

A KEY TO THE PRINCIPAL  
ORDERS AND  
FAMILIES OF INSECTS

*by*

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## PREFACE

What is it?—Having found an unknown insect, whether a beautiful butterfly or a freakish and formidable thing in the woods, a disconcerting moth or weevil in the pantry, granary, or clothes press, or a caterpillar, bug or beetle devouring vegetables, field crops, flowers or trees—the universal question that flashes in the mind and to the lips is “*What is it?*”

This little booklet is an attempt to answer the question in a fundamental and scientific way, or at least to start the tyro on his way toward the correct answer; for the complete answer to even so simple a question may involve considerable work. Even with the most extensive entomological library at hand, the beginner or the professional, would be well-nigh helpless to determine his insect unless he first knew the *order* and *family* to which it belongs. The number of insect kinds is so great and the literature dealing with them so vast that it is necessary to approach the subject in a systematic way in order to make any profitable use of the many books, monographs and bulletins on the subject. The first logical step is to determine the order and family. This booklet has been written with the hope of guiding you to that end.

The student in biology, zoology, ecology or kindred fields, who is not technically trained in entomology, will find this key indispensable. With it he can place an insect in the proper family and then can send his material to the proper specialist for identification to species.

**Scope.**—This key attempts to cover only the *true insects*; and only *adult* insects. True insects may be recognized as those small creatures that possess six legs (arranged in three pairs) and a body made up of three divisions; (a) the *head*, with eyes, a pair of feelers or antennæ, and the mouthparts; (b) a *thorax*, bearing the three pairs of legs and often one or two pairs of wings; and (c) an *abdomen*, which has no appendages except at the tip, where claspers, ovipositor and other feeler-like organs may sometimes be found.

The reader will therefore not expect to determine the names of spiders, ticks, centipedes, scorpions, harvestmen, true worms, slugs or snails with this key, because they are not insects; nor the names of caterpillars, “worms,” nymphs, pupæ, chrysalides or cocoons, because they are not adult stages of the insect.

It should also be understood that this key makes no pretense of being complete or exhaustive. The idea has been to make the simplest possible analysis of the families of North American insects which should include perhaps 95 to 99 percent of the specimens found in the average student's collection. To have included the other 1 to 5 percent it would have been necessary to make it so complex and technical that the beginning student could not use it at all. For the more uncommon specimens, not covered by this key, the student is referred to the many special books on entomology, some of which are listed below.

To a considerable degree insects of the same order and to a very large degree those of the same family, have similar habits, habitats, life-cycles and economic importance. So, for the amateur to be able to place an insect in its order, and especially in the correct family, is a genuine accomplishment. This is of fundamental importance to everyone who makes any claim to being a nature student, biologist, zoologist or entomologist. At the same time the student will recognize that such a key as this is only a beginning for his study of insects. Having determined the order and family he will be interested in finding out more about his specimens, especially the common name, habits, and control. Some of the following books he will want to consult as his knowledge grows.

- Lutz, *Field Book of Insects*, G. P. Putnam's Sons, 1921.  
Comstock, *Introduction to Entomology*, Comstock Publishing Co., 1924.  
Kellogg, *American Insects*, Henry Holt & Co., 1908.  
Howard, *The Insect Book*, Doubleday, Page & Co., 1905.  
Holland, *The Butterfly Book*, Doubleday, Page & Co., 1901.  
Holland, *The Moth Book*, Doubleday, Page & Co., 1910.  
Williston, *North American Diptera*, James T. Hathaway, New Haven, Conn., 1908.  
Blatchley, *Coleoptera of Indiana*, Nature Publishing Co., 1910.  
Blatchley, *Heteroptera or True Bugs of Eastern North America*, Nature Publishing Co., 1926.  
Blatchley, *Orthoptera of North Eastern America*, Nature Publishing Co., 1920.  
Essig, *Insects of Western North America*, The MacMillan Co., 1926.  
Imms, *General Textbook of Entomology*, Methuen & Co., (G. E. Stechert, Importer), 1925.  
Lochhead, *Economic Entomology*, P. Blakiston's Sons and Co., 1919.  
Fernald, *Applied Entomology*, McGraw-Hill Book Co., 1921.  
Slingerland and Crosby, *Manual of Fruit Insects*, The MacMillan Co., 1914.  
Crosby & Leonard, *Manual of Vegetable Garden Insects*, The MacMillan Co., 1918.  
Herrick, *Insects Injurious to the Household*, The MacMillan Co., 1927.  
Herms, *Medical and Veterinary Entomology*, The MacMillan Co., 1926.  
Houser, *Destructive Insects Affecting Ohio Shade and Forest Trees*, Ohio Agr. Exp. Sta. Bull. 332, 1918.  
Felt, *Manual of Tree and Shrub Insects*, The MacMillan Co., 1924.  
Sanderson and Peairs, *Insect Pests of Farm, Garden and Orchard*, John Wiley and Sons, 1921.  
Herrick, *Manual of Injurious Insects*, Henry Holt & Co., 1925.  
Metcalf and Flint, *Destructive and Useful Insects*, McGraw-Hill Book Co., 1928.

## PREFACE [*Continued*]

**How to Use This Key.**—The pages that follow may be likened to a system of highways in which every turn involves a choice between two forks of the road and in which no two roads lead to the same end. From the very first number the correct choice *must be made every time* or the final destination cannot be correct.

The characters given are arranged in *couplets* bearing the *same number but different letters* as 1a, 1b; or 123a, 123b. The two parts of any couplet are opposing or partly opposing characters. No insect can fit both; every insect should fit one or the other.

With a given insect in hand you should read both parts of the first couplet—"1a, Wingless Insects—1b, Winged Insects." If this particular specimen has wings, read next, couplet 37; if it does not have wings read next, couplet 2, as directed by the figure at the end of that line whose description best fits the specimen. If it has two wings (37a) go next to couplet 38, if four wings (37b) go next to couplet 76. Continuing in this way to select the alternative which best agrees with the specimen in hand, you should come presently to a couplet which ends in a name, preceded by "Order" as couplet 39a "Order DIPTERA." This should be the *order name* of the specimen being keyed. Following the order name is another number (for example 40, in the case cited) leading eventually to the *family name* of the insect being keyed. Continue until a name without a following number is reached.

**The Figures.**—Wherever a star (\*) appears in the couplet, one or more figures will be found at the top of the page *bearing the same number as the couplet*. The figures should make plain to anyone the nature of the character described. Often there are several figures illustrating the same point and bearing the same number. Or *two different points* in the same couplet may be illustrated, in which case very different figures will bear that same number. Figures and descriptions should be used together. If a point is reached where neither alternative fits the specimen, you should retrace your steps to the couplet where you had most doubt about your choice and try the other alternative from that point. If that does not eventually fit, either (a) you have made an earlier mistake in choice or (b) the specimen belongs to one of the more unusual species that is not included in this key.

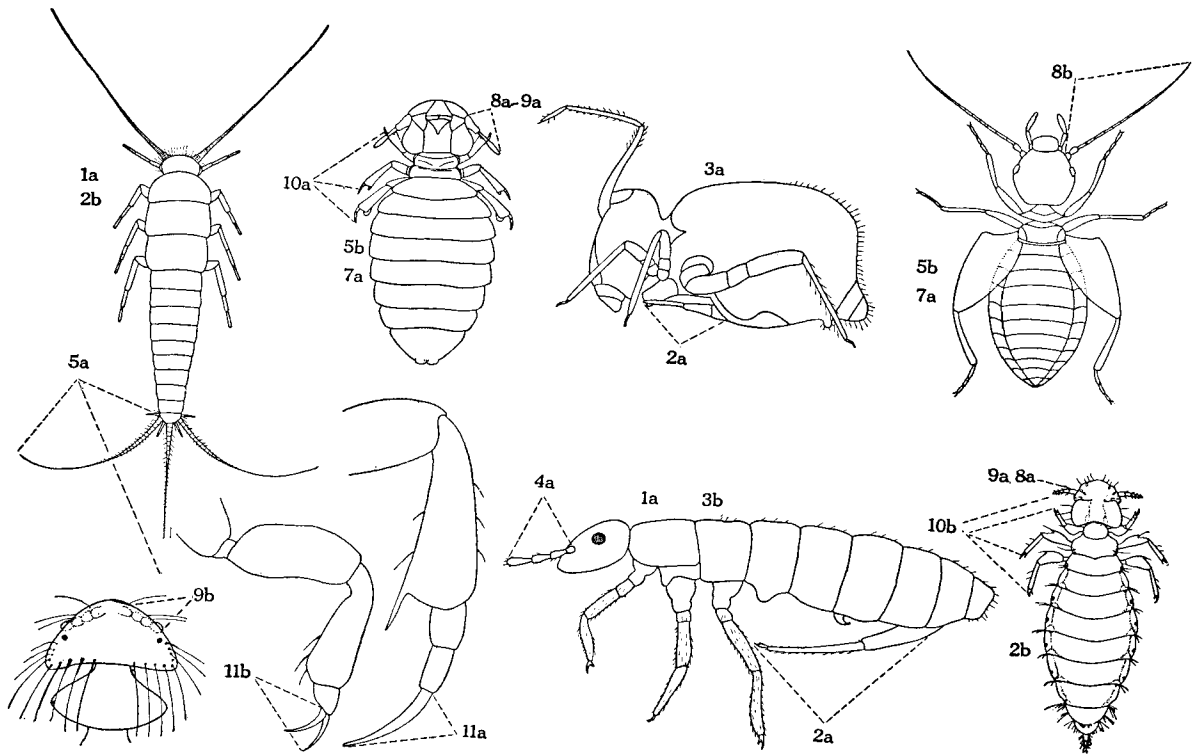
**To Teachers.**—Most students are interested in the names of insects. This is a good place to begin in entomology, biology or nature study. Teachers of these subjects in high school or college will find the devotion of a considerable amount of time to insects, a valuable feature of their courses. No better training for *the logical mind, the seeing eye and the skillful fingers* can be found than the preparation and determination of a good collection of insects. Perhaps the best way to learn the morphology of insects (so often a dry and uninteresting, though very essential part, of a course) is to attempt to "key the insects down," which is morphology with a purpose.

**Acknowledgments.**—The earlier editions of this key have been widely used in high schools, summer camps, biological stations, colleges and universities, and the authors are indebted to numerous colleagues for helpful suggestion. The key characters used have been drawn from so wide a variety of technical works that it is impossible to credit them specifically. Among the figures redrawn for this work the authors are glad to credit the following, of which the original source is known: Fig. 3a from Lubbock; 8b from Howard; 33a from Tower; 48a from Johannsen; 41a and 73b from Folsom; 131a from Hopkins; 148b, 149a, 152a and 157b from Comstock; 196a, 196b, and 198b from Imms; 193a from Riley; and 200a from Packard. A number of figures were redrawn from the published or unpublished works of the senior author. The remainder were prepared especially for this work by Miss E. Haban, for whose painstaking and enthusiastic work the authors are greatly indebted.

It is hoped that these few pages will make simple and easy a path that is too often formidable to the beginner, and open to the nature lover a wonderful world, whose marvels continually increase, the more man exposes them to common knowledge. Corrections and criticisms of the key will be gratefully received by

THE AUTHORS.

October, 1928



**A KEY TO THE PRINCIPAL ORDERS AND FAMILIES OF INSECTS**

- 1a \*Wingless insects (See also figures 2b, 18a, 35a, etc.) .....2
- 1b Winged insects (See figures 39a, 77a, 84b, 90b, 100a, 113a, 136a, 146a, 180b).....37

**WINGLESS INSECTS**

- 2a \*Abdomen provided with a spring, segments often fused, not more than six abdominal segments visible .....Order COLLEMBOLA, 3
- 2b \*Abdomen not provided with a spring, with more than six segments visible in the abdomen.....5

**Order Collembola**

- 3a \*Abdominal segments fused, body globose..... Family Sminthuridæ
- 3b \*Abdominal segments not fused, body longer than broad .....4
- 4a \*Antennæ short, scarcely as long as the head..... Family Poduridæ
- 4b Antennæ longer, usually as long as the head and thorax combined ..... Family Entomobryidæ

- 5a \*Abdomen with three terminal, antennal-like appendages .....Order THYSANURA, Family Lepismatidæ
- 5b \*Abdomen without antennal-like appendages.....6

