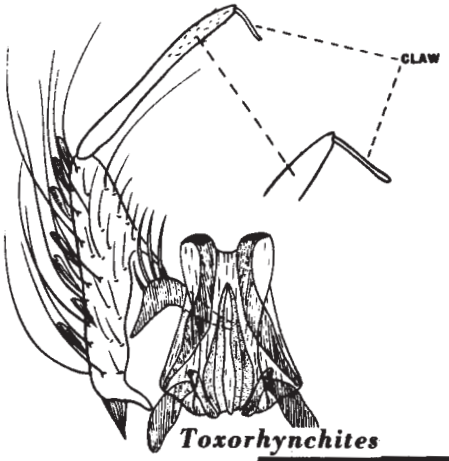
claw of dististyle not comb-like



SEE PART IV

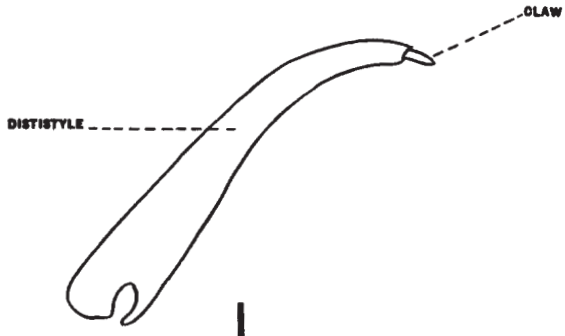
PART IV

claw of dististyle elongated

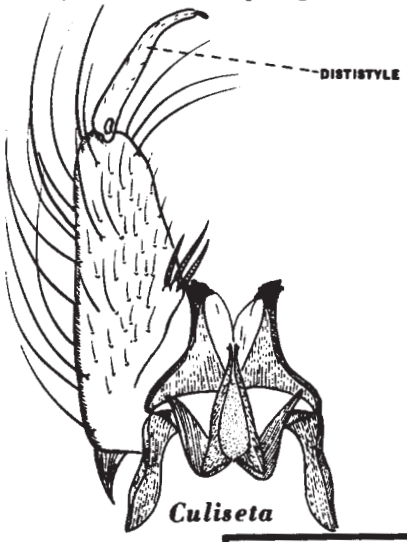


Toxorhynchites

claw of dististyle short

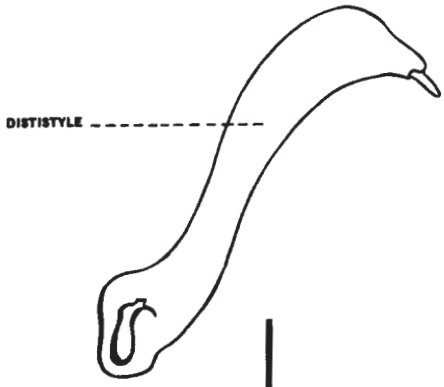


dististyle slender and tapering towards tip

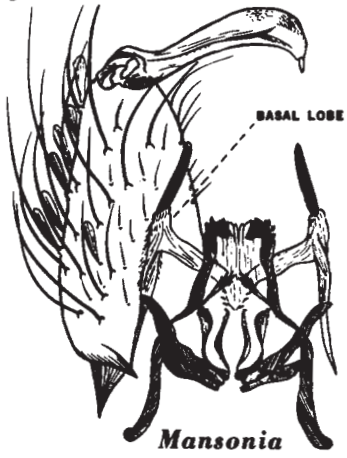


Culiseta

dististyle stout

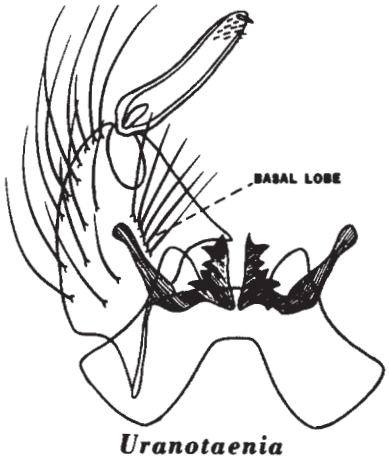


basal lobe long and slender, if not long bearing a rod-like seta



Mansonia

basal lobe not long and slender and without rod-like seta



Uranotaenia

MOSQUITOES: PICTORIAL KEY TO MOST ADULTS (FEMALE) OF NEW MEXICO
PART I

Chester J. Stojanovich

palps as long as proboscis

palps much shorter than proboscis

palp

proboscis

wing scales all dark and with 4 dark spots

wing scales pale and dark

wing with second marginal cell less than half as long as its petiole

wing with second marginal cell at least as long as its petiole

Anopheles freeborni

Uranotaenia syntheta

palp unbanded

palp tipped with black

palp tipped with white

abdomen pointed

abdomen blunt

Anopheles punctipennis

Anopheles franciscanus

Anopheles pseudopunctipennis

SEE PART II

mesonotum with fine longitudinal lines of white scales

mesonotum without lines of white scales

Orthopodomyia alba

base of subcosta with row of bristles on under side

base of subcosta without row of bristles on under side

wing spotted

wing not spotted

hind tarsus with pale bands

hind tarsus entirely dark

Culiseta incidens

Culiseta inornata

proboscis banded

proboscis not banded

abdomen with narrow pale bands

abdomen with broad pale bands

Culex thriambus

mesonotum brown

mesonotum brownish red

mesonotum with 2 pale spots

mesonotum without 2 pale spots

femora and tibia with narrow white line of scales

femora and tibia without narrow white line of scales

Culex tarsalis

Culex peus

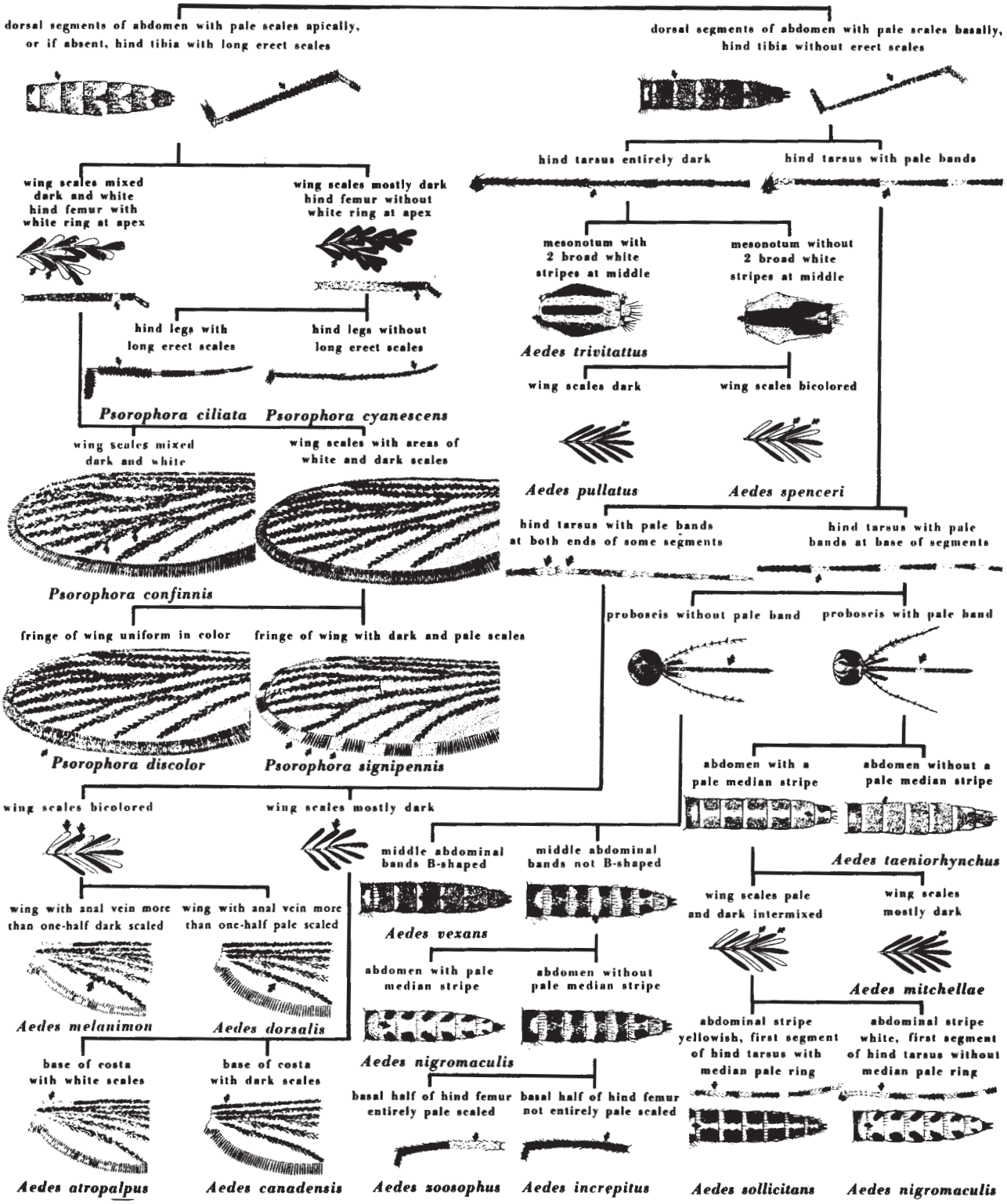
Culex salinarius

Culex erythrothorax

Culex restuans

Culex quinquefasciatus

PART II


dorsal segments of abdomen with pale scales apically, or if absent, hind tibia with long erect scales
dorsal segments of abdomen with pale scales basally, hind tibia without erect scales
wing scales mixed dark and white hind femur with white ring at apex
wing scales mostly dark hind femur without white ring at apex
hind tarsus entirely dark
hind tarsus with pale bands
hind legs with long erect scales
hind legs without long erect scales
mesonotum with 2 broad white stripes at middle
mesonotum without 2 broad white stripes at middle
Psorophora ciliata
Psorophora cyanescens
Aedes trivittatus
wing scales dark
wing scales bicolored
wing scales mixed dark and white
wing scales with areas of white and dark scales
Aedes pullatus
Aedes spenceri
hind tarsus with pale bands at both ends of some segments
hind tarsus with pale bands at base of segments
Psorophora confinnis
proboscis without pale band
proboscis with pale band
fringe of wing uniform in color
fringe of wing with dark and pale scales
Psorophora discolor
Psorophora signipennis
abdomen with a pale median stripe
abdomen without a pale median stripe
wing scales bicolored
wing scales mostly dark
Aedes taeniorhynchus
middle abdominal bands B-shaped
middle abdominal bands not B-shaped
wing scales pale and dark intermixed
wing scales mostly dark
wing with anal vein more than one-half dark scaled
wing with anal vein more than one-half pale scaled
Aedes vexans
abdomen with pale median stripe
abdomen without pale median stripe
Aedes mitchellae
Aedes melanimon
Aedes dorsalis
Aedes nigromaculis
abdominal stripe yellowish, first segment of hind tarsus with median pale ring
abdominal stripe white, first segment of hind tarsus without median pale ring
base of costa with white scales
base of costa with dark scales
basal half of hind femur entirely pale scaled
basal half of hind femur not entirely pale scaled
Aedes atropalpus
Aedes canadensis
Aedes zoosophus
Aedes increpitus
Aedes sollicitans
Aedes nigromaculis

MOSQUITOES: PICTORIAL KEY TO SOME COMMON ADULTS (FEMALE) OF IDAHO

Chester J. Stojanovich

palps as long as proboscis

palps much shorter than proboscis

Anopheles freeborni

abdomen blunt

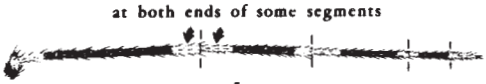
abdomen pointed

hind tarsus entirely dark

hind tarsus with pale bands

Aedes cinereus

hind tarsus with pale bands at both ends of some segments



hind tarsus with pale bands at base of segments

wing scales mixed pale and dark

wing scales dark with white scales at base of costa

proboscis banded

proboscis not banded

Aedes dorsalis *Aedes canadensis* *Aedes nigromaculis*

middle abdominal bands B-shaped

middle abdominal bands not B-shaped

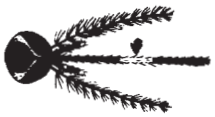
Aedes vexans

abdomen with a pale median stripe

abdomen without a pale median stripe

Aedes nigromaculis

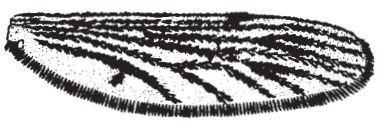
proboscis with pale band



proboscis without pale band

Culex tarsalis

wing spotted



Culiseta incidens

wing not spotted

Culiseta inornata

tarsal claws I and II with parallel teeth

tarsal claws I and II with divergent teeth

Aedes excrucians

dorsal surface of torus with white scales

Aedes fitchi

dorsal surface of torus without white scales

Aedes increpitus

MOSQUITOES: PICTORIAL KEY TO ALL ADULTS (FEMALE) OF TEXAS
PART I

Chester J. Stojanovich

palps as long as proboscis

palps much shorter than proboscis

palp

proboscis

wing scales all dark

wing scales pale and dark

proboscis stout on basal half, and strongly turned downward

proboscis slender and never curved downward

Toxorhynchites rutilus

wing not spotted

wing spotted

wing with second marginal cell less than half as long as its petiole

wing with second marginal cell at least as long as its petiole

thoracic bristles long

thoracic bristles short

hind tarsi with broad white bands

hind tarsi entirely dark

Anopheles barberi

Anopheles atropos

Uranotaenia lowii

mesonotum with median stripe of iridescent blue scales

mesonotum without median stripe of iridescent blue scales

halter knobs pale scaled, palps banded

halter knobs dark, palps unbanded

Uranotaenia sapphirina

Uranotaenia anhydor syntheta

abdomen pointed

abdomen blunt

Anopheles walkeri

Anopheles quadrimaculatus
Anopheles freeborni

SEE PART III

hind tarsi entirely dark

hind tarsi not entirely dark

base of subcosta without row of bristles on under side

base of subcosta with row of bristles on under side

Anopheles albimanus

SEE PART II

one pale area on front margin of wing

two pale areas on front margin of wing

wing spotted

wing not spotted

Anopheles crucians
Anopheles bradleyi

Culiseta incidens

palp unbanded

palp tipped with black

palp tipped with white

wing scales narrow

wing scales broad

Anopheles punctipenni.

