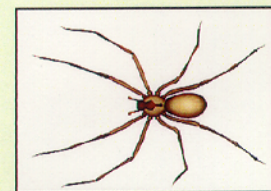


Pictorial Keys

Arthropods, Reptiles, Birds and Mammals of Public Health Significance



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



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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PUBLIC HEALTH SIGNIFICANCE OF GROUPS INCLUDED IN THE KEY

<i>COMMON NAME</i>	<i>PUBLIC HEALTH SIGNIFICANCE</i>
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, relapsing 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 broad 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

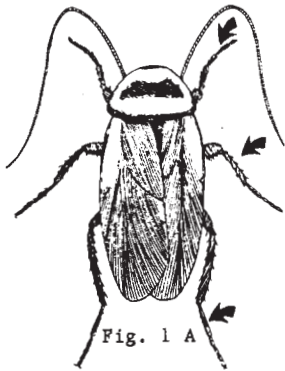


Fig. 1 A

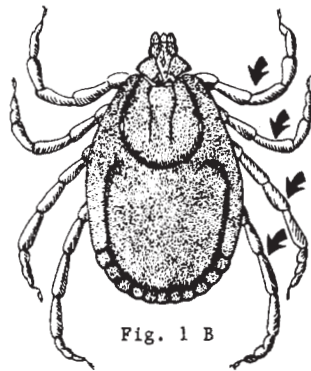


Fig. 1 B

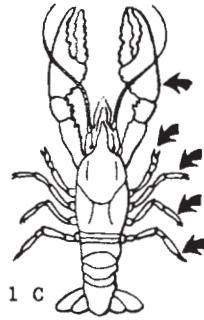


Fig. 1 C

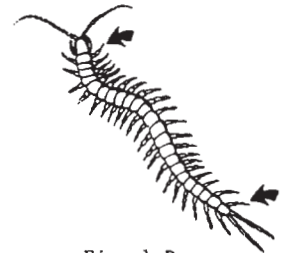


Fig. 1 D

- 2. Three pairs of walking legs (Fig. 2 A).....3
- Four pairs of walking legs (Fig. 2 B).....25

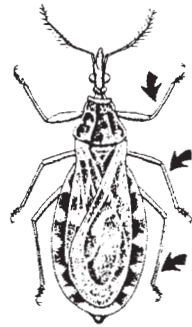


Fig. 2 A

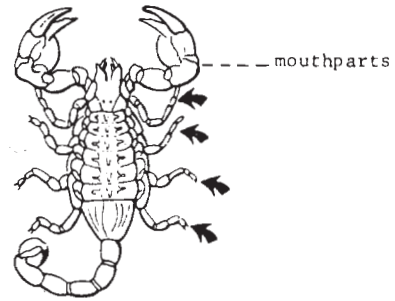


Fig. 2 B

----- mouthparts

- 3. Wings present, well developed (Fig. 3 A).....4
- Wings absent or rudimentary (Fig. 3 B & C).....13

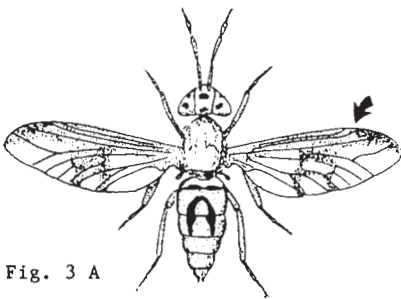


Fig. 3 A

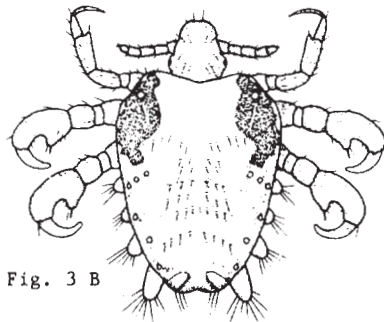


Fig. 3 B

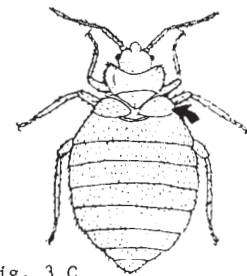


Fig. 3 C

- 4. With one pair of membranous wings (Fig. 4 A). ORDER DIPTERA.....5
- With two pairs of wings (Fig. 4 B & C).....6

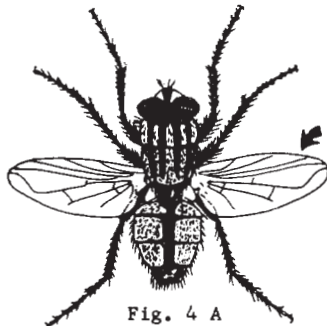


Fig. 4 A

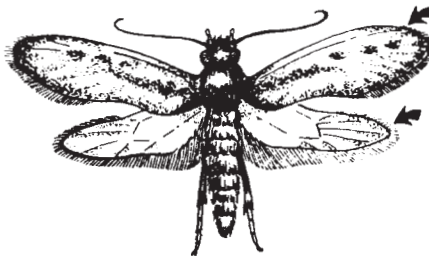


Fig. 4 B

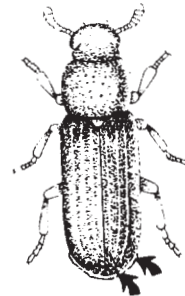


Fig. 4 C

5. Wings with scales (Fig. 5 A). FAMILY CULICIDAE.....MOSQUITO
 Wings without scales (Fig. 5 B). DIPTERA OTHER THAN MOSQUITOES.....FLY

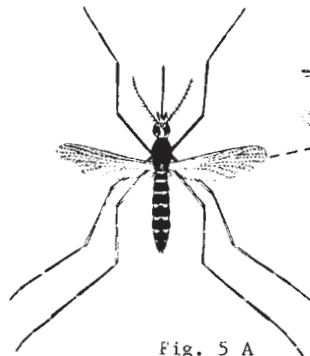


Fig. 5 A

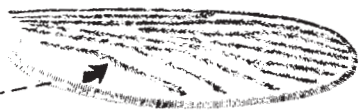


Fig. 5 B

6. Mouthparts adapted for sucking, with elongate proboscis (Fig. 6 A).....7
 Mouthparts adapted for chewing, without elongate proboscis (Fig. 6 B).....9

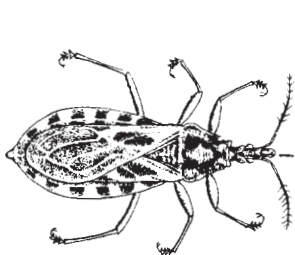


Fig. 6 A

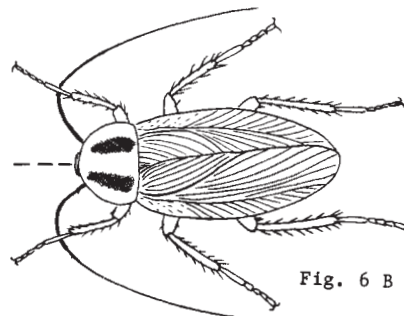
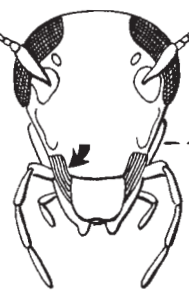
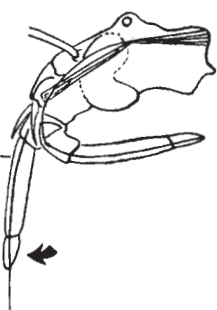


Fig. 6 B

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

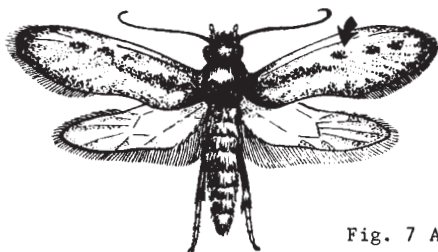


Fig. 7 A

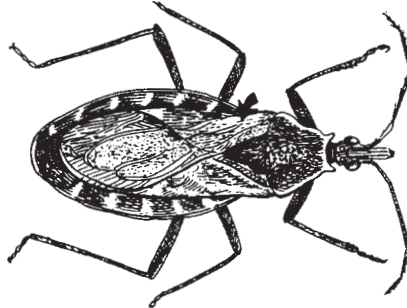


Fig. 7 B

8. Wing with fringe of long hair (Fig. 8 A). ORDER THYSANOPTERA.....THRIPS
 Wing without long hair (Fig. 8 B). ORDER HEMIPTERA.....KISSING BUG

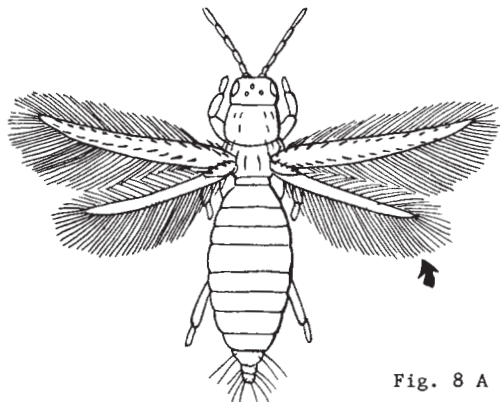


Fig. 8 A

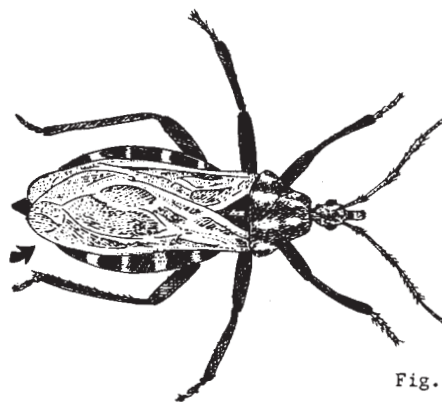


Fig. 8 B

- 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

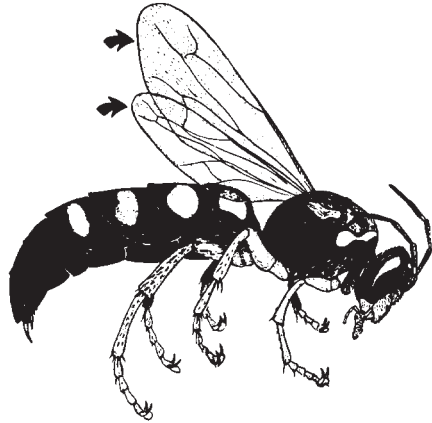


Fig. 9 A

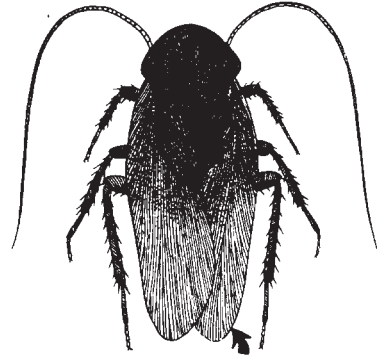


Fig. 9 B

- 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

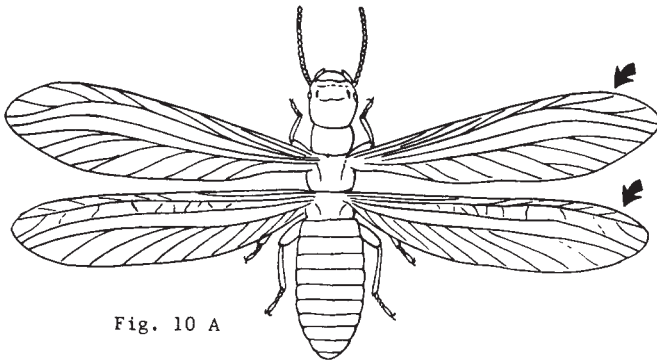


Fig. 10 A



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

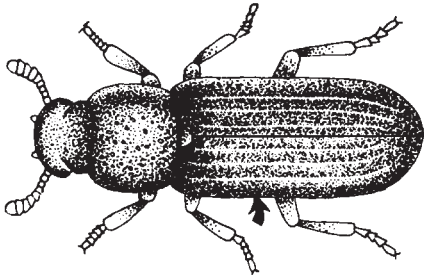


Fig. 11 A

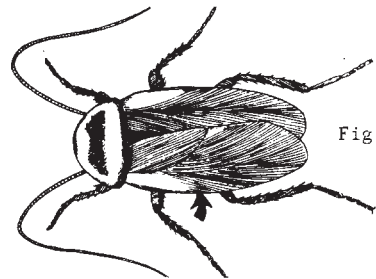


Fig. 11 B

- 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

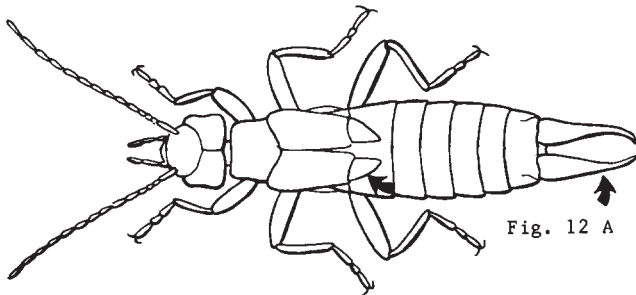


Fig. 12 A

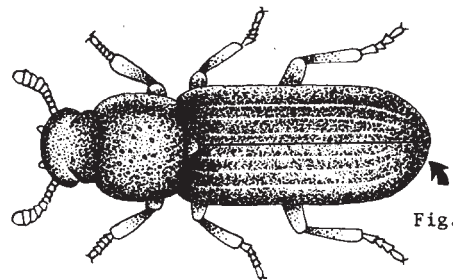


Fig. 12 B

- 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

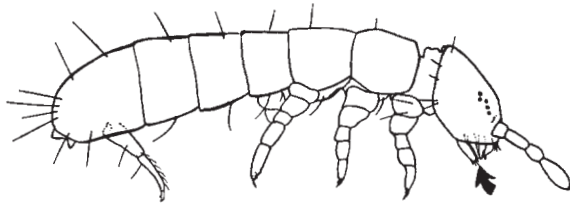


Fig. 13 A

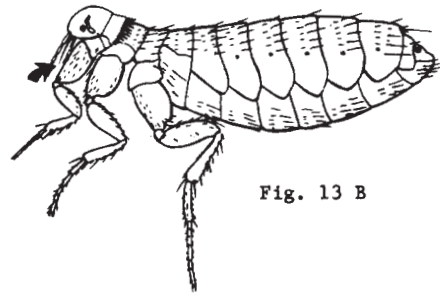


Fig. 13 B

- 14. With three long terminal tails (Fig. 14 A). ORDER THYSANURA.....SILVERFISH AND FIREBRAT
- Without three long terminal tails (Fig. 14 B).....15

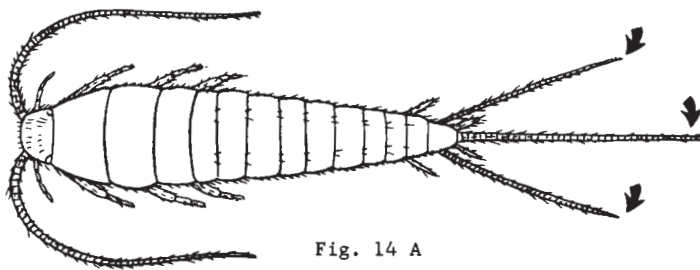


Fig. 14 A



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

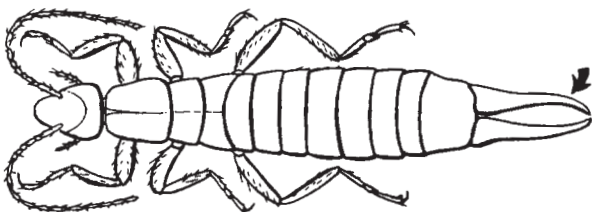


Fig. 15 A



Fig. 15 B

- 16. With narrow waist (Fig. 16 A). ORDER HYMENOPTERA.....ANT
- Without narrow waist (Fig. 16 B).....17



Fig. 16 A

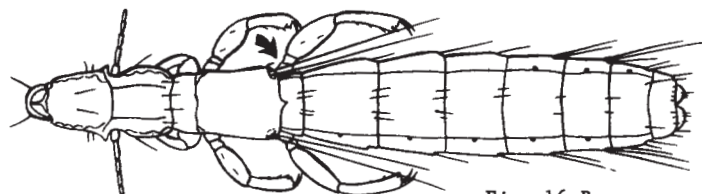


Fig. 16 B

- 17. Antenna with fewer than 8 segments (Fig. 17 A).....18
- Antenna with more than 8 segments (Fig. 17 B).....19

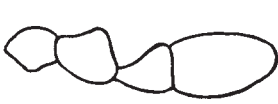


Fig. 17 A



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

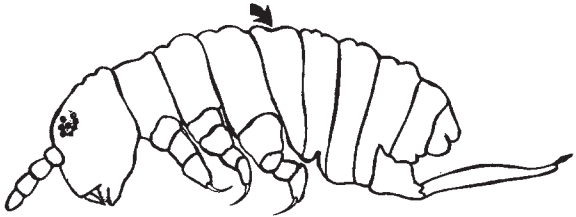


Fig. 18 A

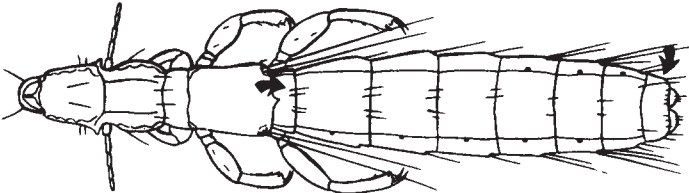


Fig. 18 B

- 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

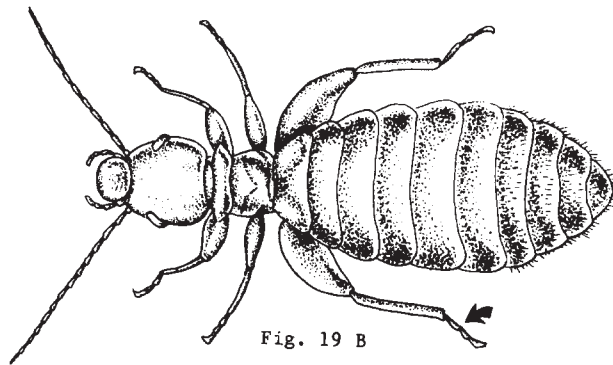


Fig. 19 B

- 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

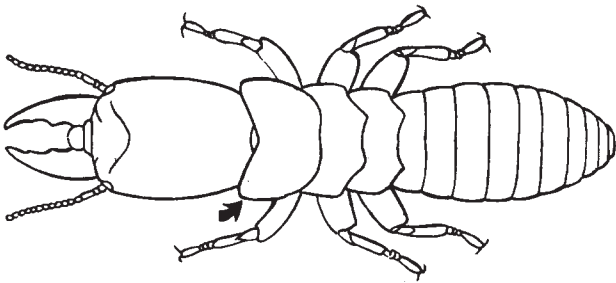


Fig. 20 A



Fig. 20 B

21. Flattened laterally (Fig. 21 A). ORDER SIPHONATERA.....FLEA
 Flattened dorso-ventrally (Fig. 21 B).....22

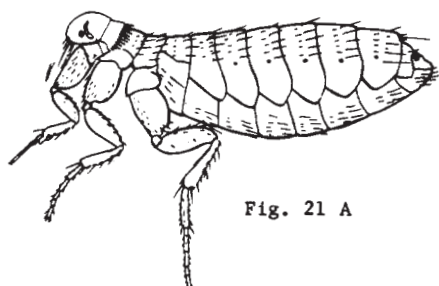


Fig. 21 A

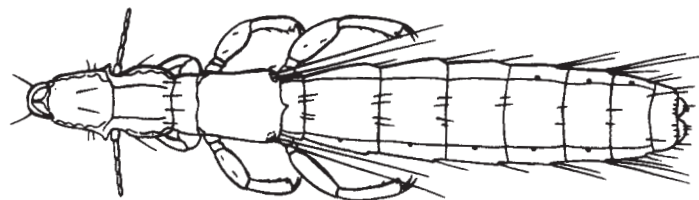


Fig. 21 B

22. Foot terminating in protrusible bladder (Fig. 22 A). ORDER THYSANOPTERA.....THRIPS
 Foot not terminating in protrusible bladder (Fig. 22 B).....23

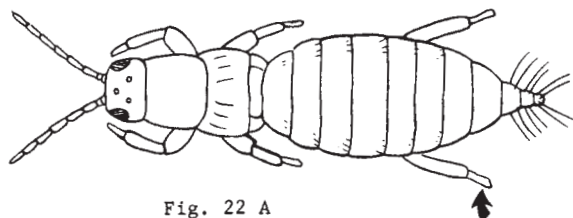


Fig. 22 A



Fig. 22 B

23. Beak jointed (Fig. 23 A). ORDER HEMIPTERA.....BEDBUG
 Beak not jointed (Fig. 23 B).....24

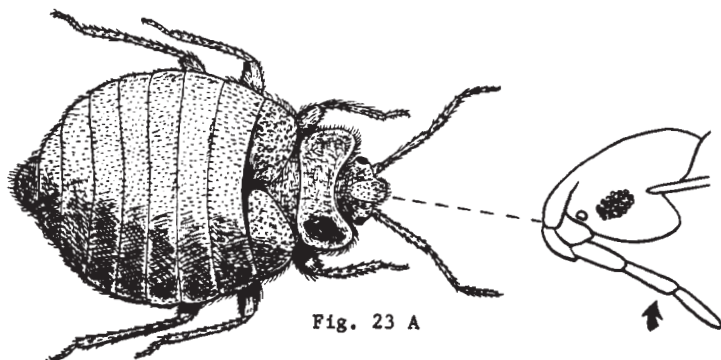


Fig. 23 A

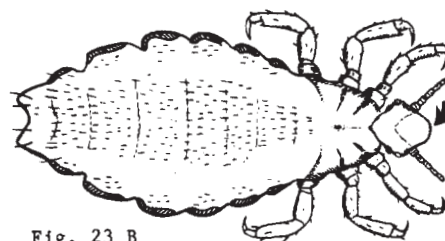


Fig. 23 B

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

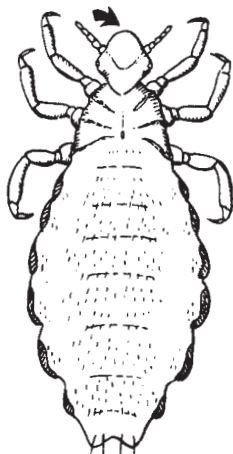


Fig. 24 A

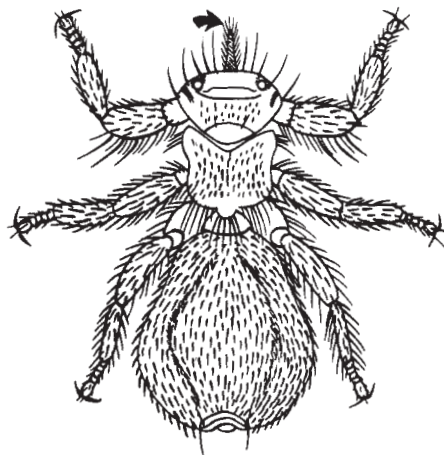


Fig. 24 B

25. Abdomen well-developed (Fig. 25 A). CLASS ARACHNIDA.....26
 Abdomen peg-like (Fig. 25 B). CLASS PYCNOGONIDA.....SEA SPIDER

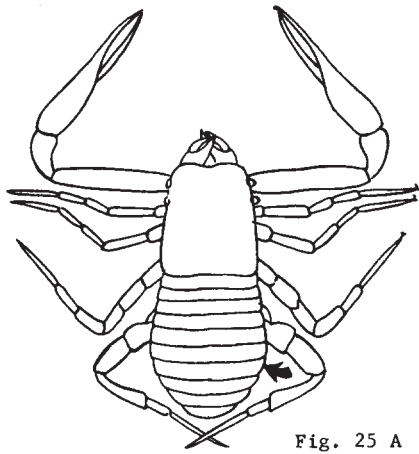


Fig. 25 A

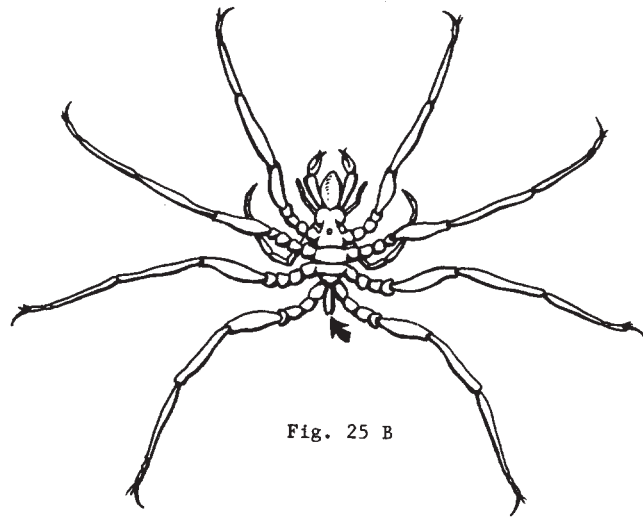


Fig. 25 B

26. Abdomen distinctly segmented (Fig. 26 A).....27
 Abdomen not distinctly segmented (Fig. 26 B).....31

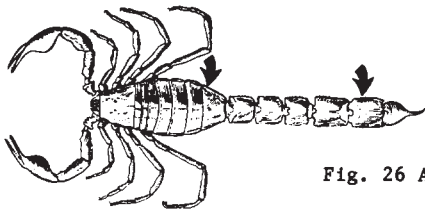


Fig. 26 A

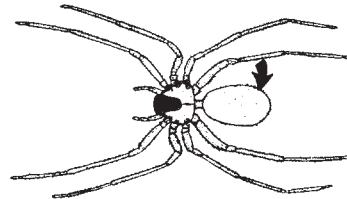


Fig. 26 B

27. Abdomen lengthened to form a long tail (Fig. 27 A).....28
 Abdomen not lengthened to form a long tail (Fig. 27 B).....29

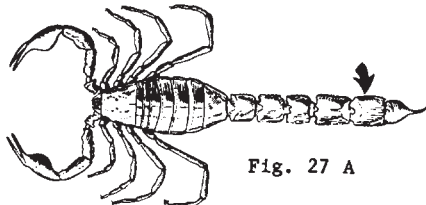


Fig. 27 A

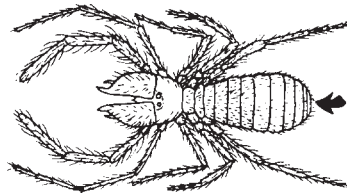


Fig. 27 B

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

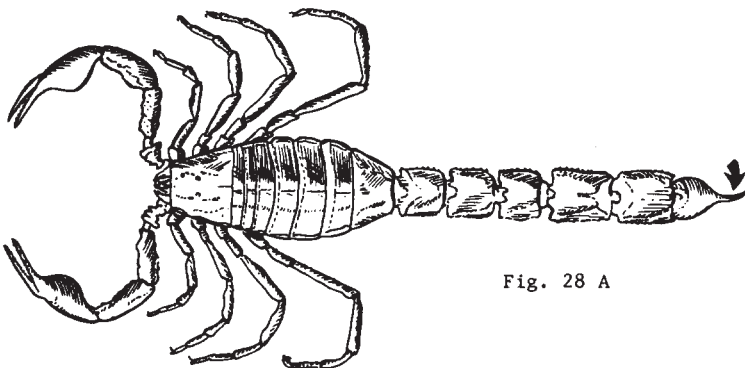


Fig. 28 A

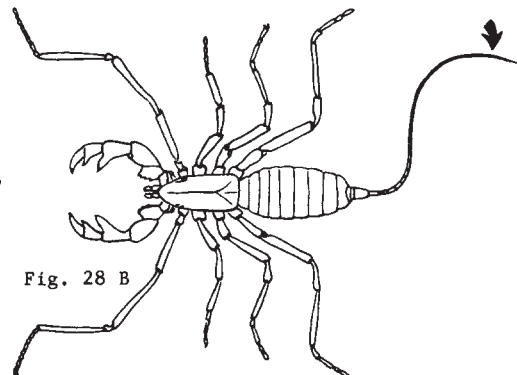


Fig. 28 B

29. With large pincer-like claws (Fig. 29 A). ORDER PSEUDOSCORPIONIDA.....PSEUDOSCORPION
 Without large pincer-like claws (Fig. 29 B).....30

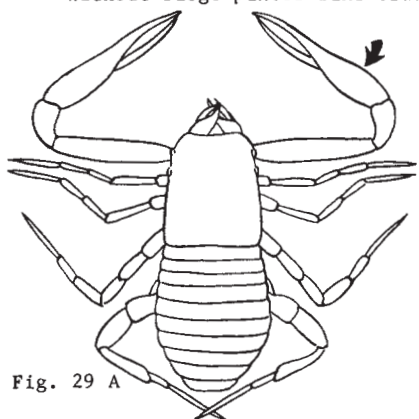


Fig. 29 A

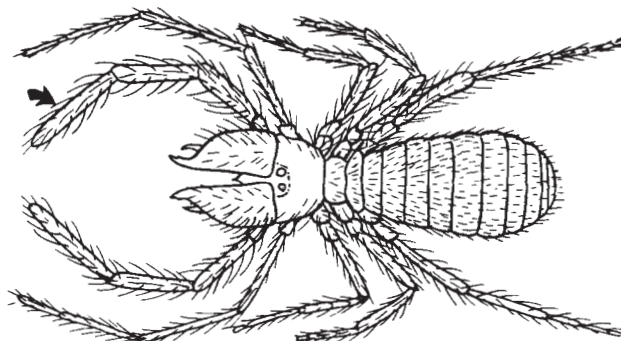


Fig. 29 B

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

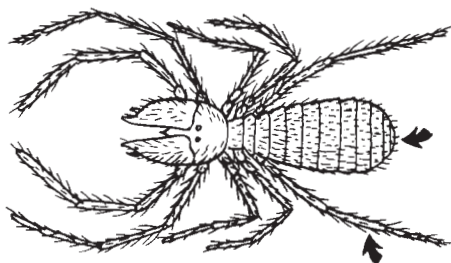


Fig. 30 A

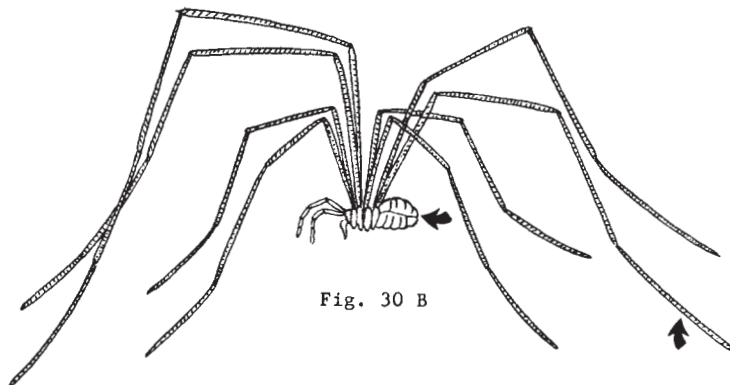


Fig. 30 B

31. Abdomen constricted to form a narrow waist (Fig. 31 A). ORDER ARANEIDA.....SPIDER
 Abdomen not constricted (Fig. 31 B).....32

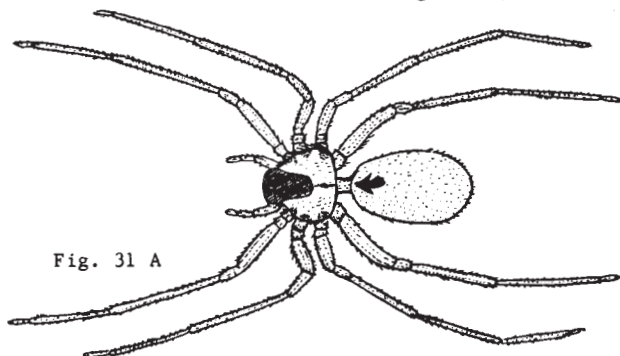


Fig. 31 A

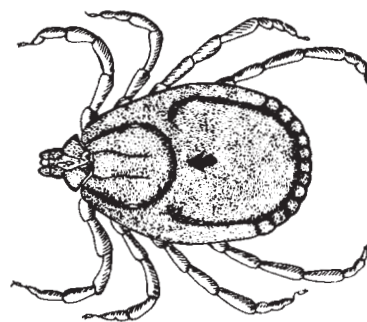


Fig. 31 B

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

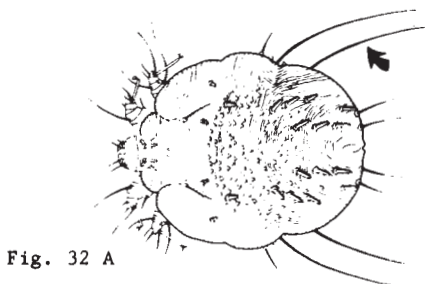


Fig. 32 A

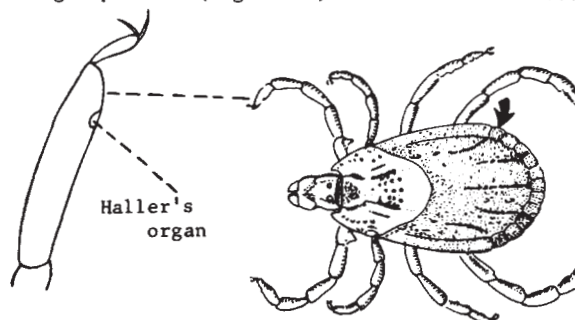


Fig. 32 B

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

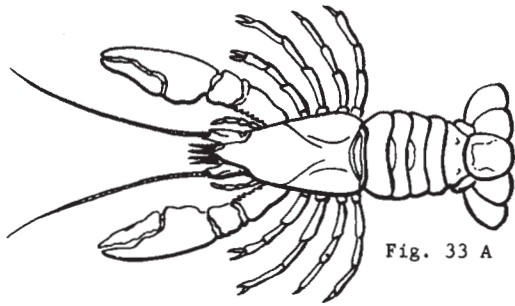


Fig. 33 A

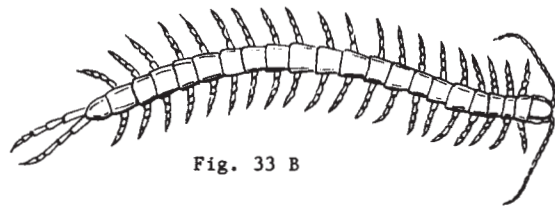


Fig. 33 B

34. Abdomen without appendages (Fig. 34 A). ORDER COPEPODA.....COPEPOD
 Abdomen with appendages (Fig. 34 B).....35

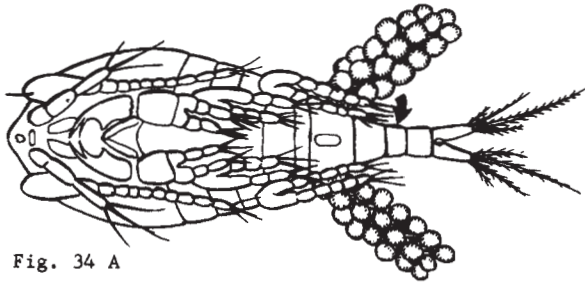


Fig. 34 A

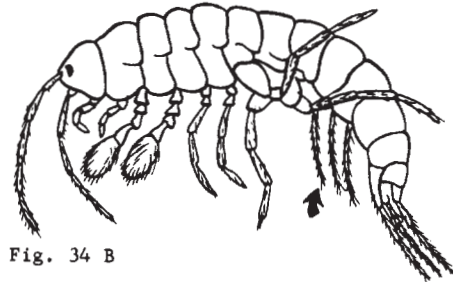


Fig. 34 B

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

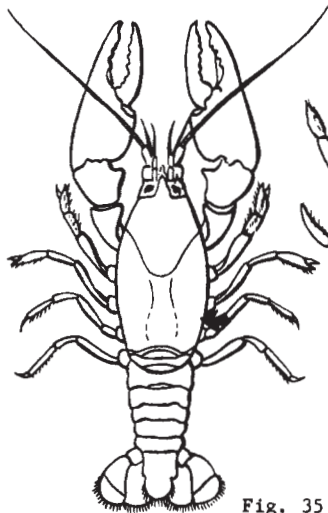


Fig. 35 A

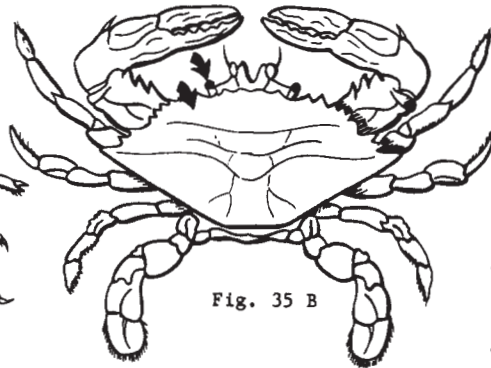


Fig. 35 B

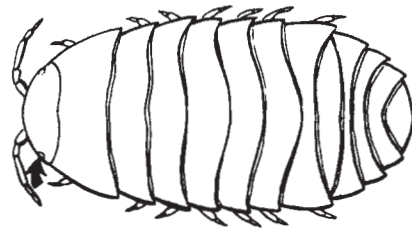


Fig. 35 C

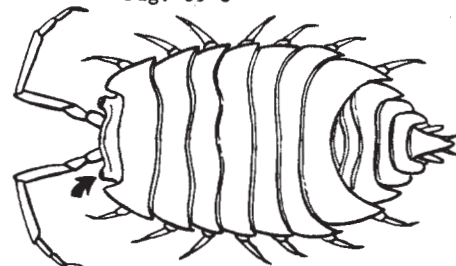


Fig. 35 D

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

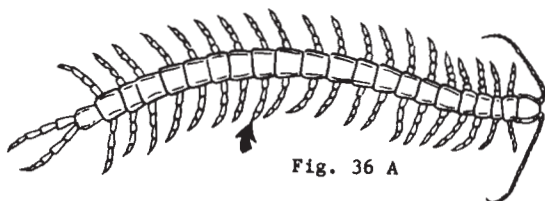


Fig. 36 A

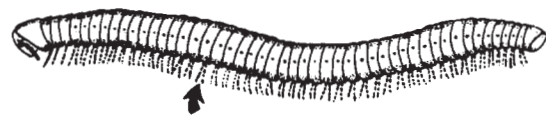
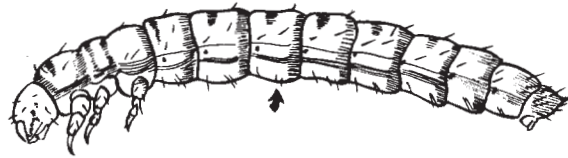
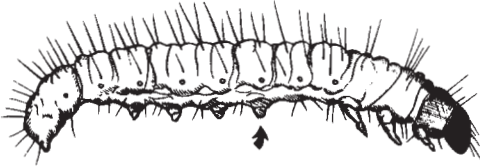


Fig. 36 B

HOUSEHOLD AND STORED-FOOD PESTS: PICTORIAL KEY TO COMMON LARVAE
Chester J. Stojanovich & Harold George Scott

abdominal legs present

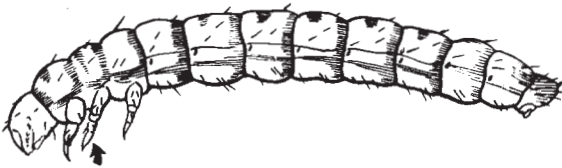
abdominal legs absent



MOTH LARVAE

thoracic legs present

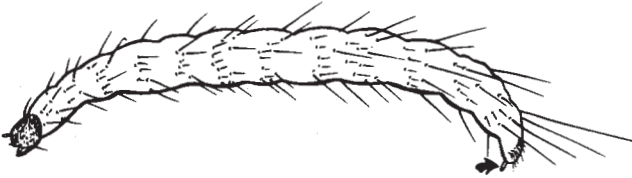
thoracic legs absent



BEEBLE, BORER & MEALWORM LARVAE

with fleshy lobes at ends of body

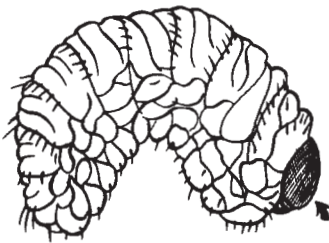
without fleshy lobes at ends of body



FLEA LARVAE

head capsule present

head capsule absent



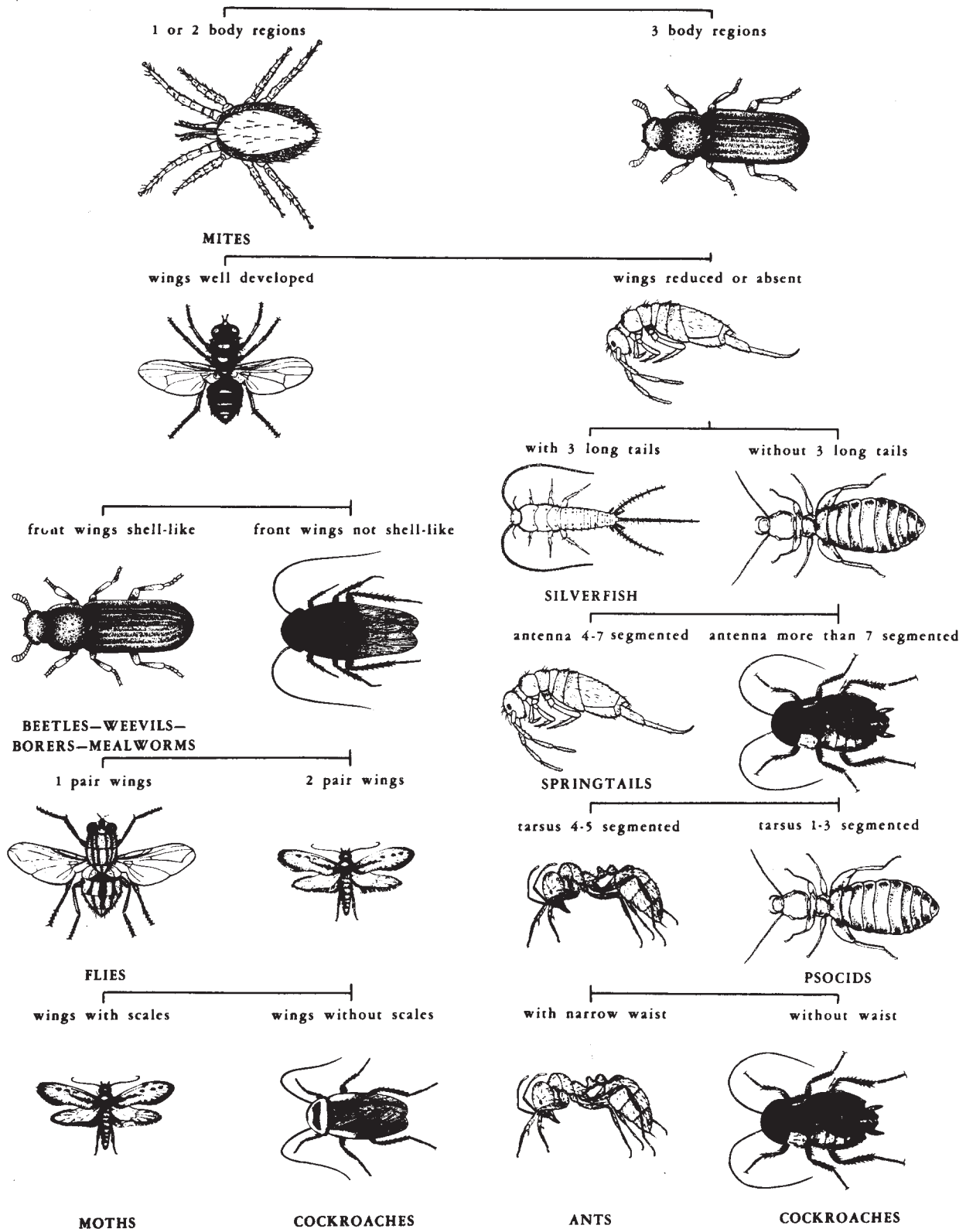
WEEVIL LARVAE



MUSCOID FLY LARVAE

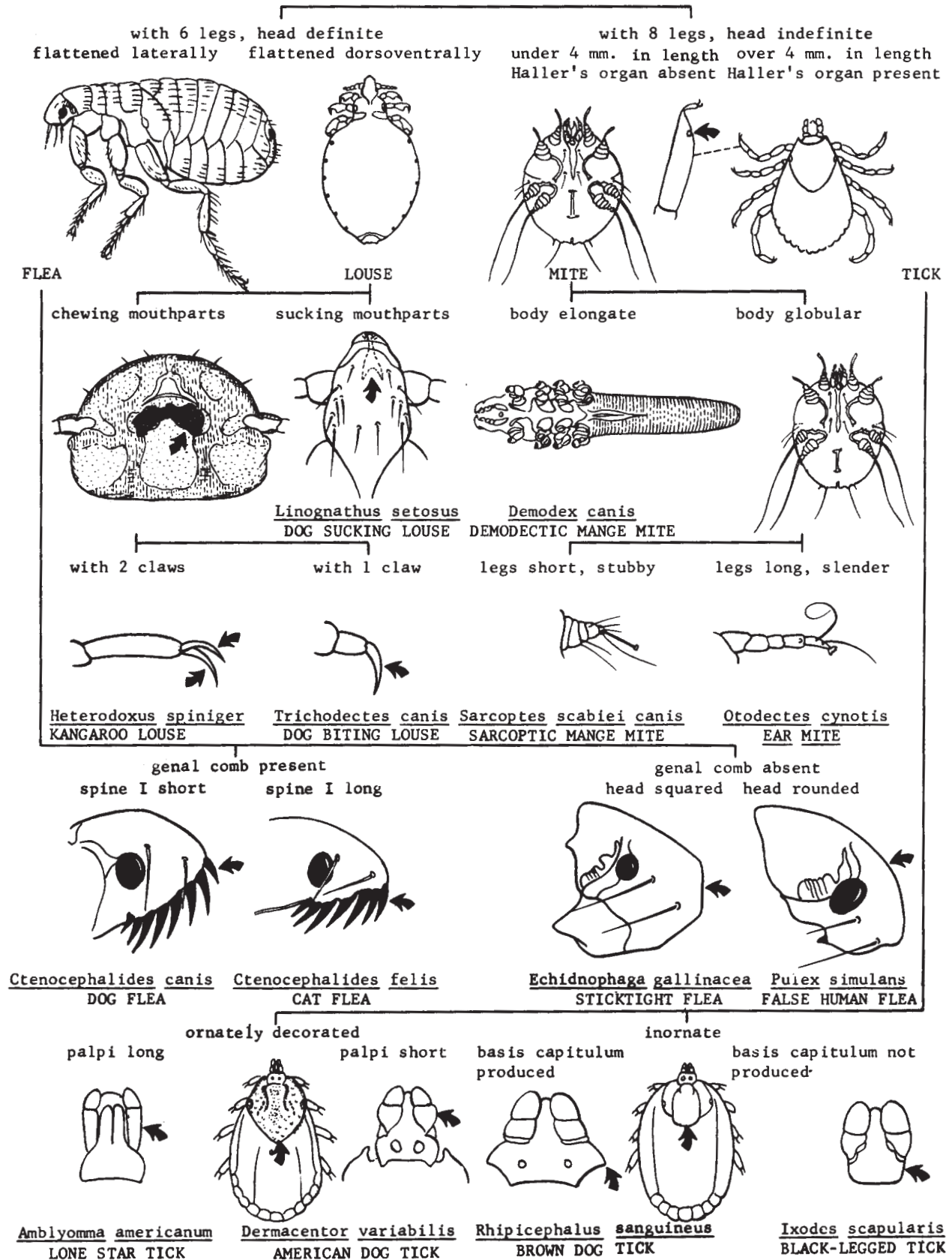
HOUSEHOLD AND STORED-FOOD PESTS: KEY TO COMMON ADULTS

Harold George Scott & Chester J. Stojanovich

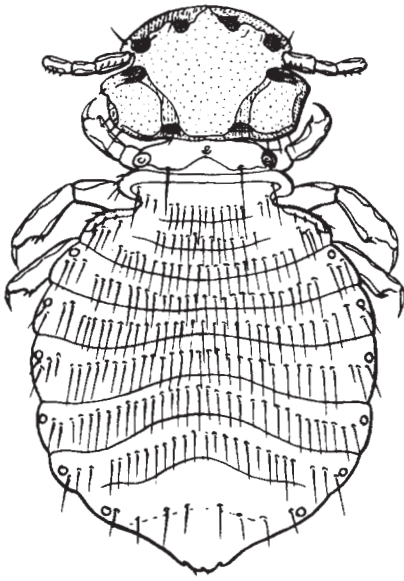


ECTOPARASITES OF THE DOG: PICTORIAL KEY TO COMMON SPECIES

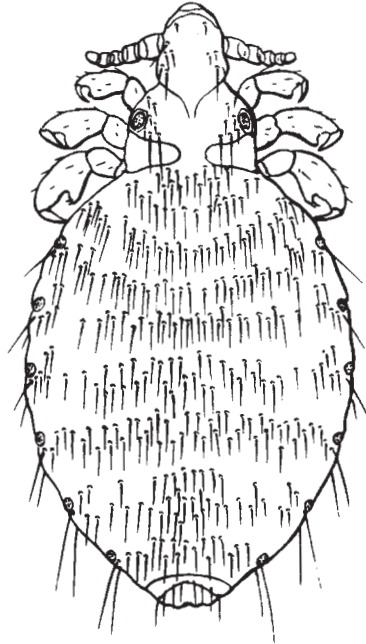
Harold George Scott & Chester J. Stojanovich



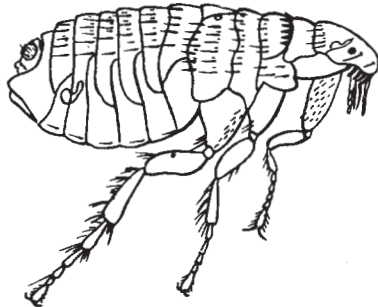
REPRESENTATIVE ECTOPARASITES OF THE DOG
Chester J. Stojanovich



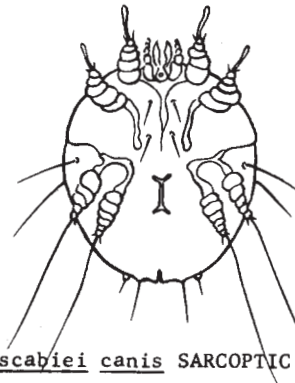
Trichodectes canis DOG BITING LOUSE



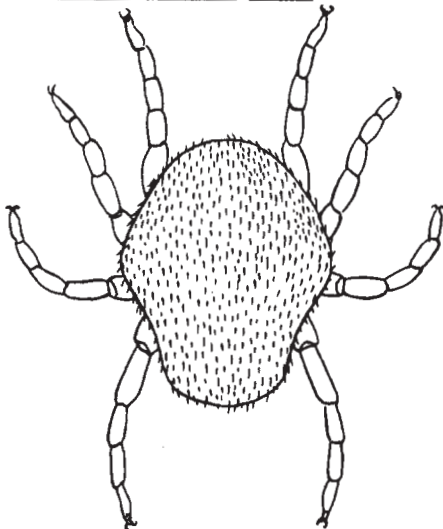
Linognathus setosus DOG SUCKING LOUSE



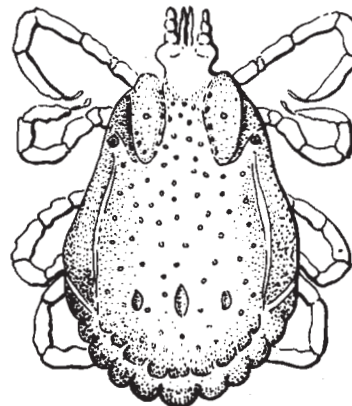
Ctenocephalides felis CAT FLEA



Sarcoptes scabiei canis SARCOPTIC MANGE MITE



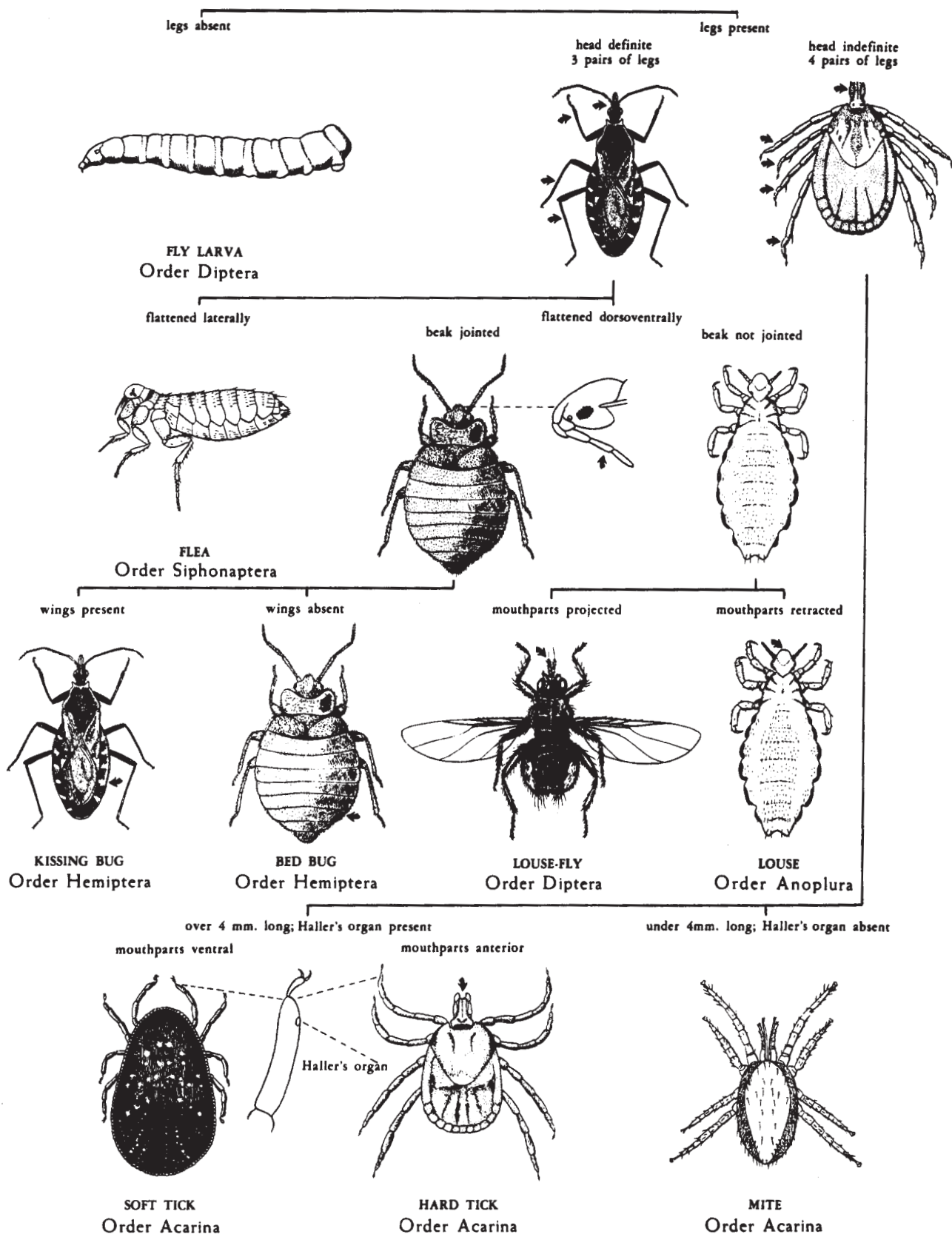
Otobius megnini SPINOSE EAR TICK



Rhipicephalus sanguineus BROWN DOG TICK

HUMAN ECTOPARASITES: KEY TO COMMON GROUPS

Chester J. Stojanovich and Harold George Scott



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

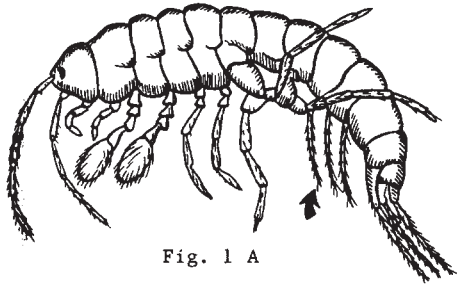


Fig. 1 A

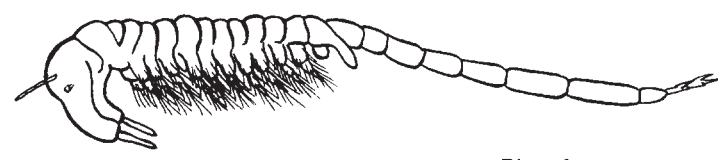


Fig. 1 B

- Carapace present (Fig. 2 A)..... 3
- Carapace absent (Fig. 2 B)..... 6

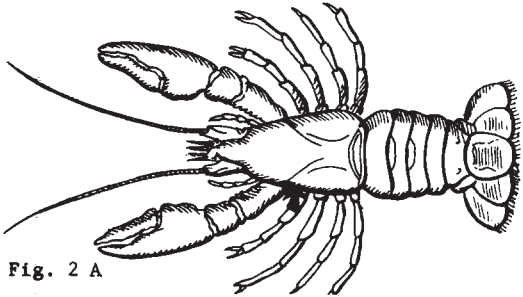


Fig. 2 A

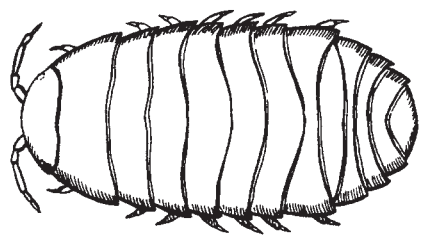


Fig. 2 B

- 3. With dorsal shield (Fig. 3 A). SHIELD SHRIMP..... Order NOTOSTRACA
- Without dorsal shield (Fig. 3 B)..... 4

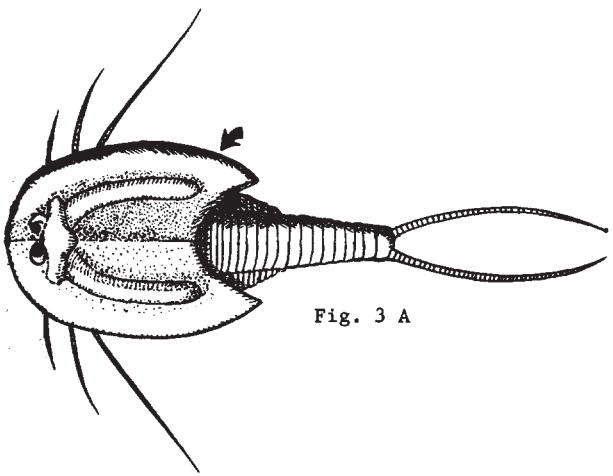


Fig. 3 A

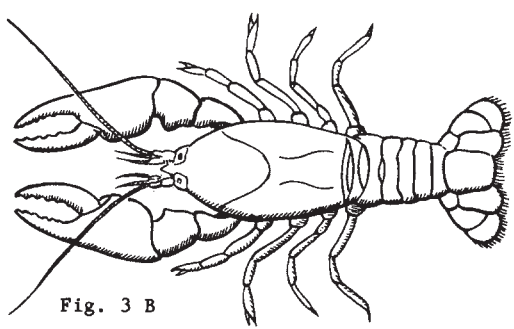
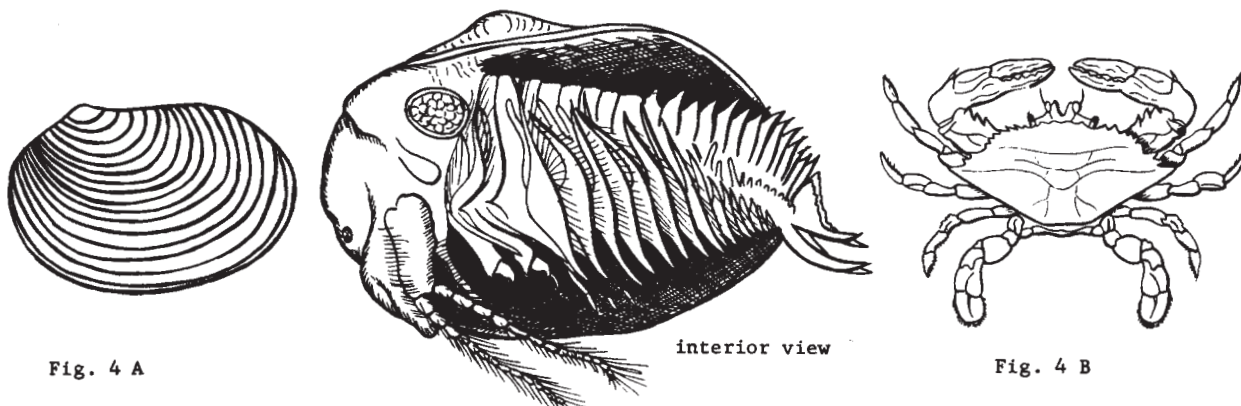
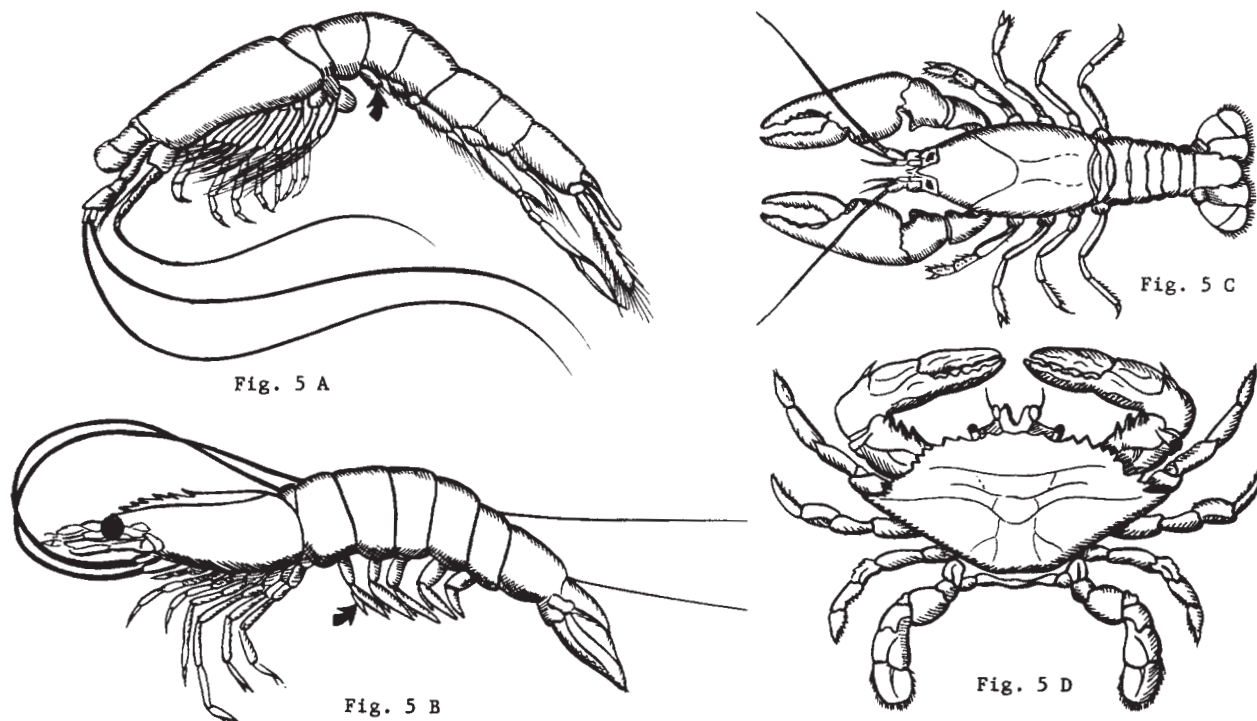


Fig. 3 B

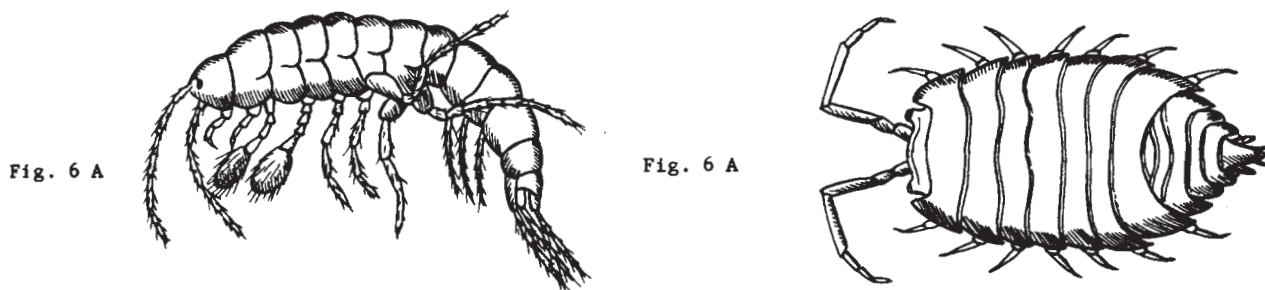
4. With bivalve shell (Fig. 4 A). SHELL SHRIMP.....Order CONCHOSTRACA
 Without bivalve shell (Fig. 4 B).....5



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



6. Body laterally compressed (Fig. 6 A). SAND FLEAS, ETC..... Order AMPHIPODA
 Body dorso-ventrally compressed (Fig. 6 B). SOWBUGS, PILLBUGS, ETC.....Order ISOPODA



7. Body not completely enclosed in a bivalve shell (Fig. 7 A).....8
 Body completely enclosed in a bivalve shell (Fig. 7 B). OSTRACODS..... Order PODOCOPA

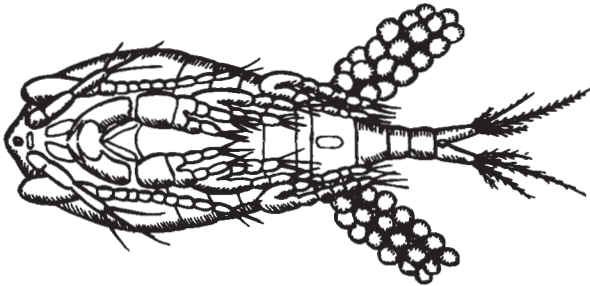


Fig. 7 A

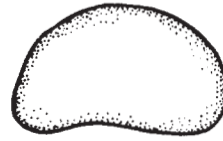
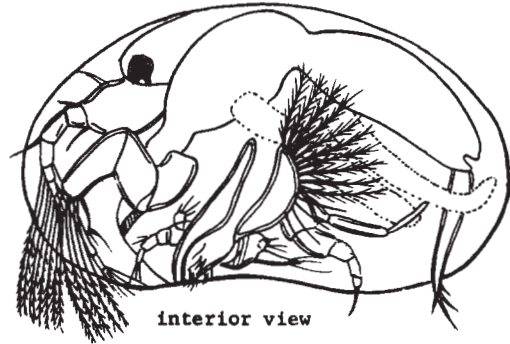


Fig. 7 B



interior view

8. Body segmented (Fig. 8 A)..... 9
 Body not segmented (Fig. 8 B). WATER FLEAS..... Order CLADOCERA

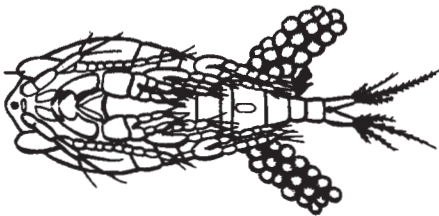


Fig. 8 A

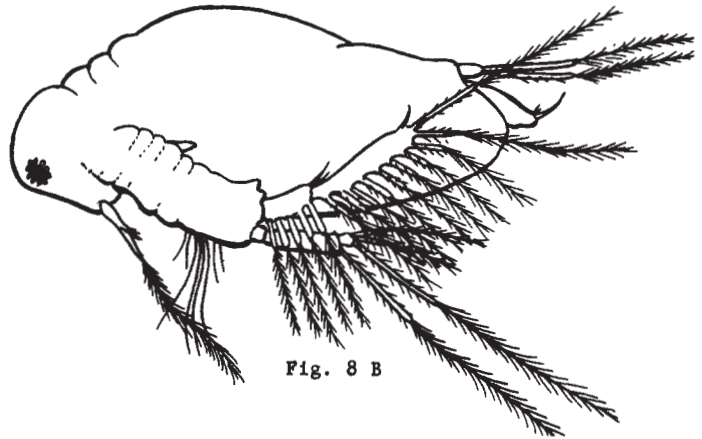


Fig. 8 B

9. Eyes stalked (Fig. 9 A). FAIRY SHRIMP..... Order ANOSTRACA
 Eyes not stalked (Fig. 9 B). COPEPODS..... Order EUCOPEPODA

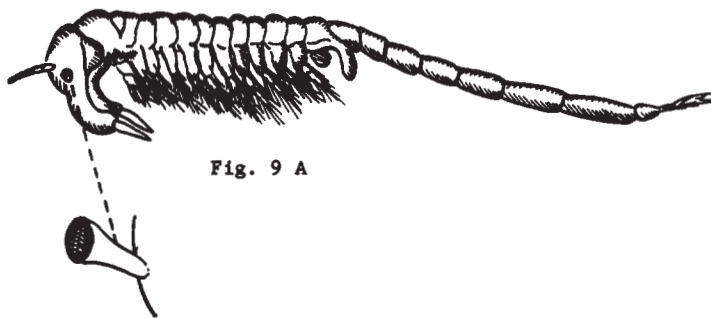


Fig. 9 A

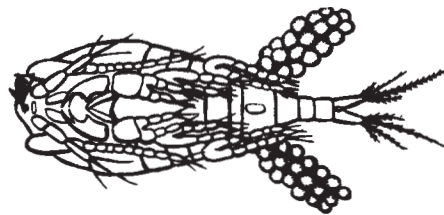
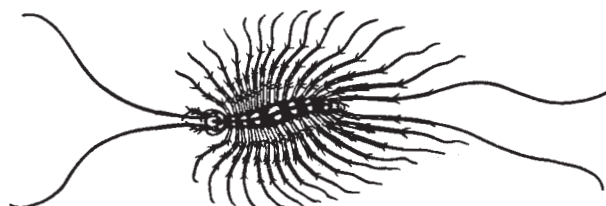


Fig. 9 B

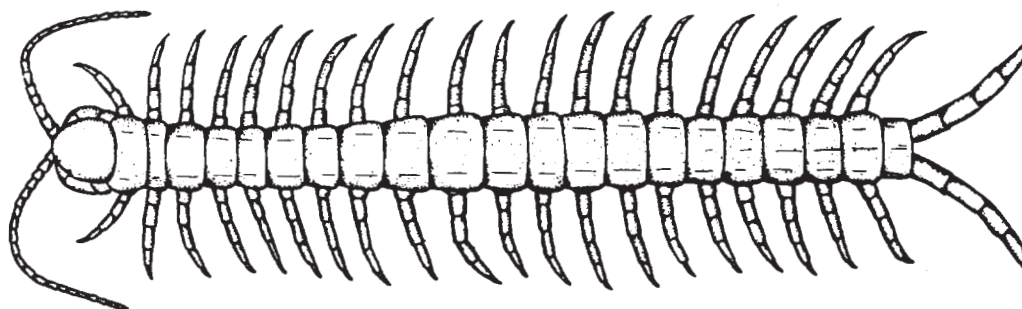
CENTIPEDES: KEY TO SOME IMPORTANT UNITED STATES SPECIES

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*)

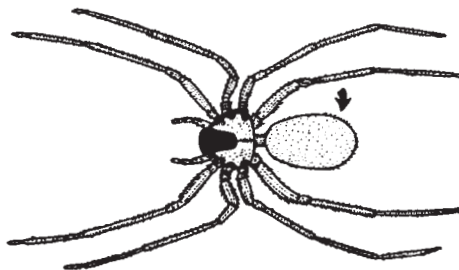
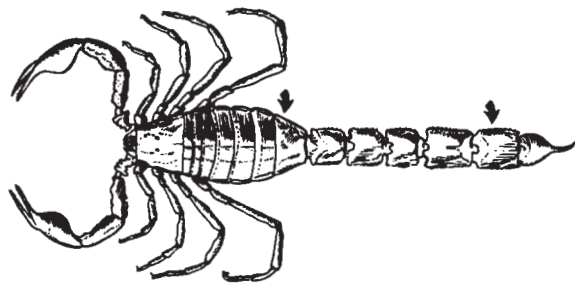
Brachyiulus pusillus



ARACHNIDA: KEY TO COMMON ORDERS OF PUBLIC HEALTH IMPORTANCE
Harold George Scott & Chester J. Stojanovich

ABDOMEN DISTINCTLY SEGMENTED

ABDOMEN NOT DISTINCTLY SEGMENTED

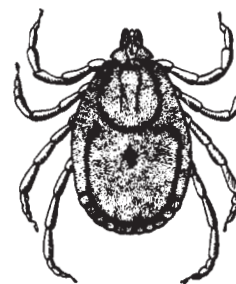
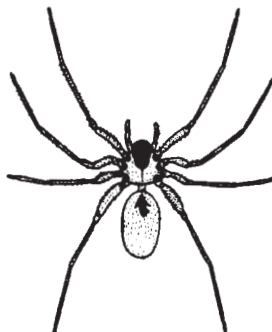
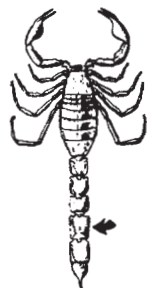
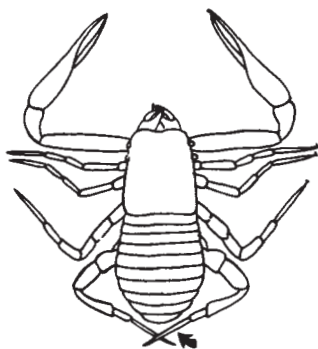


WITHOUT TAIL

WITH TAIL

THREAD-WAISTED

THICK-WAISTED



ARANEIDA
Spiders

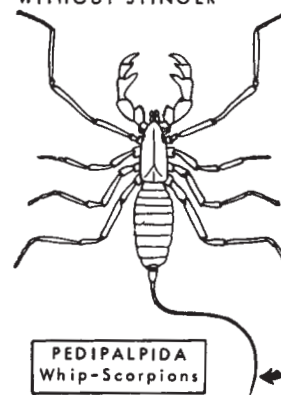
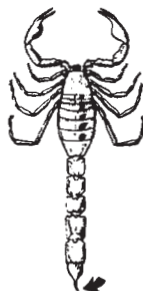
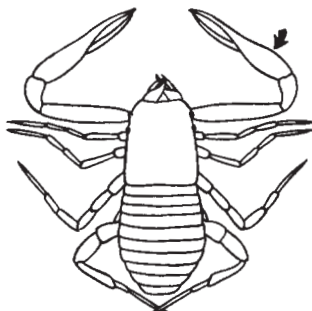
ACARINA
Ticks and Mites

PALPS WITHOUT PINCERS

PALPS WITH PINCERS

WITH STINGER

WITHOUT STINGER



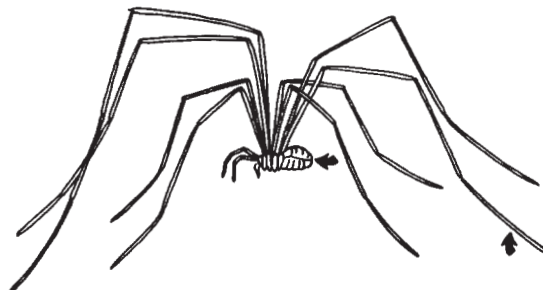
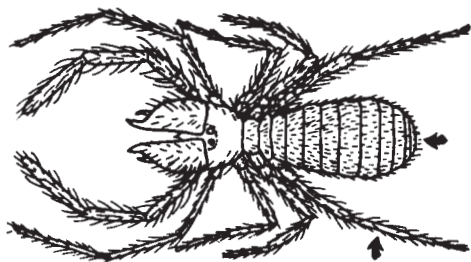
PSEUDOSCORPIONIDA
Pseudoscorpions

SCORPIONIDA
Scorpions

PEDIPALPIDA
Whip-Scorpions

LEGS SHORTER THAN BODY

LEGS MUCH LONGER THAN BODY



SOLPUGIDA
Sun Spiders

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

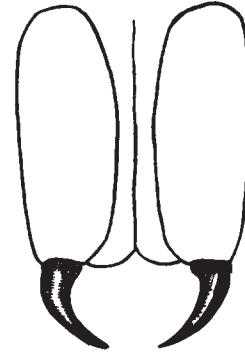
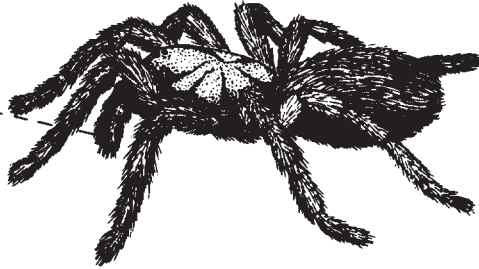