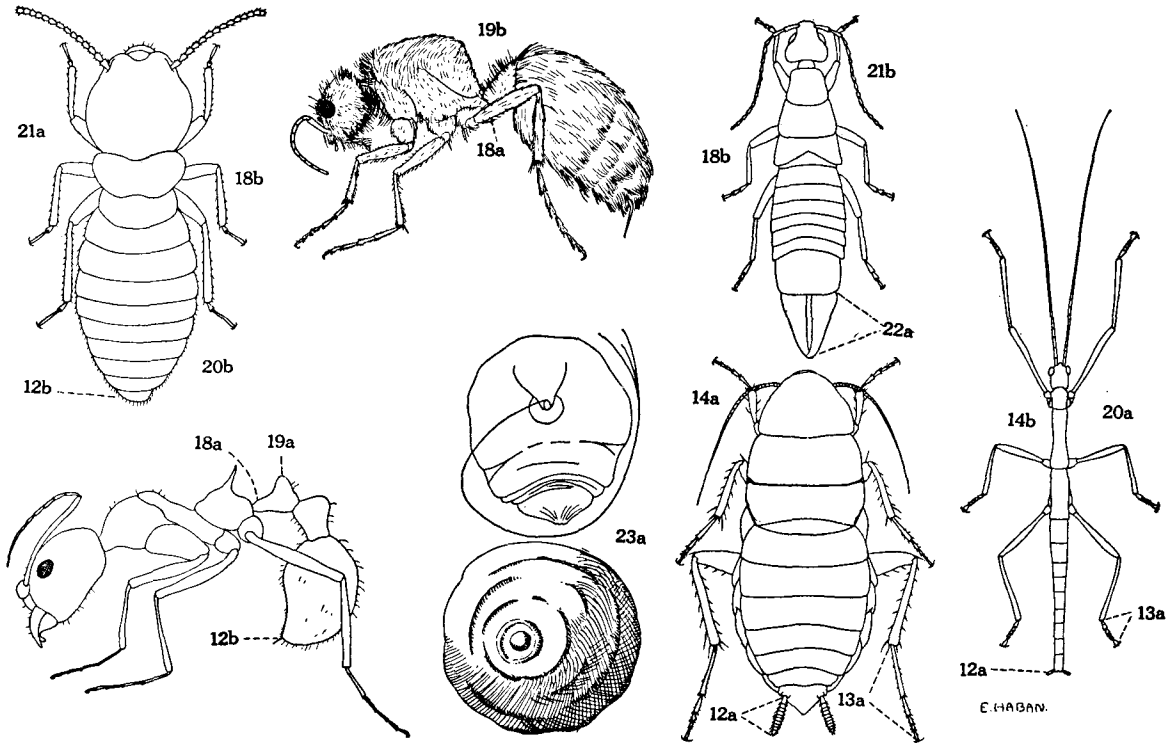
- 6a Mouth parts fitted for chewing (See figures 73b, 102a, 102b, 137b, 140a).....7
- 6b Mouth parts fitted for piercing, lapping or sucking, sometimes concealed (See figures 31b, 41a, 47b, 58a, 89b, 158a, 169a, 203a, 208a) .....23

- 7a \*Louse-like insects (See also figures 10b, 20b, 31a) .....8
- 7b Insects of various forms, not louse-like.....12

- 8a \*Antennæ with five segments or fewer than five segments .....Order MALLOPHAGA, 9
- 8b \*Antennæ with more than five segments.....Order CORRODENTIA (in part), Family Atropidæ

**Order Mallophaga**

- 9a \*Antennæ plainly visible, three- or five-segmented .....10
- 9b \*Antennæ more or less concealed, four-segmented .....11
- 10a \*Tarsi with one claw (See also figure 11a). \*Antennæ three-segmented. Infesting mammals ..... Family Trichodectidæ
- 10b \*Tarsi with two claws (See also figure 11b.) \*Antennæ five-segmented. Infesting birds ..... Family Philopteridæ
- 11a \*Tarsi with one claw. Infesting mammals..... Family Gyropidæ
- 11b \*Tarsi with two claws. Infesting birds..... Family Liotheidæ



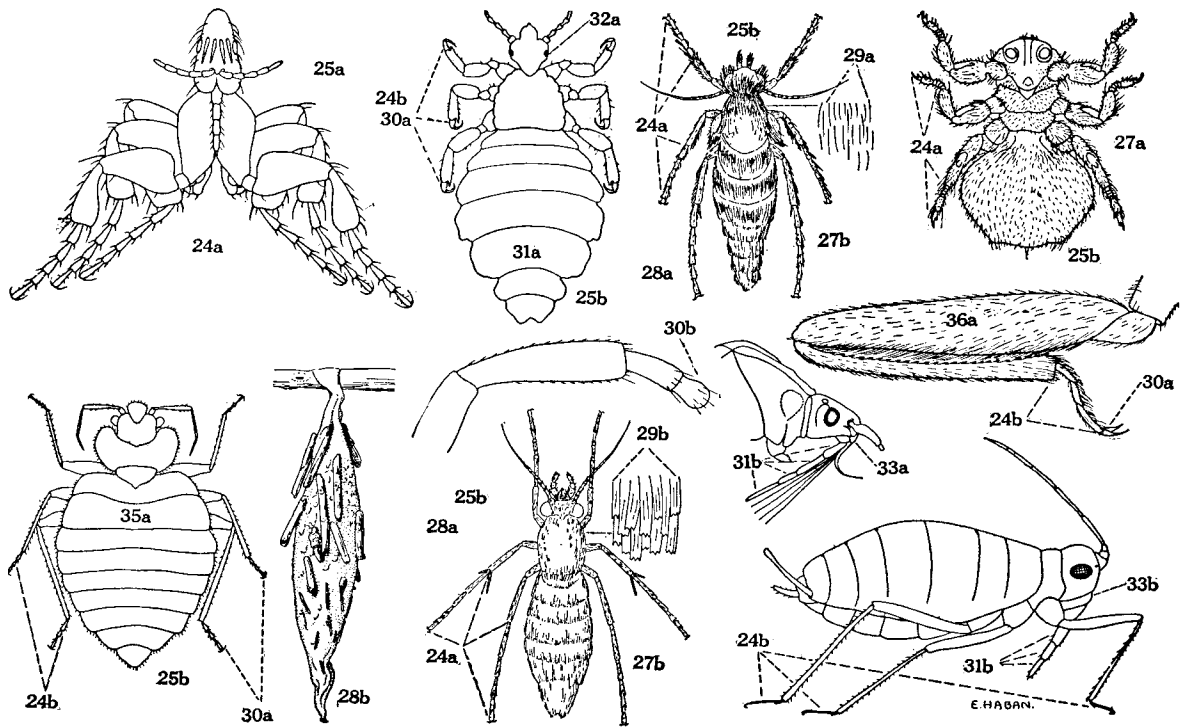
12a \*Abdomen with cerci (i.e., feeler-like appendages at the posterior end)-----  
 -----Order ORTHOPTERA (in part), 13  
 12b \*Abdomen without cerci-----16

**Order Orthoptera**

13a \*Tarsi five-segmented -----14  
 13b Tarsi three- or four-segmented (See figures 24b, 90b, 98a, 99a, 135b, 136a)-----15  
 14a \*Body oval, flattened -----Family Blattidæ (in part)  
 14b \*Body elongate, not flattened-----Family Phasmidæ  
 15a Tarsi three-segmented -----Family Gryllidæ (in part)  
 15b Tarsi four-segmented -----Family Tettigoniidæ (Also called Locustidæ) (in part)  
 16a Hind legs fitted for leaping (See figures 136a, 138b); hind femora much thickened  
 -----Order ORTHOPTERA, 17  
 16b Legs not fitted for leaping; hind femora not much thickened. (See figures 13a, 18a)-----18  
 17a Tarsi three-segmented -----Family Gryllidæ (in part)  
 17b Tarsi four-segmented -----Family Tettigoniidæ (Also called Locustidæ) (in part)  
 18a \*Base of abdomen constricted, much narrower than the thorax, Order HYMENOPTERA (in part), 19  
 18b \*Base of abdomen nearly as broad as thorax (See also figures 14a, 14b)-----20

**Order Hymenoptera**

19a \*Peduncle of abdomen with a nodus or swelling. Body nearly bare -----Family Formicidæ  
 19b \*Peduncle of abdomen without a nodus. Bright-colored, very hairy species -----  
 -----Family Mutillidæ (Females)  
 20a \*Body very slender, linear-----Order ORTHOPTERA (in part), Family Phasmidæ  
 20b \*Body broader, not linear-----21  
 21a \*Body ant-like in form, but base of abdomen not constricted -----  
 -----Order ISOPTERA (in part), Family Termitidæ (in part)  
 21b \*Body not ant-like in form-----22  
 22a \*End of abdomen provided with forceps. (See also figure 101a)-----  
 -----Order DERMAPTERA (Also called EUPLEXOPTERA), Family Forficulidæ (in part)  
 22b End of abdomen without forceps -----Order COLEOPTERA, Family Lampyridæ (in part)  
 23a \*Small, scale-like insects, usually without legs, eyes or antennæ and usually covered with a  
 scale beneath which the insect lives. Sometimes legs and antennæ are present, the scale  
 wanting, and the insect covered with a mealy powder -----  
 -----Order HOMOPTERA, Family Coccidæ (in part)  
 23b Insect not scale-like or sedentary. Legs and antennæ always present -----24



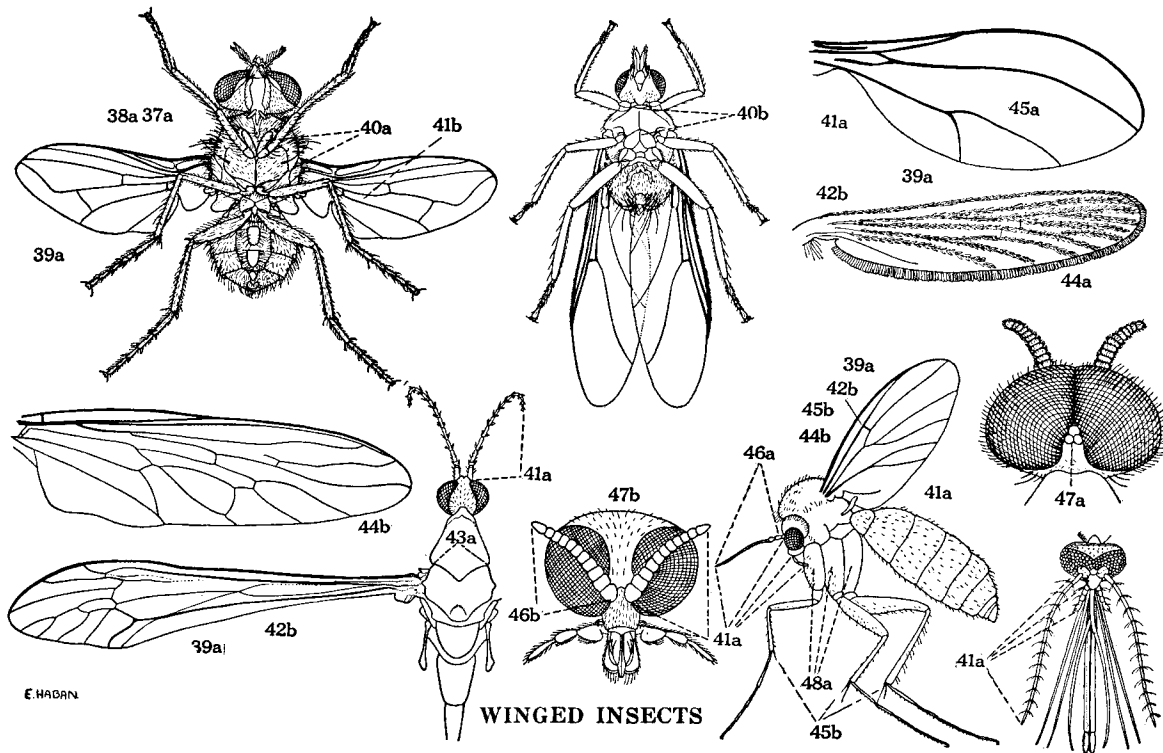
- 24a \*Tarsi with five segments ..... 25  
 24b \*Tarsi with fewer than five segments ..... 30  
 25a \*Body compressed; flattened from side to side. Not covered with scales, ..... Order SIPHONAPTERA, 26  
 25b \*Body not compressed; wider than its depth ..... 27

#### Order Siphonaptera

- 26a Thorax longer than the first abdominal segment ..... Family Pulicidæ  
 26b Thorax shorter than the first abdominal segment ..... Family Echidnophagidæ (Also called Sarcopsyllidæ)  
 27a \*Abdomen indistinctly segmented, covered with hairs. The sheep "tick" and related forms. .... Order DIPTERA, Family Hippoboscidæ  
 27b \*Abdomen distinctly segmented, covered with scales, Order LEPIDOPTERA (Females, in part), 28  
 28a \*Adult female not in a case ..... 29  
 28b \*Adult female remaining within the larval case ..... Family Psychidæ (in part)  
 29a \*Adult clothed with fine, hair-like scales ..... Family Lymantriidæ (Also called Liparidæ) (in part)  
 29b \*Adult clothed with broad, flat scales ..... Family Geometridæ (in part)  
 30a \*With one or two claws on the last tarsal segment. Mouth parts enclosed in a beak or with-  
 drawn into the head ..... 31  
 30b \*Without claws on the last tarsal segment. Mouth parts not enclosed in a beak .....  
 Order THYSANOPTERA (in part), Family Thripidæ  
 31a \*Beak not evident; mouth stylets completely withdrawn into head. Louse-like in form. Ex-  
 ternal parasites on various mammals ..... Order ANOPLURA (Also called SIPHUNCULATA and PARASITA), 32  
 31b \*Beak evident and segmented ..... 33

#### Order Anoplura

- 32a \*Eyes present, evident. Parasitic lice on man ..... Family Pediculidæ  
 32b Eyes wanting or inconspicuous. Parasitic lice on domestic animals ..... Family Hæmatopinidæ  
 33a \*Beak (labium) arising from the fore part of the head ..... Order HEMIPTERA (s.s., in part), 34  
 33b \*Beak (labium) arising from the hinder part of the head between the front coxæ .....  
 Order HOMOPTERA (in part), Family Aphididæ  
 34a Middle and hind legs much longer than body and very slender ..... Family Gerridæ  
 34b Legs not extremely long ..... 35  
 35a Beak (labium) apparently three-segmented. \*Body greatly depressed (flattened) .....  
 Family Cimicidæ  
 35b Beak (labium) apparently four-segmented. Body not greatly depressed ..... 36  
 36a \*Front legs fitted for grasping prey ..... Family Nabidæ (in part)  
 36b Front legs not fitted for grasping ..... Family Lygæidæ (in part)