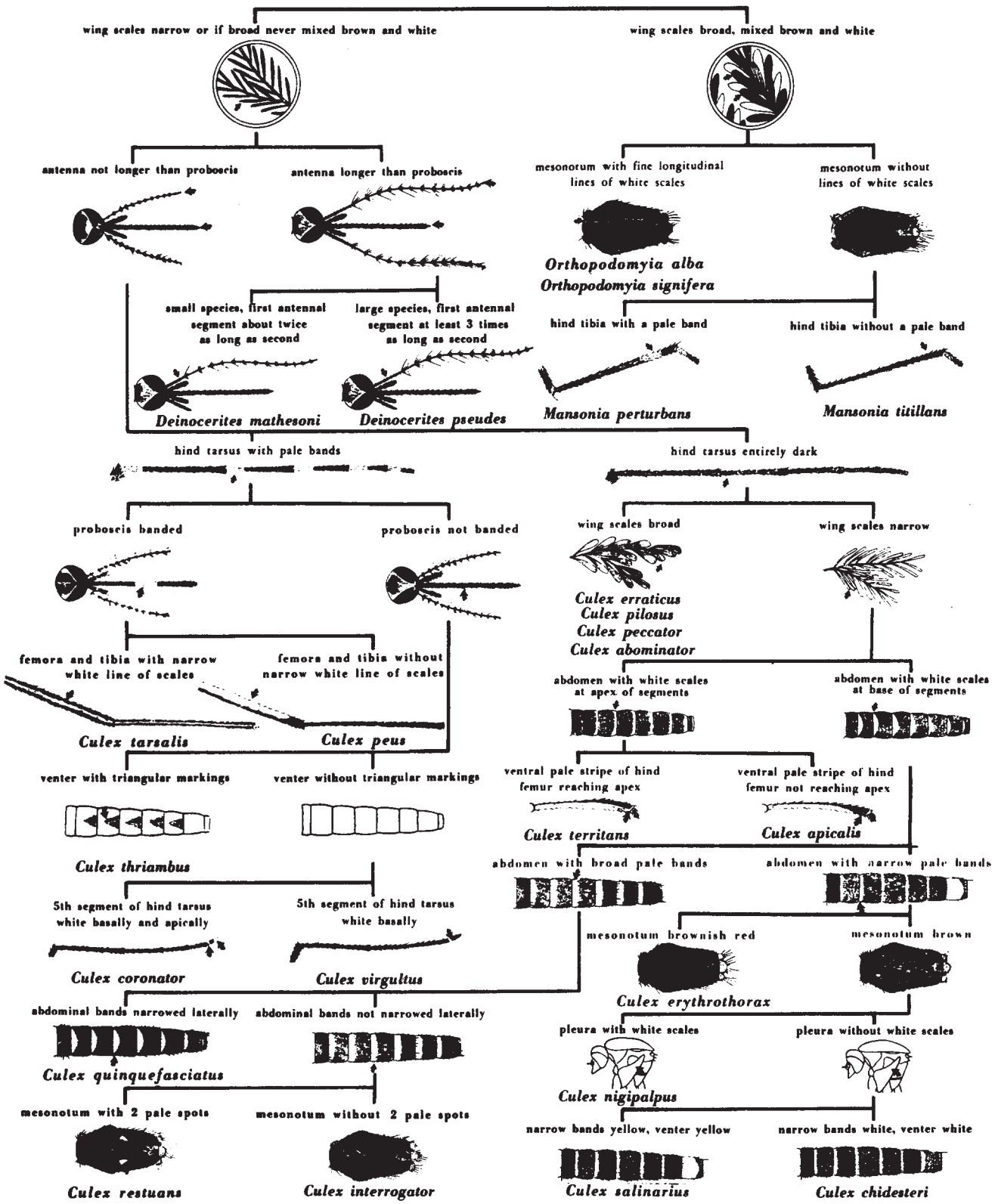
Anopheles franciscanus

Anopheles pseudopunctipennis

Culiseta inornata

Culiseta melanura

PART II


wing scales narrow or if broad never mixed brown and white
wing scales broad, mixed brown and white
antenna not longer than proboscis
antenna longer than proboscis
mesonotum with fine longitudinal lines of white scales
mesonotum without lines of white scales
Orthopodomyia alba
Orthopodomyia signifera
small species, first antennal segment about twice as long as second
large species, first antennal segment at least 3 times as long as second
hind tibia with a pale band
hind tibia without a pale band
Deinocerites mathesoni
Deinocerites pseudes
Mansonia perturbans
Mansonia titillans
hind tarsus with pale bands
hind tarsus entirely dark
proboscis banded
proboscis not banded
wing scales broad
wing scales narrow
Culex erraticus
Culex pilosus
Culex peccator
Culex abominator
femora and tibia with narrow white line of scales
femora and tibia without narrow white line of scales
abdomen with white scales at apex of segments
abdomen with white scales at base of segments
Culex tarsalis
Culex peus
venter with triangular markings
venter without triangular markings
ventral pale stripe of hind femur reaching apex
ventral pale stripe of hind femur not reaching apex
Culex territans
Culex apicalis
Culex thriambus
abdomen with broad pale bands
abdomen with narrow pale bands
5th segment of hind tarsus white basally and apically
5th segment of hind tarsus white basally
mesonotum brownish red
mesonotum brown
Culex coronator
Culex virgultus
Culex erythrothorax
abdominal bands narrowed laterally
abdominal bands not narrowed laterally
pleura with white scales
pleura without white scales
Culex quinquefasciatus
Culex nigripalpus
mesonotum with 2 pale spots
mesonotum without 2 pale spots
narrow bands yellow, venter yellow
narrow bands white, venter white
Culex restuans
Culex interrogator
Culex salinarius
Culex chidesteri

PART III

dorsal segments of abdomen with pale scales apically

wing scales mixed dark and white
hind femur with white ring at apex

wing uniformly speckled
with dark and white scales

wing with definite areas
of white and dark scales

Psorophora confinnis

fringe of wing uniform in color

Psorophora discolor

fringe of wing with dark and pale scales

Psorophora signipennis

hind tarsal segments
entirely dark

Psorophora cyanescens

hind tarsal segments
not entirely dark

wing scales mostly dark
hind femur without
white ring at apex

dorsal segments of abdomen with pale scales basally

anterior pronotal lobes large

anterior pronotal lobes small

Haemogogus equinus

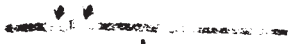
hind tarsus entirely dark

hind tarsus with pale bands

SEE PART IV SECTION I

hind tarsus with pale
bands at base of segments

hind tarsus with pale bands
at both ends of some segments



SEE PART IV SECTION II

wing scales mostly dark

wing scales bicolored

base of costa
with white scales

Aedes atropalpus

base of costa
with dark scales

Aedes canadensis

wing scales evenly mixed

Aedes campestris

wing scales not evenly mixed

Aedes dorsalis

hind legs with long erect scales

hind legs without long erect scales

mesonotum with a median stripe
of golden scales, tarsi banded

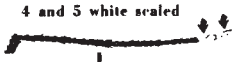
Psorophora ciliata

mesonotum without a median
stripe of golden scales,
tarsi unbanded

Psorophora howardi

hind tarsus without both segments
4 and 5 white scaled

hind tarsus with both segments
4 and 5 white scaled



mesonotum with mixed
dark and pale scales

Psorophora ferox

mesonotum with a median
stripe of dark scales

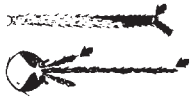
5th segment of hind tarsus dark,
4th segment white

Psorophora varipes

5th segment of hind tarsus white,
4th segment mostly dark

Psorophora mexicana

with pale knee spots, palps less
than one-third as long as proboscis

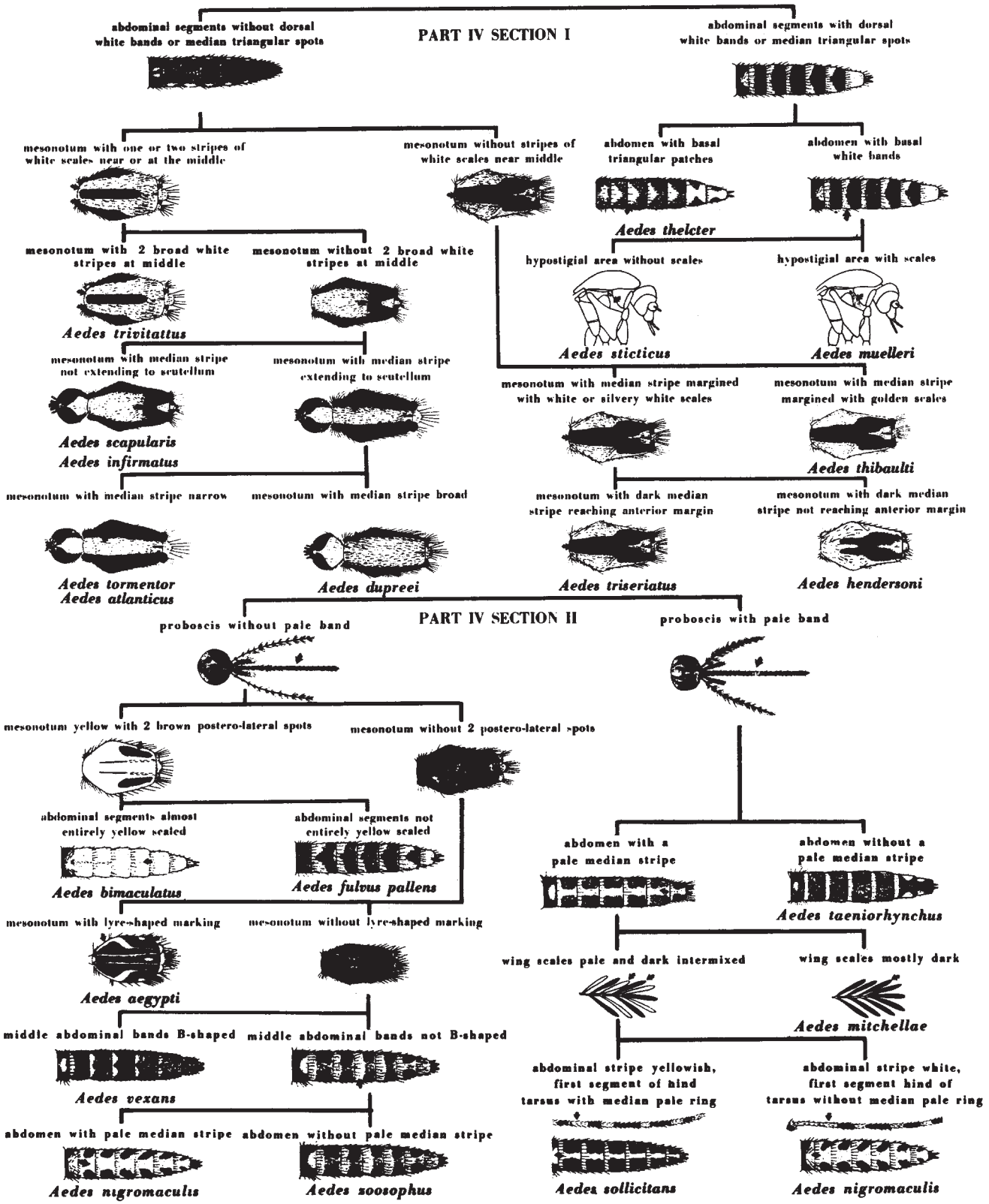


Psorophora horrida

without pale knee spots, palps more
than one-third as long as proboscis

Psorophora longipalpus

PART IV

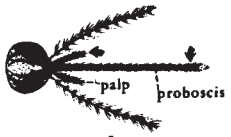

abdominal segments without dorsal white bands or median triangular spots
PART IV SECTION I
abdominal segments with dorsal white bands or median triangular spots
mesonotum with one or two stripes of white scales near or at the middle
mesonotum without stripes of white scales near middle
abdomen with basal triangular patches
abdomen with basal white bands
Aedes thelcter
mesonotum with 2 broad white stripes at middle
mesonotum without 2 broad white stripes at middle
hypostigial area without scales
hypostigial area with scales
Aedes trivittatus
Aedes sticticus
Aedes muelleri
mesonotum with median stripe not extending to scutellum
mesonotum with median stripe extending to scutellum
mesonotum with median stripe margined with white or silvery white scales
mesonotum with median stripe margined with golden scales
Aedes scapularis
Aedes infirmatus
Aedes thibaulti
mesonotum with median stripe narrow
mesonotum with median stripe broad
mesonotum with dark median stripe reaching anterior margin
mesonotum with dark median stripe not reaching anterior margin
Aedes tormentor
Aedes atlanticus
Aedes dupreei
Aedes triseriatus
Aedes hendersoni
PART IV SECTION II
proboscis without pale band
proboscis with pale band
mesonotum yellow with 2 brown postero-lateral spots
mesonotum without 2 postero-lateral spots
abdominal segments almost entirely yellow scaled
abdominal segments not entirely yellow scaled
abdomen with a pale median stripe
abdomen without a pale median stripe
Aedes bimaculatus
Aedes fulvus pallens
Aedes taeniorhynchus
mesonotum with lyre-shaped marking
mesonotum without lyre-shaped marking
wing scales pale and dark intermixed
wing scales mostly dark
Aedes aegypti
Aedes mitchellae
middle abdominal bands B-shaped
middle abdominal bands not B-shaped
abdominal stripe yellowish, first segment of hind tarsus with median pale ring
abdominal stripe white, first segment hind of tarsus without median pale ring
Aedes vexans
abdomen with pale median stripe
abdomen without pale median stripe
Aedes sollicitans
Aedes nigromaculis
Aedes nigromaculis
Aedes soosophus