Fig. 1 B

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

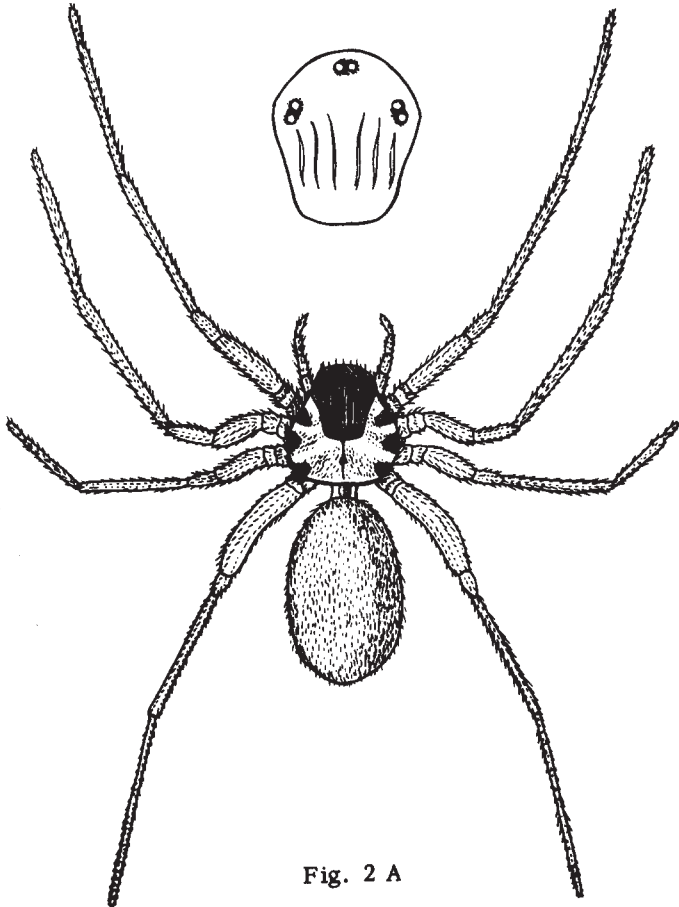


Fig. 2 A

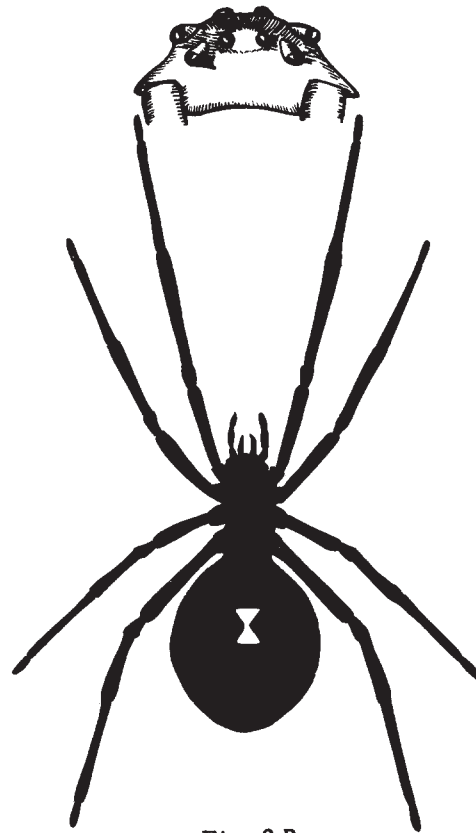
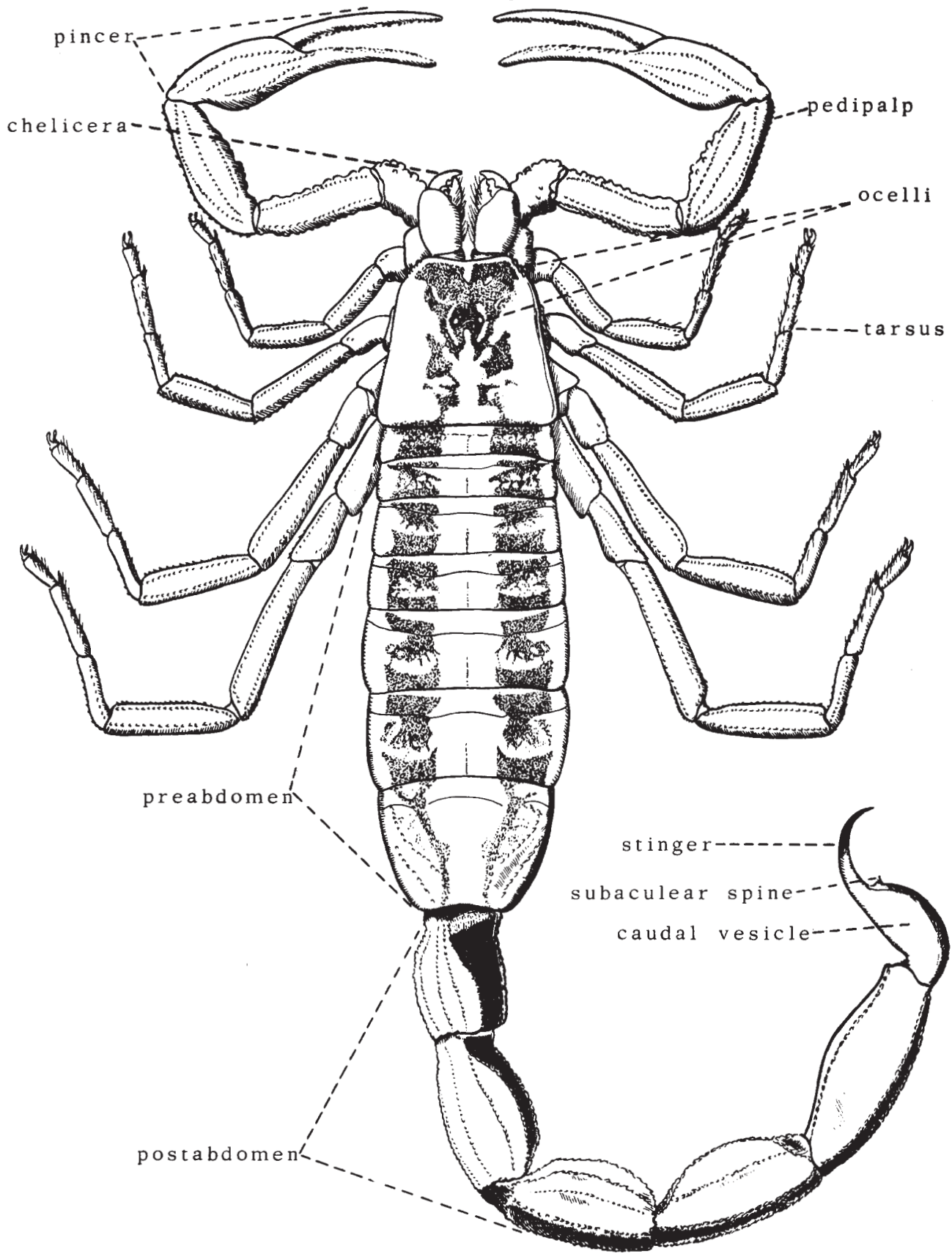


Fig. 2 B

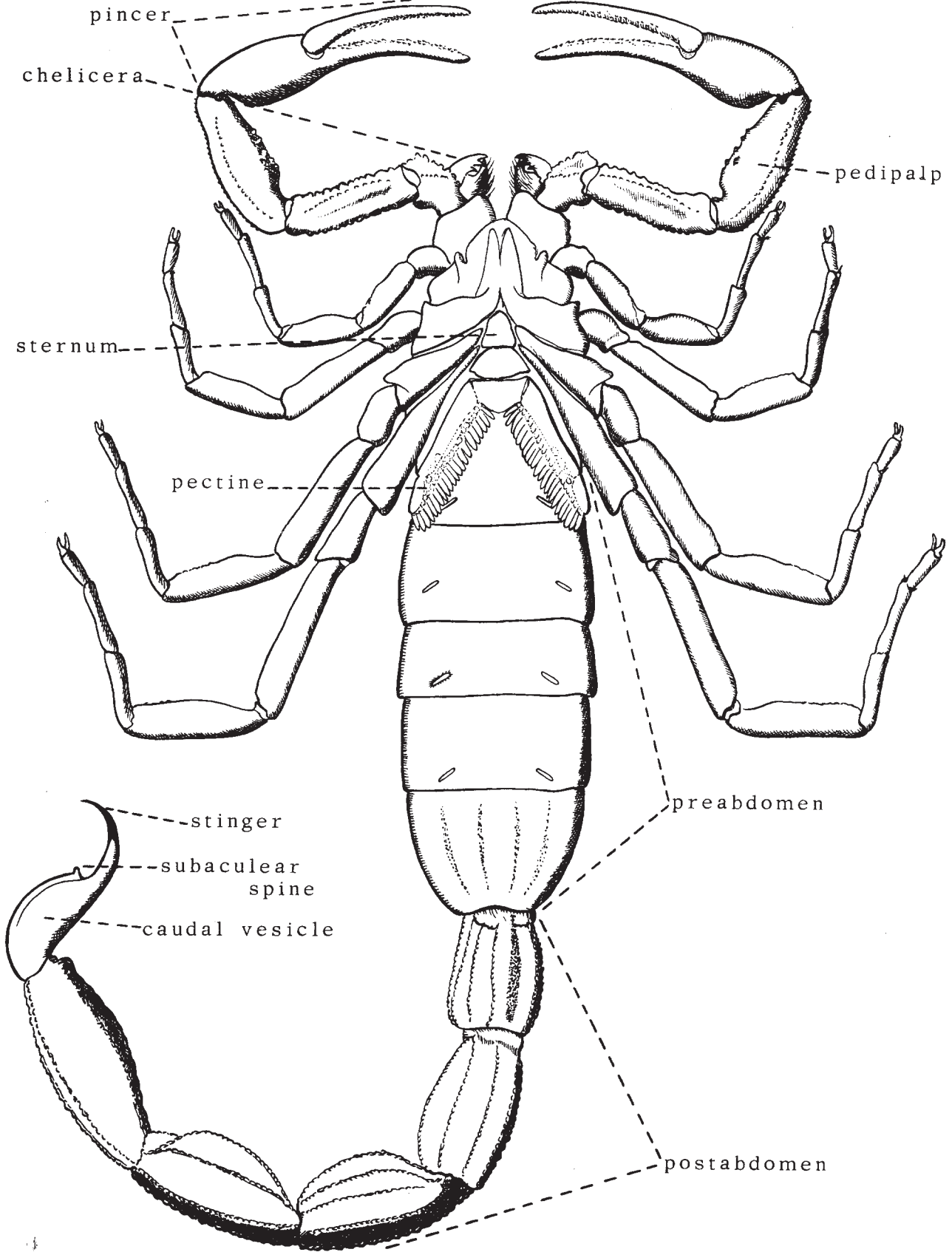
SCORPION DIAGRAM: DORSAL VIEW OF CENTRUROIDES VITTATUS

Chester J. Stojanovich



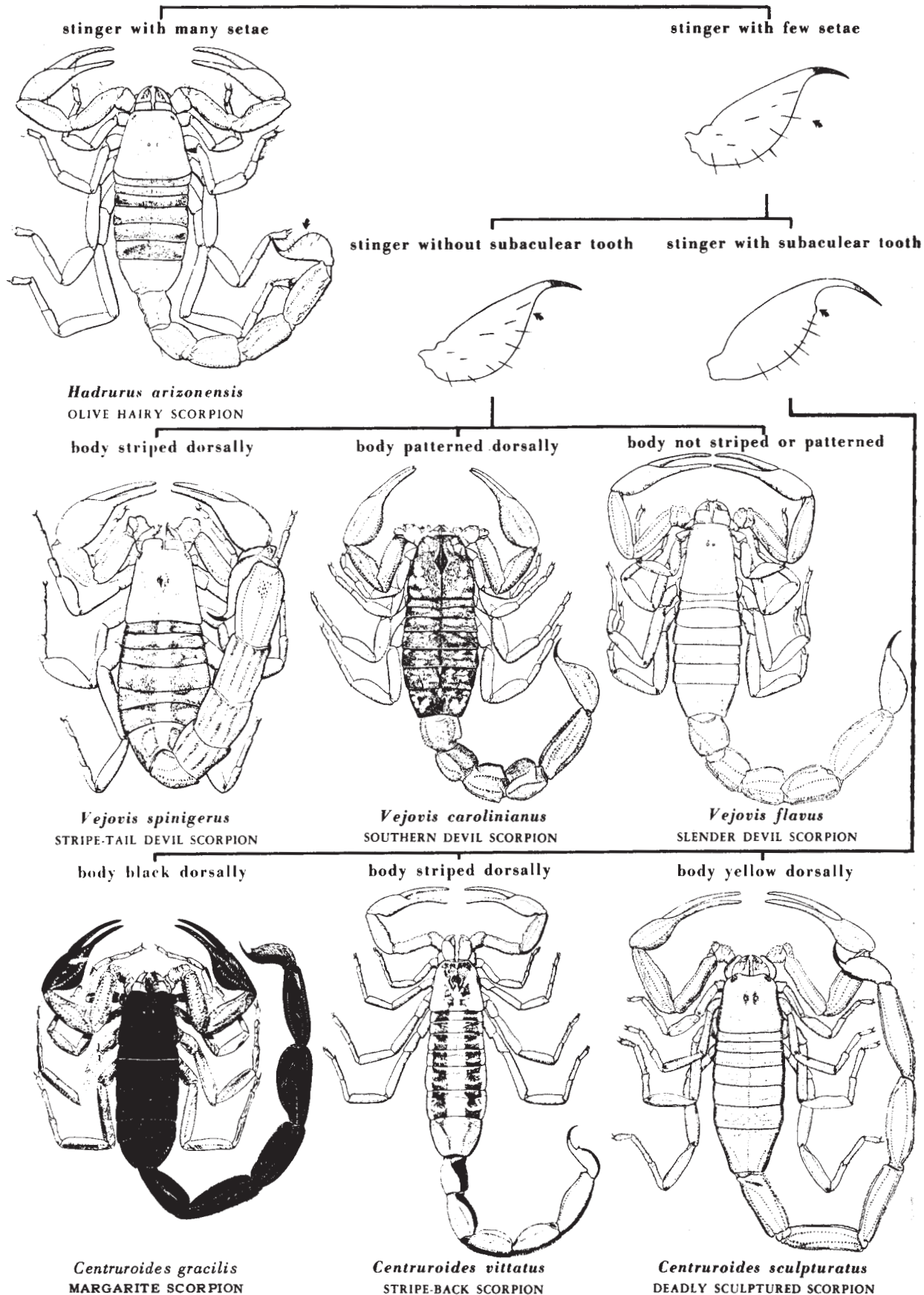
SCORPION DIAGRAM: VENTRAL VIEW OF CENTRUROIDES VITTATUS

Chester J. Stojanovich



SCORPIONS: PICTORIAL KEY TO SOME COMMON UNITED STATES SPECIES

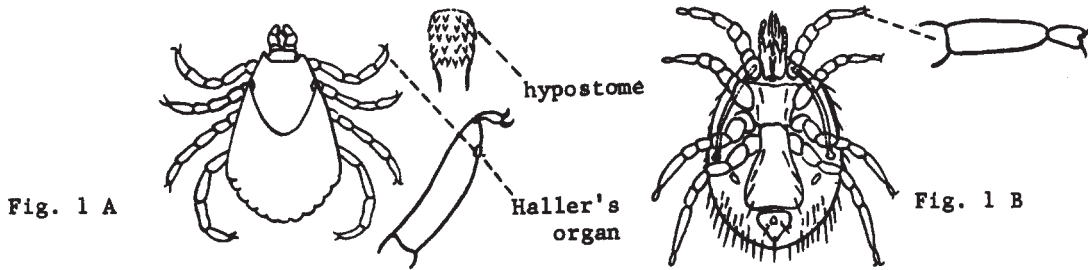
Chester J. Stojanovich and Harold George Scott



ACARINA: ILLUSTRATED KEY TO SOME COMMON ADULT FEMALE MITES AND ADULT TICKS
Harry D. Pratt and Chester J. Stojanovich

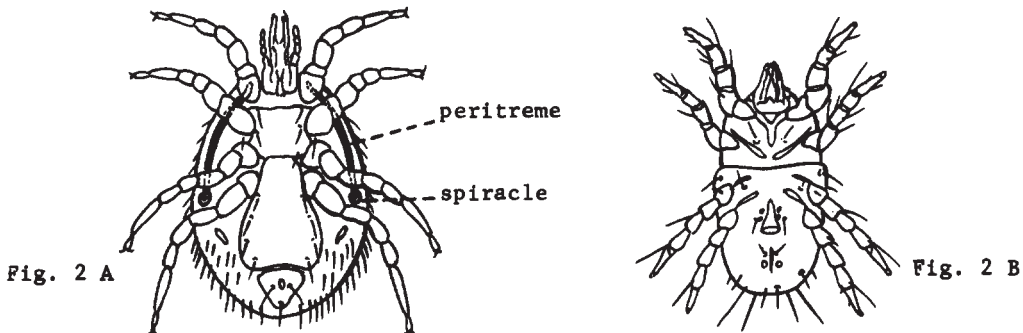
1. Last segment of first leg with a depression known as Haller's organ; most species with a toothed hypostome on capitulum; size usually over 4 mm. (Fig. 1 A). Ticks21

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



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



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



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

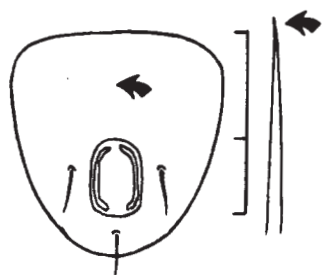


Fig. 4 A

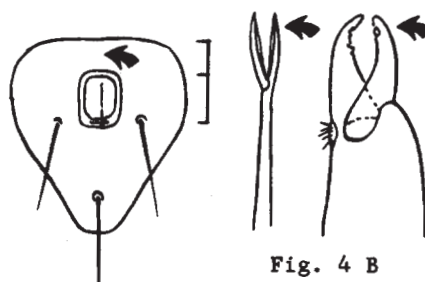


Fig. 4 B

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

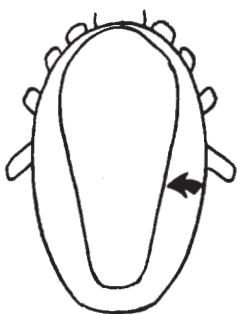


Fig. 5 A



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

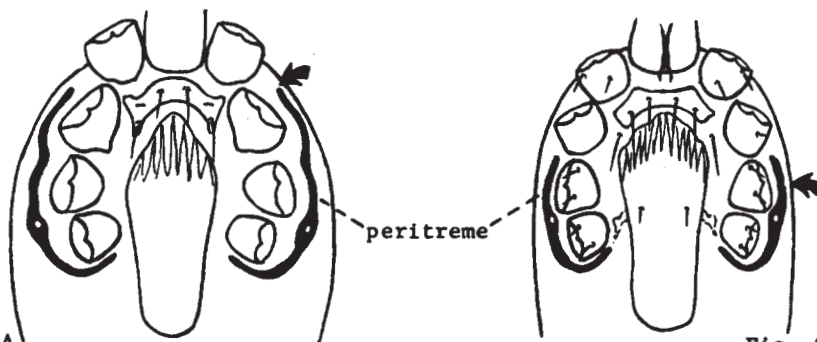
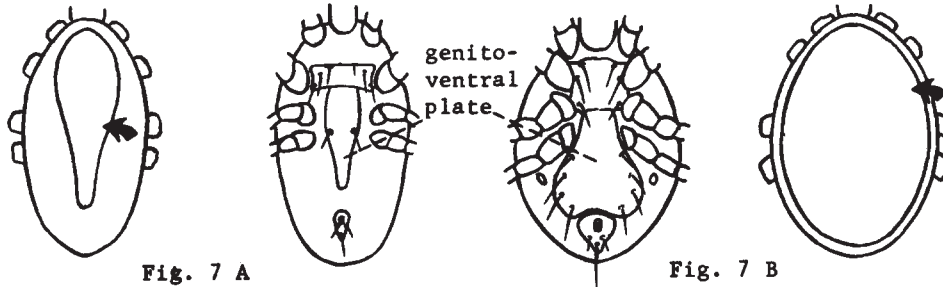


Fig. 6 A

Fig. 6 B

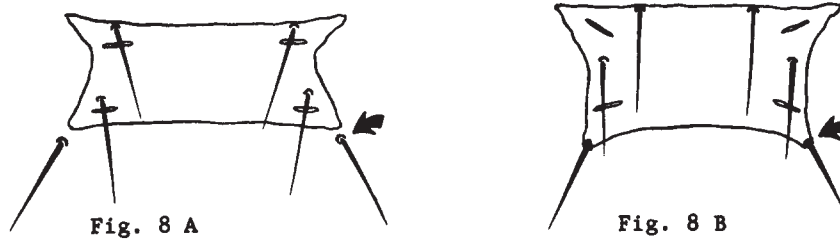
7. Dorsal plate not covering entire dorsal surface of mite; genito-ventral plate typically narrowed posteriorly behind 4th coxae; chelae on chelicerae without teeth or setae (Fig. 7 A). Genus Ornithonyssus8

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



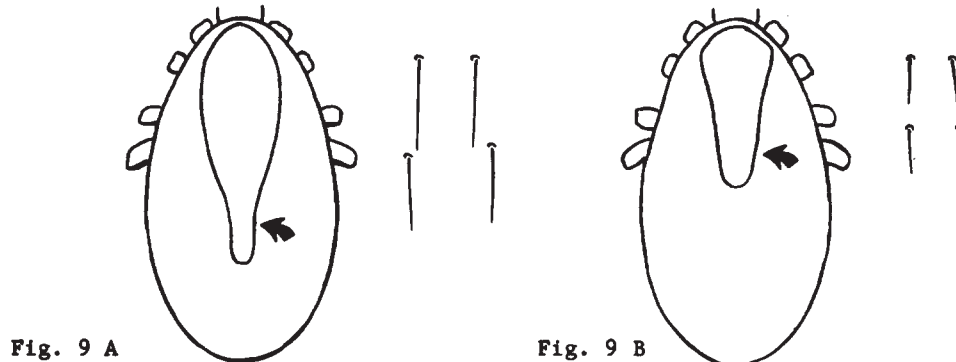
8. Sternal plate with anterior and middle pairs of sternal setae on the plate, posterior pair usually just off the plate (Fig. 8 A). On Birds... Ornithonyssus sylviarum.....
.....NORTHERN FOWL MITE

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



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



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

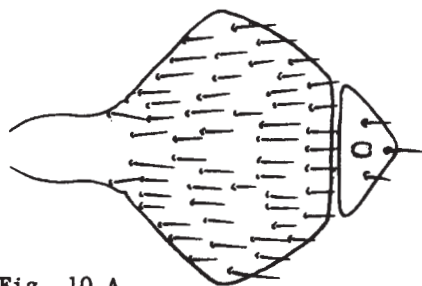


Fig. 10 A

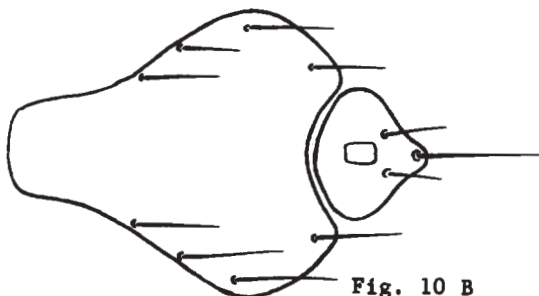


Fig. 10 B

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

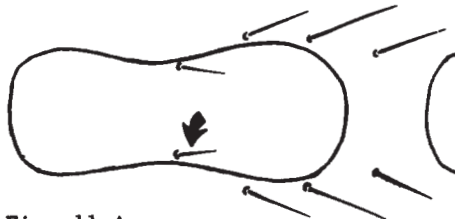


Fig. 11 A

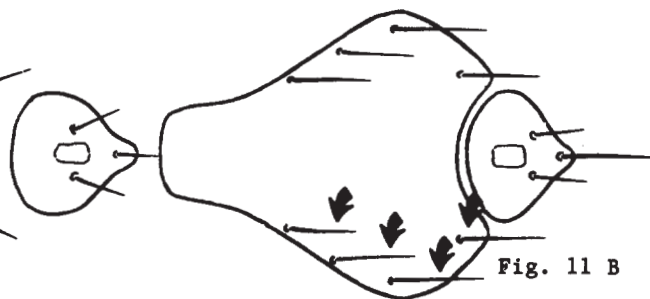


Fig. 11 B

12. Anal plate contiguous with the genito-ventral plate, anterior margin rounded and fitting into a strong concavity in genito-ventral 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

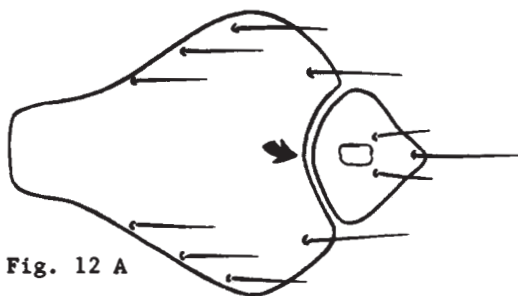


Fig. 12 A

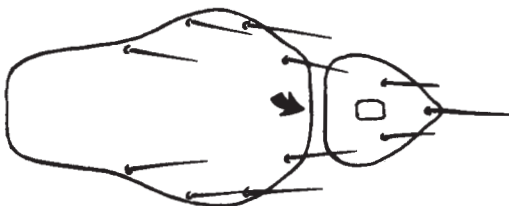


Fig. 12 B

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

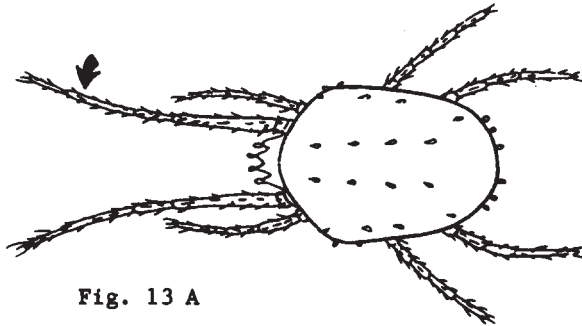


Fig. 13 A

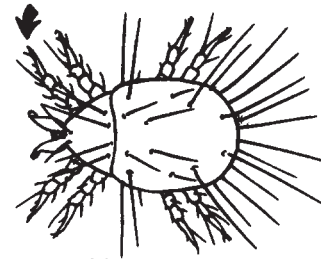


Fig. 13 B

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

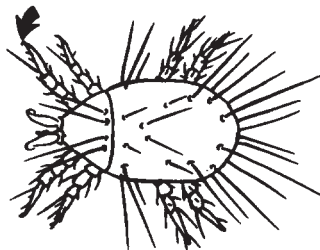


Fig. 14 A

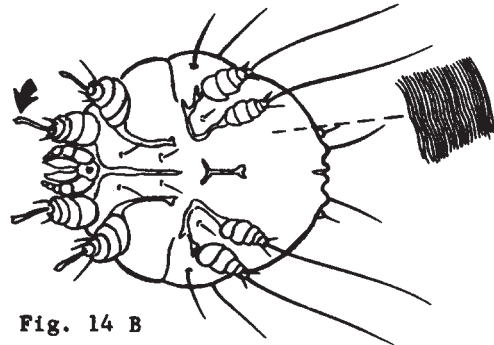


Fig. 14 B

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

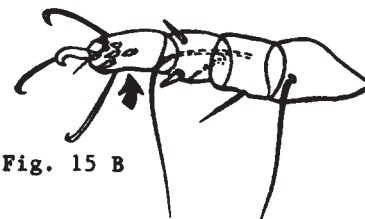


Fig. 15 B

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

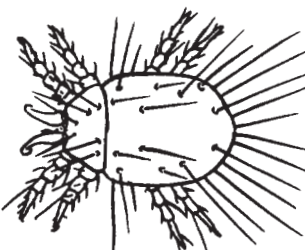


Fig. 16 B

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

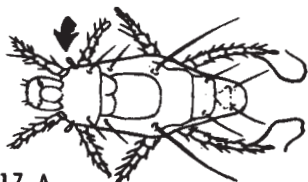


Fig. 17 A

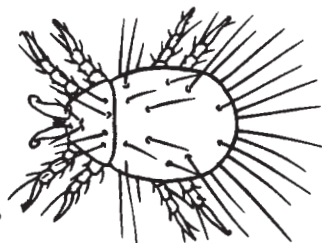


Fig. 17 B

18. Legs short and stubby (Fig. 18 A).....20
 Legs longer and more slender (Fig. 18 B).....19

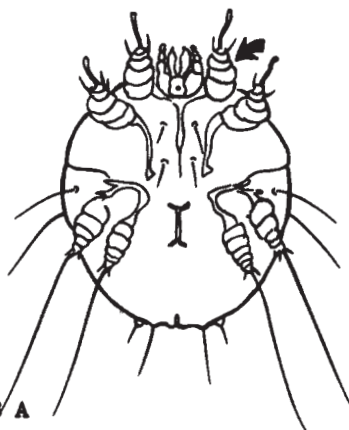


Fig. 18 A

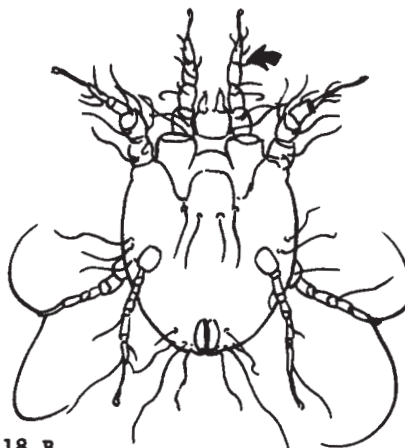


Fig. 18 B

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

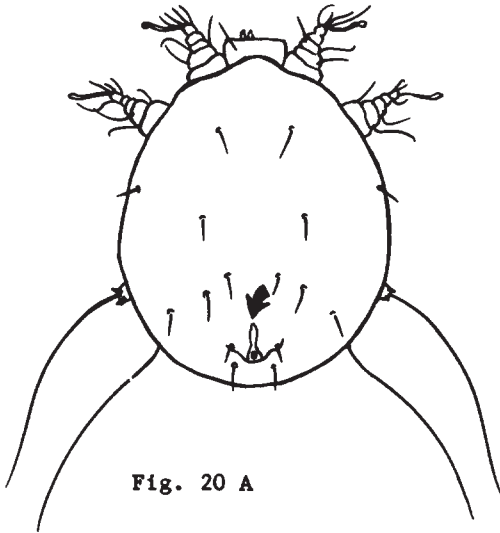


Fig. 20 A

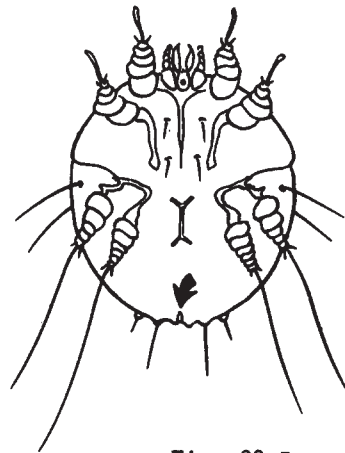


Fig. 20 B

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

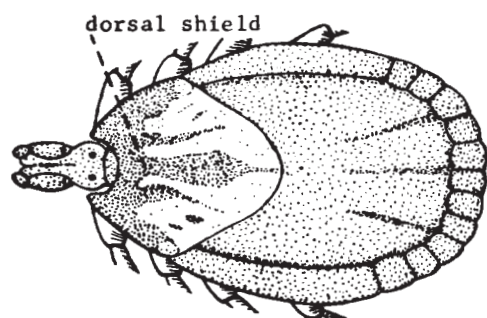


Fig. 2 A

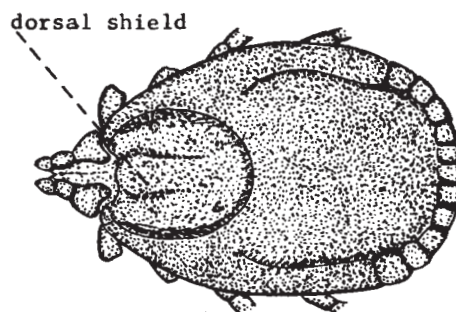


Fig. 2 B

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

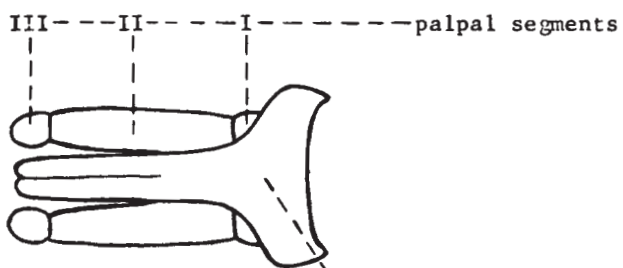


Fig. 23A

basis capituli

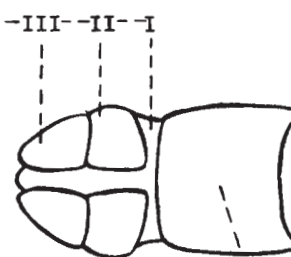


Fig. 23 B

basis capituli

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

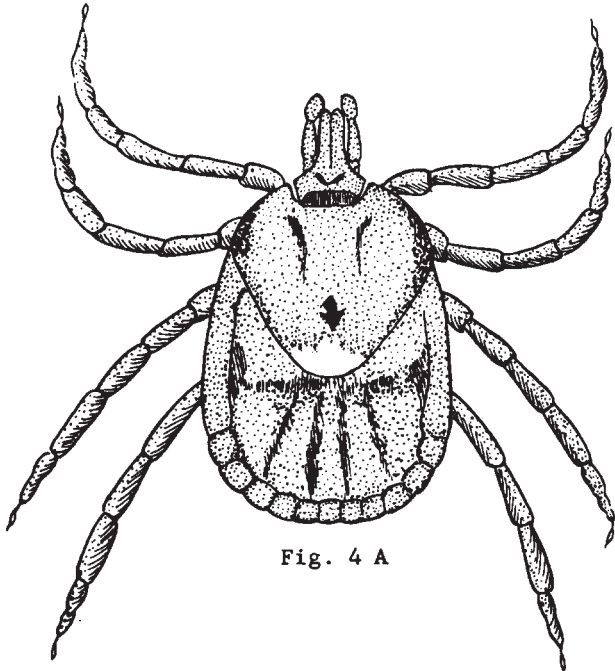


Fig. 4 A

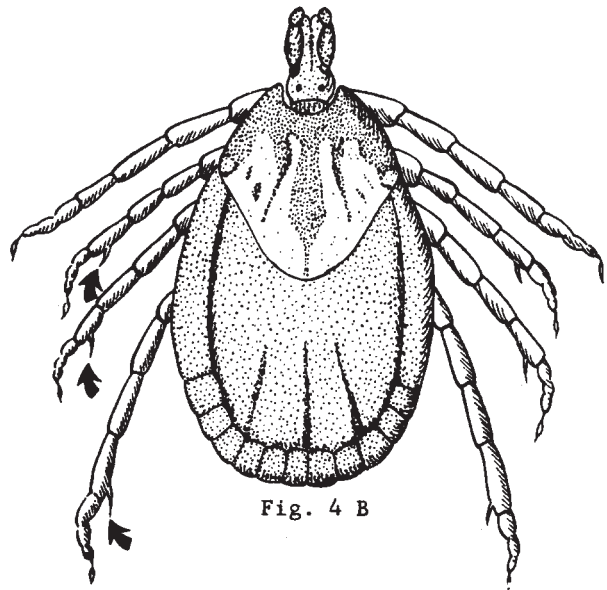


Fig. 4 B

25. Spiracular plate without dorsal prolongation (Fig. 25 A). Dermacentor albipictus.....
WINTER TICK
- Spiracular plate with dorsal prolongation (Fig. 25 B).....26

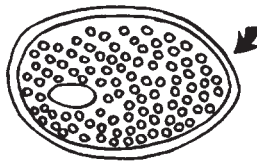


Fig. 25 A

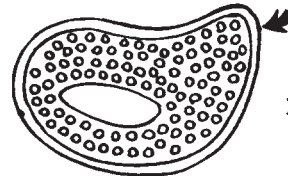


Fig. 25 B

26. Basis capituli with long cornua (Fig. 26 A). Dermacentor occidentalis.PACIFIC COAST TICK
- Basis capituli with short cornua (Fig. 26 B)..... 27

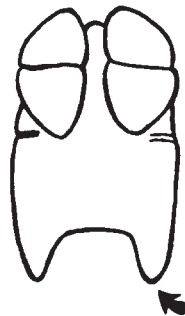


Fig. 26 A

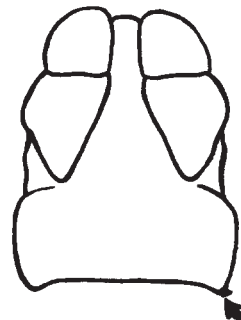


Fig. 26 B

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

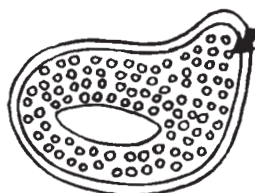


Fig. 27 A

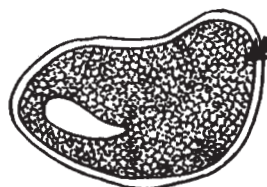


Fig. 27 B

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

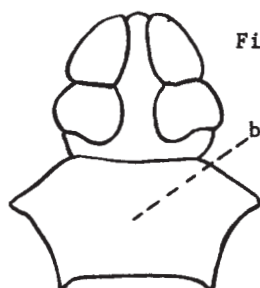


Fig. 28 A

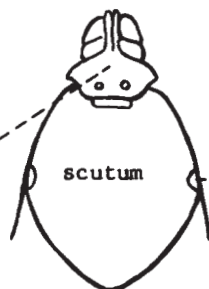


Fig. 28 B

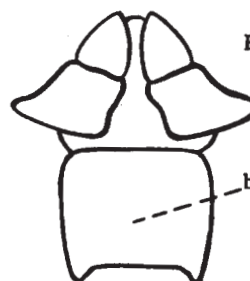


Fig. 28 C

basis capituli

scutum

eye

basis capituli

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

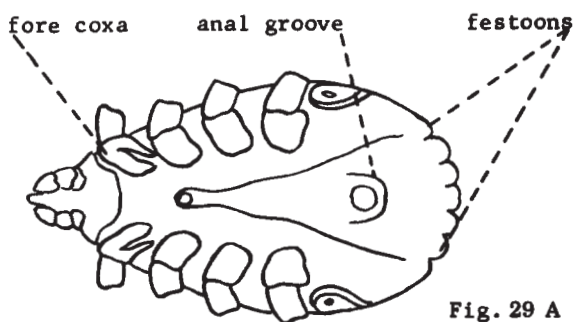


Fig. 29 A

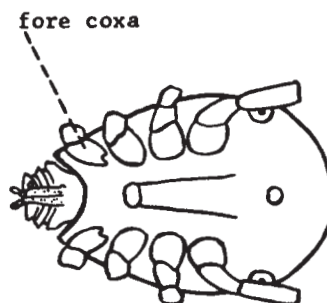


Fig. 29 B

fore coxa

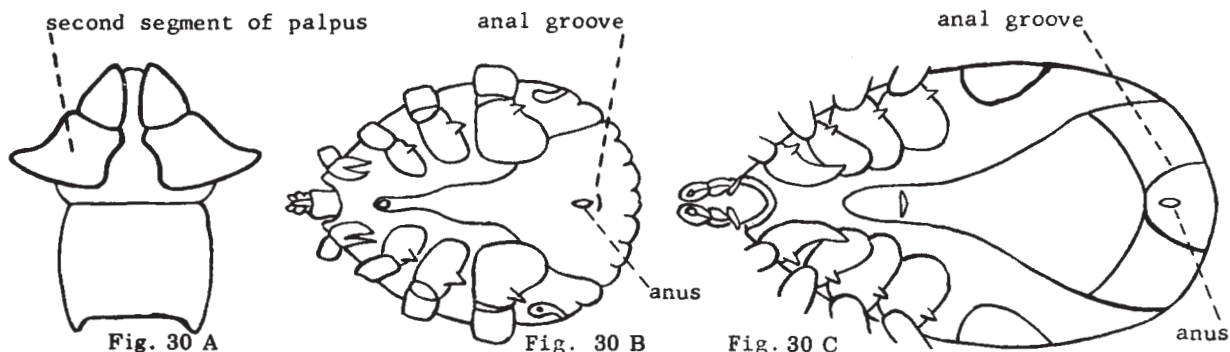
anal groove

festoons

fore coxa

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

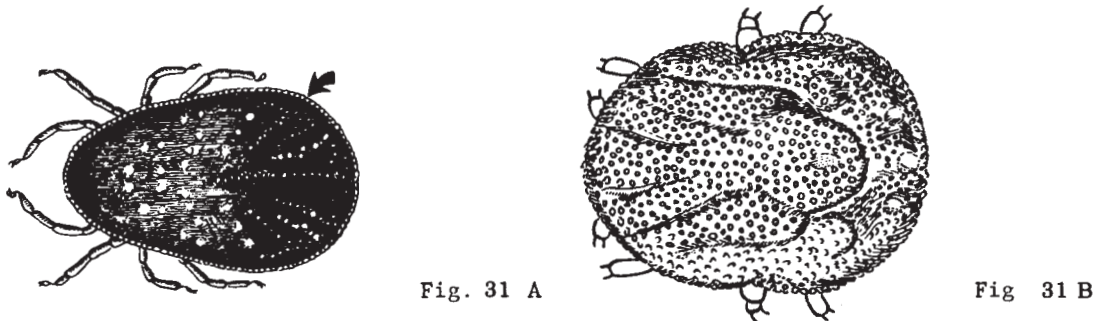
Second segment of palpus not laterally produced; anal groove extending as an inverted U from in front of anus to posterior margins of body (Fig. 30 C).....Genus Ixodes



FAMILY ARGASIDAE - SOFT TICKS

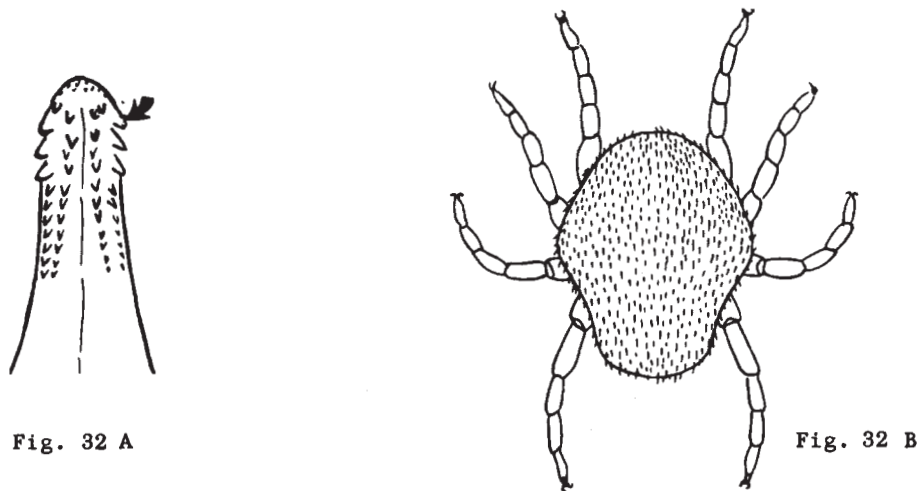
31. Margin of body with a definite sutural line separating dorsal and ventral surfaces; dorsal surface with conspicuous "discs" arranged somewhat in radiating lines (Fig. 31 A) Argas persicus.....FOWL TICK

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



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



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

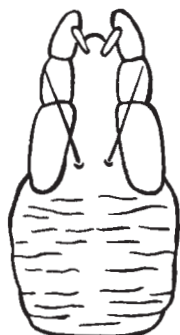


Fig. 34 A



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

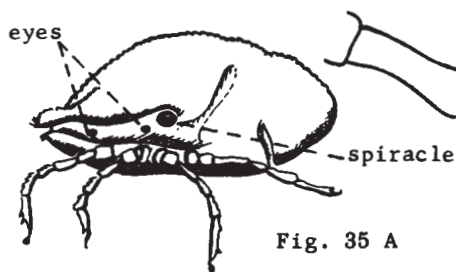


Fig. 35 A

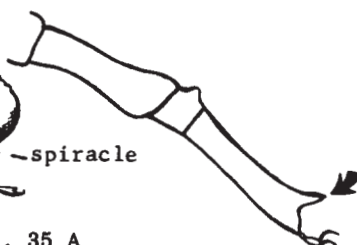


Fig. 35 B

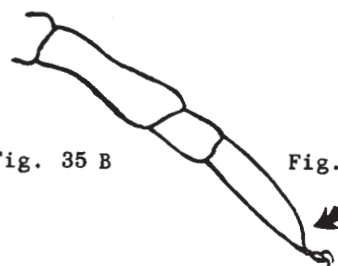
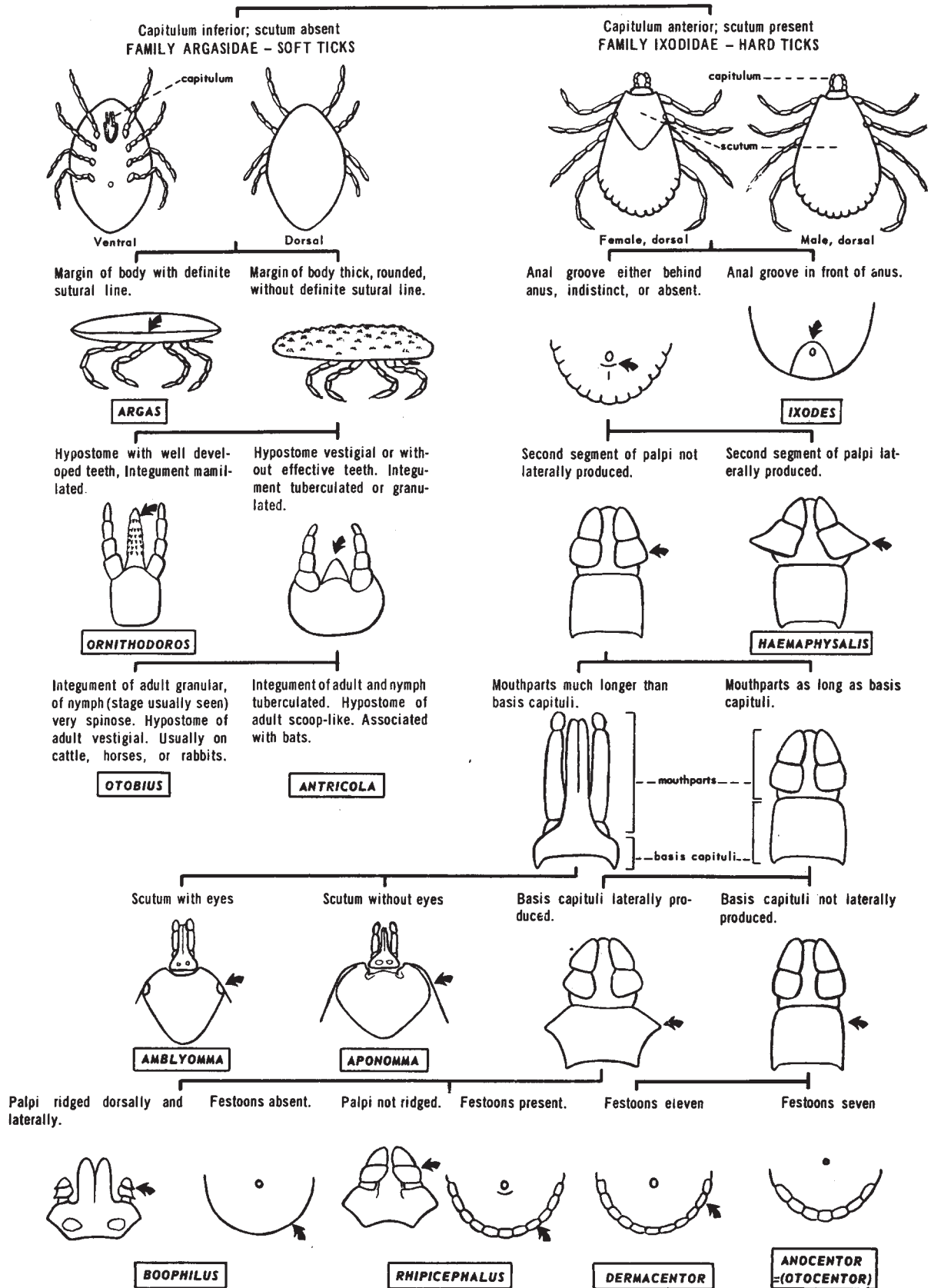


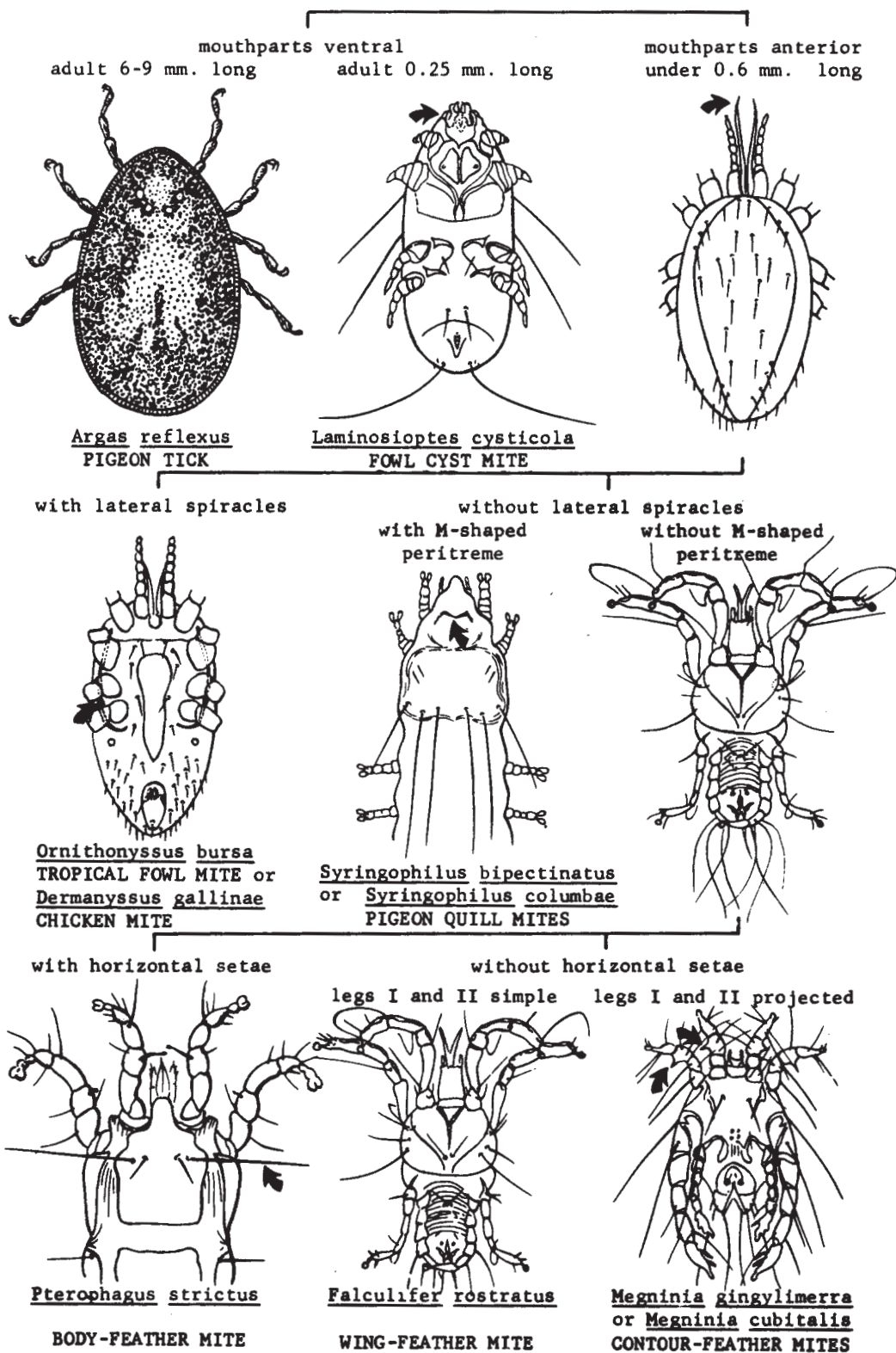
Fig. 35 C

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

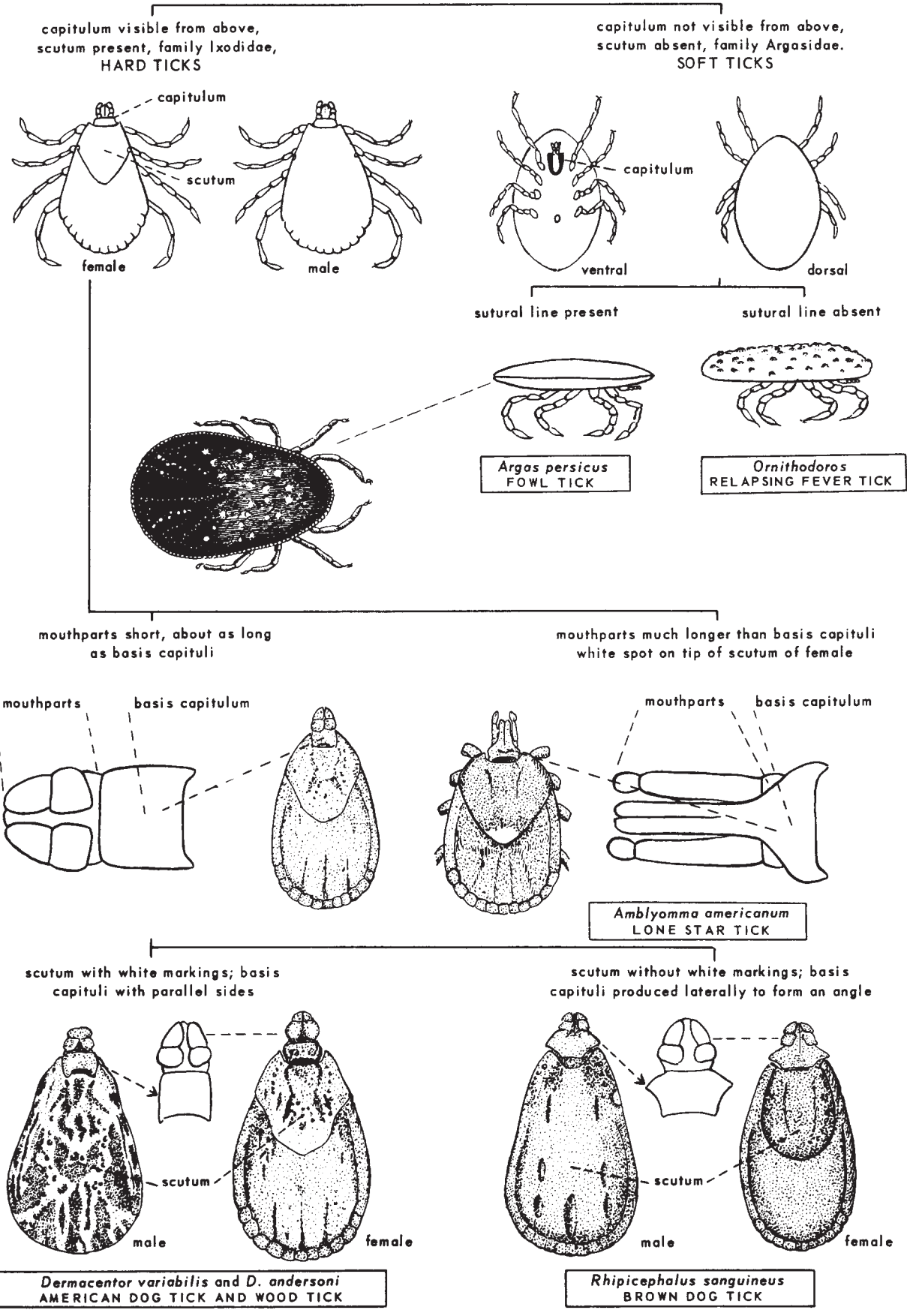


TICKS AND MITES: KEY TO SPECIES COMMONLY INFESTING PIGEONS
Harold George Scott & Chester J. Stojanovich



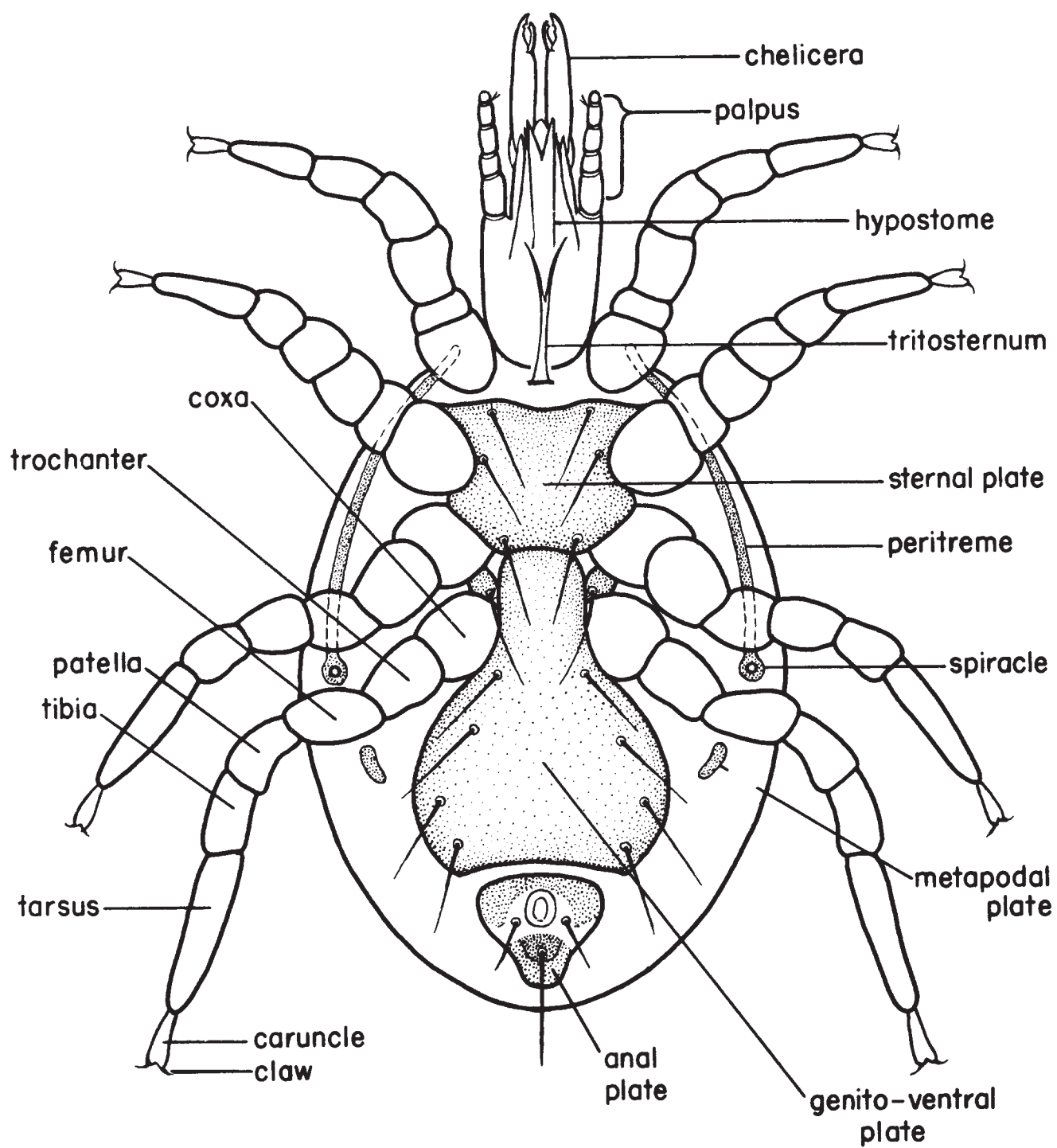
TICKS: PICTORIAL KEY TO SOME COMMON SPECIES

Harry D. Pratt



MITE DIAGRAM WITH STRUCTURES LABELED

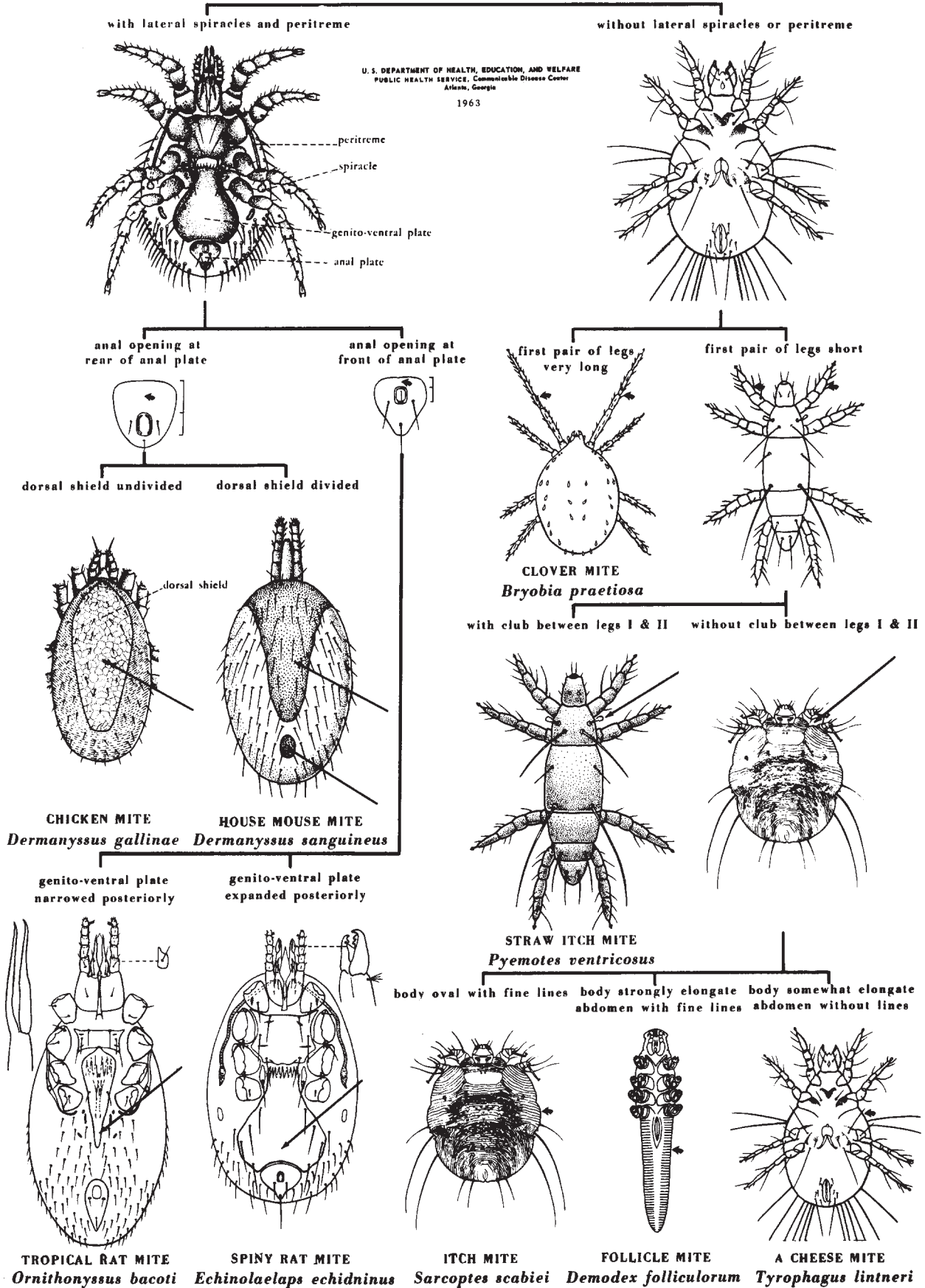
Harry D. Pratt



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

Harold George Scott and Chester J. Stojanovich

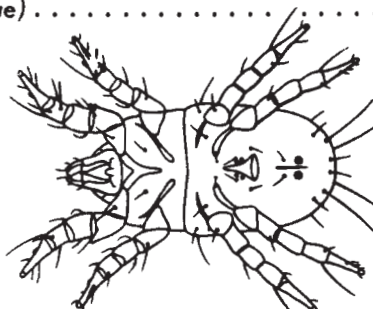
U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE, Communicable Disease Center
Atlanta, Georgia
1963



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

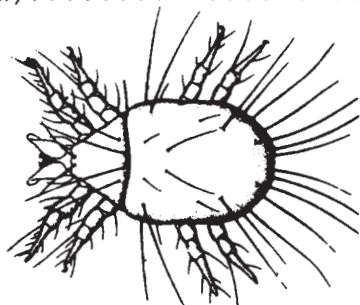
Harold George Scott

- 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
Glycyphagus 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



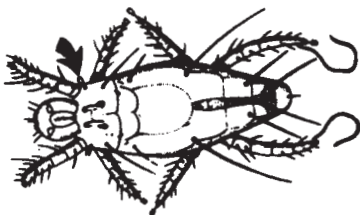
Acarus farinae

- 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

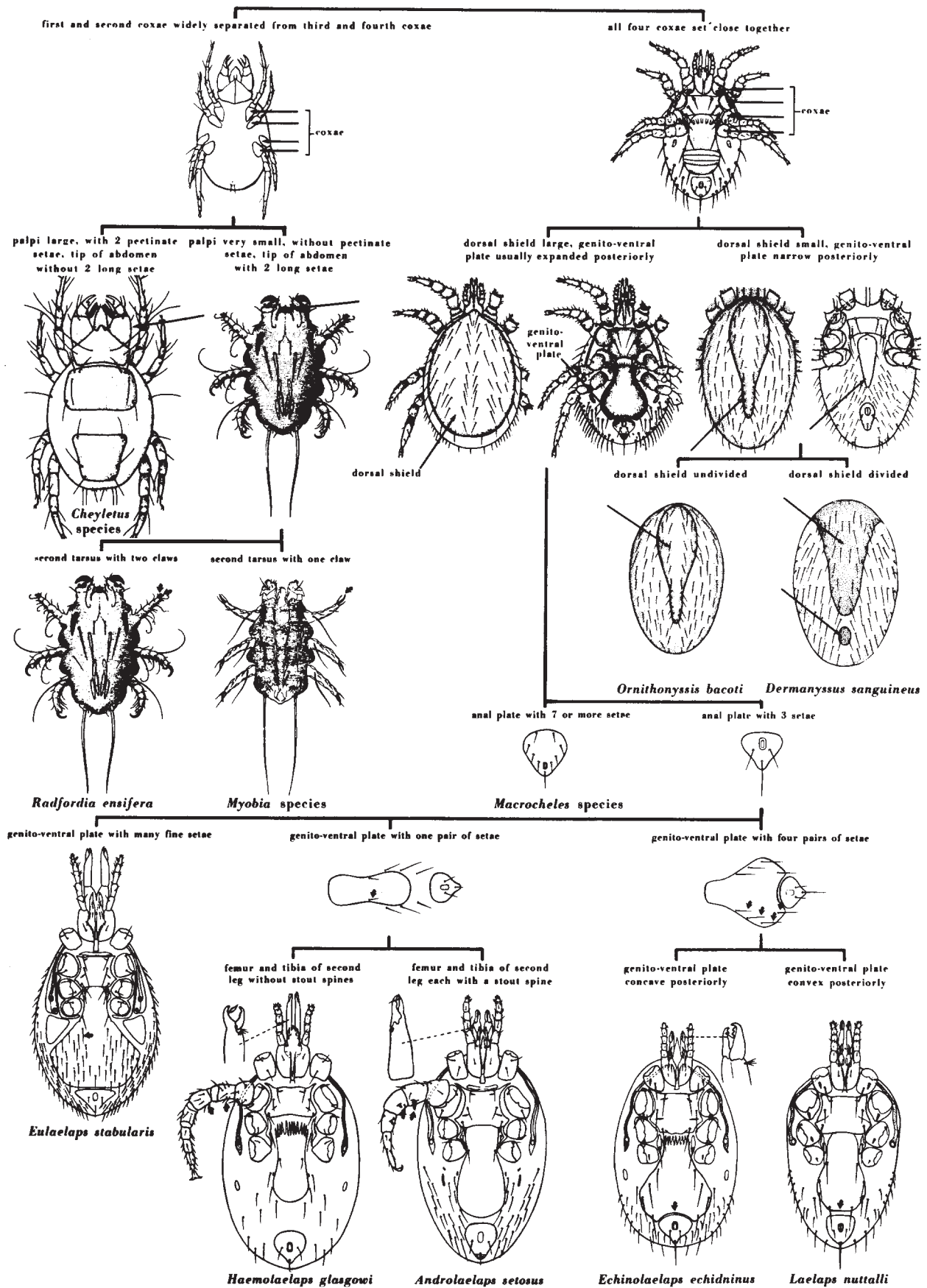
- 5. Tarsus IV of female ending in claws and a fleshy protuberance; leg
 IV of male smoothly curved inwards (*Pyemotes ventricosus*, formerly
Pediculoides ventricosus) STRAW ITCH MITE
 Tarsus IV of female ending in two long hairs of unequal length; leg
 IV of male sharply bent (*Tarsonemus floricolus*)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

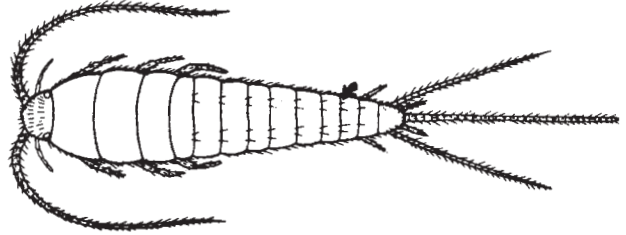
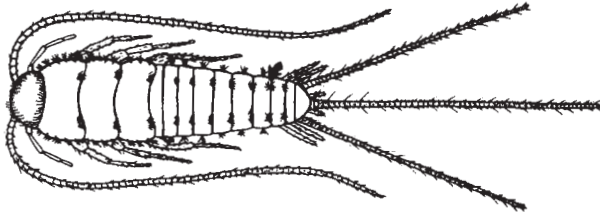


SILVERFISH. PICTORIAL KEY TO DOMESTIC SPECIES

Chester J. Stojanovich and Harold George Scott

setae in tufts
color brown

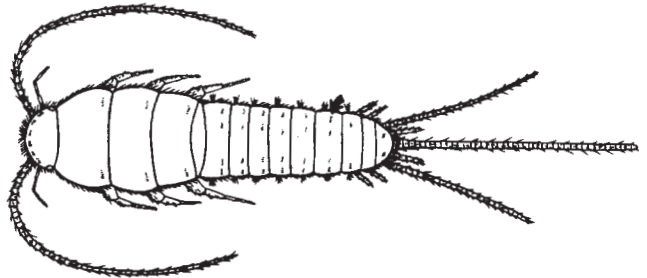
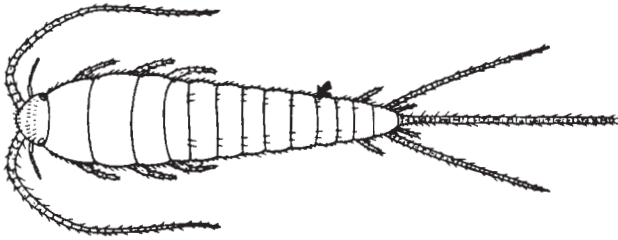
setae single



Thermobia domestica
FIREBRAT

without setal combs
color silver

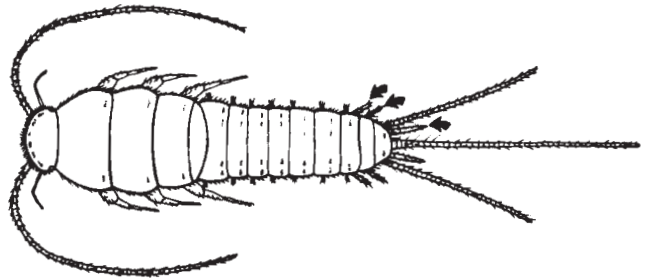
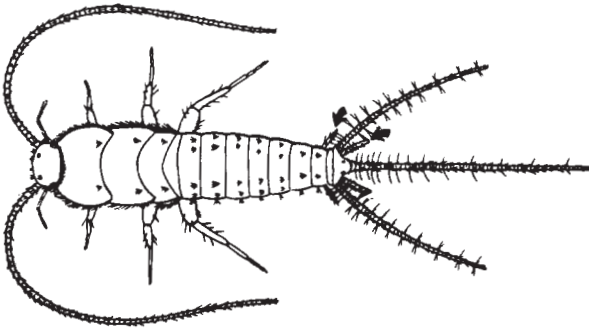
with setal combs



Lepisma saccharina
COMMON SILVERFISH

2 pairs of styli
color gray

3 pairs of styli
color brown



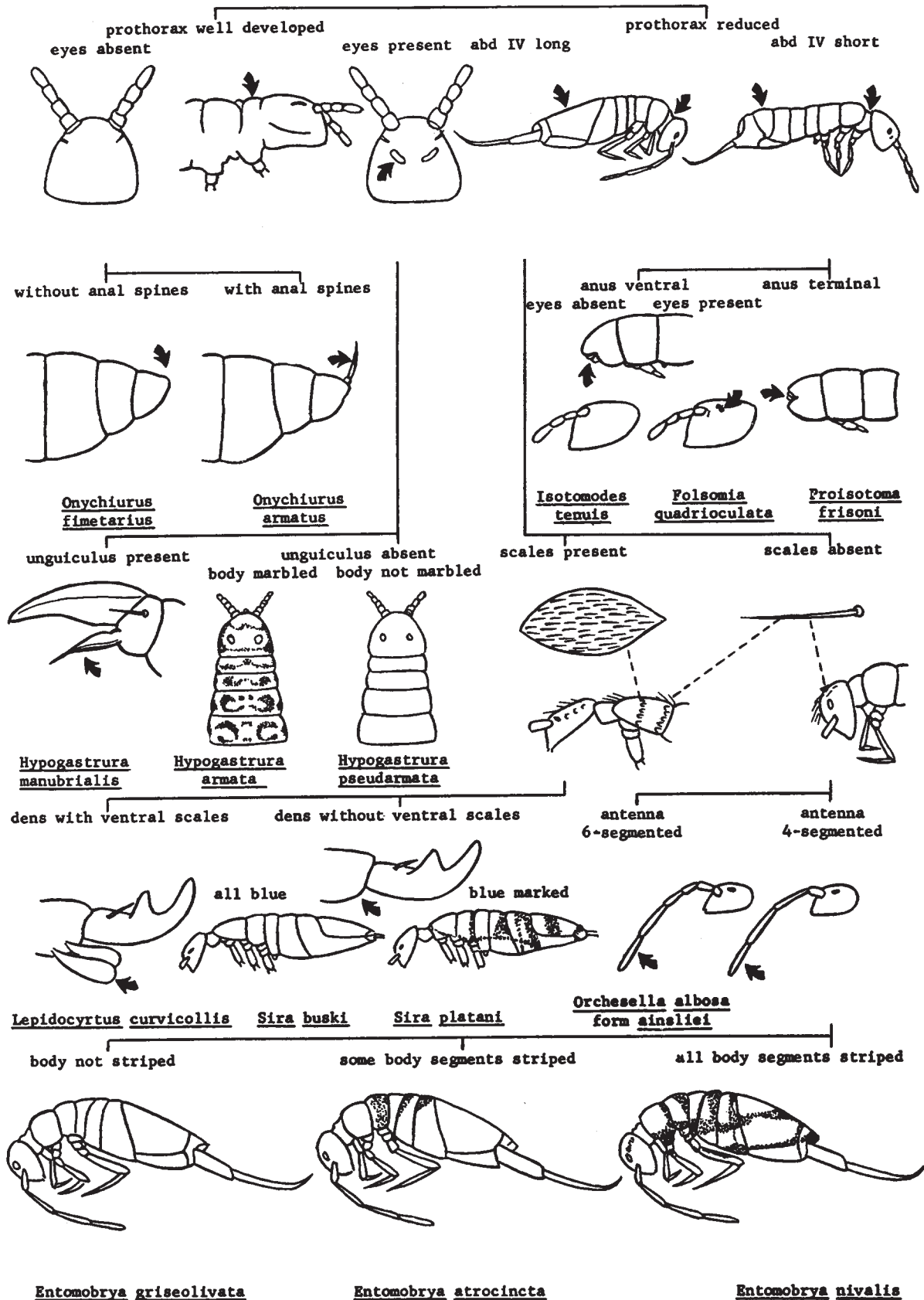
Ctenolepisma urbana
GIANT SILVERFISH

Ctenolepisma quadriseriata
FOUR-LINED SILVERFISH

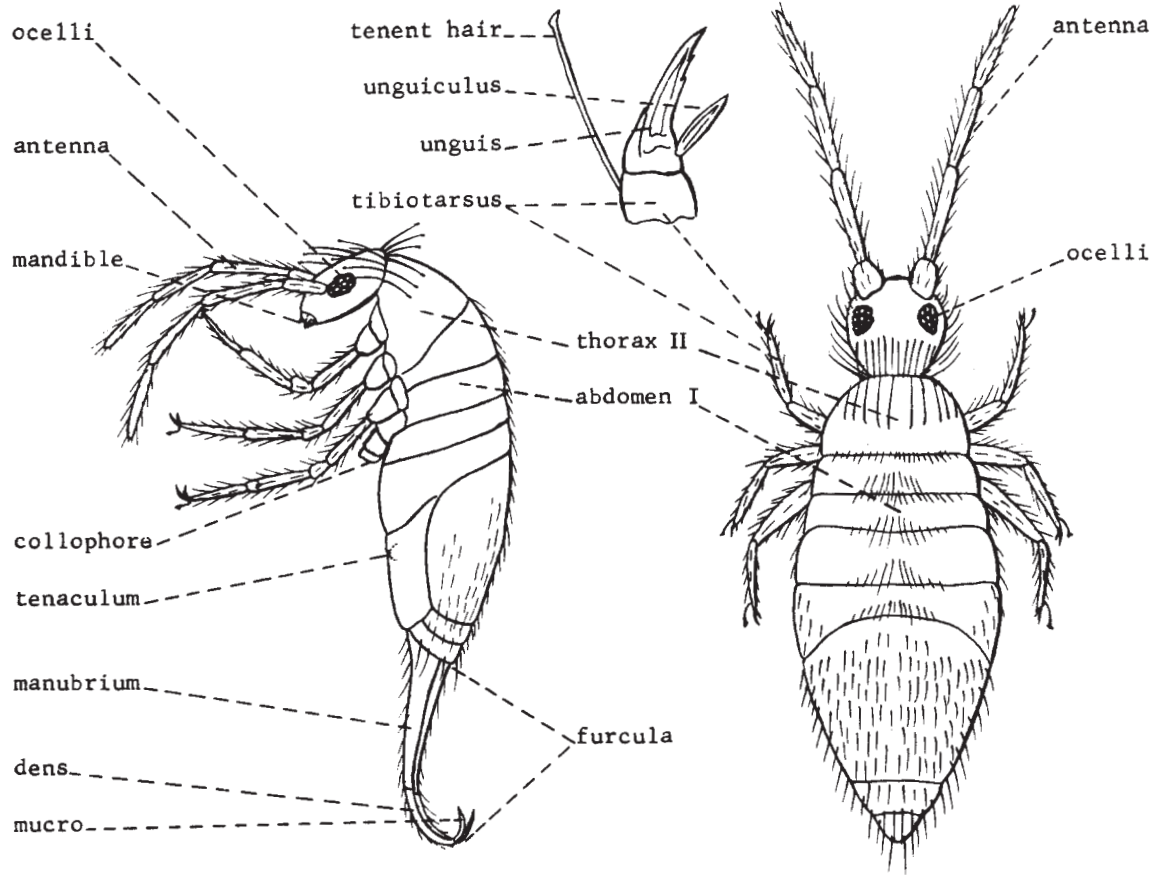
Ctenolepisma longicauda of some authors

COLLEMBOLA: PICTORIAL KEY TO COMMON DOMESTIC SPECIES

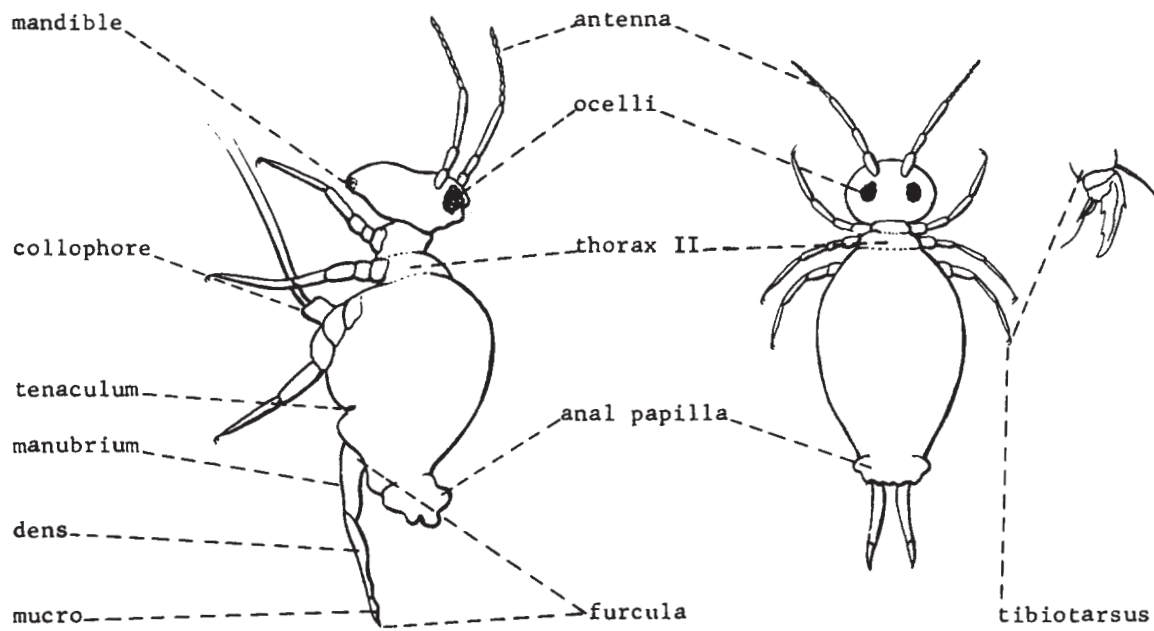
Harold George Scott, and Chester J. Stojanovich



COLLEMBOLA DIAGRAMS
Harold George Scott

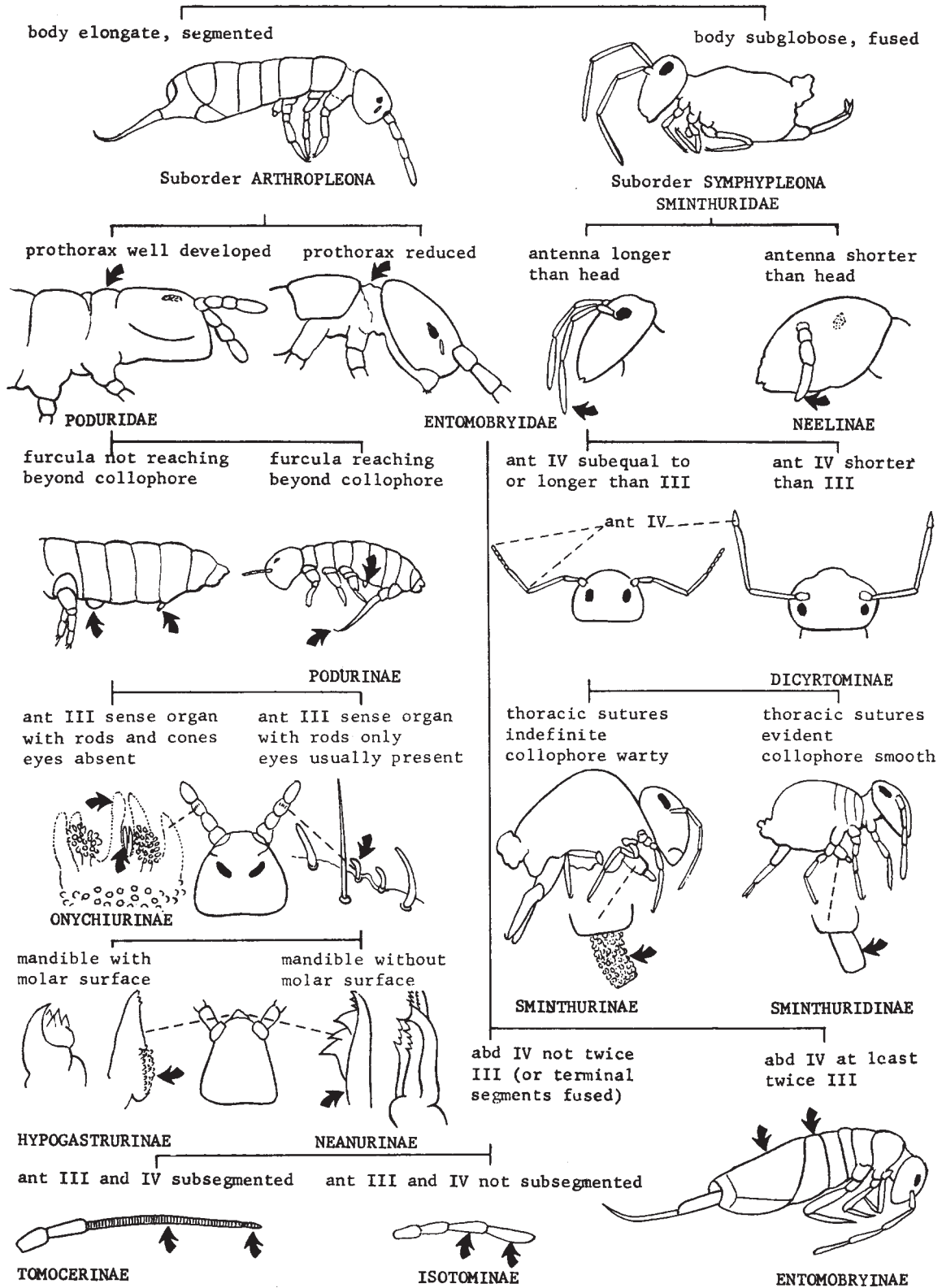


SUBORDER ARTHROPLEONA



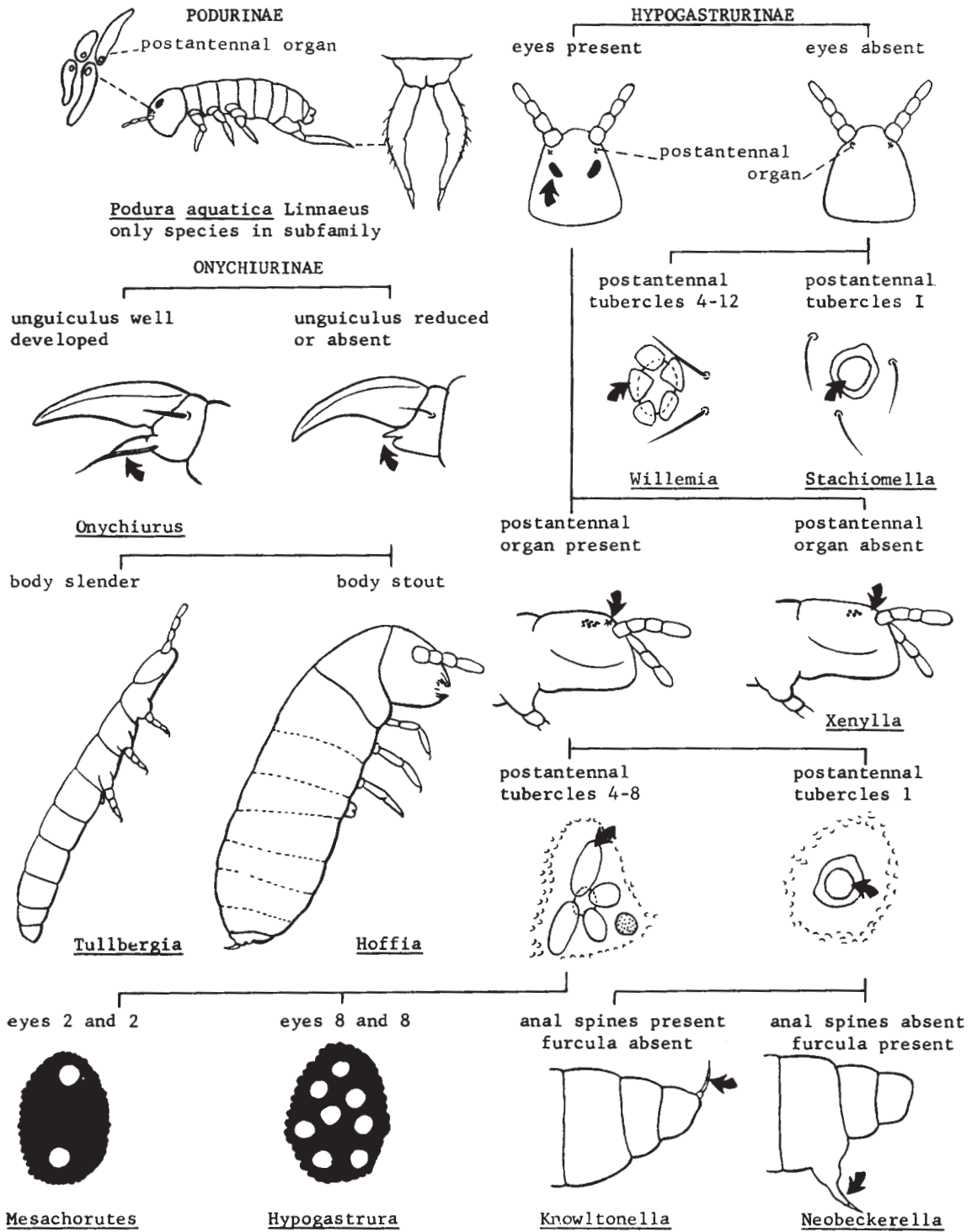
SUBORDER SYMPHOPLEONA

COLLEMBOLA: PICTORIAL KEY TO WORLD SUBFAMILIES
Harold George Scott, Ph.D.