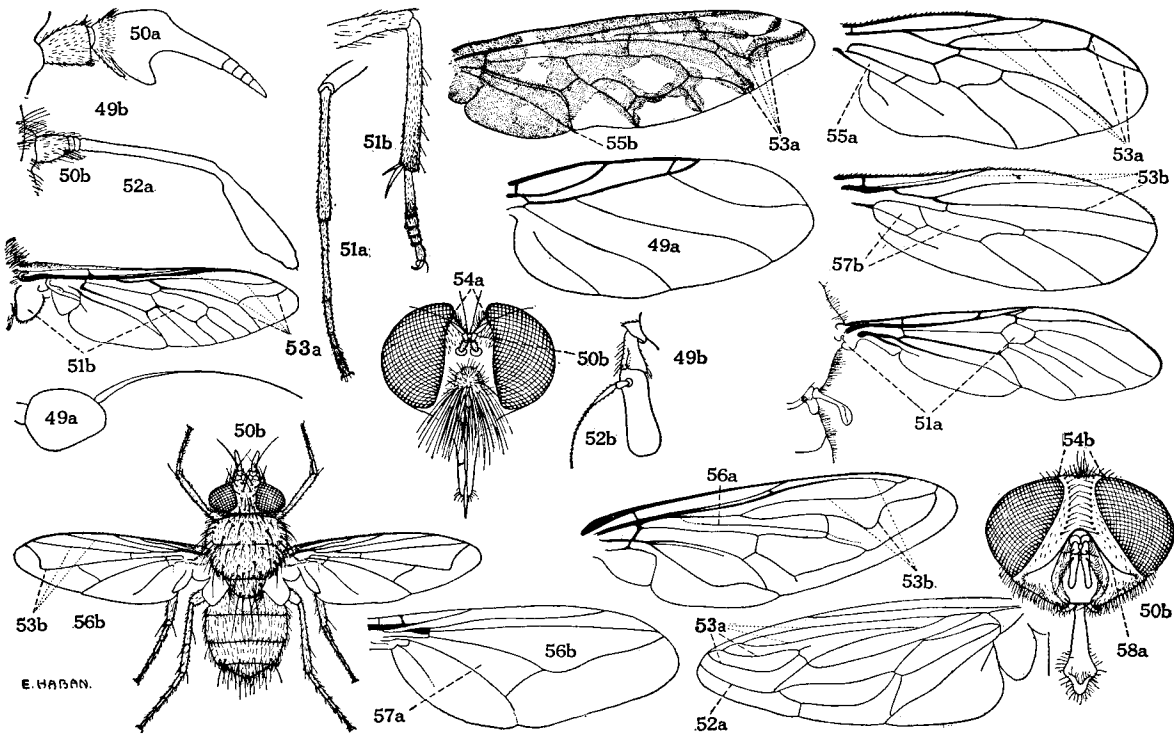
WINGED INSECTS

- 37a \*With two wings (See also figures 56b, 59b) ----- 38
- 37b With four wings evident (See figures 184b, 188b, 191a, 199b, 214b), or the presence or absence of the second pair concealed by the thickness of the first pair. ----- 38
- Note: When the front wings are thick and horny and meet in a straight line down the back (as in figures 100a, 104a, 112b, 113b, 132b, 138b) or thick and horny at the base with membranous, overlapping tips (as in figures 77a, 90a, 90b, 98a), a second pair of wings may be taken for granted in dry pinned specimens where the wings cannot be spread without breaking them. ----- 76
- 38a \*Wings membranous, i. e., thin and transparent like glass ----- 39
- 38b Wings horny or leathery; not membranous ----- 73
- 39a \*With few or no cross-veins (See also figures 42b, 56b, 61a, 66a) ----- Order DIPTERA, 40
- 39b With many cross-veins (As in figures 181a, 182b, 185a, 185b) ----- Order EPHEMERIDA (Also called EPHEMEROPTERA) (in part), Family Ephemeridæ

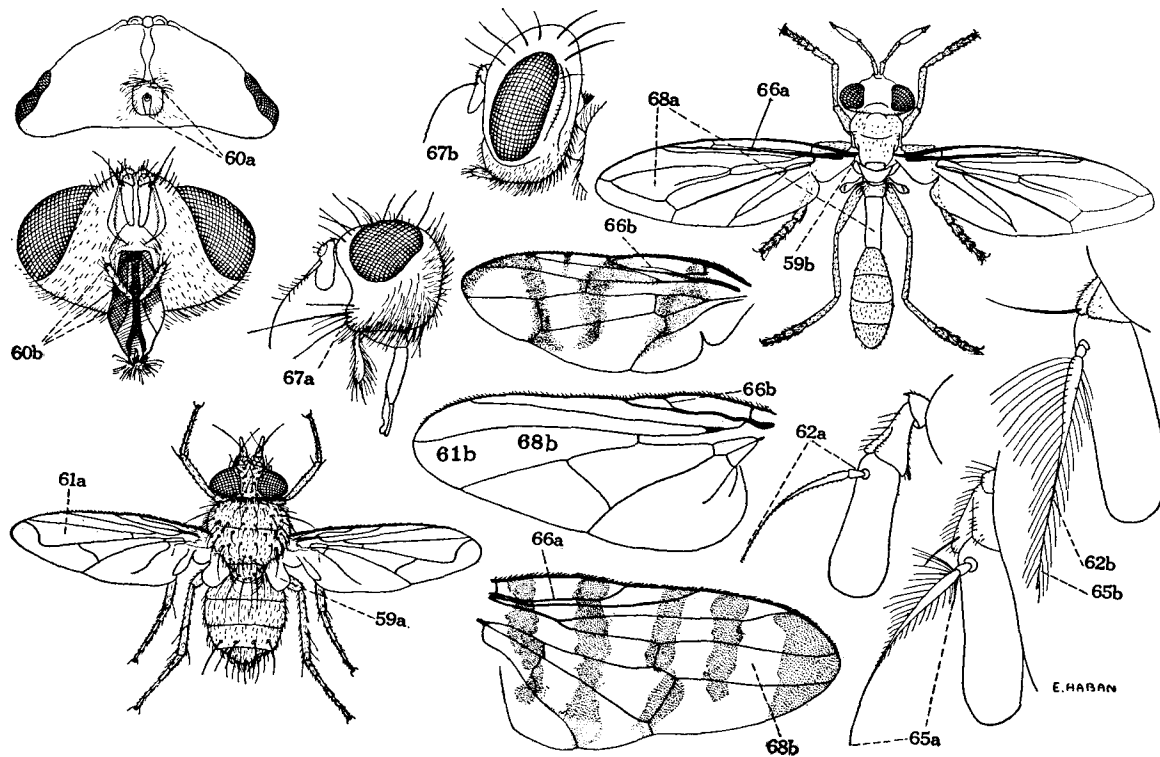
Order Diptera

- 40a \*Right and left legs attached close together, often touching at base. Segmentation of abdomen showing ----- 41
- 40b \*Distance between coxæ about equal to that from either coxa to the lateral margin. Abdomen does not show distinct segments ----- Family Hippoboscidæ
- 41a \*Antennæ of more than five segments, usually as long as head and thorax together. \*Palpi elongate. \*First anal (or anal) cell seldom closed or narrowed before the wing margin. \*First medial 2 (or discal) cell generally wanting. (See also figure 49a) ----- 42
- 41b Antennæ with usually not more than four segments. (See figures 50b, 52b, 62a, 71b). Palpi not elongate. First anal (or anal) cell closed or much narrowed before the wing margin. (See figures 55a, 55b). \*First medial 2 (or discal) cell present. (See also figures 57a, 57b) ----- 49
- 42a Moth-like flies. Wings very hairy, without cross-veins. Wings held roof-like when at rest ----- Family Psychodidæ
- 42b \*Not moth-like in form. \*Wings with cross-veins ----- 43
- 43a \*The thorax with a distinct, V-shaped suture dorsally ----- Family Tipulidæ
- 43b No V-shaped suture on the thorax. (See figures 50b, 59b) ----- 44
- 44a \*Veins of the wing fringed with scales ----- Family Culicidæ
- 44b \*Veins of the wing not scaled ----- 45
- 45a \*Wings usually with three or less, never with more than five longitudinal veins. Tibiæ without spurs ----- Family Cecidomyiidæ (Also called Itonididæ)
- 45b \*Wings with more than three, usually the normal number of longitudinal veins. \*Tibiæ generally with spurs ----- 46
- 46a \*Antennæ longer than the thorax ----- 48
- 46b \*Antennæ shorter than the thorax ----- 47
- 47a \*Ocelli present; slender flies with slender abdomen ----- Family Bibionidæ
- 47b \*Ocelli absent; thick-set, hunch-backed flies, with heavy abdomen ----- Family Simuliidæ
- 48a Ocelli present. \*Coxæ elongate ----- Family Mycetophilidæ
- 48b Ocelli absent. Coxæ not especially elongate ----- Family Chironomidæ