MOSQUITOES: PICTORIAL KEY TO SOME COMMON ADULTS (FEMALE) OF UTAH
PART I

Chester J. Stojanovich

palp as long as proboscis

palp much shorter than proboscis



wing scales pale and dark

Anopheles franciscanus

wing scales all dark and with 4 dark spots

Anopheles freeborni

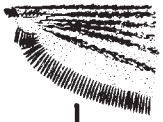
abdomen blunt

abdomen pointed

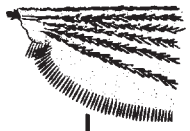
Aedes species

SEE PART II

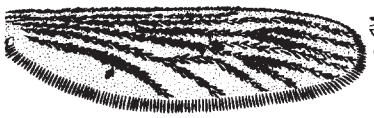
base of subcosta with row of bristles on under side



base of subcosta without row of bristles on under side



wing spotted



Culiseta incidens

wing not spotted

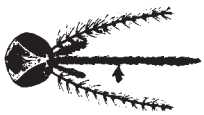
wing scales entirely dark

Culiseta inornata

wing scales mixed dark and white on costa and subcosta

Culiseta impatiens

proboscis without pale band



proboscis with pale band

Culex tarsalis

abdomen with narrow pale bands

abdomen with broad pale bands

Culex pipiens

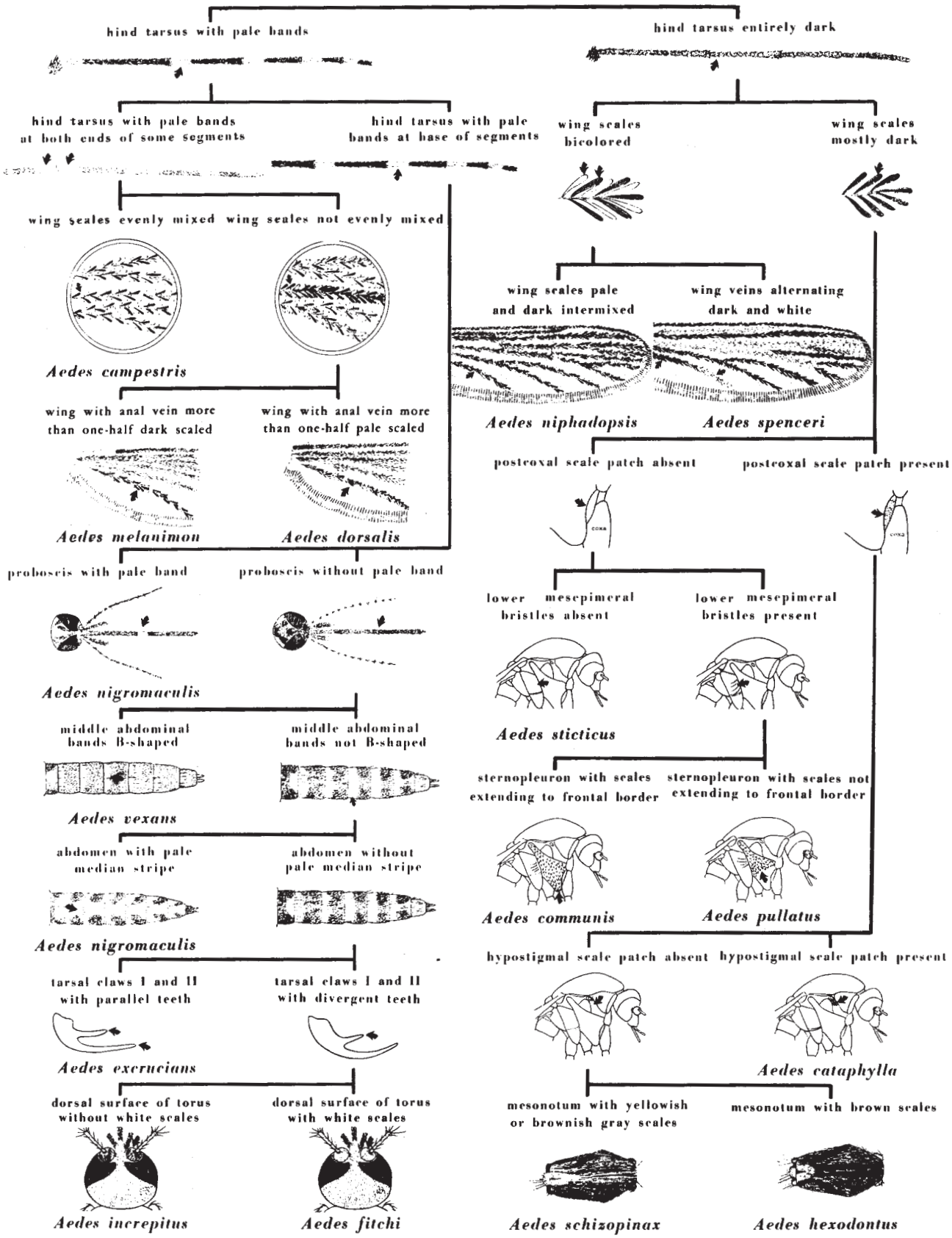
mesonotum brownish red

Culex erythrothorax

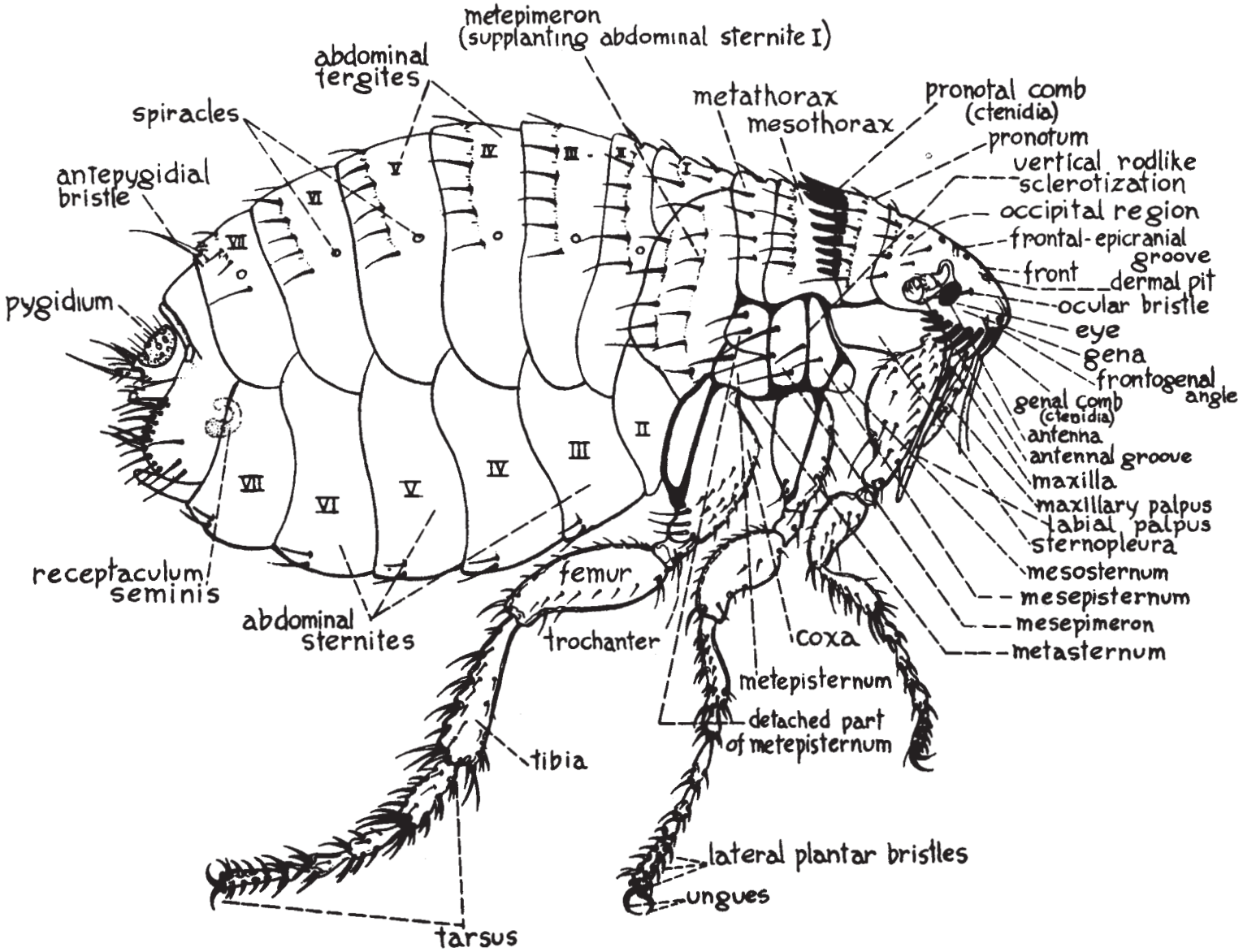
mesonotum brown

Culex salinarius

PART II

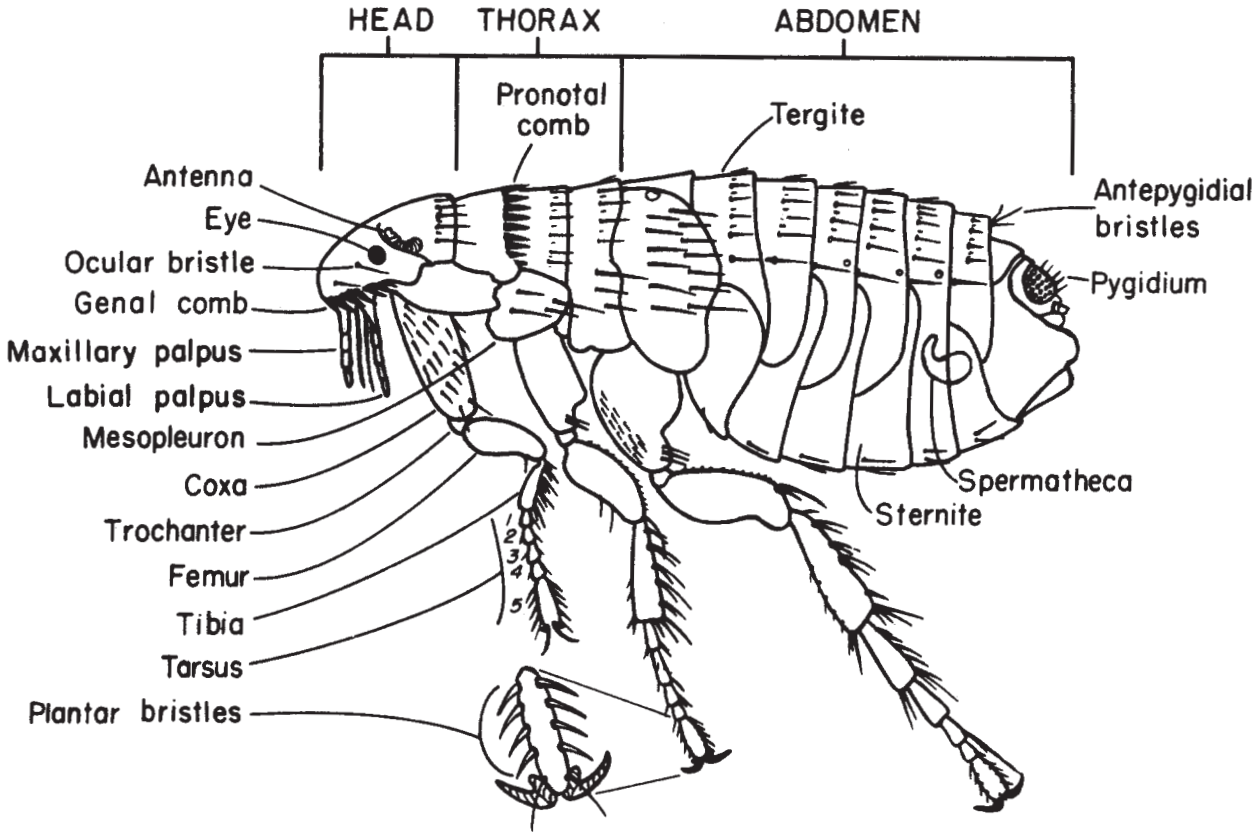

hind tarsus with pale bands
hind tarsus entirely dark
hind tarsus with pale bands at both ends of some segments
hind tarsus with pale bands at base of segments
wing scales bicolored
wing scales mostly dark
wing scales evenly mixed
wing scales not evenly mixed
wing scales pale and dark intermixed
wing veins alternating dark and white
Aedes campestris
Aedes niphadopsis
Aedes spenceri
wing with anal vein more than one-half dark scaled
wing with anal vein more than one-half pale scaled
postcoxal scale patch absent
postcoxal scale patch present
Aedes melanimon
Aedes dorsalis
proboscis with pale band
proboscis without pale band
lower mesepimeral bristles absent
lower mesepimeral bristles present
Aedes nigromaculis
Aedes sticticus
middle abdominal bands B-shaped
middle abdominal bands not B-shaped
sternopleuron with scales extending to frontal border
sternopleuron with scales not extending to frontal border
Aedes vexans
Aedes communis
Aedes pullatus
abdomen with pale median stripe
abdomen without pale median stripe
Aedes nigromaculis
hypostigmal scale patch absent
hypostigmal scale patch present
tarsal claws I and II with parallel teeth
tarsal claws I and II with divergent teeth
Aedes excrucians
Aedes cataphylla
dorsal surface of torus without white scales
dorsal surface of torus with white scales
mesonotum with yellowish or brownish gray scales
mesonotum with brown scales
Aedes increpitus
Aedes fitchi
Aedes schizopinax
Aedes hexodontus