COLLEMBOLA: PICTORIAL KEY TO NEARCTIC GENERA
 Harold George Scott, Ph.D.

SUBFAMILIES PODURINAE, HYPOGASTRURINAE, AND ONYCHIURINAE

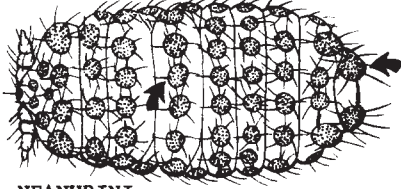


COLLEMBOLA: PICTORIAL KEY TO NEARCTIC GENERA
Harold George Scott, Ph.D.

SUBFAMILY NEANURINAE

abd VI large, bilobed
 segmental tubercles present

abd VI small, rounded
 segmental tubercles absent



NEANURINI

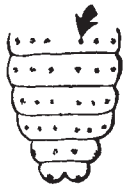
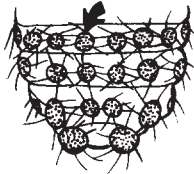
PSEUDACHORUTINI

segmental tubercles large

segmental tubercles small

anal spines present

anal spines absent



Neanura

Neanurodes

furcula present

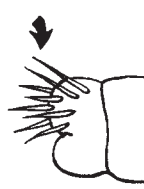
furcula absent



anal spines 2

anal spines 3-5

anal spines 8



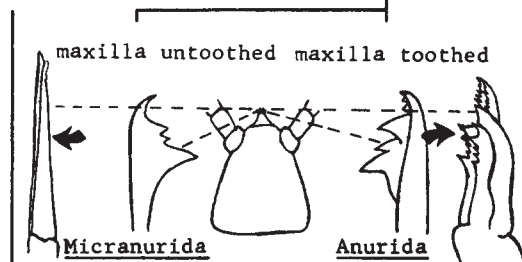
Xenyllodes

Friesea

Prospinanura

maxilla untoothed

maxilla toothed



Micranurida

Anurida

eyes 5 and 5

eyes 6 and 6

eyes 8 and 8



Microgastrura

postantennal tubercles 8

postantennal tubercles 4-5

with buccal cone

without buccal cone



Logacanura

Odontella

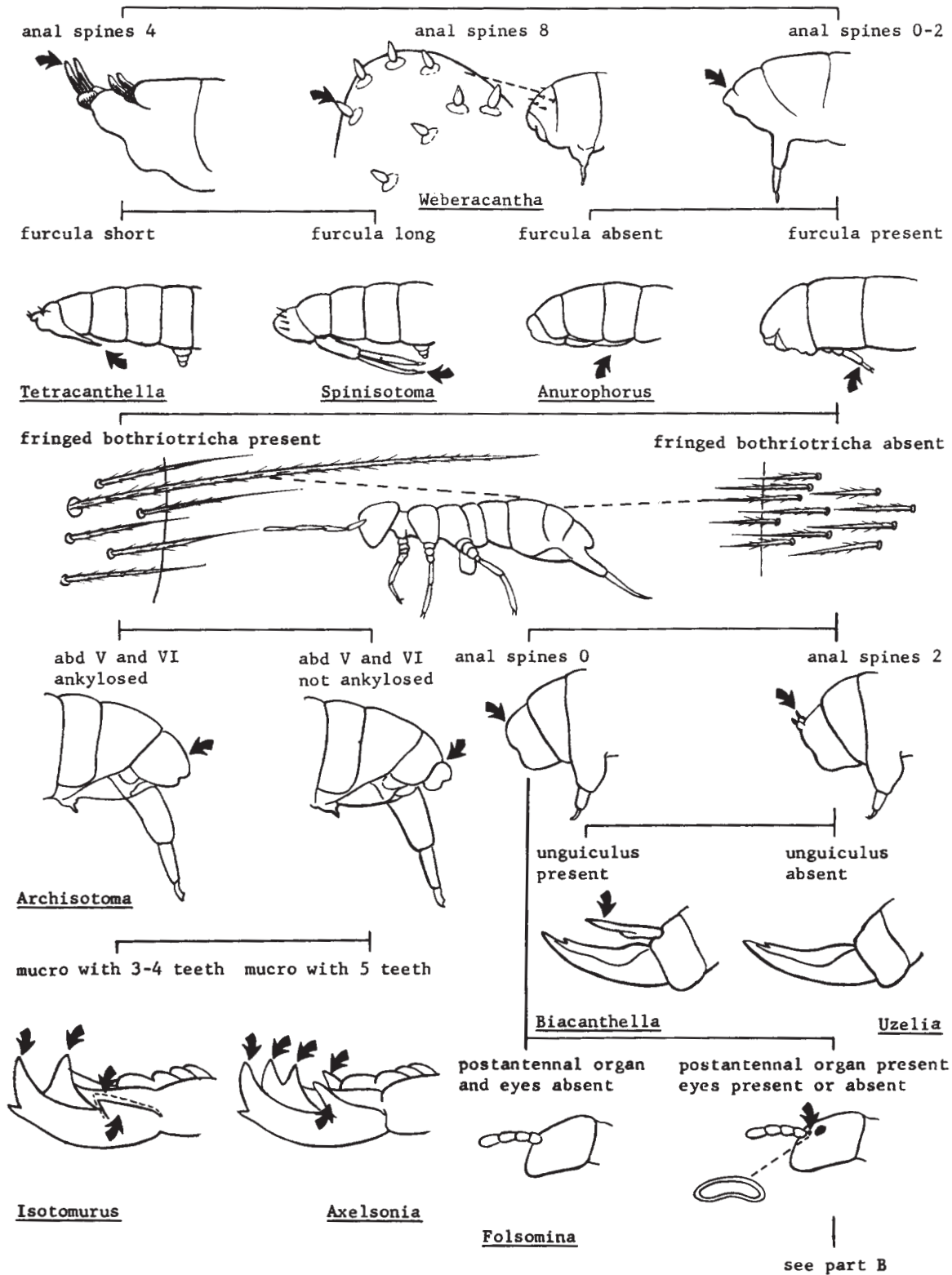
Brachystomella

Pseudachorutes

COLLEMBOLA: PICTORIAL KEY TO NEARCTIC GENERA

Harold George Scott, Ph.D.

SUBFAMILY ISOTOMINAE - Part A

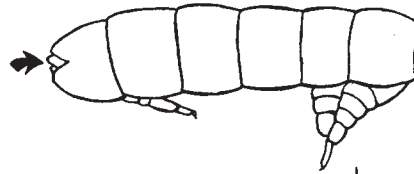
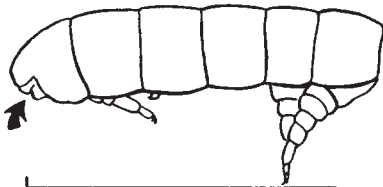


COLLEMBOLA: PICTORIAL KEY TO NEARCTIC GENERA

SUBFAMILY ISOTOMINAE - Part B

continued from part A

anus ventral anus terminal

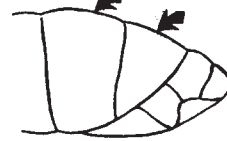
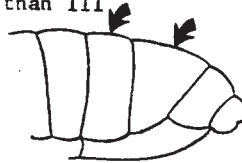


manubrium with hooks

manubrium without hooks

abd IV not shorter than III

abd IV shorter than III



Isotomodes

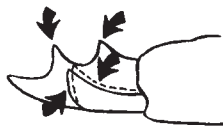
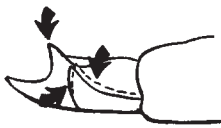
Folsomia

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

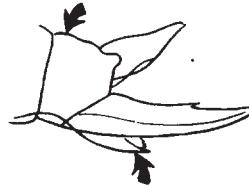
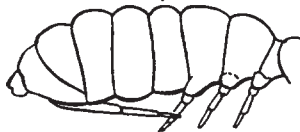
Micrisotoma

body segments bulging

body segments not bulging

unguis tunicate

unguis not tunicate



Guthriella

Isotomina

Agrenia

with dental spines

without dental spines

mucro with 3 teeth

mucro with 4 teeth



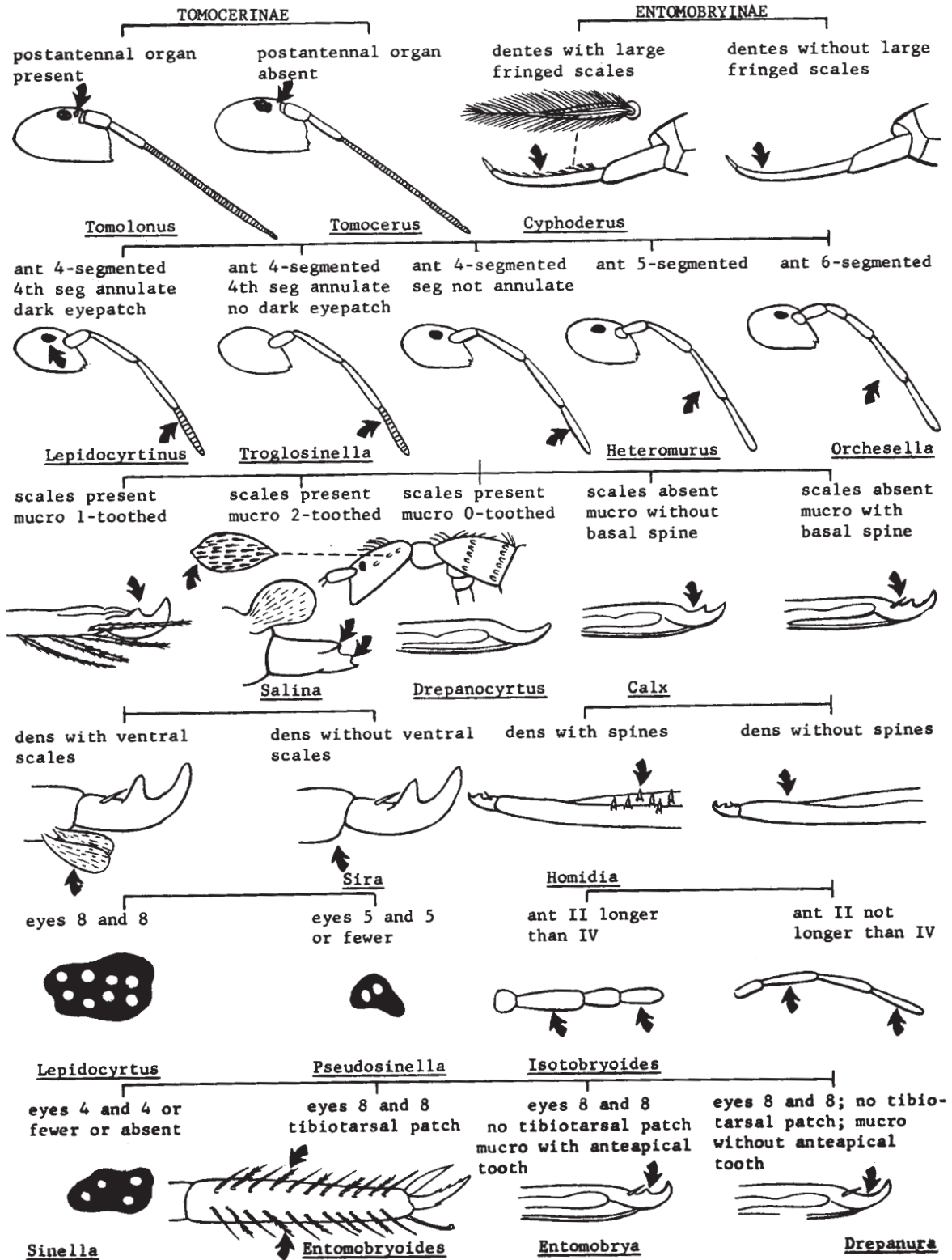
Semicerura

Tomocerura

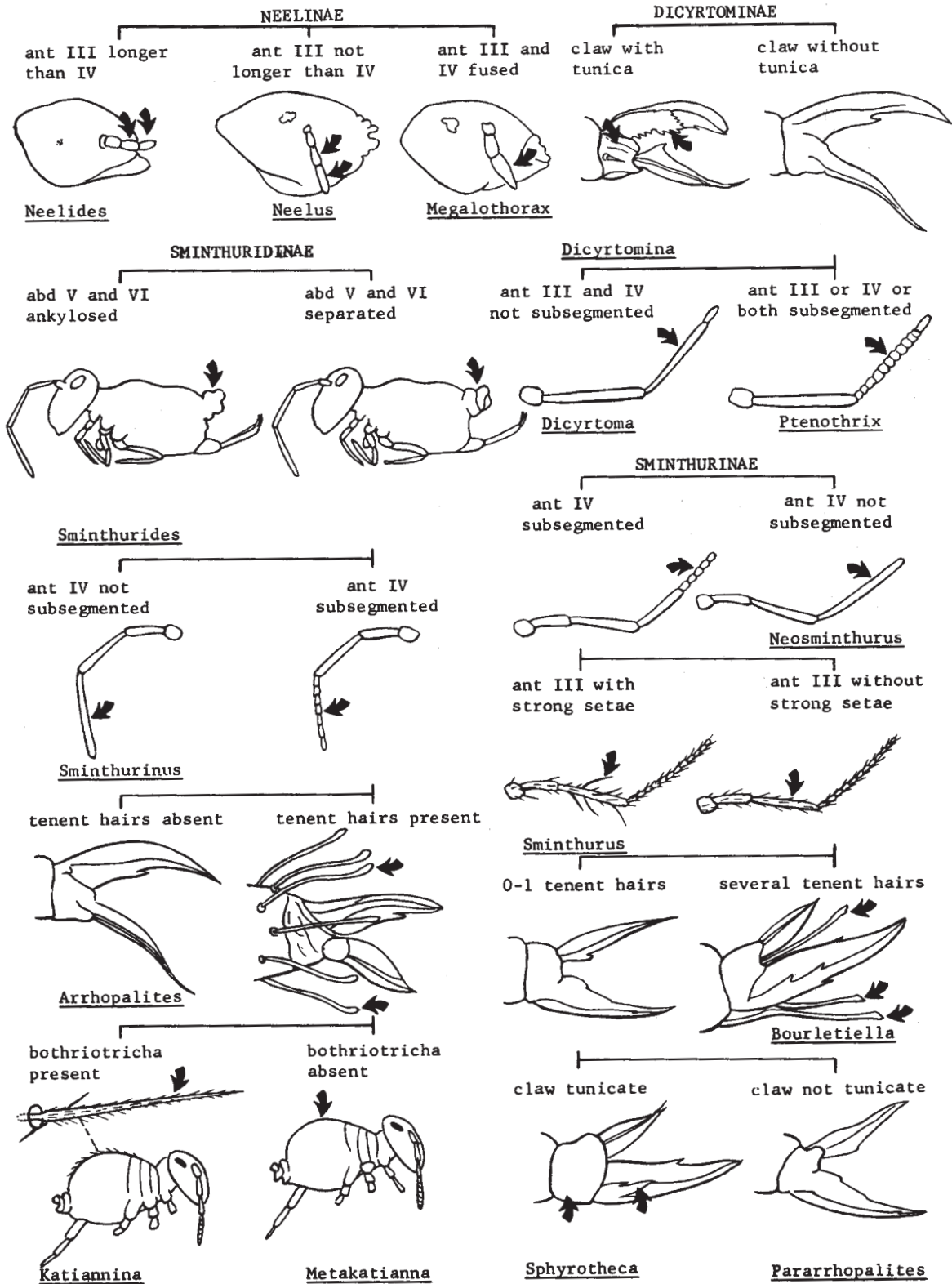
Isotoma

COLLEMBOLA: PICTORIAL KEY TO NEARCTIC GENERA
Harold George Scott, Ph.D.

SUBFAMILIES TOMOCERINAE AND ENTOMOBRYINAE

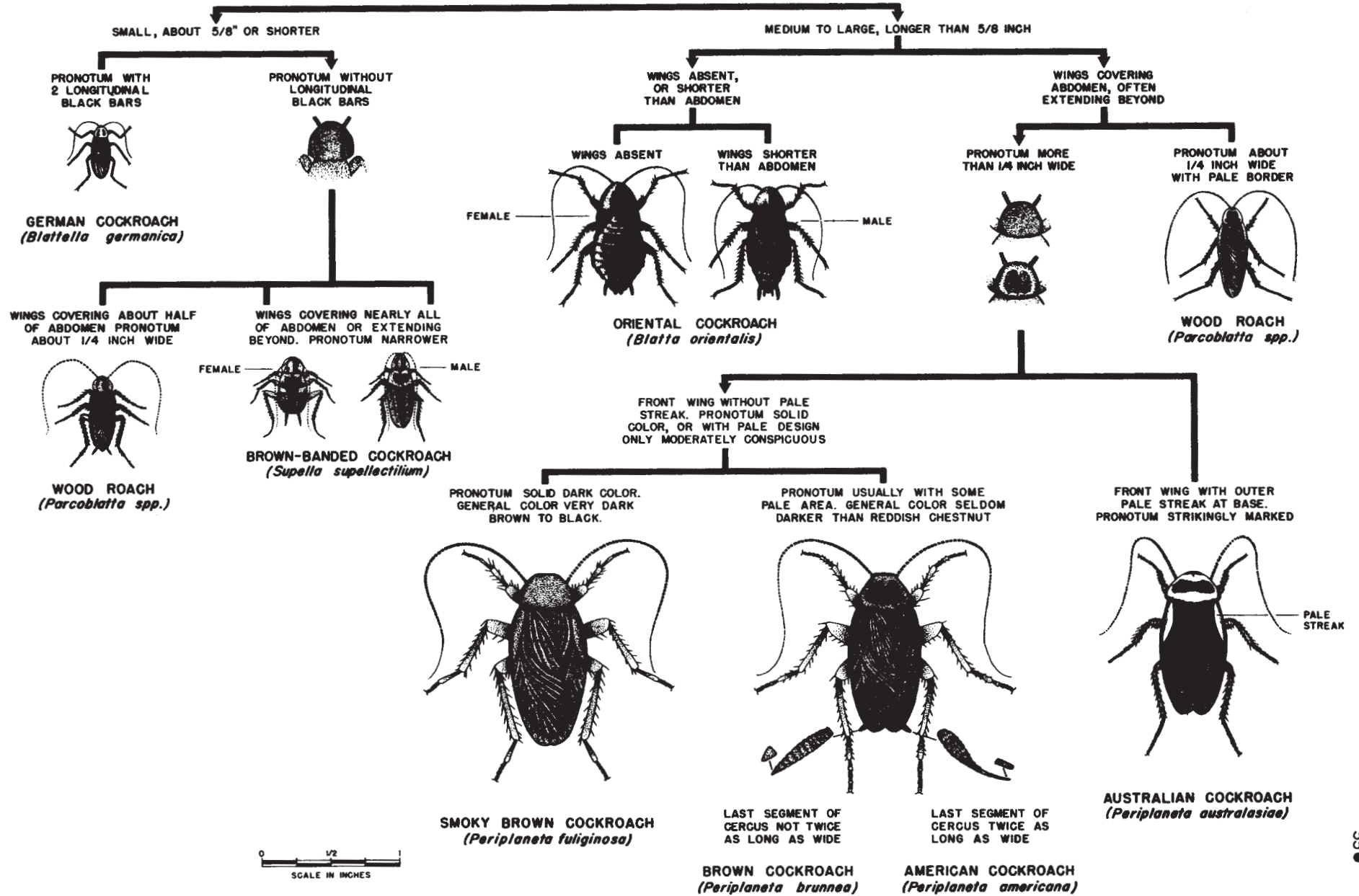


COLLEMBOLA: PICTORIAL KEY TO NEARCTIC GENERA
Harold George Scott, Ph.D.
FAMILY SMINTHURIDAE

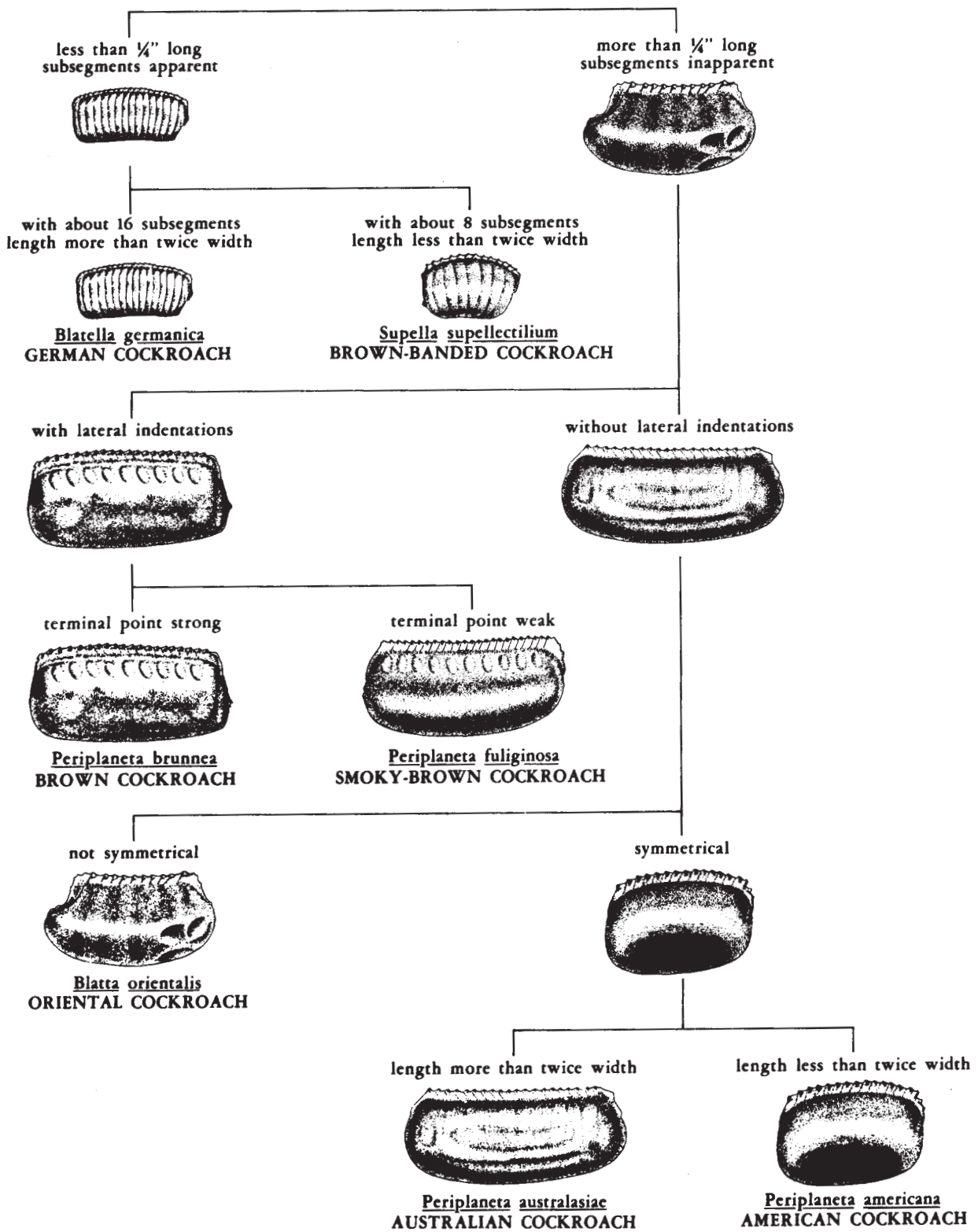


COCKROACHES: PICTORIAL KEY TO SOME COMMON SPECIES

Harry D. Pratt



COCKROACHES: KEY TO EGG CASES OF COMMON DOMESTIC SPECIES
 Harold George Scott, Ph.D. and Margery R. Borom



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

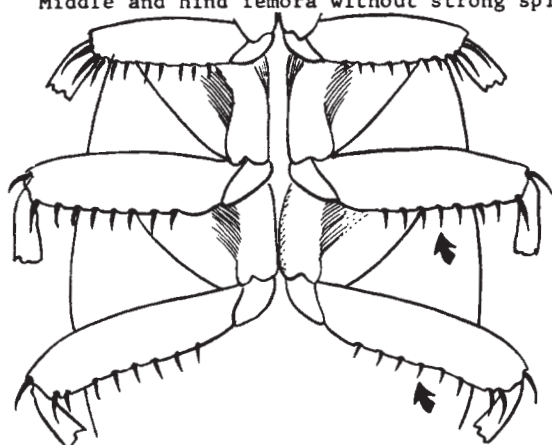


Fig. 1 A

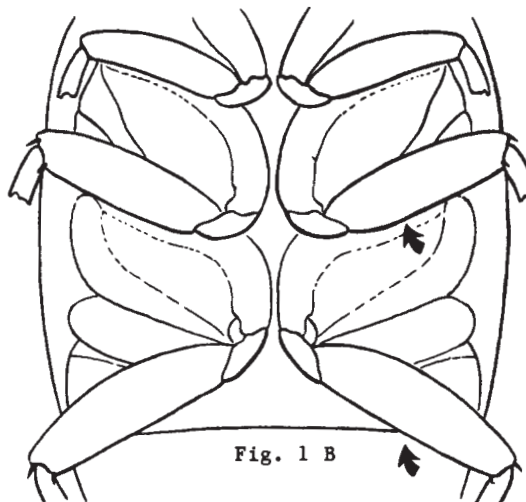


Fig. 1 B

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

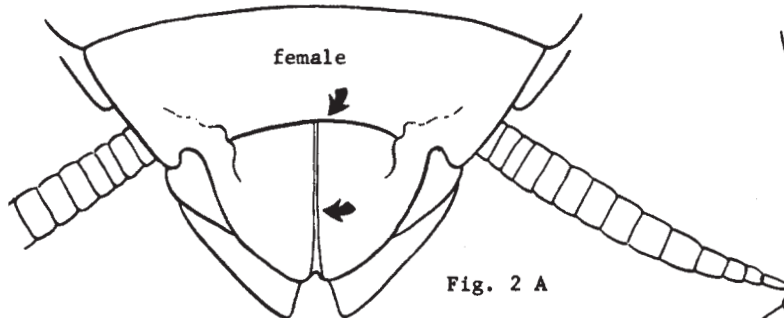


Fig. 2 A

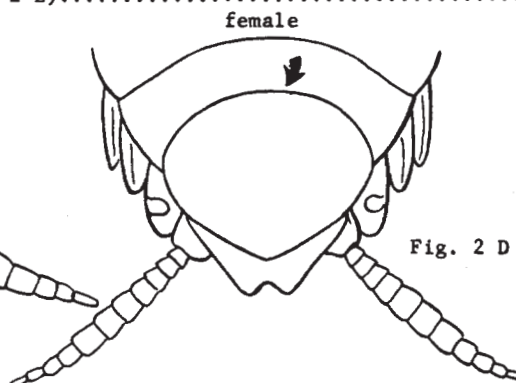


Fig. 2 D

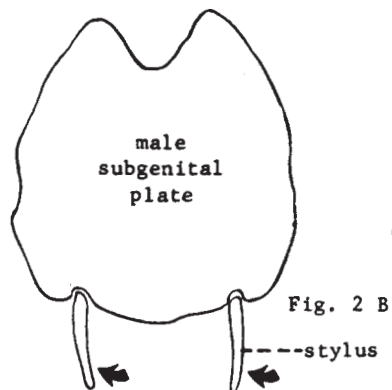


Fig. 2 B

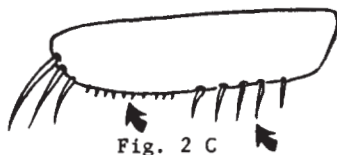


Fig. 2 C

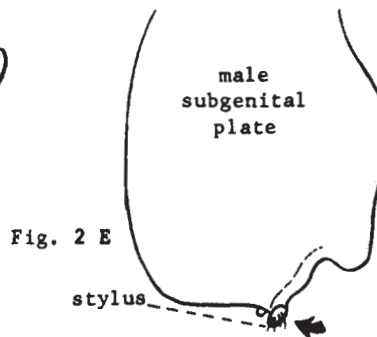


Fig. 2 E

- 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

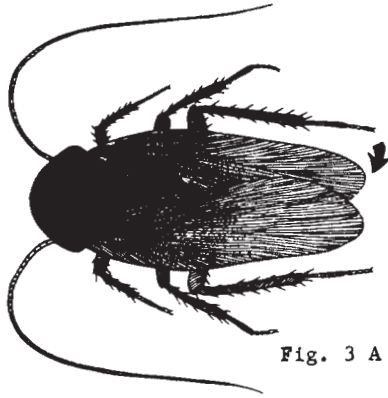


Fig. 3 A

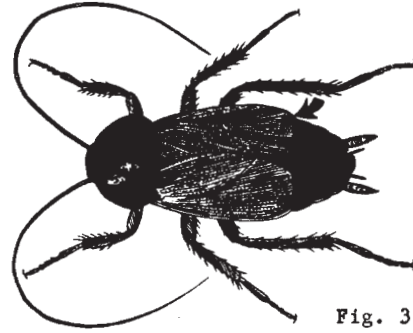


Fig. 3 B

- 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

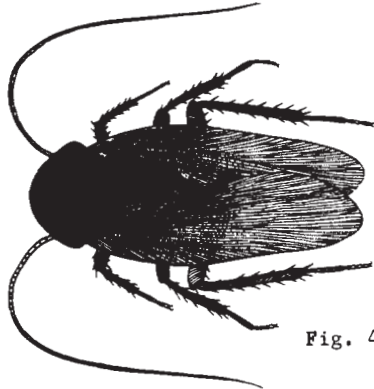


Fig. 4 A

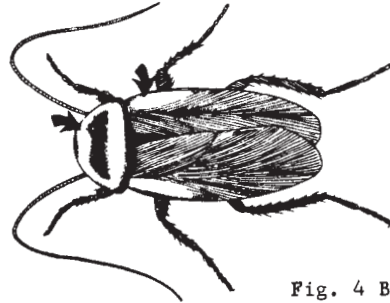


Fig. 4 B

- 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

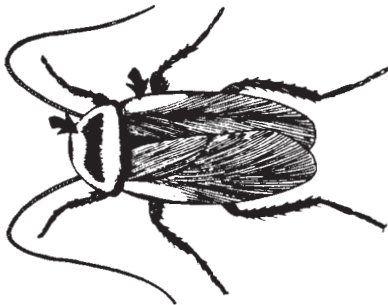


Fig. 5 A

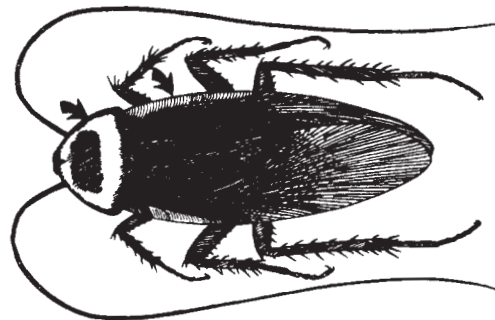
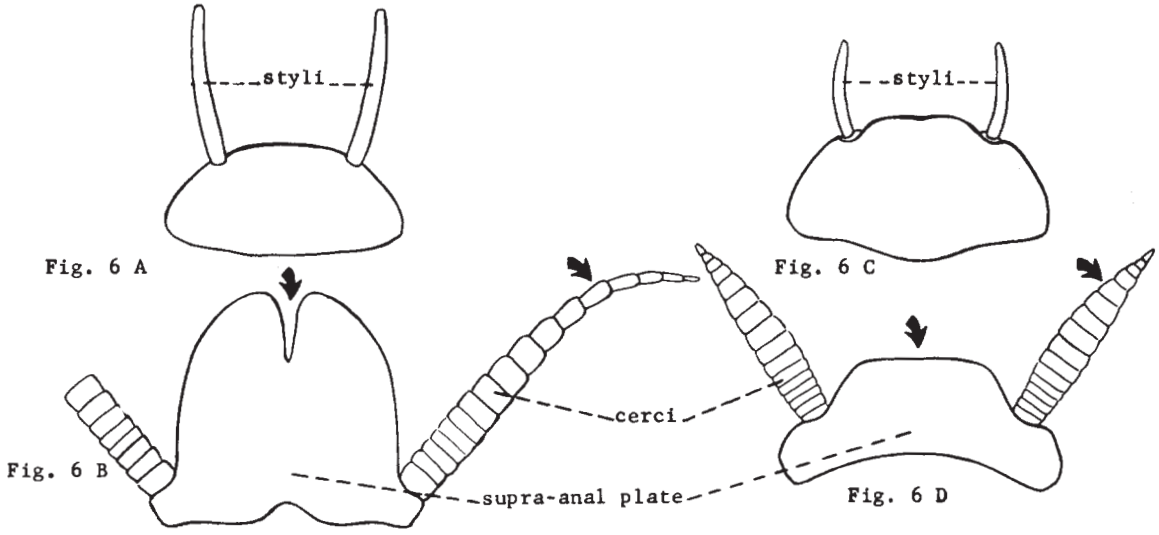
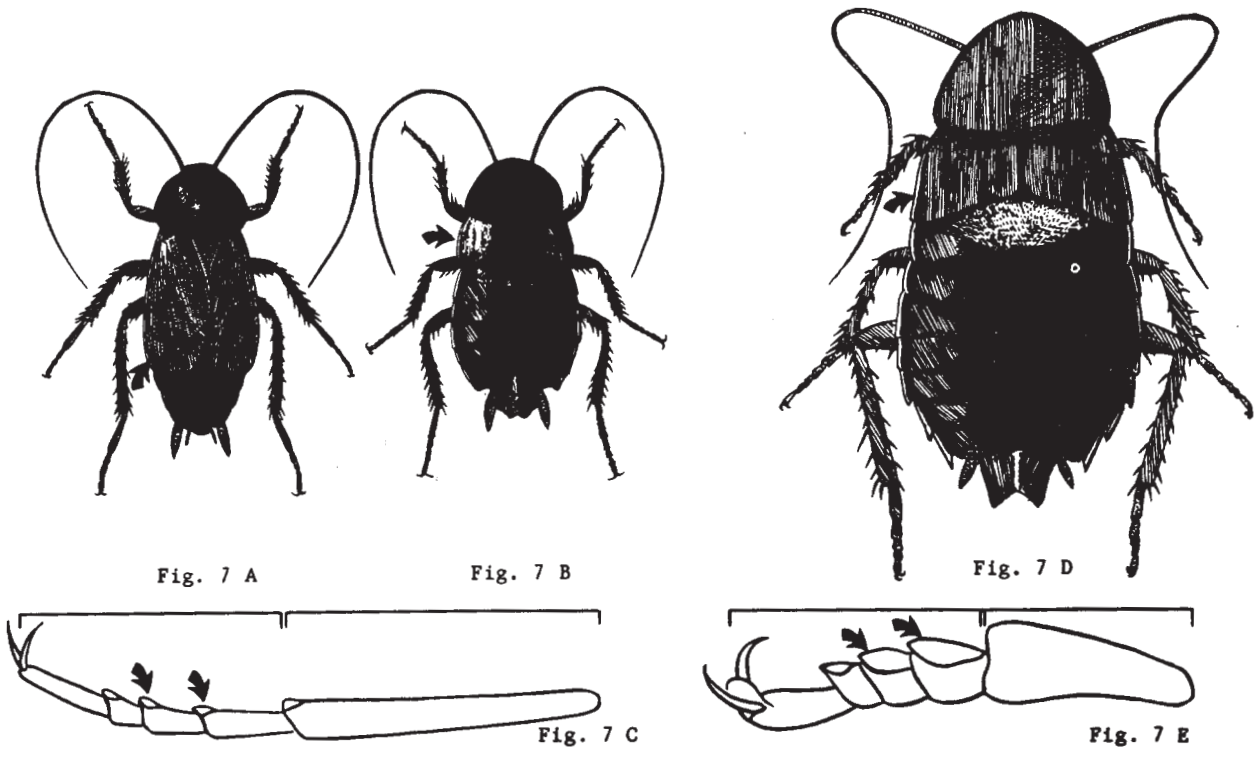


Fig. 5 B

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



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



- 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

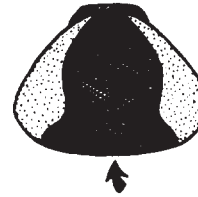


Fig. 8 B

- 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

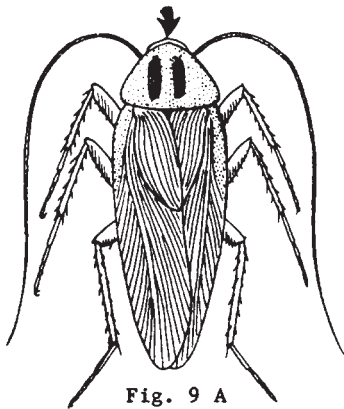


Fig. 9 A

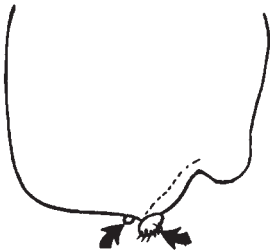


Fig. 9 B

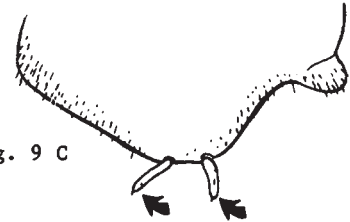


Fig. 9 C

- 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

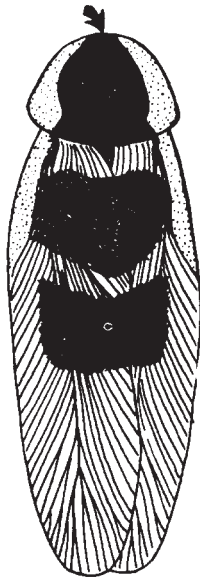


Fig. 10 A



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

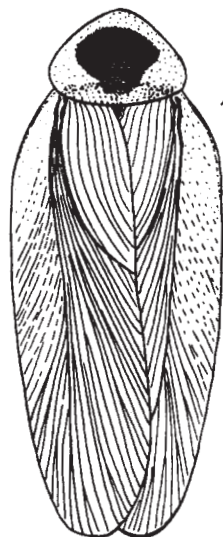


Fig. 11 A

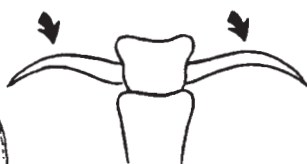


Fig. 11 B

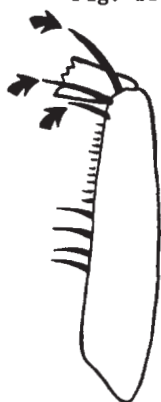


Fig. 11 C



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

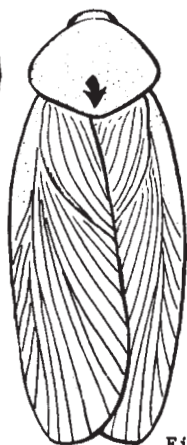


Fig. 12 B



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

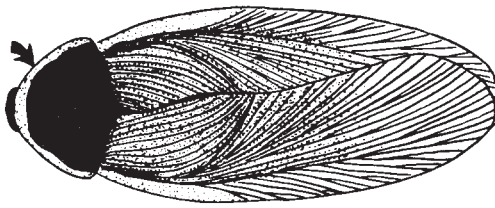


Fig. 14 A

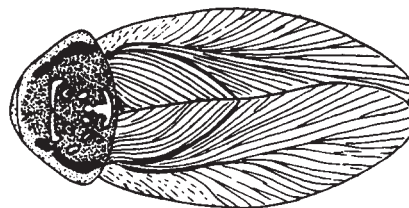


Fig. 14 B

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

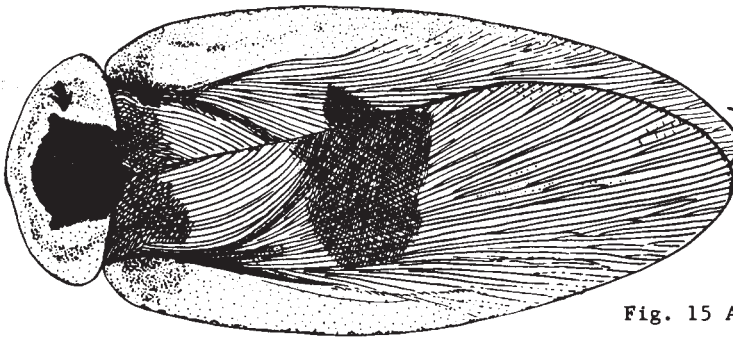


Fig. 15 A

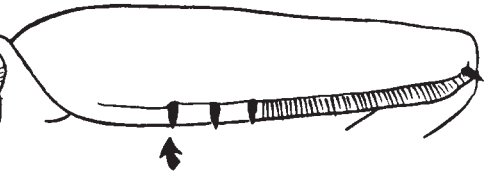


Fig. 15 B

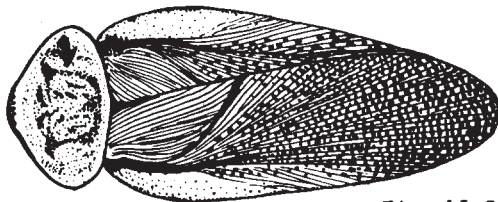


Fig. 15 C



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



Fig. D - Wing

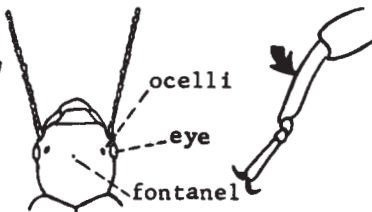


Fig. E - Head



Fig. F - Leg

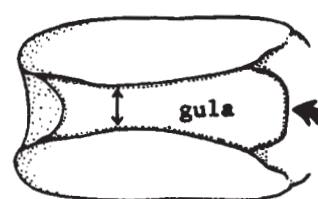


Fig. G - Throat

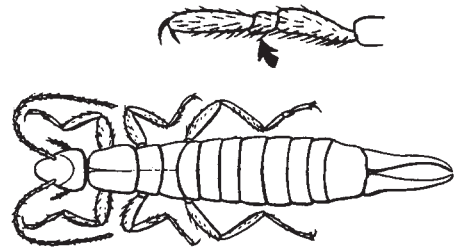
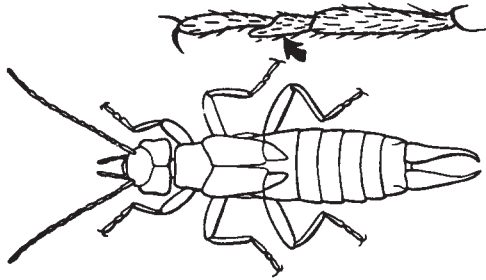
Key to Soldiers

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

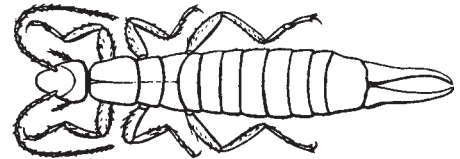
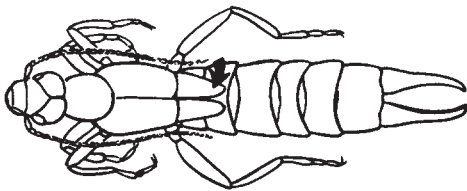
tarsus II not prolonged beneath III



EUROPEAN EARWIG
Forficula auricularia

wings present

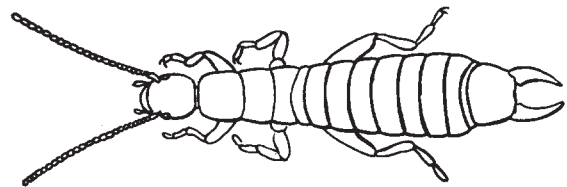
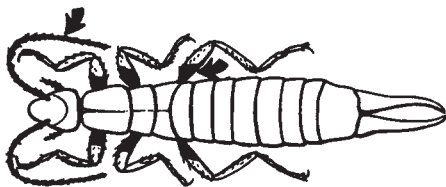
wings absent



SHORE EARWIG
Labiidura riparia

legs and antennae banded

legs and antennae not banded

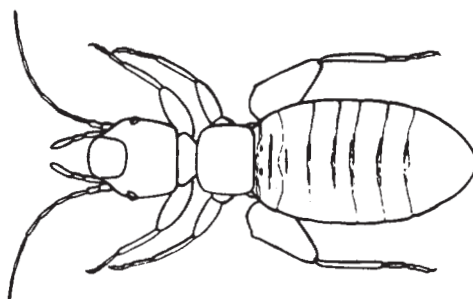


RING-LEGGED EARWIG
Euborellia annulipes

SEASIDE EARWIG
Anisolabis maritima

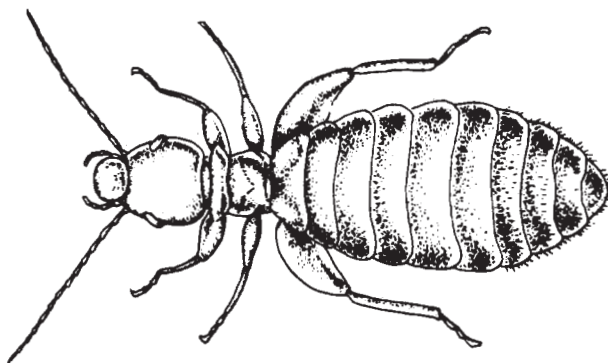
PSOCIDS: KEY TO SOME SPECIES COMMONLY INFESTING STORED FOOD
Harold George Scott and Chester J. Stojanovich

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 bostrychophilus*) **BANDED PSOCID**
 Eye with 2-4 facets; head brown, body yellow (*Liposcelis paetus*) **WAREHOUSE PSOCID**



Warehouse Psocid

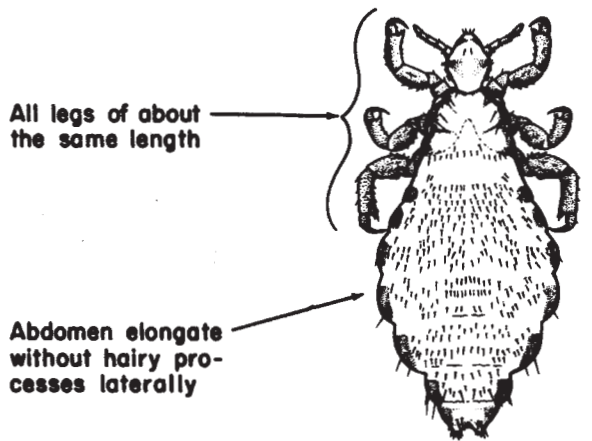
4. Two to 5 large pronotal bristles (*Liposcelis entomophilus*) **GRAIN PSOCID**
 One large pronotal bristle (*Liposcelis terricolus*) **BOOK LOUSE**



Book Louse

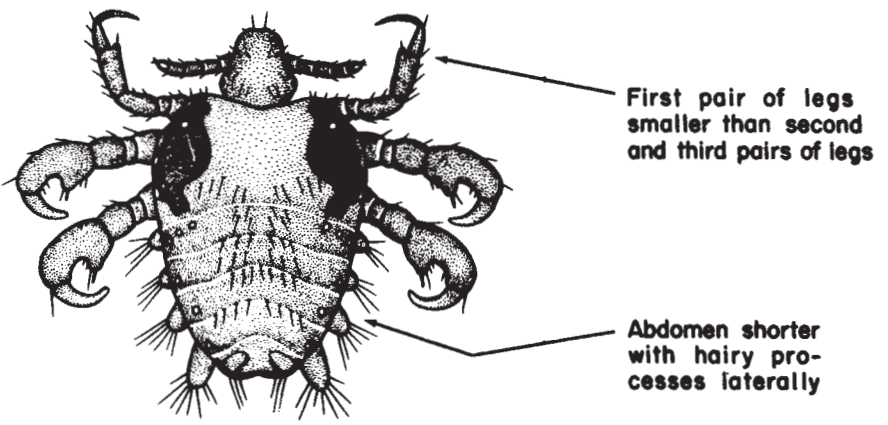
LICE COMMONLY FOUND ON MAN
Harry D. Pratt

BODY LOUSE
AND
HEAD LOUSE



*PEDICULUS
HUMANUS*

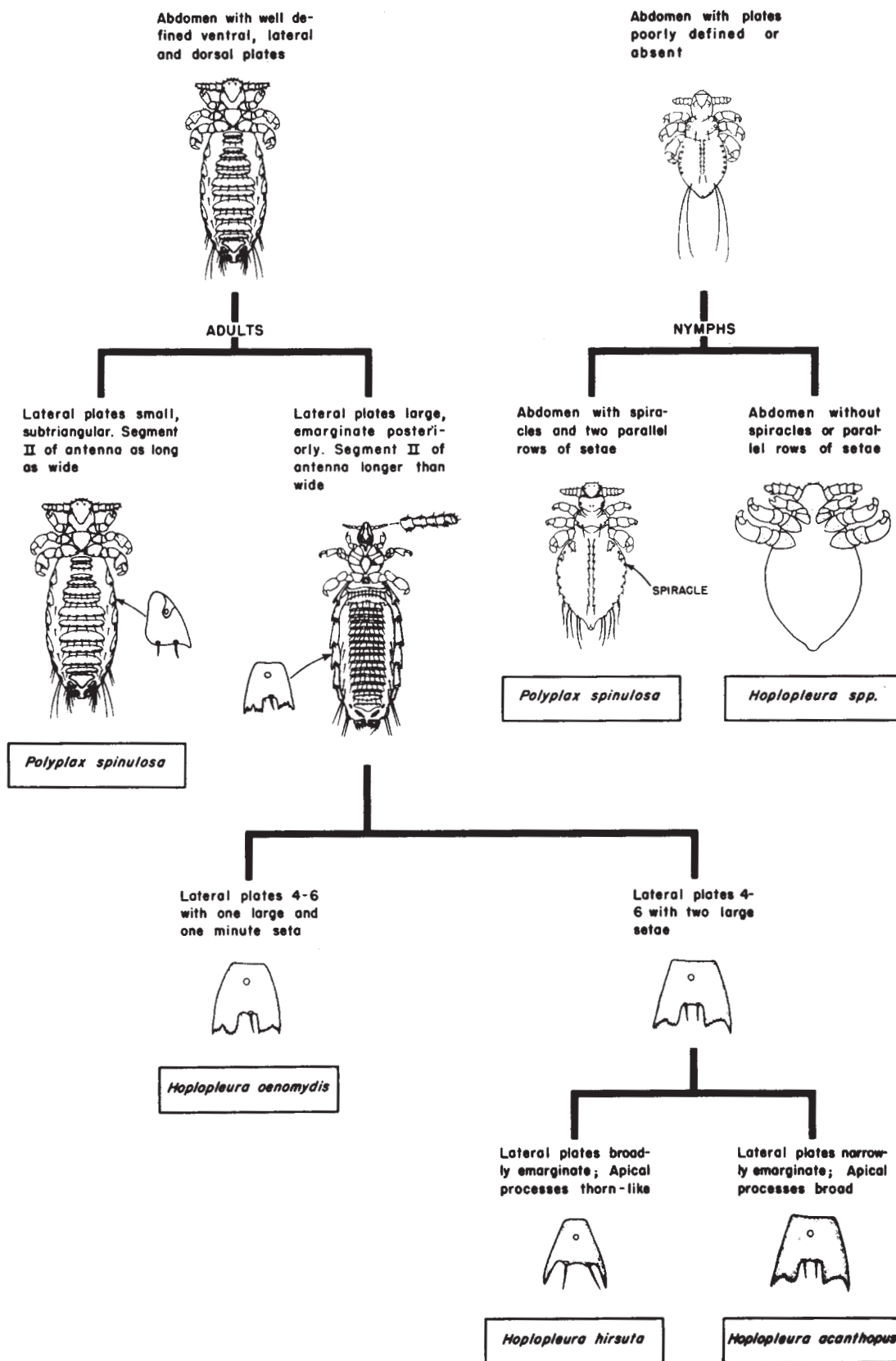
CRAB LOUSE



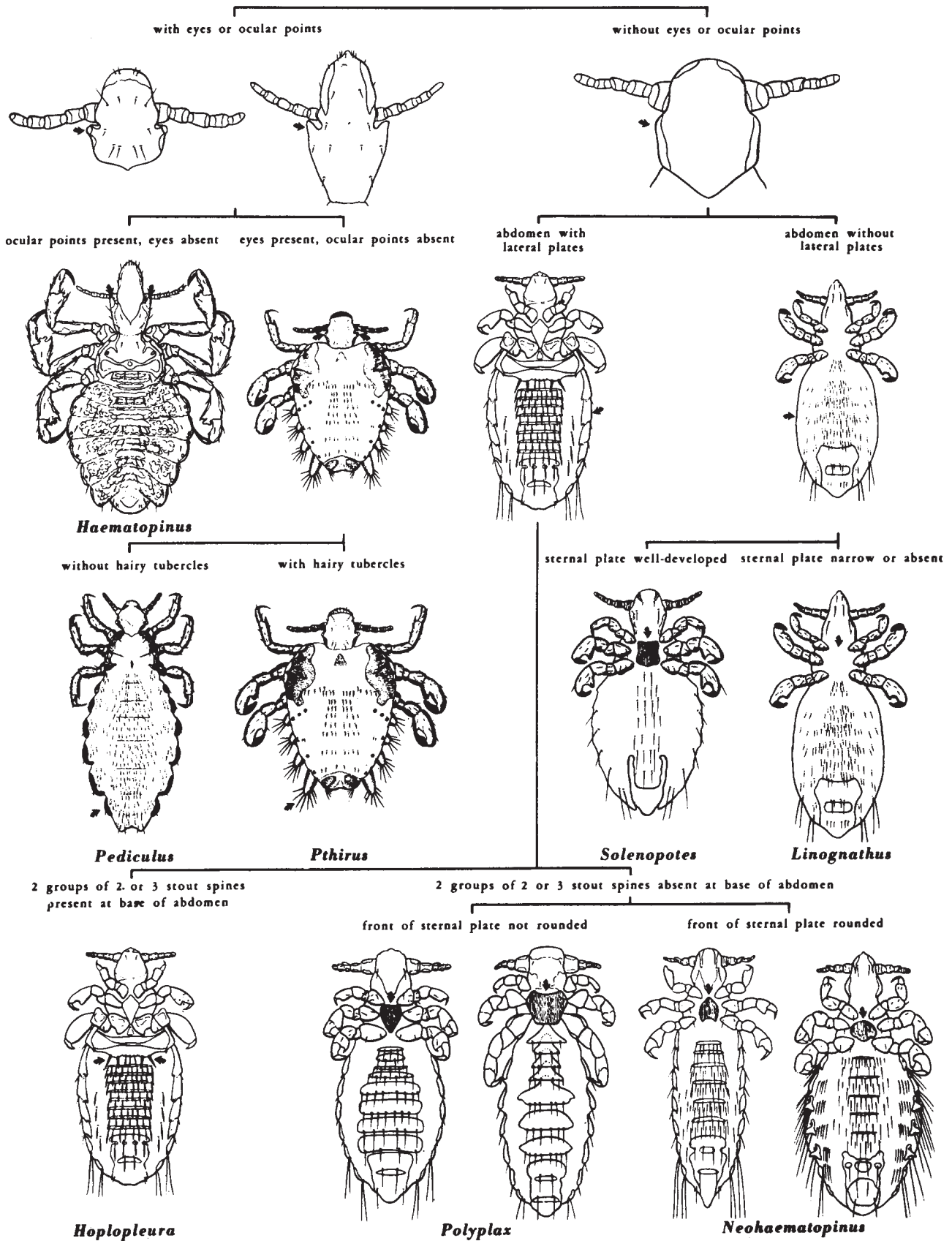
*PHTHIRUS
PUBIS*

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

Roy F. Fritz and Harry D. Pratt



ANOPLURA: PICTORIAL KEY TO SOME COMMON GENERA OF SUCKING LICE
 Chester J. Stojanovich and Harry D. Pratt



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

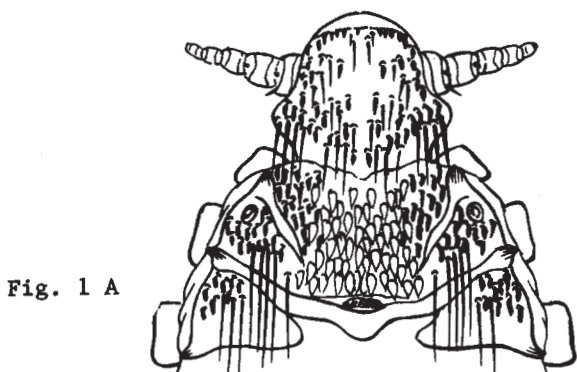


Fig. 1 A

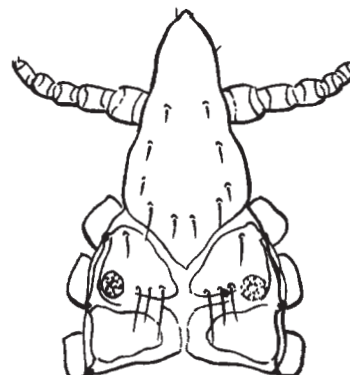


Fig. 1 B

- 2. Eyes present or with prominent ocular points (Fig. 2 A & B).....3
- Eyes and ocular points absent (Fig. 2 C).....4

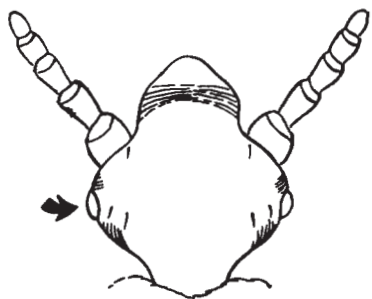


Fig. 2 A

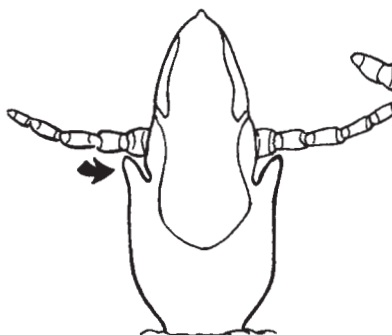


Fig. 2 B

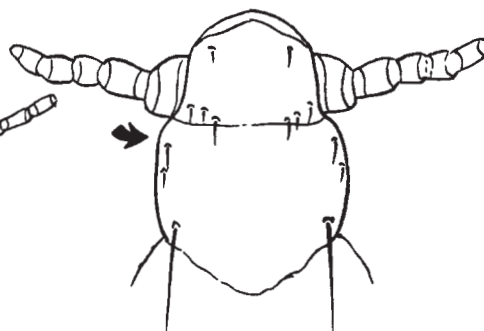


Fig. 2 C

- 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

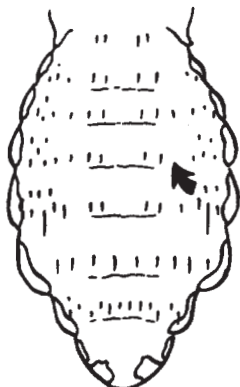


Fig. 3 A

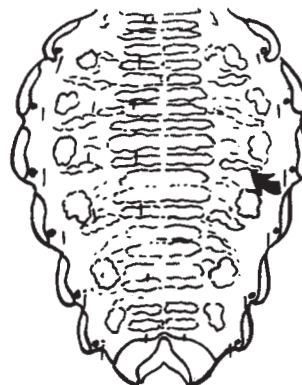


Fig. 3 B

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

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

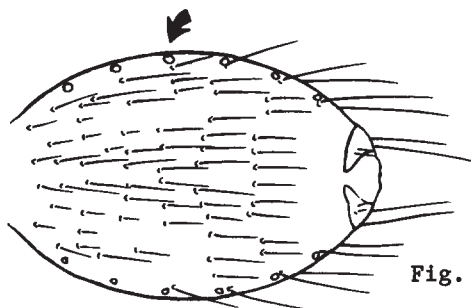


Fig. 4 A

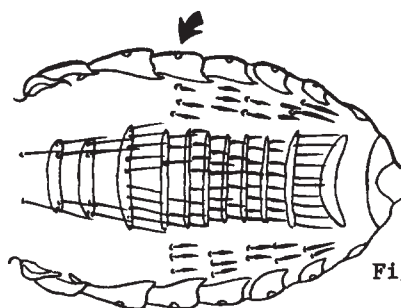


Fig. 4 B

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

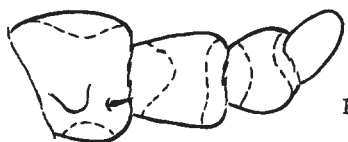


Fig. 1 A

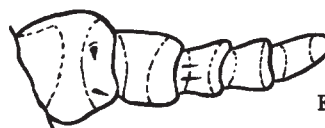


Fig. 1 B

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

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

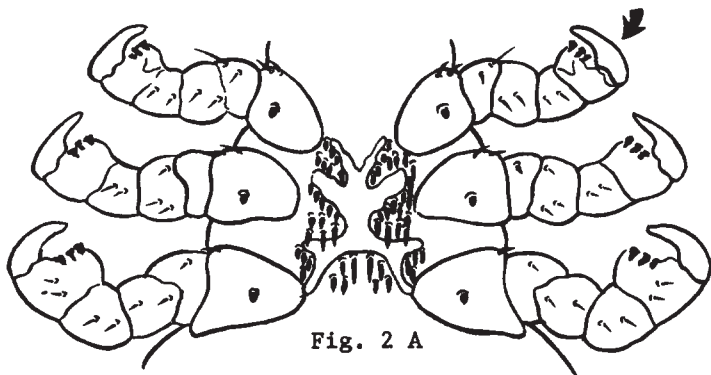


Fig. 2 A

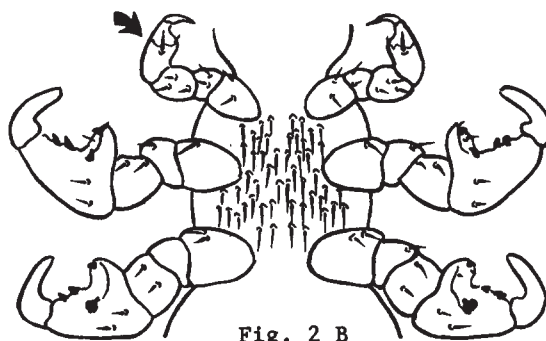


Fig. 2 B

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

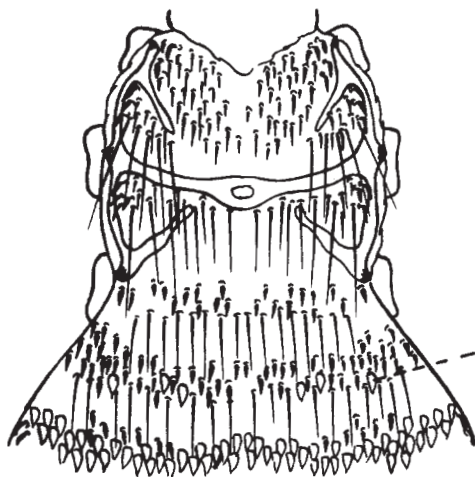


Fig. 1 A

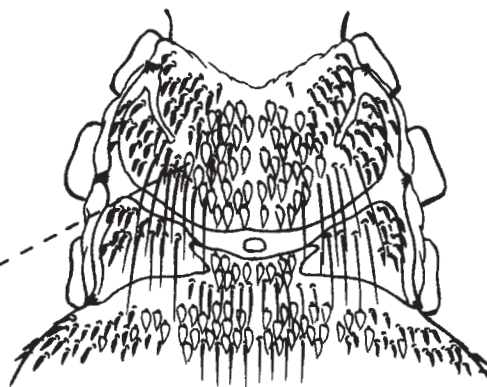


Fig. 1 B

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)

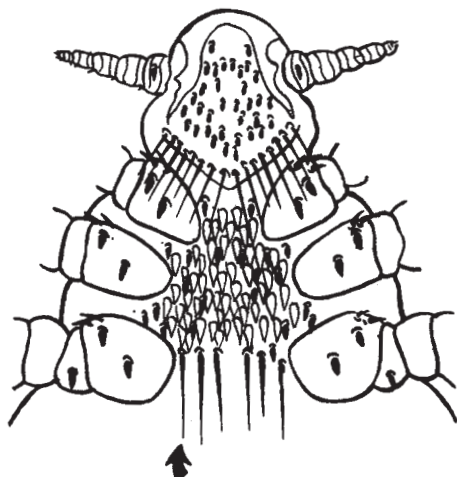


Fig. 2 A

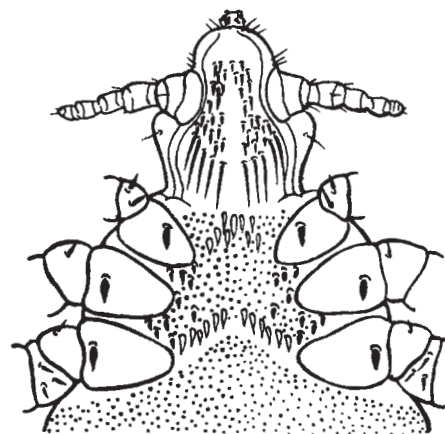
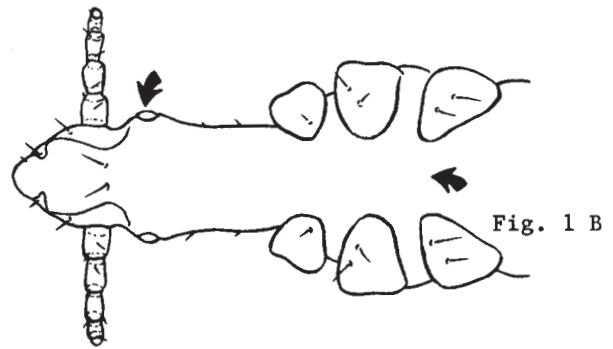
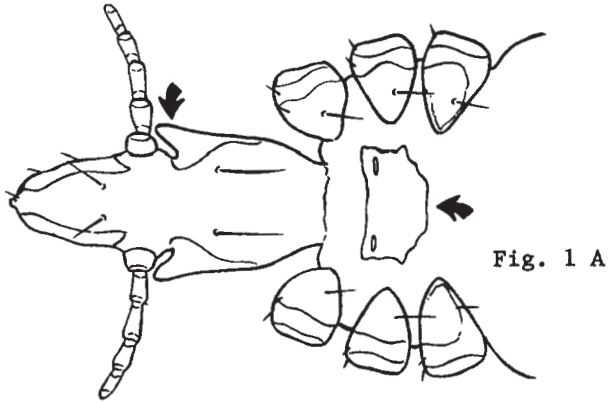


Fig. 2 B

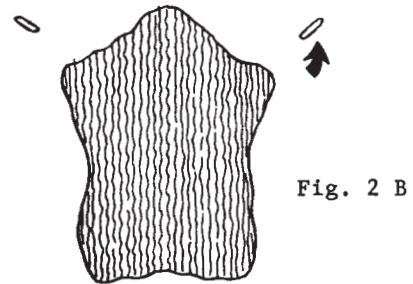
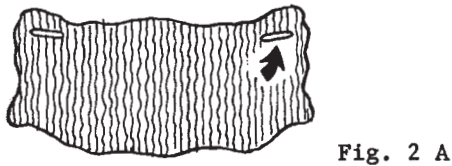
Key to Genera of Haematopinidae

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

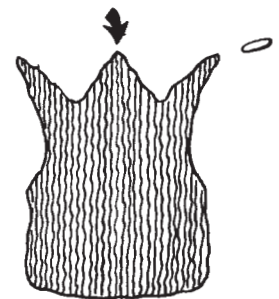
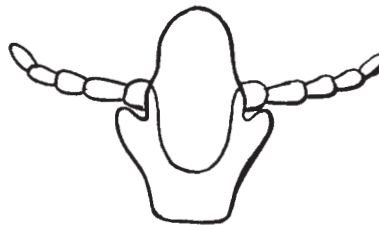
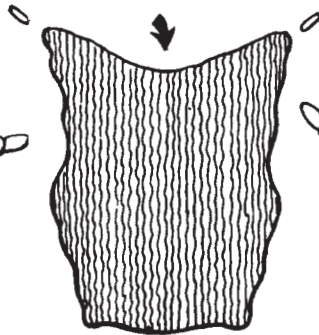
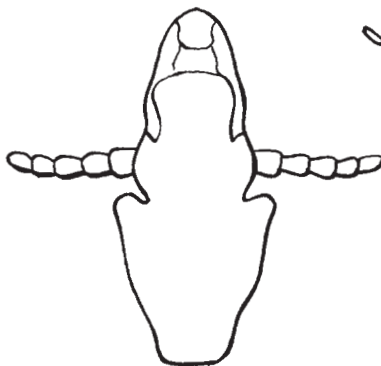