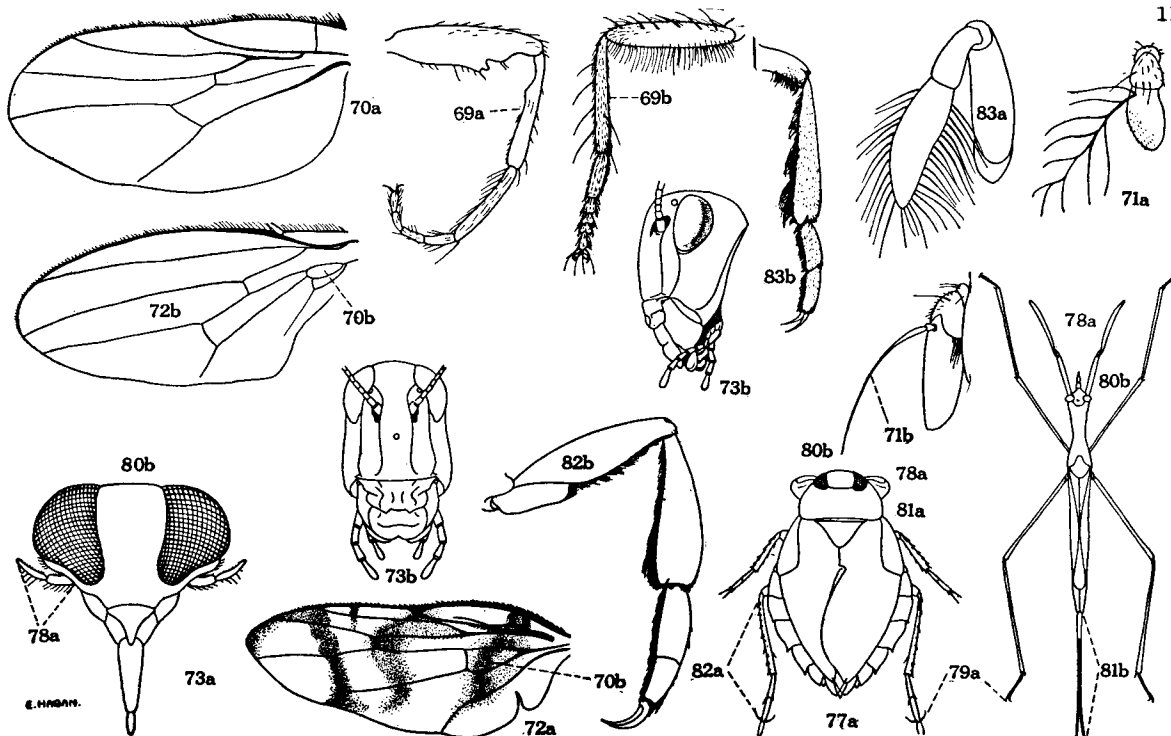




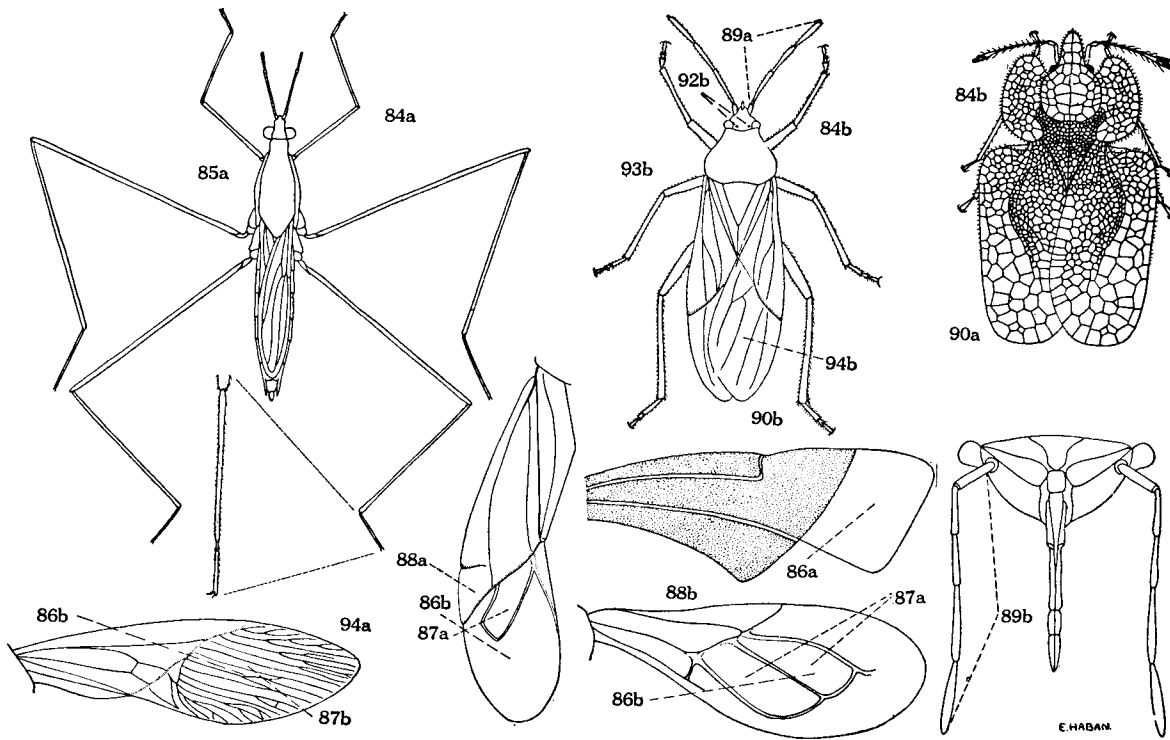
- 49a \*Antenna consisting of a single globular segment with a bristle. \*No closed cells in the wing; two heavy veins near the costal margin and several lighter ones running obliquely backward ..... Family Phoridae
- 49b \*Antenna of more than two segments; though the basal one may be very small (See also figures 62, 65, 71) ..... 50
- 50a \*Antennæ of five or more segments; or if three-segmented the third segment is composed of several, closely applied, segment-like rings; and often with a triangular or thumb-like expansion at base of third segment..... 51
- 50b \*Antennæ three- or four-segmented, the third segment not ringed..... 52
- 51a \*First medial two (or discal) cell small, hardly longer than broad, or rounded. \*Tibiæ without spurs at tip. \*Tegulæ (or squamæ) small ..... Family Stratiomyidæ
- 51b \*First medial two (or discal) cell several times as long as broad. \*Middle tibiæ with two spurs at tip. \*Tegulæ (or squamæ) large..... Family Tabanidæ
- 52a \*Antennæ of four segments, clavate. \*Medius 1 + 2 (fourth vein) of wing curves forward to wing margin before the tip of wing. Large flies..... Family Mydaidæ
- 52b \*Antennæ three-segmented; the third segment usually with a dorsal or terminal bristle..... 53
- 53a \*Radial vein four-branched (third vein forked)..... 54
- 53b \*Radial vein three-branched (third vein not forked or branched)..... 56
- 54a \*Vertex of the head distinctly hollowed out between the eyes. Large, bristly flies... Family Asilidæ
- 54b \*Vertex of the head not hollowed out..... 55
- 55a \*First anal (or anal) cell closed remote from the border of the wing..... Family Empididæ
- 55b \*First anal (or anal) cell narrowly open, or closed close to the border of the wing. Often hairy flies with pictured wings..... Family Bombyliidæ
- 56a \*A false vein between radius 4 + 5 (third vein) and medius 1 + 2 (fourth vein) bisecting the radio-medial (anterior) cross-vein. Flies often banded with black and yellow, resembling bees or wasps..... Family Syrphidæ
- 56b \*Without a false vein..... 57
- 57a \*First medial 2 (or discal) and medial (or second basal) cells not separated, the first medial 2 (or discal) cell open to the base of the wing. Small, brilliantly-colored flies ..... Family Dolichopodidæ
- 57b \*First medial 2 (or discal) cell complete and separated from base of wing by a cross-vein. Usually medium to large size flies; if small, not brilliantly-colored..... 58
- 58a \*Head with a curving suture (the frontal suture), usually beginning on the face, running around above the antennæ and down on the other side..... 59
- 58b Head without such suture (See figure 54a) ..... Family Bombyliidæ



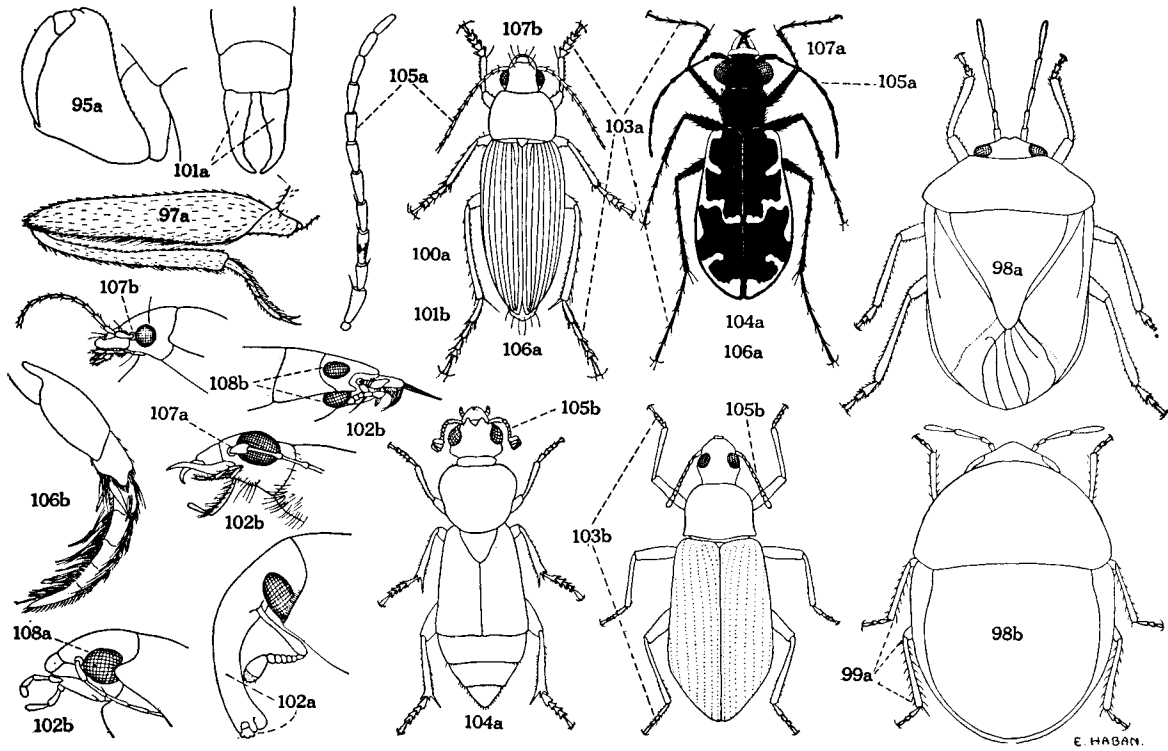
- 59a \*Tegulae (squamae) large.....60  
 59b \*Tegulae (squamae) small or wanting.....66
- 60a \*Oral opening small. Mouth parts small. Palpi wanting, Family Cestridae, including Gastrophilidae  
 60b \*Oral opening of the usual size.....61
- 61a \*Fifth radial (or first posterior) cell narrowed in the border of the wing.....62  
 61b \*Fifth radial (or first posterior) cell not narrowed in the border of the wing...Family Anthomyiidae
- 62a \*Antennal bristle (arista) bare or short plumose..... Family Tachinidae  
 62b \*Antennal bristle (arista) plumose for part of its length at least.....63
- 63a Base of abdomen with conspicuous bristles. Legs unusually long..... Family Dexiidae  
 63b Base of abdomen without large bristles.....64
- 64a Color metallic blue or green.....Family Calliphoridae  
 64b Color grayish or grayish white. Antennal bristle (arista) plumose (As in figure 62b).....65
- 65a \*Base of antennal bristle (arista) plumose; tip bare .....Family Sarcophagidae  
 65b \*Antennal bristle (arista) plumose to the tip.....Family Muscidae
- 66a \*Subcostal (or auxiliary) vein present, distinct.....67  
 66b \*Subcostal (or auxiliary) vein absent or incomplete (See also figures 70a, 70b).....70
- 67a \*Oral vibrissae present, i. e., a distinct large bristle on each side of the face near oral margin...69  
 67b \*Oral vibrissae absent.....68
- 68a \*Fifth radial (or first posterior) cell narrowed (As in figure 61a) or closed (As in figure 68a), toward the border of the wing. \*Abdomen often narrowed toward the base....  
 .....Family Conopidae
- 68b \*Fifth radial (or first posterior) cell no narrowed toward the border of the wing. Wings usually pictured..... Family Ortalidae



- 69a \*Middle tibiae without strong bristles..... Families Sepsidae and Piophilidae
  - 69b \*Middle tibiae with strong bristles..... Family Cordyluridae
  - 70a \*First anal (or anal) cell absent..... Family Oscinidae
  - 70b \*First anal (or anal) cell present, often small..... 71
  - 71a \*Antennal bristle (arista) long plumose..... Family Drosophilidae
  - 71b \*Antennal bristle (arista) bare or short plumose..... 72
  - 72a \*Wings pictured or spotted (See also figures 86b, 68b)..... Family Trypetidae
  - 72b \*Wings not pictured..... Family Agromyzidae
  - 73a \*Mouth parts fitted for piercing (See also figures 31b and 89b)..... Order HEMIPTERA, s.s.,  
or Order HOMOPTERA (a few short-winged adults from various families), 134
  - 73b \*Mouth parts fitted for chewing..... 74
  - 74a Front wings horny without veins (As in figures 104a, 106a, 115b, etc.). Legs not fitted  
for leaping..... Order COLEOPTERA, Family Meloidae (in part)
  - 74b Front wings leathery with many veins (As in figures 136a, 136b). Hind legs fitted for leap-  
ing (As in figure 138b)..... Order ORTHOPTERA (in part), 75
  - 75a Tarsi three-segmented. (As in figure 138b)..... Family Gryllidae (in part)
  - 75b Tarsi four-segmented..... Family Tettigoniidae (Also called Locustidae) (in part)
  - 76a The two pairs of wings unlike in structure, i. e., with fore wings usually much thicker or less  
transparent than hind wings or the front wings only slightly thicker and the hind  
wings folded like a fan.  
*Note: When the front wings are thick and horny and meet in a straight line down the middle of the back (As  
in figures 100a, 104a, 112b, 113b, 132b, 138b) or thick and horny at the base with thinner, overlapping tips  
(As in figures 77a, 90a, 90b, 98a), it may be taken for granted that the hind pair of wings are transparent  
or membranous, in dry, pinned specimens where the wings cannot be spread without breaking them.....* 77
  - 76b The two pairs of wings similar in structure, i.e., with the two pairs of wings of the same de-  
gree of thickness or transparency.  
*Note: If the front wings are only slightly thicker and the hind wings are folded like a fan, see couplet 77; if  
prothorax very long and front legs large and grasping, see couplet 137.....* 142
  - 77a \*Front wings thick at base, thinner and overlapping at tip (See also figures 90b, 98a). Mouth  
parts fitted for piercing, the beak arising from the front part of the head (See figures  
31b, 73a)..... Order HEMIPTERA, s.s., 78
  - 77b Front wing of same texture throughout. (If legs very long and slender and beak attached to  
front of head, see couplet 85)..... 100
- Order Hemiptera**
- 78a \*Antennae short, usually concealed..... 79
  - 78b \*Antennae longer, usually not concealed..... 84
  - 79a \*Hind tarsi with claws..... 80
  - 79b Hind tarsi without claws..... 83
  - 80a With two ocelli (As in figures 92b and 172b). Legs slender..... Family Gelastocoridae (Also called Galgulidae)
  - 80b \*Without ocelli..... 81
  - 81a \*Body broadly oval in outline..... 82
  - 81b \*Body slender, linear in outline, with long appendages at tip of abdomen..... Family Nepidae
  - 82a \*Hind legs slender. Our species small, about one-third inch long..... Family Naucoridae
  - 82b \*Hind legs flattened. Our species larger..... Family Belostomatidae
  - 83a \*Fore tarsi flattened and without claws..... Family Corixidae
  - 83b \*Fore tarsi not flattened, with claws..... Family Notonectidae



- 84a \*Front legs comparatively short and slender, less than one-half as long as middle and hind legs, which are very long and slender.....85
- 84b \*Front legs not remarkably shorter than other legs; or, if so, thick and modified for grasping. Tarsi not split .....86
- 85a \*Body elongate. Beak (labium) four-segmented ..... Family Gerridæ
- 85b Body oval. Beak (labium) three-segmented..... Family Veliidæ
- 86a \*Membrane of the wing without closed cells or veins .....Family Anthocoridæ
- 86b \*Membrane with either closed cells or veins, or both .....87
- 87a \*Membrane with one or two large closed cells, without additional longitudinal veins.....88
- 87b \*Membrane with longitudinal veins (See also figure 94b). Closed cells usually small or wanting .....89
- 88a \*Wings with a cuneus. Beak (labium) apparently four-segmented ..... Family Miridæ (Also called Capsidæ)
- 88b \*Wings without a cuneus. Beak (labium) apparently three-segmented .....Family Reduviidæ
- 89a \*Antennæ three- or four-segmented .....90
- 89b \*Antennæ five-segmented .....98
- 90a \*Fore wings resembling a net-work..... Family Tingitidæ
- 90b \*Fore wings not resembling a net-work.....91
- 91a Beak (labium) apparently four-segmented.....92
- 91b Beak (labium) apparently three-segmented.....95
- 92a Without ocelli (See figure 80b)..... Family Pyrrhocoridæ
- 92b \*With ocelli .....93
- 93a Body very slender. Antennæ longer than the body .....Family Berytidæ (Also called Neididæ)
- 93b \*Body not slender. Antennæ shorter than the body .....94
- 94a \*Membrane with many branching veins .....97
- 94b \*Membrane with a few, usually five, unbranched veins ..... Family Lygæidæ