CAT FLEA – CTENOCEPHALIDES FELIS
adult female



FLEA DIAGRAM – WITH STRUCTURES LABELED

Harry D. Pratt



FLEAS: PICTORIAL KEY TO SOME COMMON SPECIES IN THE UNITED STATES

Harry D. Pratt

Genal and pronotal combs present

Genal comb of 5 or more spines. Eye present

Genal comb horizontal Spines pointed

Head length less than twice height

Spine I of genal comb distinctly shorter than spine II

DOG FLEA
Ctenocephalides canis

Head length twice height

Spine I and spine II of genal comb approximately equal in length

CAT FLEA
Ctenocephalides felis

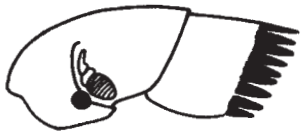
Genal comb vertical Spines blunt

RABBIT FLEA
Cediopsylla simplex

Genal comb of 4 spines Eye absent

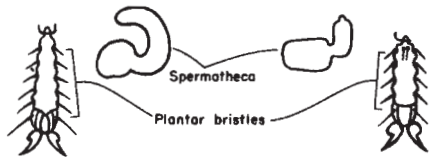
MOUSE FLEA
Leptopsylla segnis

Pronotal comb present



Labial palps not extending beyond trochanter of first leg

Segment 5 of hind tarsus with 5 pairs lateral plantar bristles



NORTHERN RAT FLEA
Nosopsyllus fasciatus

Labial palps extending beyond trochanter of first leg

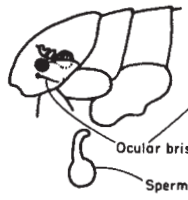
Segment 5 of hind tarsus with I pair ventral (basal) and 4 pairs lateral plantar bristles

SQUIRREL FLEA
Orchopeas howardii

Genal and pronotal combs absent

Front margin of head rounded Thorax normal

Mesopleuron not divided by vertical thickening

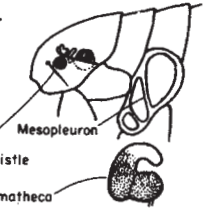


Ocular bristle inserted below eye

HUMAN FLEA
Pulex irritans

Front margin of head angular Thorax contracted

Mesopleuron divided by vertical rodlike thickening



Ocular bristle inserted in front of eye

ORIENTAL RAT FLEA
Xenopsylla cheopis

STICKTIGHT FLEA
Echidnophaga gallinacea

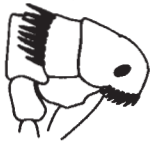
FLEAS: PICTORIAL KEY TO SPECIES FOUND ON DOMESTIC RATS IN SOUTHERN UNITED STATES

Slightly revised April 1947
By Roy F. Fritz and Harry D. Pratt
Rev. March, 1954

Genal, pronotal and abdominal combs present

STENOPONIA AMERICANA

Genal and pronotal combs present



Genal comb of five or more spines. Eye present.

Genal comb horizontal Spines pointed

Genal comb vertical Spines blunt

GEDIOPSYLLA SIMPLEX

Head length not twice width

Spine I of genal comb distinctly shorter than spine II

CTENOCEPHALIDES CANIS

Head length twice width

Spine I and spine II of genal comb approximately equal in length

CTENOCEPHALIDES FELIS

Genal comb of two to four spines. Eye absent or reduced.

Genal comb with 4 spines

LEPTOPSYLLA SEGNIS

Genal comb with 3 spines

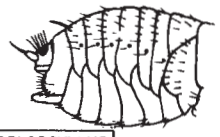
CTENOPHTHALMUS PSEUDAGYRTES

Genal comb with 2 spines

EPITEDIA WENMANNI

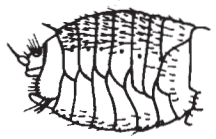
Pronotal comb present

1 row of bristles on typical abdominal segment



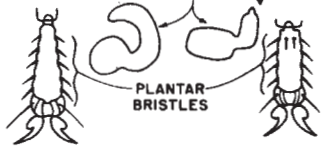
HOPLOPSYLLUS AFFINIS

2 rows of bristles on typical abdominal segment



Labial palps not extending beyond trochanter of first pair of legs

Segment 5 of hind tarsi with 5 pairs lateral plantar bristles



NOSOPSYLLUS FASCIATUS

Segment 5 of hind tarsi with 1 pair ventral (basal) and 4 pairs lateral plantar bristles

ORCHOPEAS HOWARDII

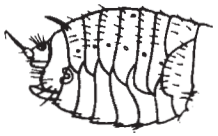
Labial palps extending beyond trochanter of first pair of legs

DIAMANUS MONTANUS

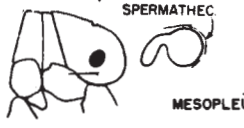
No combs present

Thorax normal Front margin of head rounded

1 row of bristles on typical abdominal segment



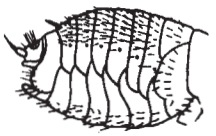
Mesopleuron not divided by vertical sclerotization.



Ocular bristle inserted below eye

PULEX IRRITANS

2 rows of bristles on typical abdominal segment



Mesopleuron divided by vertical rodlike sclerotization.

Ocular bristle inserted in front of eye

XENOPSYLLA CHEOPIS

Thorax contracted Front margin of head angular

ECHIDNOPHAGA GALLINACEA

POLYGENIS GWYNI

FLEAS: ILLUSTRATED KEY TO SPECIES FOUND DURING PLAGUE INVESTIGATIONS

Harry D. Pratt and Chester J. Stojanovich

1. Pronotal and genal combs absent (Fig. 1 A).....2

   Pronotal combs present; genal comb present or absent (Fig. 1 B & C)...5

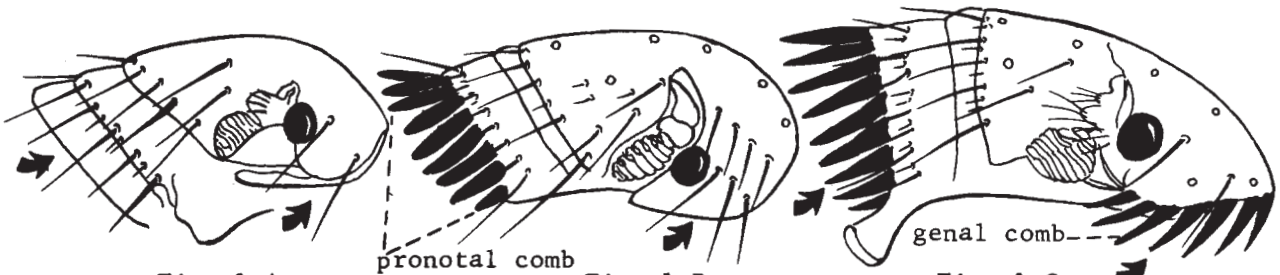


Fig. 1 A Fig. 1 B Fig. 1 C

2. Front margin of head with two angles; three thoracic tergites together shorter than the first abdominal tergite (Fig. 2 A). (Echidnophaga gallinacea).....STICKTIGHT FLEA

   Front margin of head rounded; three thoracic tergites together longer than the first abdominal tergite (Fig. 2 B).....3

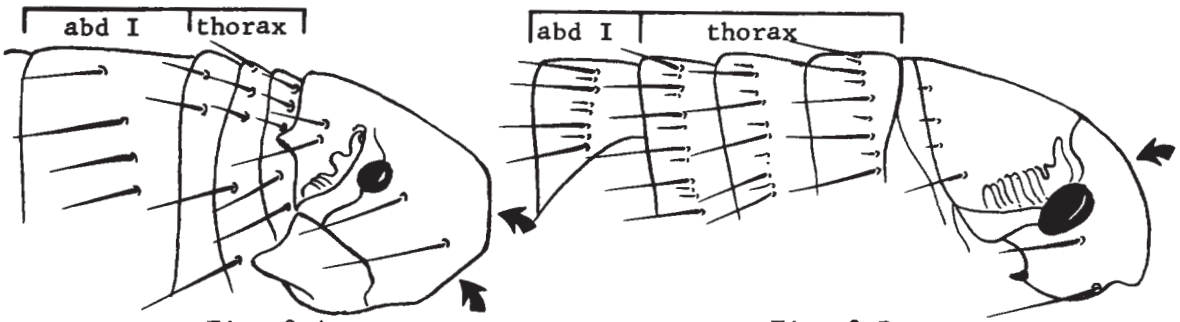


Fig. 2 A Fig. 2 B

3. Ocular bristle in front of eye; mesopleuron divided by internal sclerotization; female with spermatheca partially pigmented (Fig. 3 A & B)... .....,(Genus Xenopsylla).....4

   Ocular bristle beneath eye; mesopleuron without internal sclerotization; female with spermatheca entirely without pigment (Fig. 3 C & D)..... (Pulex irritans).....HUMAN FLEA