Key to Species of Haematopinus

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



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



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

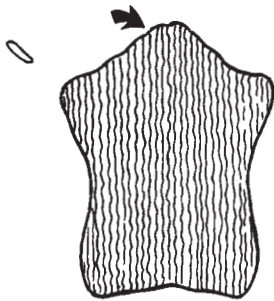


Fig. 3 A



Fig. 3 B

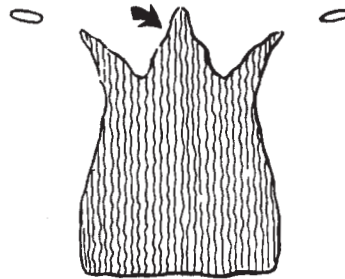


Fig. 3 C



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

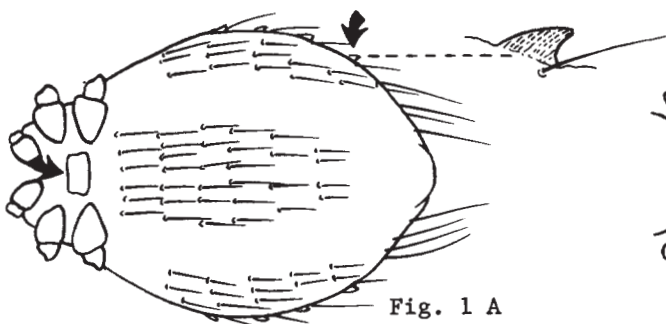


Fig. 1 A

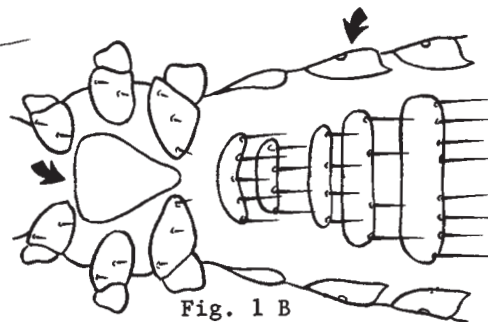


Fig. 1 B

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

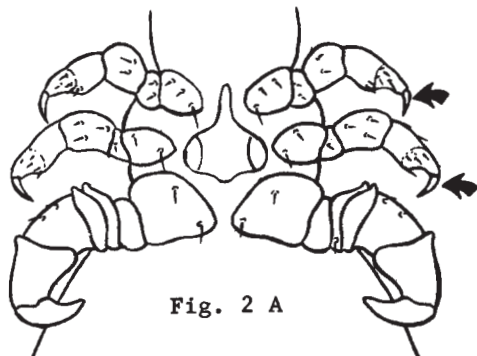


Fig. 2 A

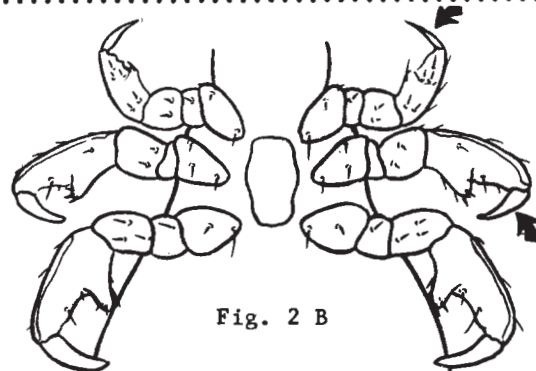


Fig. 2 B

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)

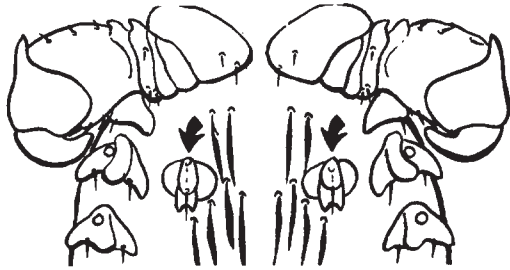


Fig. 3 A

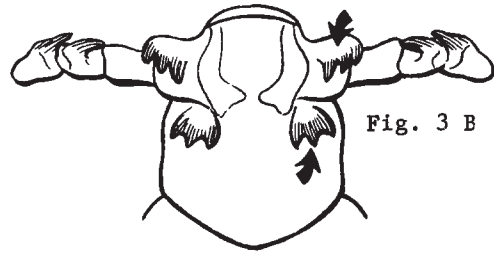


Fig. 3 B

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

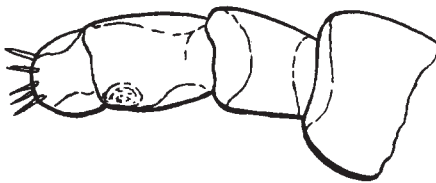


Fig. 4 A

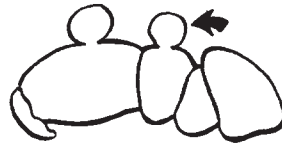


Fig. 4 B



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

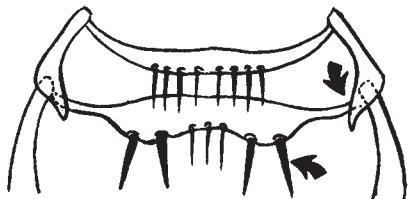


Fig. 5 A

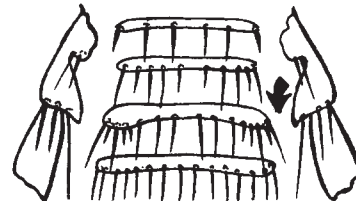


Fig. 5 B

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



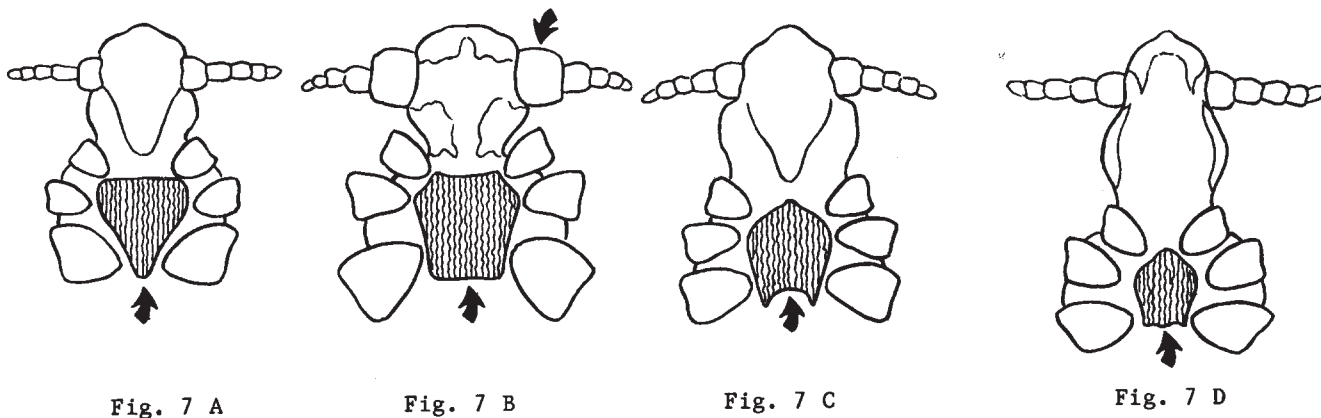
Fig. 6 A



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

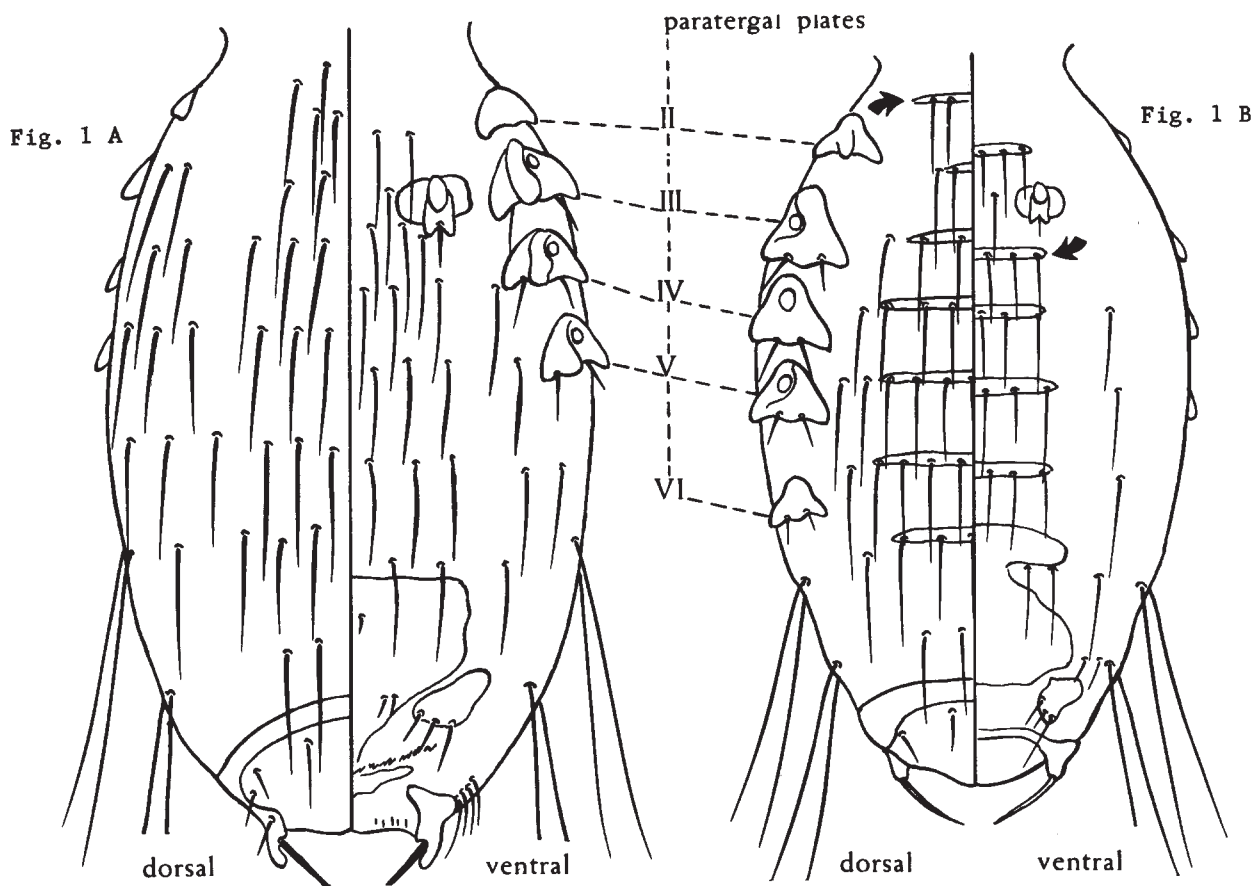
Sternal plate of thorax usually emarginate posteriorly or sometimes quadrate in shape (Fig. 7 C & D).....Neohaematopinus



Key to Species of Enderleinellus

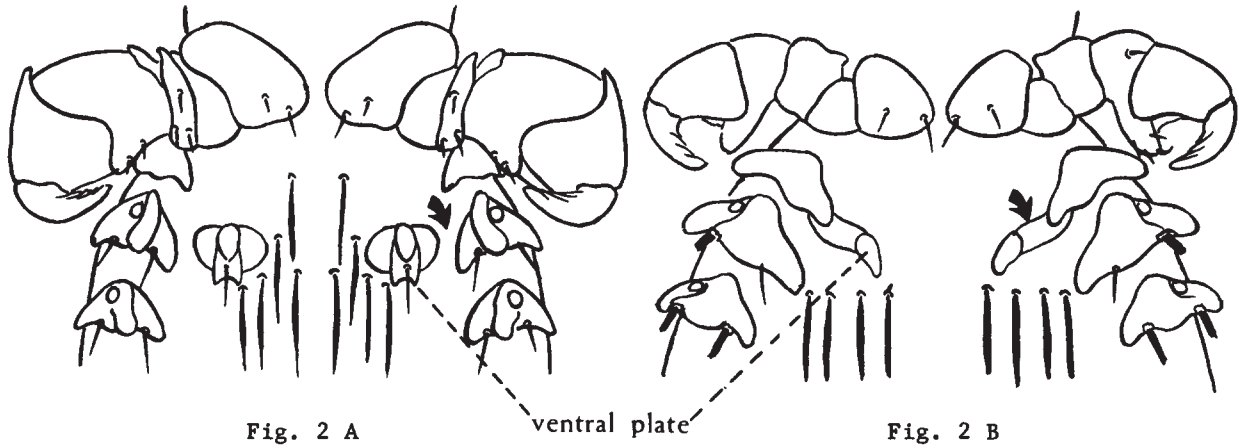
1. Paratergal plates present on abdominal segments 2-5 (Fig. 1 A).....2

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



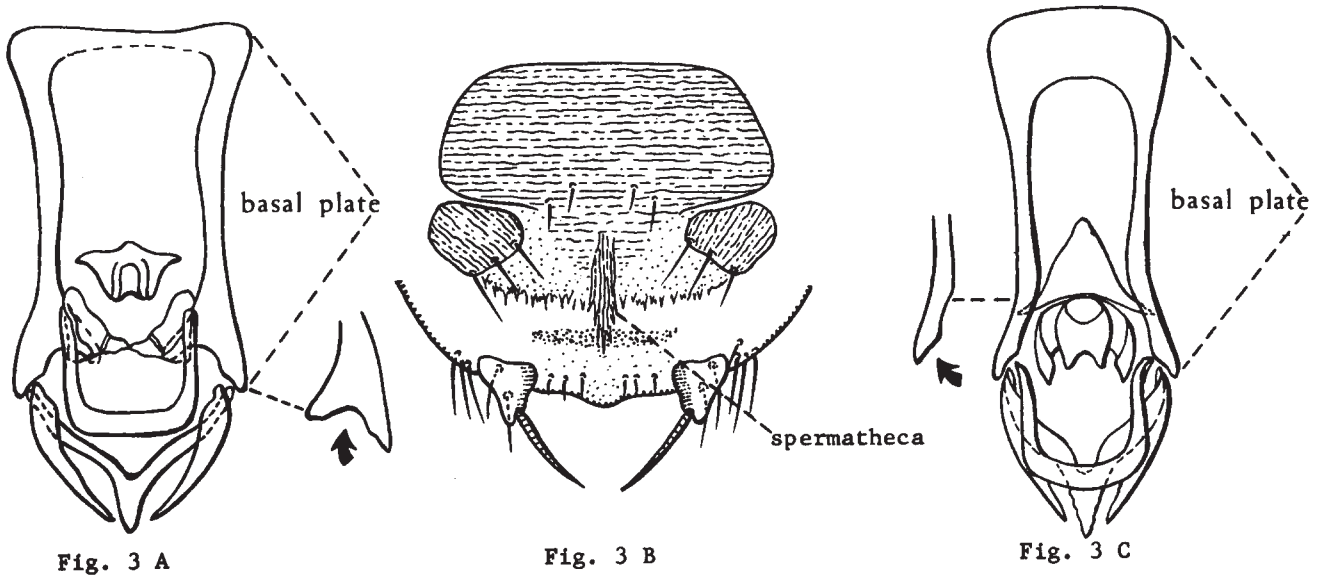
2. Paired ventral plates of abdominal segment 2 completely detached from its corresponding paratergal plate; each ventral plate bearing a single seta (Fig. 2 A). On Sciurus....3

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



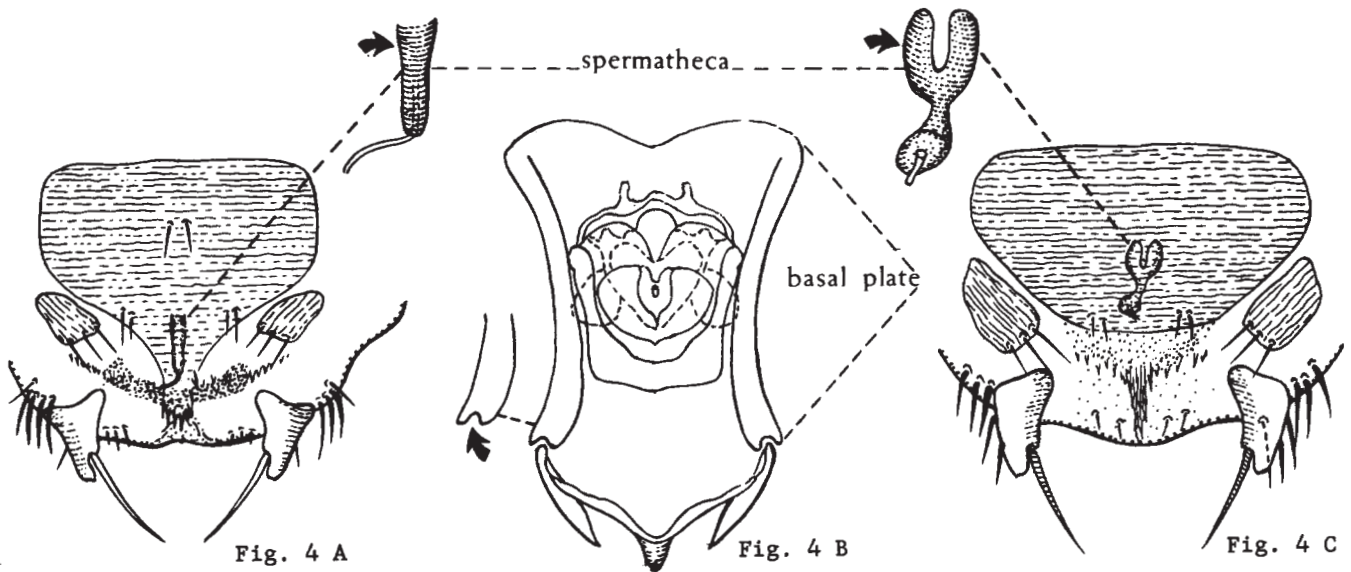
3. Spermatheca present; arms of basal plate apically bilobed (Fig. 3 A & B).....4

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



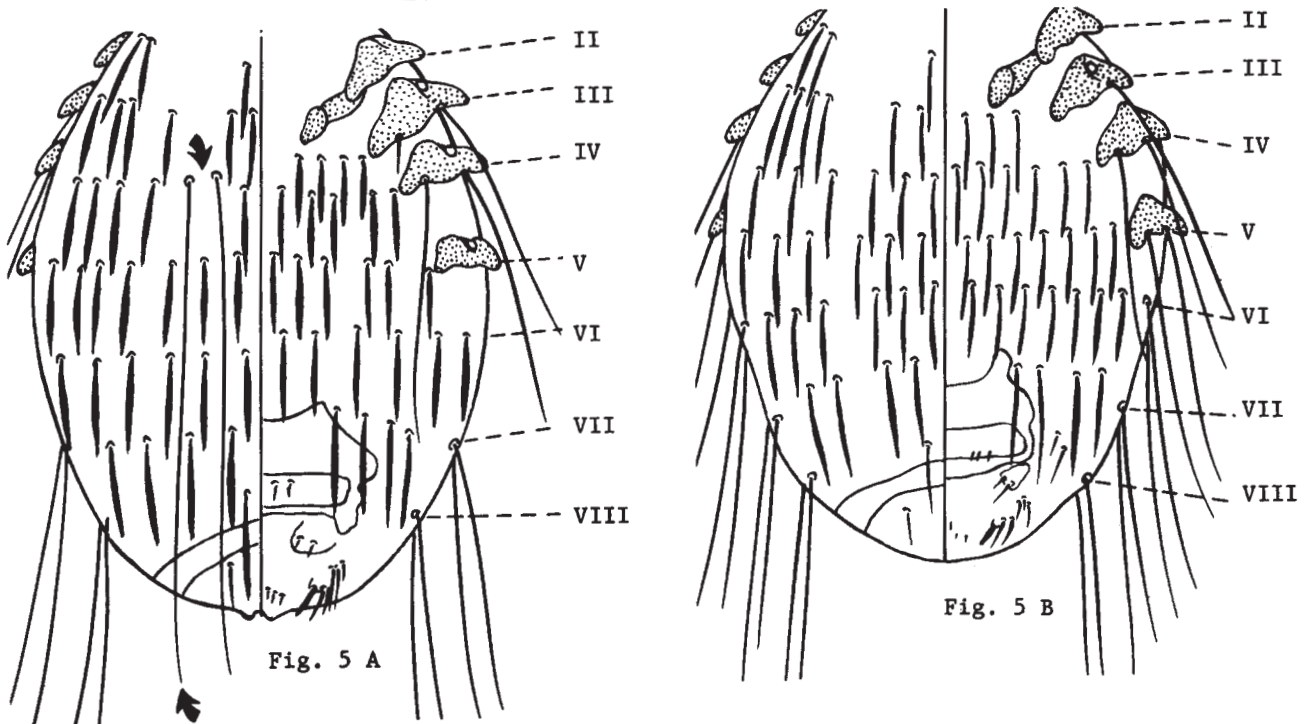
4. Spermatheca a straight slightly tapering tube; arms of basal plate apically bilobed but not expanded (Fig. 4 A & B).....Enderleinellus longiceps (Kellogg & Ferris)

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



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

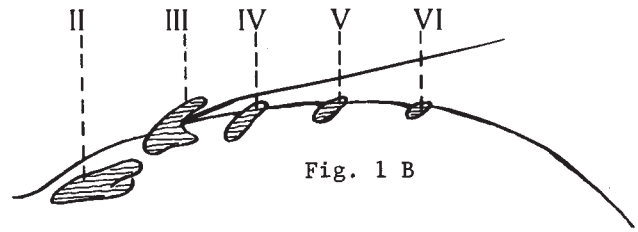
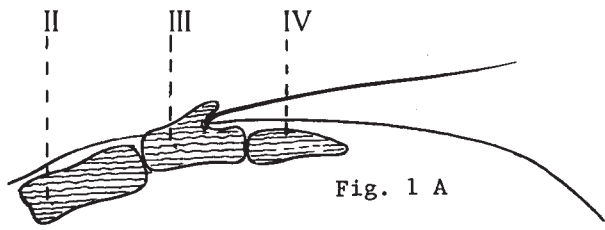


6. Female with 2-4 long setae on dorsum of abdominal segment 4 reaching to apex of body (Fig. 5 A). On Citellus and Cynomys.....Enderleinellus osborni (Kellogg & Ferris)

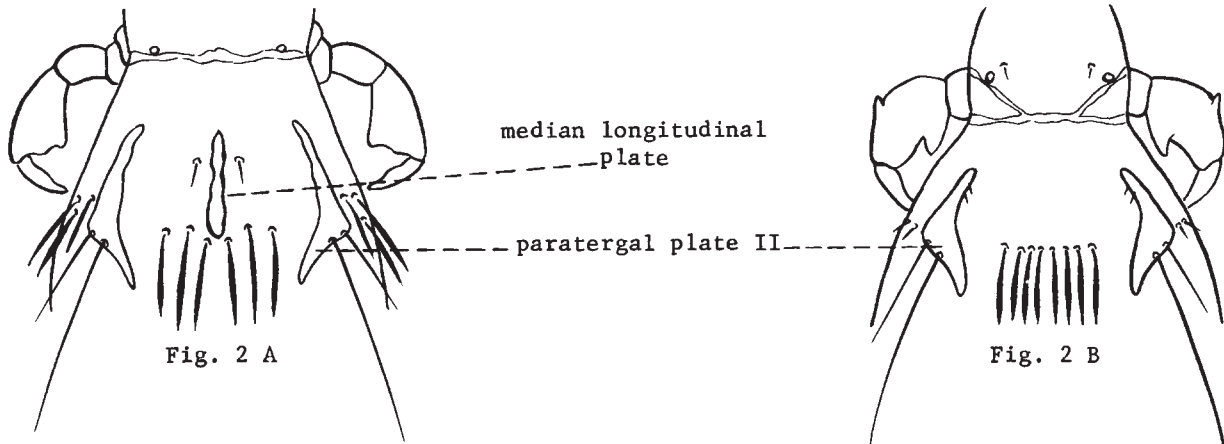
Female without such setae. On Citellus.....Enderleinellus suturalis (Osborn)

Key to Species of *Fahrenholzia*

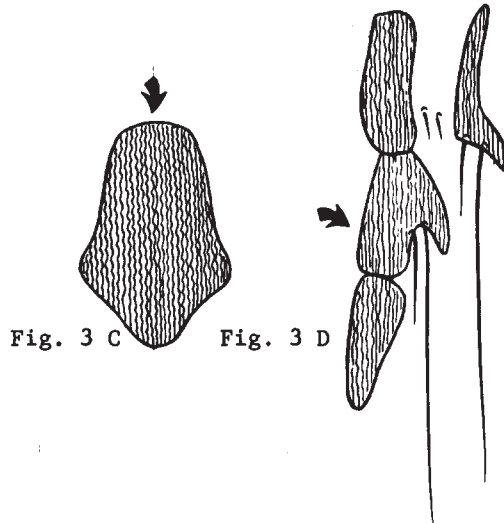
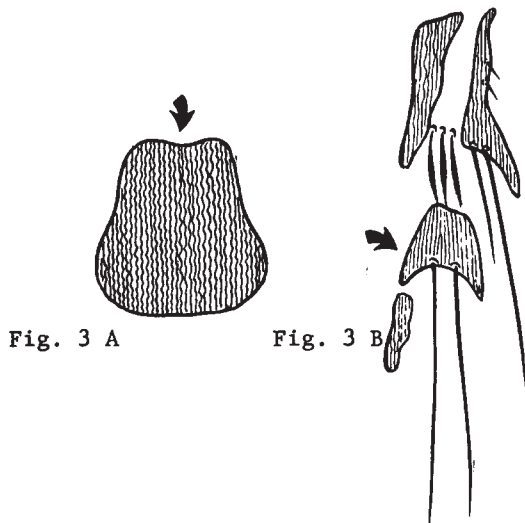
1. Paratergal plates present only on abdominal segments 2 to 4 (Fig. 1 A).....2
- Paratergal plates present on at least abdominal segments 2-6 (Fig. 1 B).....6



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



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



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

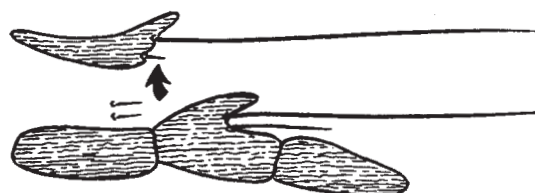


Fig. 4 B

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

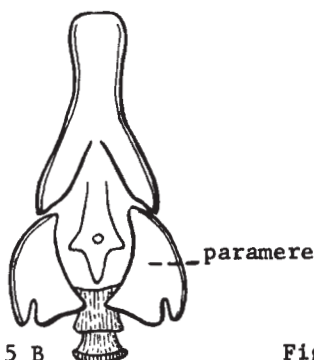


Fig. 5 B



Fig. 5 D

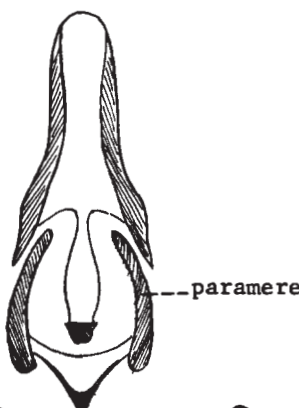


Fig. 5 E

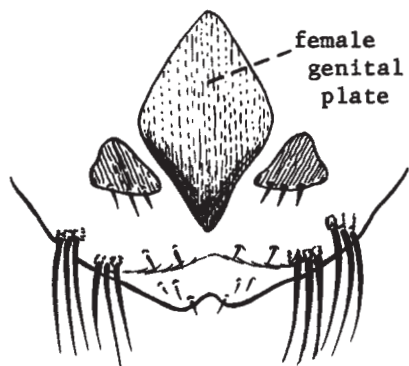


Fig. 5 C

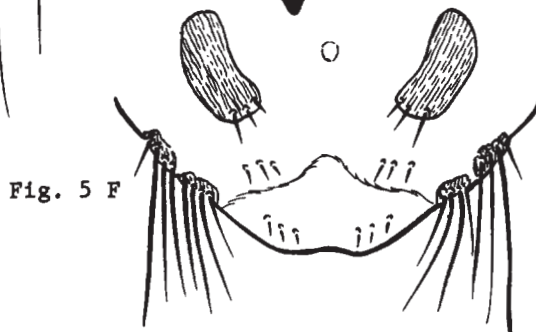


Fig. 5 F

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

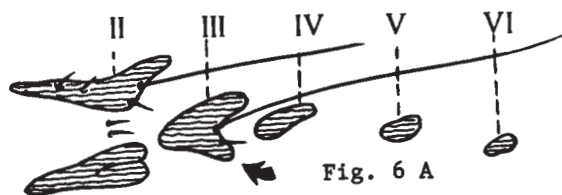


Fig. 6 A

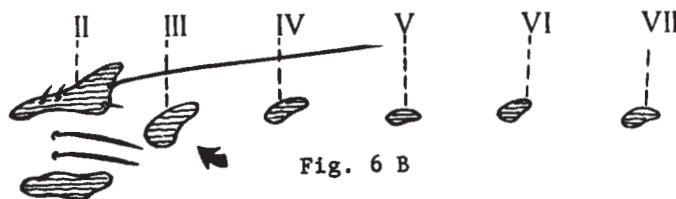


Fig. 6 B

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

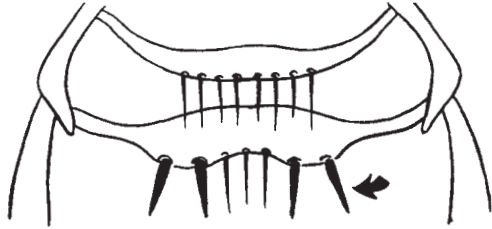


Fig. 1 A

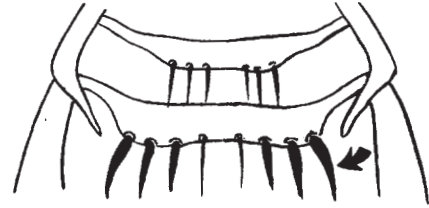


Fig. 1 B

- 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

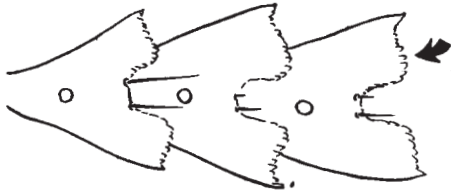


Fig. 2 A



Fig. 2 B

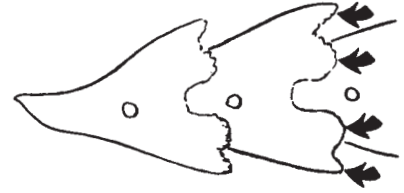


Fig. 2 C

- 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

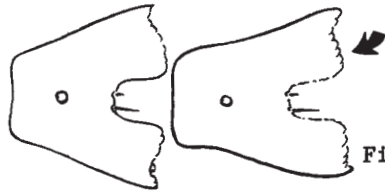


Fig. 3 A



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

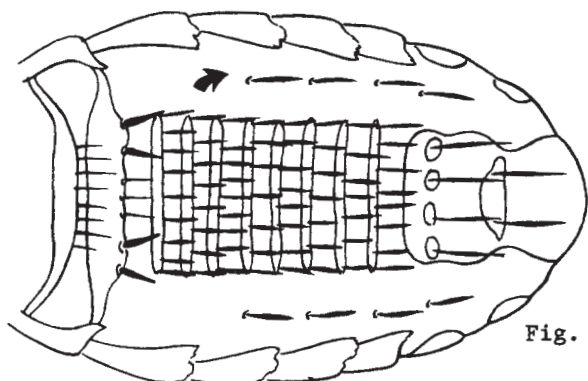


Fig. 5 A

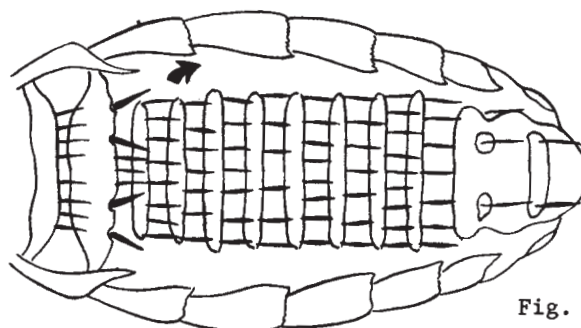


Fig. 5 B

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

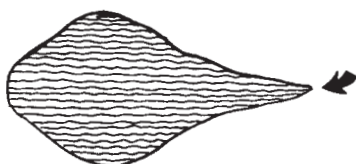


Fig. 6 A

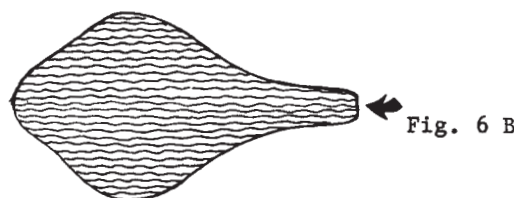


Fig. 6 B

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

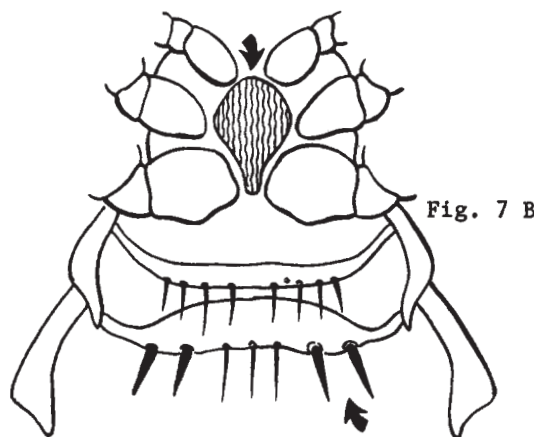
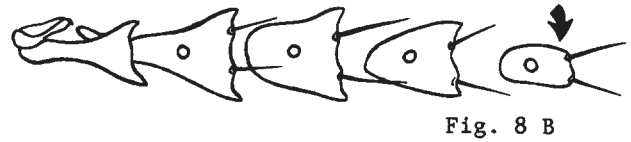
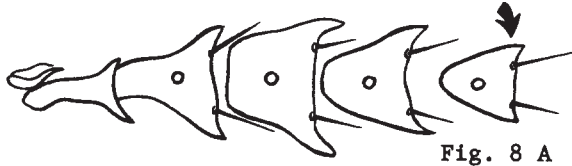


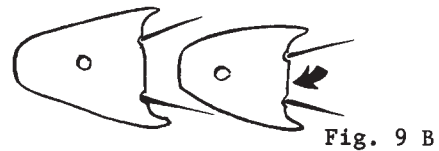
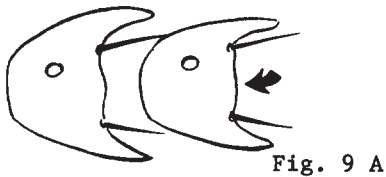
Fig. 7 B

*These species are separated only in the immature stages.

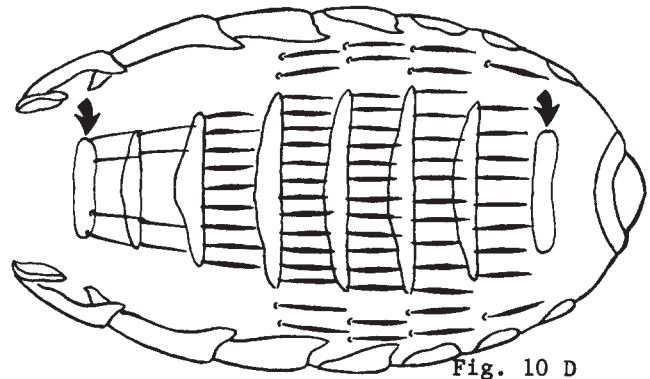
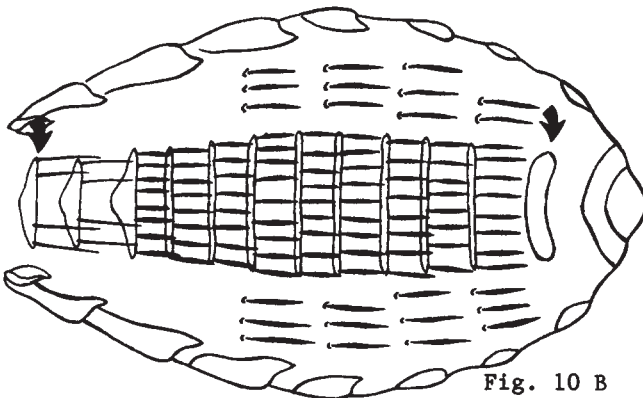
8. Paratergal plate 6 with posterior angles produced into points (Fig. 8 A). On EutamiasHoplopleura arboricola Kellogg & Ferris
 Paratergal plate 6 without points on posterior angles (Fig. 8 B). On Tamias.....Hoplopleura erratica (Osborn)



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

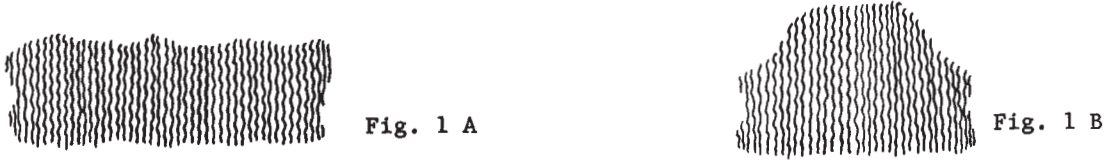


10. Female with paratergal plates 4-6 elongated; male with 11 tergal plates bearing a row of setae (Fig. 10 A & B).....Hoplopleura arizonensis Stojanovich & Pratt
 Female with paratergal plates 4-6 only slightly elongated; male with only 7 tergal plates bearing a row of setae (Fig. 10 C & D).....Hoplopleura hirsuta Ferris



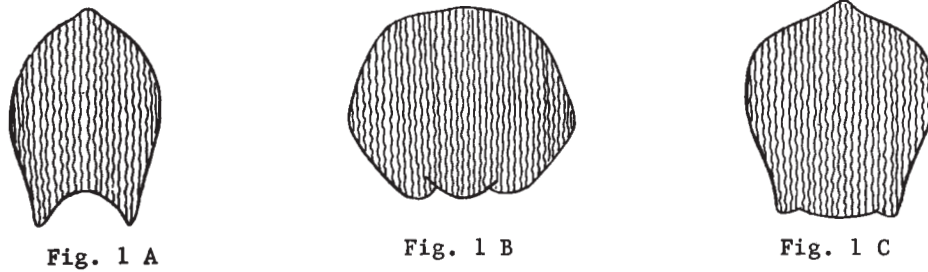
Key to Species of Haemodipsus

1. Thoracic sternal plate almost three times as wide as long (Fig. 1 A). On domestic rabbits (Oryctolagus).....Haemodipsus ventricosus (Denny)
- Thoracic sternal plate hexagonal, being almost as long as wide (Fig. 1 B). On wild rabbits and hares (Sylvilagus and Lepus).....Haemodipsus setoni Ewing

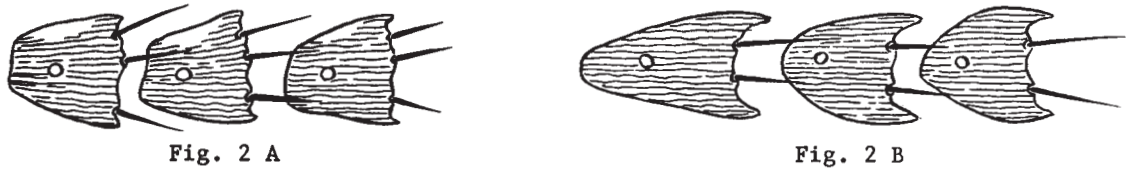


Key to Species of Neohaematopinus

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



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



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



- 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

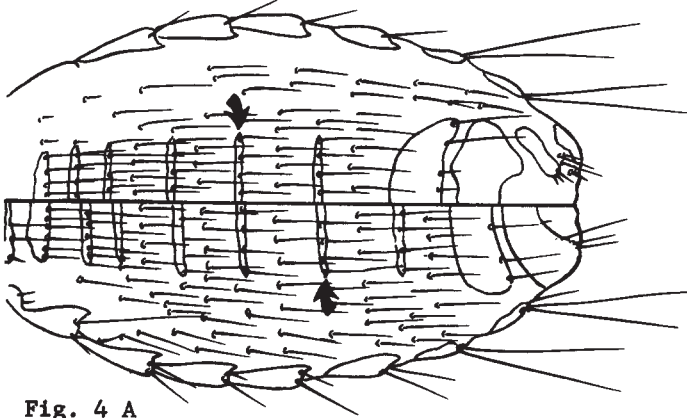


Fig. 4 A

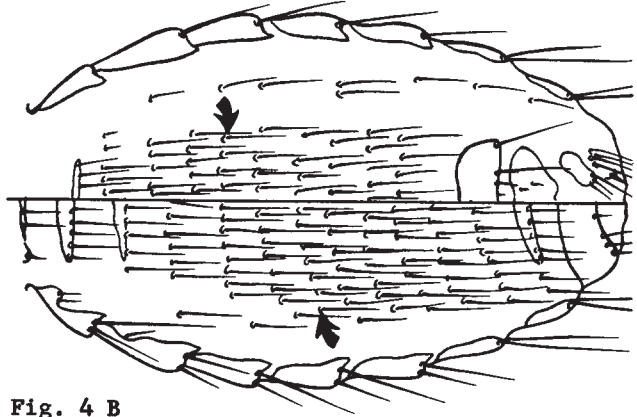


Fig. 4 B

- 5. First antennal segment prolonged postero-apically, with stout spine (Fig. 5 A).....6
First antennal segment without such a prolongation (Fig. 5 B).....8

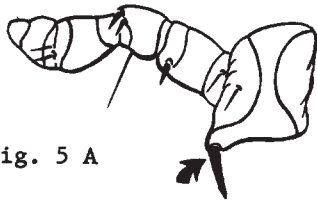


Fig. 5 A

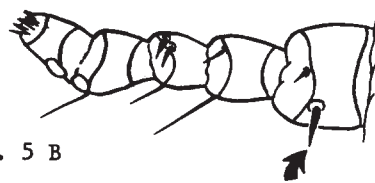


Fig. 5 B

- 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

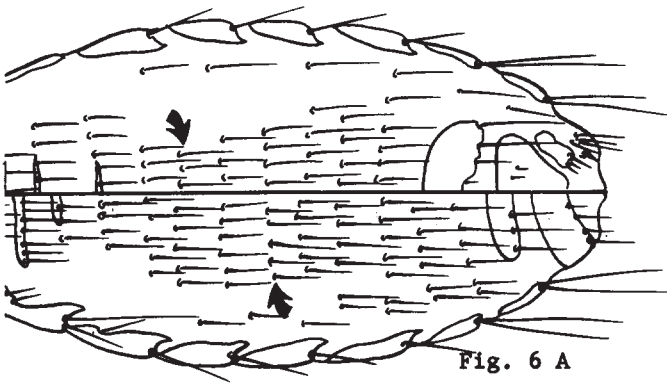


Fig. 6 A

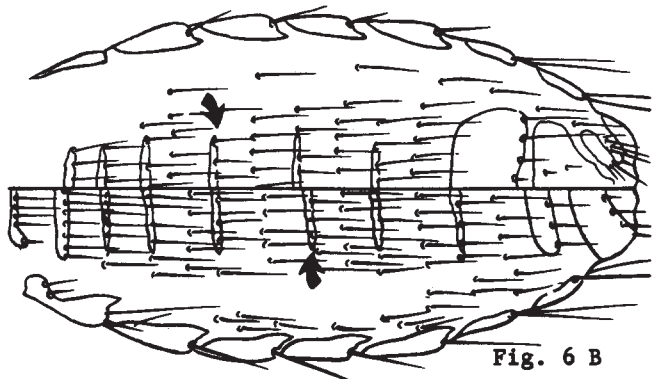


Fig. 6 B

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

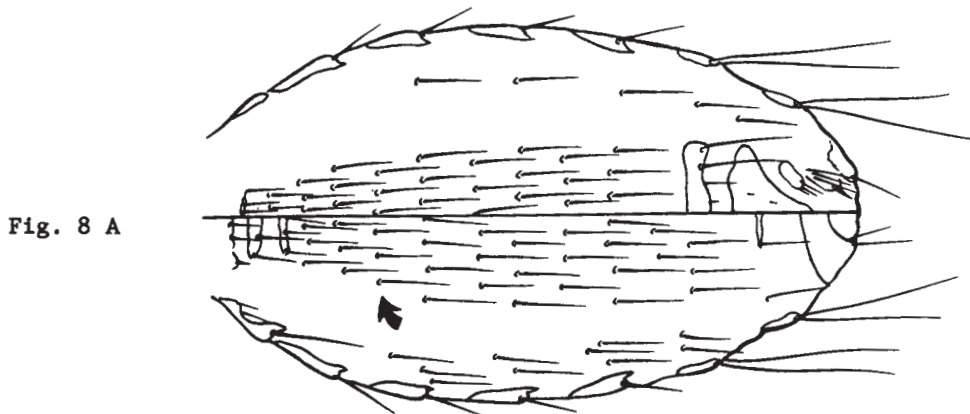


Fig. 8 A

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)

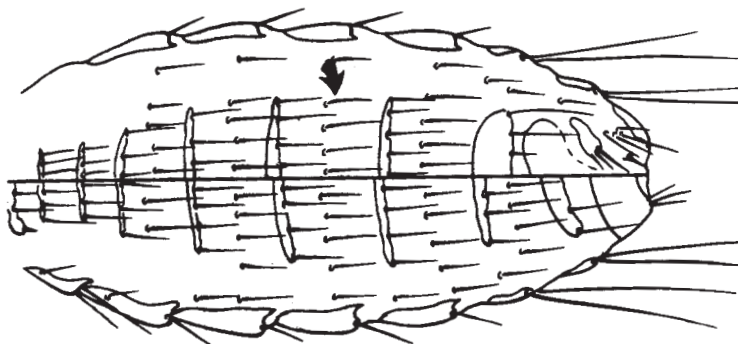


Fig. 9 A

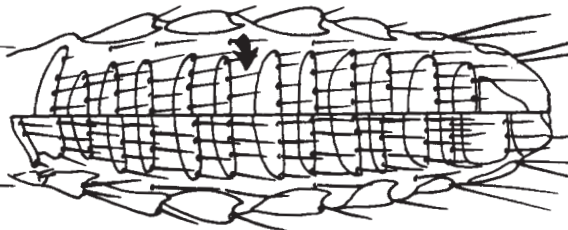


Fig. 9 B

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

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

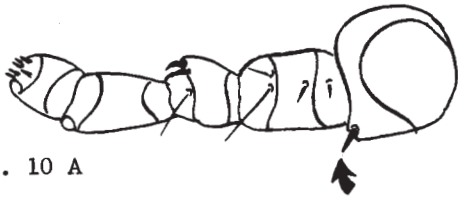


Fig. 10 A

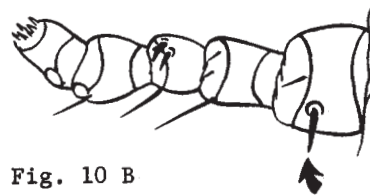


Fig. 10 B

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

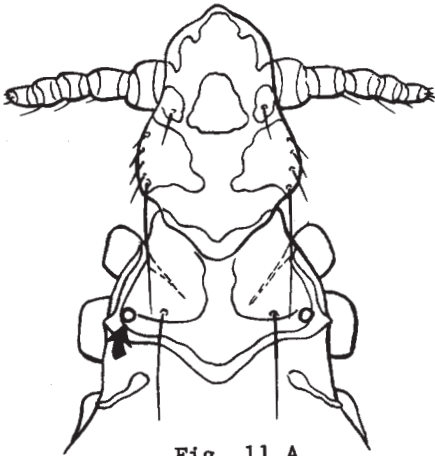


Fig. 11 A

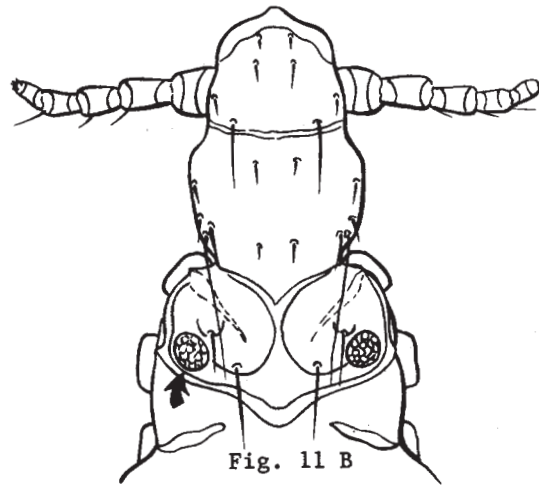


Fig. 11 B

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

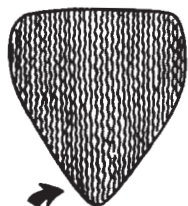


Fig. 1 A

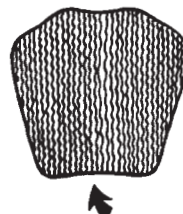


Fig. 1 B

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).....4
- 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)

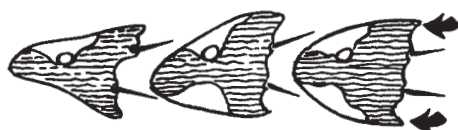


Fig. 3 A



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

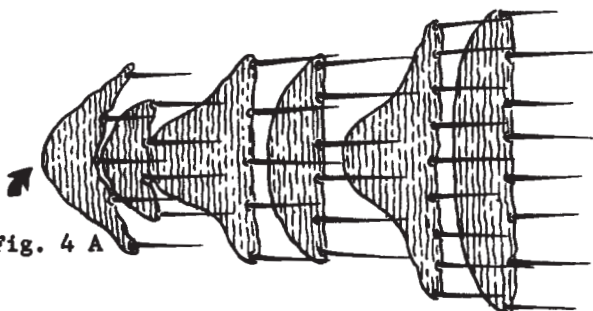


Fig. 4 A

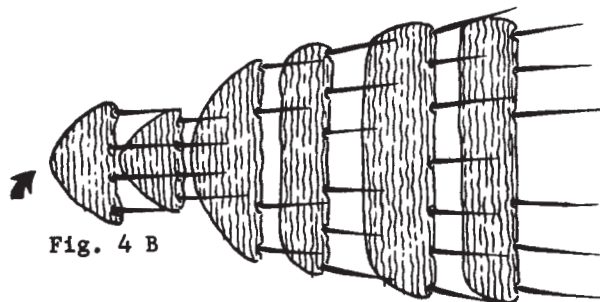


Fig. 4 B

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

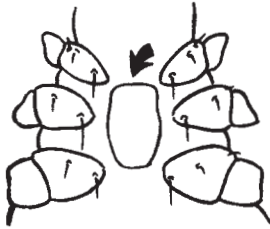


Fig. 1 A

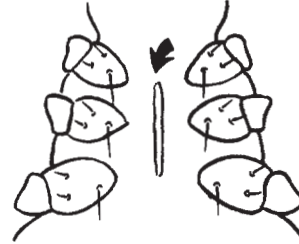


Fig. 1 B

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

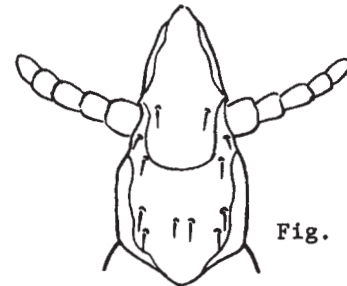


Fig. 1 B

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

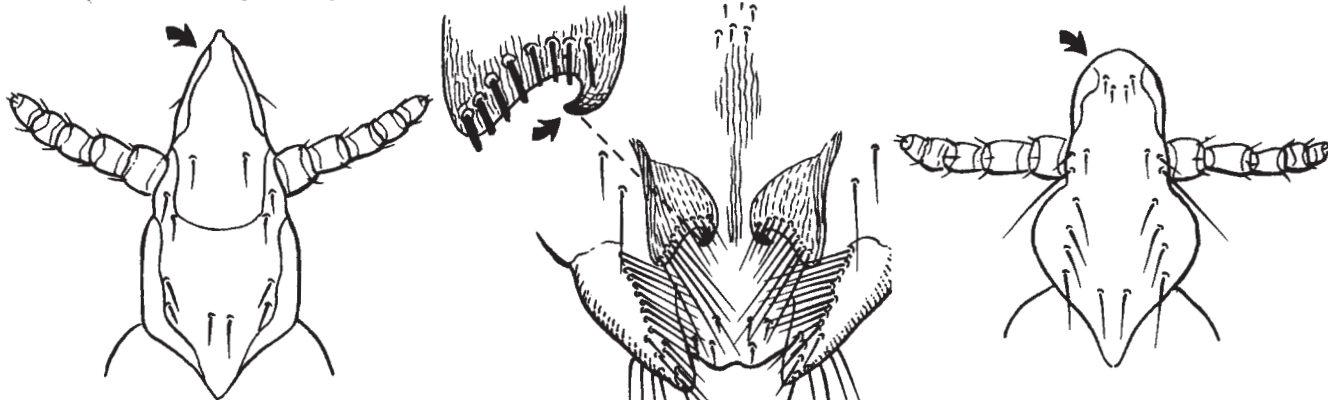


Fig. 3 A

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

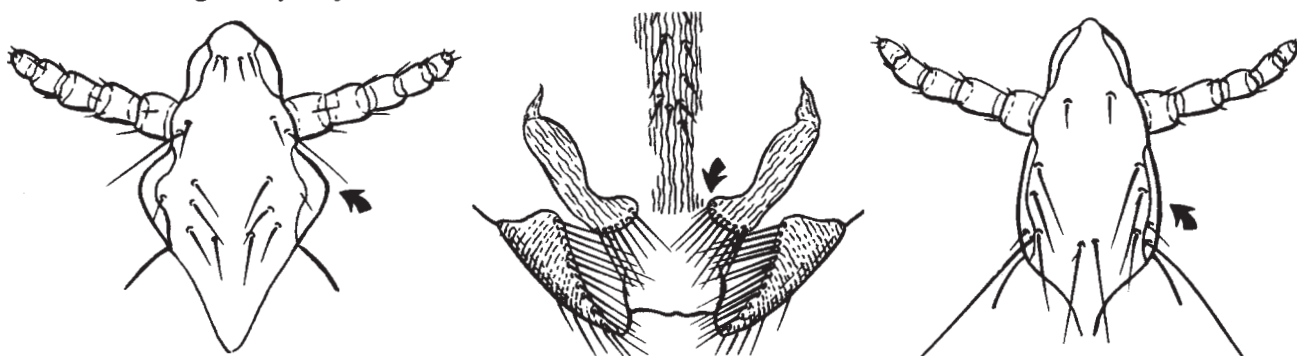


Fig. 4 A

Fig. 4 B

Fig. 4 C

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

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

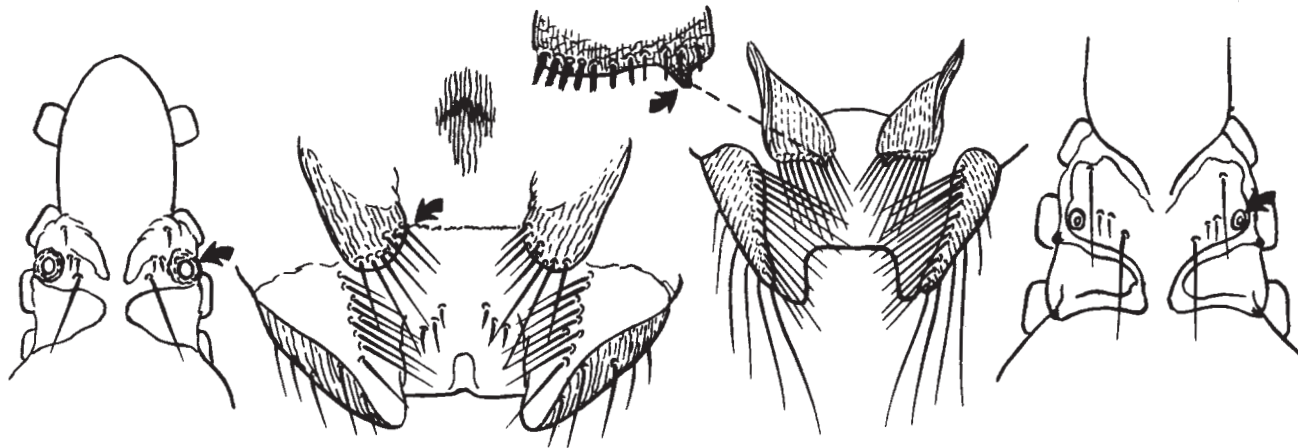


Fig. 5 A

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 C

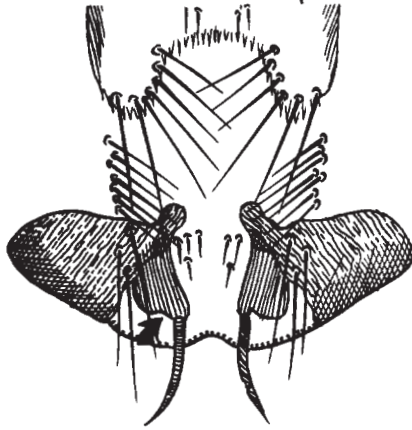


Fig. 1 B (capillatus)

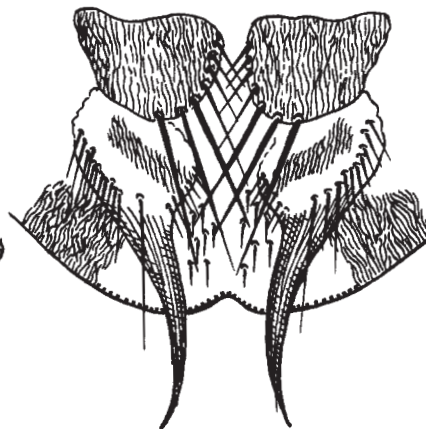


Fig. 1 D (binipilosus)

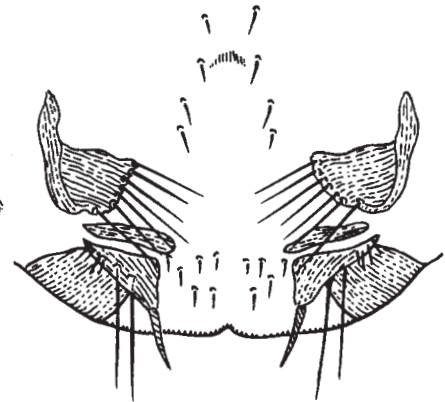


Fig. 1 E (ferrisi)

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)

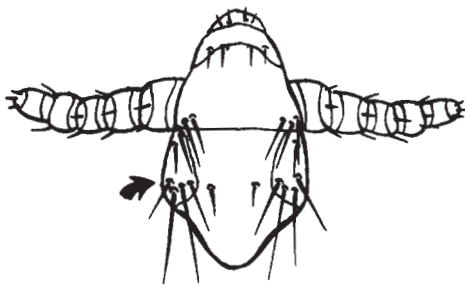


Fig. 2 A

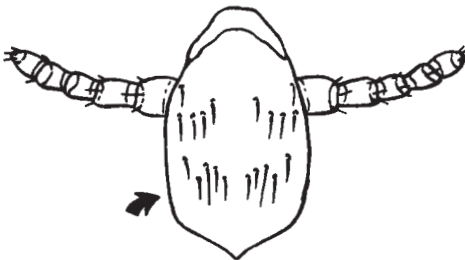


Fig. 2 B



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)

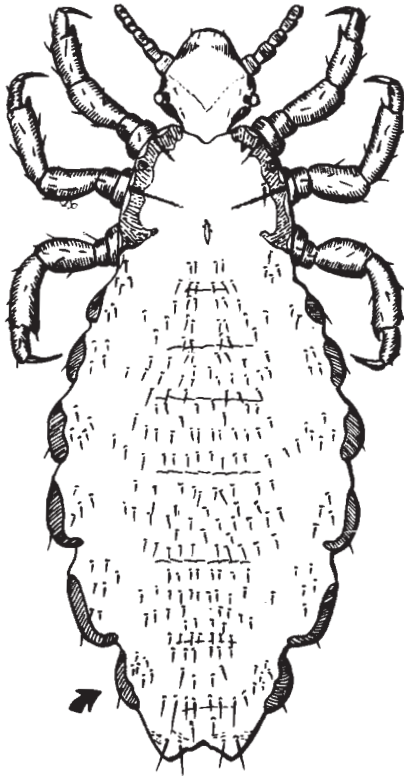


Fig. 1 A

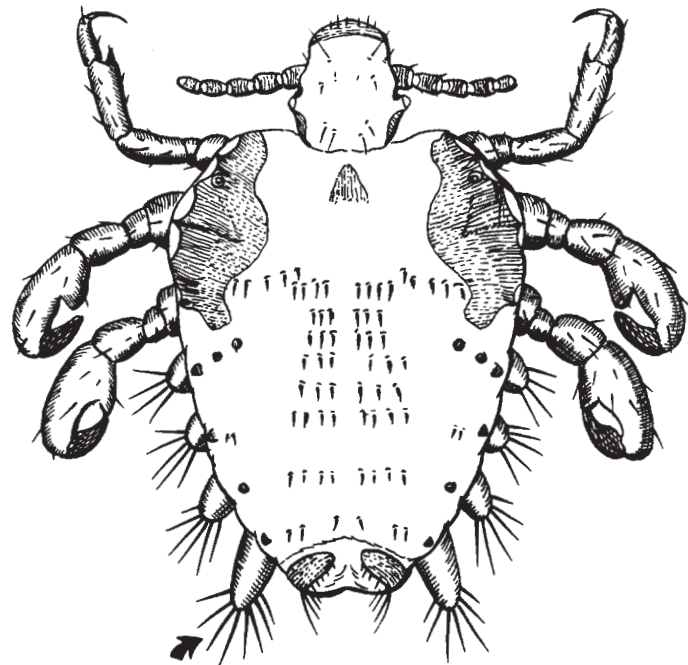
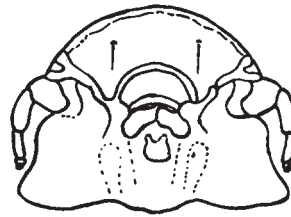


Fig. 1 B

MALLOPHAGA: PICTORIAL KEY TO SPECIES INFESTING PIGEONS
Harold George Scott and Chester J. Stojanovich

maxillary palps present

maxillary palps absent

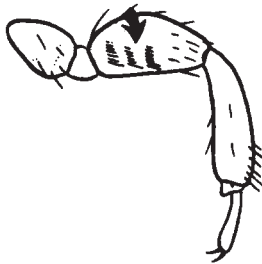
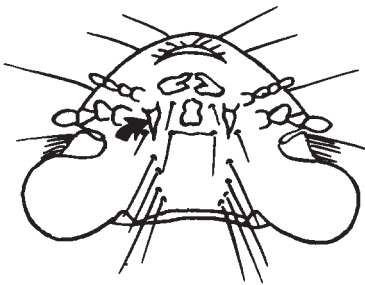


forehead with spines

forehead without spines

femur III with comb

femur III without comb



Hohorstiella lata
 LARGE PIGEON BODY LOUSE

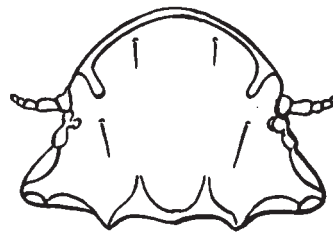
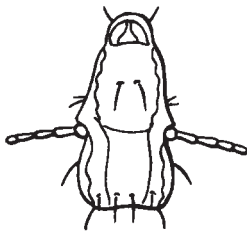
Colpocephalum turbinatum
 SMALL PIGEON BODY LOUSE

Bonomiella columbae
 PIGEON VENT LOUSE

head longer than wide

head wider than long
 forehead with spines

forehead without spines

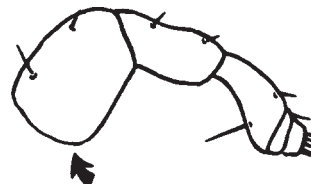


Columbicola columbae
 SLENDER PIGEON LOUSE

Physconelloides zenaidurae
 PIGEON HEAD LOUSE

male basal antennal segment small

male basal antennal segment large

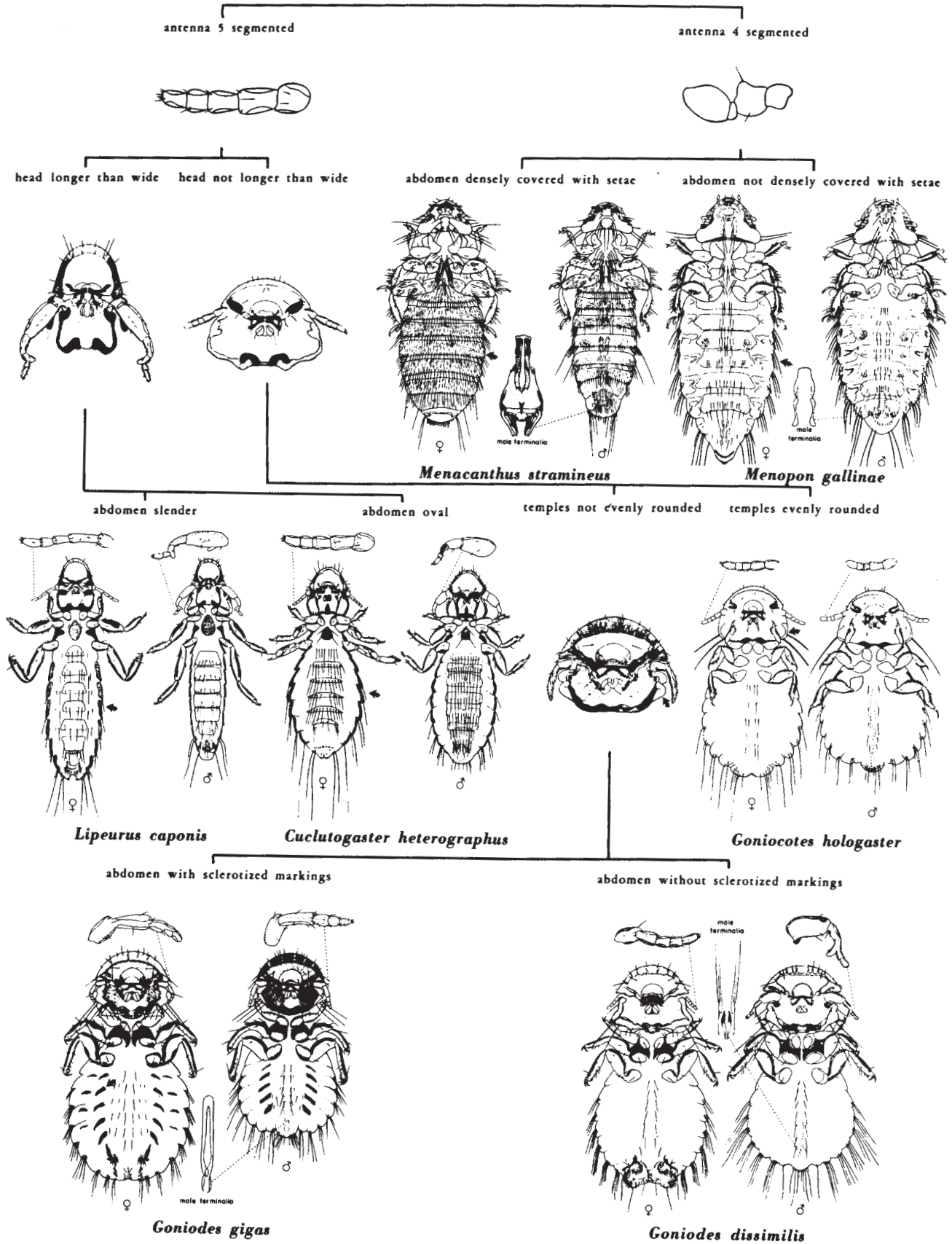


Campanulotes bidentatus compar
 SMALL PIGEON FEATHER LOUSE

Coloceras damicorne fahrenheitzi
 LARGE PIGEON FEATHER LOUSE

MALLOPHAGA: PICTORIAL KEY TO SOME COMMON SPECIES ON CHICKENS

Chester J. Stojanovich and Harry D. Pratt

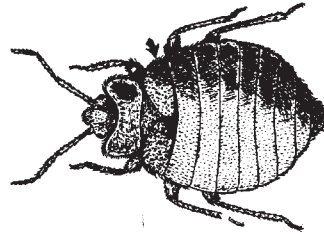
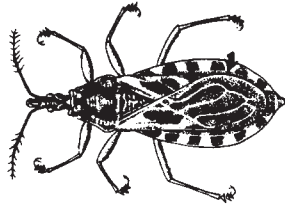


BUGS: PICTORIAL KEY TO SOME SPECIES THAT MAY BITE MAN

Harry D. Pratt and Chester J. Stojanovich

wings usually well-developed; body elongate-oval

wings reduced; body broadly-oval



ASSASSIN AND KISSING BUGS-FAMILY REDUVIIDAE

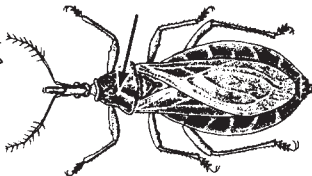
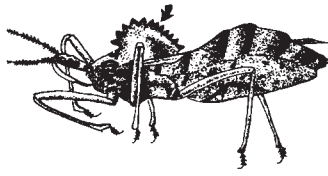
BED BUGS-FAMILY CIMICIDAE

thorax with cog-wheel crest

thorax without crest

middle coxae nearly touching
beak reaching 2nd coxa

middle coxae widely separated
beak not reaching 2nd coxa



WHEEL BUG
Arilus cristatus

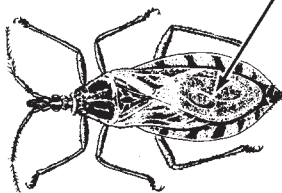
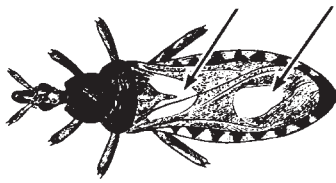
POULTRY BUG
Haematosiphon inodorus

fore-wing with 2 yellow spots

fore-wing dark in U. S. species

3rd and 4th antennal
segments equal

4th antennal segment
shorter than 3rd



CORSAIR
Rasahus biguttatus

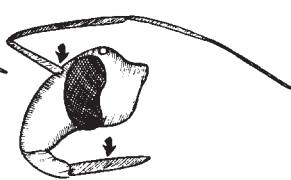
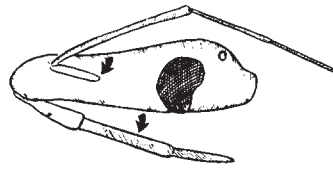
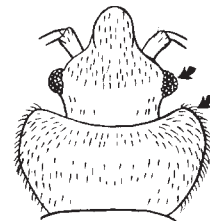
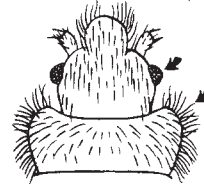
BARN SWALLOW BUG
Oeciacus vicarius

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

fringe hairs on pronotum
shorter than width of eye

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

antenna inserted near eye;
beak stout, curved



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

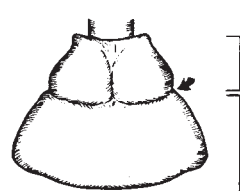
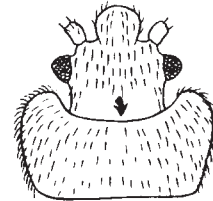
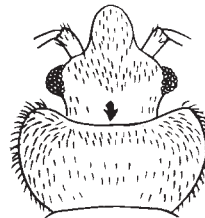
pronotum with anterior margin
moderately excavated

pronotum with anterior margin
deeply excavated

KISSING BUG
Triatoma spp

pronotum constricted behind middle

pronotum constricted before middle



BLACK BUG
Melanolestes picipes

MASKED HUNTER
Reduvius personatus

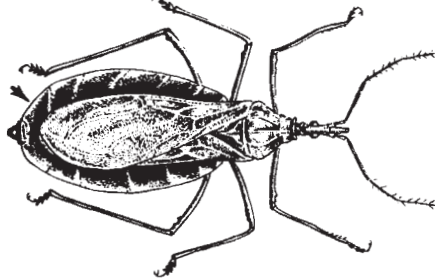
TROPICAL BED BUG
Cimex hemipterus
SO. U.S. & TROPICS

BED BUG
Cimex lectularius
TEMPERATE AREAS

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

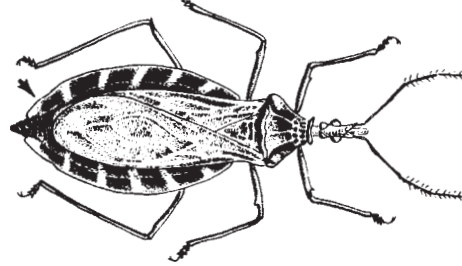
Harold George Scott and Margery R. Borom

about 1-1/4 inch long; connexivum pale



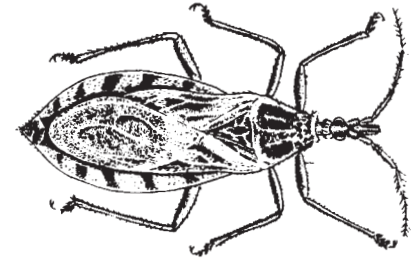
Triatoma recurva

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

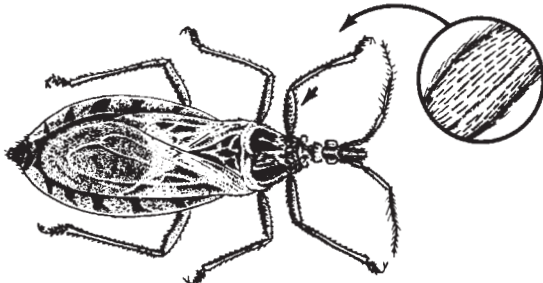


Triatoma gerstaeckeri

less than 1 inch long

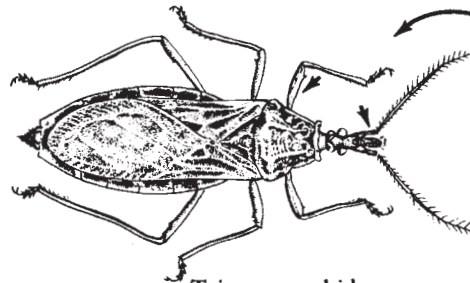


first femur with thick hair

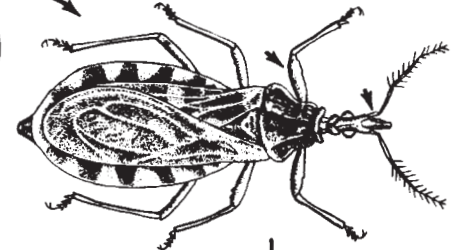


Triatoma lecticularius

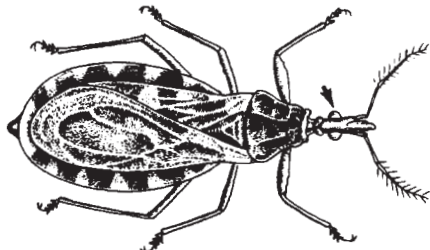
first antennal segment long ← first femur with sparse hair → first antennal segment short



Triatoma rubida

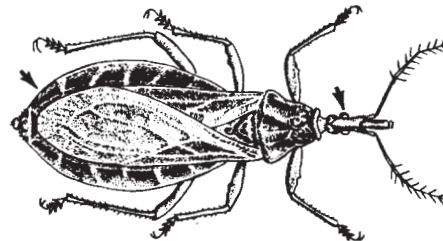


eyes large

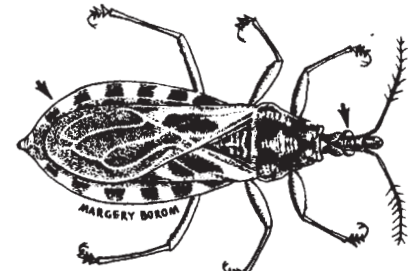


Triatoma sanguisuga

connexivum brown, pale banded or not ← eyes small → connexivum yellow banded

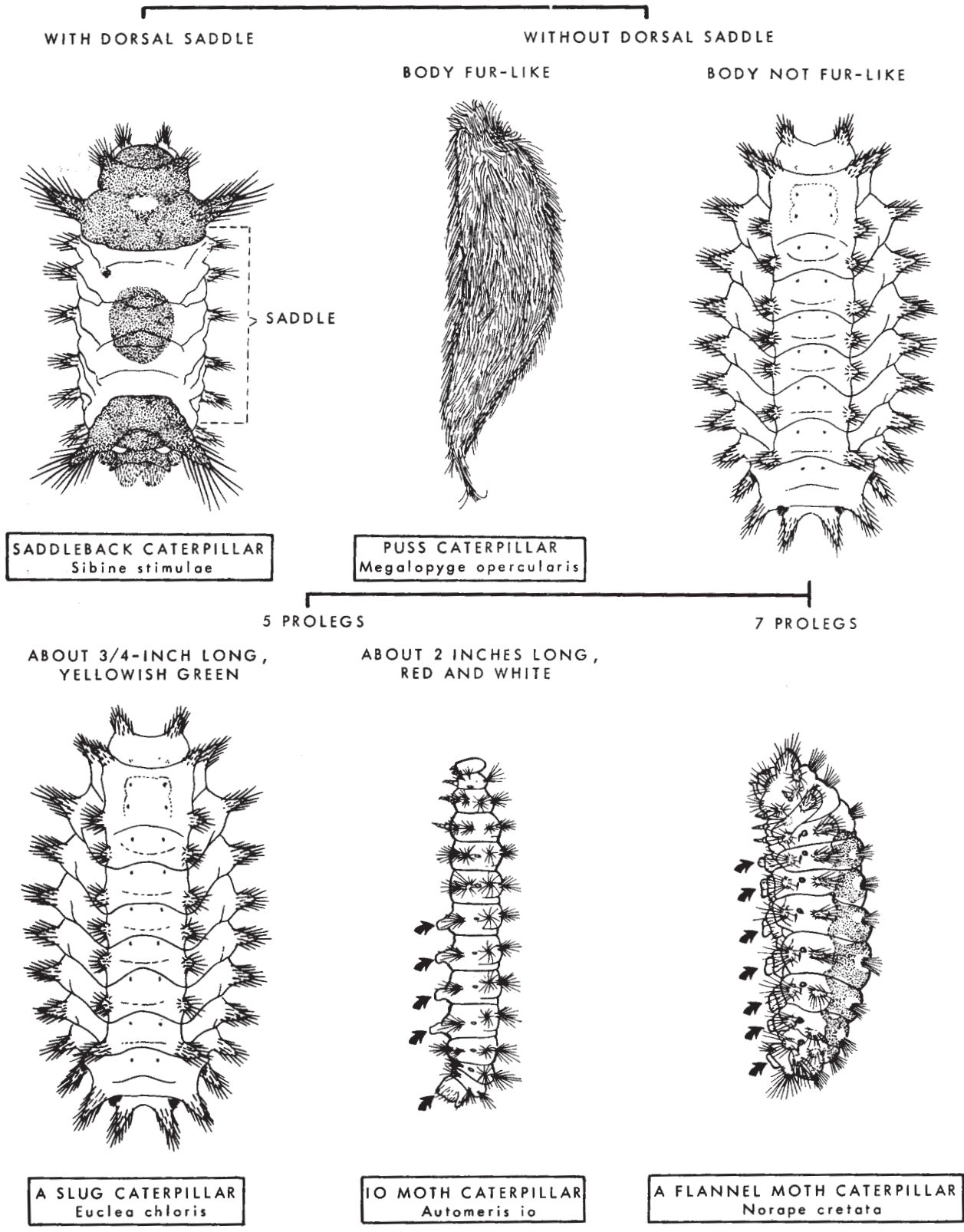


Triatoma protracta



Triatoma neotomae

**STINGING CATERpillARS:
PICTORIAL KEY TO SOME IMPORTANT UNITED STATES SPECIES**
Harold George Scott & Chester J. Stojanovich