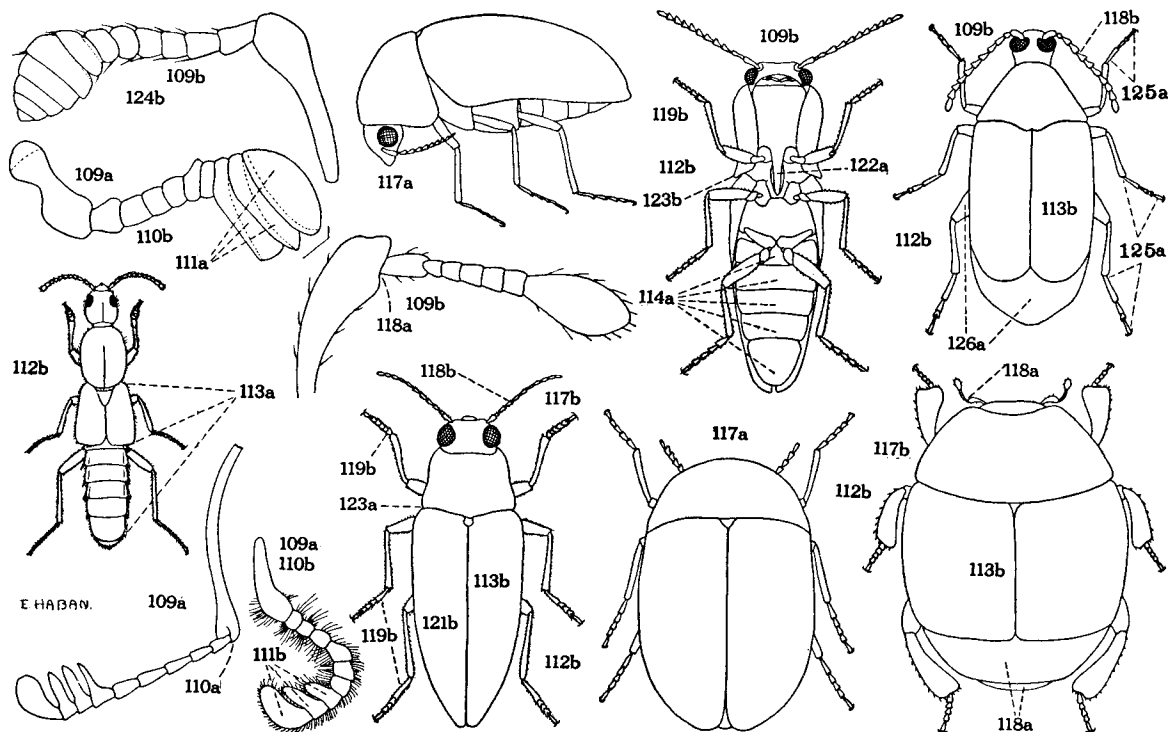


- 95a \*Femora of fore legs nearly as wide as long ----- Family Phymatidæ
- 95b Femora of fore legs sometimes thickened, but never more than half as wide as long ----- 96
- 96a Tarsi two-segmented ----- Family Aradidæ
- 96b Tarsi three-segmented ----- Family Saldidæ
- 97a \*Fore legs fitted for grasping (with strong spines between femur and tibia) ----- Family Nabidæ
- 97b Fore legs not fitted for grasping ----- Family Coreidæ
- 98a \*Scutellum flattened and usually narrowed behind ----- Family Pentatomidæ
- 98b \*Scutellum very large and convex, covering almost the entire abdomen ----- 99
- 99a \*Tibiæ with strong spines. Corium (the cell of the wing nearest below the figures "88b" and "90b" on page 12) narrow and pointed ----- Family Cydnidæ (Also called Thyreocoridae)
- 99b Tibiæ without strong spines. Corium broad and obtuse at tip ----- Family Scutelleridæ

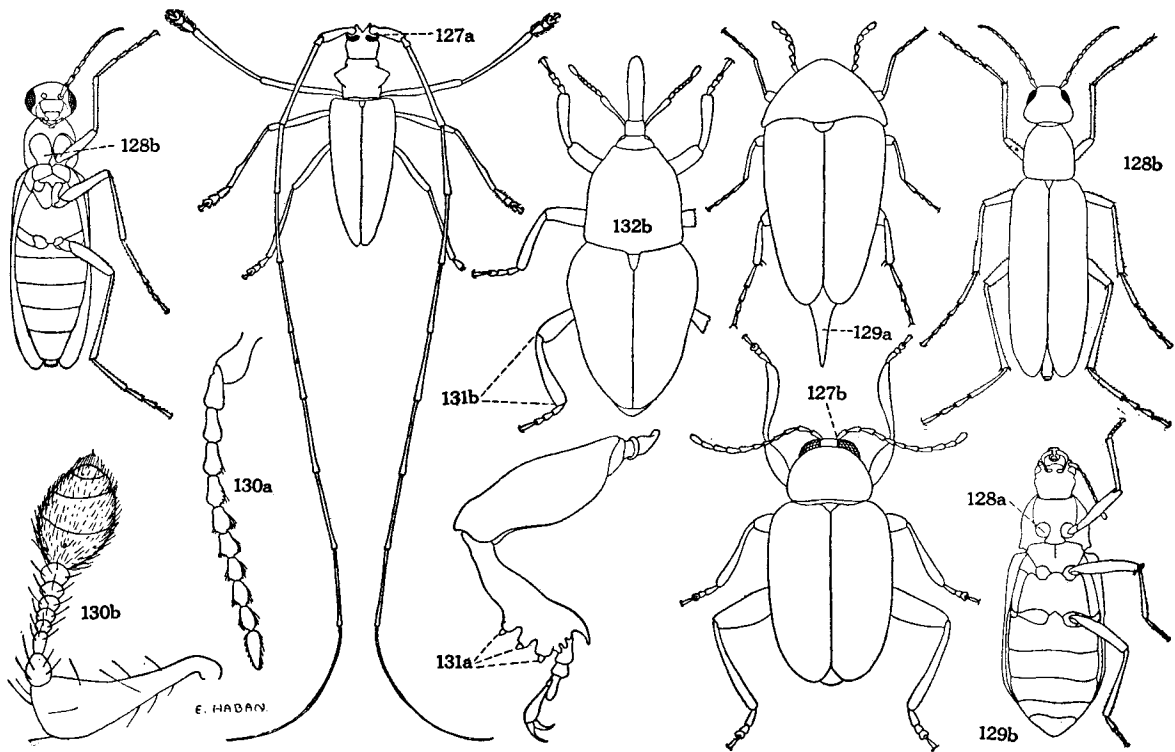
- 100a \*Front wings horny, without veins. (Note: The regular, parallel ridges on the front wings of beetles are not veins) ----- 101
- 100b Front wings leathery or opaque, with veins (As in figure 136b) ----- 133
- 101a \*Abdomen provided with forceps at posterior end ----- Order DERMAPTERA (Also called EUPLEXOPTERA), Family Forficulidæ
- 101b \*Abdomen without forceps ----- Order COLEOPTERA, 102

**Order Coleoptera**

- 102a \*Mouth parts reduced. \*Front of head usually prolonged into a slender snout often longer than the rest of the head. Gular sutures (on under side of head) fused into one. Prosternal sutures wanting. Snout beetles ----- 130
- 102b \*Mouth parts not reduced. Front of head not prolonged into a slender, cylindrical snout. Gular sutures two. Prosternal sutures present. Typical beetles ----- 103
- 103a \*Hind tarsi with the same number of segments as the fore tarsi (See also figures 127a, 127b, 132b) ----- 104
- 103b \*Hind tarsi with four segments. Fore tarsi with five segments ----- 128
- 104a \*All the tarsi evidently five-segmented ----- 105
- 104b All the tarsi apparently four- or three-segmented (See figures 125a, 127a) ----- 125
- 105a \*Antennæ filiform ----- 106
- 105b \*Antennæ of various shapes, not filiform ----- 109
- 106a \*Legs fitted for walking or running ----- 107
- 106b \*Legs fitted for swimming, being flattened and fringed with stiff hairs, ----- 108
- 107a \*Head wider than the thorax. \*Antennæ inserted on the front above the base of the mandibles. \*Wings usually spotted ----- Family Cicindelidæ
- 107b \*Head narrower than the thorax. \*Antennæ inserted on the side of the head between the base of the mandible and the eye. \*Wings usually not spotted ----- Family Carabidæ
- 108a \*With one pair of compound eyes ----- Family Dytiscidæ
- 108b \*With two pairs of compound eyes i.e., each eye divided ----- Family Gyrinidæ

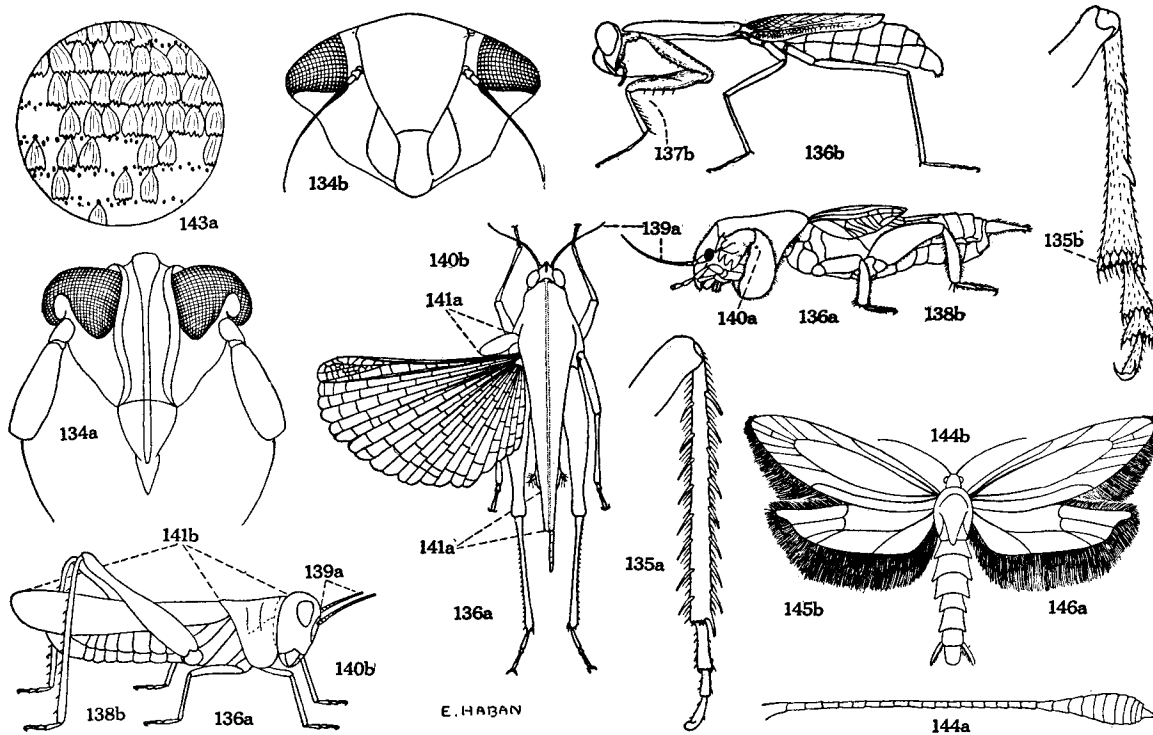


109a	*Antennæ lamellate, bearing flattened plates at the end	110
109b	*Antennæ not lamellate	112
110a	*Antennæ elbowed ( a long basal segment followed by a series of shorter segments standing at an angle to the first)	Family Lucanidæ
110b	*Antennæ not elbowed	111
111a	*Lamellæ of antennæ thin and pressed close together	Family Scarabæidæ
111b	*Lamellæ of antennæ not thin and not pressed close together	Family Passalidæ
112a	Aquatic insects. Legs fitted for swimming (As in figure 106b)	Family Hydrophilidæ
112b	*Terrestrial insects. Legs not fitted for swimming	113
113a	*Elytra (front wings) covering basal segments of abdomen only	Family Staphylinidæ
113b	*Elytra (front wings) covering most of abdomen	114
114a	*Ventral abdominal segments five	117
114b	Ventral abdominal segments more than five	115
115a	Ventral abdominal segments six	Family Silphidæ
115b	Ventral abdominal segments more than six	116
116a	Abdomen provided with light-giving organs	Family Lampyridæ
116b	Abdomen not provided with light-producing organs	Family Cantharidæ
117a	*Head bent under the hood-like prothorax, rarely visible from above	Family Ptinidæ
117b	*Prothorax not hood-like. Head visible from above	118
118a	*Antennæ elbowed. *Last two abdominal segments exposed beyond the elytra	Family Histeridæ
118b	*Antennæ not elbowed	119
119a	First segment of tarsi very small	120
119b	*First segment of tarsi not remarkably smaller than others	121
120a	Thorax as broad as the elytra (front wings). Head narrower than thorax	Family Trogositidæ
120b	Thorax narrower than the elytra (front wings). Head broader than thorax	Family Cleridæ
121a	Elytra (front wings) truncate, exposing one or two abdominal segments (As in figure 115b)	Family Nitidulidæ
121b	*Elytra (front wings) entire, covering the abdomen	122
122a	*Pro-sternum with a spine which fits into a groove in the meso-sternum	123
122b	No spine on the pro-sternum	124
123a	*Prothorax closely joined to the abdomen; hind angles not prolonged	Family Buprestidæ
123b	*Prothorax closely joined to abdomen; hind angles usually prolonged	Family Elateridæ
124a	Front coxæ not conical, not prominent. Antennæ moniliform	Family Cucujidæ
124b	Front coxæ conical, prominent. *Antennæ capitate or clavate	Family Dermestidæ
125a	*All the tarsi apparently four-segmented	126
125b	All the tarsi apparently three-segmented	Family Coccinellidæ
126a	Front prolonged into a short snout or muzzle. *Tip of abdomen exposed beyond the ends of the short elytra. *Hind femora thickened	Family Mylabridæ (Also called Bruchidæ)
126b	Front not prolonged. Tip of abdomen not usually exposed	127