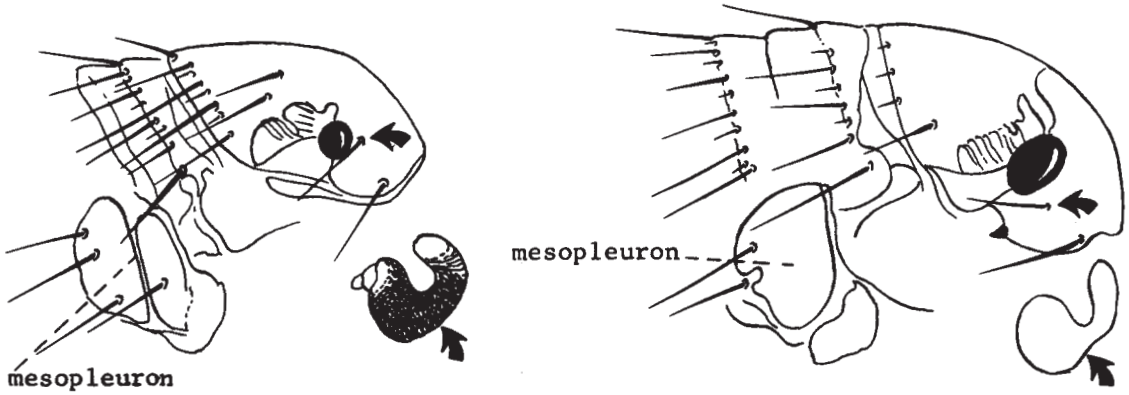
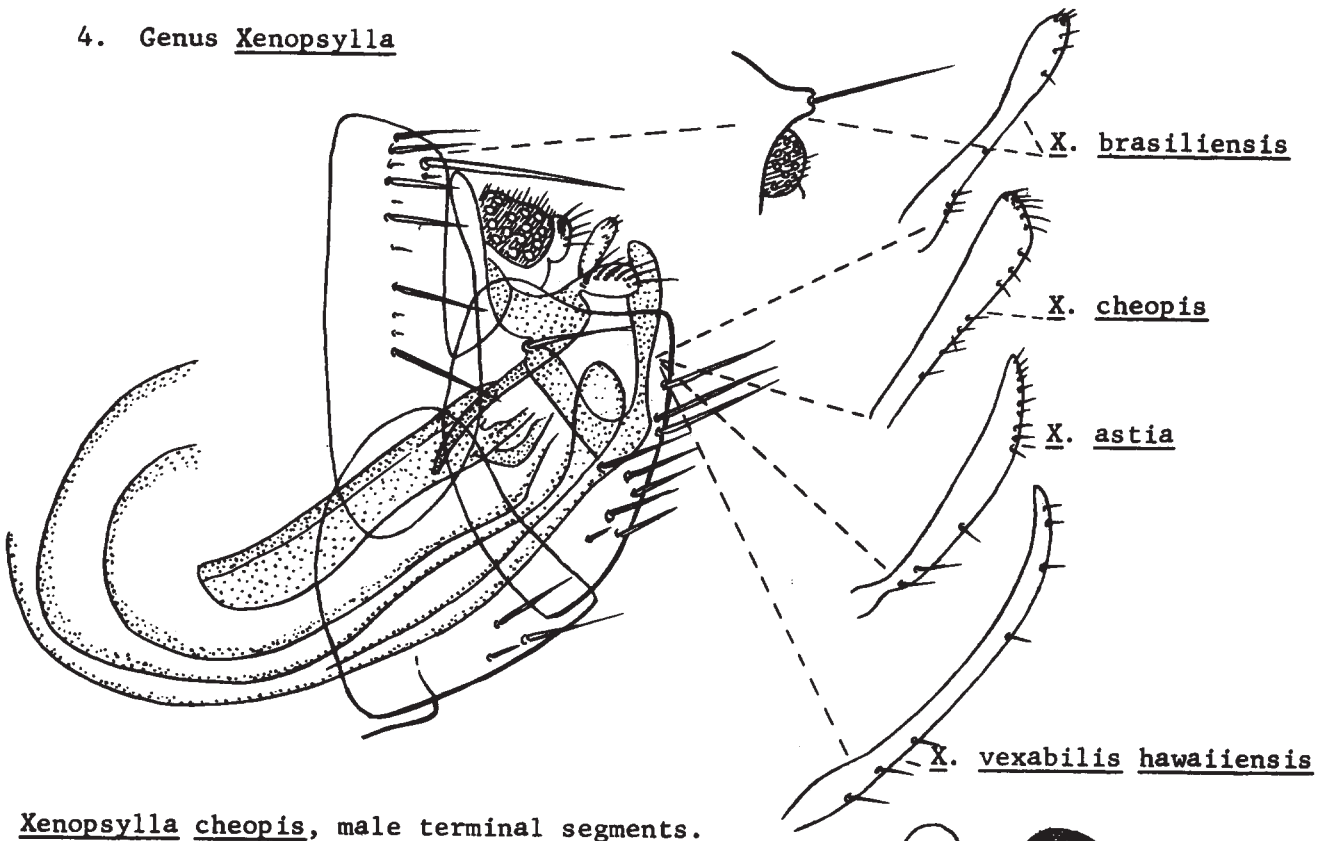
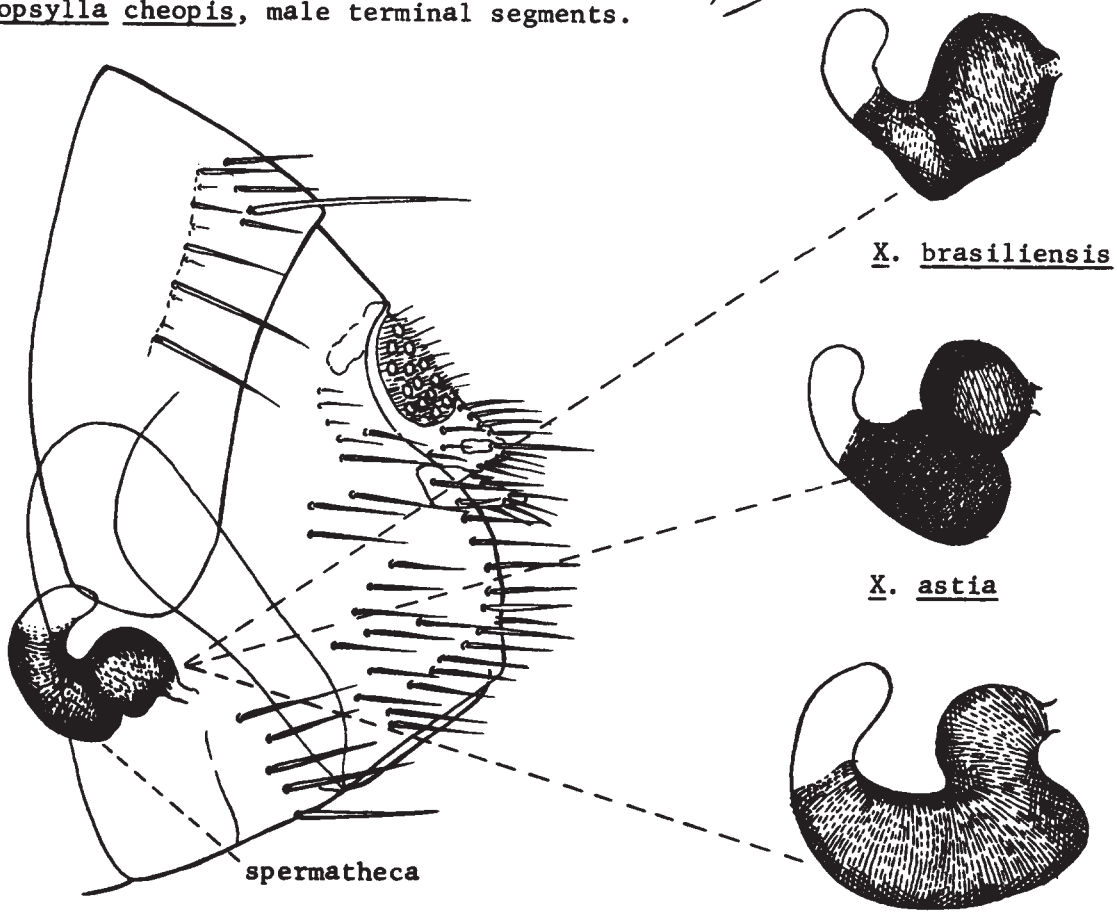


Fig. 3 A Fig. 3 B Fig. 3 C Fig. 3 D

4. Genus Xenopsylla



Xenopsylla cheopis, male terminal segments.



Xenopsylla cheopis, female terminal segments

5. Genal comb absent (Fig. 5 A).....6

Genal comb present (Fig. 5 B).....8

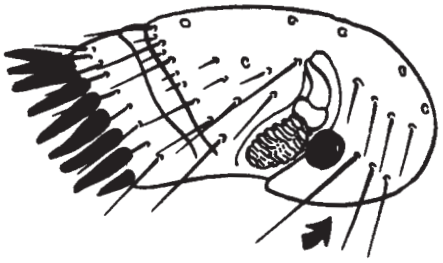


Fig. 5 A

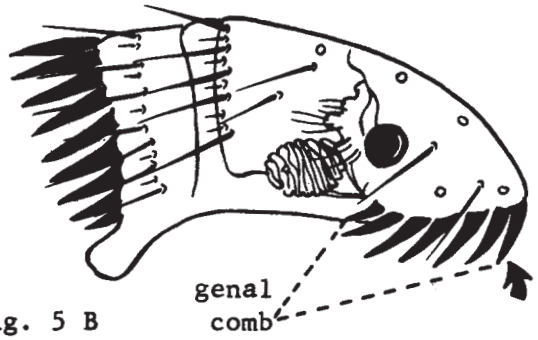


Fig. 5 B

6. Pronotal comb with about 12 teeth on each side (Fig. 6 A). India.....
.....Stivalius ahalae

Pronotal comb with 5 to 10 teeth on each side (Fig. 6 B).....7

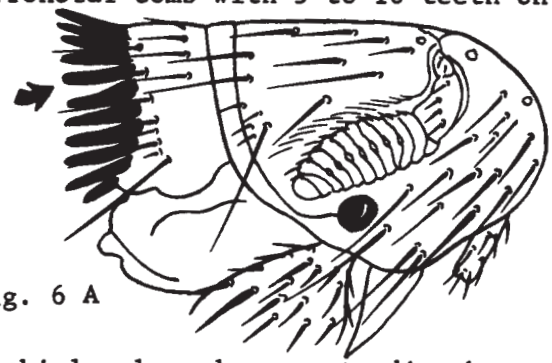


Fig. 6 A

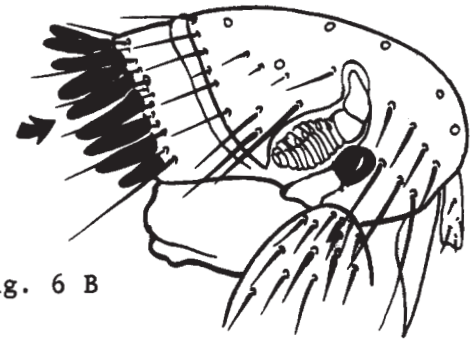


Fig. 6 B

7. Labial palpus long, extending beyond trochanter of first leg (Fig. 7 A).
Diamanus montanus.....ROCK SQUIRREL FLEA

Labial palpus short, not extending to tip of coxa of first leg (Fig. 7 B).
Nosopsyllus fasciatus.....NORTHERN RAT FLEA

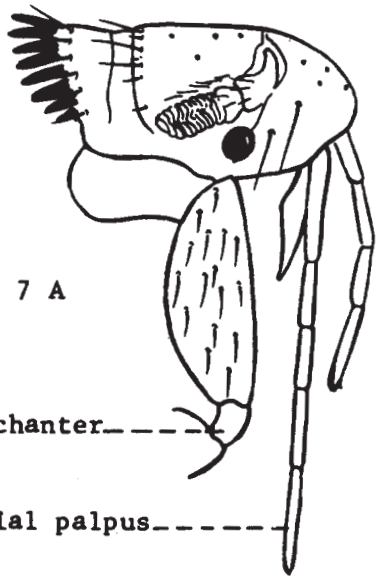


Fig. 7 A

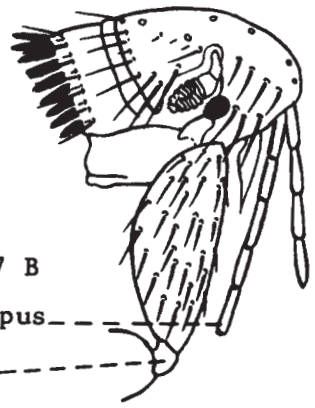


Fig. 7 B

8. Genal comb with two teeth (Fig. 8 A).....(Genus Neopsylla)
Neopsylla setosa important in U. S. S. R., Mongolia and Manchuria.

Genal comb with three teeth (Fig. 8 B).....(Genus Ctenophthalmus)
Ctenophthalmus breviatus and pollex potential vectors in U. S. S. R.

Genal comb with four teeth (Fig. 8 C).....(Genus Leptopsylla)
Leptopsylla segnis is cosmopolitan.

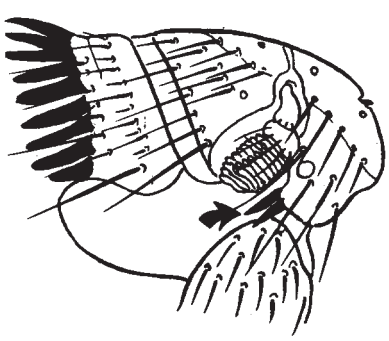


Fig. 8 A

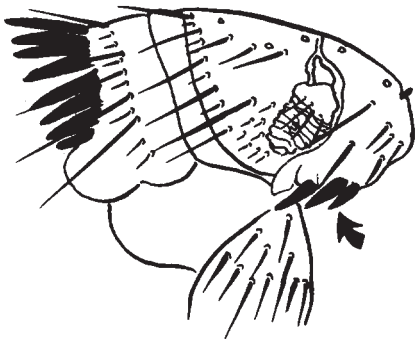


Fig. 8 B

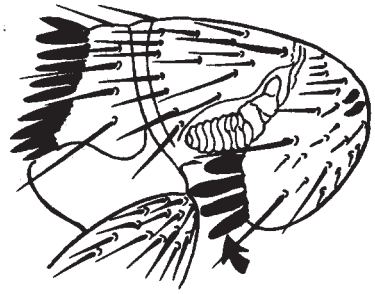


Fig. 8 C

Genal comb with more than five teeth.....(Genus Ctenocephalides). 9

9. Head strongly rounded anteriorly; first spine of genal comb about half as long as second; hind tibia with the spiniform setae A and B (Fig. 9 A & B).
Ctenocephalides canis.....DOG FLEA

Head not strongly convex anteriorly; first spine of genal comb almost as long as second spine; hind tibia with spiniform seta B, spiniform seta A replaced by a minute seta which may be absent in some specimens (Fig. 9 C & D). Ctenocephalides felis.....CAT FLEA