MOTHS: KEY TO SOME SPECIES COMMONLY ASSOCIATED WITH STORED FOOD
Harold George Scott

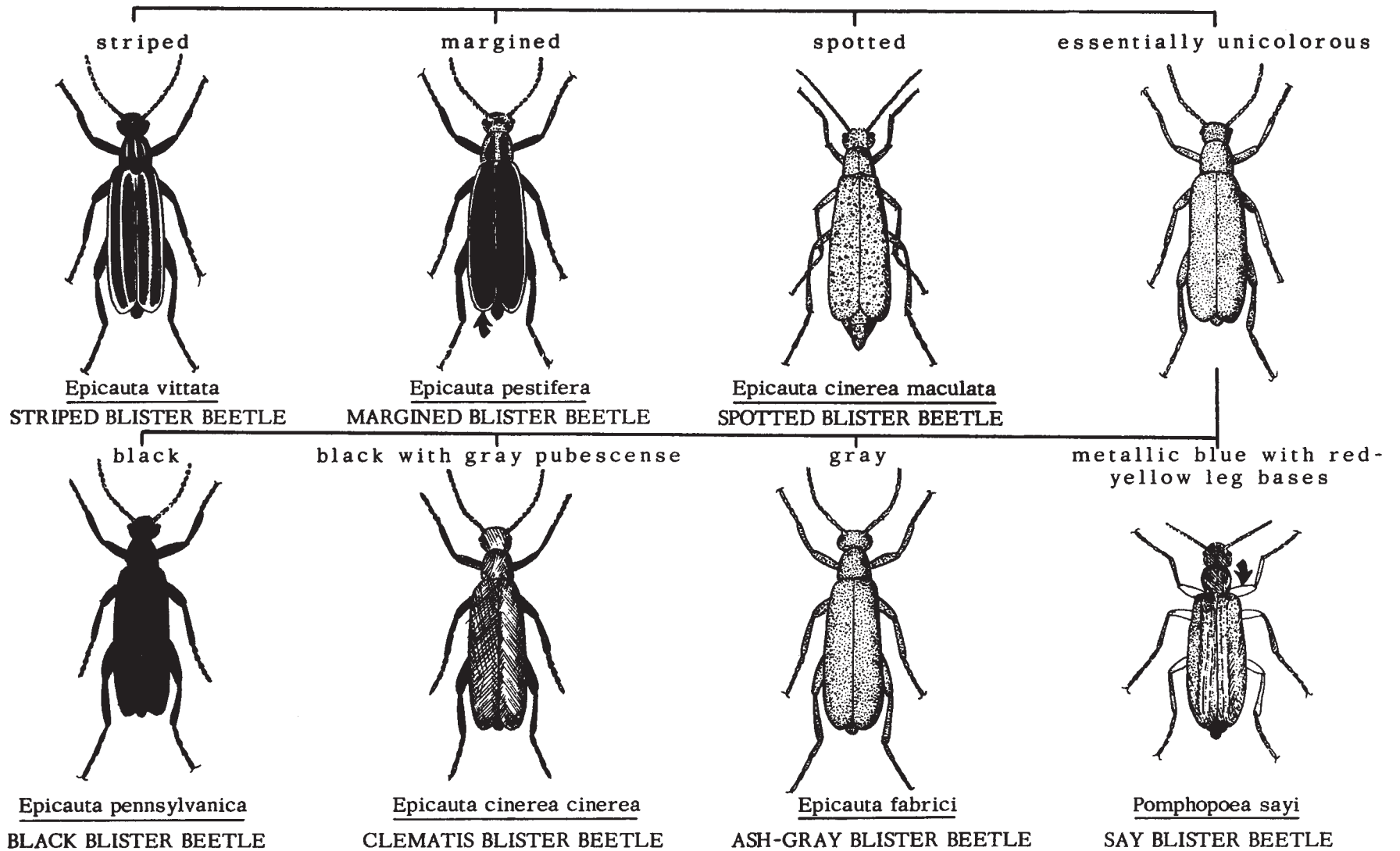
- | | | |
|--|--------------------------|---|
| 1. Caterpillars | | 2 |
| Adult moths | | 5 |
| 2. Pinkish larvae up to 3/5-inch long living in silken tubes and producing matter webbing in the infested food (<i>Anagasta kuhniella</i>) | MEDITERRANEAN FLOUR MOTH | |
| Whitish larvae with or without black or orange markings | | 3 |
| 3. Black head and prothorax; orange markings at both ends of the body; living in silken tubes (<i>Pyralis farinalis</i>) | MEAL MOTH | |
| Without black head and prothorax | | 4 |
| 4. White to greenish-white larvae producing matter webbing in the infested food (<i>Plodia interpunctella</i>) | INDIAN MEAL MOTH | |
| Whitish; not producing matted webbing; living inside kernels of grain (<i>Sitotroga cerealella</i>) | ANGOUMOIS GRAIN MOTH | |
| 5. Wings unicolorous to slightly spotted; long fringe at rear of wings (<i>Sitotroga cerealella</i>) | ANGOUMOIS GRAIN MOTH | |
| Wings heavily dark marked | | 6 |
| 6. Distal half of front wings dark; basal half light (<i>Plodia interpunctella</i>) | INDIAN MEAL MOTH | |
| Wings not so marked | | 7 |
| 7. Basal and distal thirds of front wings dark; middle portion of front wings light (<i>Pyralis farinalis</i>) | MEAL MOTH | |
| Front wings pale gray with transverse wavy black markings (<i>Anagasta kuhniella</i>) | MEDITERRANEAN FLOUR MOTH | |



Angoumois Grain Moth

BLISTER BEETLES: KEY TO SOME COMMON UNITED STATES SPECIES

Harold George Scott and Chester J. Stojanovich



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

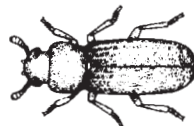
Harry D. Pratt

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



SAW-TOOTHED GRAIN BEETLE
Oryzaephilus surinamensis

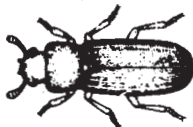
PRONOTUM WITHOUT TEETH ON EACH SIDE
BEAK ABSENT



SMALL BROWNISH SPECIES
LESS THAN 1/4 INCH LONG

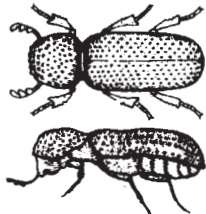
LARGER BLACKISH SPECIES
1/4 TO 3/4 INCH LONG

HEAD VISIBLE FROM ABOVE
1/8 INCH LONG OR MORE

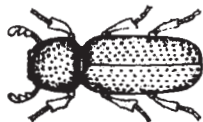


CONFUSED AND RED FLOUR BEETLES
Tribolium confusum AND *castaneum*

HEAD HIDDEN UNDER PRONOTUM
LESS THAN 1/8 INCH LONG



FORE WING WITH ROUGHENED SURFACE



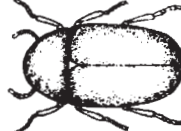
LESSER GRAIN BORER
Rhyzopertha dominica

FORE WING WITH LINES



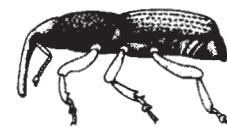
DRUG STORE BEETLE
Stegobium paniceum

FORE WING SMOOTH

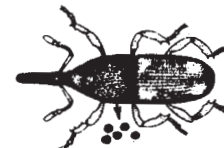


CIGARETTE BEETLE
Lasioderma serricorne

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 oryzae

EACH FORE WING DARK
PRONOTUM WITH ELONGATE PUNCTURES



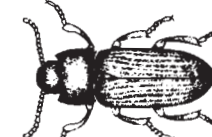
GRANARY WEEVIL
Sitophilus granarius

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

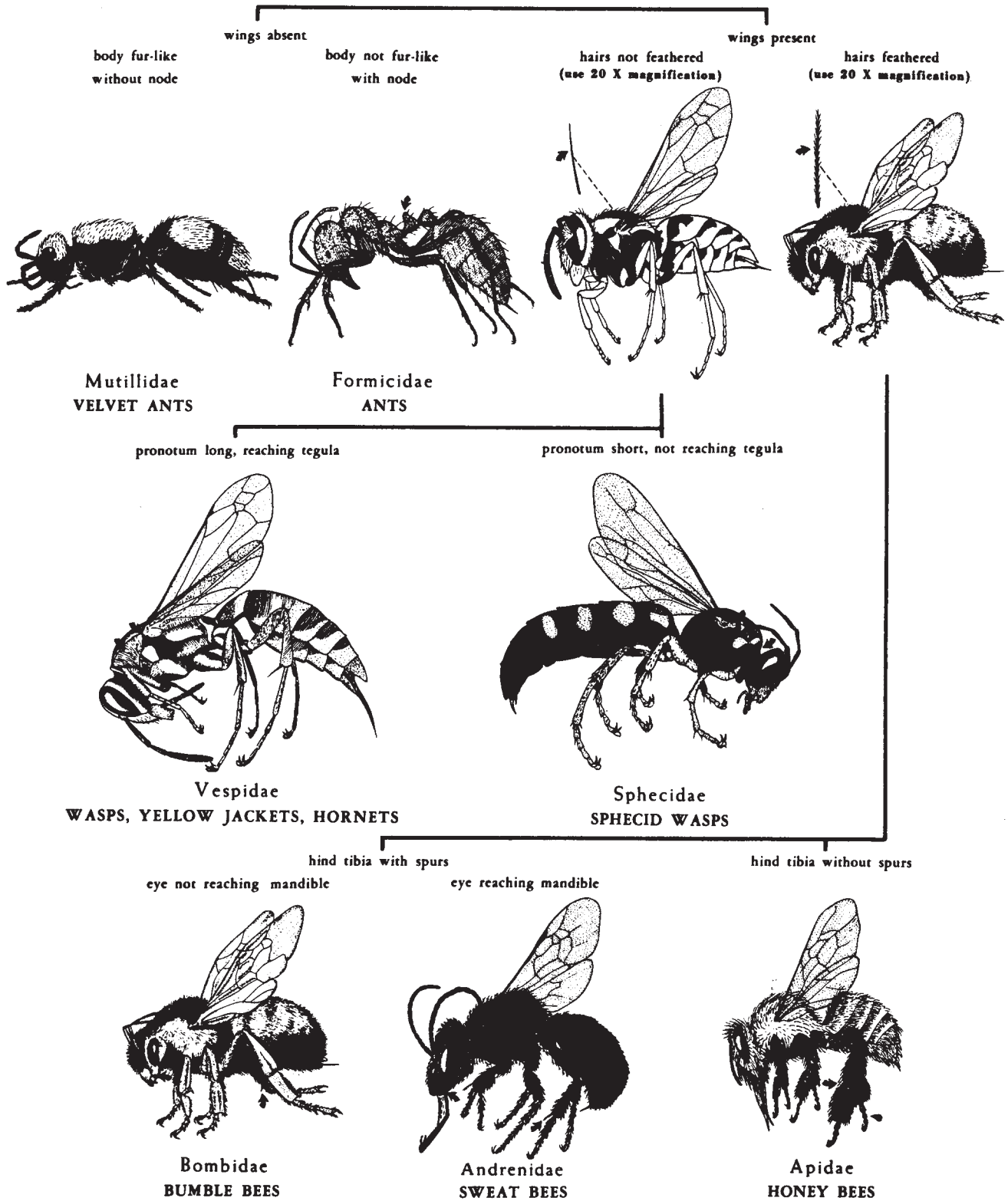


DIAGRAM OF SOCIAL WASP

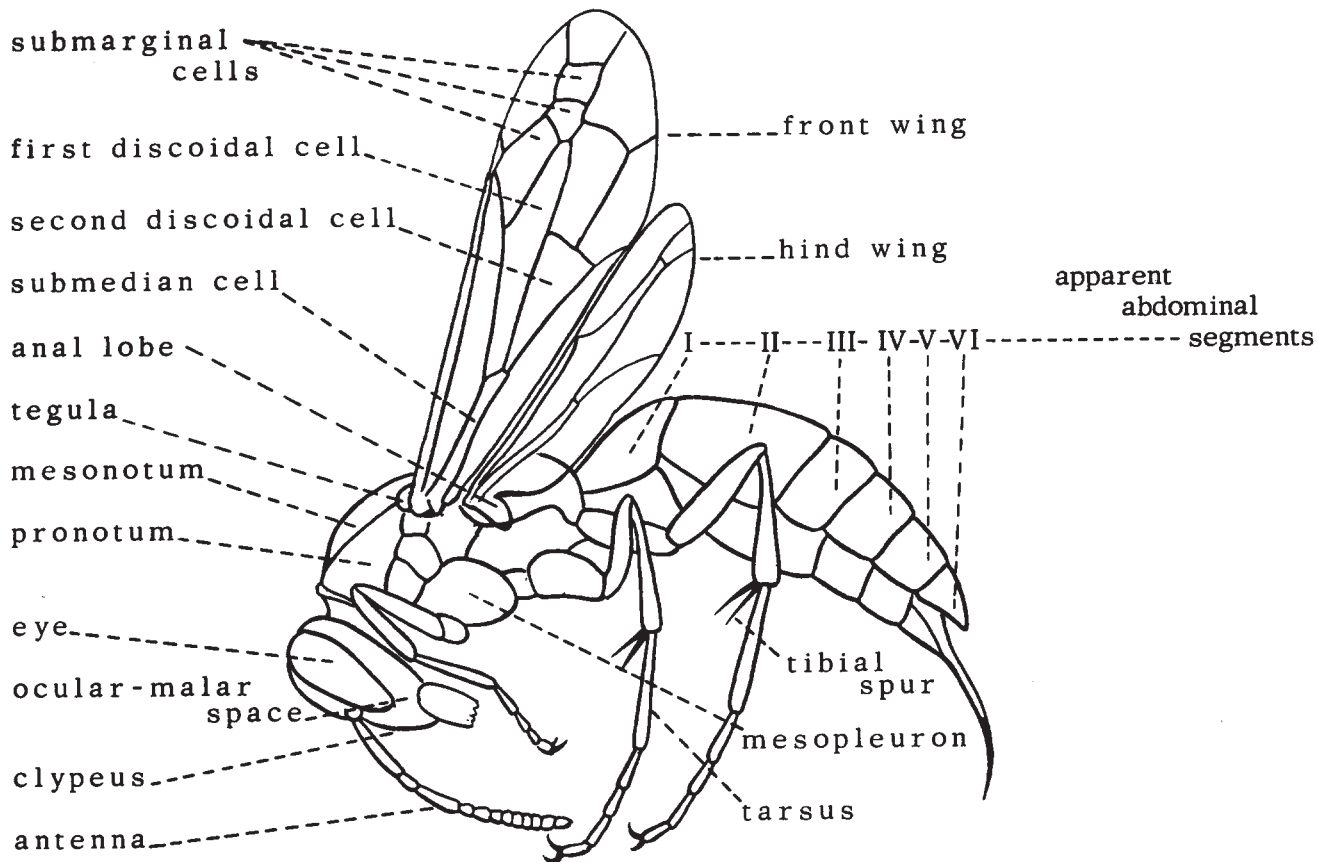
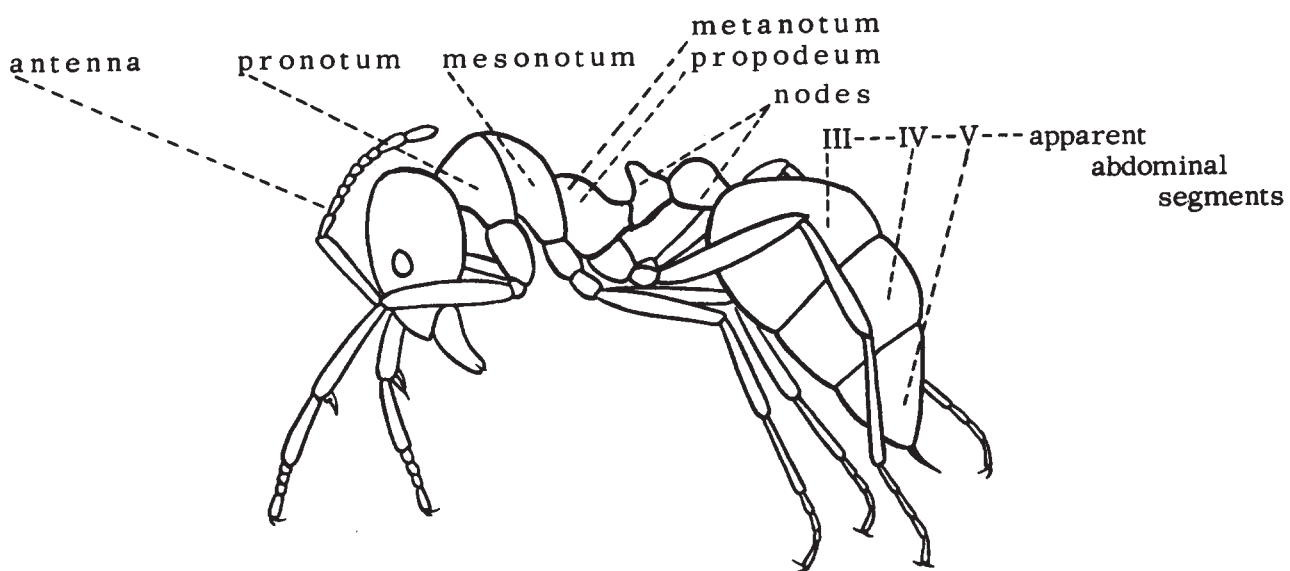


DIAGRAM OF FIRE ANT



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

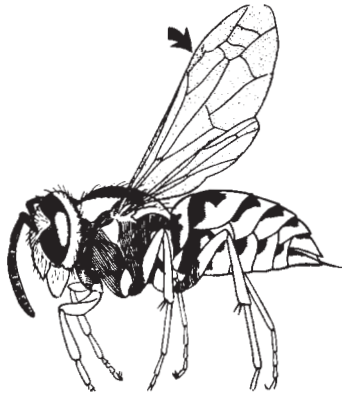


Fig. 1 A



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

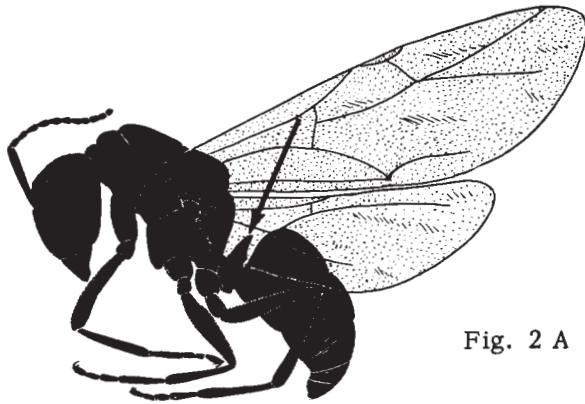


Fig. 2 A



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

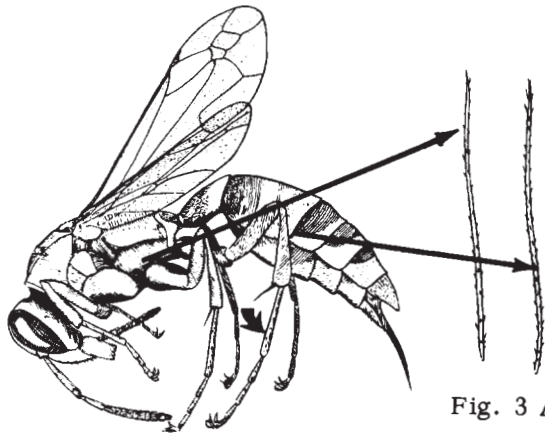
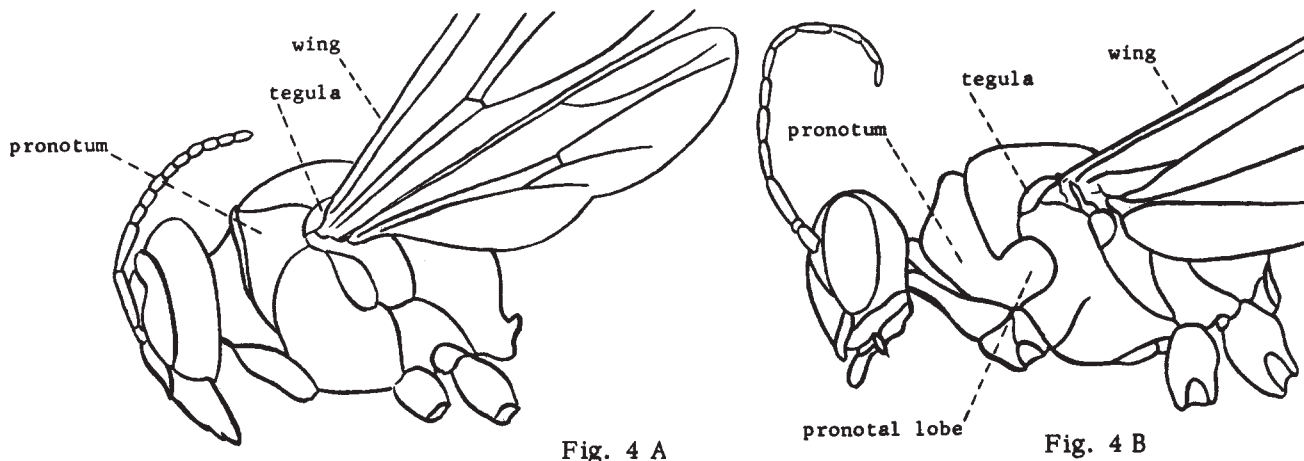


Fig. 3 A

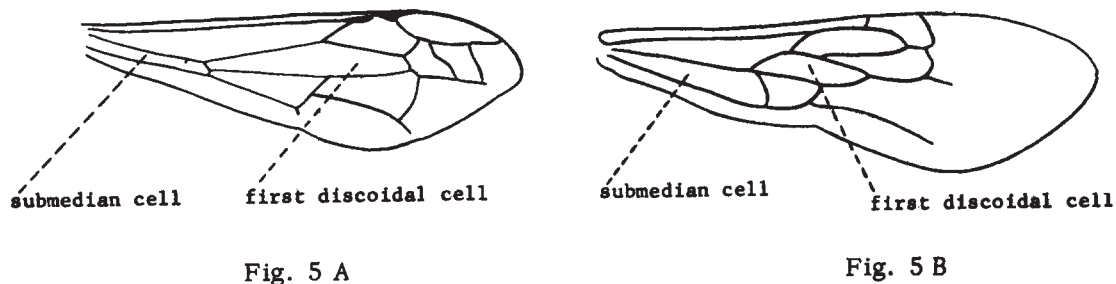


Fig. 3 B

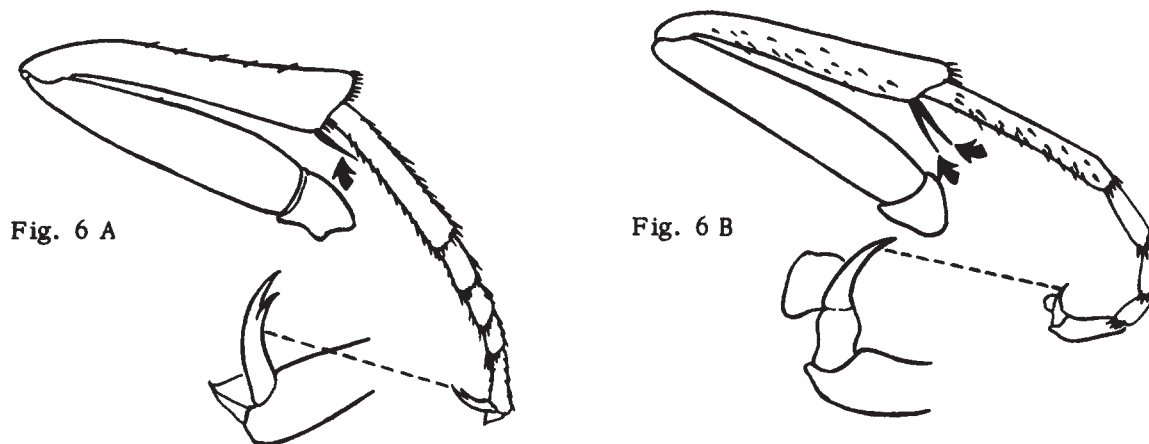
4. Pronotum extending entirely, or almost back, to the tegula (the scale covering base of fore-wing), its hind angles not lobed (Fig. 4 A). (Superfamily Vespoidea).....5
- Pronotum shortened, more or less collar-like, not extending back to tegula, its hind angles often produced into lobes (Fig. 4 B). (Superfamily Sphecoidea).....22



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



6. One spur at tip of middle tibia; claws bifid, split at tip (Fig. 6 A). (Subfamily Eumeninae).....18
Solitary Wasps.....
- Two spurs at tip of middle tibia; claws tapering to point (Fig. 6 B).....7



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

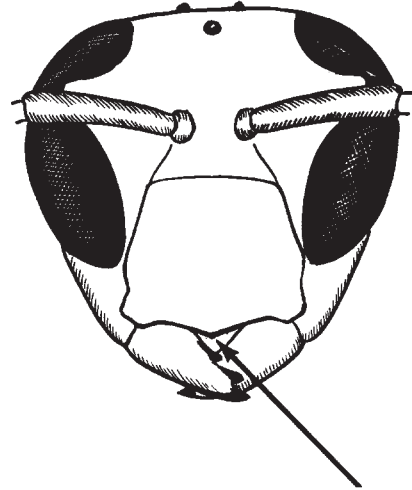


Fig. 7 C



Fig. 7 B

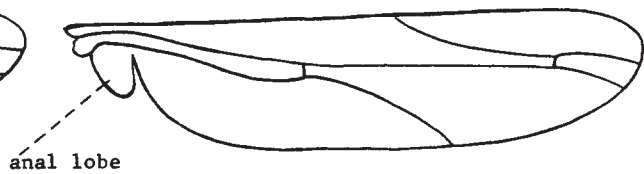


Fig. 7 D

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

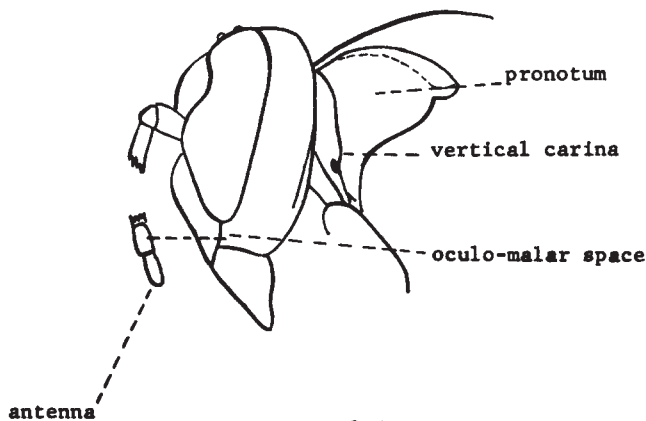


Fig. 8 A

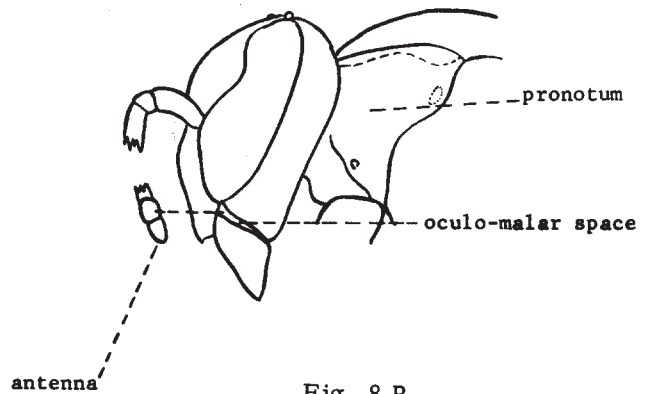


Fig. 8 B

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

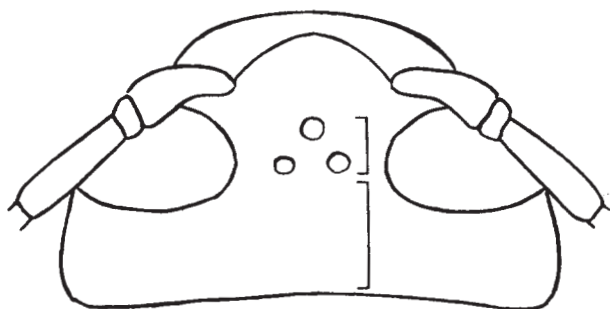


Fig. 9 A

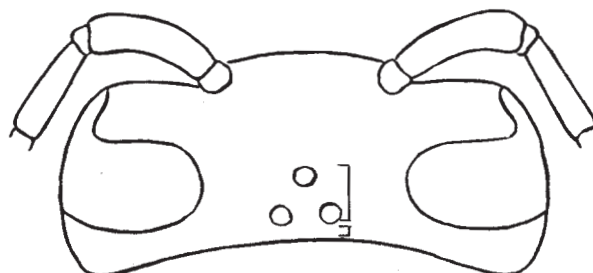
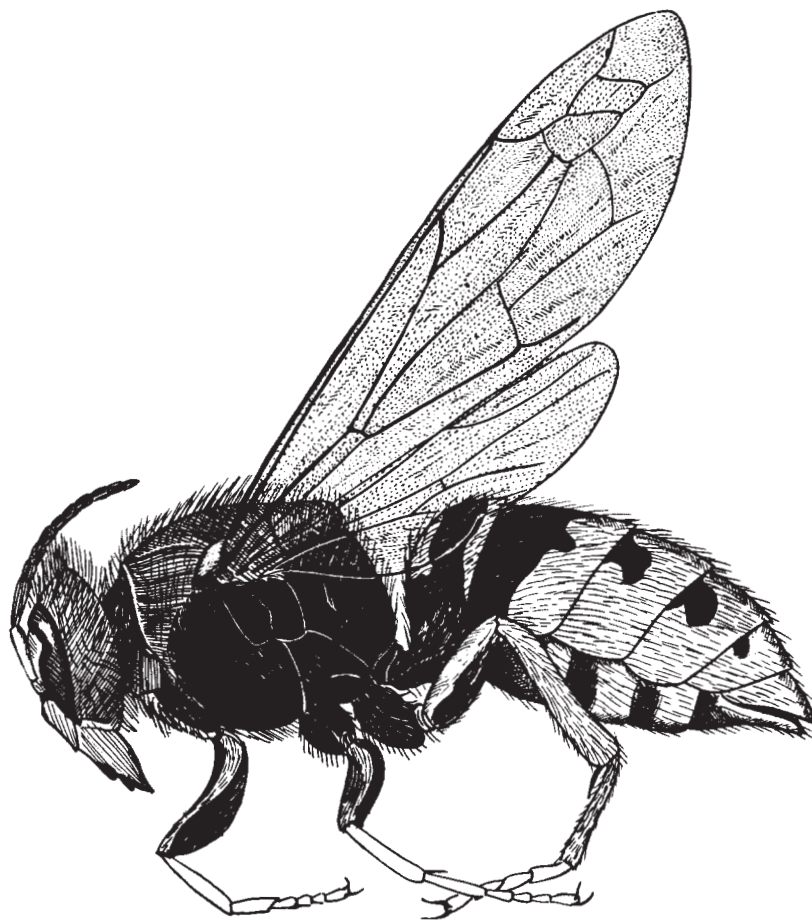


Fig. 9 B



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

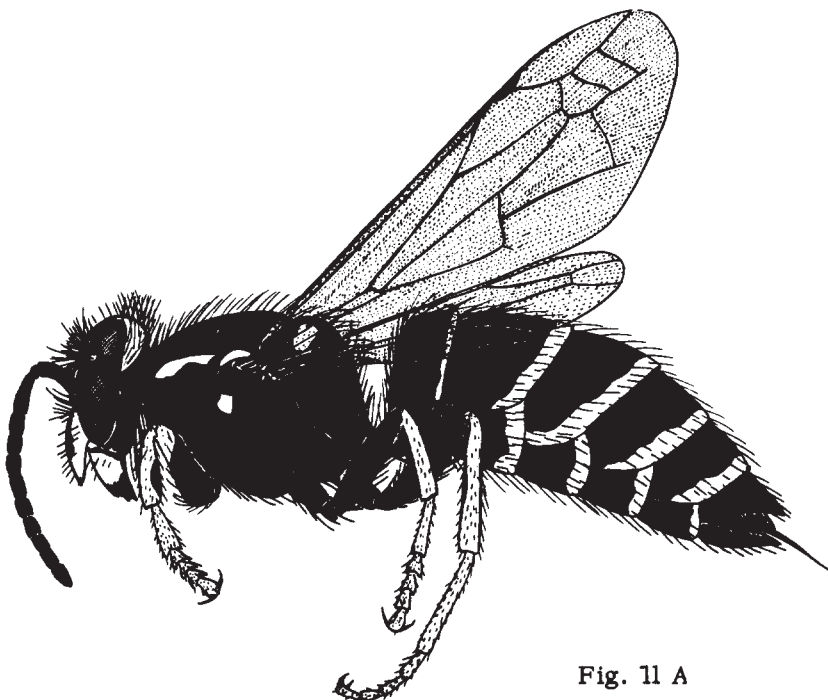


Fig. 11 A



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

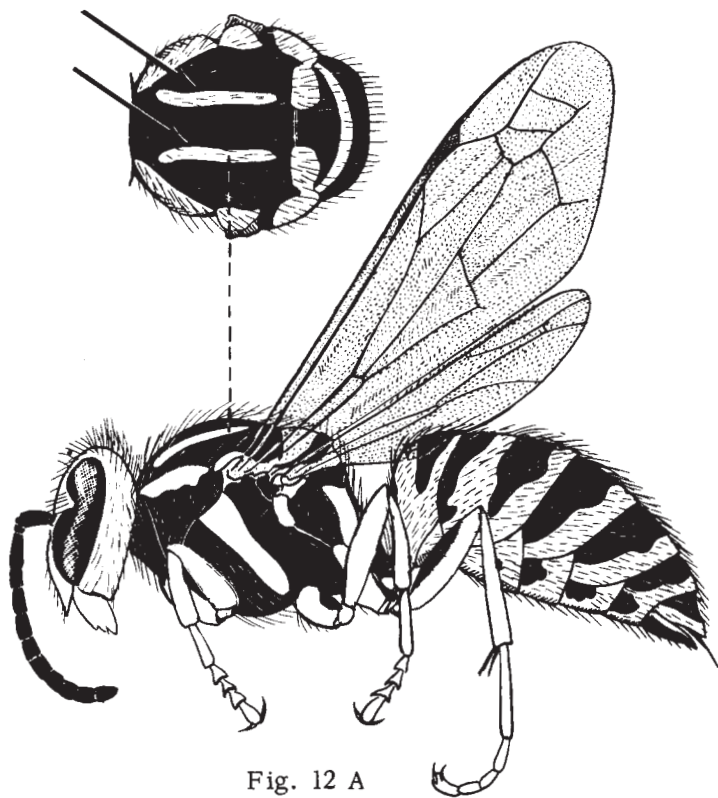


Fig. 12 A

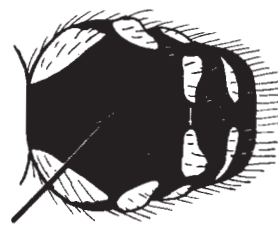


Fig. 12 B

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

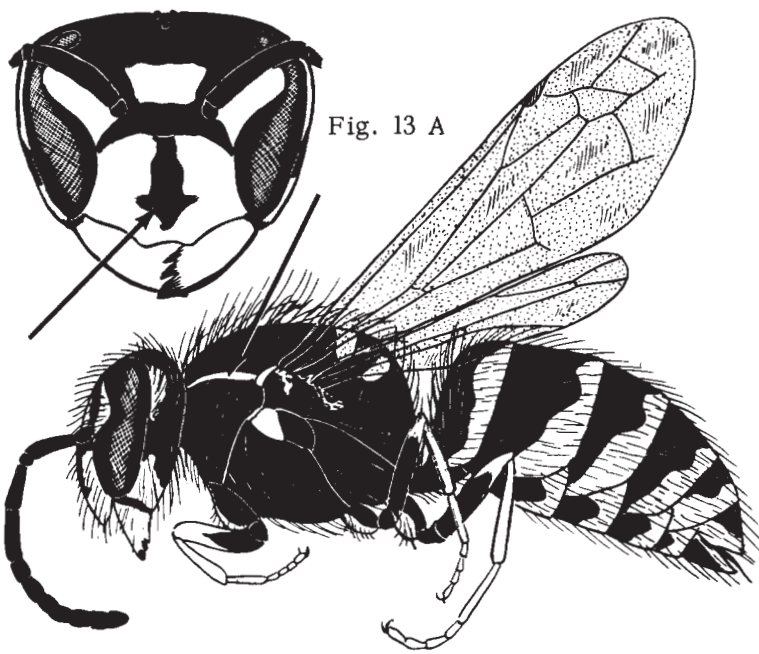


Fig. 13 A



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

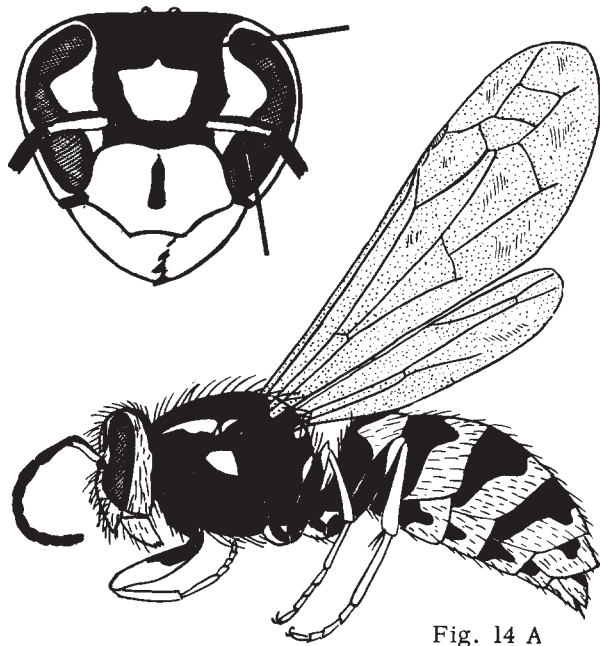


Fig. 14 A

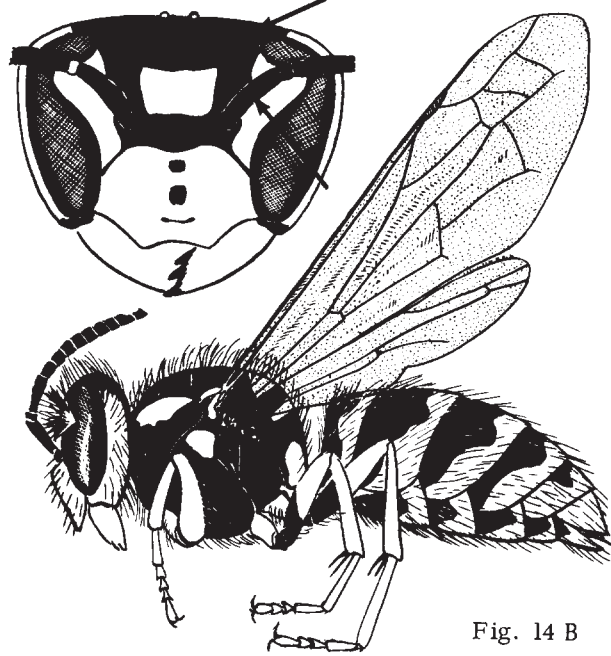


Fig. 14 B

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

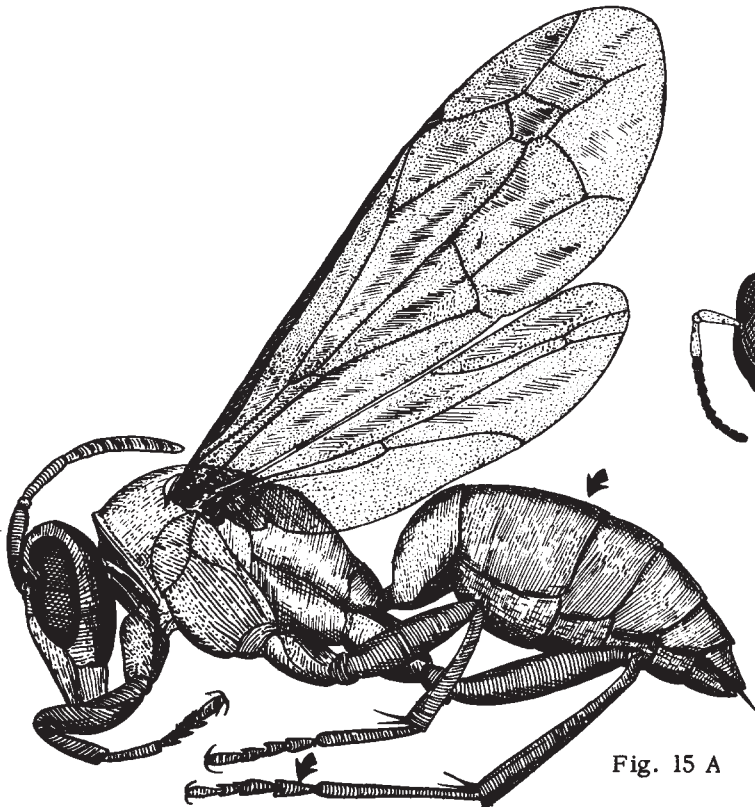


Fig. 15 A

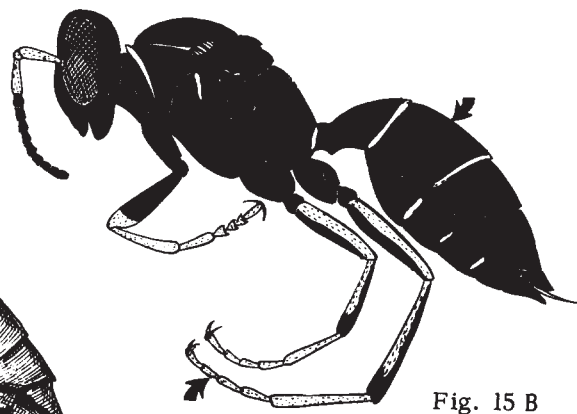


Fig. 15 B

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

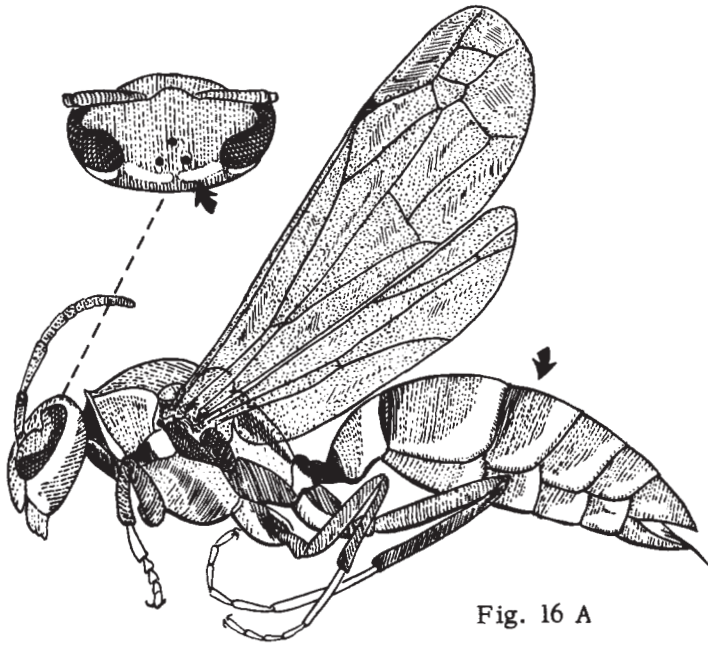


Fig. 16 A

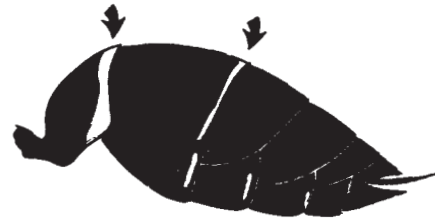


Fig. 16 B

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

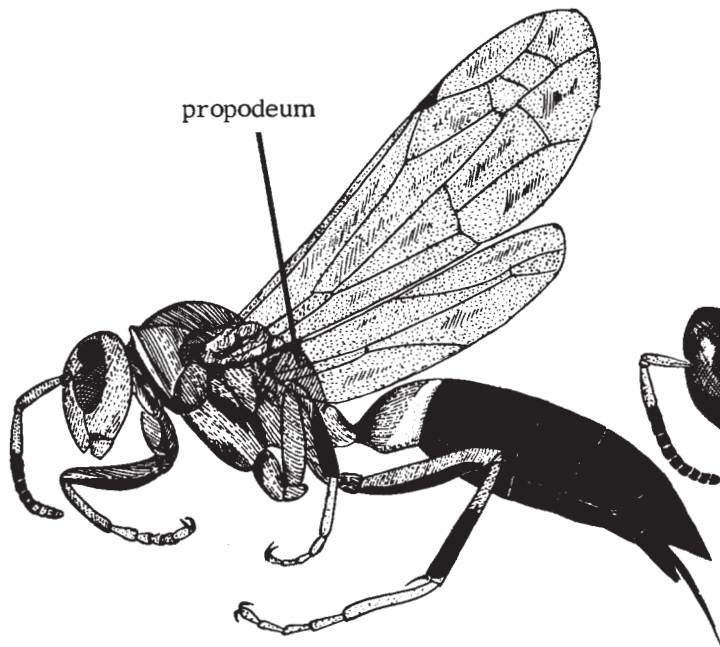


Fig. 17 A



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

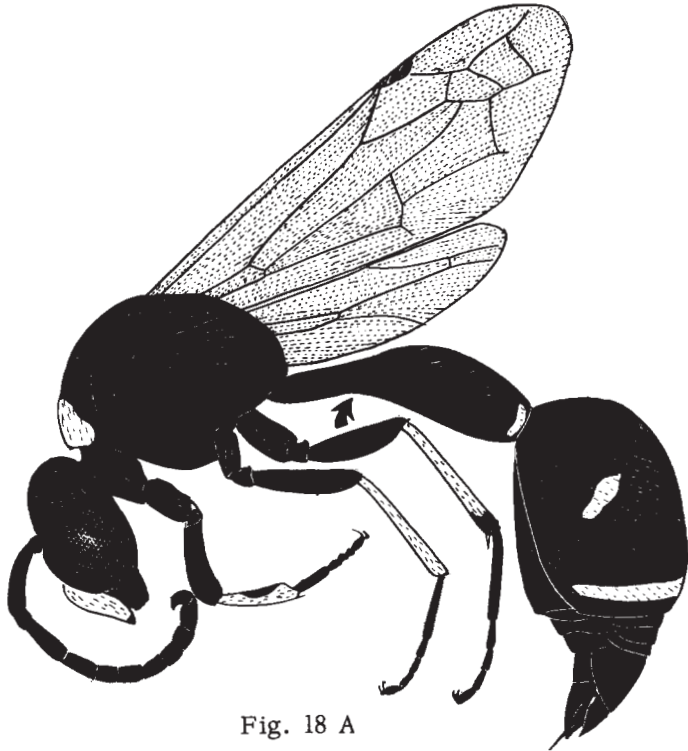


Fig. 18 A

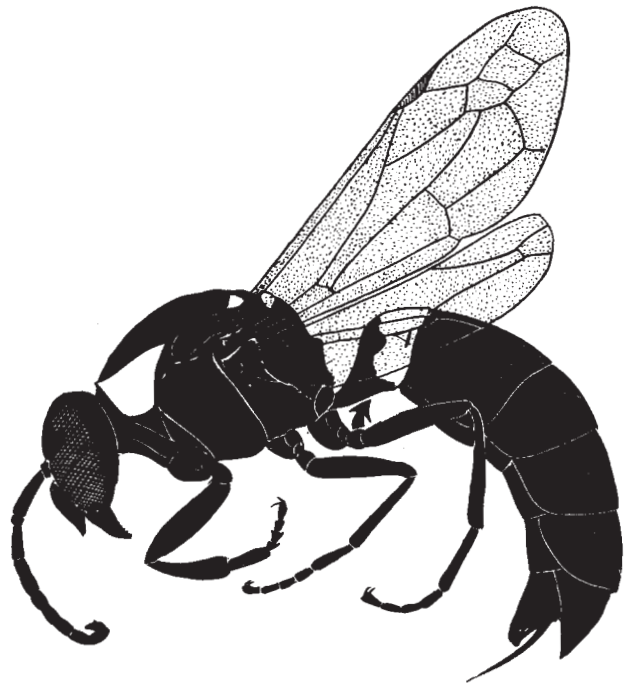


Fig. 18 B

- 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

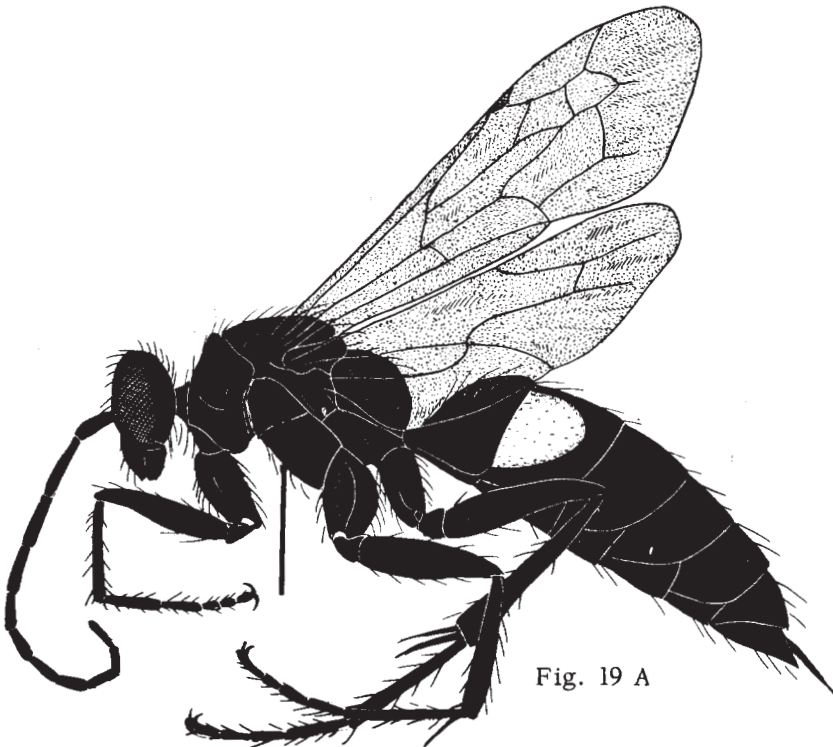


Fig. 19 A

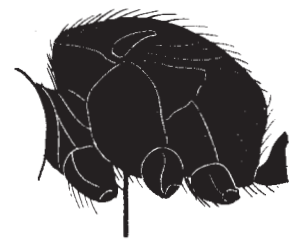


Fig. 19 B

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

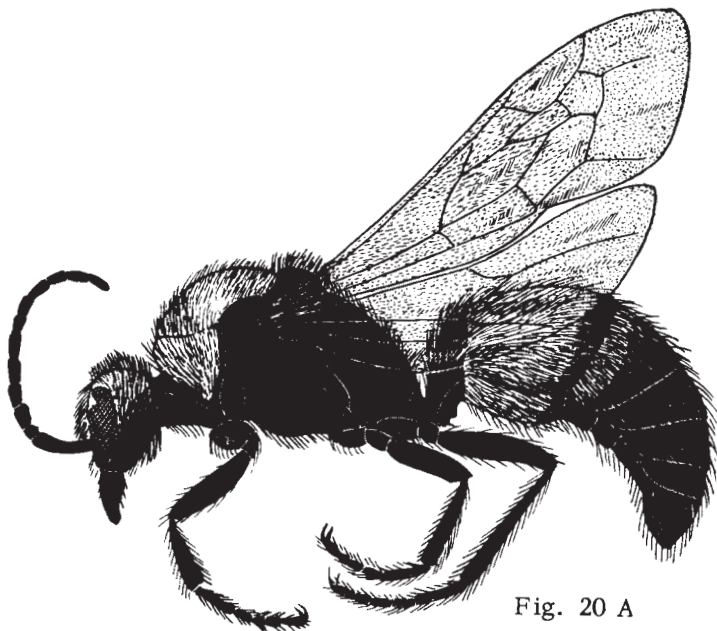


Fig. 20 A

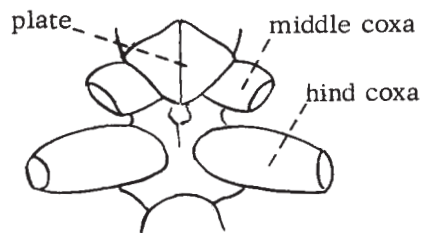


Fig. 20 B

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

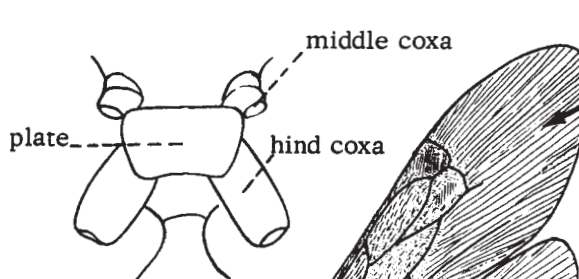


Fig. 21 B

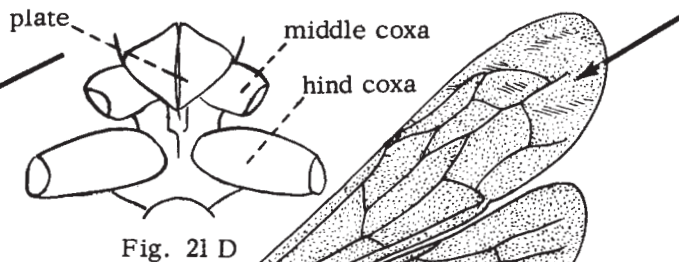


Fig. 21 D

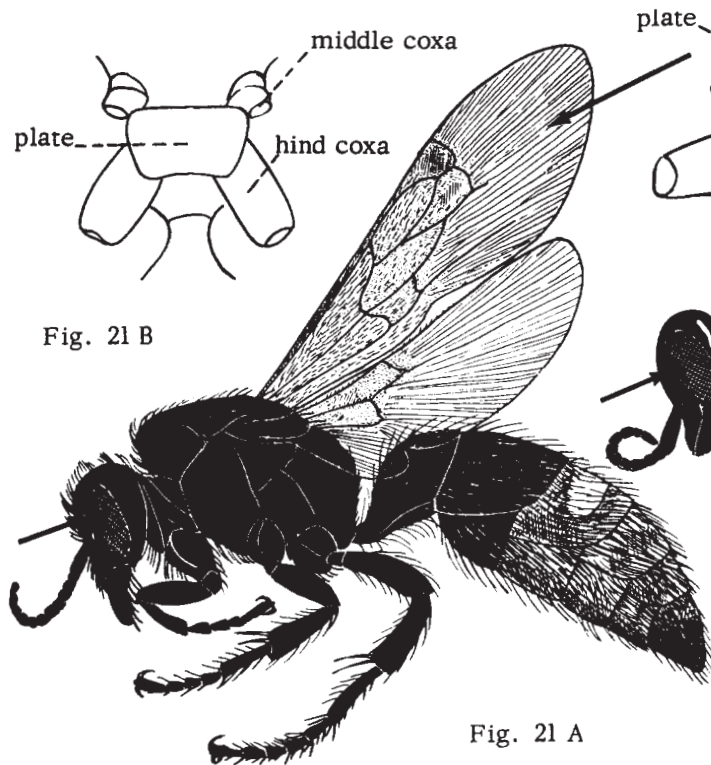


Fig. 21 A

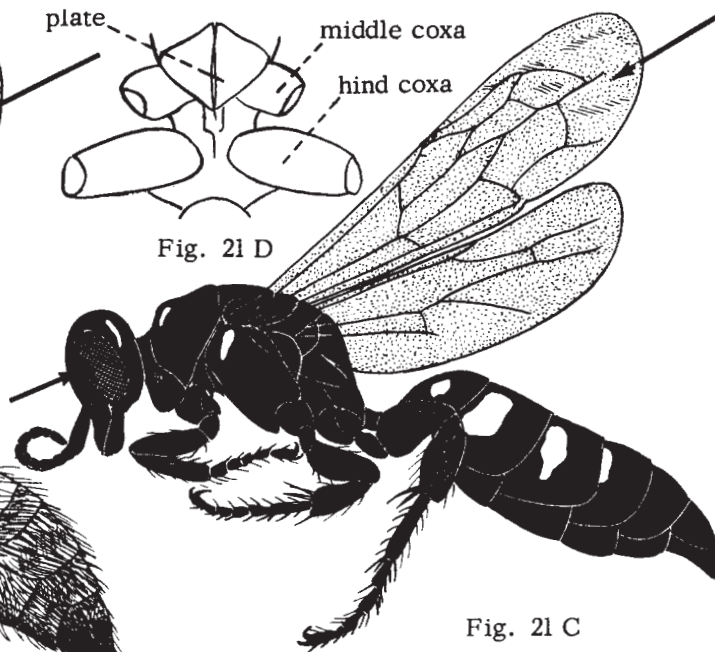


Fig. 21 C

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

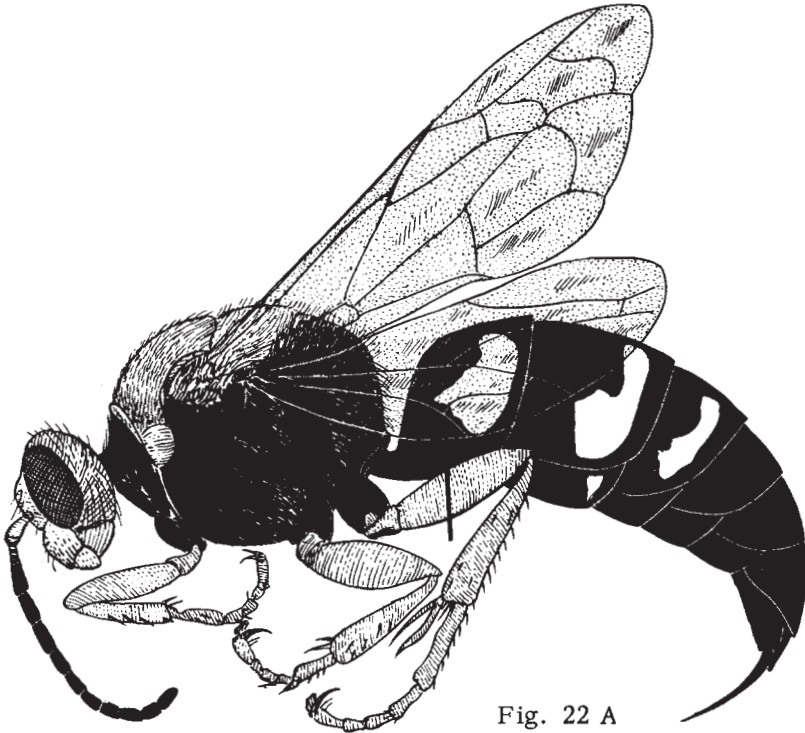


Fig. 22 A



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

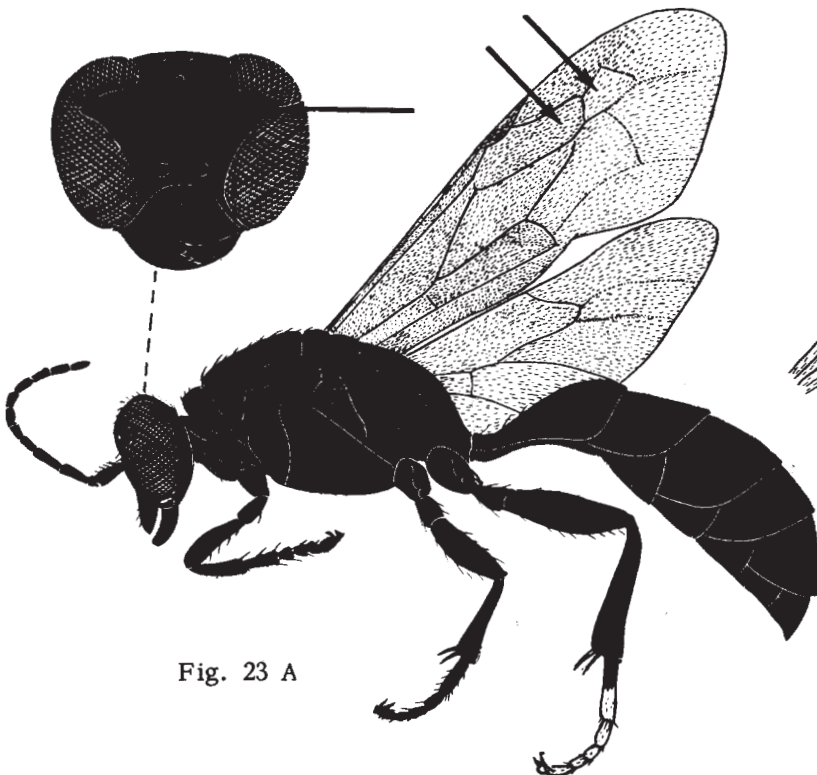


Fig. 23 A

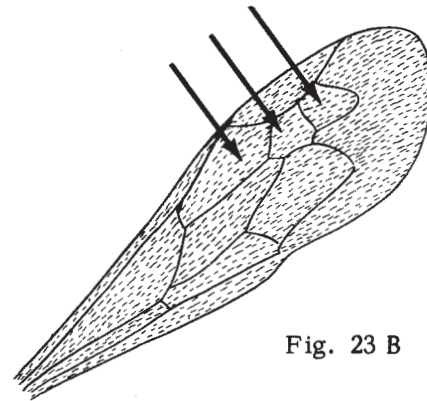


Fig. 23 B



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

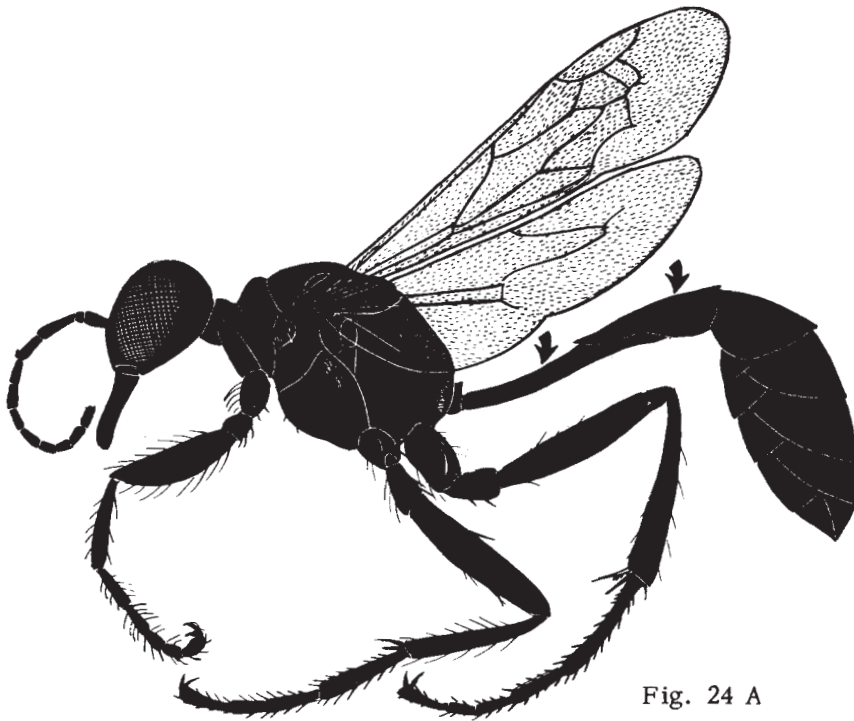


Fig. 24 A



Fig. 24 B

25. Bright metallic-bluish species (Fig. 25 A). Builds mud nests provisioned with spiders..... BLUE MUD-DAUBER
 (Chalybion californicum).....
 Darker species with yellowish or orange markings (Fig. 25 B)..... 26

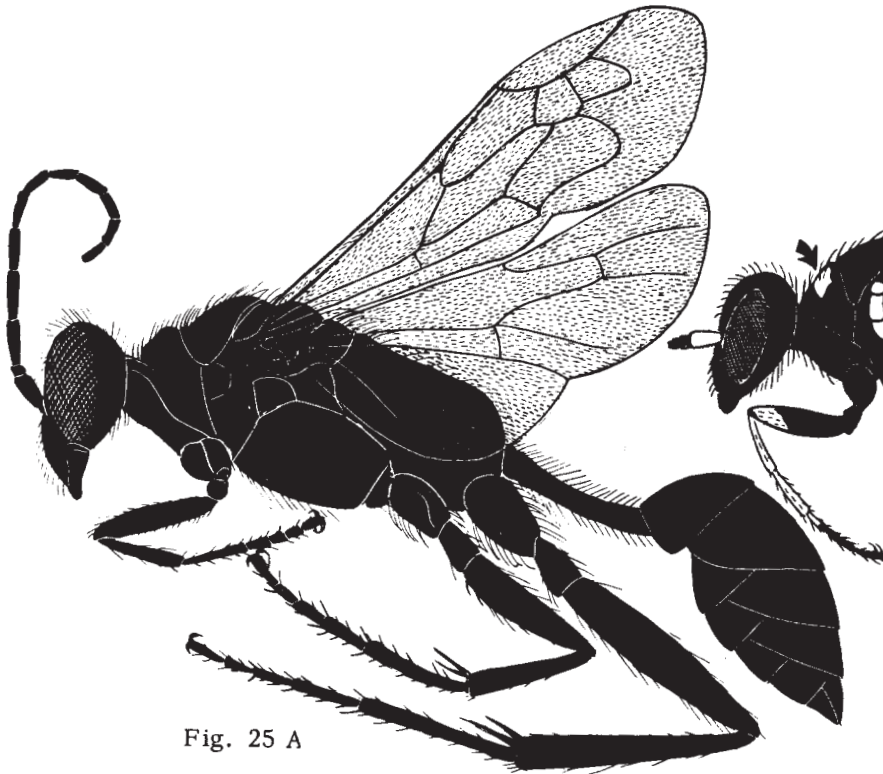


Fig. 25 A



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 THR EAD-WAISTED WASP



Fig. 26 A

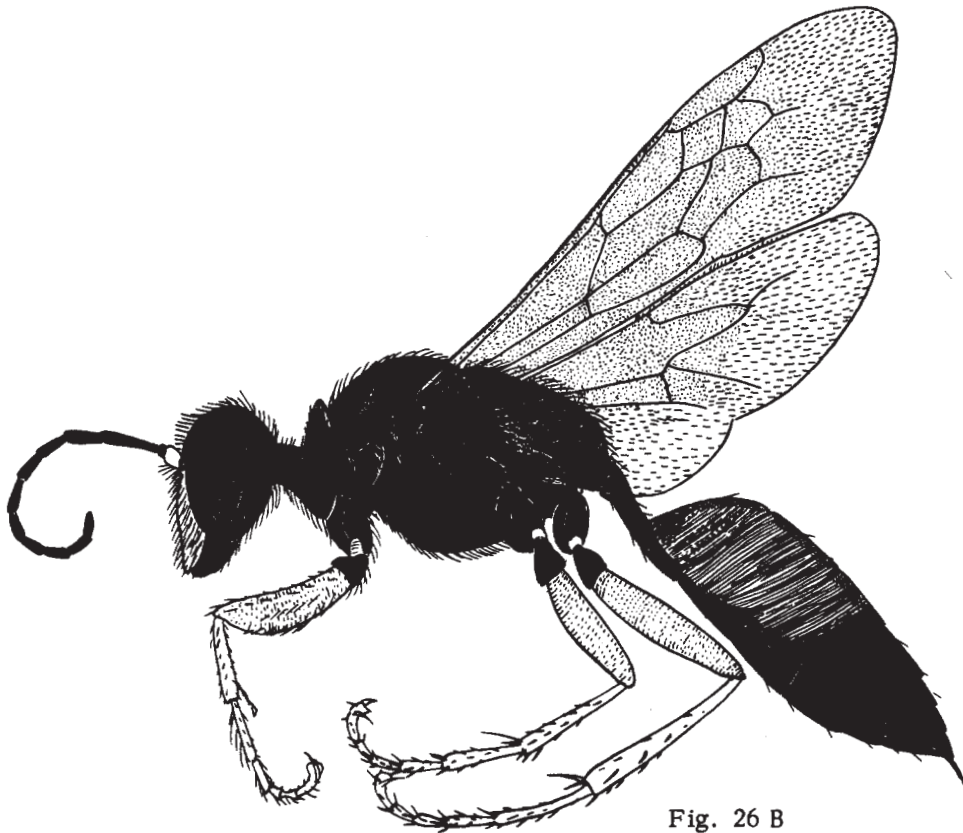


Fig. 26 B

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

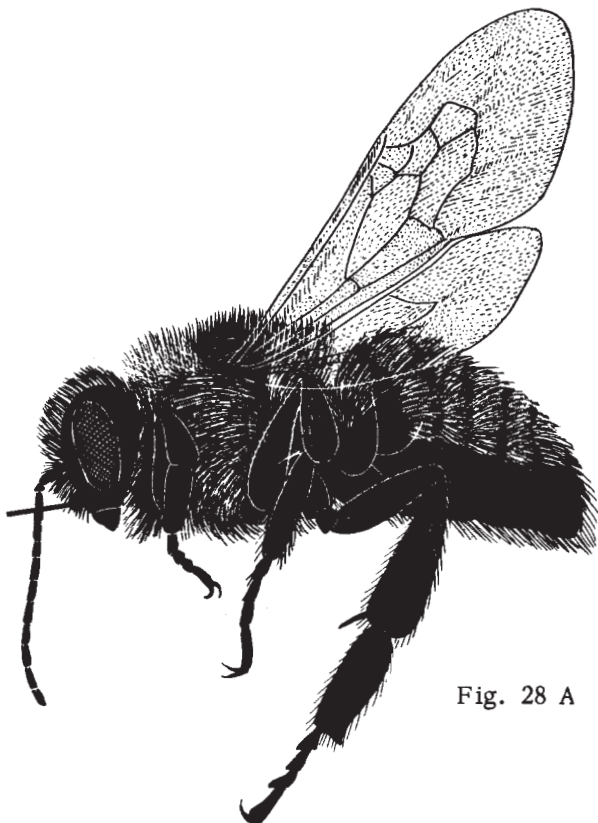


Fig. 28 A



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

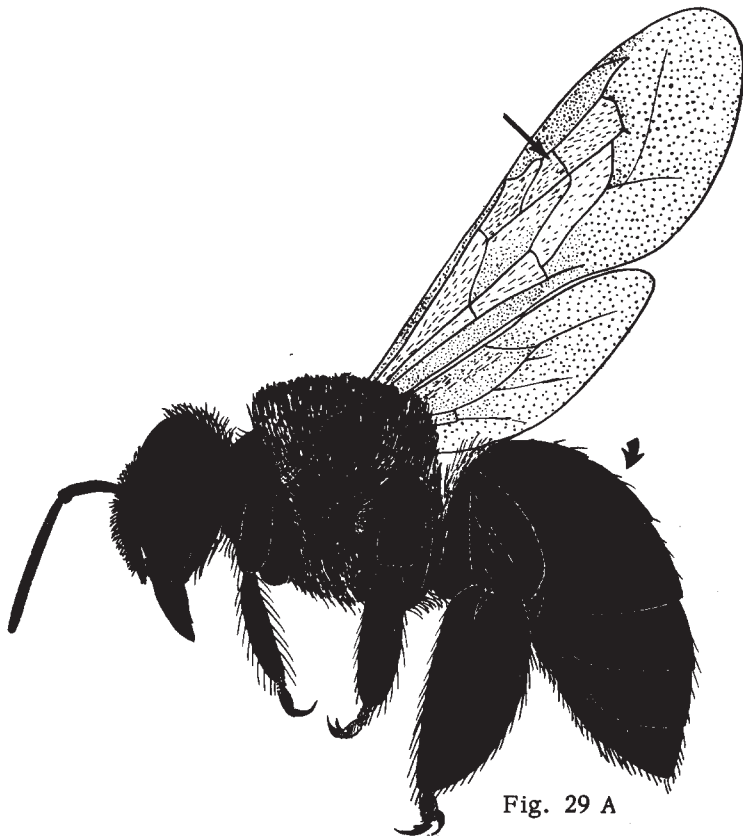


Fig. 29 A

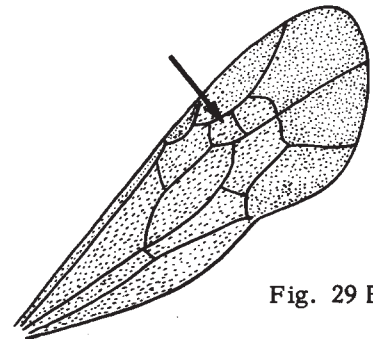


Fig. 29 B



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

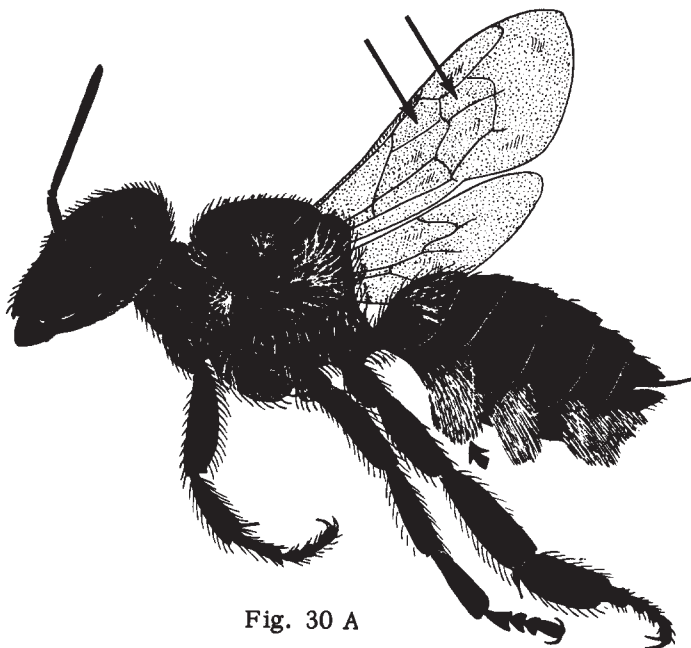


Fig. 30 A

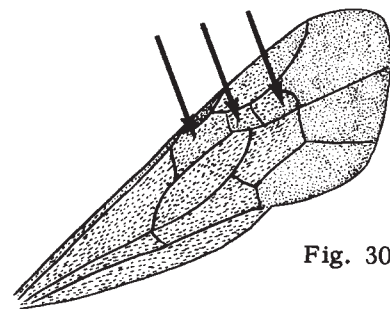


Fig. 30 B



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

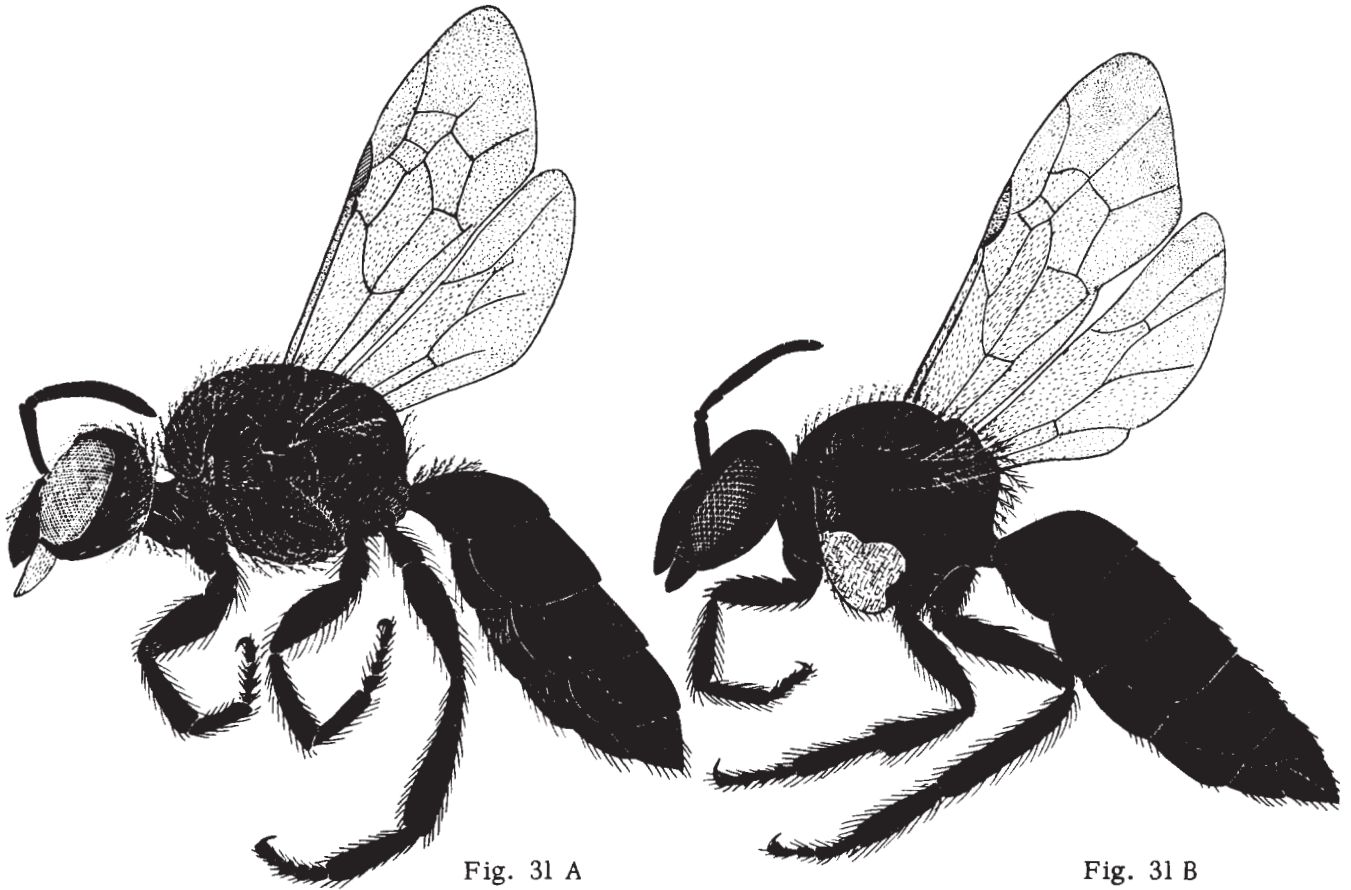


Fig. 31 A

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 Bethyidae, Scleroderma species...
.....PARASITIC WASPS