- 127a \*Antennæ usually as long as, or longer than, the head and thorax; their insertion usually emarginating the eyes. Body elongate ..... Family Cerambycidae
- 127b \*Antennæ usually shorter than the head and thorax, not at all surrounded at the base by the eyes ..... Family Chrysomelidæ
- 128a \*Front coxal cavities closed behind. \*Head narrower than the prothorax, without distinct neck ..... 129
- 128b \*Front coxal cavities open behind. \*Head as wide as the prothorax, with a visible neck ..... Family Meloidæ
- 129a \*Abdomen prolonged in a pointed style behind the elytra (front wings)..... Family Mordellidæ
- 129b \*Abdomen not prolonged in a pointed style (*See also figure 103b*)..... Family Tenebrionidæ
- 130a \*Antennæ straight, not clubbed ..... Family Brenthidæ
- 130b \*Antennæ clubbed ..... 131
- 131a \*Tibia serrate. Beak usually wanting..... Family Scolytidæ
- 131b \*Tibia not serrate..... 132
- 132a Antennæ not elbowed (*As in figure 130a*). A raised line on base of thorax... Family Anthribidæ
- 132b \*Antennæ elbowed. No raised line on base of thorax ..... Family Curculionidæ

- 
- 133a Mouth parts fitted for piercing, the beak (labium) arising from the ventral posterior part of the head, near the front legs (*As in figure 169a*)..... Order HOMOPTERA, 134
- 133b Mouth parts fitted for chewing (*As in figure 73b*)..... Order ORTHOPTERA, 136



**Order Homoptera**

- 134a \*Antennæ below the eyes at side of head ..... Family Fulgoridæ
- 134b \*Antennæ in front of and between the eyes ..... 135
- 135a \*Hind tibia with two rows of spines ..... Family Cicadellidæ (Also called Jassidæ)
- 135b \*Hind tibia with a circlet of spines at apex ..... Family Cercopidæ

**Order Orthoptera**

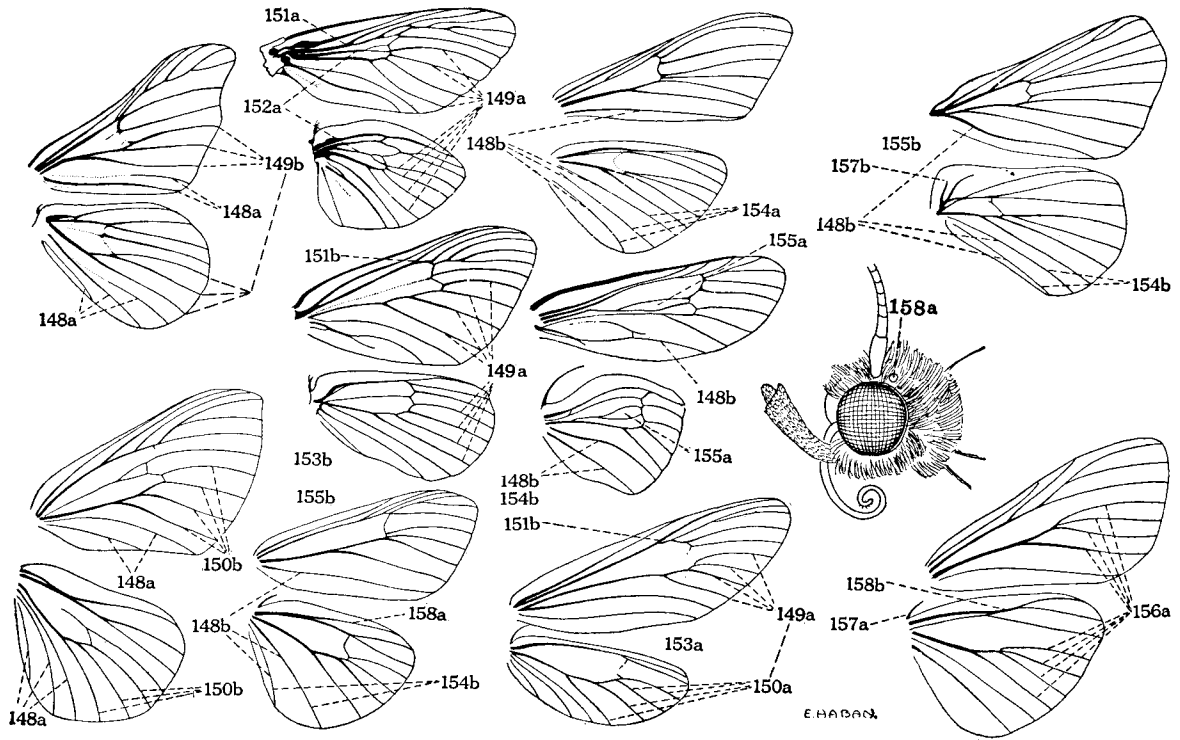
- 136a \*Legs fitted for leaping. Tarsi three- or four-segmented ..... 138
- 136b \*Legs not fitted for leaping. Tarsi five-segmented ..... 137
- 137a Body oval, depressed (*As in figure 14a*) ..... Family Blattidæ
- 137b \*Body elongate, not depressed. \*Front legs fitted for grasping, the femur and tibia bearing heavy spines ..... Family Mantidæ
- 138a Tarsi four-segmented. Antennæ usually longer than body ..... Family Tettigoniidæ (Also called Locustidæ)
- 138b Tarsi three-segmented ..... 139
- 139a \*Antennæ short, usually not over half the length of the body ..... 140
- 139b Antennæ long. Ovipositor long. Front wings flat above, bent abruptly down at sides ..... Family Gryllidæ
- 140a \*Fore legs much widened, rake-like, fitted for burrowing ..... Family Gryllotalpidæ
- 140b \*Fore legs not fitted for burrowing ..... 141
- 141a \*Fore wings reduced. Prothorax extending to near the tip of the abdomen ..... Family Acrydiidæ (Also called Tetrigidæ)
- 141b \*Fore wings not reduced. Prothorax not extending over more than the base of the abdomen ..... Family Locustidæ (Also called Acrididæ)

- 142a Last segment of tarsi without claws (*See figure 30b*) ..... Order THYSANOPTERA
- 142b Last segment of tarsi with claws (*See figure 167b*) ..... 143
- 143a \*Wings in part, at least, covered with scales ..... Order LEPIDOPTERA, 144
- 143b Wings not scaled (*See figures 170a, 182, 195*) ..... 169

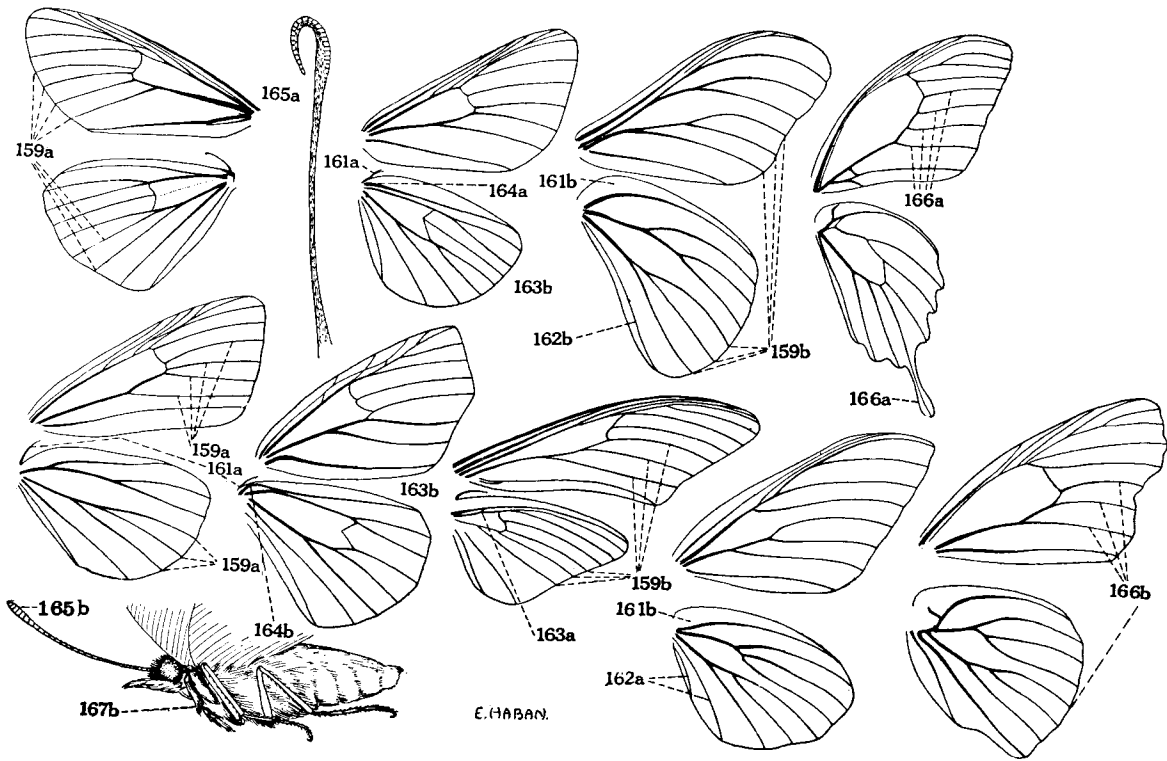
**Order Lepidoptera**

- 144a \*Antennæ thickened or enlarged toward the tip ..... 165
- 144b \*Antennæ of various forms, not thickened toward the tip ..... 145
- 145a Wings split lengthwise, the borders of the clefts fringed with long hair-like scales ..... Family Pterophoridæ
- 145b \*Wings not split lengthwise ..... 146
- 146a \*Hind wings usually lanceolate in shape, with a long fringe ..... Family Tineidæ
- 146b Hind wings not lanceolate (*See figures 150a, 150b, 154a, 154b*). Fringe short ..... 147