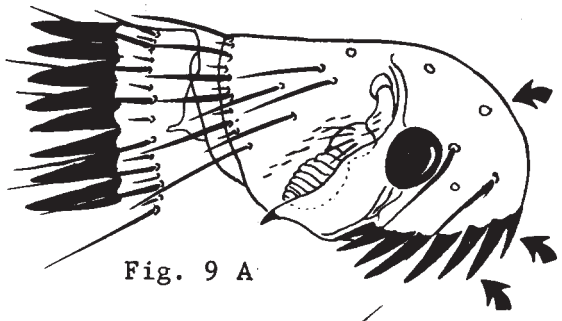


Fig. 9 A

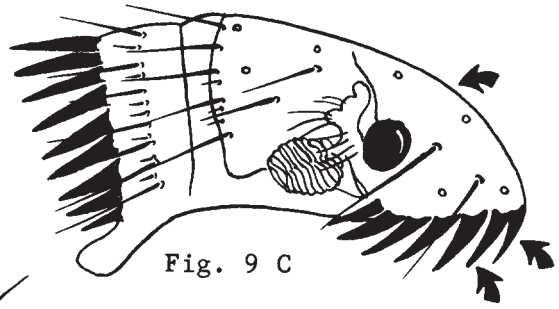


Fig. 9 C

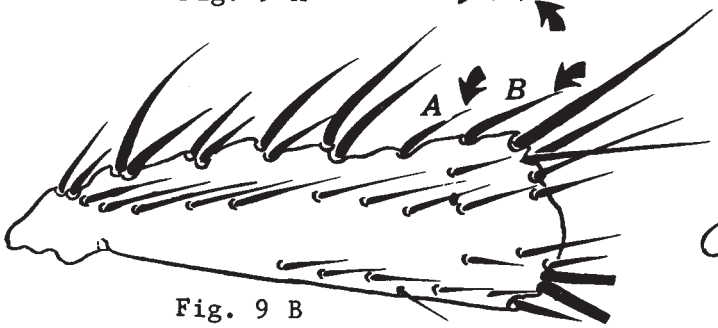


Fig. 9 B

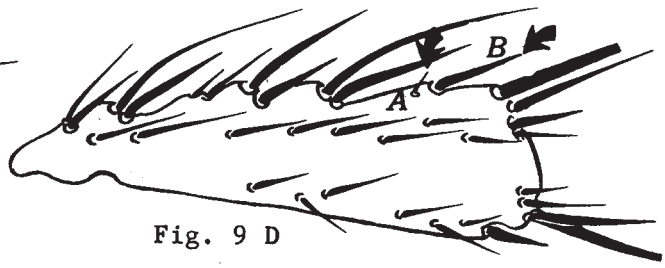
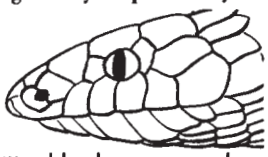


Fig. 9 D

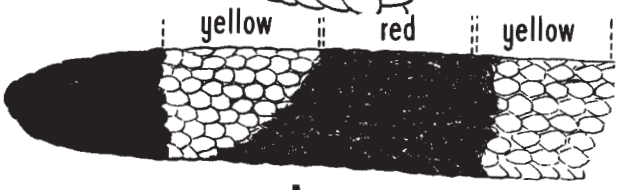
SNAKES: PICTORIAL KEY TO VENOMOUS SPECIES IN UNITED STATES
PART I

Chester J. Stojanovich and Margaret A. Parsons

loreal pit absent, if ringed red and yellow rings always separated by black

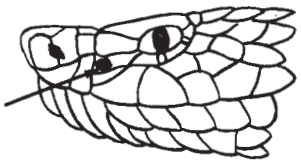


loreal pit present, if absent red and yellow rings touch



NON-VENOMOUS SNAKES

loreal pit present



loreal pit absent

neck ring black

Micrurus fulvius
TRUE CORAL SNAKE

M. f. fulvius	*M. f. barbouri*	*M. f. tenere*
Southeastern	Florida	Arkansas, Texas

neck ring red

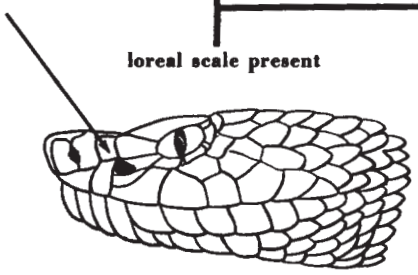
Micruroides euryxanthus
ARIZONA CORAL SNAKE

tail pointed

tail blunt or with rattle

SEE PART II

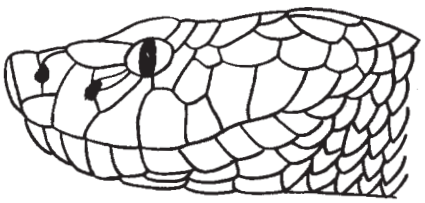
loreal scale present



Agkistrodon contortrix
COPPERHEAD

A. c. contortrix	*A. c. laticinctus*	*A. c. mokasen*	*A. c. pictigaster*
Southeastern	Texas, Oklahoma, Kansas	Eastern	Texas

loreal scale absent

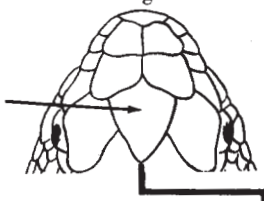


Agkistrodon piscivorus
WATER MOCCASIN

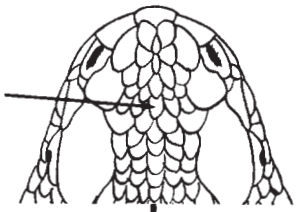
A. p. piscivorus	*A. p. leucostoma*
Southeastern	Southeastern

PART II

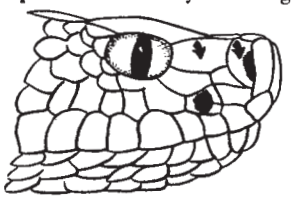
head with large scales medially



head with small scales medially



upper preocular usually touching postnasal



Sistrurus catenatus
MASSASAUGA RATTLESNAKE

S. c. catenatus	*S. c. edwardsii*
Great Lakes & Central U.S.	Arizona, Colorado, New Mexico, Texas

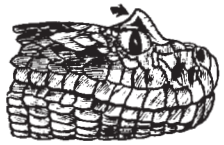
S. c. tergeminus
Colorado, Kansas, Nebraska, New Mexico, Oklahoma, Texas

upper preocular and postnasal separated

Sistrurus miliarius
PIGMY RATTLESNAKE

S. m. miliarius	*S. m. barbouri*	*S. m. streckeri*
Southeastern	Southeastern	Southeastern

supraocular scale modified into a hornlike ridge

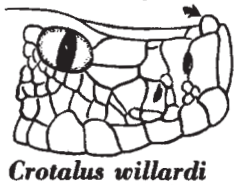


Crotalus cerastes
SIDEWINDER RATTLESNAKE

C. c. cerastes	*C. c. cercobombus*	*C. c. laterorepens*
Arizona, California, Nevada, Utah	Arizona	Arizona, California

supraocular scale not modified into a hornlike ridge

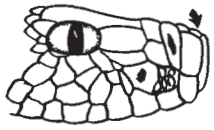
internasal ridge present



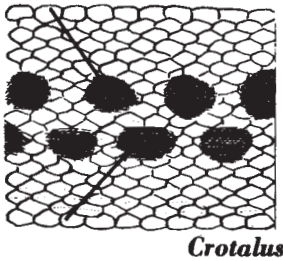
Crotalus willardi
RIDGE-NOSED RATTLESNAKE

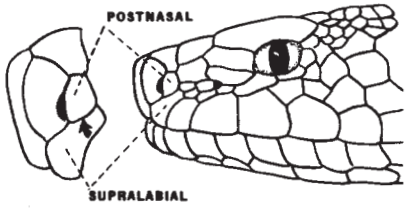
C. w. silus	*C. w. willardi*
New Mexico	Arizona,

internasal ridge absent



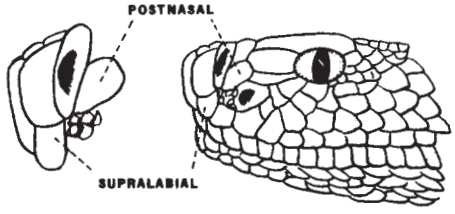
dorsal blotches on body divided into 2 parallel rows
first supralabial scale broadly attached to postnasal scale





Crotalus pricei
TWIN-SPOTTED RATTLESNAKE Arizona

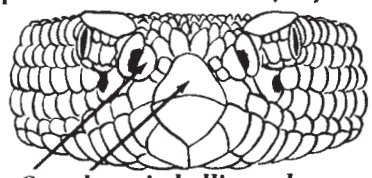
dorsal blotches on body not divided into 2 parallel rows
first supralabial scale not broadly attached to
postnasal scale, sometimes completely separated



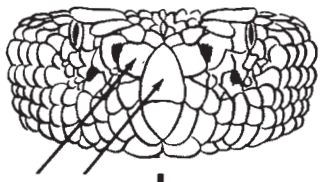
SEE PART III

PART III

prenasal and rostral usually separated

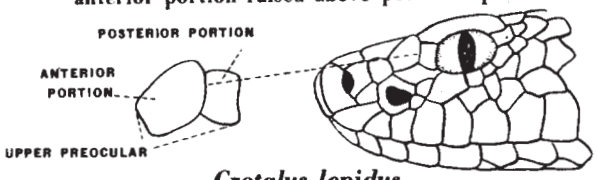


prenasal and rostral attached

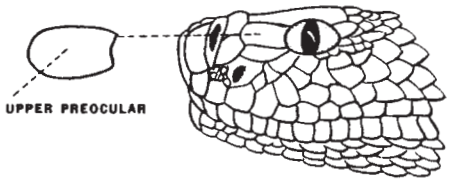


Crotalus mitchelli pyrrhus
SOUTHWESTERN SPECKLED RATTLESNAKE Arizona, California, Nevada, Utah

upper preocular usually separated vertically, anterior portion raised above posterior portion



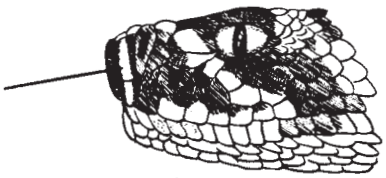
upper preocular usually not separated, if separated anterior portion not raised above posterior portio



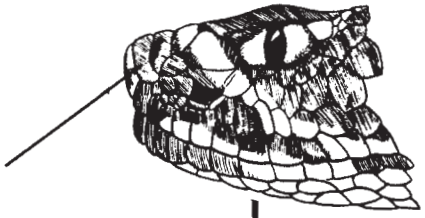
Crotalus lepidus
ROCK RATTLESNAKE

C. l. lepidus	*C. l. klauberi*
New Mexico, Texas	Arizona, New Mexico, Texas

prenasal and supralabial scales with pale stripe



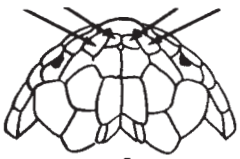
prenasal and supralabial scales without pale stripe



Crotalus adamanteus
EASTERN DIAMONDBACK RATTLESNAKE Southeastern

with 2 internasals

with more than 2 internasals



Crotalus viridis
WESTERN RATTLESNAKE

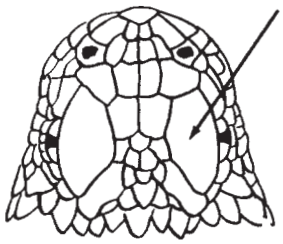
C. v. viridis	*C. v. abyssus*	*C. v. cerberus*	*C. v. concolor*
West Central U.S.	Arizona	Arizona	Colorado, Utah

C. v. helleri	*C. v. lutosus*	*C. v. nuntius*	*C. v. oreganus*
California	Nevada & adjoining states	Arizona	California, Idaho, Oregon, Washington

supraocular scale divided, pitted or margins uneven

Crotalus mitchelli stephensi
PANAMINT RATTLESNAKE California, Nevada

supraocular scale not divided, pitted or margins uneven



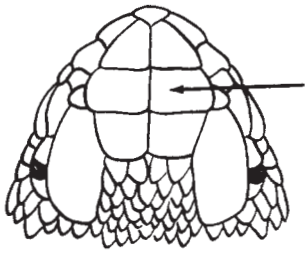
SEE PART IV

PART IV

tail without distinct rings

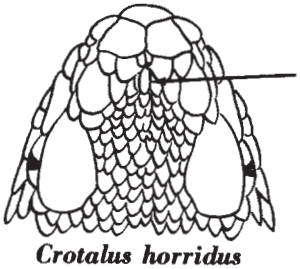
tail with distinct rings

anterior frontal area with large scales



Crotalus molossus
BLACK-TAILED RATTLESNAKE Southwestern

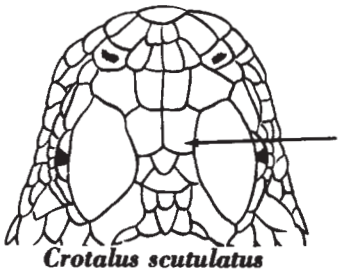
anterior frontal area with scales not much larger than posterior scales