Fig. 33 A

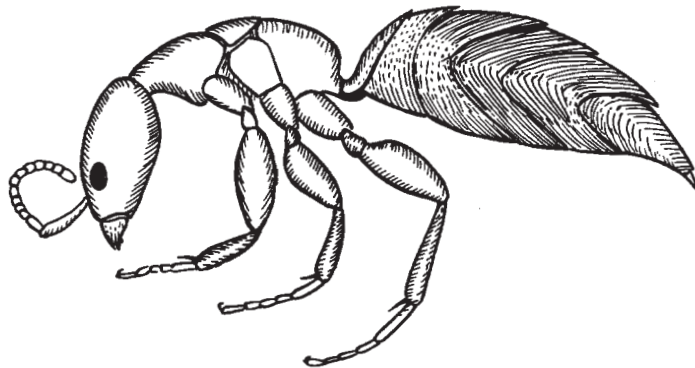


Fig. 33 B

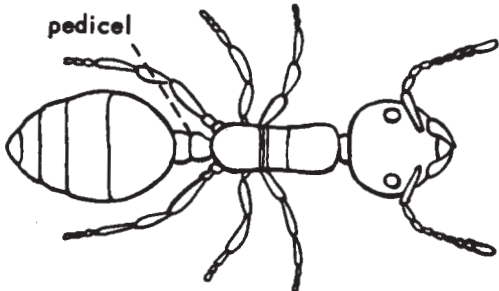
ANTS: KEY TO SOME COMMON SPECIES
Harold George Scott

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

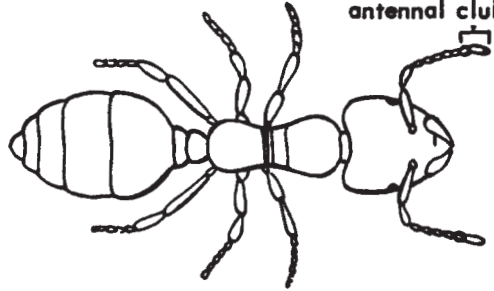
 2. Petiole (scale on pedicel) poorly developed, hidden beneath abdomen
 (*Tapinoma sessile*) ODOROUS HOUSE ANT
 Petiole well-developed, erect, not hidden beneath abdomen 3

 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

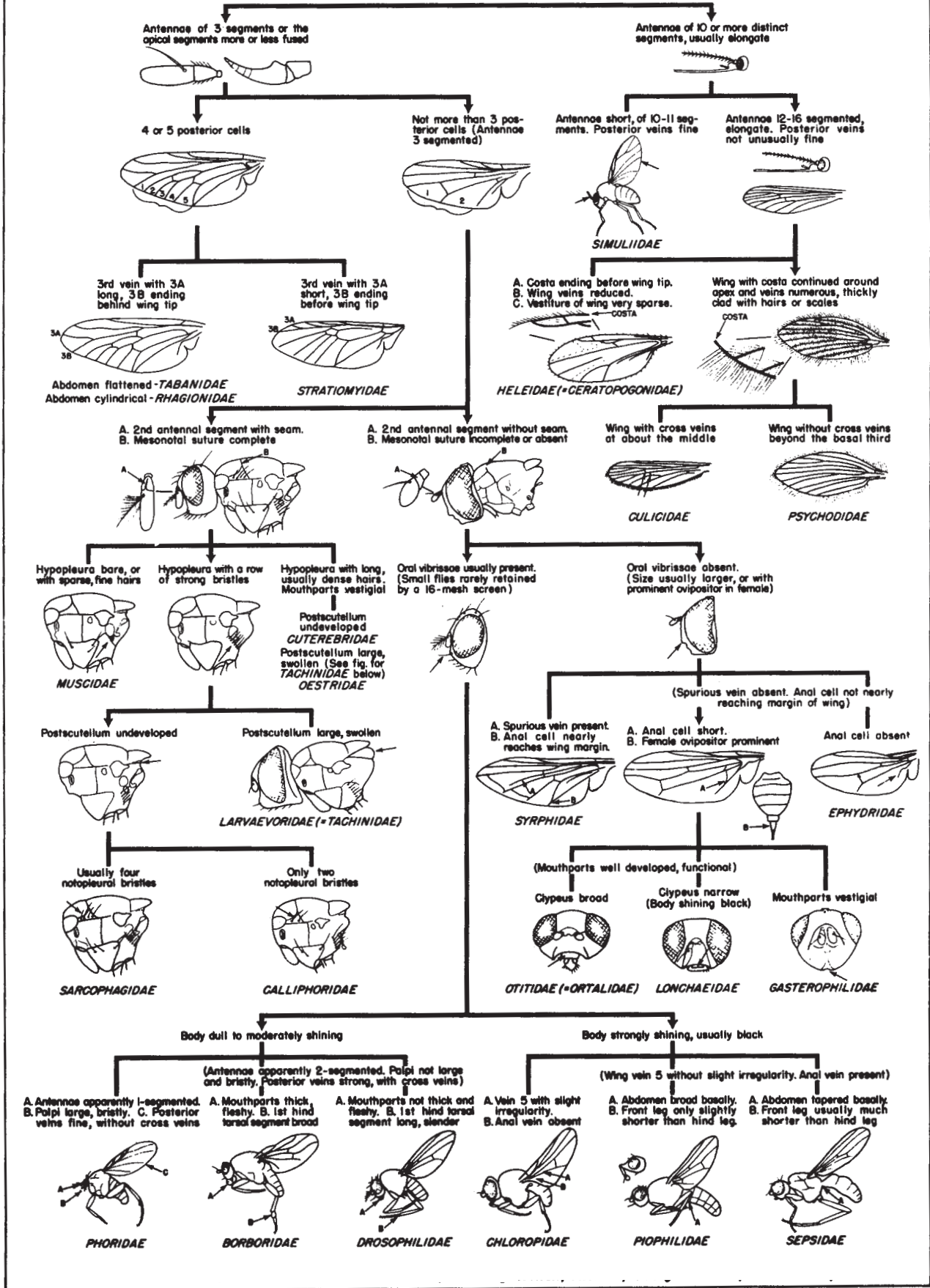
 8. House infesting ants (*Solenopsis molesta*) THIEF ANT
 Outdoor mound-building ants 9

 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

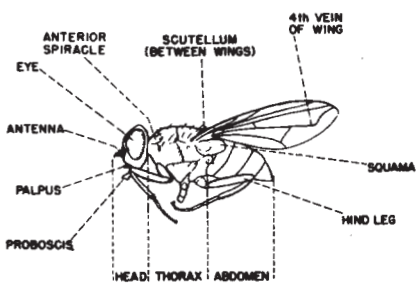
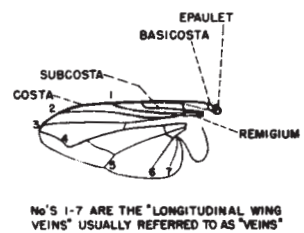
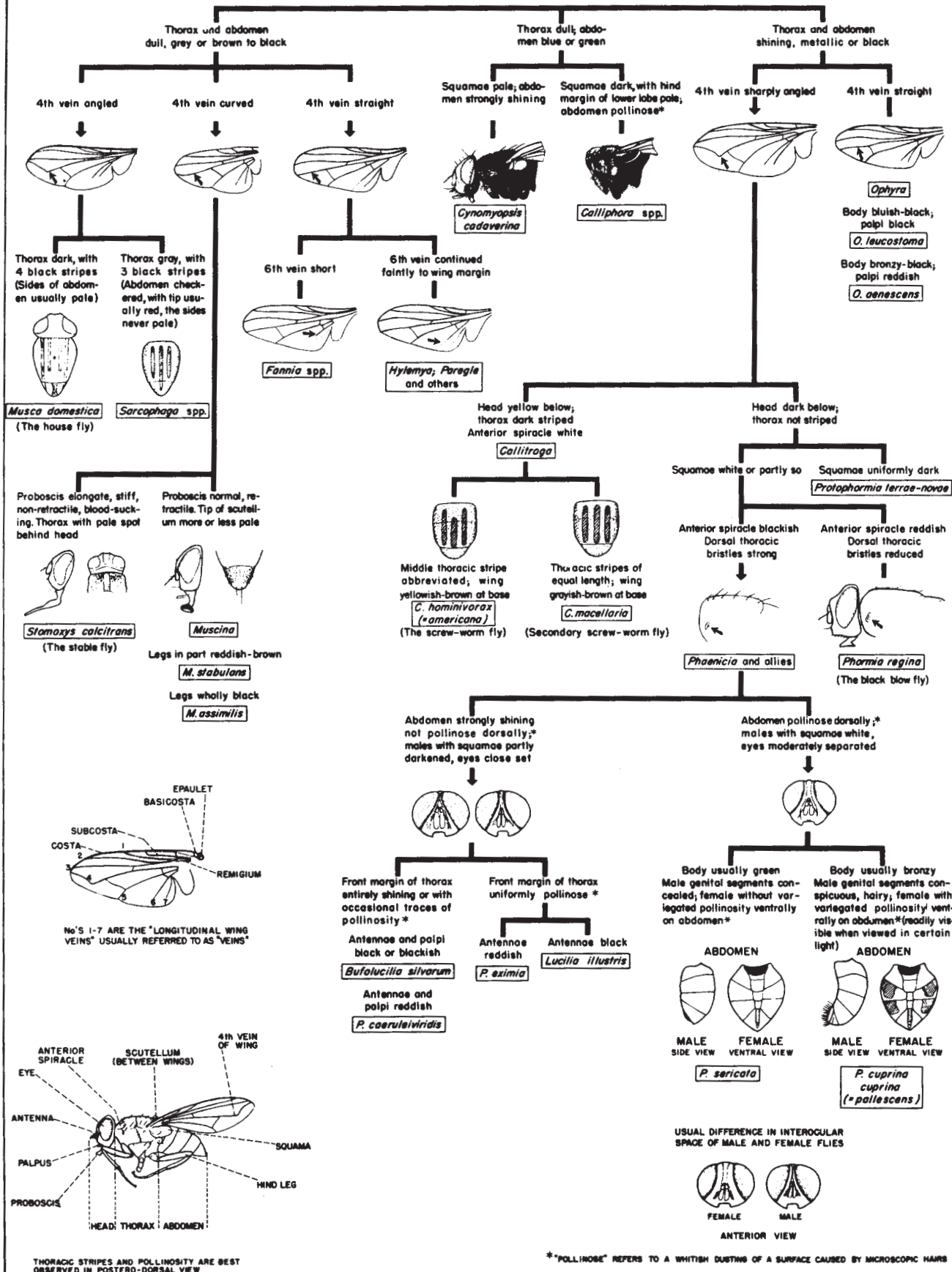
DIPTERA: PICTORIAL KEY TO PRINCIPAL FAMILIES OF PUBLIC HEALTH IMPORTANCE

H. R. Dodge



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

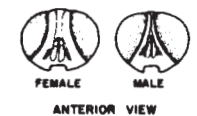
H. R. Dodge



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

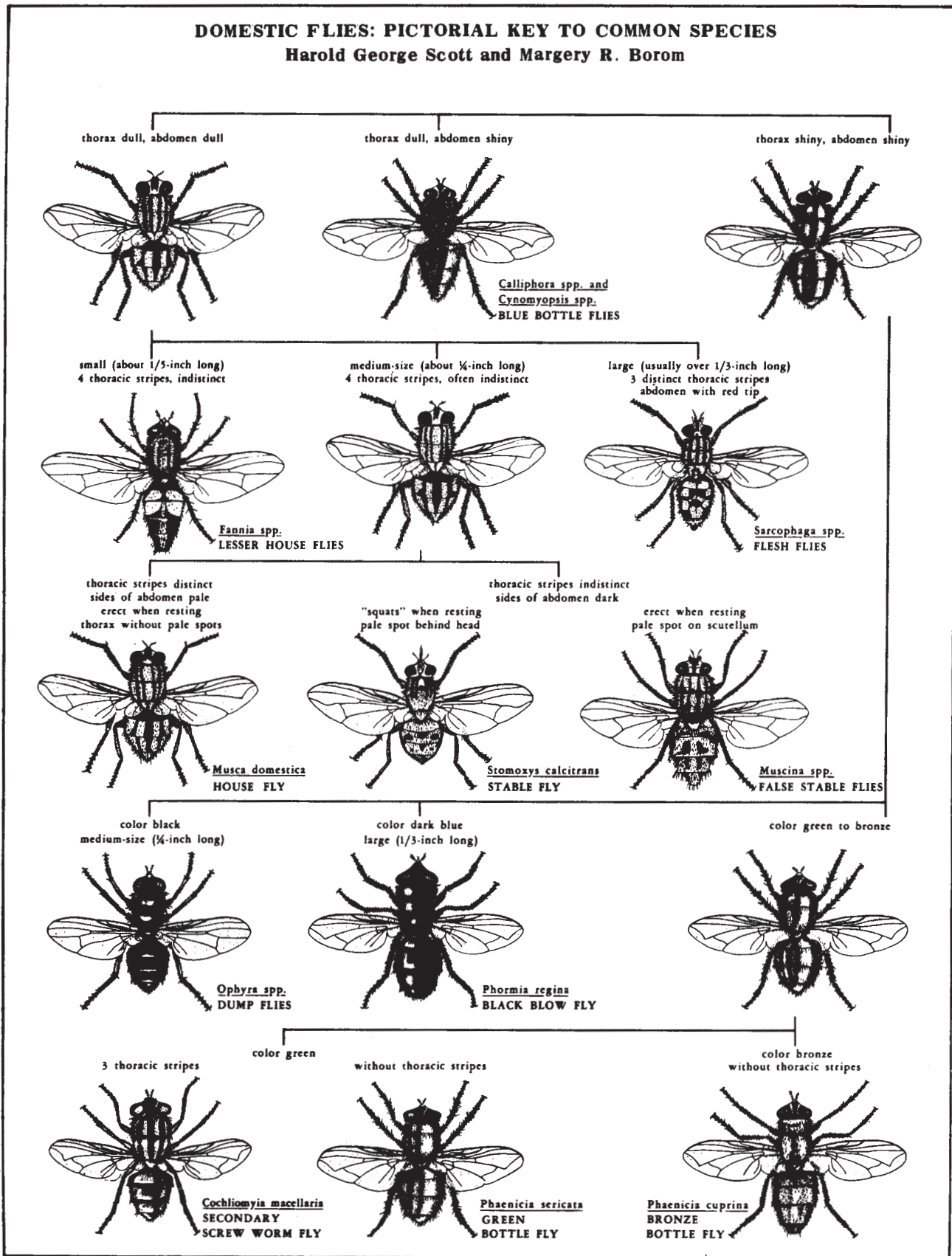
*"POLLINOSE" REFERS TO A WHITISH DUSTING OF A SURFACE CAUSED BY MICROSCOPIC HAIRS

USUAL DIFFERENCE IN INTEROCULAR SPACE OF MALE AND FEMALE FLIES



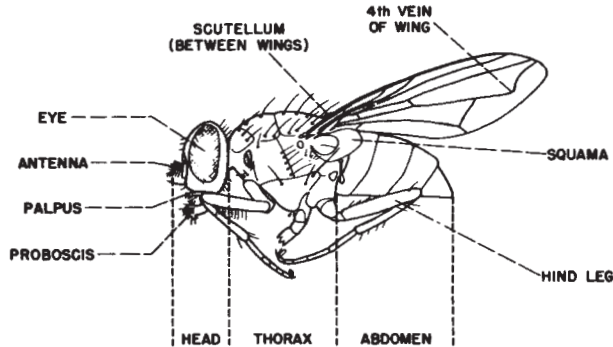
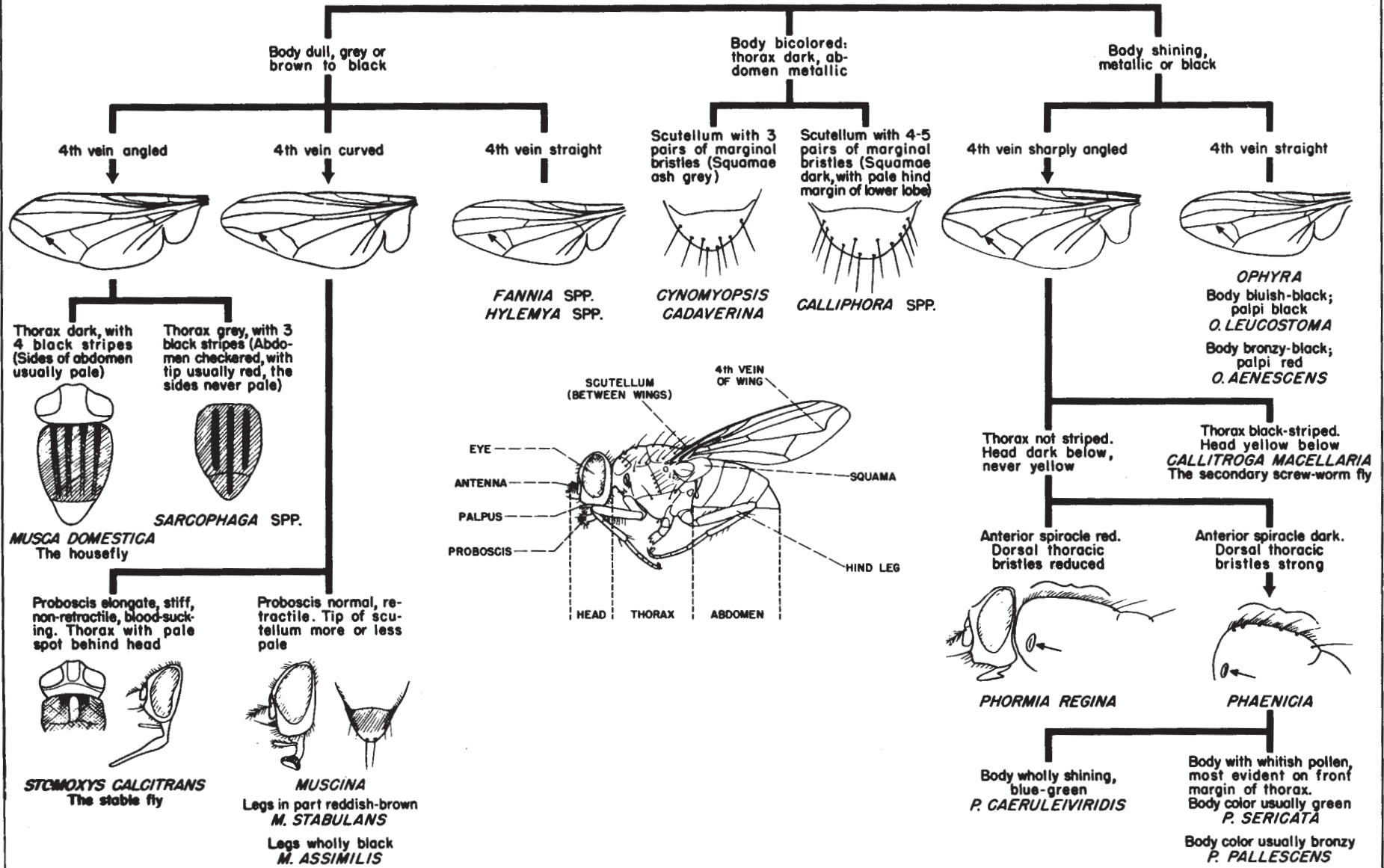
DOMESTIC FLIES: PICTORIAL KEY TO COMMON SPECIES

Harold George Scott and Margery R. Borom

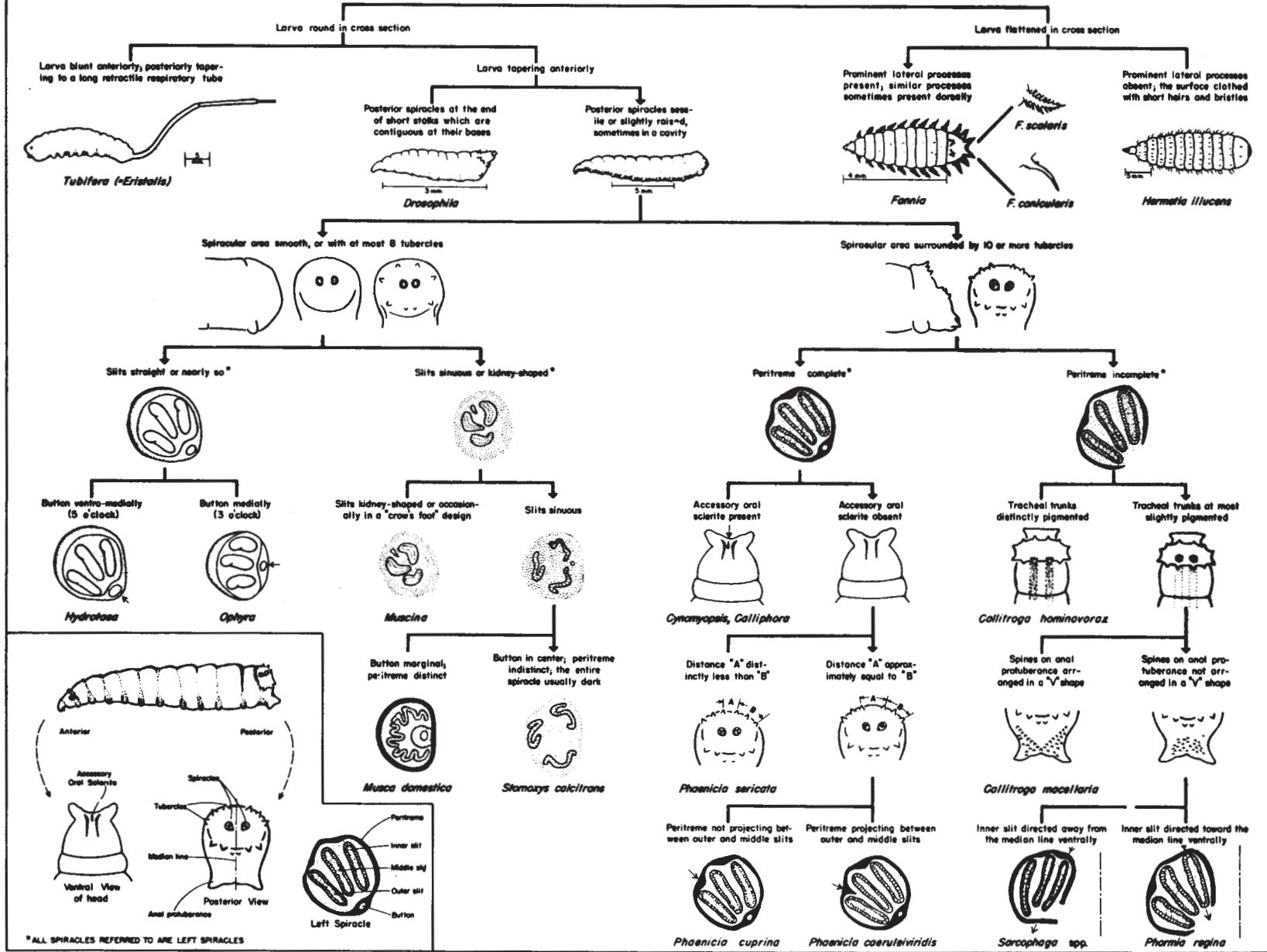


DOMESTIC FLIES: PICTORIAL KEY TO COMMON SPECIES IN SOUTHERN U.S.

H. R. Dodge



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

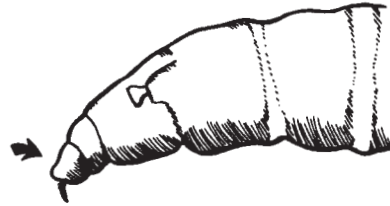


Fig. 1 B

- 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

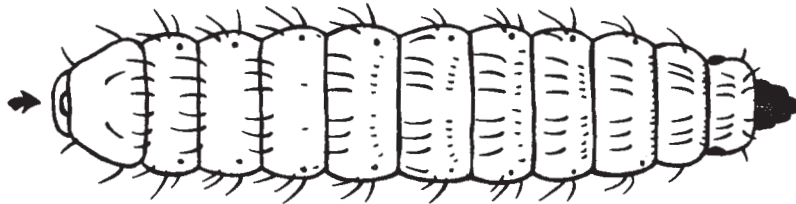


Fig. 2 A



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

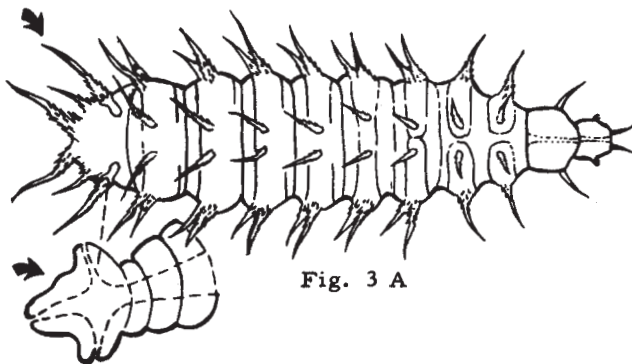


Fig. 3 A



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

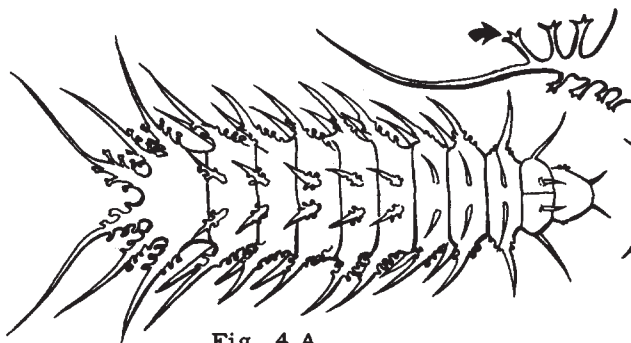


Fig. 4 A

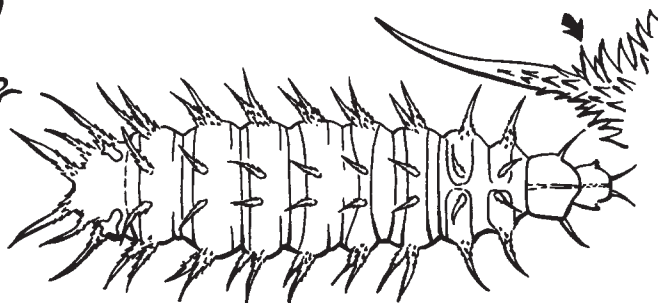


Fig. 4 B

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

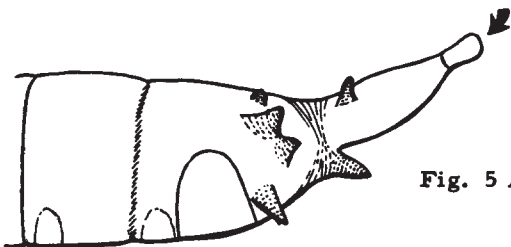


Fig. 5 A

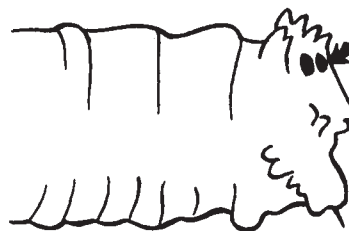


Fig. 5 B

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).....(Piophilha casei) CHEESE SKIPPER

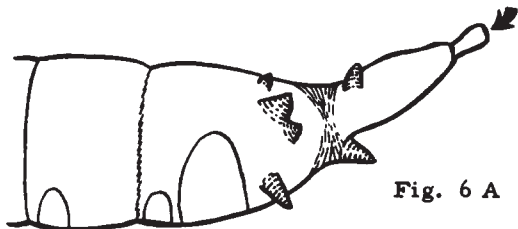


Fig. 6 A



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

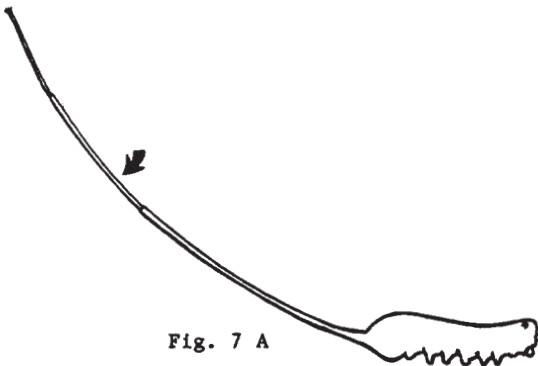


Fig. 7 A



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

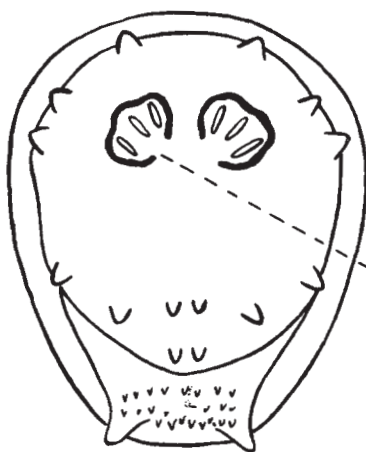


Fig. 9 A

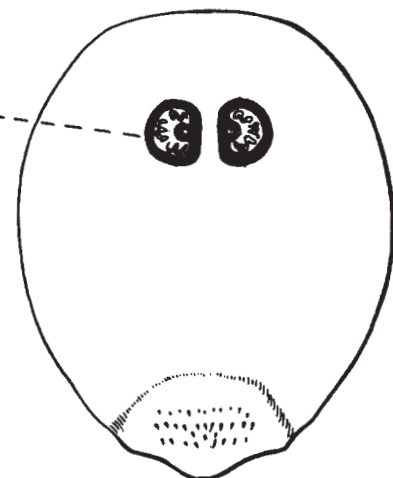


Fig. 9 B

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

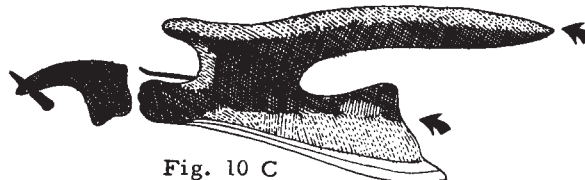


Fig. 10 C

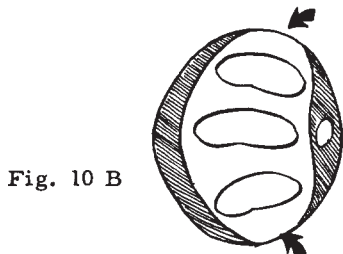


Fig. 10 B

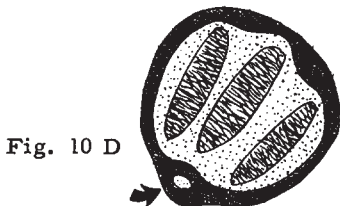


Fig. 10 D



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

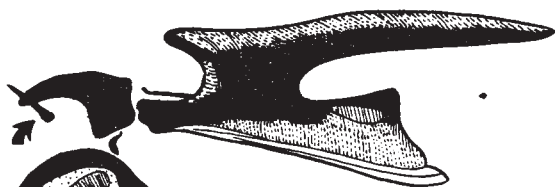


Fig. 12 A

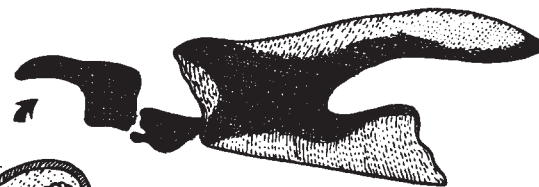


Fig. 12 C

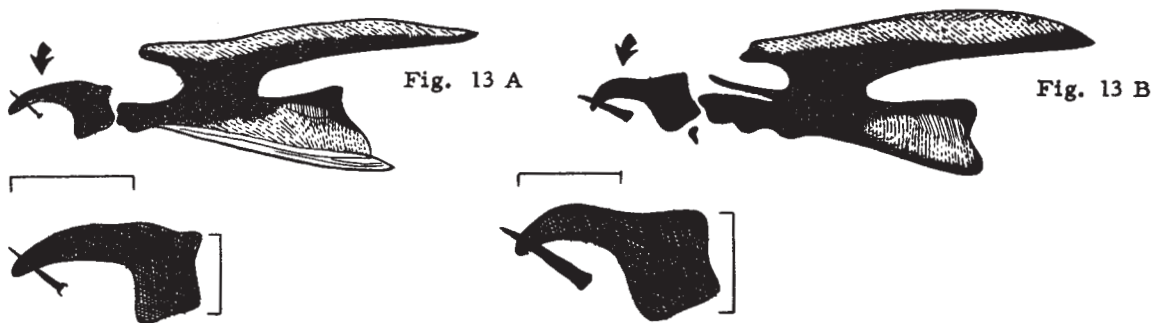


Fig. 12 B

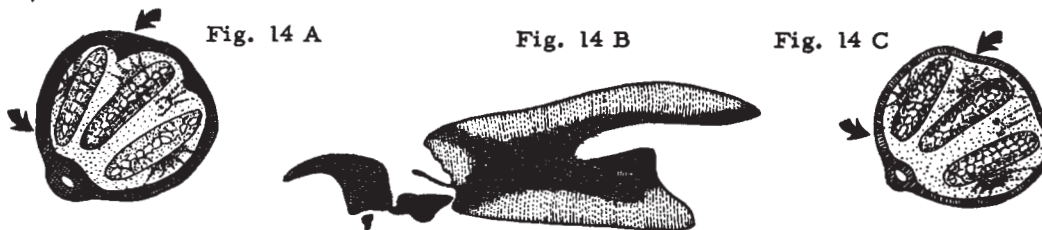


Fig. 12 D

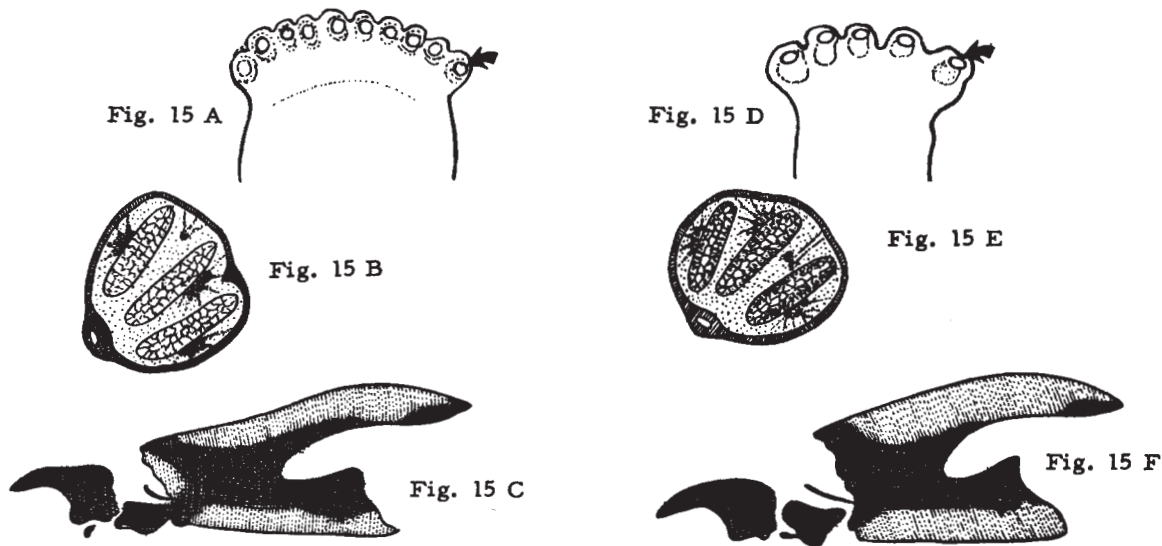
13. Mandibular sclerite with tooth longer than greatest width of basal portion (Fig. 13 A).....
 (*Calliphora vicina*) A BLUE BOTTLE FLY
- Mandibular sclerite with tooth only as long as greatest width of basal portion (Fig. 13 B)..
 (*Cynomyopsis cadaverina*) A BLUE BOTTLE FLY



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



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



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

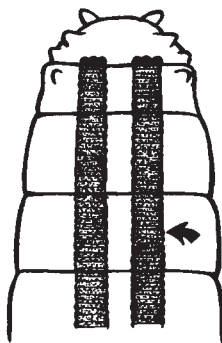


Fig. 21 A

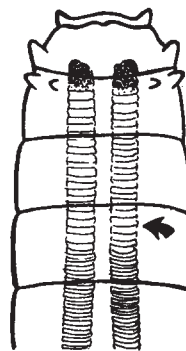


Fig. 21 B

22. Peritreme thick (Fig. 22 A).....(Musca domestica) HOUSE FLY
 Peritreme thin (Fig. 22 B).....(Haematobia irritans) HORN FLY

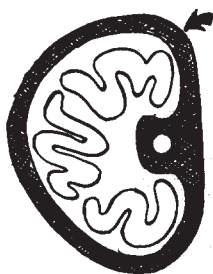


Fig. 22 A



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

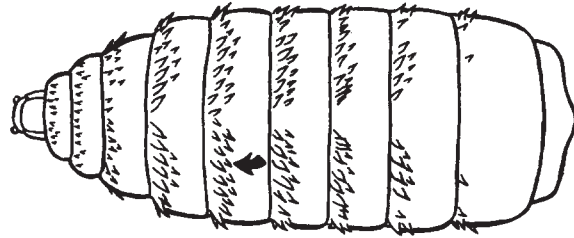


Fig. 23 B

24. Button centrally located (Fig. 24 A)..... (Stomoxys calcitrans) STABLE FLY
 Button not centrally located (Fig. 24 B).....25



Fig. 24 A

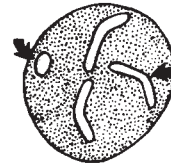


Fig. 24 B

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

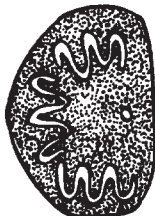


Fig. 25 A

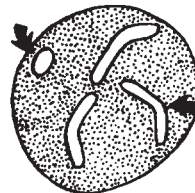


Fig. 25 B

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

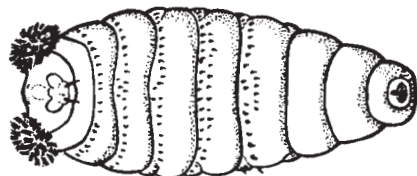


Fig. 27 B

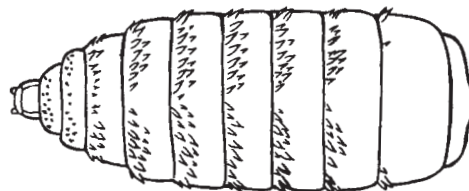


Fig. 27 D

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

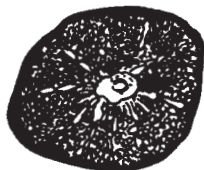


Fig. 29 A



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

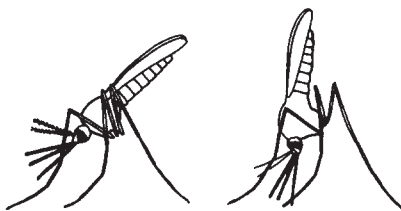
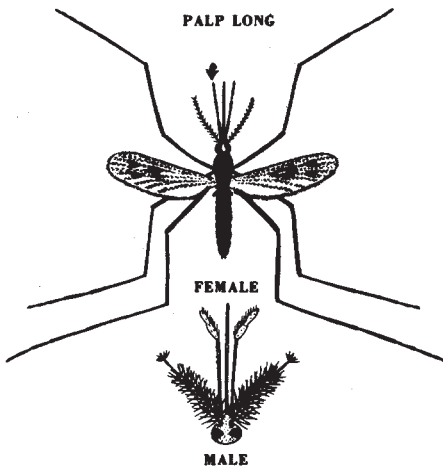
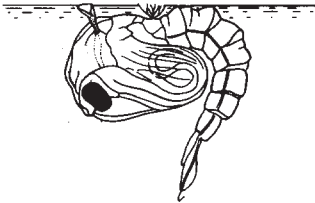
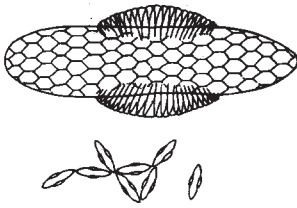


Fig. 30 B

MOSQUITOES: CHARACTERISTICS OF ANOPHELINES AND CULICINES

Kent S. Littig and Chester J. Stojanovich

ANOPHELES

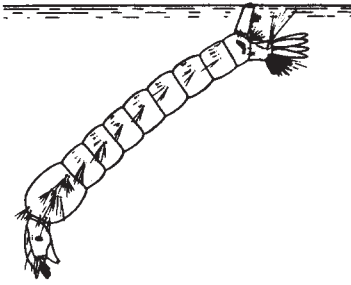


AEDES

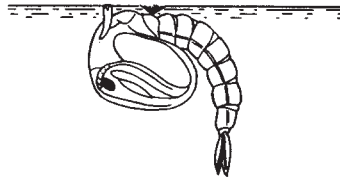
Egg



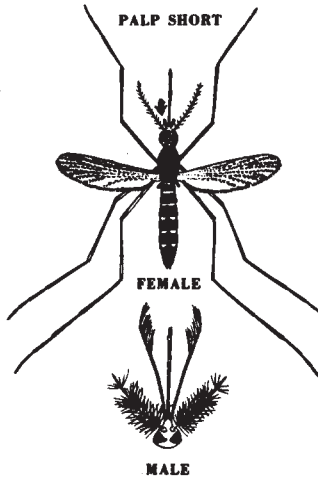
Larva



Pupa



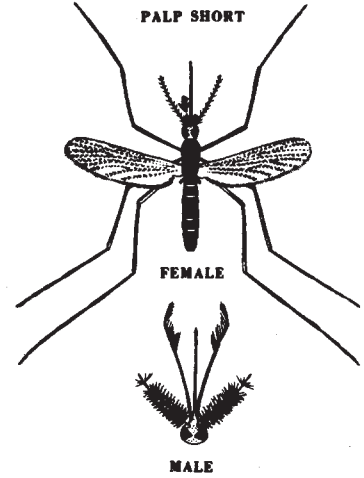
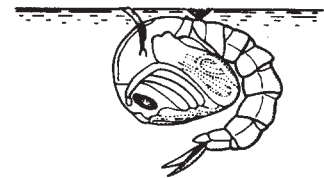
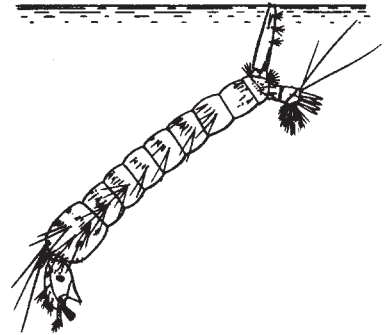
Adult



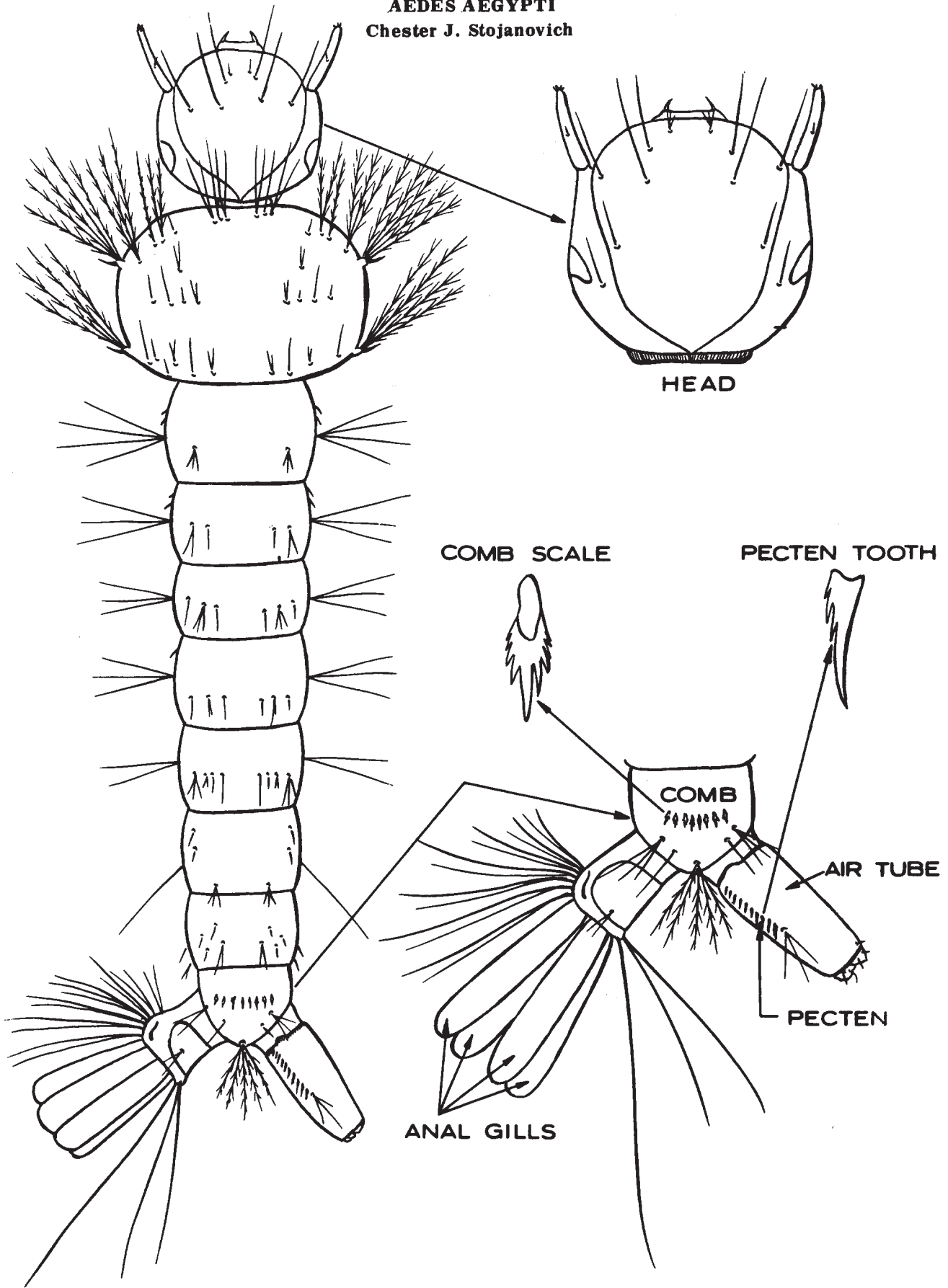
Resting Position



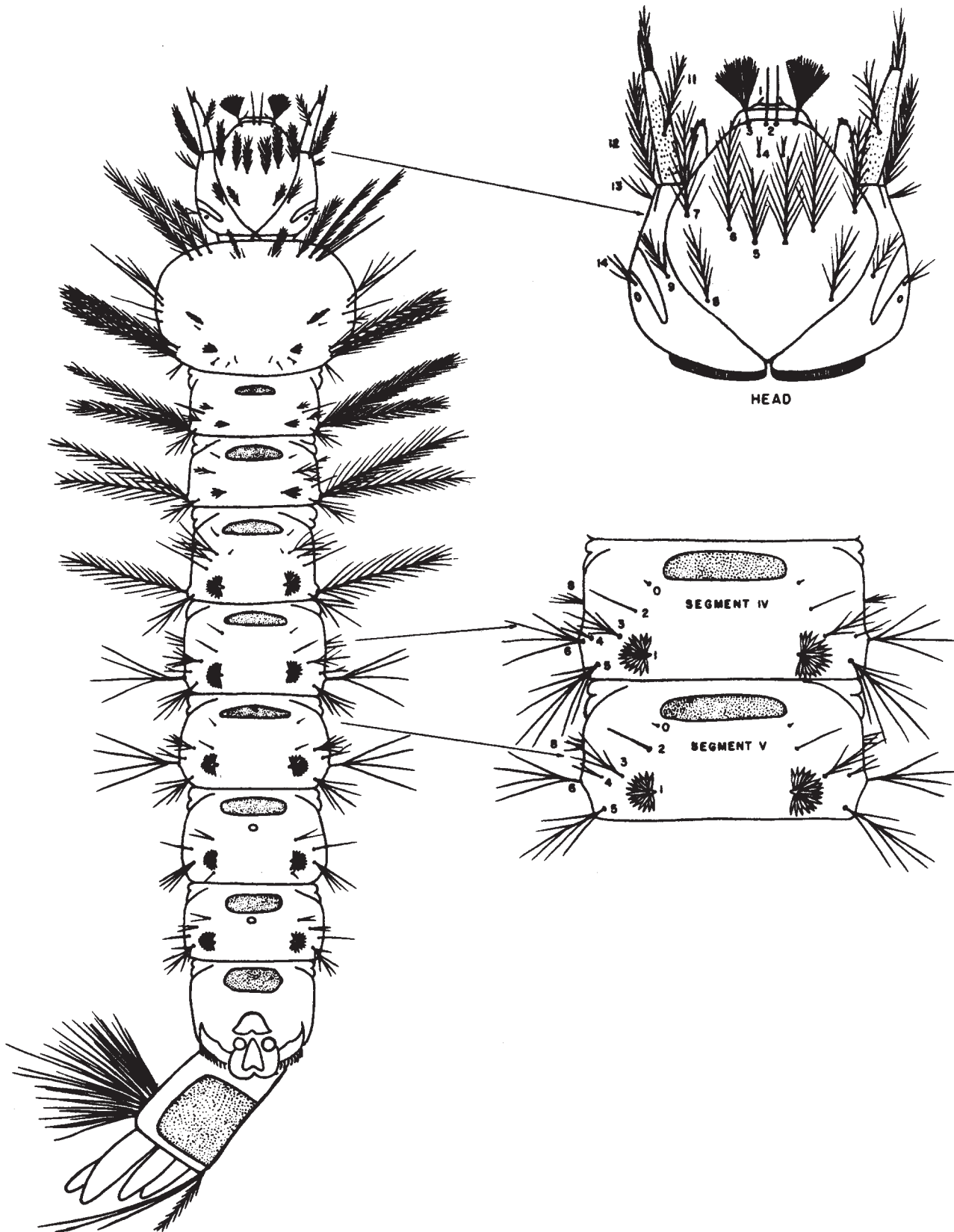
CULEX



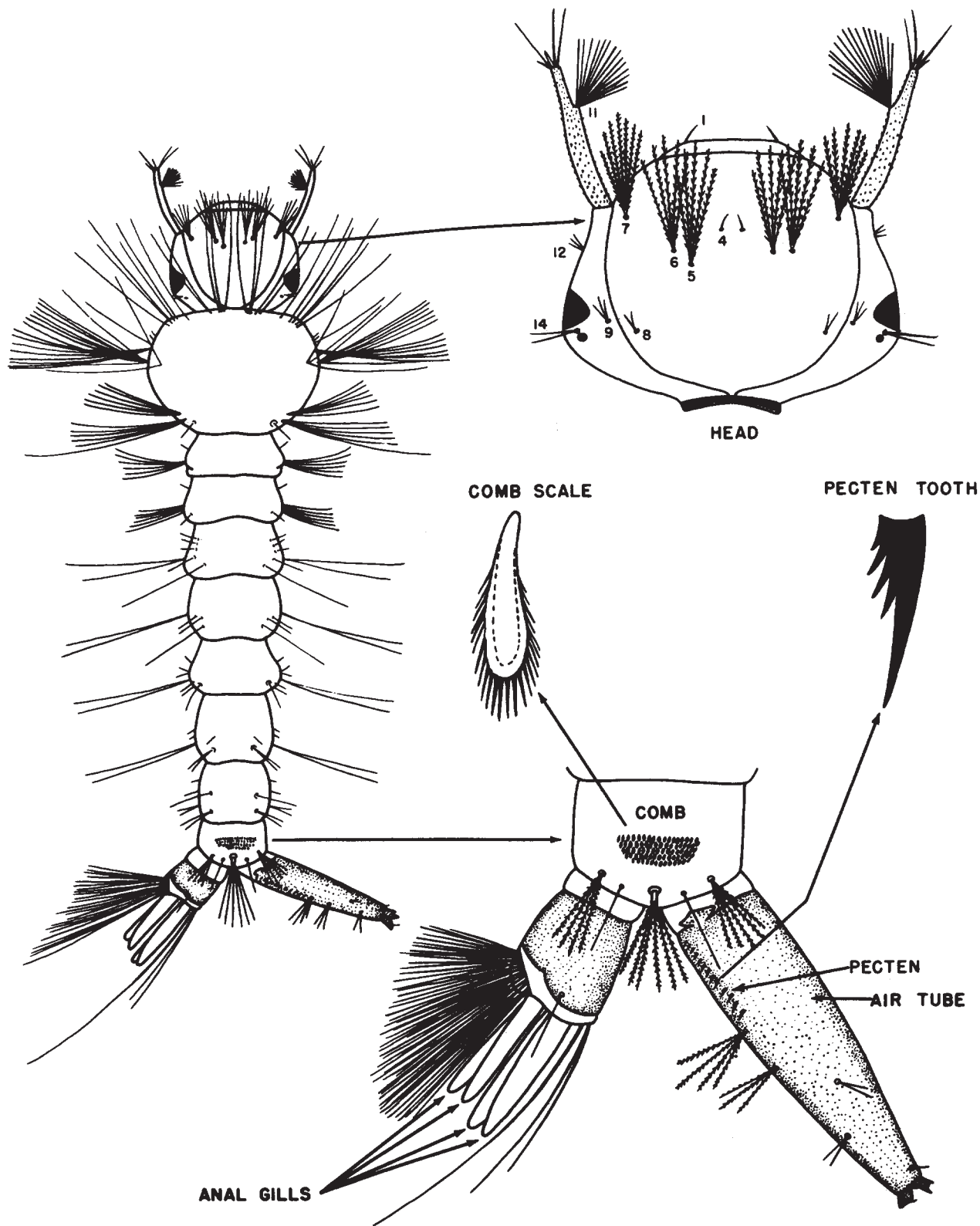
AEDES AEGYPTI
Chester J. Stojanovich



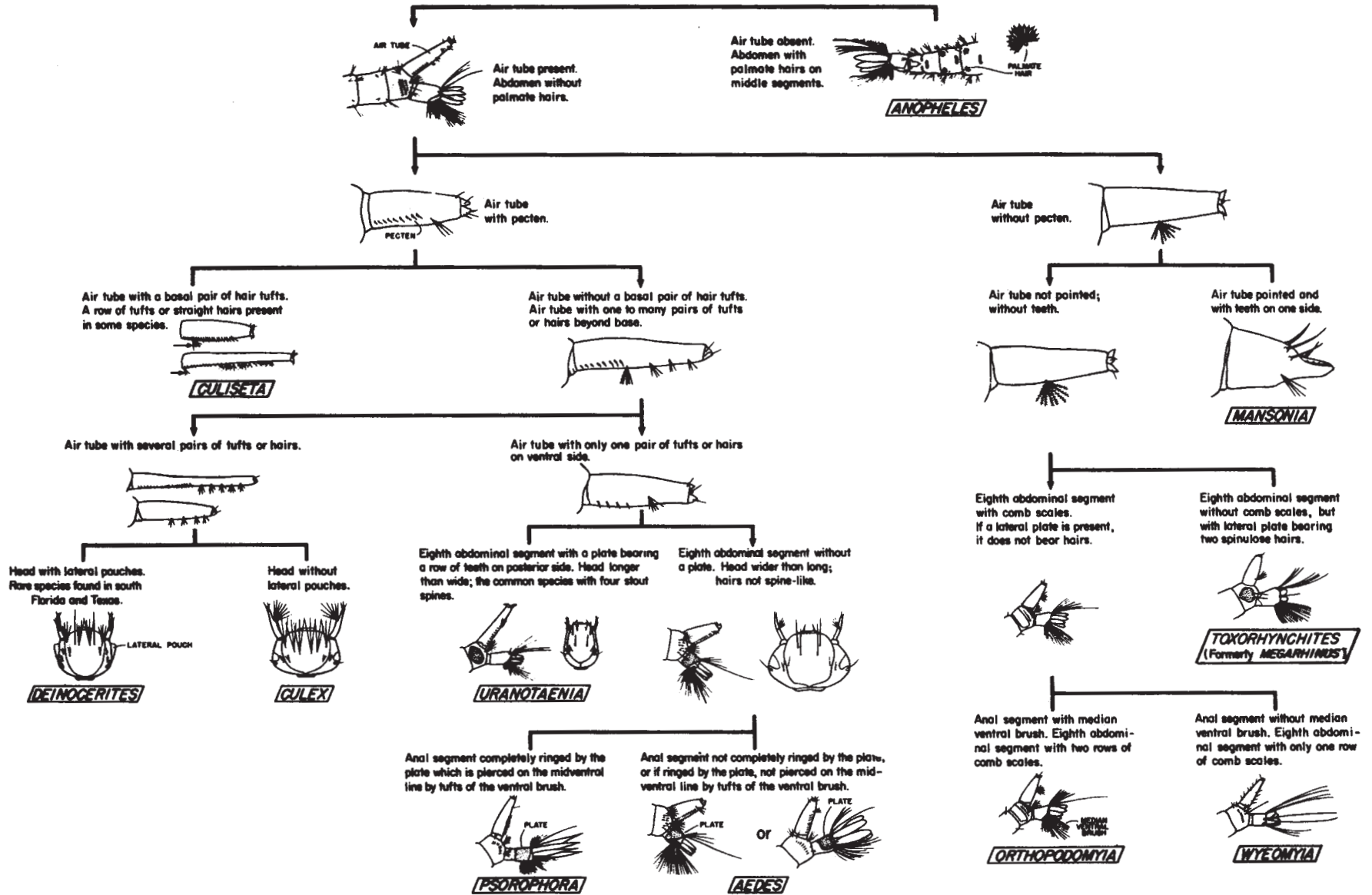
ANOPHELES QUADRIMACULATUS
Harry D. Pratt



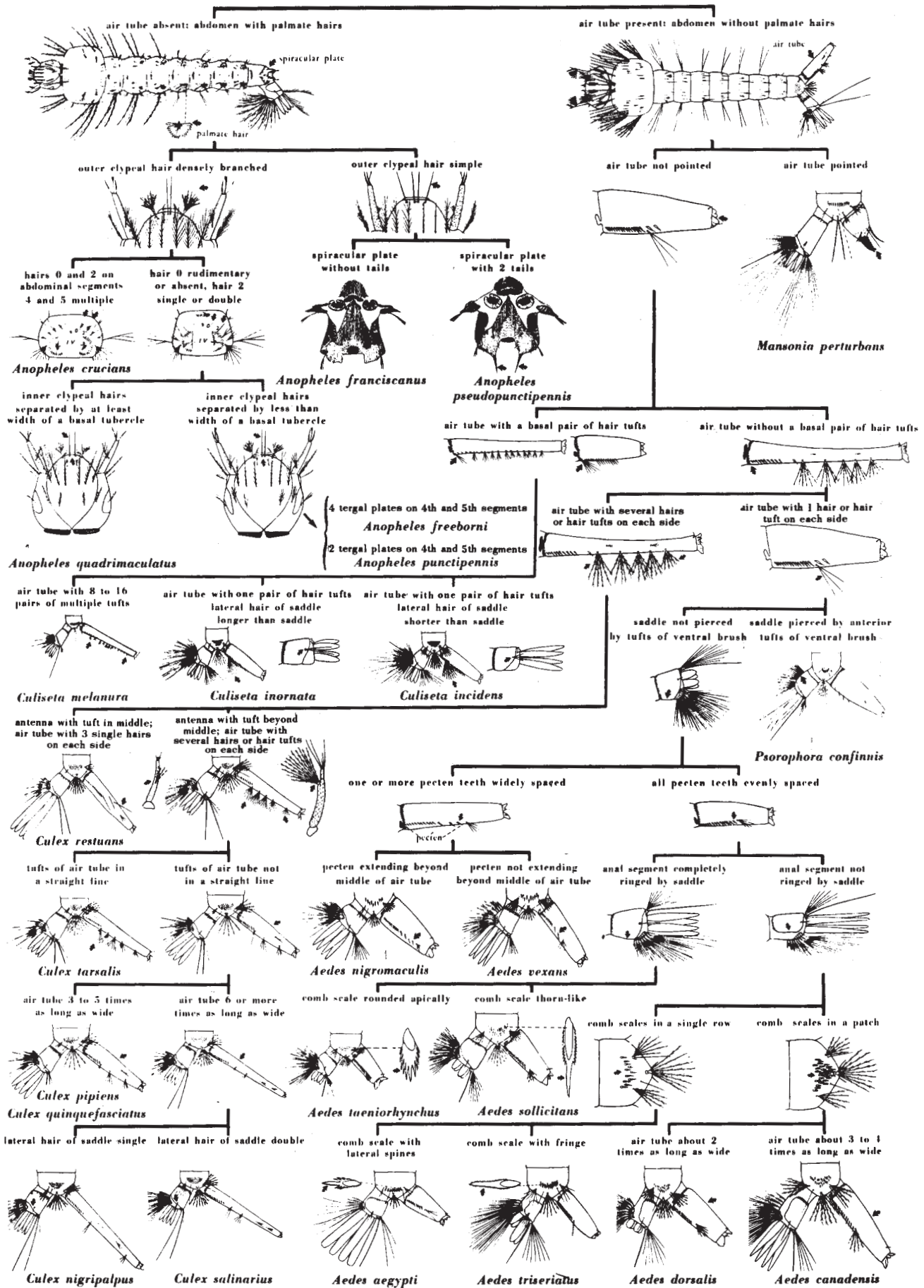
CULEX QUINQUEFASCIATUS
Harry D. Pratt



MOSQUITOES: PICTORIAL KEY TO U.S. GENERA OF LARVAE
Harry D. Pratt



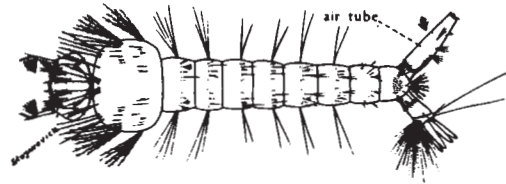
Chester J. Stojanovich and Harry D. Pratt



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

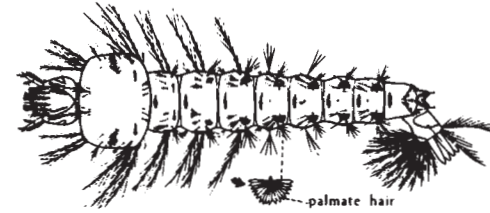
Harry D. Pratt

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 a tuft at base on each side.
GENUS *Culiseta*



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



Air tube with 5 or more tufts on each side.



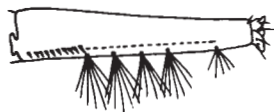
ENCEPHALITIS MOSQUITO
Culex tarsalis

Air tube with 4 tufts on each side.

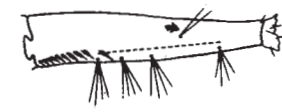


HOUSE MOSQUITO
Culex pipiens

All tufts on each side inserted in a straight line.

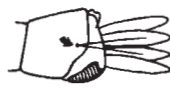


One or more tufts on each side out of line.



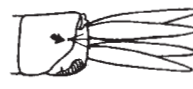
Culex peus

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.



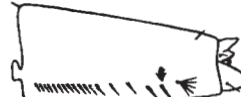
Culiseta incidens

Pecten teeth extend to about middle of air tube.



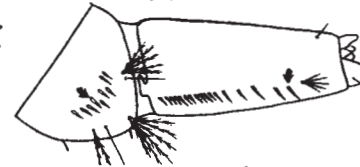
Aedes vexans

Pecten teeth extend much beyond middle of air tube.



Aedes nigromaculis

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



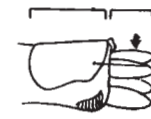
Aedes dorsalis

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



Aedes sticticus

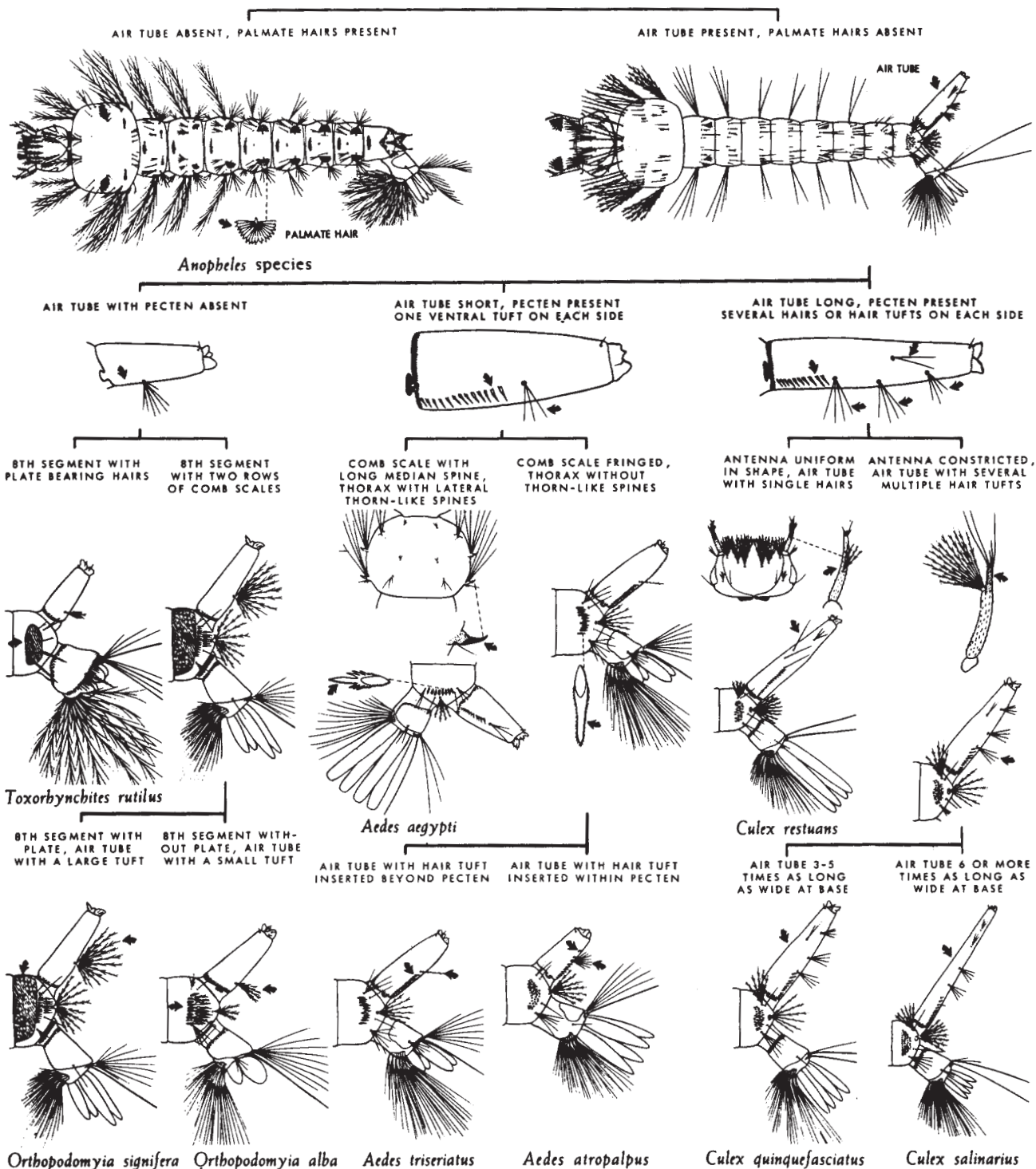
Anal gills shorter than anal segment.



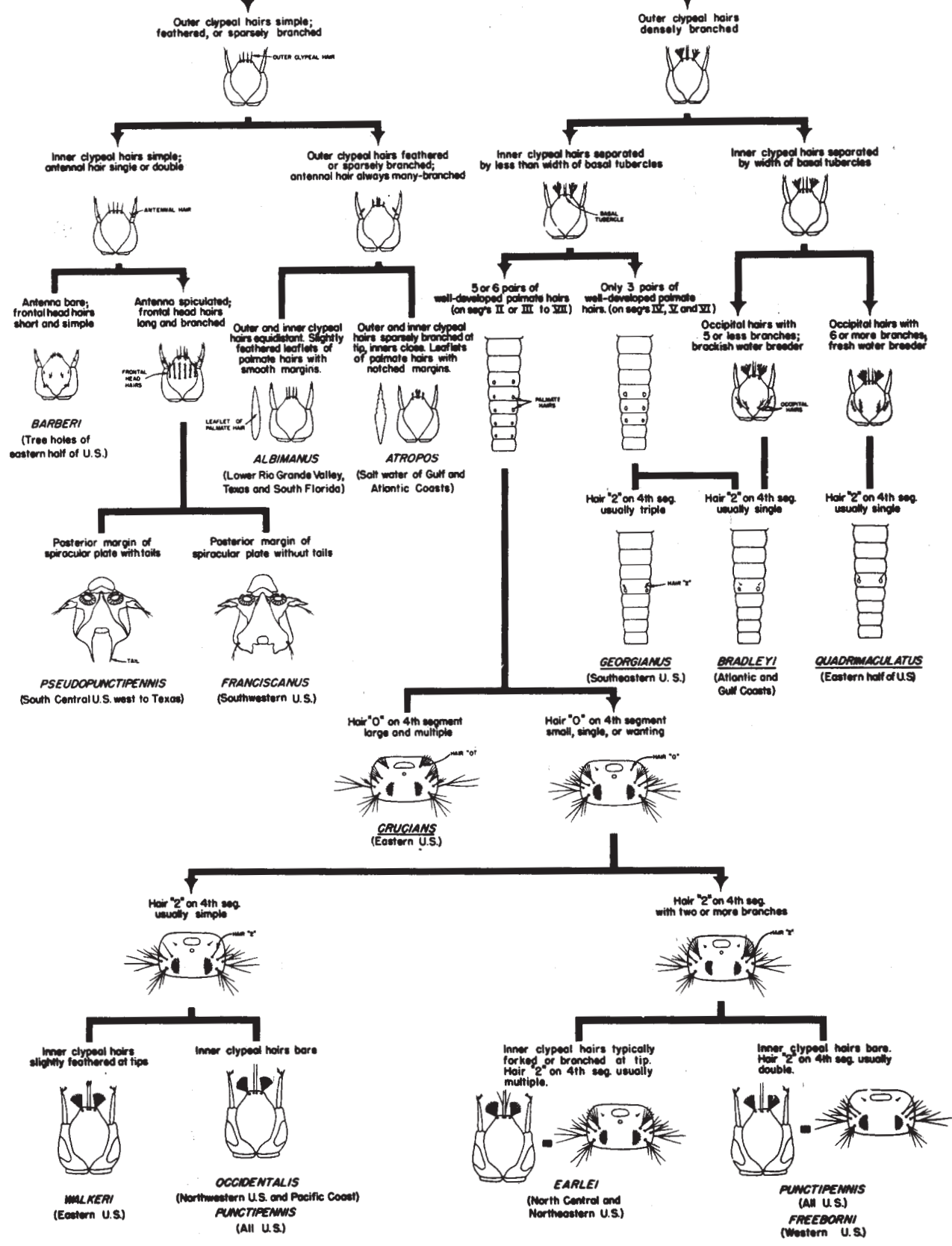
Anal gills longer than anal segment.