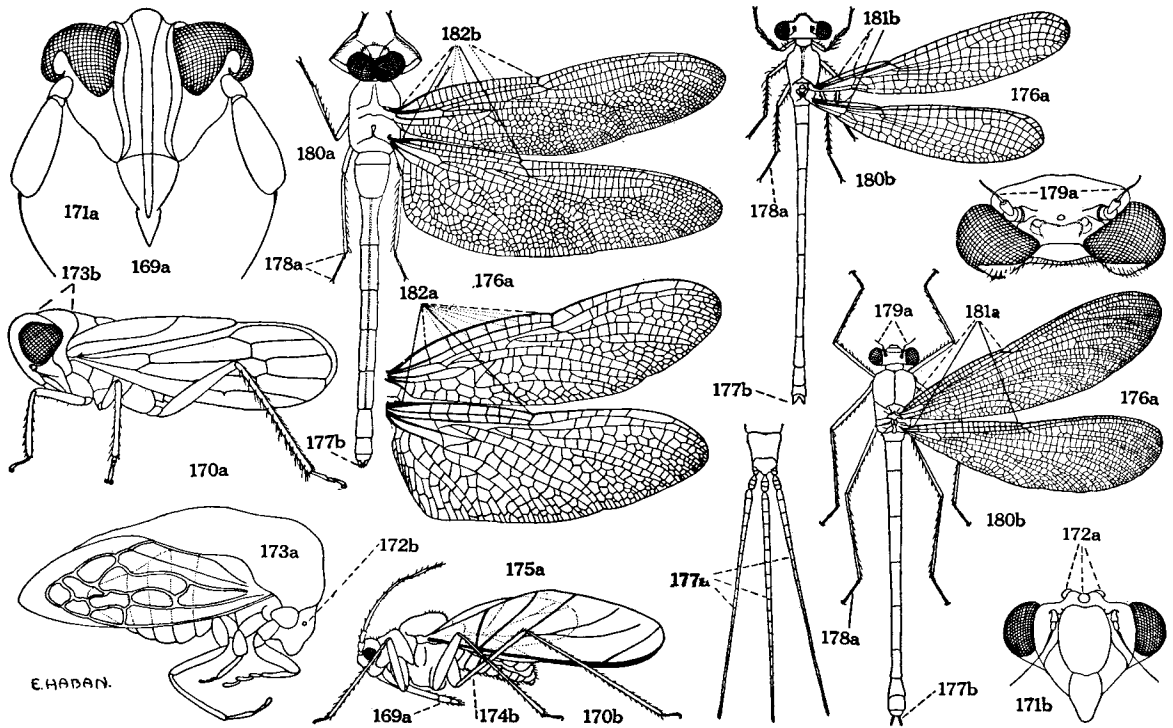




- 147a Fore wings narrow, more than four times as long as broad. Hind wings and sometimes fore wings in large part devoid of scales and therefore transparent ..... Family *Ægeriidae* (Also called *Sesiidae*)
- 147b Fore wings not especially narrow. Hind wings usually covered with scales .....
- 148a \*Anal veins of fore wing two, of hind wing three .....
- 148b \*Anal veins of fore wing one, of hind wing usually two, rarely three or one .....
- 149a \*Medius 2 and medius 3 joined to cubitus, so that cubitus of fore wing appears four-branched...150
- 149b \*Cubitus of fore and hind wings apparently three-branched ..... Family *Bombycidae*
- 150a \*Cubitus of fore and hind wings apparently four-branched .....
- 150b \*Cubitus of fore wing apparently four-branched, of hind wing three-branched ..Family *Euclidæ*
- 151a \*Radius 1 arising before the middle of the discal cell .....
- 151b \*Radius 1 arising near the apex of the discal cell .....
- 152a Large moths. \*Stem of medius distinct, dividing the discal cell..... Family *Cossidæ*
- 152b Small moths. Stem of medius not distinct (*As in figures 149b, 155b*). Discal cell not divided .....
- ..... Family *Tortricidæ*
- 153a \*Small blackish moths with narrow elongate wings ..... Family *Pyromorphidæ*
- 153b \*Medium brownish moths with broad wings ..... Family *Megalopygidæ*
- 154a \*Anal veins of hind wing three .....
- 154b \*Anal veins of hind wing two, rarely one .....
- ..... Family *Pyralididæ*
- 155a \*Accessory cells present in fore and hind wings ..... Family *Psychidæ*
- 155b \*Accessory cells absent .....
- ..... Family *Psychidæ*
- 156a \*Cubitus of fore and hind wings apparently four-branched, *i.e.*, with medius 2 and 3 more closely joined to cubitus than to radius.....157
- 156b Cubitus of both fore and hind wings not appearing four-branched .....
- ..... Family *Psychidæ*
- 157a \*Frenulum present. Humeral angles (base of front margin) of hind wing not greatly expanded .....
- ..... Family *Psychidæ*
- 157b \*Frenulum absent. \*Humeral angles of hind wing greatly expanded .....
- ..... Family *Lasiocampidæ*
- 158a \*Subcosta of hind wing united to radius for a considerable distance .....
- ..... Family *Arctiidæ*
- 158b \*Subcosta of hind wing united to radius for a short distance only.....
- ..... Family *Lymantriidæ* (Also called *Liparidæ*)



- 159a \*Cubitus of fore wing apparently four-branched, of hind wing three-branched .....160
- 159b \*Cubitus of both wings apparently three-branched .....161
- 160a Moths with strongly contrasted colors ..... Family *Agaristidæ*
- 160b Colors of front wings dull grays and browns, not strongly contrasted .....Family *Noctuidæ*
- 161a \*Frenulum present. Humeral angles (base of front margin) of hind wings not greatly expanded .....163
- 161b \*Frenulum absent. \*Humeral angles of hind wings expanded .....162
- 162a \*Hind wings with two anal veins.....Family *Citheroniidæ* (Also called *Ceratocampidæ*)
- 162b \*Hind wings with one anal vein ..... Family *Saturniidæ*
- 163a \*Subcosta and radius of hind wing united by a strong cross vein .....Family *Sphingidæ*
- 163b \*Subcosta and radius of hind wing not united by a strong cross vein .....164
- 164a \*Subcosta of hind wing not bent sharply into the humeral angle. Stout bodied, narrow winged moths.....Family *Notodontidæ*
- 164b \*Subcosta of hind wing bent sharply into humeral angle. Slender-bodied, broad, delicate-winged moths .....Family *Geometridæ* (Also called Super-family *Geometroidea*)
- 165a \*Antennæ usually recurved or hooked at tip.....Family *Hesperiidæ*
- 165b \*Antennæ distinctly knobbed at tip, not recurved (*See also figure 144a*).....166
- 166a \*Cubitus of fore wing apparently four-branched. \*Hind wing with a tail-like projection along medius 3 .....Family *Papilionidæ*
- 166b \*Cubitus of fore wing apparently three-branched. \*Usually no tail-like projection along medius 3 of hind wing.....167
- 167a Fore legs well developed.....168
- 167b \*Fore legs reduced, the tarsi incomplete.....Family *Nymphalidæ*
- 168a Colors yellow, white or orange, usually marked with black.....Family *Pieridæ*
- 168b Not colored as above. Usually coppery, blue or brown.....Family *Lycænidæ*



169a \*Mouth parts fitted for piercing.....Order HOMOPTERA, 170  
 169b Mouth parts not fitted for piercing; usually for chewing, sometimes for sucking or lapping;  
 sometimes greatly reduced.....176

**Order Homoptera**

- 170a \*Tarsi three-segmented. \*Beak present, evidently arising from the head. \*Antennæ small,  
 not prominent.....171  
 170b \*Tarsi one- or two-segmented. Beak present or absent; when present \*apparently arising  
 from between the front coxæ. \*Antennæ usually prominent.....174  
 171a \*Antennæ arising below the eyes, on sides of head.....Family Fulgoridæ  
 171b \*Antennæ arising in front of or between the eyes.....172  
 172a \*With three ocelli. Prothorax not reaching tip of abdomen.....Family Cicadidæ  
 172b \*With two ocelli or none (See also figure 92b).....173  
 173a \*Prothorax greatly enlarged upward and backward, often grotesquely shaped, usually reach-  
 ing tip of abdomen.....Family Membracidæ  
 173b \*Prothorax not enlarged or prolonged.....Family Cicadellidæ (Also called Jassidæ)  
 174a Hind legs with femora thickened, fitted for leaping.....Family Chermidæ (Also called Psyllidæ)  
 174b \*Hind legs not fitted for leaping, the femora slender.....175  
 175a \*Legs long. Wings membranous.....Family Aphididæ  
 175b Legs short, wings opaque whitish.....Family Aleyrodidæ

176a \*Wings with many cross-veins and usually many veins (See also figure 181a).....177  
 176b Wings with few cross-veins and usually not many veins (See figures 188b, 195, etc.). Head  
 never prolonged downward into a beak.....187

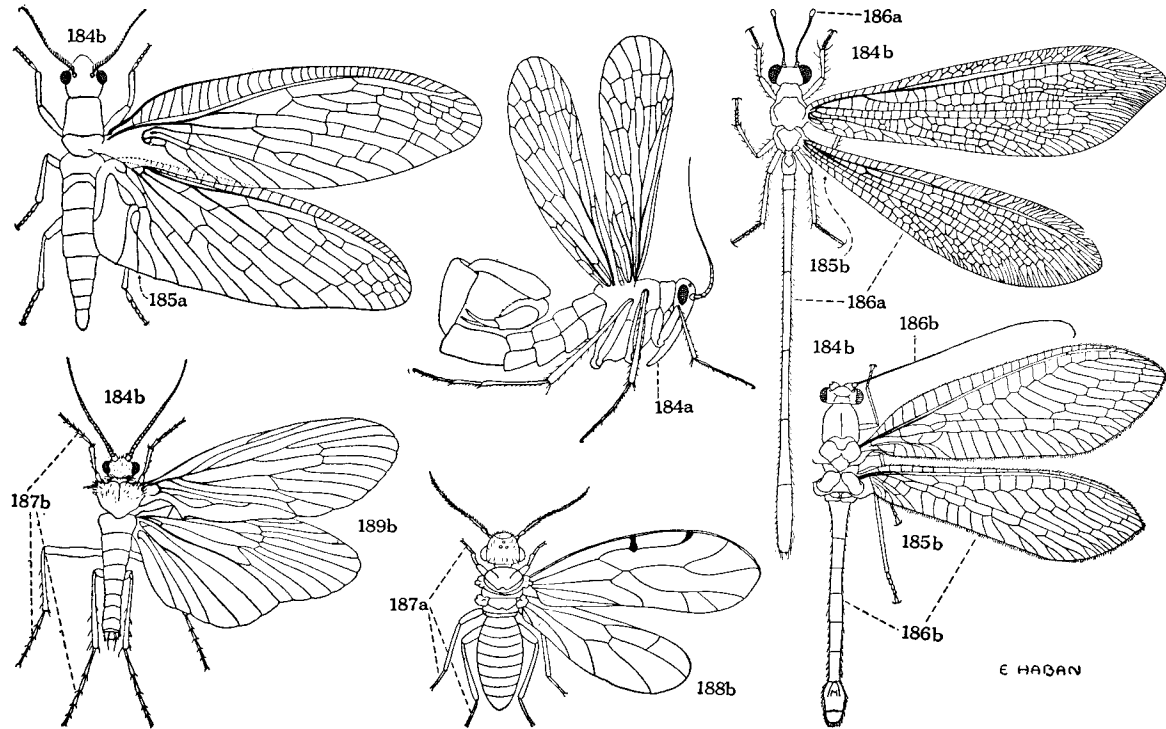
177a \*Tip of abdomen with long, anal filaments.....  
 Order EPHEMERIDA (Also called EPHEMEROPTERA), Family Ephemeridæ

177b \*Abdomen without long anal filaments.....178  
 178a \*Hind tarsi with fewer than five segments.....179  
 178b Hind tarsi with five segments.....184

179a \*Antennæ short and slender, inconspicuous.....Order ODONATA, 180  
 179b Antennæ conspicuous (See figures 184b, 186b).....183

**Order Odonata**

- 180a \*Front and hind wings dissimilar in outline, hind wings wider at base.....182  
 180b \*Front and hind wings similar in outline, distinctly narrower at base.....181  
 181a \*Wings with not fewer than five antenodal cross-veins, usually many.....Family Agrionidæ  
 181b \*Wings with not more than three antenodal cross-veins, usually two.....Family Coenagrionidæ  
 182a \*Antenodals of first and second row usually meeting each other.....Family Libellulidæ  
 182b \*Antenodals of first and second row not meeting each other.....Family Æschnidæ

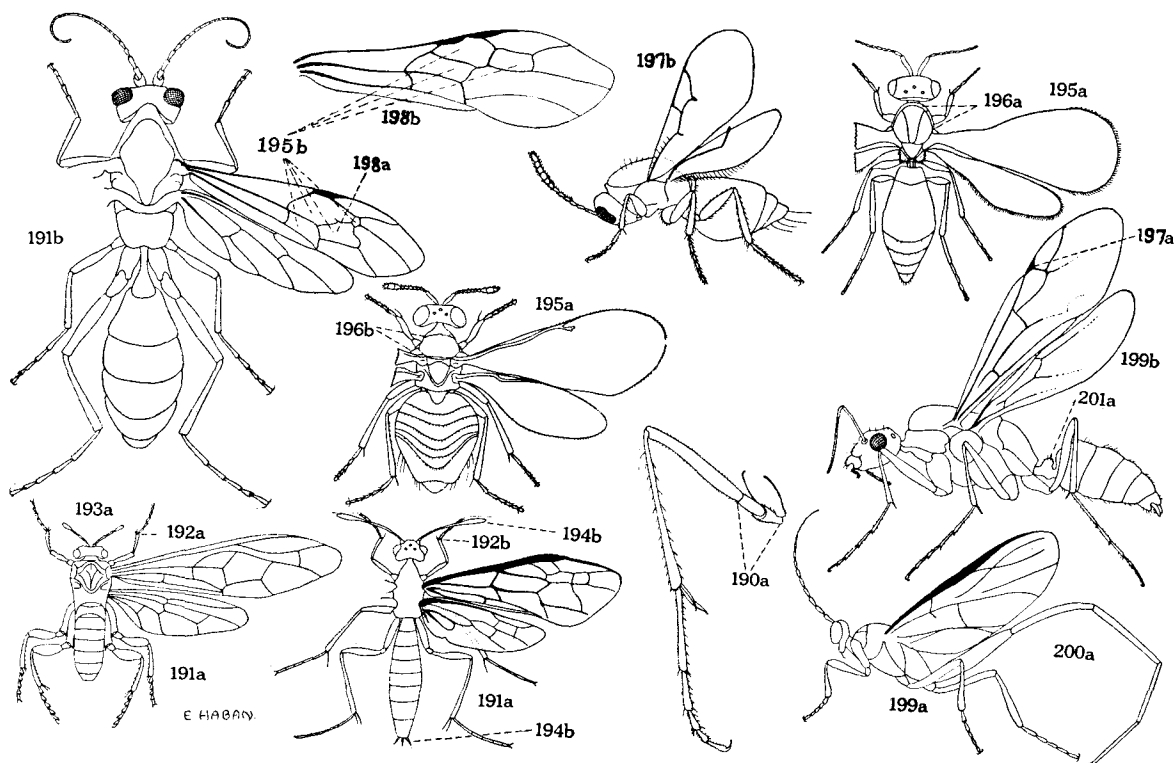


- 183a Tarsi three-segmented (As in figure 187a). Hind wings as large as or larger than fore wings ----- Order PLECOPTERA, Family Perlidæ
- 183b Tarsi four-segmented. Fore and hind wings of equal area. Order ISOPTERA, Family Termitidæ
- 184a \*Head prolonged into a beak with chewing mouth parts at its tip. ----- Order MECOPTERA, Family Panorpidæ
- 184b \*Head not prolonged into a beak ----- Order NEUROPTERA, 185