Crotalus horridus
CANEBRAKE OR TIMBER RATTLESNAKE

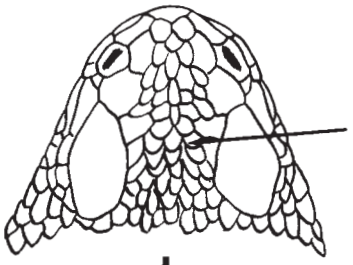
C. h. horridus	*C. h. atricaudatus*
Eastern	Southeastern

scales between supraoculars usually 2



Crotalus scutulatus
MOHAVE RATTLESNAKE Arizona, California, Nevada, New Mexico, Texas

scales between supraoculars usually 4, or more

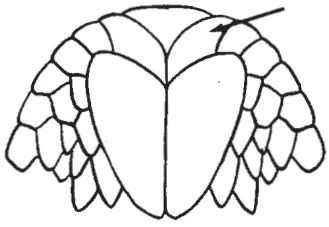


tail not in sharp contrast to posterior part of body

Crotalus tigris
TIGER RATTLESNAKE Arizona

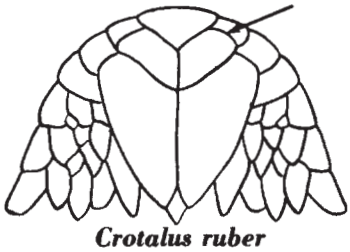
tail in sharp contrast to posterior part of body

first infralabial scale rarely divided, body color grayish



Crotalus atrox
WESTERN DIAMONDBACK RATTLESNAKE Southwestern

first infralabial scale usually divided, body color pink or red



Crotalus ruber
RED DIAMONDBACK RATTLESNAKE California

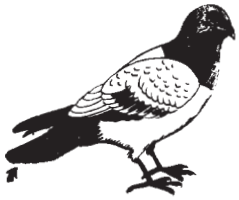
BIRDS: PICTORIAL KEY TO SOME COMMON PEST SPECIES OF PUBLIC HEALTH IMPORTANCE

Margaret A. Parsons and Chester J. Stojanovich

bill short

bill long

male and female. body plump, tail fan-like



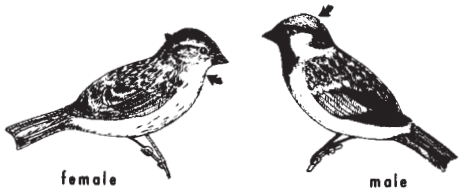
COMMON PIGEON

body trim, tail not fan-like

male. body black, head brown
female. overall dull grey color

COMMON COWBIRD

male. black throat, grey crown
female. whitish throat, dull eye stripe



HOUSE SPARROW

male. wing with red 'epaulettes'
female. breast heavily striped, light eye stripe

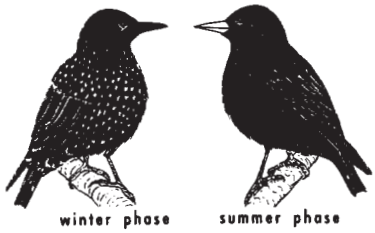
RED-WINGED BLACKBIRD

wing without 'epaulettes'
breast not heavily striped

males. plain bronze or
dull purple back, tail long
females: less iridescent, smaller size

GRACKLES

winter. bill dark, body heavily speckled with light dots
spring. bill yellow, color purple and green



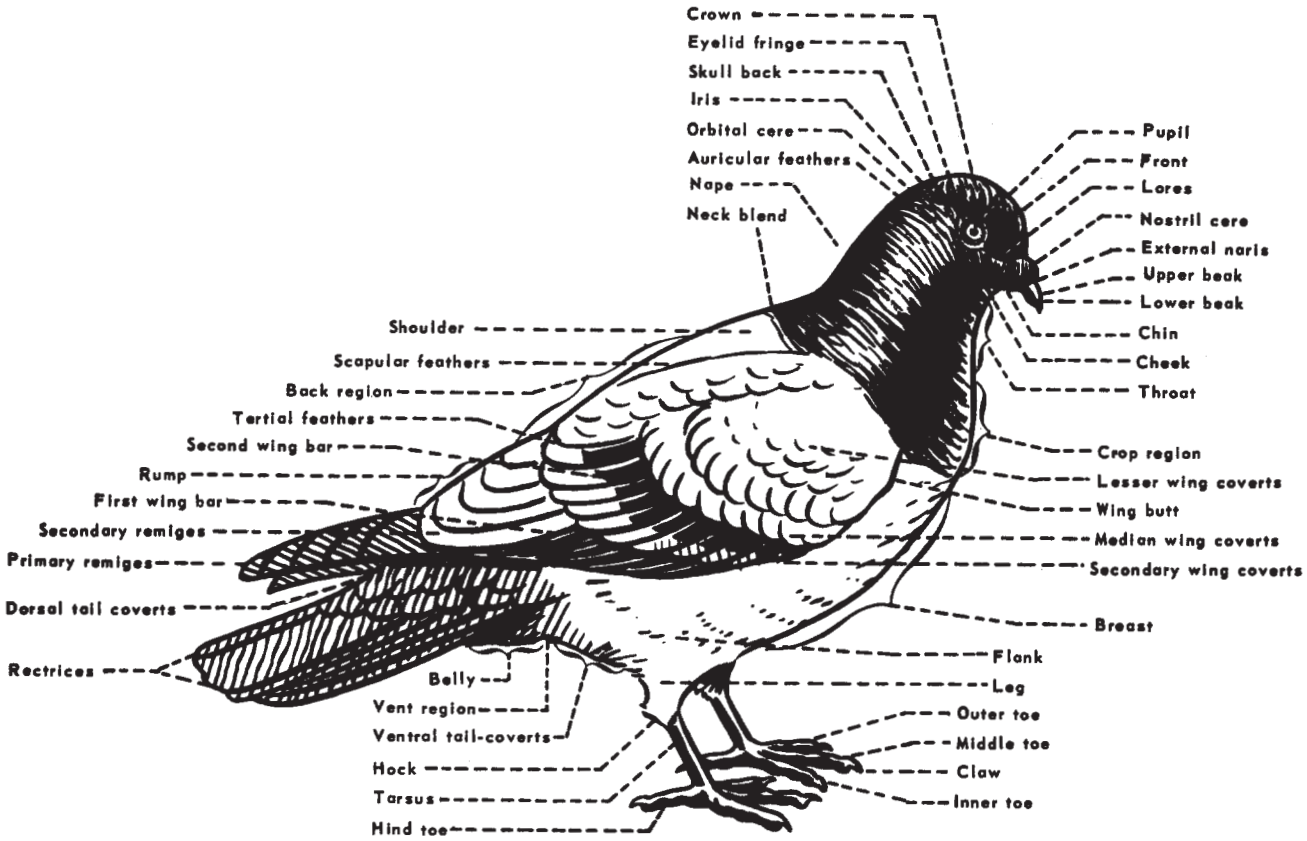
STARLING

male and female.
very large size, coal
black color, tail flat

CROWS

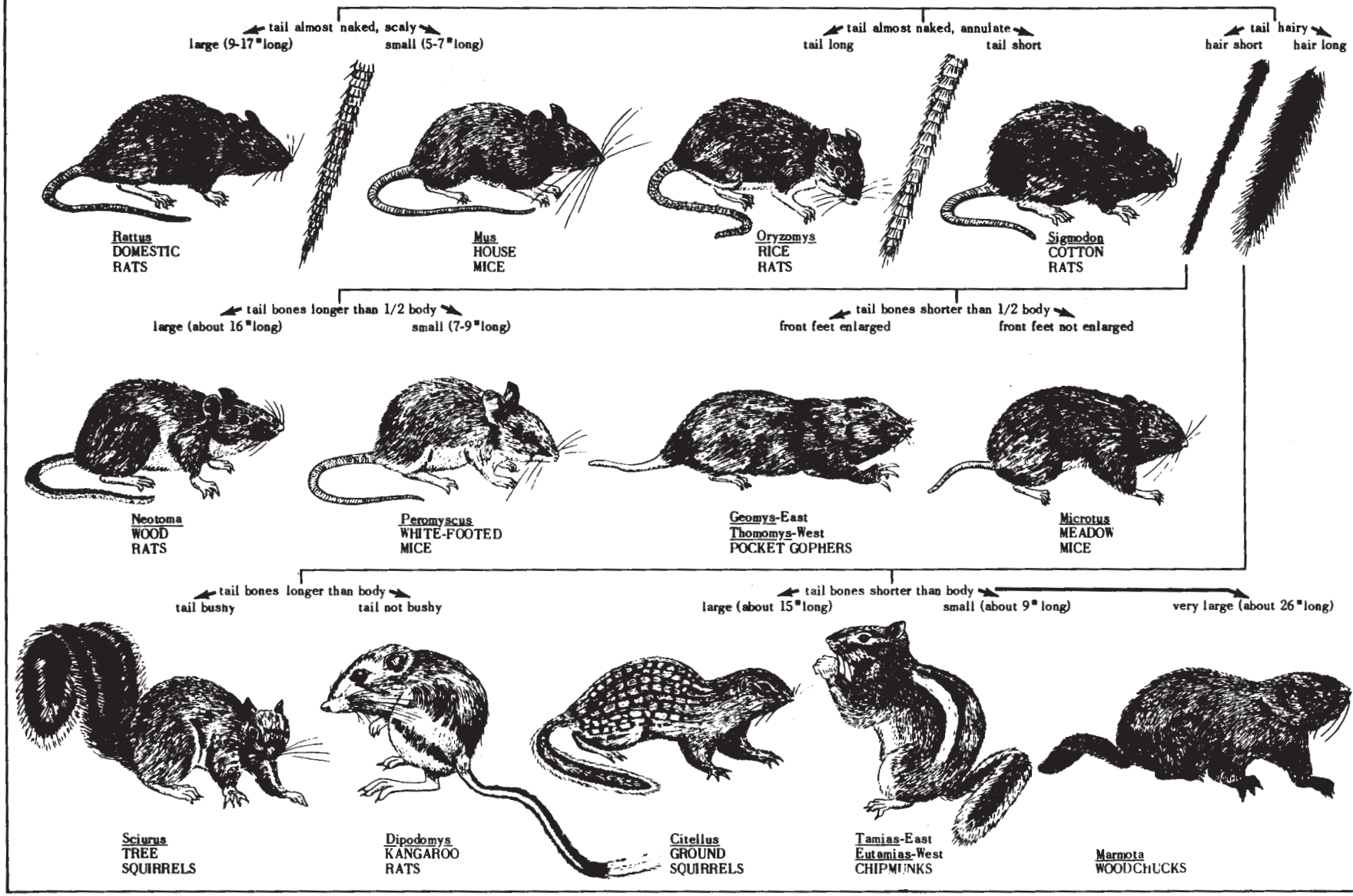
PIGEON, COLUMBA LIVIA – EXTERNAL MORPHOLOGY

Harold George Scott and Walter S. Dougherty



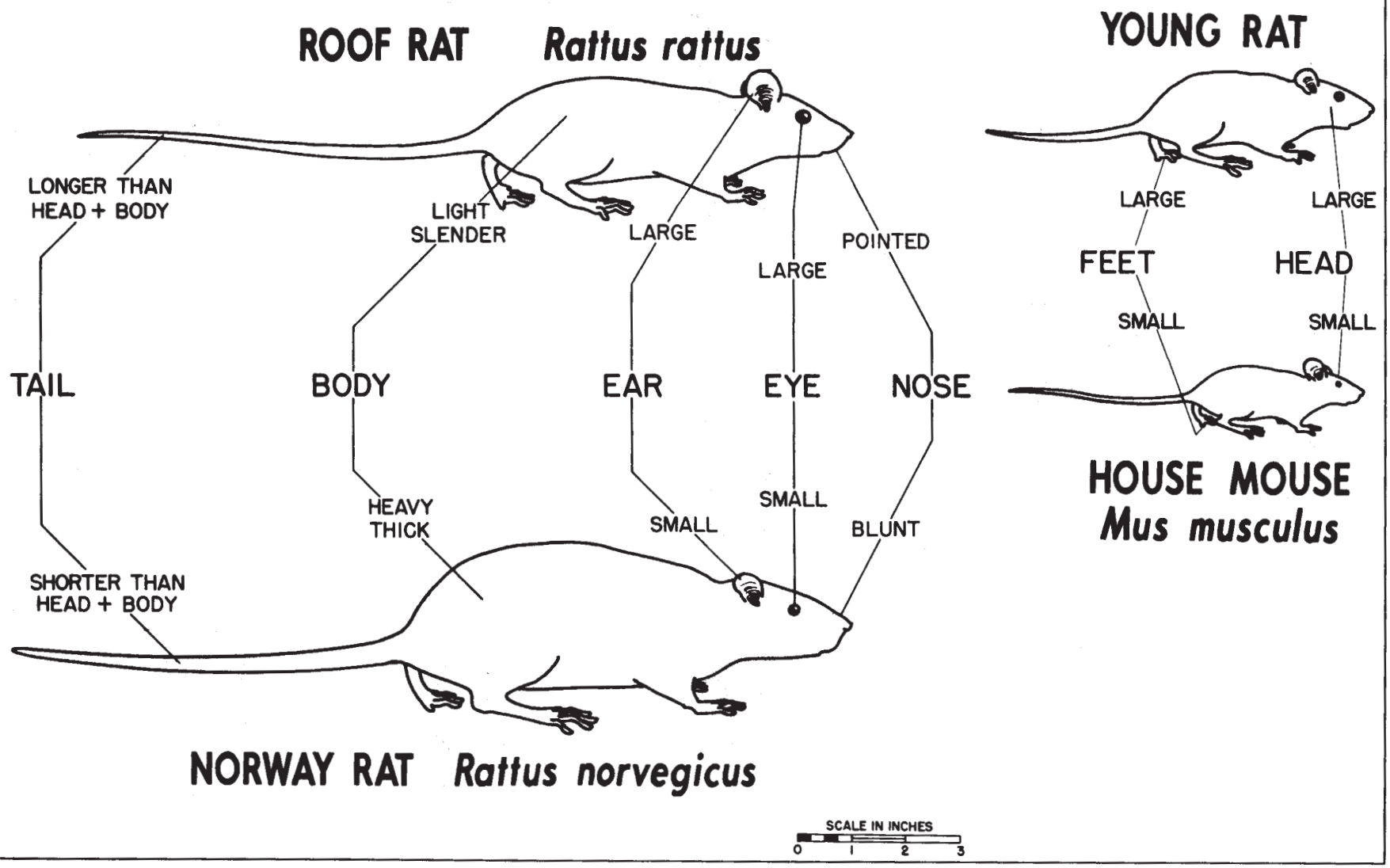
RODENTS: PICTORIAL KEY TO SOME COMMON UNITED STATES GENERA

Harold George Scott and Margery R. Borom



DOMESTIC RODENT FIELD IDENTIFICATION

Robert Z. Brown

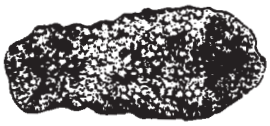


DOMESTIC RODENTS AND COCKROACHES: PICTORIAL KEY TO DROPPINGS

Harold George Scott and Margery R. Borom

length over 1/3-inch*

rectangular, blunt

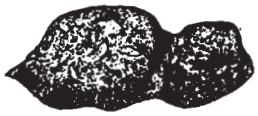


Rattus norvegicus
NORWAY RAT

elongate, pointed

Rattus rattus
ROOF RAT

length under 1/4-inch*



elongate, pointed

without ridges
length about 1/4-inch

Mus musculus
HOUSE MOUSE

with ridges
length about 1/16-inch

Blatella germanica
GERMAN COCKROACH

rectangular, blunt
with ridges

ovoid, pointed
with ridges

length about 1/8-inch

Periplaneta americana
AMERICAN COCKROACH

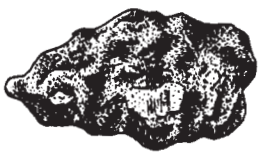
length about 1/16-inch

Blatta orientalis — ORIENTAL COCKROACH or
Periplaneta fuliginosa — SMOKY BROWN COCKROACH

length about 1/8-inch

Periplaneta australasiae
AUSTRALIAN COCKROACH

length about 1/16-inch



Periplaneta brunnea
BROWN COCKROACH

length about 1/32-inch

Supella supellectilium
BROWN-BANDED COCKROACH

*All characteristics for average, dry, adult droppings. Study groups, not individual droppings.