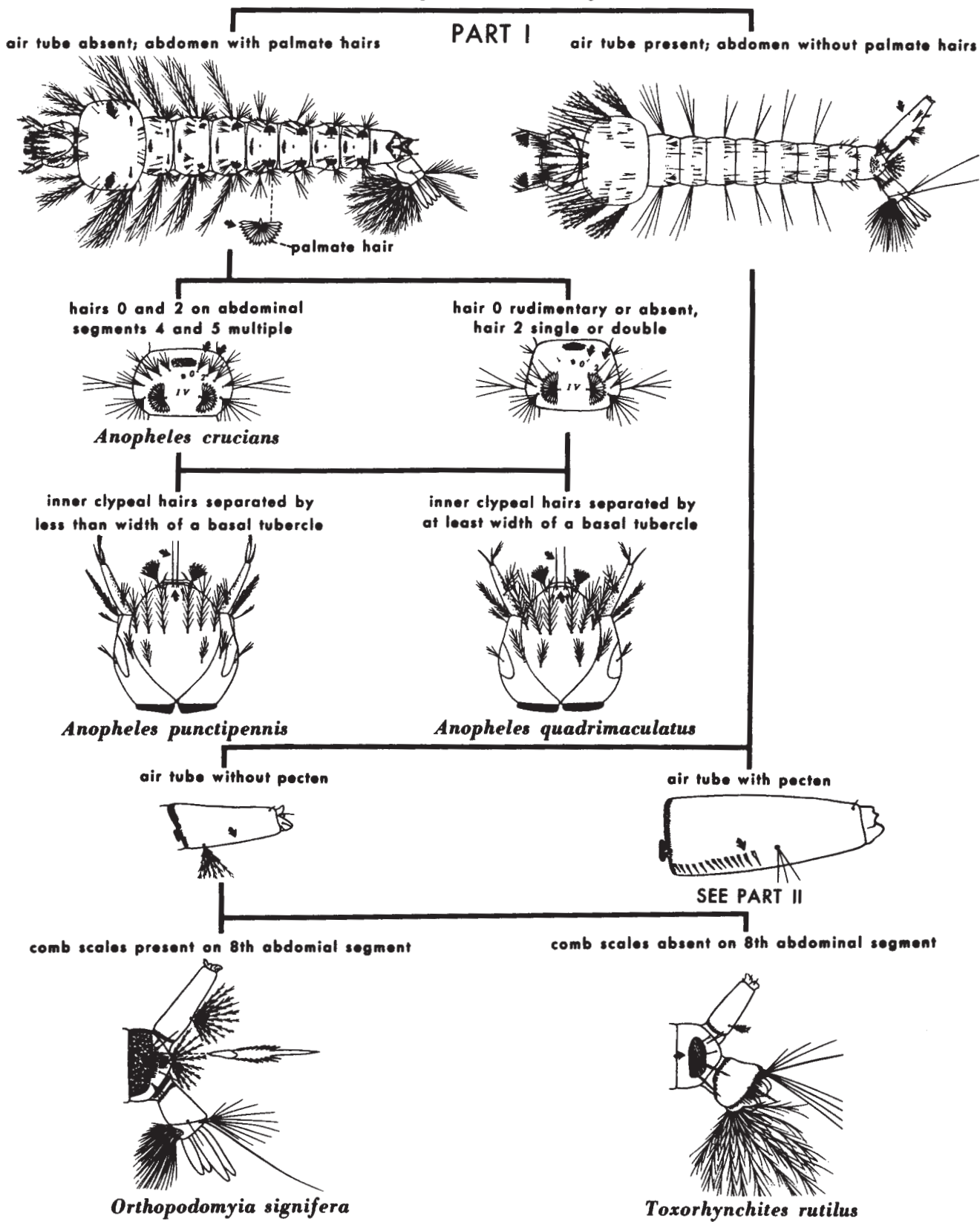
**MOSQUITOES: PICTORIAL KEY TO SOME LARVAE
COMMONLY FOUND IN ARTIFICIAL CONTAINERS**
Harry D. Pratt and Chester J. Stojanovich



MOSQUITOES: PICTORIAL KEY TO ANOPHELINE LARVAE OF THE UNITED STATES
 Stanley B. Freeborn and Eugene J. Gerberg



**MOSQUITOES: PICTORIAL KEY TO SOME LARVAE OF FLORIDA
COMMONLY FOUND IN CONTAINERS**
Chester J. Stojanovich and Harry D. Pratt



PART II

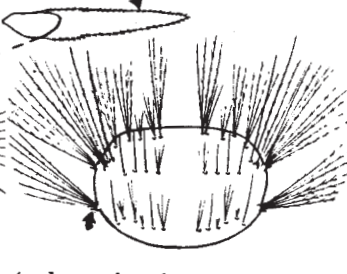
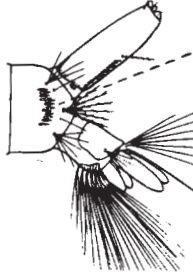
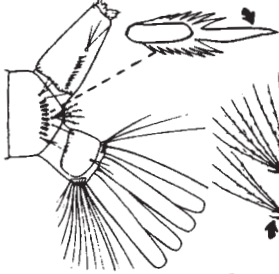
air tube with one hair or tuft on each side

air tube with several hairs or tufts on each side



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

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

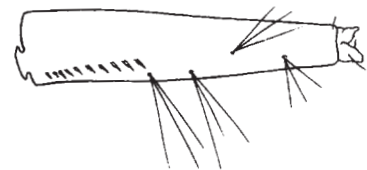


Aedes aegypti

Aedes triseriatus

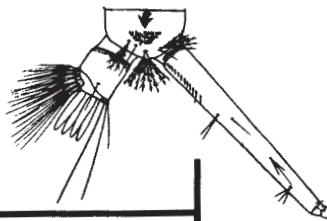
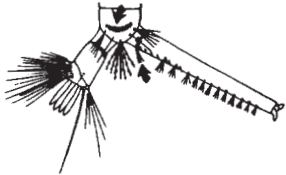
air tube at least 6 times as long as wide

air tube 3-5 times as long as wide



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

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



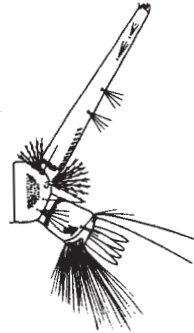
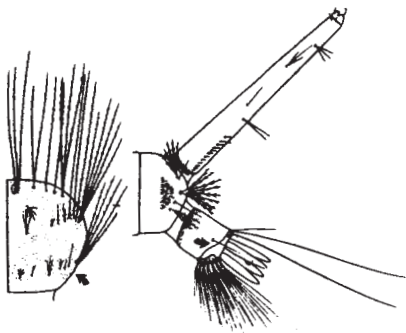
Culiseta melanura

thorax with spicules, lateral hair of saddle single

thorax without spicules, lateral hair of saddle double

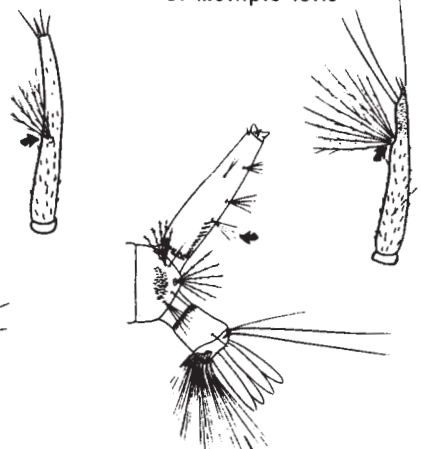
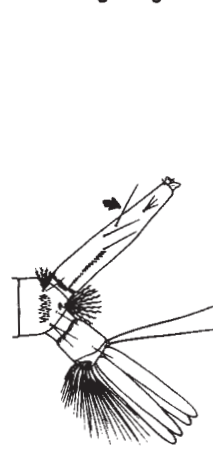
antenna with tuft inserted at middle, air tube with 3 pairs of long single hairs

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



Culex nigripalpus

Culex salinarius

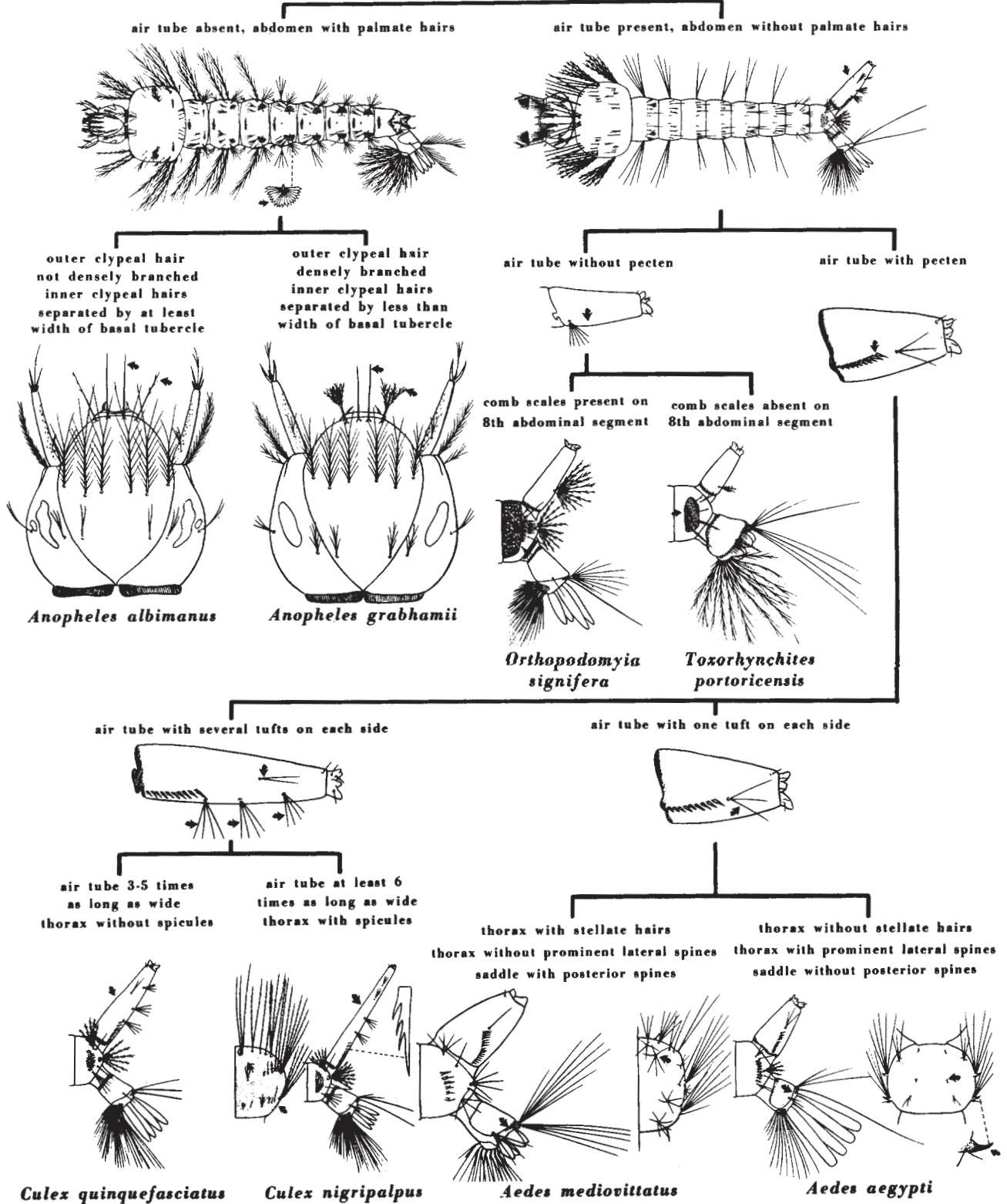


Culex restuans

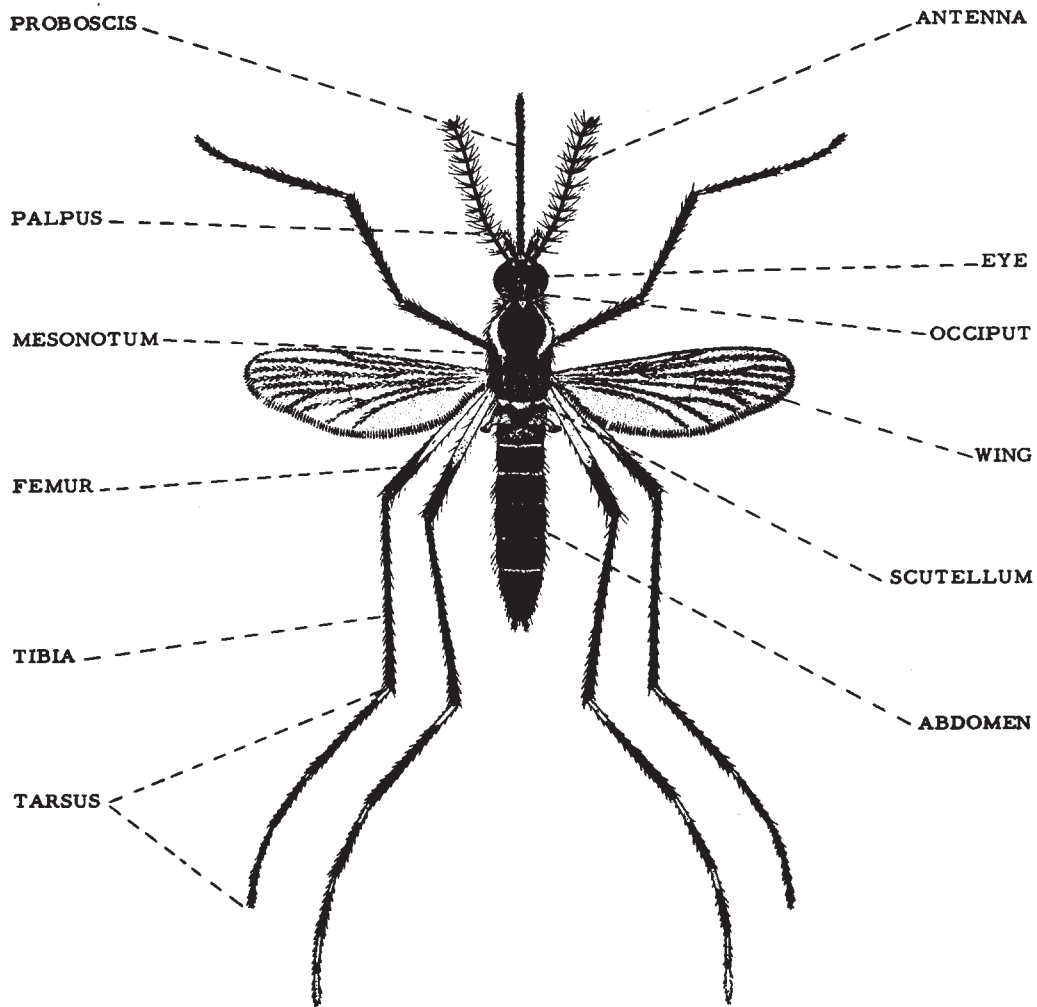
Culex quinquefasciatus

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

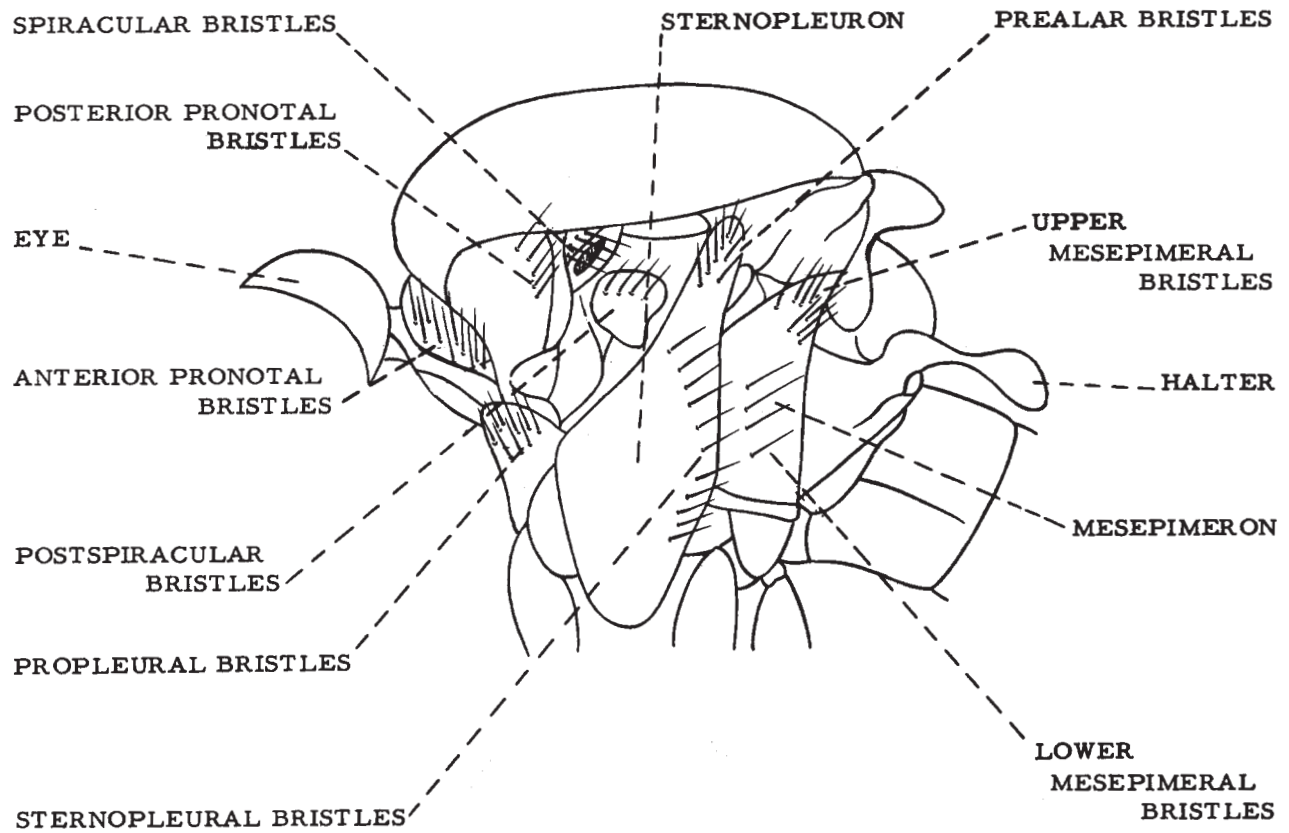
Harry D. Pratt and Chester J. Stojanovich



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

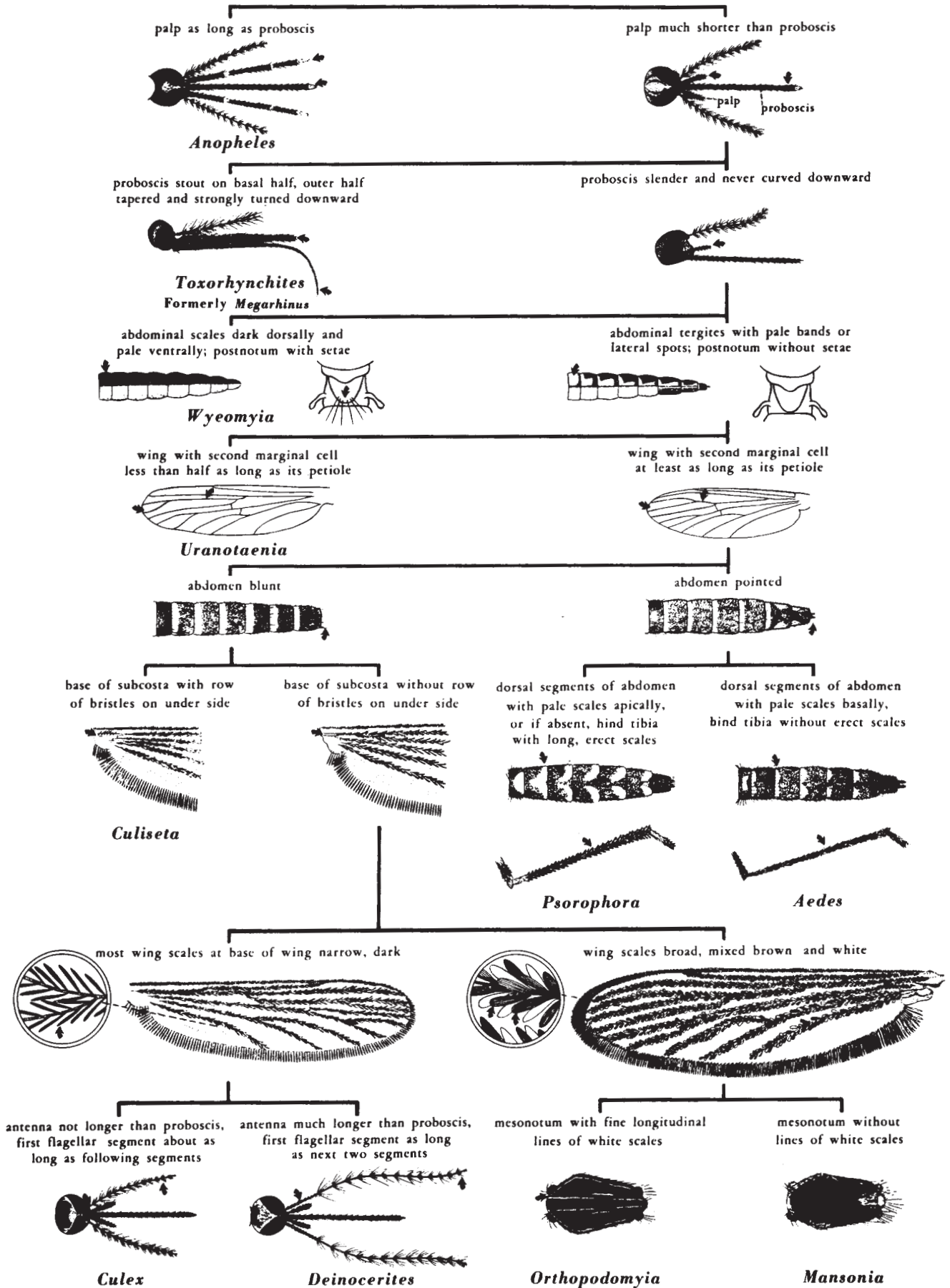


MOSQUITO DIAGRAM – LATERAL ASPECT OF MOSQUITO THORAX
Chester J. Stojanovich



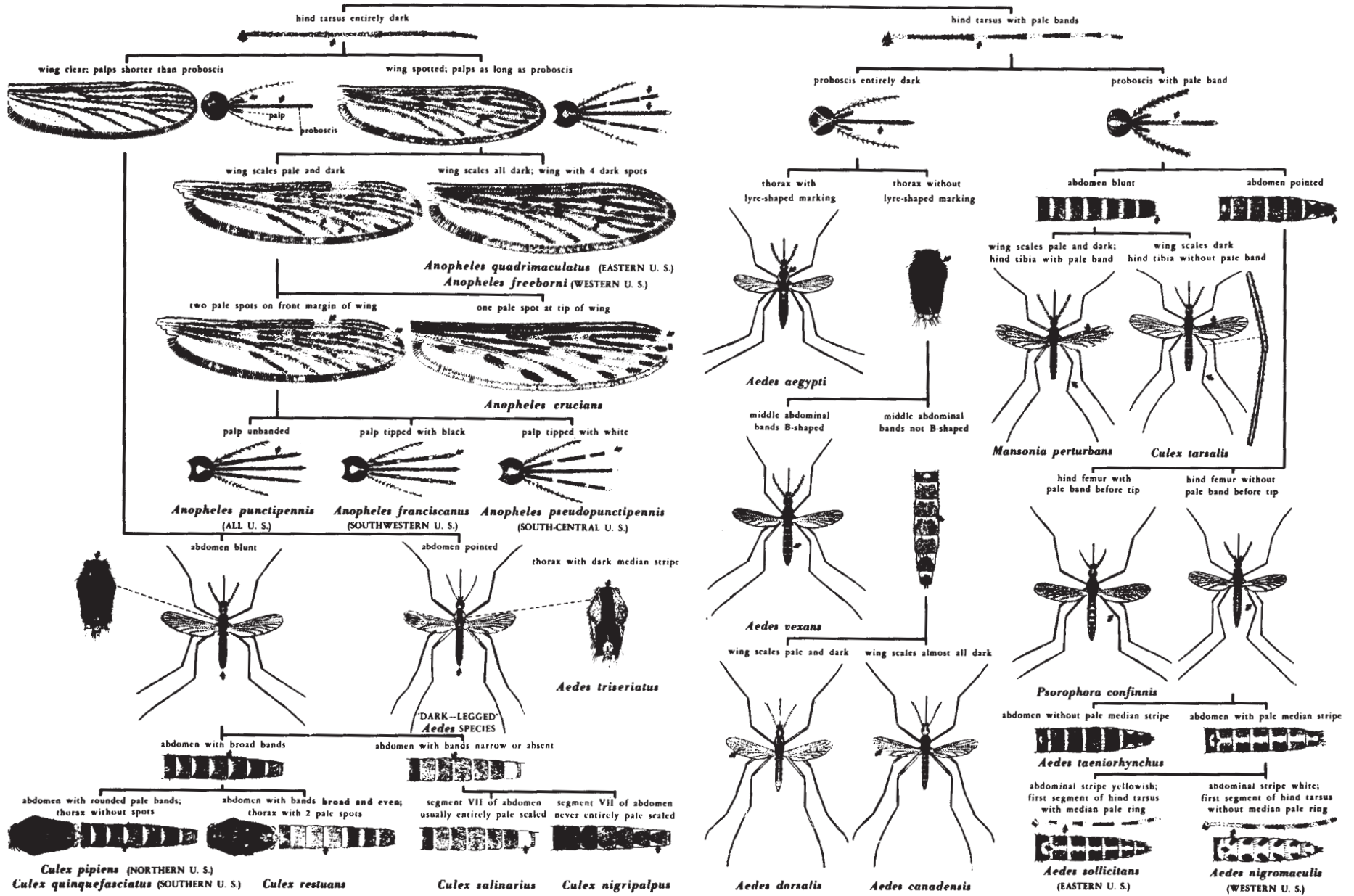
MOSQUITOES: PICTORIAL KEY TO UNITED STATES GENERA OF ADULTS (FEMALE)

Harry D. Pratt and Chester J. Stojanovich



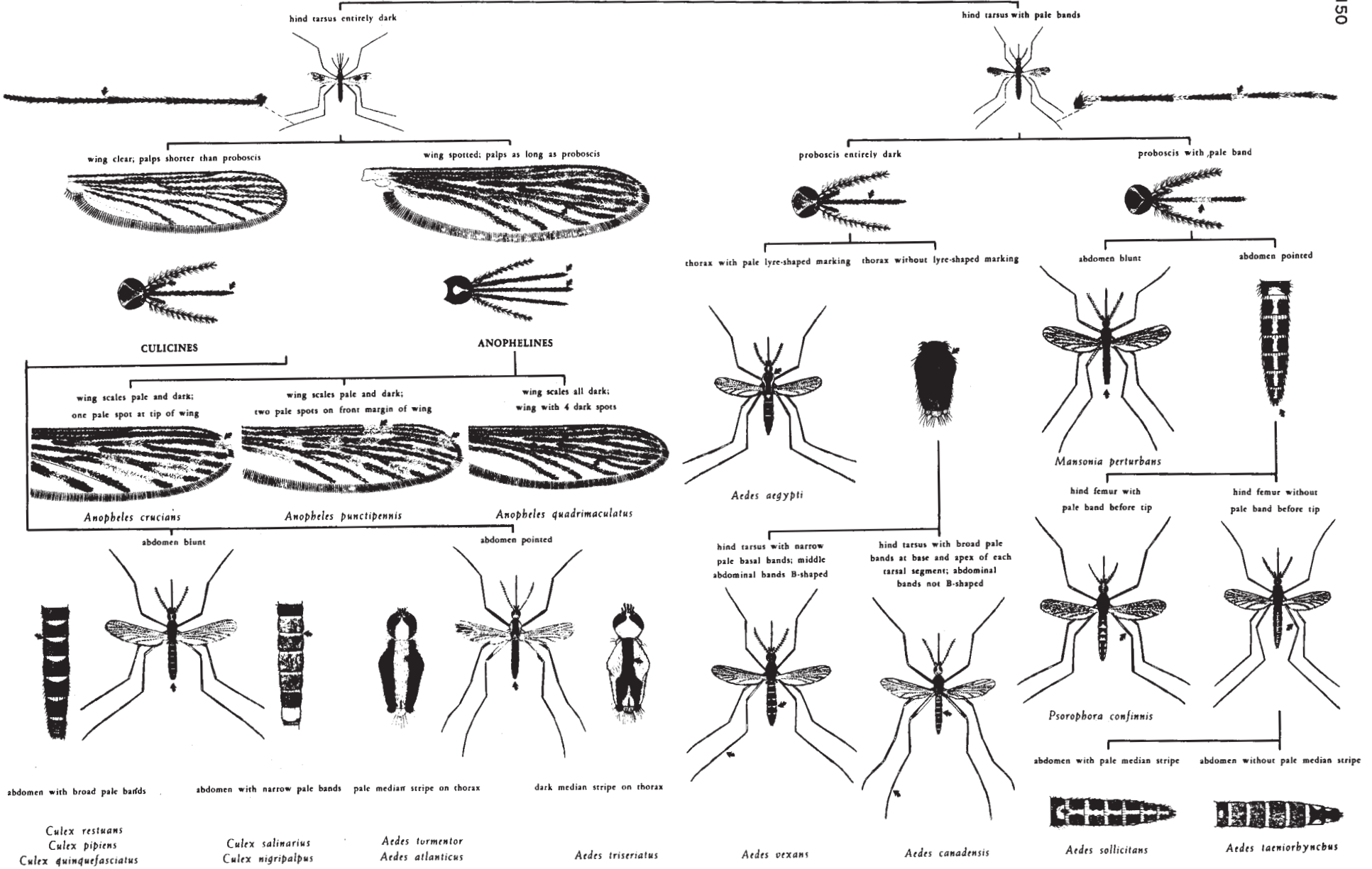
MOSQUITOES: PICTORIAL KEY TO SOME COMMON ADULTS (FEMALE) OF THE UNITED STATES

Harry D. Pratt and Chester J. Stojanovich

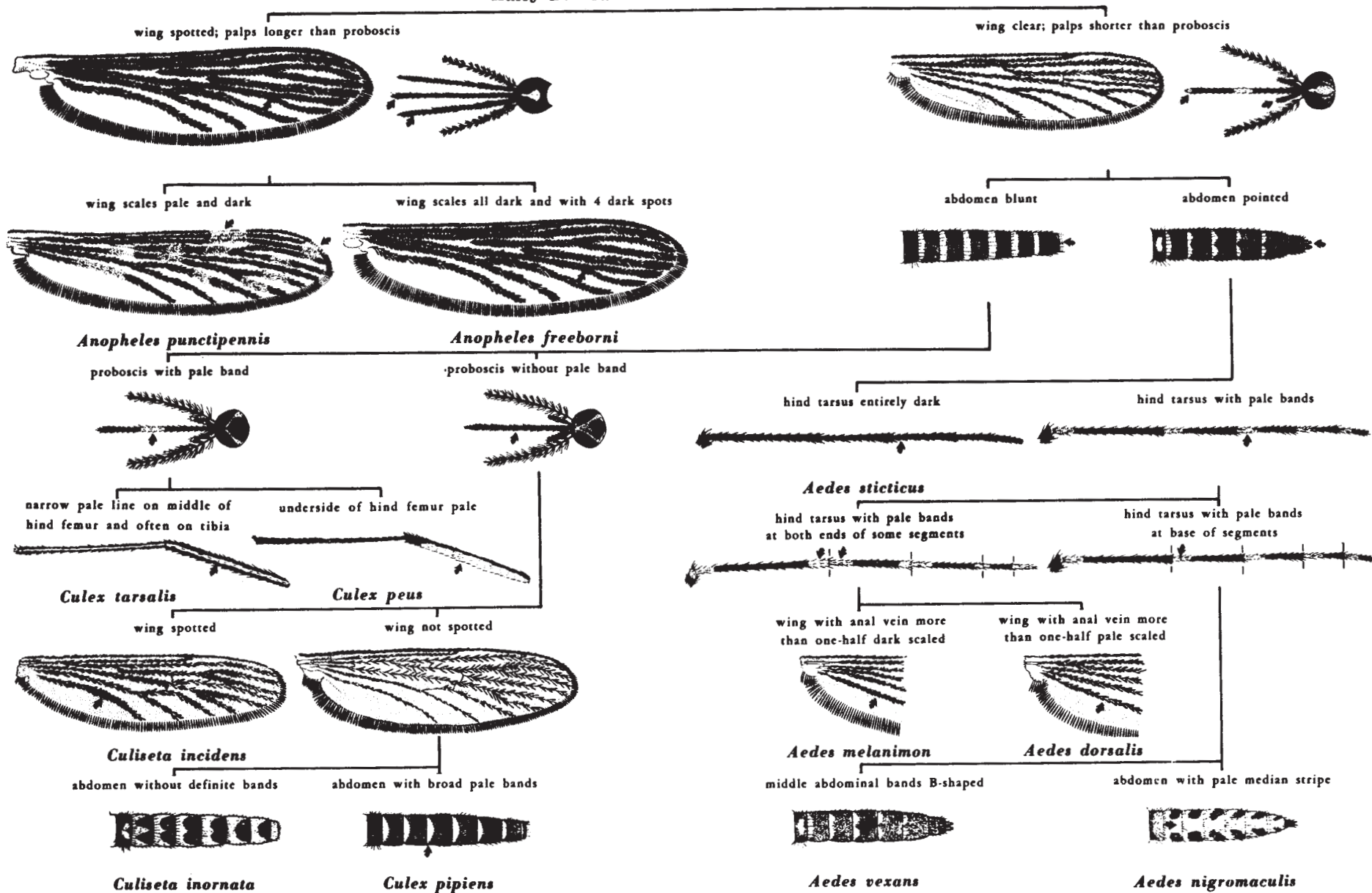


MOSQUITOES: PICTORIAL KEY TO SOME ADULTS (FEMALE) IN EASTERN UNITED STATES

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



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
PROBOSCIS STRAIGHT, SMALLER MOSQUITO USUALLY WITH BLACKISH OR BROWNISH COLOR



Toxorhynchites rutilus



HIND Tarsi WITH PALE BANDS

HIND Tarsi WITHOUT PALE BANDS



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

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

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



Aedes aegypti



Aedes atropalpus



Orthopodomyia species

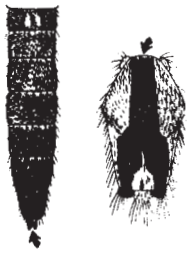
SCUTELLUM SADDLE-SHAPED, ABDOMEN WITHOUT SCALES OR PALE BANDS



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



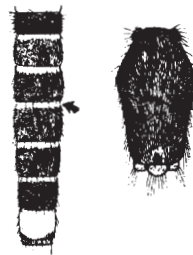
Culex restuans

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



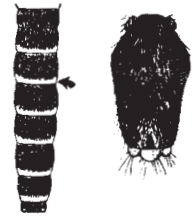
Culex quinquefasciatus

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



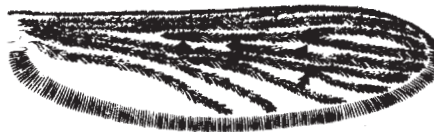
Culex territans

WING UNIFORMLY DARK



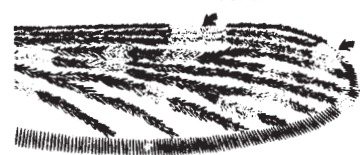
Anopheles barberi

WING DARK WITH FOUR WELL-DEFINED DARK SPOTS



Anopheles quadrimaculatus

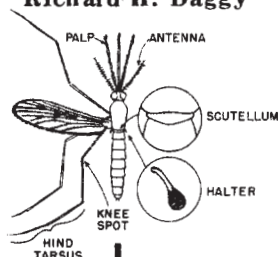
WING WITH PATCHES OF DARK AND PALE SCALES



Anopheles punctipennis

MOSQUITOES: PICTORIAL KEY TO ADULT FEMALE ANOPHELINES OF UNITED STATES

Richard H. Daggy



Palps as long as proboscis
Scutellum evenly rounded
Wings usually spotted

GENUS
ANOPHELES

wings with areas of white or yellow scales

wings entirely dark-scaled

two pale areas on front margin of wing

one pale area on front margin of wing at tip

wings clear -unspotted

wings spotted more or less distinctly by clumping of dark scales



CRUCIANS
GEORGIANUS
BRADLEYI

These three species are indistinguishable as adults
See "Pictorial Key to Anopheline Larvae" for separation in that stage.

thoracic bristles long -about one-third the width of thorax

thoracic bristles normal -shorter than one-third the width of thorax



BARBERI
(Eastern U.S.)

ATROPOS
(Atlantic and Gulf Coasts)

Some specimens of *atropos* have faintly spotted wings. These are distinguished from other anophelines by the absence of light knee spots.

hind tarsus entirely dark-scaled

hind tarsus with broad white band



ALBIMANUS
(Lower Rio Grande valley of Texas)

palp with narrow white bands
halter knobs golden-yellow

palps unbanded
halter knobs dark



WALKERI
(Eastern U.S.)

palp banded

palp unbanded



PUNCTIPENNIS
(All of U.S.)

coppery-colored fringe spot at tip of wing

no fringe spot



OCCIDENTALIS
(Pacific Coast)
EARLEI
(Northern U.S. East of Rockies)

terminal segment of palp entirely white

terminal segment of palp tipped with black



PSEUDOPUNCTIPENNIS
(Southwestern U.S.)

FRANCISCANUS
(South-central and Western U.S.)

West of the Rockies (102° W. Longitude)

East of the Rockies

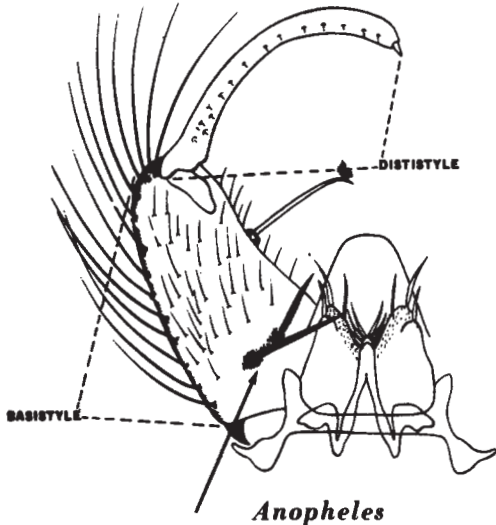
these two species are indistinguishable as adults
FREEBORNI
(Western U.S.)

QUADRIMACULATUS
(Eastern U.S.)

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

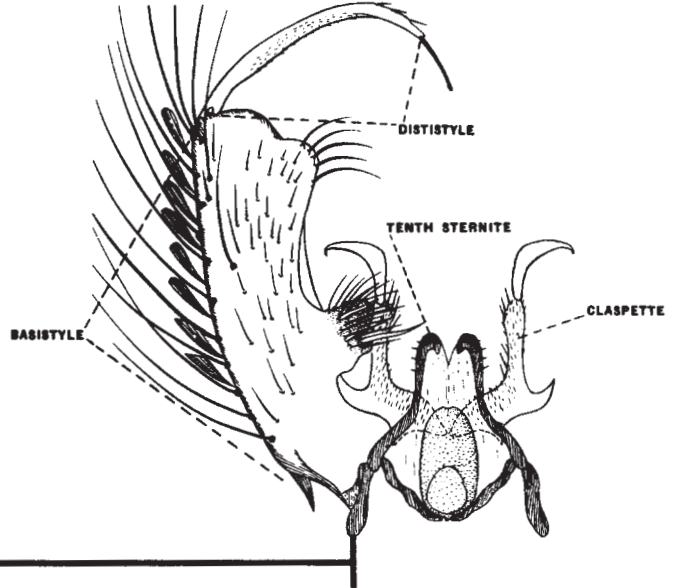
Chester J. Stojanovich

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

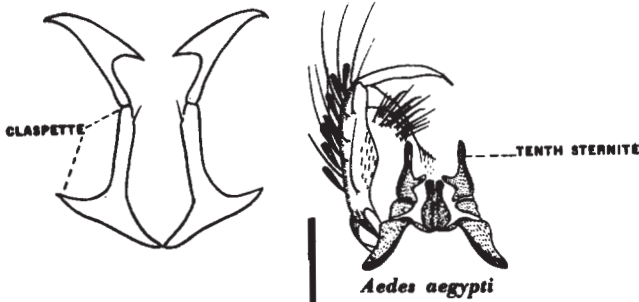


Anopheles

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

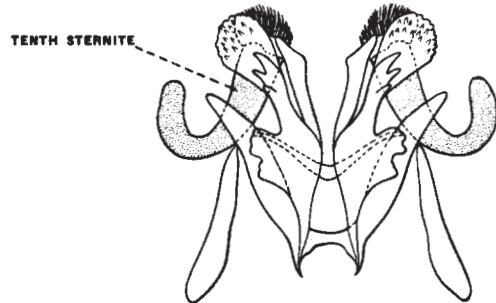


claspettes present 'absent only in *Aedes aegypti* as shown below'



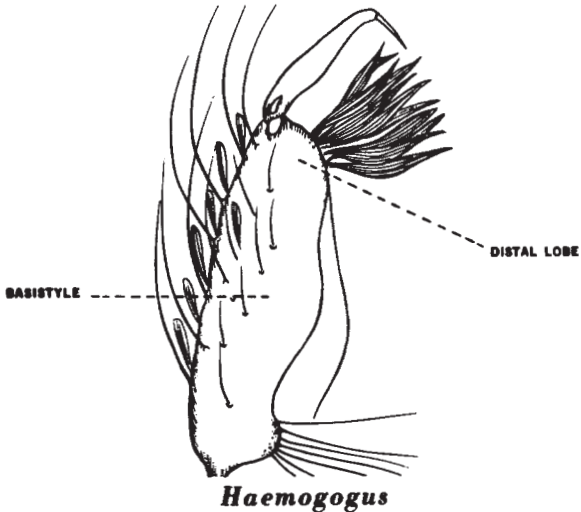
Aedes aegypti

claspette absent



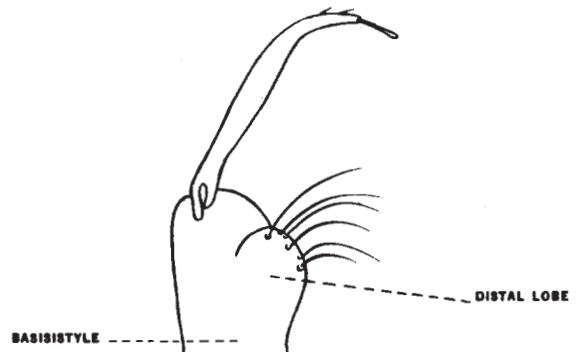
SEE PART II SECTION II

distal lobe of basistyle with leaf-like scales



Haemogogus

distal lobe when present without leaf-like scales



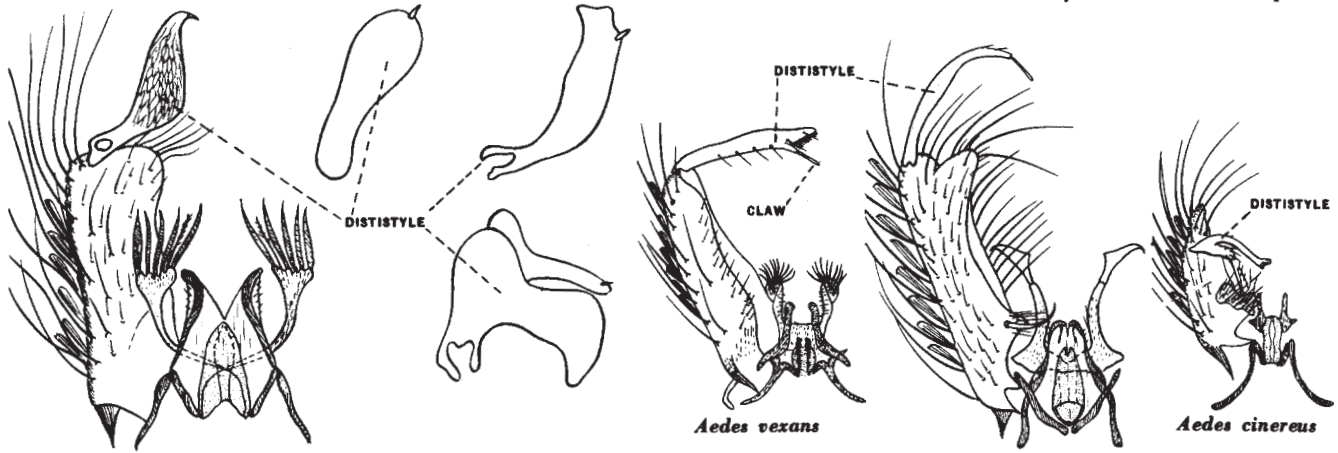
SEE PART II SECTION I

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



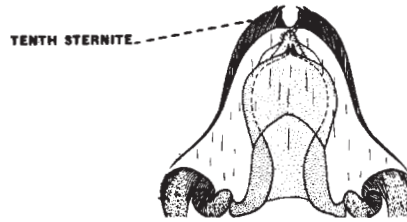
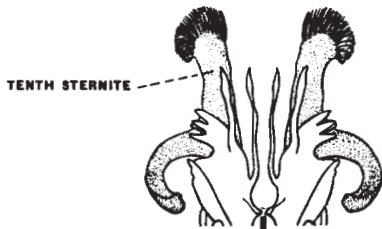
Psorophora

Aedes

PART II SECTION II

tenth sternite crowned with teeth or tuft of spines

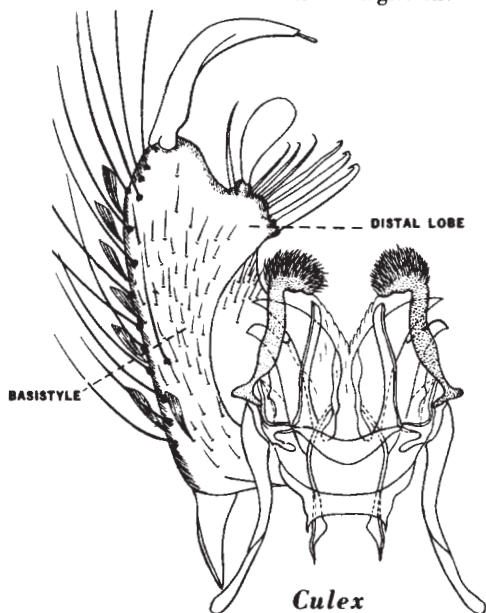
tenth sternite simple or with few teeth



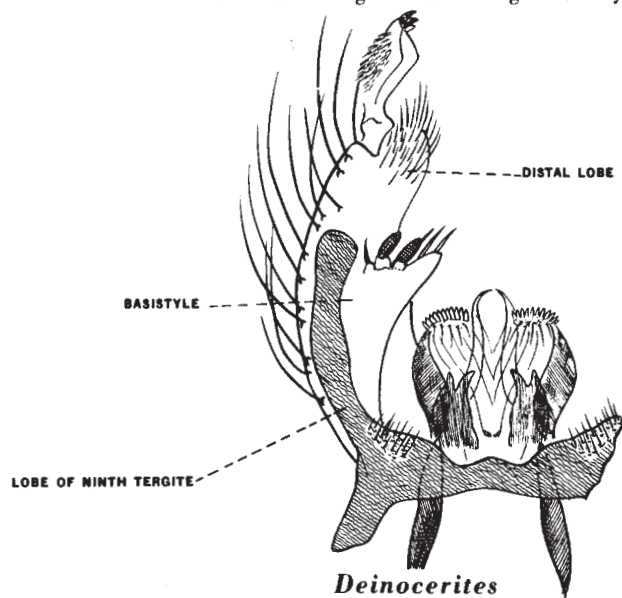
SEE PART III

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

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



Culex

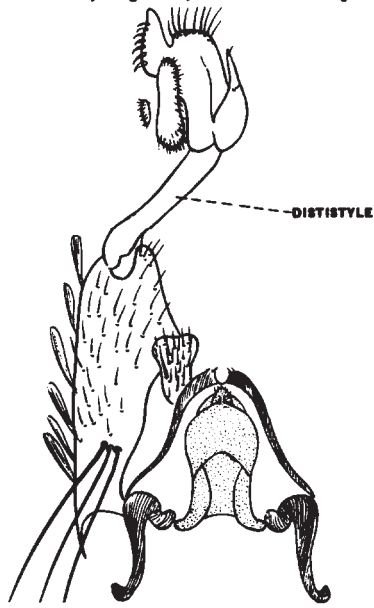


Deinocerites

PART III

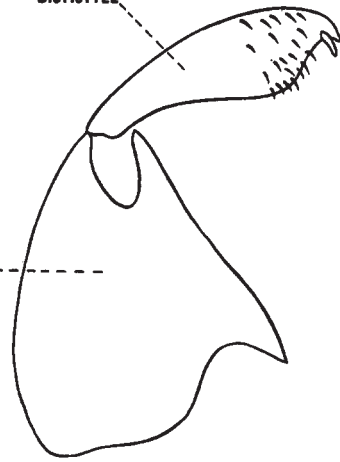
dististyle greatly modified at apex

dististyle not greatly modified at apex



Wyeomyia

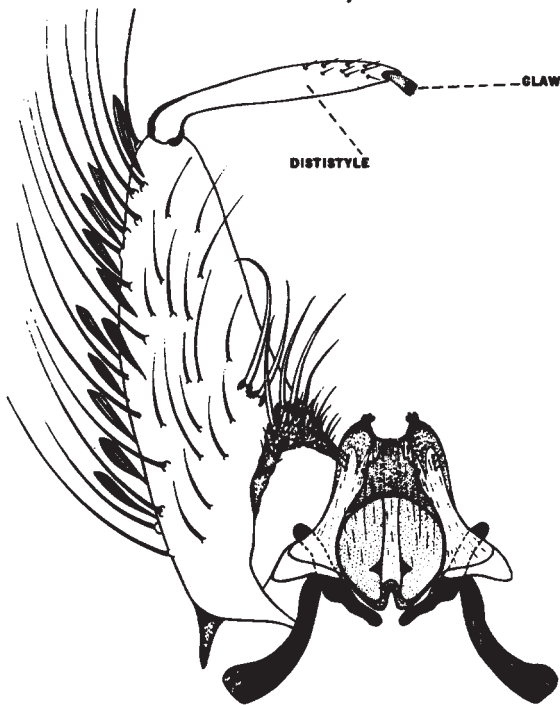
DISTISTYLE



BASISTYLE

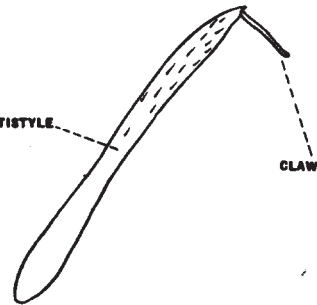
claw of dististyle comb-like

claw of dististyle not comb-like



Orthopodomyia

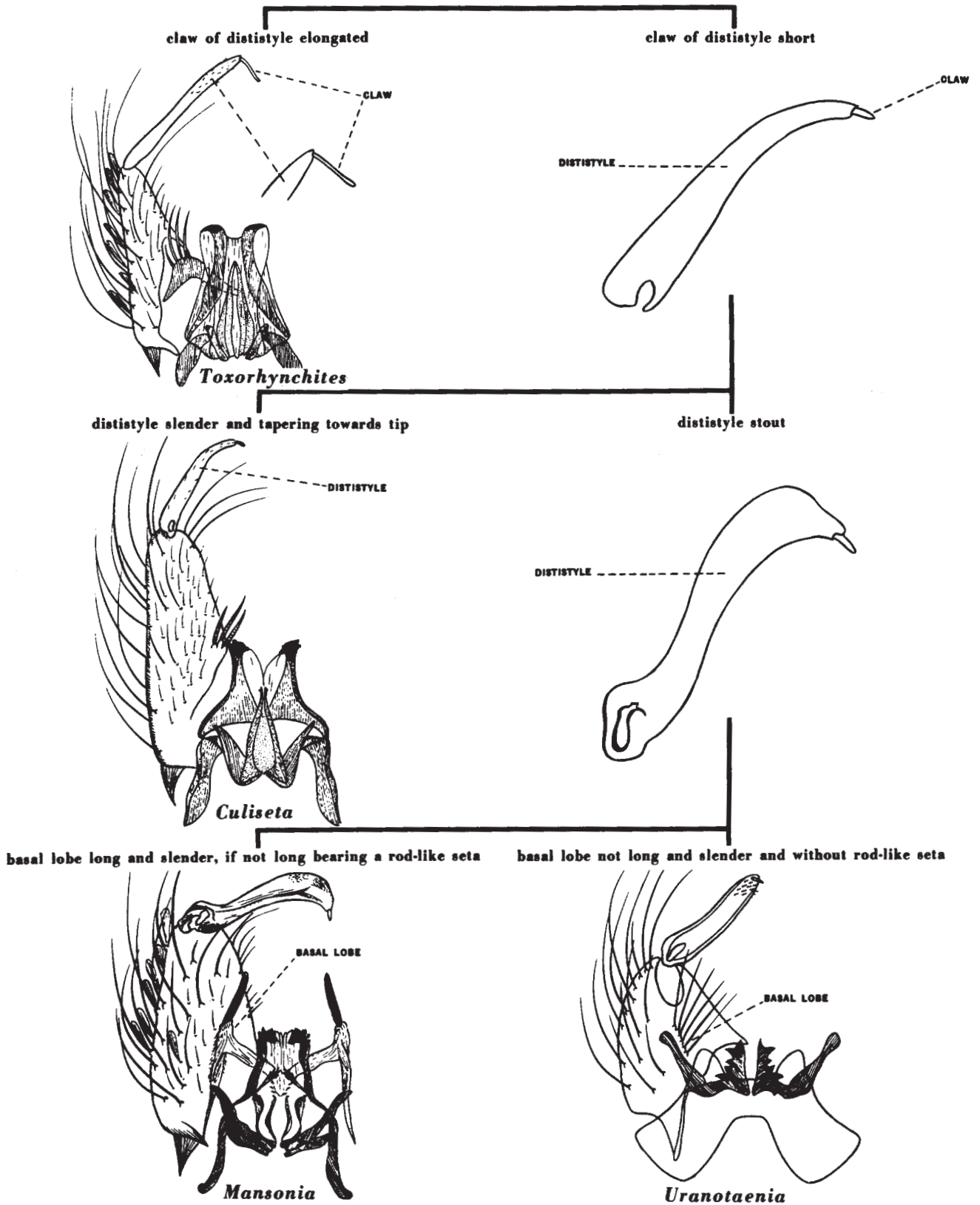
DISTISTYLE



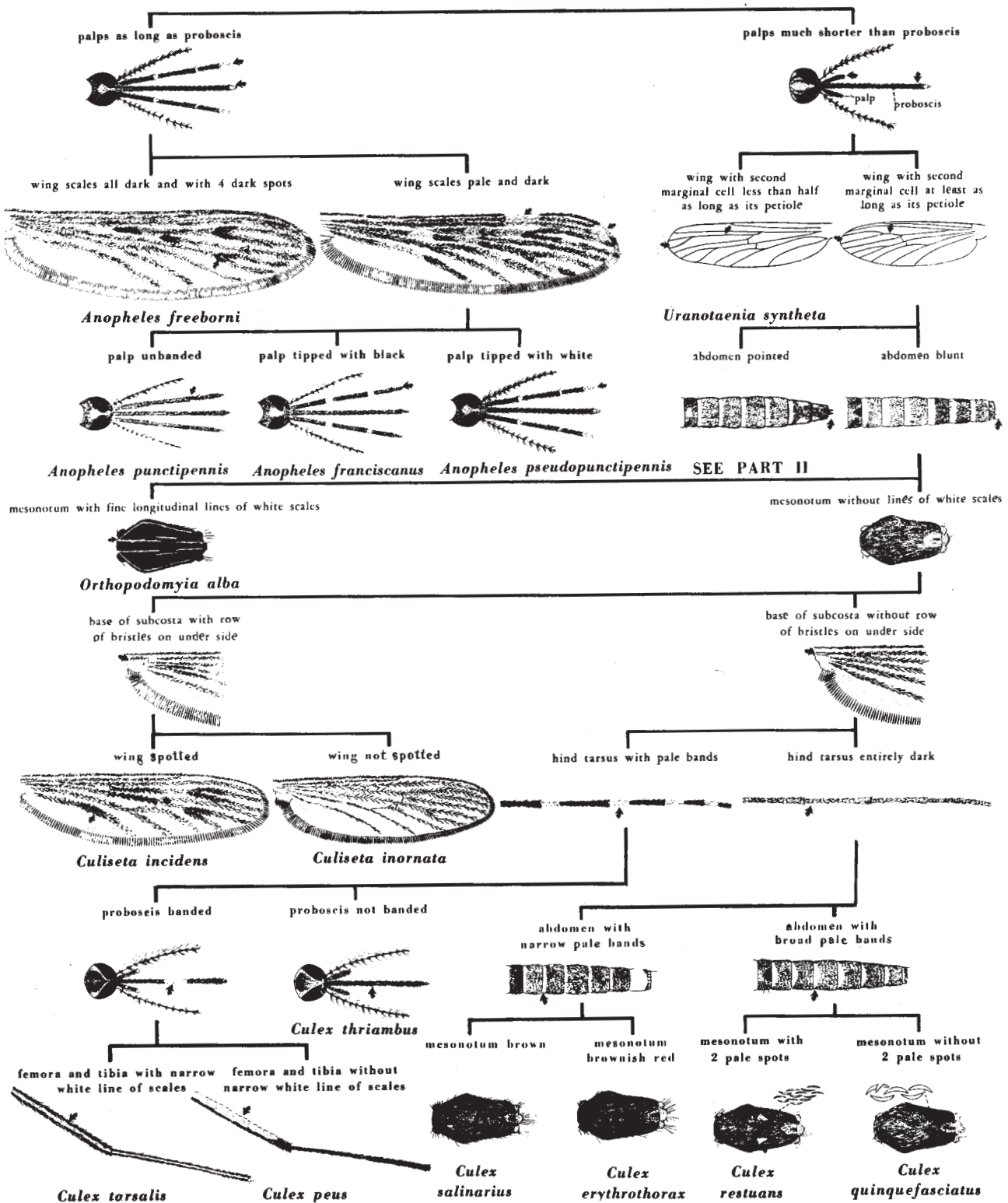
CLAW

SEE PART IV

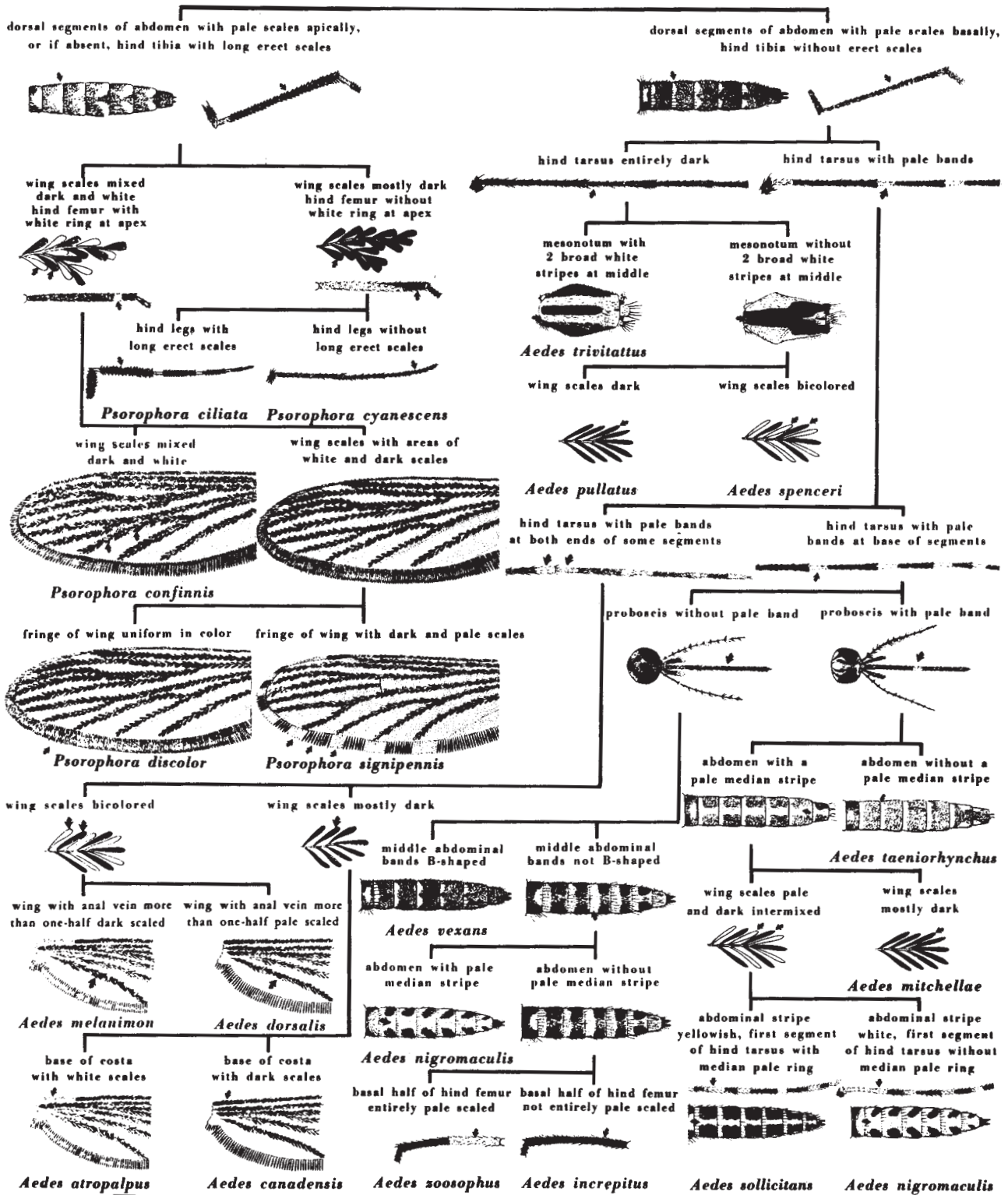
PART IV



MOSQUITOES: PICTORIAL KEY TO MOST ADULTS (FEMALE) OF NEW MEXICO
 PART I
 Chester J. Stojanovich

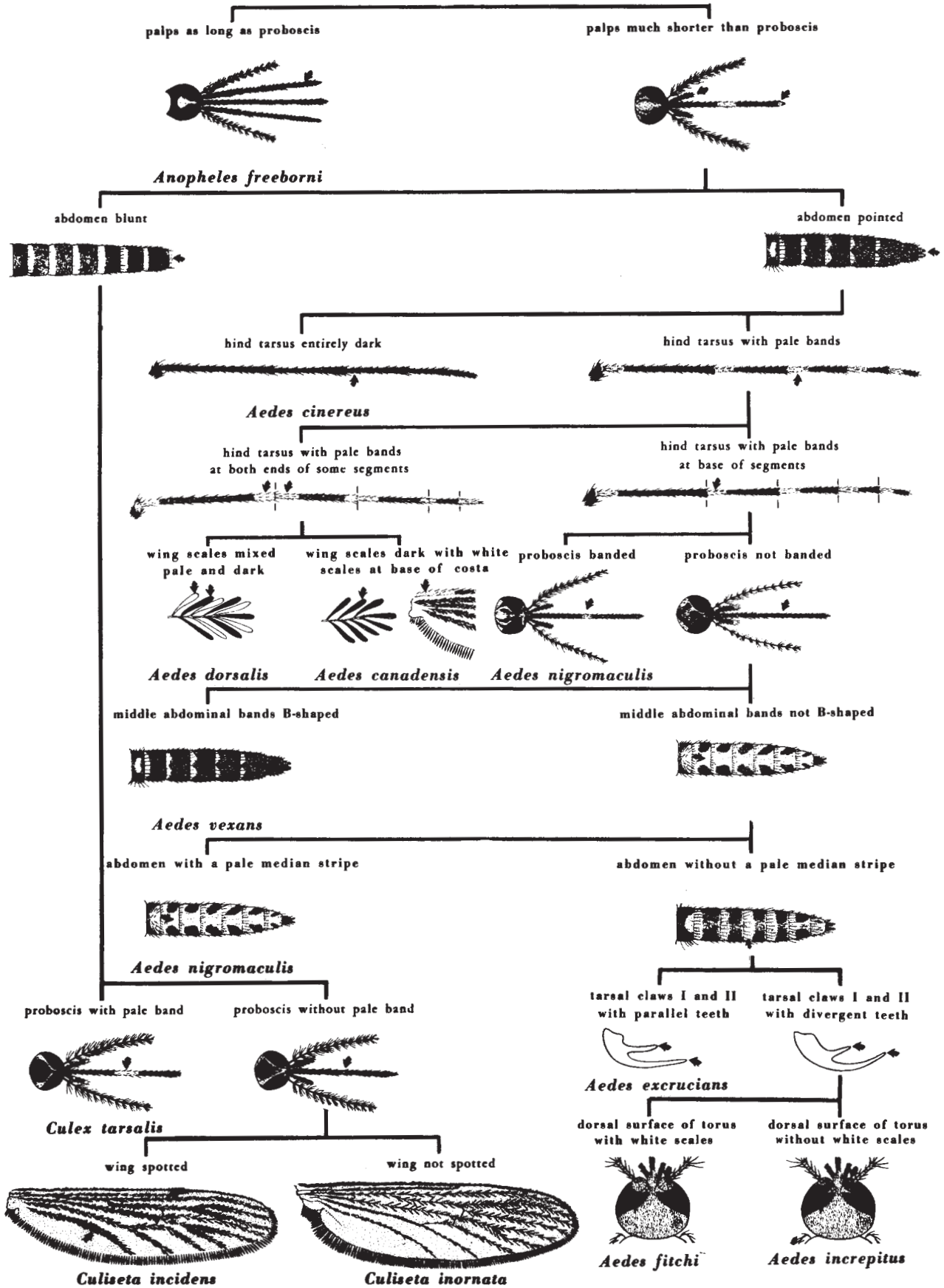


PART II



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

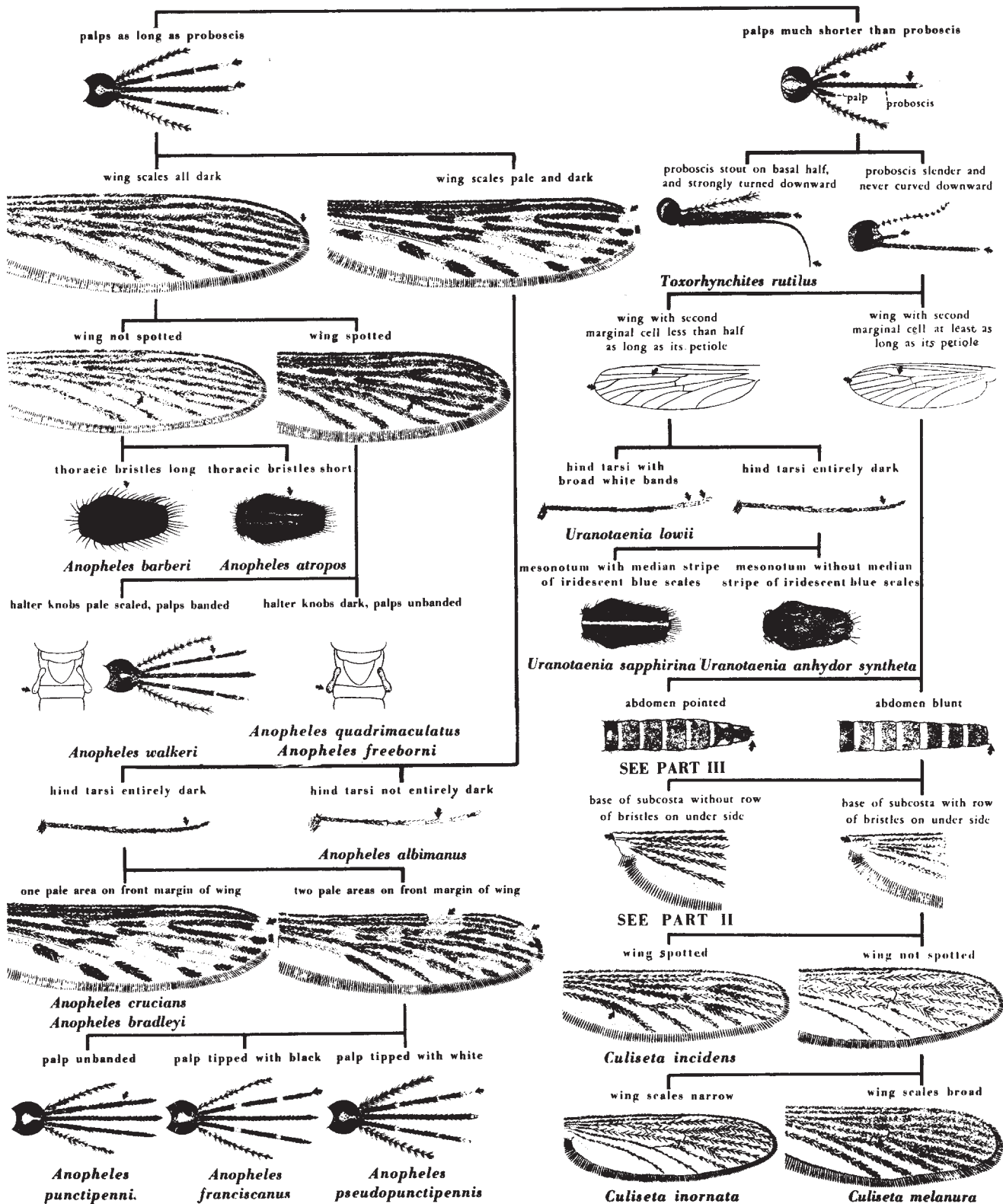
Chester J. Stojanovich



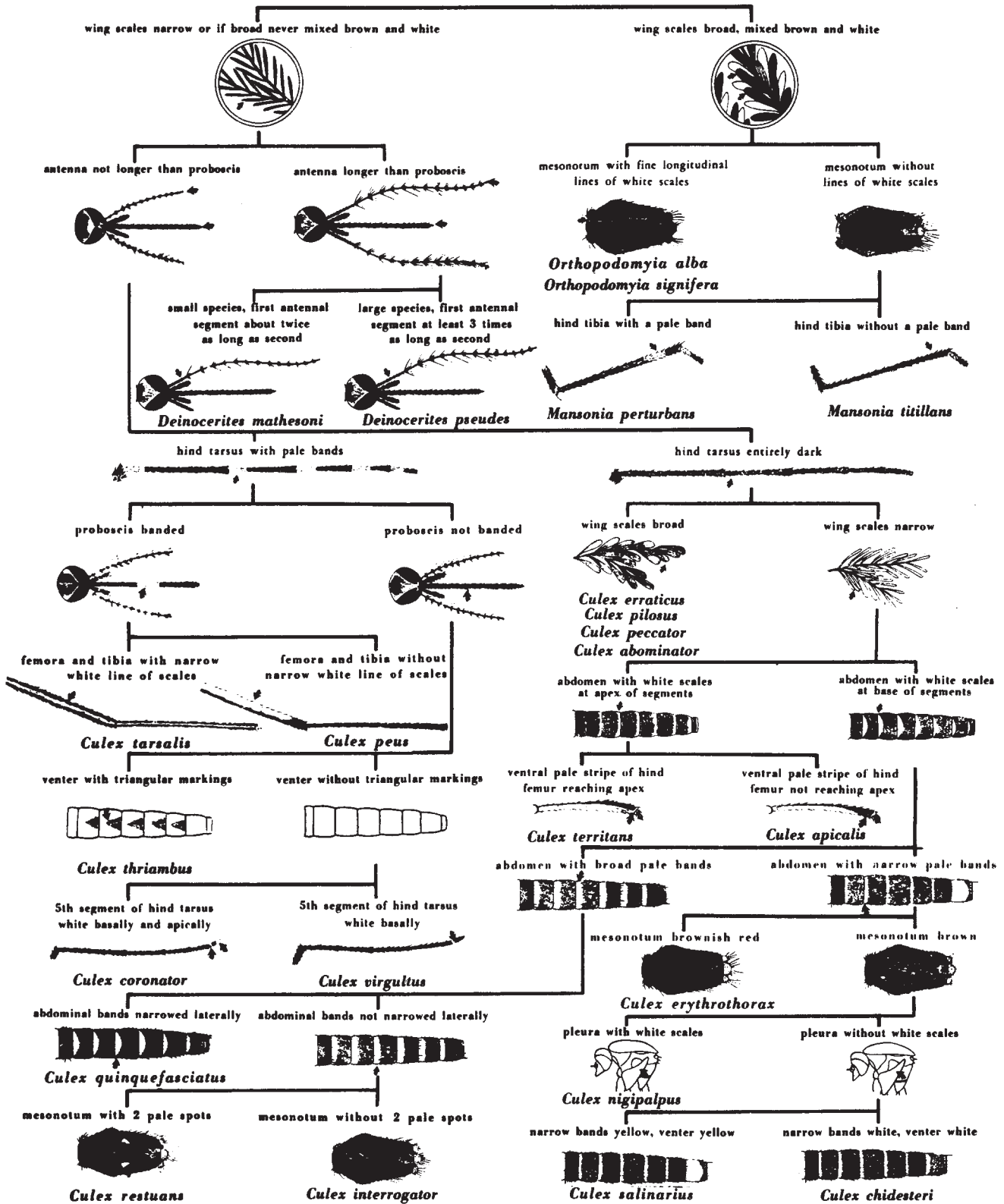
MOSQUITOES: PICTORIAL KEY TO ALL ADULTS (FEMALE) OF TEXAS

PART I

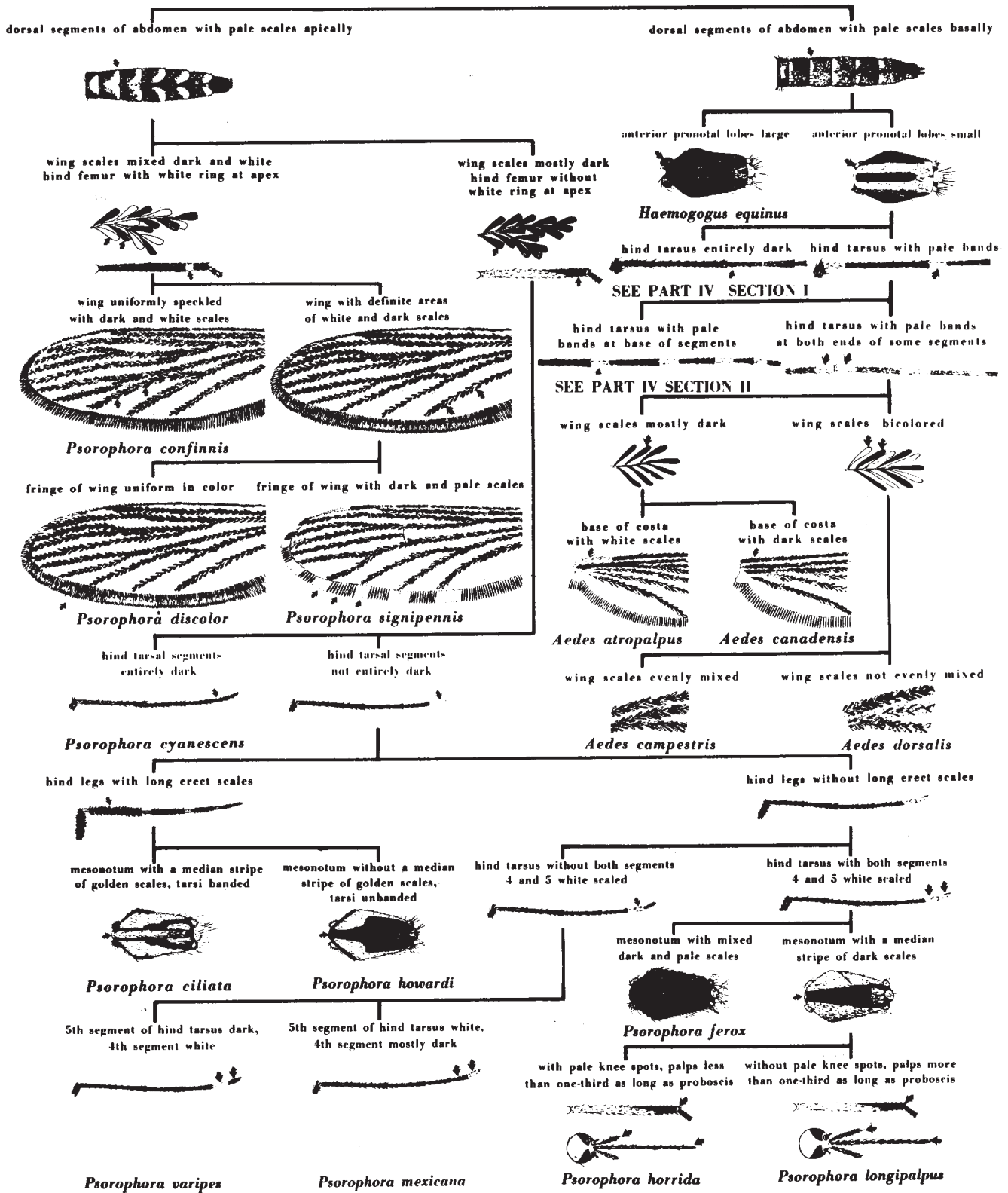
Chester J. Stojanovich



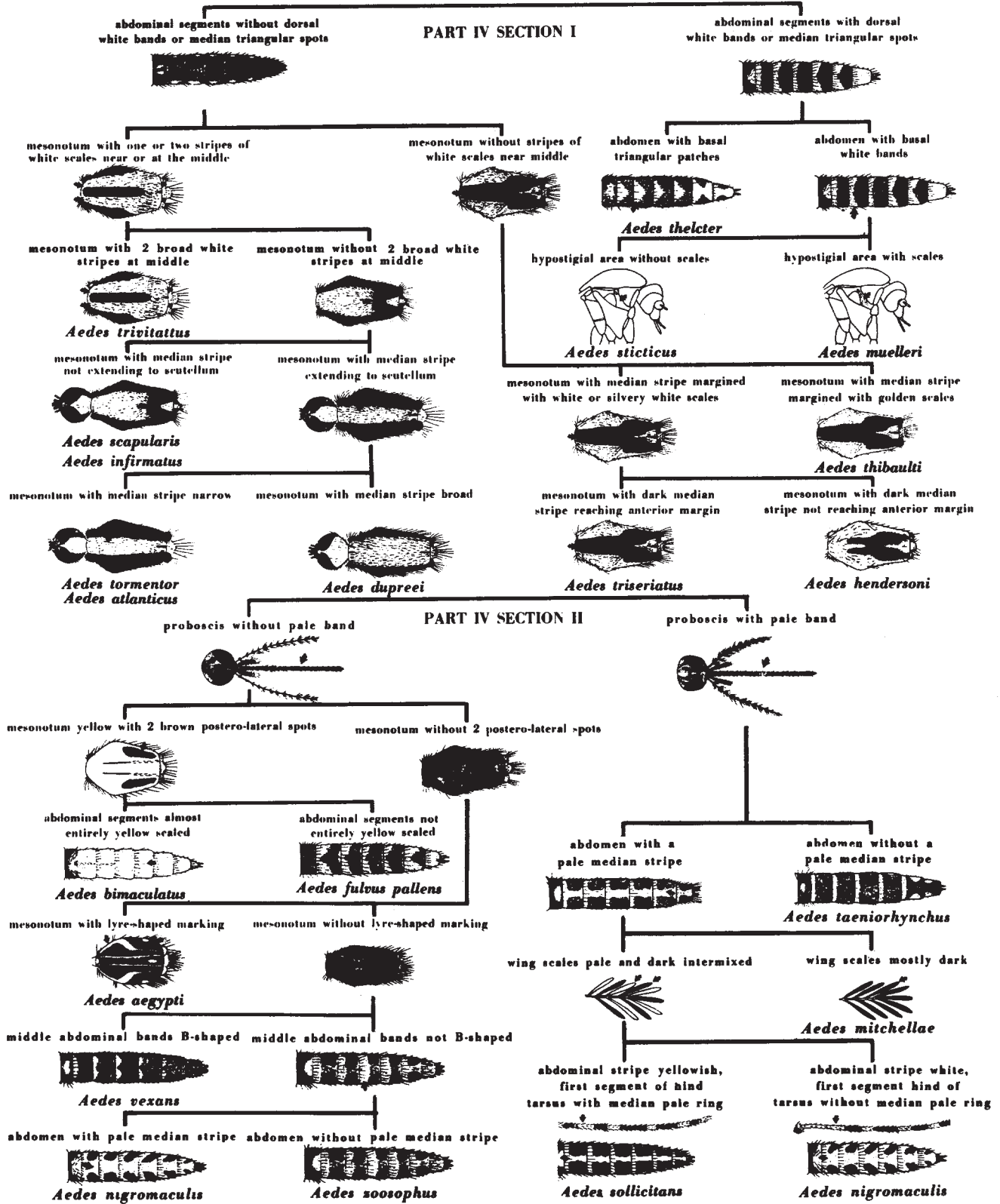
PART II



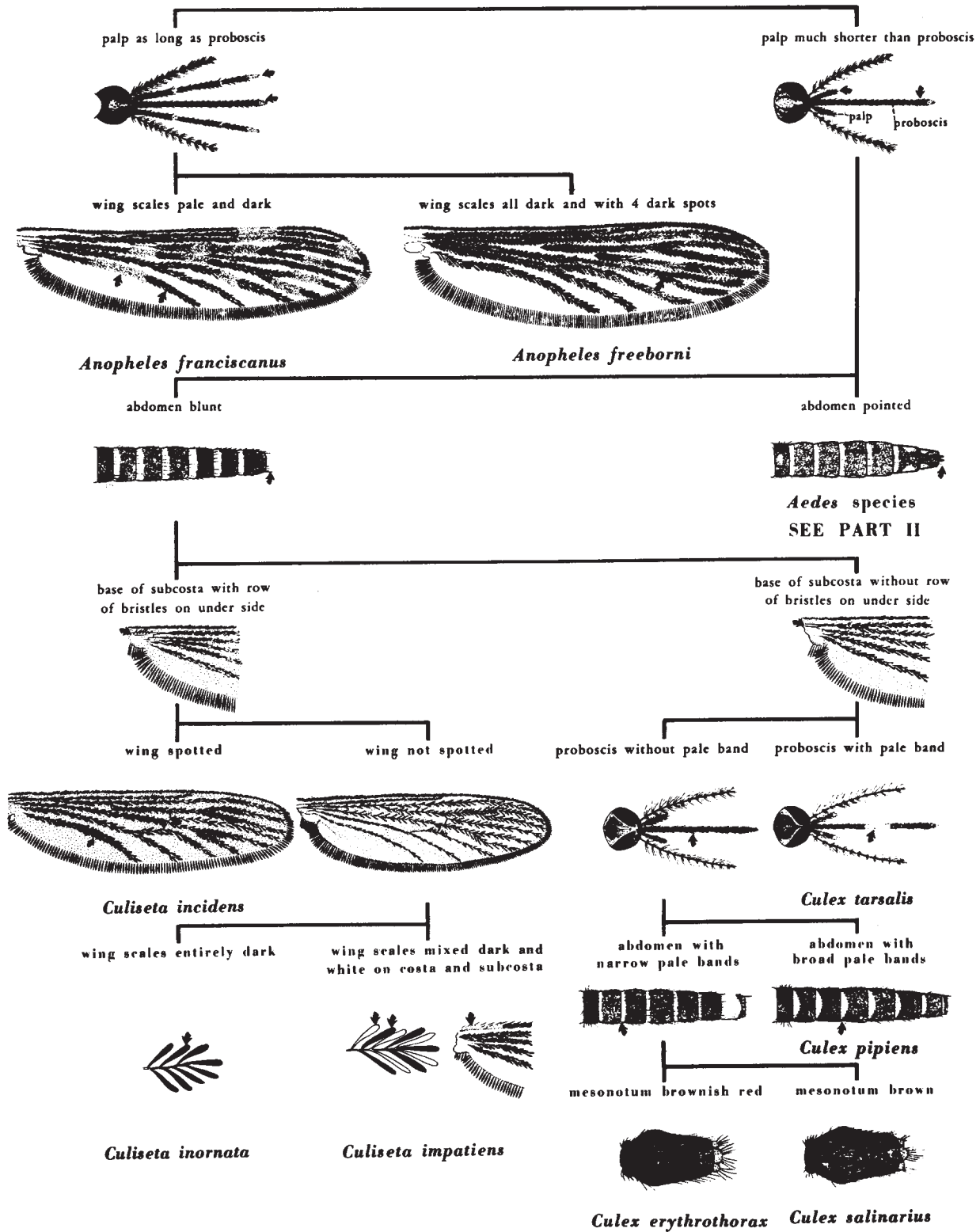
PART III



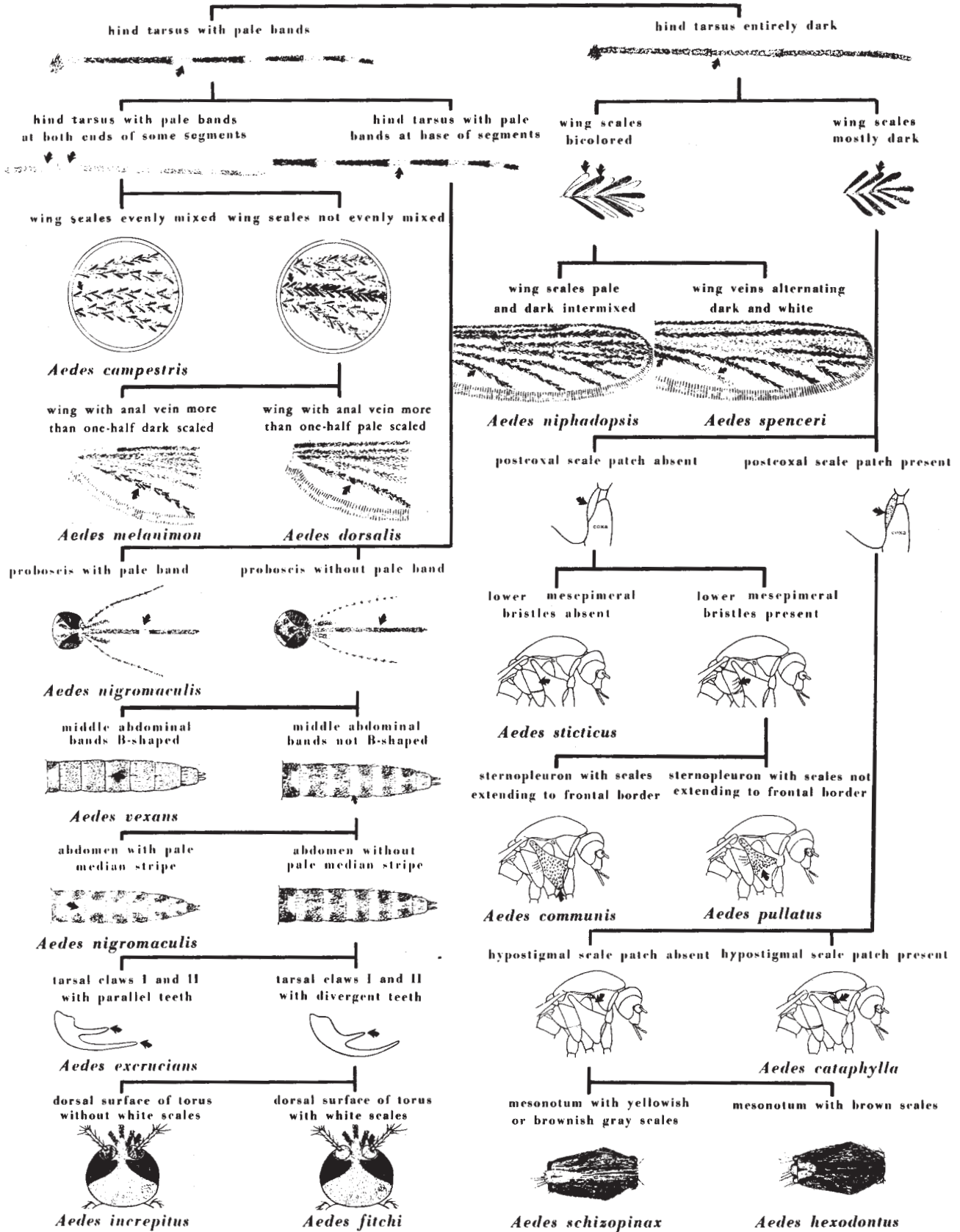
PART IV



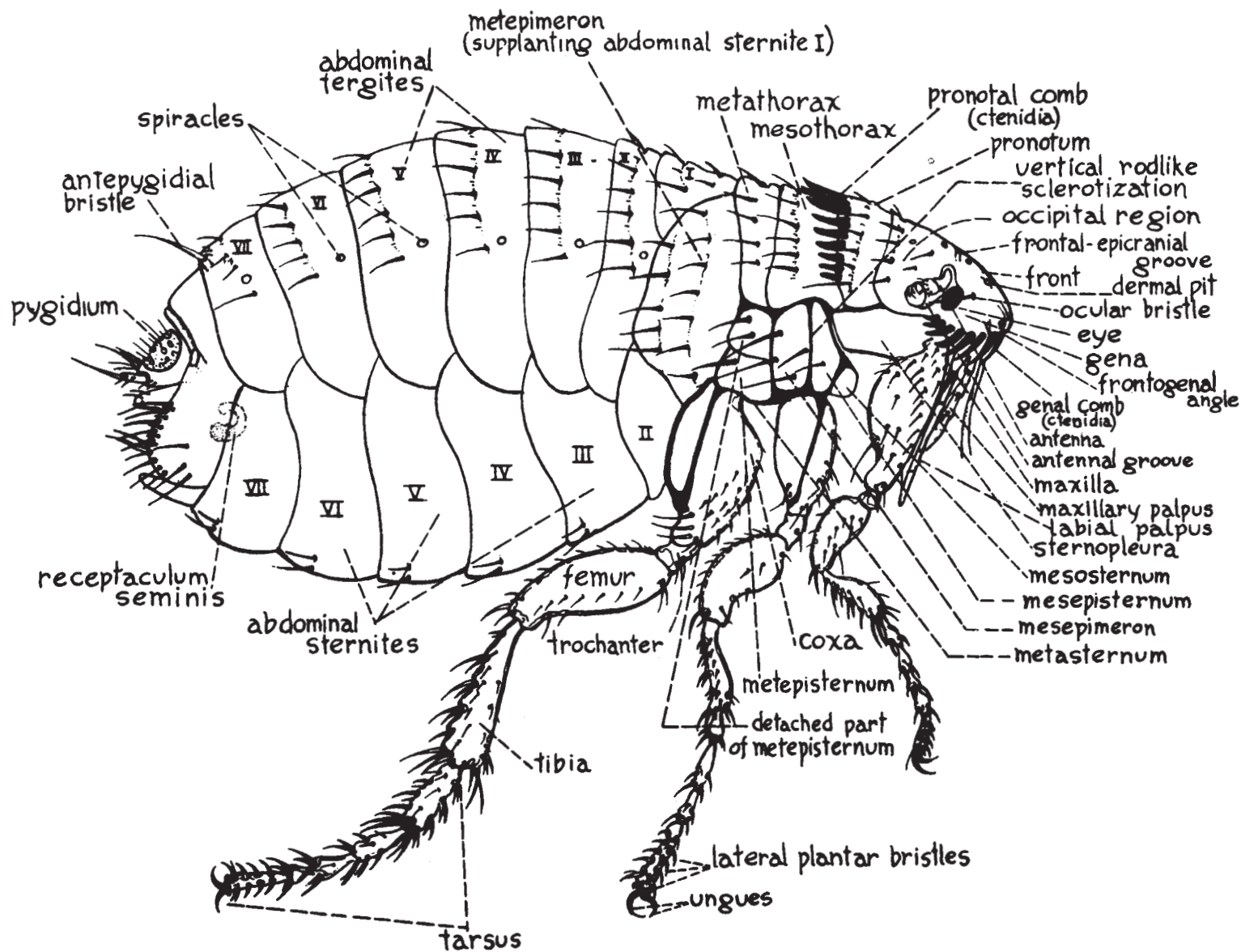
MOSQUITOES: PICTORIAL KEY TO SOME COMMON ADULTS (FEMALE) OF UTAH
 PART I
 Chester J. Stojanovich