**Order Neuroptera**

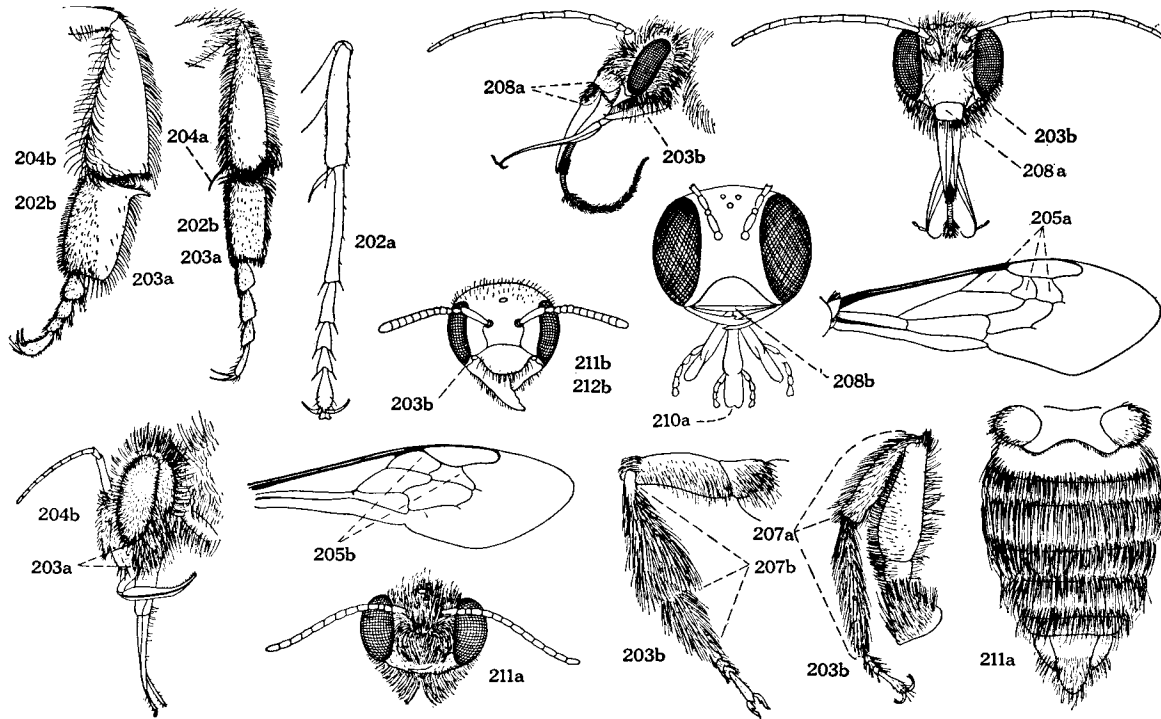
- 185a \*Anal area of hind wings broad ----- Family Sialidæ
- 185b \*Anal area of hind wings narrow ----- 186
- 186a \*Antennæ usually enlarged toward the tip. \*Abdomen longer than the wings. ----- Family Myrmeleonidæ
- 186b \*Antennæ slender, not enlarged toward the tip. \*Abdomen shorter than the wings. ----- Family Chrysopidæ

- 
- 187a \*Tarsi two- or three-segmented ----- 188
  - 187b \*Tarsi four- or five segmented ----- 189
  - 188a Hind wings folded like a fan (See figure 141a). Tarsi three-segmented (As in figure 138b) ----- Order ORTHOPTERA, Family Gryllidæ (in part)
  - 188b \*Hind wings not folded like a fan. Tarsi two-segmented (See figure 187a) ----- Order CORRODENTIA, Family Psocidæ
  - 189a Fore wings larger than hind wings (See figures 191a, 191b, 195a, 198b, etc.). Mandibles well developed ----- Order HYMENOPTERA, 190
  - 189b \*Hind wings as large as, or larger than, fore wings. Mandibles inconspicuous ----- Order TRICHOPTERA

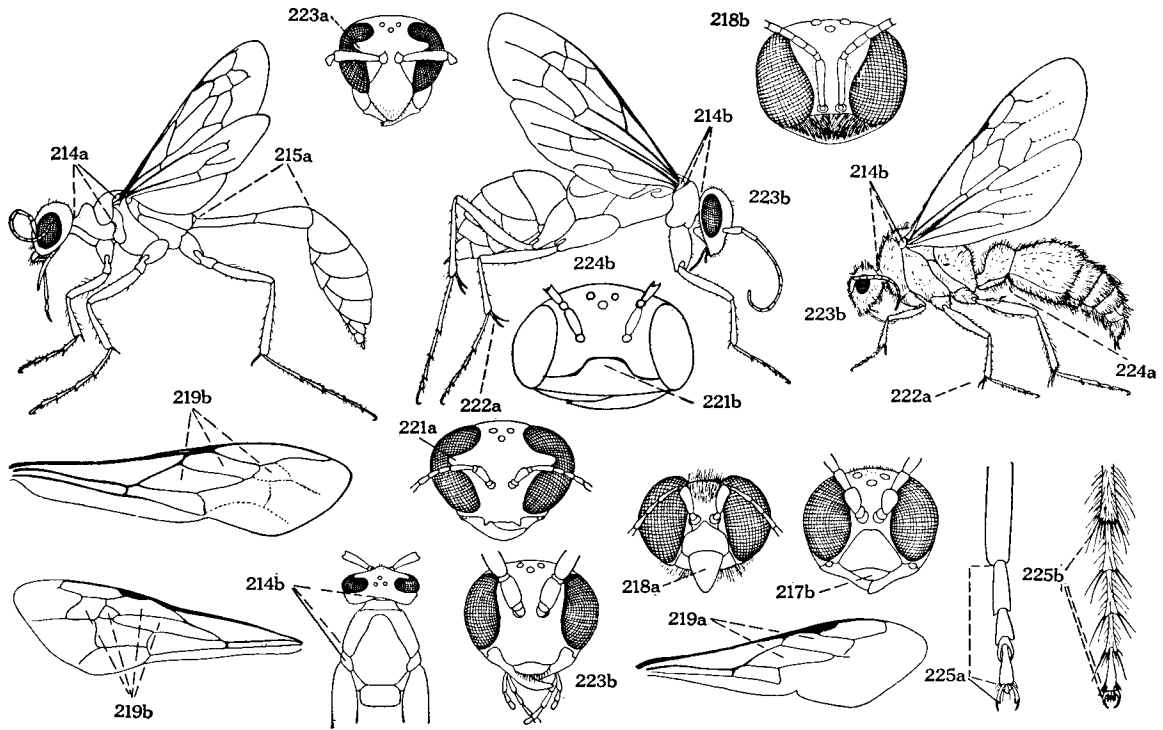


### Order Hymenoptera

- 190a \*Posterior trochanters consisting of two segments; that is, three small segments between the hind femur and the thorax.....191
- 190b Posterior trochanters consisting of a single segment; only two small segments between the hind femur and the thorax (*As in figures 191a, 191b*) .....199
- 191a \*Abdomen broadly joined to thorax.....192
- 191b \*Abdomen joined to thorax by a slender petiole or waist.....195
- 192a \*Tibia of fore leg with two terminal spurs. Ovipositor saw-like.....193
- 192b \*Tibia of fore legs with one terminal spur. Ovipositor not saw-like.....194
- 193a \*Antennæ clubbed.....Family Cimbicidæ
- 193b Antennæ not clubbed.....Family Tenthredinidæ
- 194a Ovipositor exerted nearly half as long as abdomen. Antennæ not clubbed.....Family Siricidæ
- 194b \*Ovipositor barely exerted; never half as long as abdomen. \*Antennæ clubbed...Family Cephidæ
- 195a \*Fore wings without closed cells. Minute insects .....196
- 195b \*Fore wings with at least one, sometimes several, closed cells.....197
- 196a \*Pronotum extending to the tegulæ. (*See also figure 214b*).....Family Proctotrypidae
- 196b \*Pronotum not extending to the tegulæ. (*See also figure 214a*).....Family Chalcididæ
- 197a \*Fore wings with a stigma.....198
- 197b \*Fore wings without a stigma. The body flea-like.....Family Cynipidæ
- 198a \*Cell first medius 2 (third discoidal) present.....Family Ichneumonidæ
- 198b \*Cell first medius 2 (third discoidal) absent.....Family Braconidæ
- 199a \*Hind wing with no closed cells.....200
- 199b \*Hind wing with at least one closed cell.....201
- 200a \*Abdomen in female extremely long and slender. \*Antennæ long and filiform.....Family Pelecinidæ
- 200b Abdomen short. Antennæ short. Metallic, punctate insects.....Family Chrysididæ
- 201a \*Petiole of abdomen with a node or swelling (*See also figure 19a*). Ants.....Family Formicidæ
- 201b Petiole without a node (*As in figures 191b and 215a*) .....202



- 202a \*First segment of tarsus of hind leg nearly naked and usually cylindrical. Hairs on the thorax simple. Wasps-----214
- 202b \*First segment of tarsus of hind leg with many hairs; sometimes flattened. Hairs on the thorax plumose. Bees-----203
- 203a \*Cheeks broad, eyes remote from the base of the mandibles. \*Basal joint of the hind tarsus flattened-----204
- 203b \*Cheeks narrow, eyes approaching the base of the mandibles. \*Basal joint of the hind tarsus frequently not much flattened-----205
- 204a Eyes bare. \*Hind tibiae with apical spurs-----Family Bombidae
- 204b \*Eyes hairy. \*Hind tibiae without apical spurs-----Family Apidae
- 205a \*Fore wings with three submarginal cells-----206
- 205b \*Fore wings with two submarginal cells-----211
- 206a Wasp-like bees with bright colors and not much hair. No pollen-collecting apparatus-----Family Nomadidae
- 206b Not wasp-like in appearance-----207
- 207a \*Tibia of hind leg shorter than the basal segment of tarsus. Large species resembling bumble bees-----Family Xylocopidae
- 207b \*Tibia of hind leg as long as the basal segment of the tarsus. Medium-sized species-----208
- 208a \*Labrum conspicuous, about twice as broad as long-----209
- 208b \*Labrum inconspicuous, several times as broad as long-----210
- 209a Small metallic bees, not covered with hairs-----Family Ceratinidae
- 209b Medium to large size bees. Head and thorax densely pubescent-----Family Anthophoridae
- 210a \*Tongue short, obtuse at apex-----Family Colletidae
- 210b Tongue longer, acute at apex (As in figures 203b and 204b)-----Family Andrenidae
- 211a \*Face of males densely pubescent. \*Females with a dense brush of hairs on the ventral side of the abdomen-----Family Megachilidae
- 211b \*Face bare or nearly bare. Females without a brush of hairs on the ventral side of abdomen-----212
- 212a Labrum evident, though sometimes small-----213
- 212b \*Labrum concealed by the clypeus-----Family Stelidae
- 213a Legs clothed with long hairs-----Family Panurgidae
- 213b Legs bare or clothed with short hairs-----Family Hylaeidae (Also called Prosopidae)



214a	*Pronotum not touching the tegulae (See also figure 186b)	215
214b	*Pronotum touching tegulae (See also figure 196a)	222
215a	*Petiole long and slender	Family Sphecidae
215b	Abdomen sessile or very short-petioled (As in figures 191a or 224a)	216
216a	Middle tibia with one apical spur (As in figure 214a)	218
216b	Middle tibia with two apical spurs (As in figure 222a)	217
217a	Labrum concealed by the clypeus (As in figure 218b)	Family Nyssonidae
217b	*Labrum free, exposed beyond the clypeus	Family Stizidae
218a	*Labrum free, exposed beyond the clypeus	Family Bembecidae
218b	*Labrum concealed by the clypeus	219
219a	*Fore wings with two radial cells	Family Crabronidae
219b	*Fore wings with three or four radial cells	220
220a	Abdomen constricted between first and second segments (As in figure 224a)	221
220b	Abdomen not constricted between first and second segments (As in figure 224b)	Family Larridae
221a	*Eyes deeply emarginate. Clypeus not lobed	Family Trypoxylonidae
221b	*Eyes not emarginate. *Clypeus with a median lobe	Family Philanthidae
222a	*With two terminal spurs on middle tibia	223
222b	With one terminal spur on middle tibia (As in figure 214a)	225
223a	*Eyes emarginate	Family Vespidae
223b	*Eyes not emarginate	224
224a	*First abdominal segment constricted from second ventrally. *Body densely covered with hairs	Family Mutillidae (Males)
224b	*First and second segments of abdomen not so separated	Family Psammocharidae (Also called Pompilidae)
225a	*Hind tibiae bare or with short hairs. *Each claw with a tooth	Family Eumenidae
225b	*Hind tibiae with spines and long hairs. *Claws not toothed	Family Scoliidae