PRAIRIE DOGS: PICTORIAL KEY TO COMMON NORTH AMERICAN SPECIES
(Cynomys)

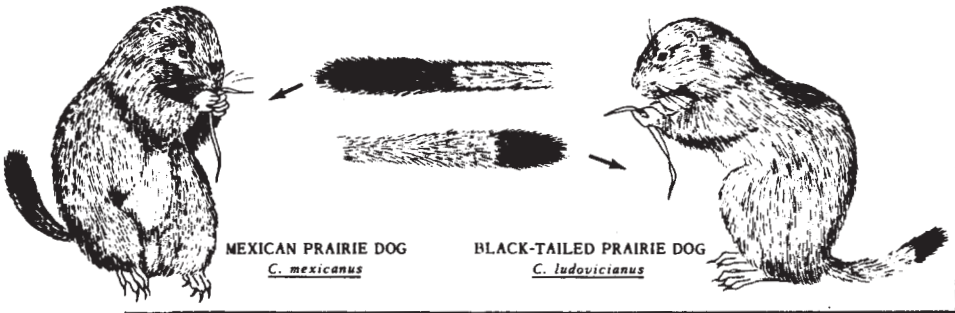
Harry Weinburgh and Margery R. Borom

Tail black-tipped, long, more than 1/5 total length (72-115 mm.)

Tail white-tipped, short, less than 1/5 total length (40-68 mm.)

Black on tail covering most of distal half
MEXICO ONLY

Black on tail confined to distal third
TEXAS TO SASKATCHEWAN

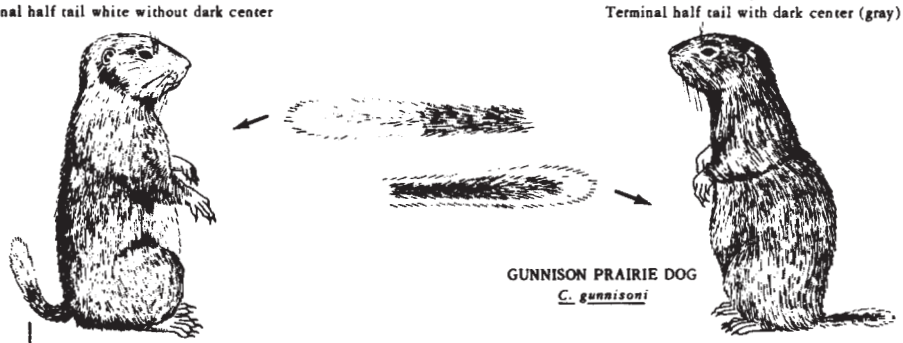


MEXICAN PRAIRIE DOG
C. mexicanus

BLACK-TAILED PRAIRIE DOG
C. ludovicianus

Terminal half tail white without dark center

Terminal half tail with dark center (gray)



GUNNISON PRAIRIE DOG
C. gunnisoni

Summer color reddish (cinnamon or clay color mixed with buff); darker on rump
CENTRAL VALLEYS OF UTAH

Summer color grayish (pinkish buff mixed with black); dark patch on cheek and above eye
WYOMING, COLORADO, AND EASTERN UTAH

UTAH PRAIRIE DOG
C. parvidens

WHITE-TAILED PRAIRIE DOG
C. leucurus

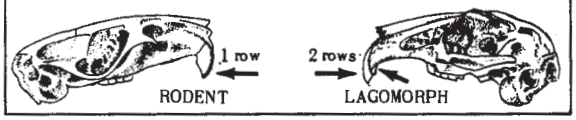
RABBITS AND HARES: PICTORIAL KEY TO COMMON UNITED STATES SPECIES

Harold George Scott and Margery R. Borom

hind foot slender
under 4-1/8 inches long*

Genus Sylvilagus
RABBITS

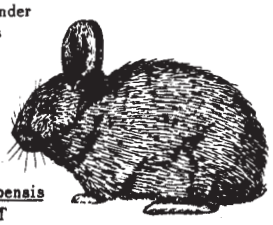
NOTE: Rabbits and hares are lagomorphs, not rodents. The incisor teeth are used to differentiate these two groups of mammals.



hind foot stout
over 4-1/8 inches long*

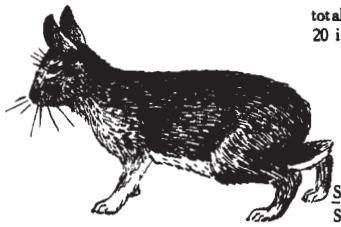
Genus Lepus
HARES

Western U. S.
total length under
11-1/2 inches



Sylvilagus idahoensis
PYGMY RABBIT

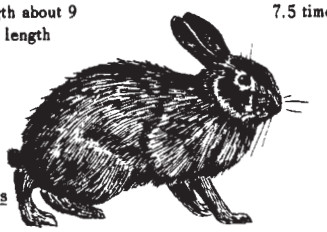
total length 11-3/4
to 18-1/4 inches



Southeastern U. S.
total length over
20 inches -

Sylvilagus aquaticus
SWAMP RABBIT

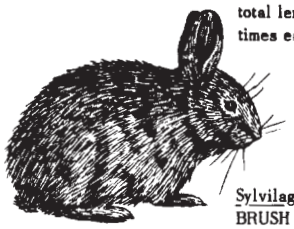
Southeastern U. S.
total length about 9
times ear length



Sylvilagus palustris
MARSH RABBIT

total length 6.2 to
7.5 times ear length

West Coast of U. S.
total length less than 6
times ear length



Sylvilagus bachmani
BRUSH RABBIT

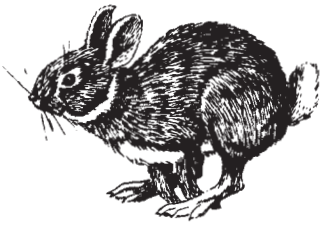
total length about 6.2
times ear length
hind feet with short fur

Sylvilagus auduboni
DESERT COTTONTAIL

total length about 6.7
times ear length
hind feet with long fur

Sylvilagus nuttalli
NUTTALL COTTONTAIL

total length about 7.2
times ear length
under tail white

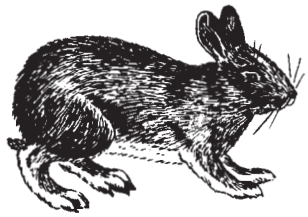


Sylvilagus floridanus
EASTERN COTTONTAIL

total length about 7.5
times ear length
under tail not white
stripe between ears

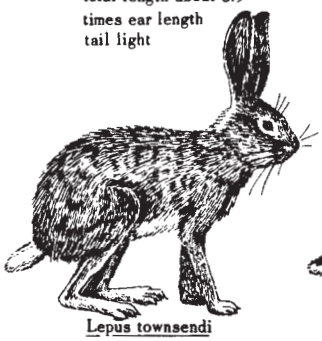
Sylvilagus transitionalis
NEW ENGLAND COTTONTAIL

total length about 6.7
times ear length
tail dark



Lepus americanus
VARYING HARE

total length about 5.9
times ear length
tail light

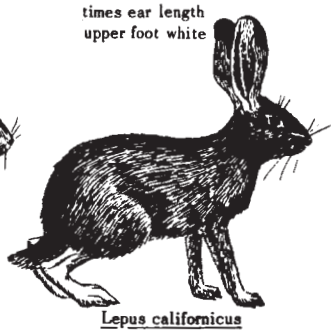


Lepus townsendi
WHITE-TAIL JACK

total length about 7.4
times ear length
upper foot dark

Lepus europaeus
EUROPEAN HARE

total length about 4.8
times ear length
upper foot white

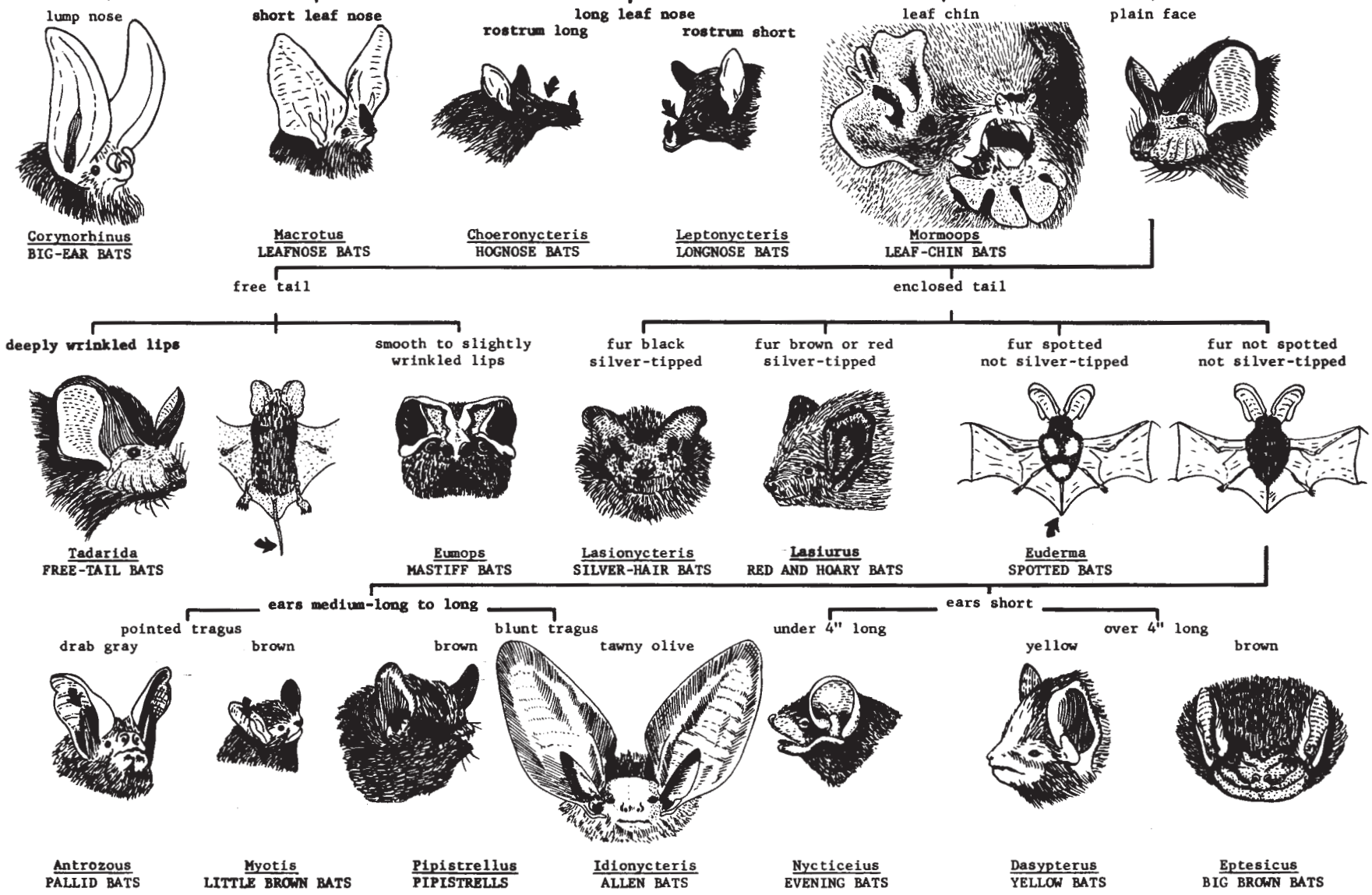


Lepus californicus
BLACK-TAIL JACK

*All measurements for adults.

BATS: PICTORIAL KEY TO UNITED STATES GENERA

Harold George Scott and Chester J. Stajanovich



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