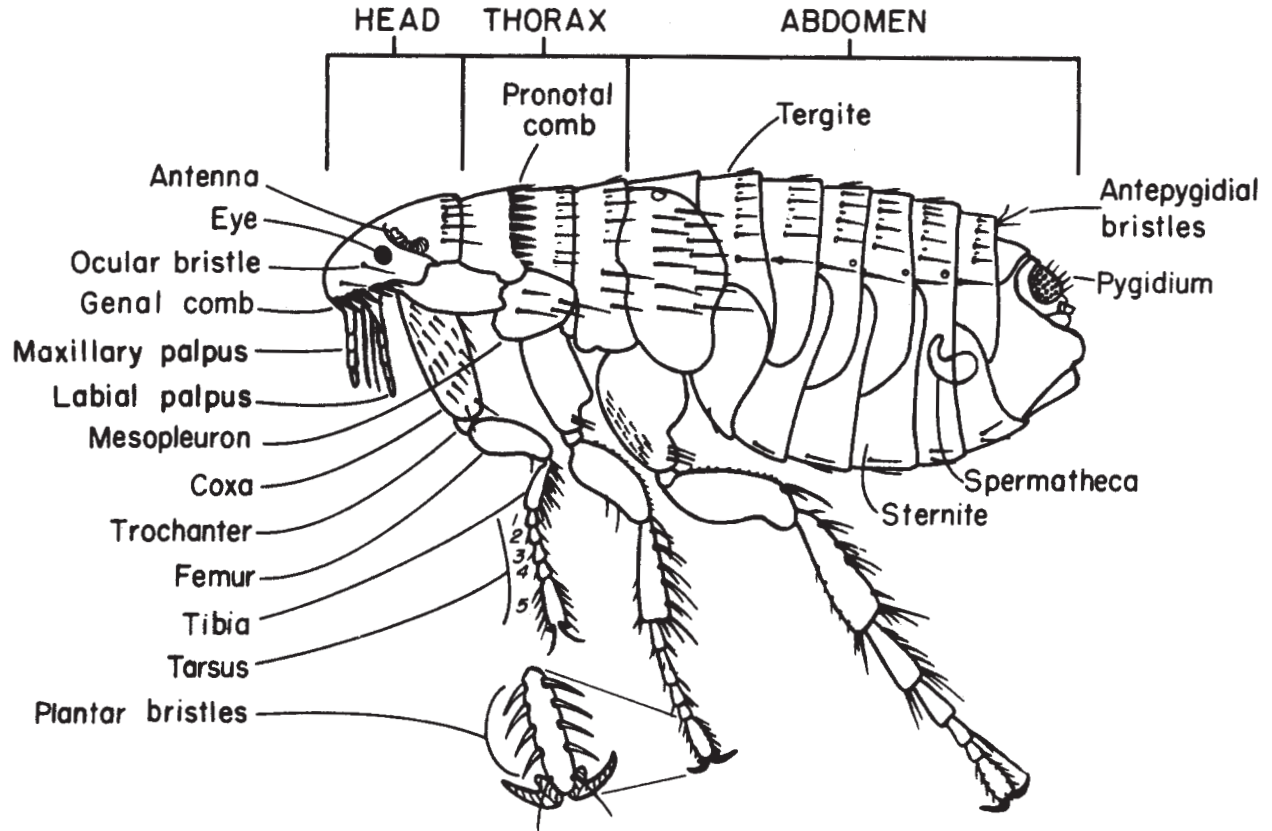
PART II



CAT FLEA - CTENOCEPHALIDES FELIS
adult female

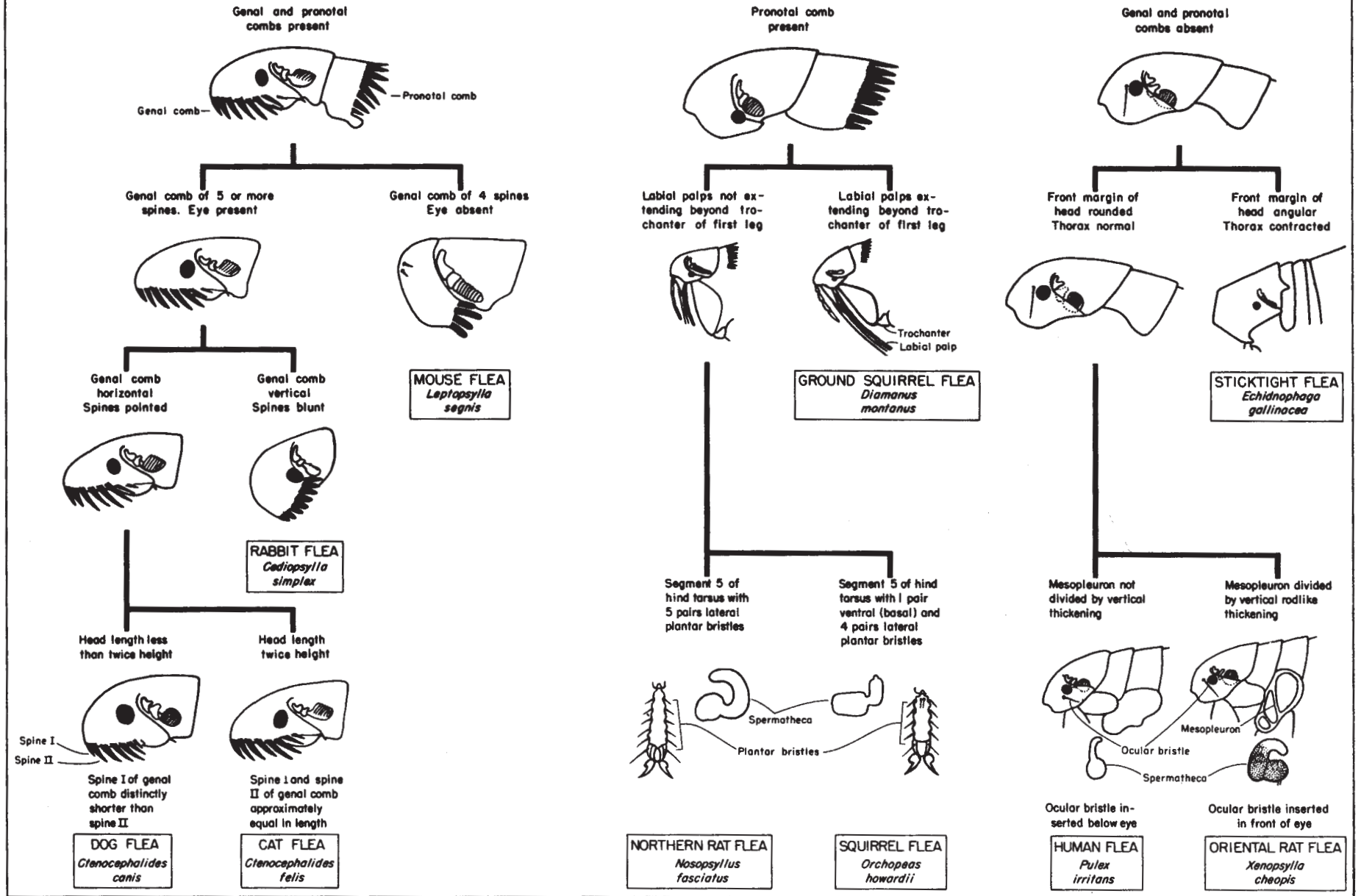


FLEA DIAGRAM – WITH STRUCTURES LABELED
Harry D. Pratt



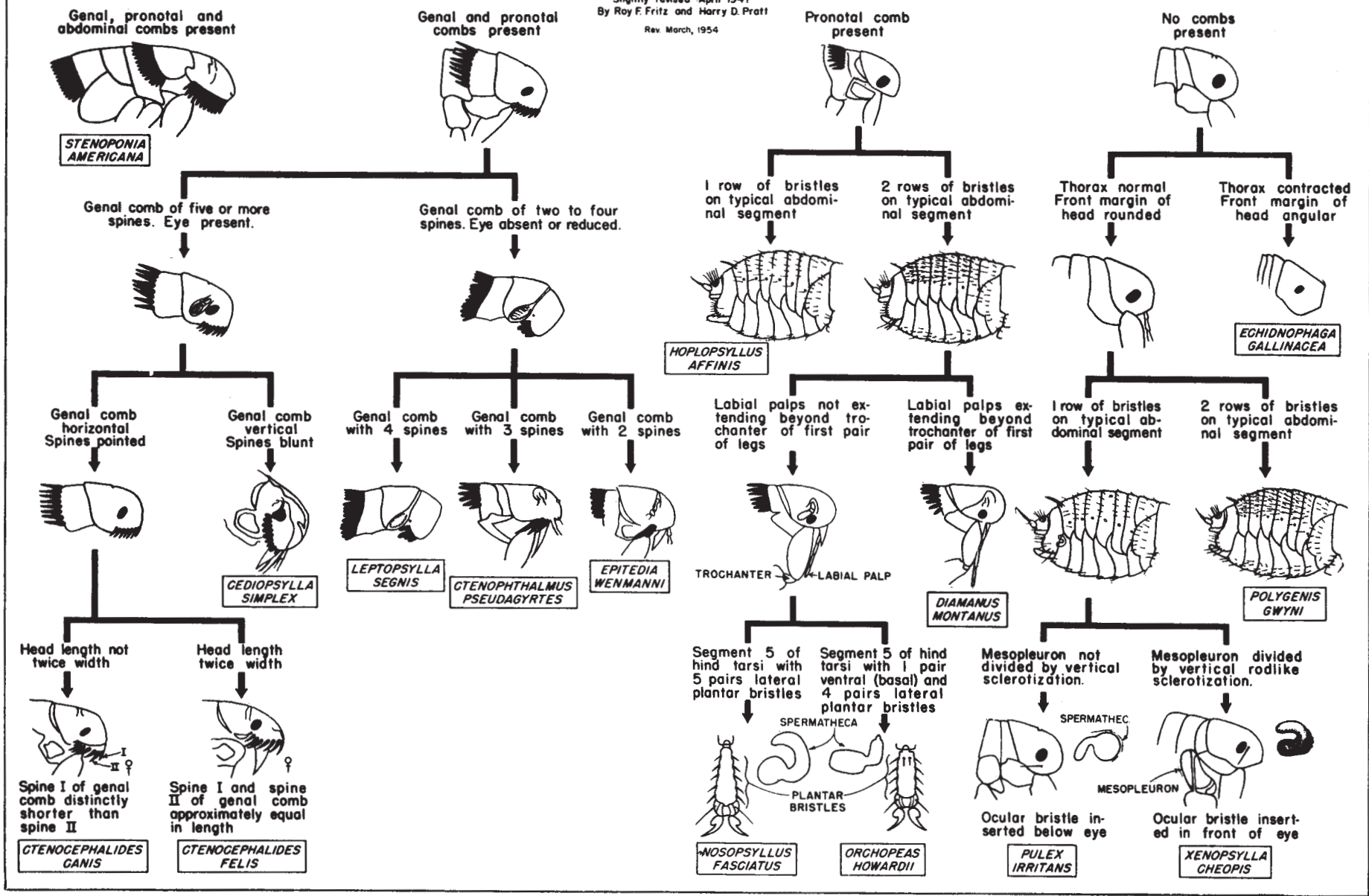
FLEAS: PICTORIAL KEY TO SOME COMMON SPECIES IN THE UNITED STATES

Harry D. Pratt



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

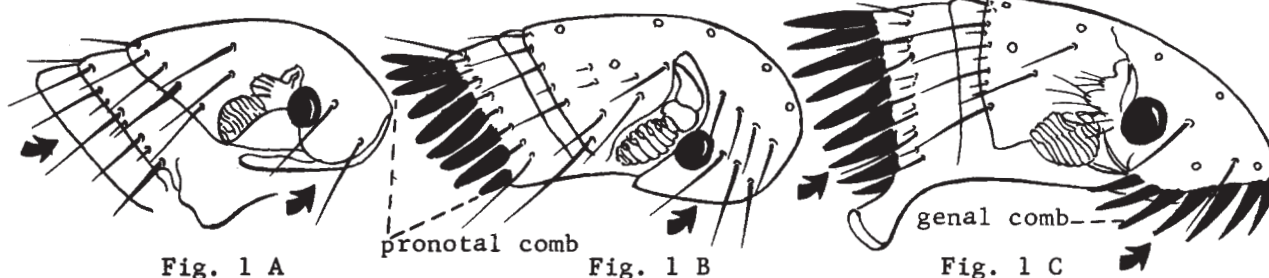
Slightly revised April 1947
By Roy F. Fritz and Harry D. Pratt
Rev. March, 1954



FLEAS: ILLUSTRATED KEY TO SPECIES FOUND DURING PLAGUE INVESTIGATIONS

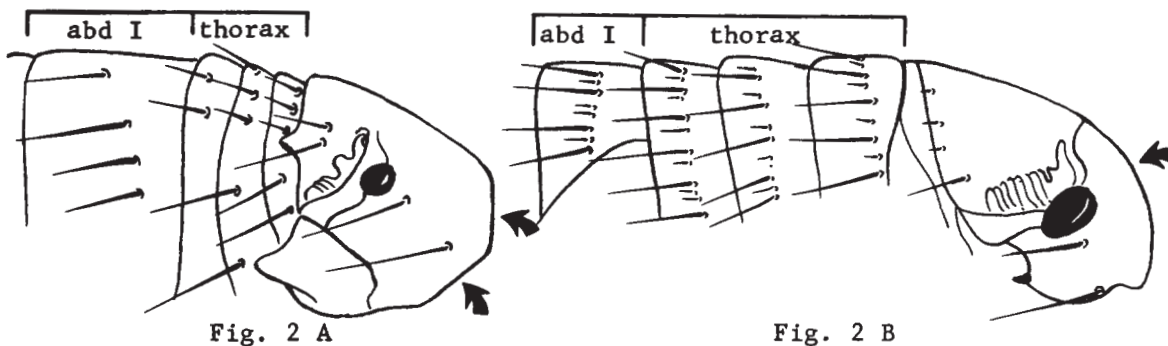
Harry D. Pratt and Chester J. Stojanovich

- 1. Pronotal and genal combs absent (Fig. 1 A).....2
- Pronotal combs present; genal comb present or absent (Fig. 1 B & G)...5



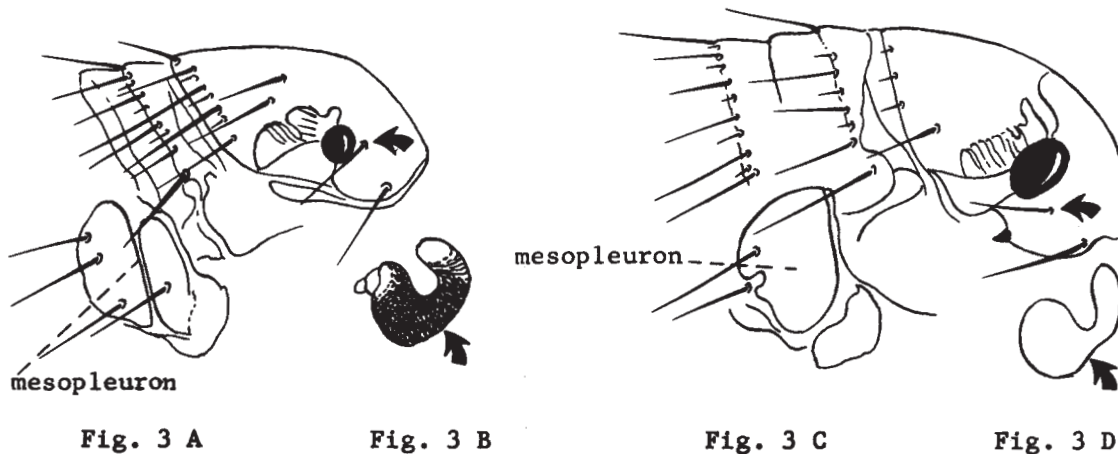
- 2. Front margin of head with two angles; three thoracic tergites together shorter than the first abdominal tergite (Fig. 2 A). (Echidnophaga gallinacea).....**STICKTIGHT FLEA**

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

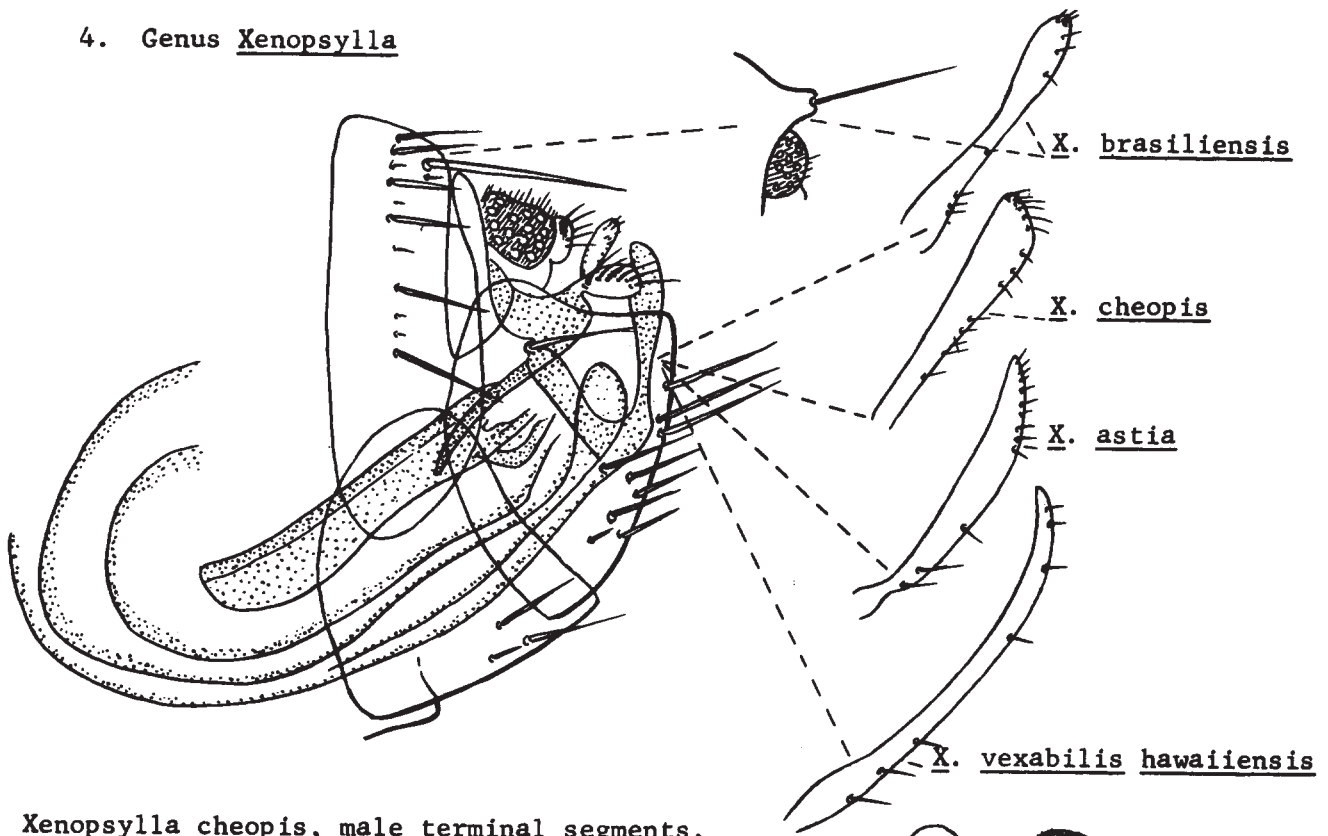


- 3. Ocular bristle in front of eye; mesopleuron divided by internal sclerotization; female with spermatheca partially pigmented (Fig. 3 A & B)...
.....(Genus Xenopsylla).....4

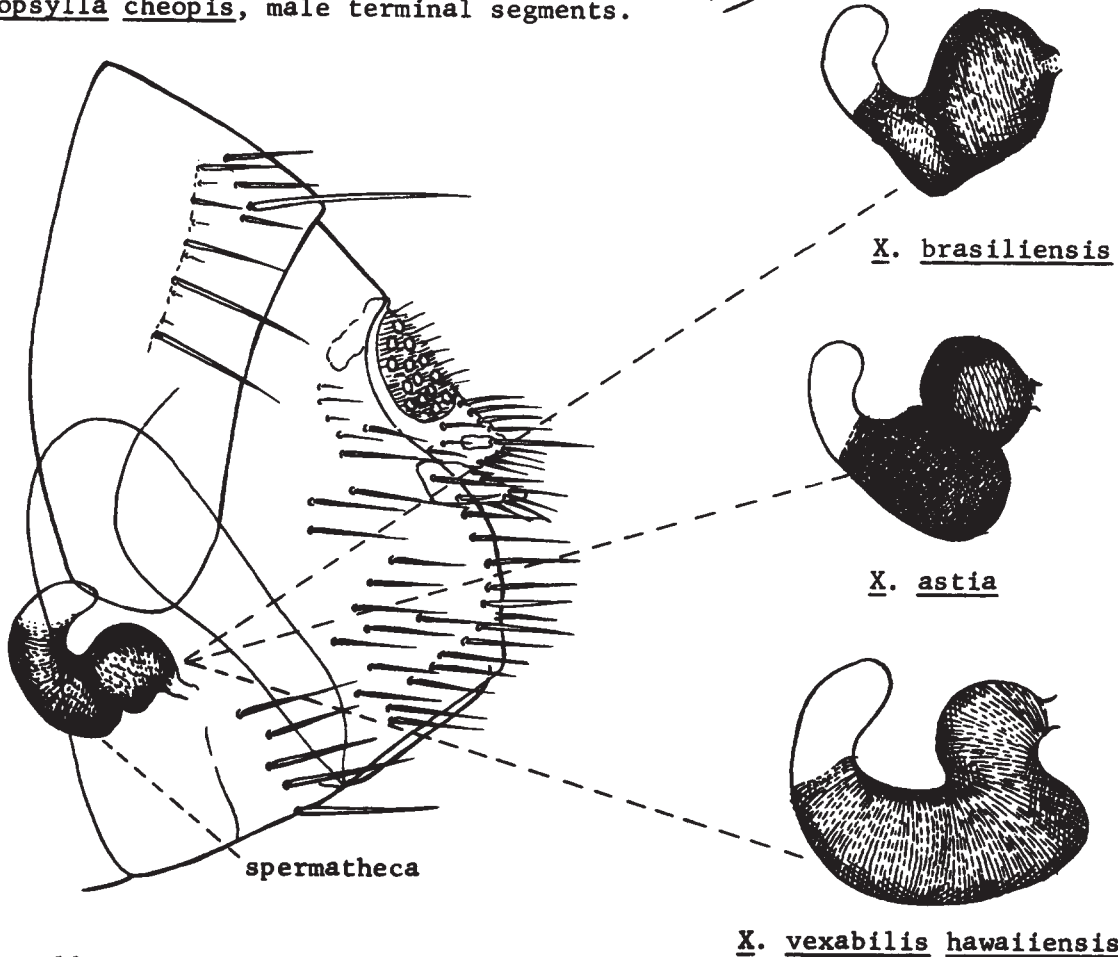
Ocular bristle beneath eye; mesopleuron without internal sclerotization; female with spermatheca entirely without pigment (Fig. 3 C & D).....
(Pulex irritans).....**HUMAN FLEA**



4. Genus Xenopsylla



Xenopsylla cheopis, male terminal segments.



Xenopsylla cheopis, female terminal segments

X. vexabilis hawaiiensis

- 5. Genal comb absent (Fig. 5 A).....6
- Genal comb present (Fig. 5 B).....8

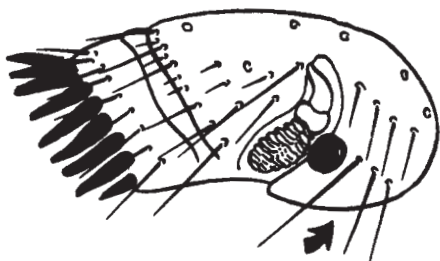


Fig. 5 A

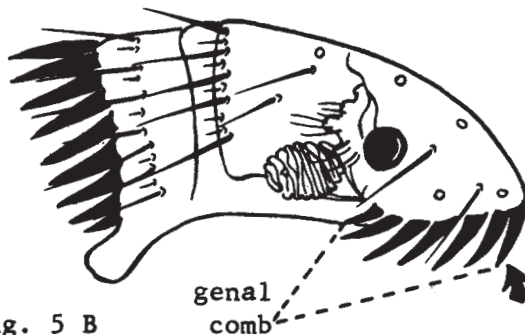


Fig. 5 B

- 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

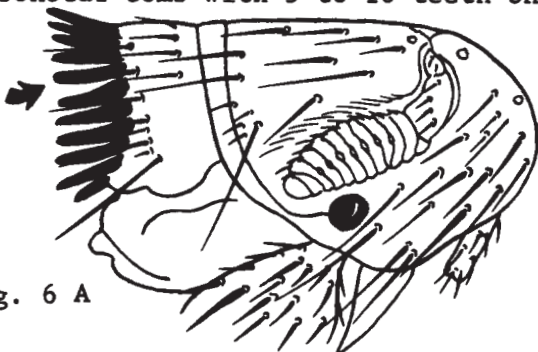


Fig. 6 A

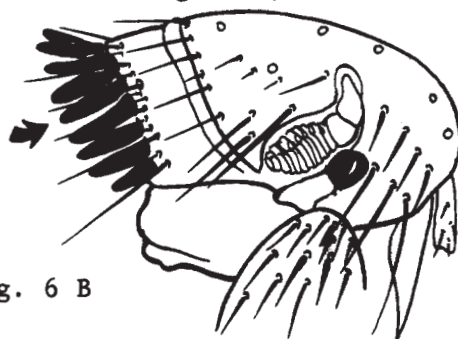


Fig. 6 B

- 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

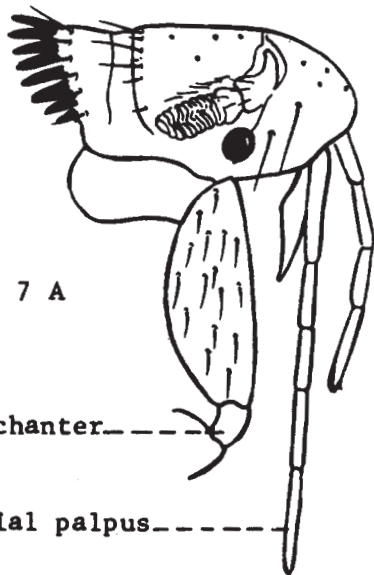


Fig. 7 A

trochanter-----

labial palpus-----



Fig. 7 B

labial palpus-----

trochanter-----

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.

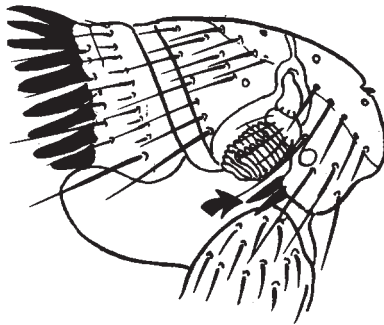


Fig. 8 A

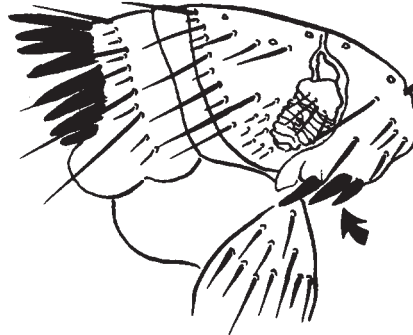


Fig. 8 B



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

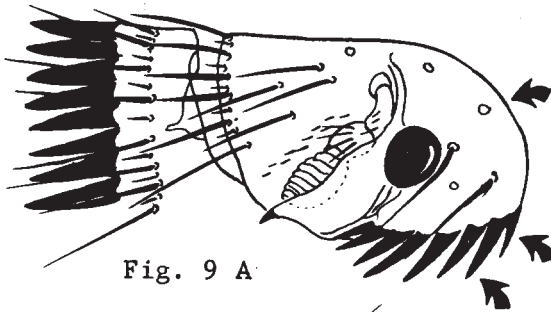


Fig. 9 A

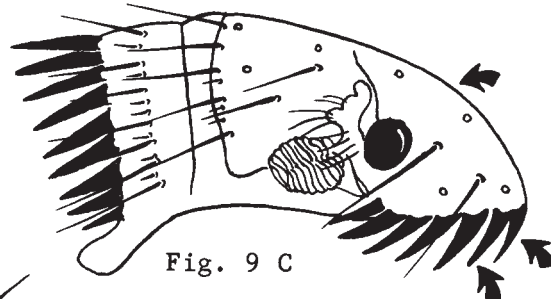


Fig. 9 C

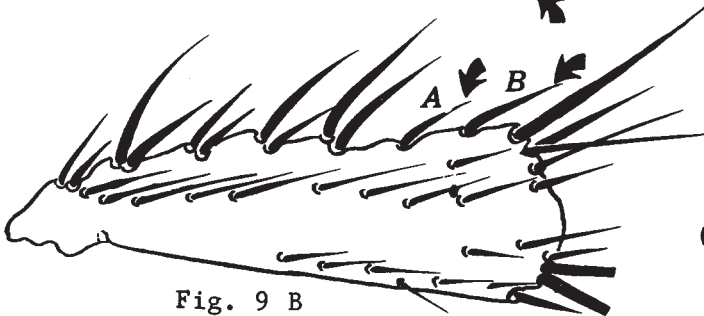


Fig. 9 B

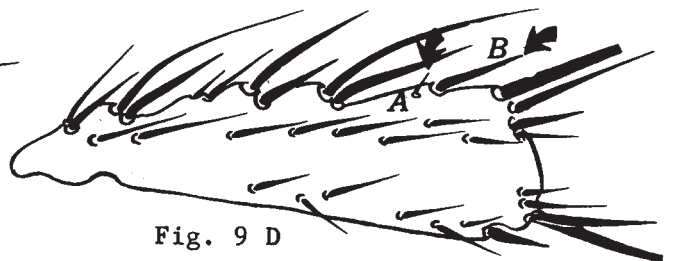
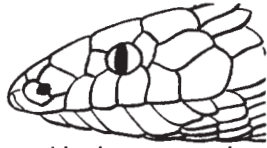


Fig. 9 D

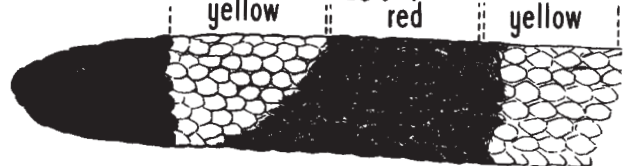
**SNAKES: PICTORIAL KEY TO VENOMOUS SPECIES IN UNITED STATES
PART I**

Chester J. Stojanovich and Margaret A. Parsons

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

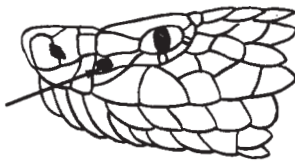


loreal pit present, if absent red and yellow rings touch



NON-VENOMOUS SNAKES

loreal pit present



loreal pit absent



neck ring black



neck ring red



Micrurus fulvius
TRUE CORAL SNAKE

- | | | |
|--------------------------------------|----------------------------------|--|
| <i>M. f. fulvius</i>
Southeastern | <i>M. f. barbouri</i>
Florida | <i>M. f. tenere</i>
Arkansas, Texas |
|--------------------------------------|----------------------------------|--|

Micruroides euryxanthus
ARIZONA CORAL SNAKE

tail pointed

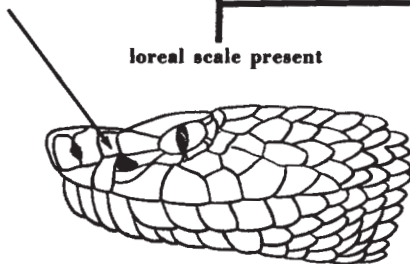


tail blunt or with rattle

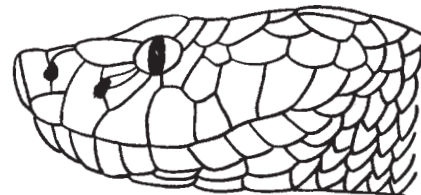


SEE PART II

loreal scale present



loreal scale absent



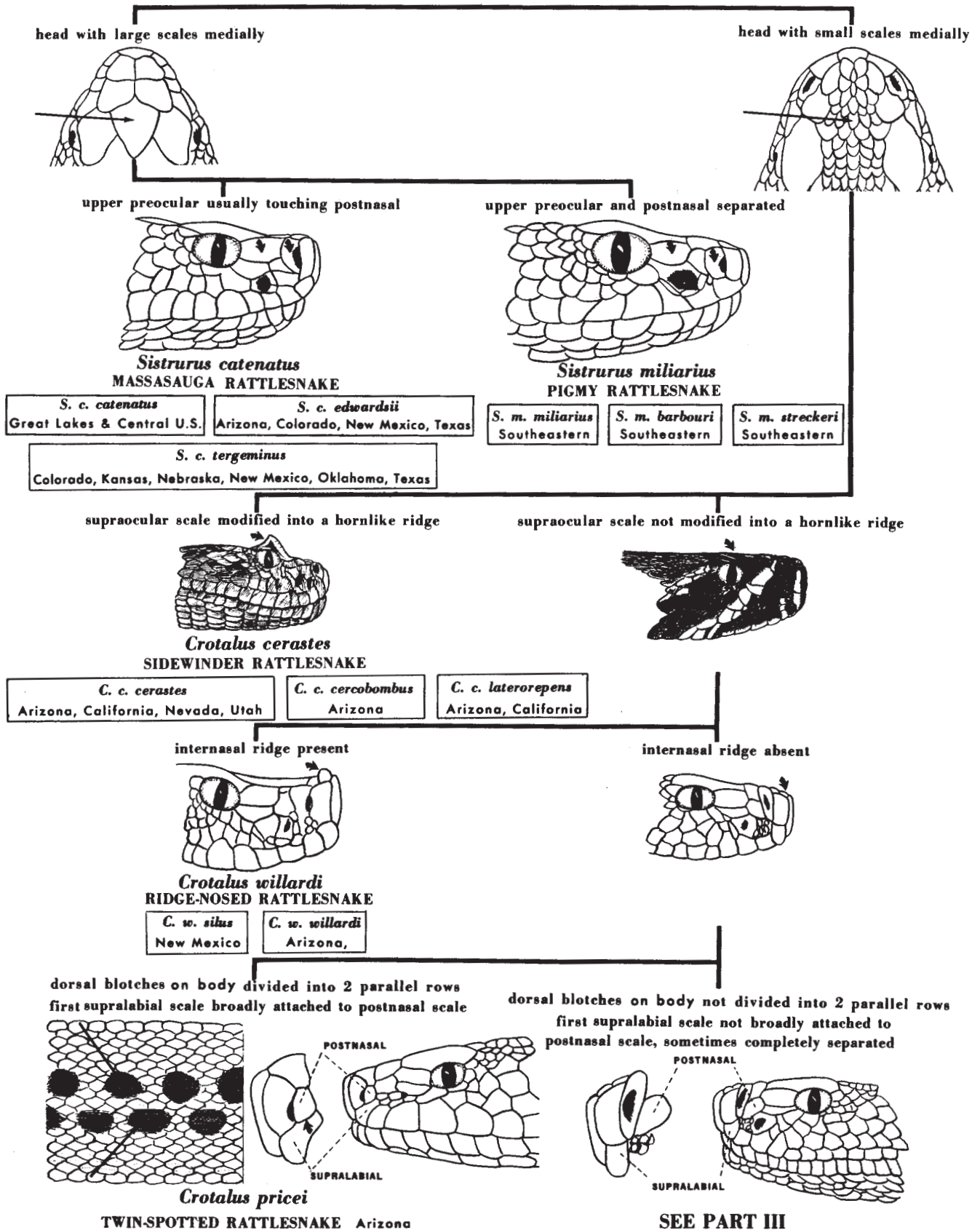
Agkistrodon contortrix
COPPERHEAD

- | | | | |
|---|---|---------------------------------|-----------------------------------|
| <i>A. c. contortrix</i>
Southeastern | <i>A. c. laticinctus</i>
Texas, Oklahoma, Kansas | <i>A. c. mokasen</i>
Eastern | <i>A. c. pictigaster</i>
Texas |
|---|---|---------------------------------|-----------------------------------|

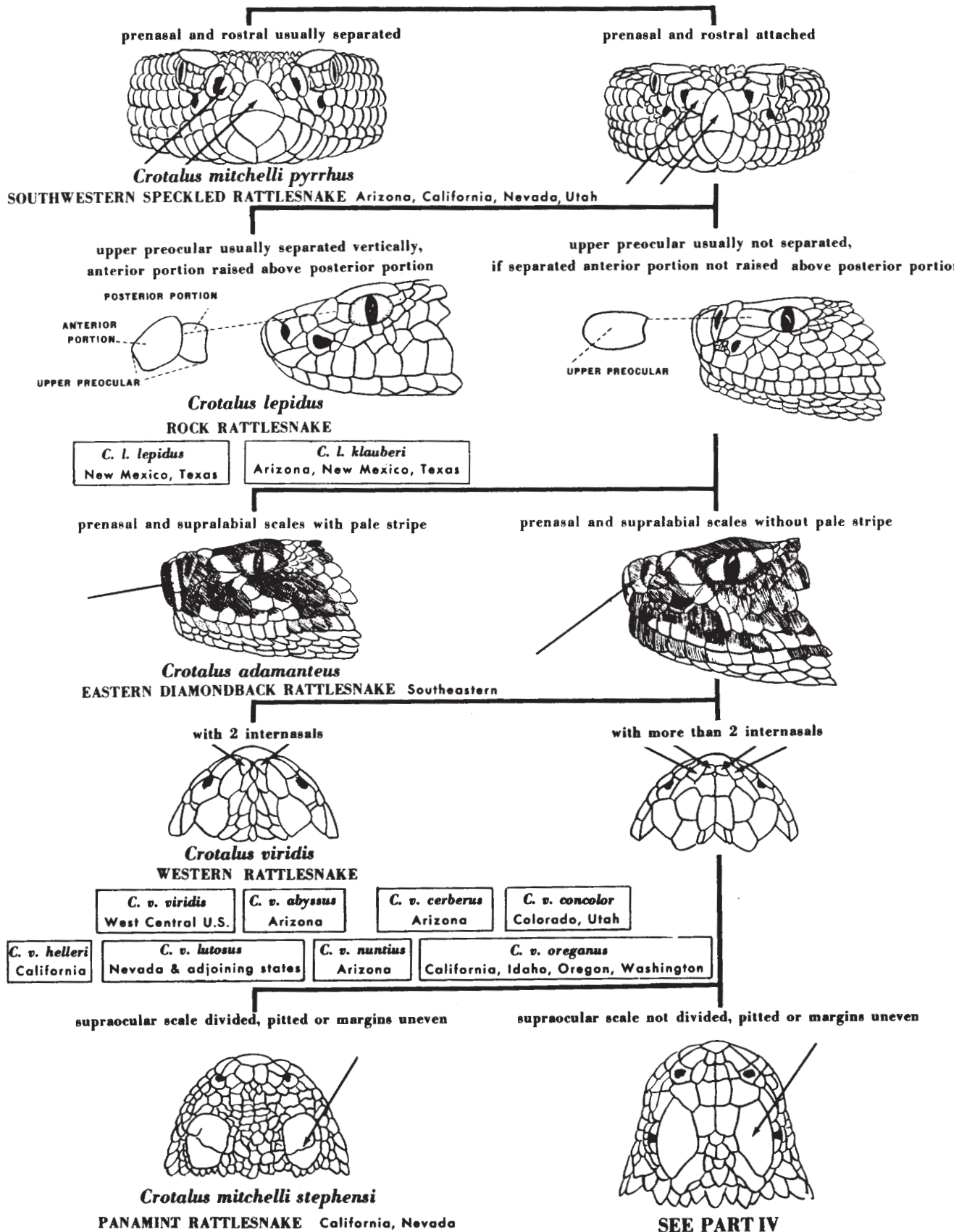
Agkistrodon piscivorus
WATER MOCCASIN

- | | |
|---|---|
| <i>A. p. piscivorus</i>
Southeastern | <i>A. p. leucostoma</i>
Southeastern |
|---|---|

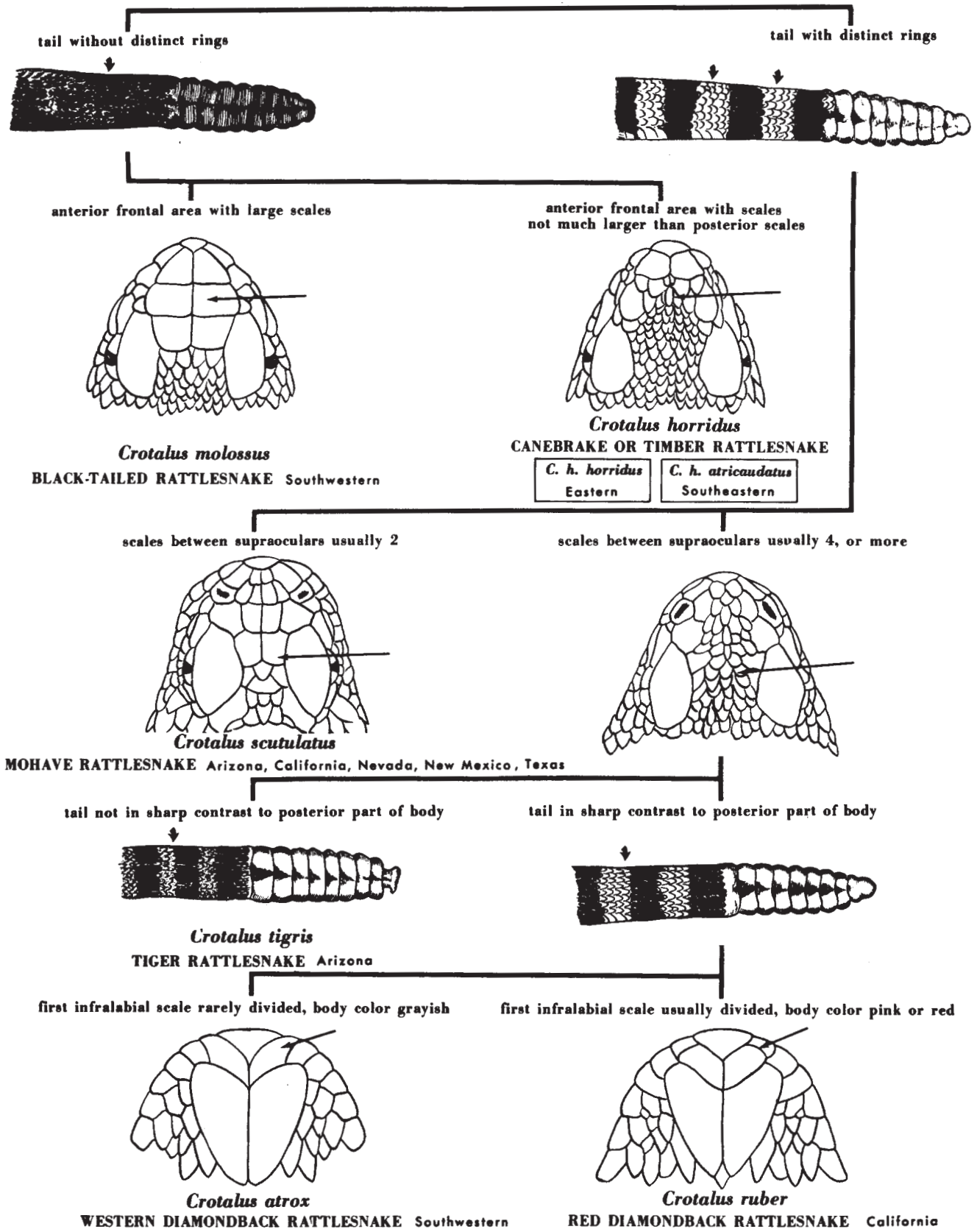
PART II



PART III

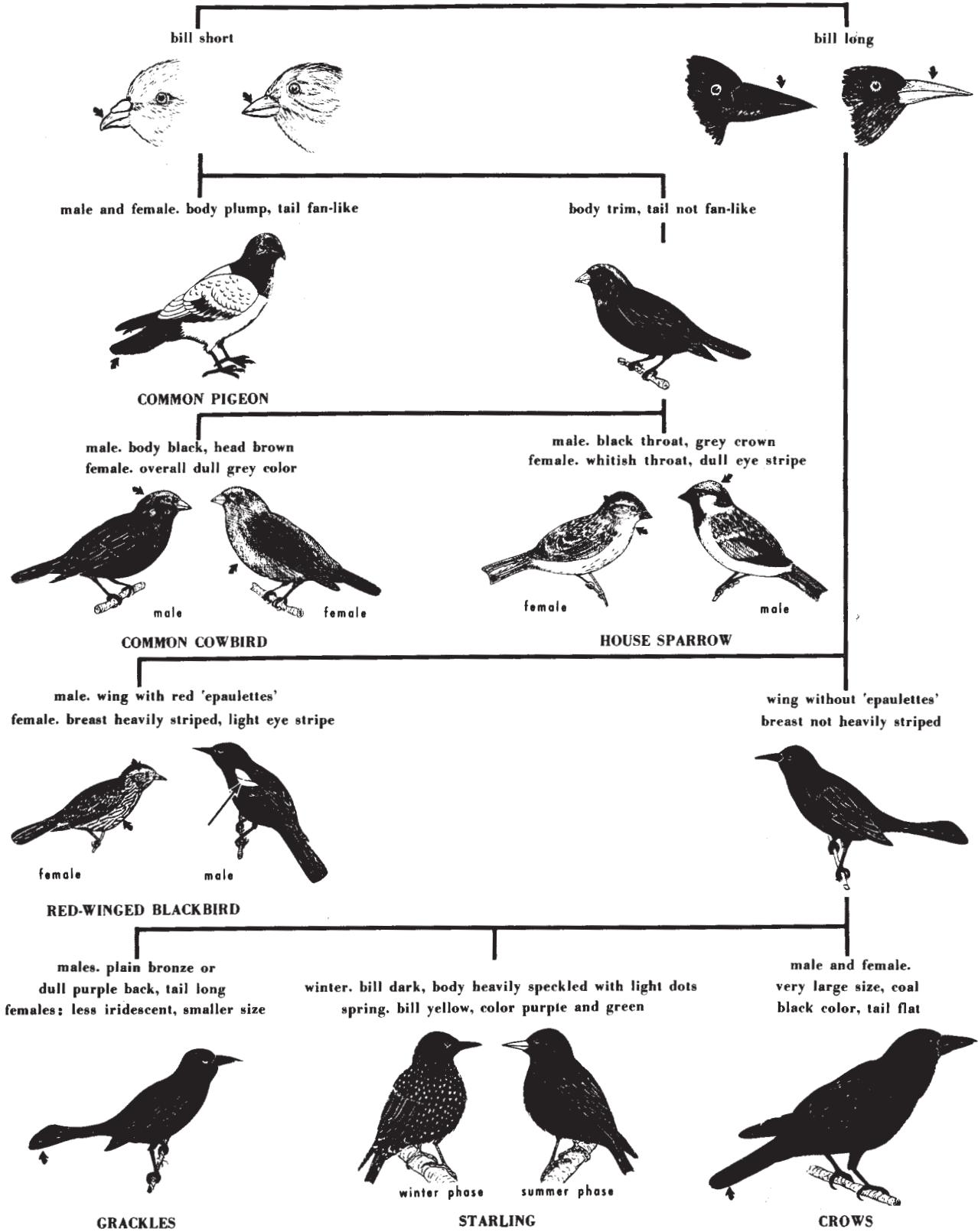


PART IV

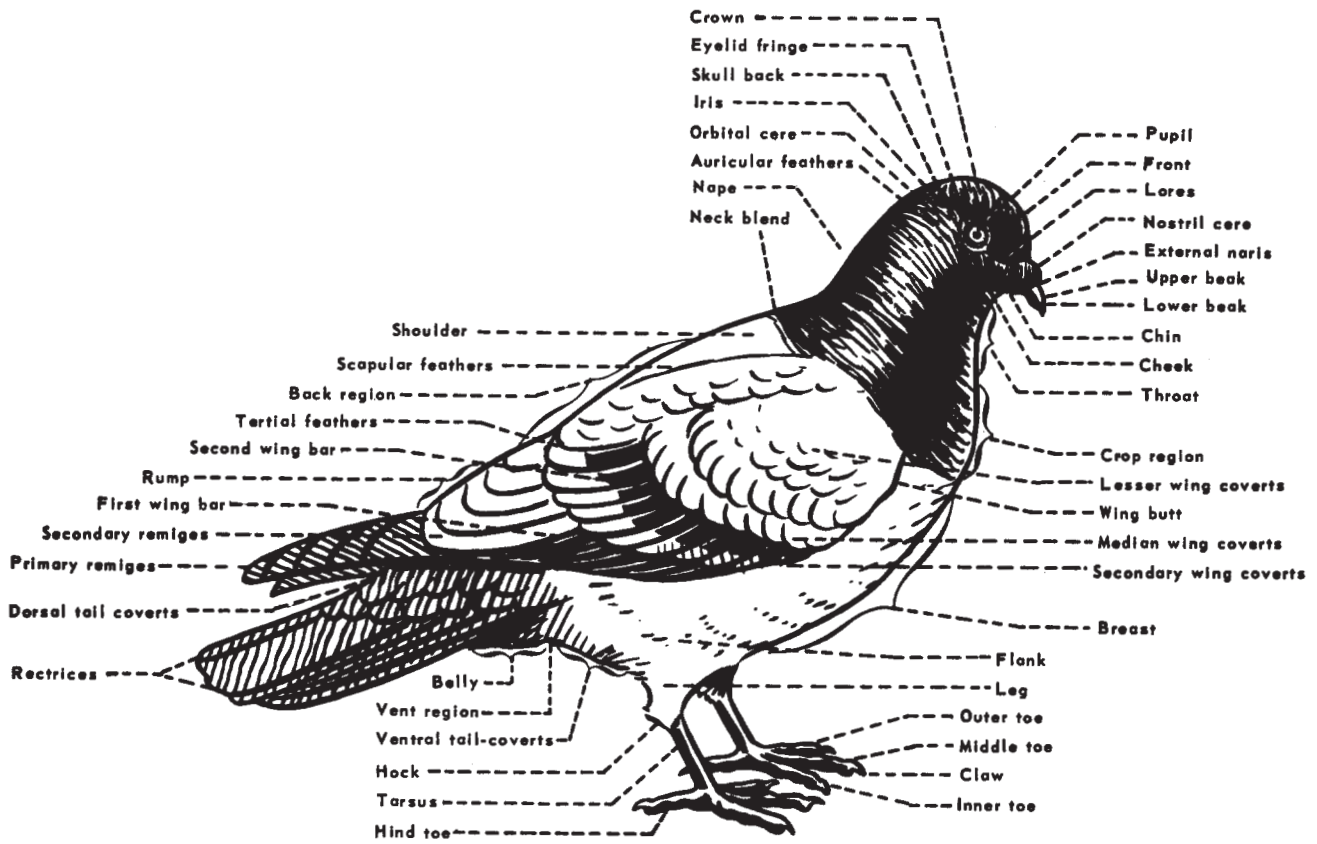


**BIRDS: PICTORIAL KEY TO SOME COMMON PEST SPECIES
OF PUBLIC HEALTH IMPORTANCE**

Margaret A. Parsons and Chester J. Stojanovich

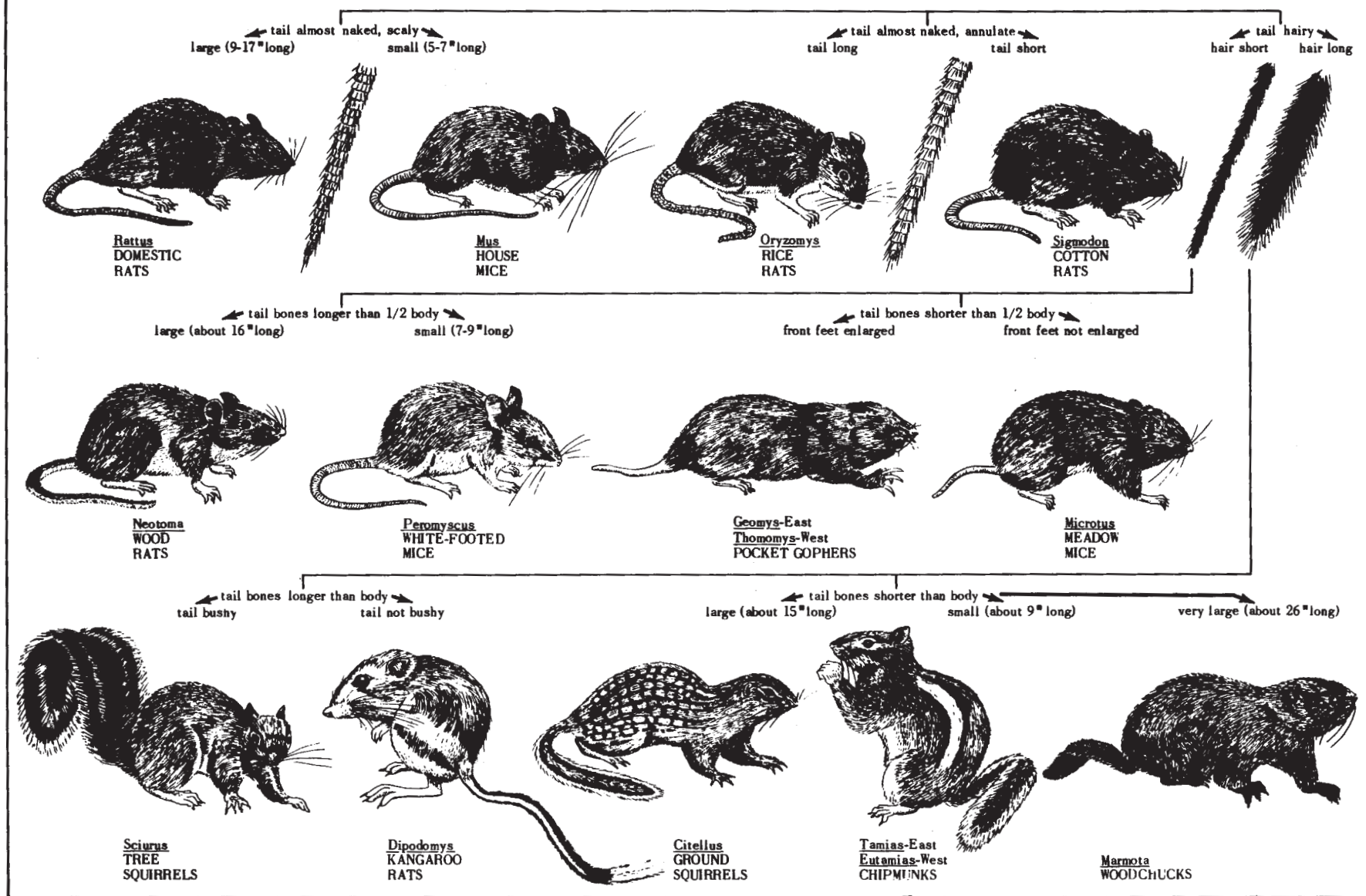


PIGEON, COLUMBA LIVIA – EXTERNAL MORPHOLOGY
Harold George Scott and Walter S. Dougherty



RODENTS: PICTORIAL KEY TO SOME COMMON UNITED STATES GENERA

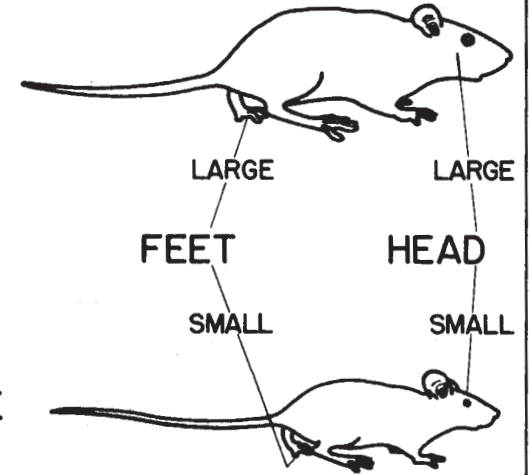
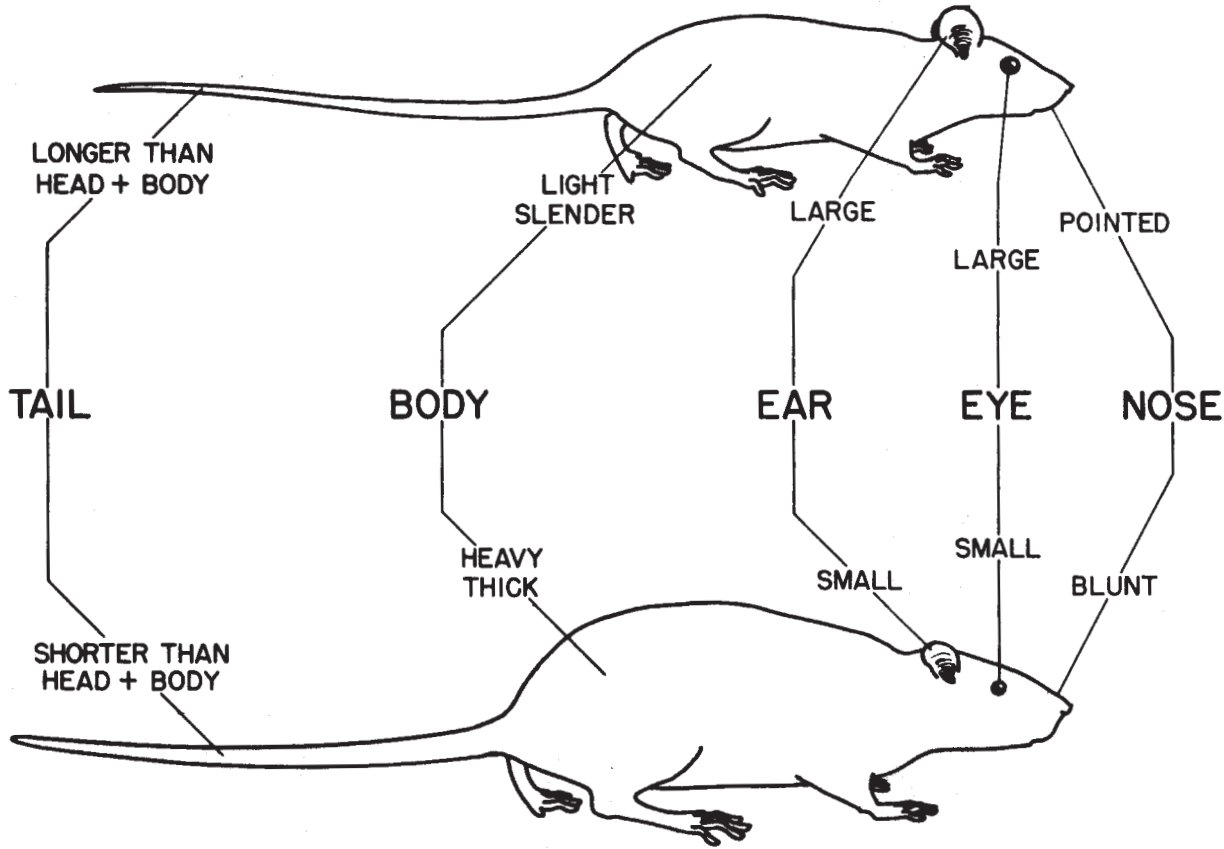
Harold George Scott and Margery R. Borom



DOMESTIC RODENT FIELD IDENTIFICATION
Robert Z. Brown

ROOF RAT *Rattus rattus*

YOUNG RAT

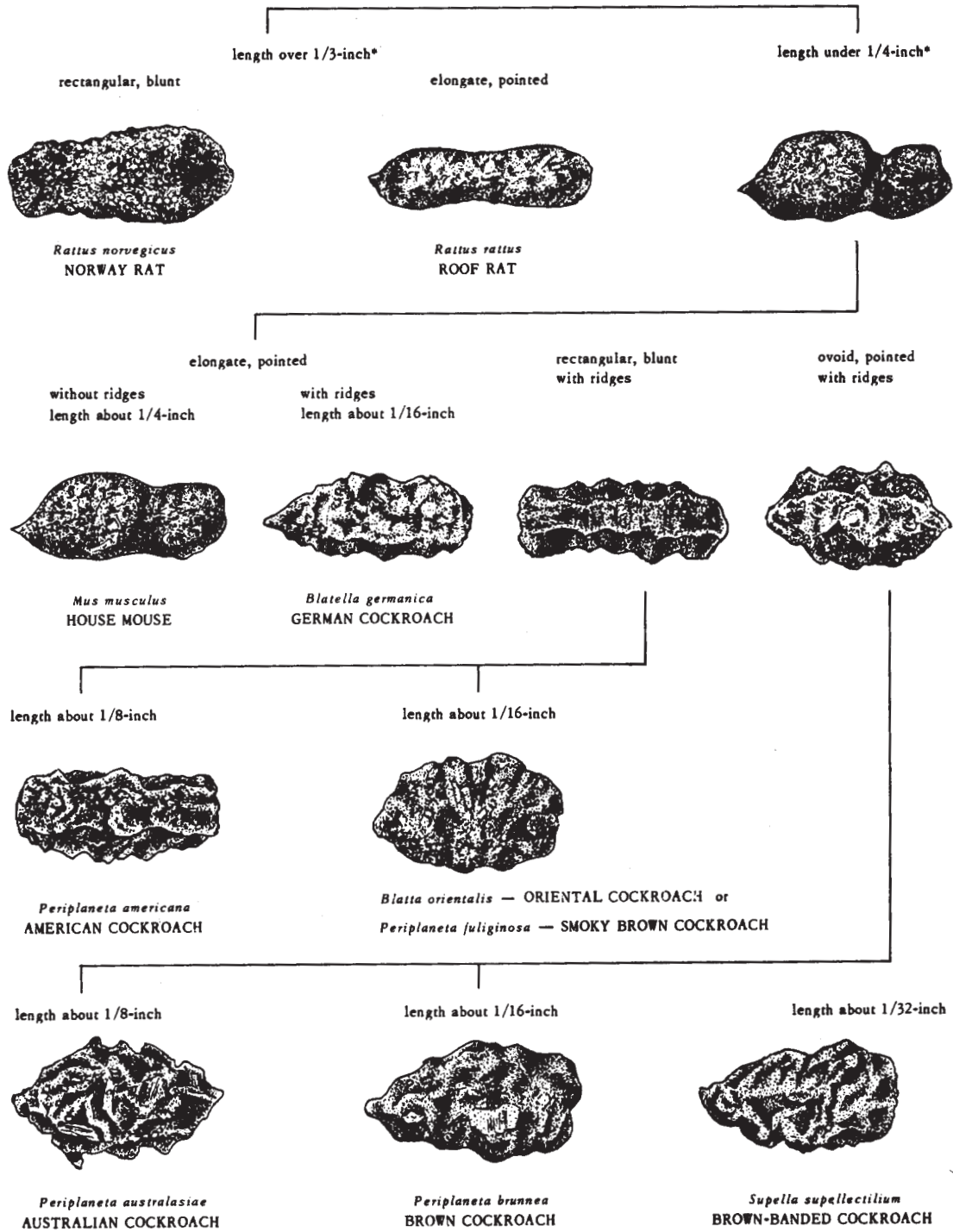


HOUSE MOUSE
Mus musculus

NORWAY RAT *Rattus norvegicus*



DOMESTIC RODENTS AND COCKROACHES: PICTORIAL KEY TO DROPPINGS
 Harold George Scott and Margery R. Borom



*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



MEXICAN PRAIRIE DOG
C. mexicanus

Black on tail confined to distal third
TEXAS TO SASKATCHEWAN

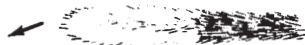


BLACK-TAILED PRAIRIE DOG
C. ludovicianus

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



UTAH PRAIRIE DOG
C. parvidens

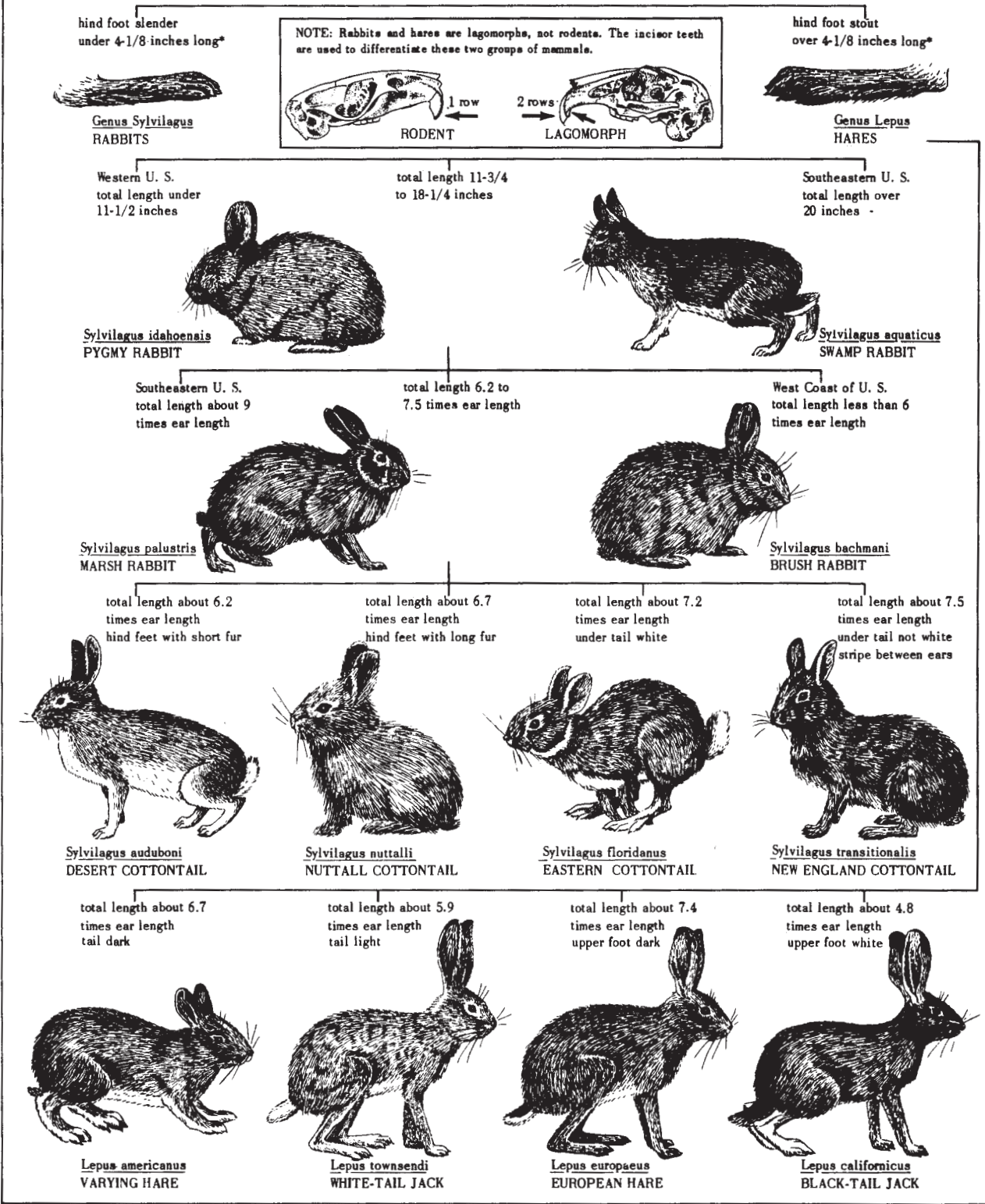
Summer color grayish (pinkish buff mixed with black);
dark patch on cheek and above eye
WYOMING, COLORADO, AND EASTERN UTAH



WHITE-TAILED PRAIRIE DOG
C. leucurus

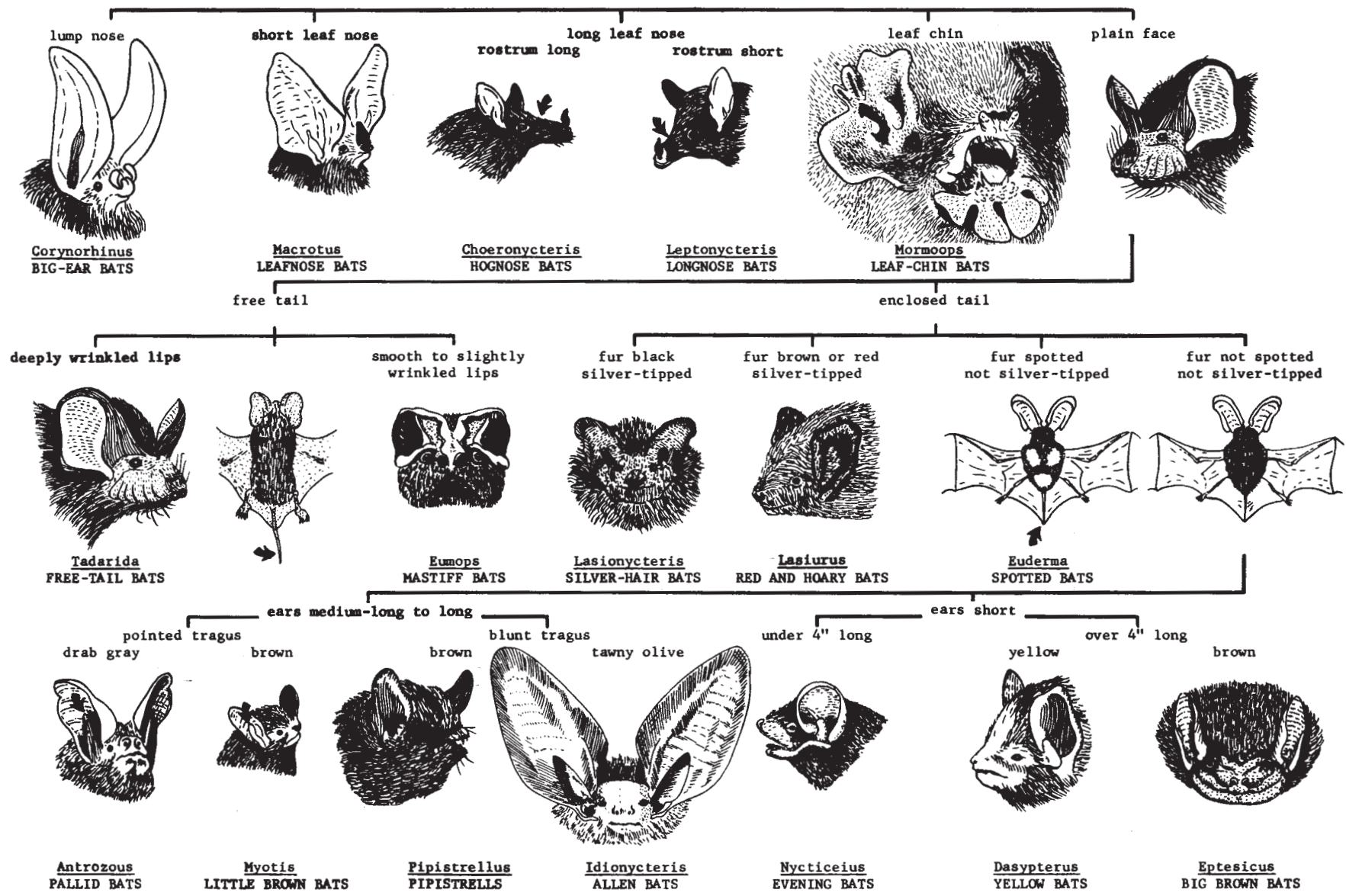
RABBITS AND HARES: PICTORIAL KEY TO COMMON UNITED STATES SPECIES

Harold George Scott and Margery R. Borom



*All measurements for adults.

BATS: PICTORIAL KEY TO UNITED STATES GENERA
 Harold George Scott and Chester J. Stajanovich



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