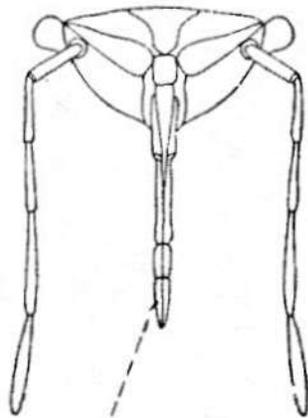


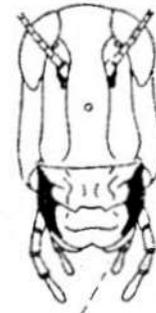
Oregon 4-H Key to the Orders of Insects

This is a dichotomous key to insect orders and a few suborders. The root word “dicot” means two. There are two choices of insect characteristics at each step in the key. The first choice in each step is indicated by the number of the step alone, for example 1. The second choice in the step is indicated by the number and the symbol=' , for example 1' . Beyond Step 1 each step also indicates which step came before that step. For example 2 (1) indicates step 1 came before step 2. This is particularly useful when the key sends the user many steps forward, for example 24(1'). It is also useful in back-tracking the characteristics of an insect. Use the Glossary in the back of *Getting to Know the Insects*, by Erin Hodgson, to assist with the words used in this key.



Sucking mouthparts

Figure 1



Chewing mouthparts

Figure 2

Step	Characteristics	Go on to this step	Order, Suborder
1	Wings well developed	2	
1'	Wingless, or with small, undeveloped wings	24	
2 (1)	Front wings (elytra) hardened, leathery, at least at base; hind wings, if present, membranous	3	
2'	Wings membranous, not hardened or leathery	9	
3 (2)	Sucking mouth parts, with beak longer than wide, and usually segmented (Figure 1) Hemiptera	4	
3'	Chewing mouth parts (Figure 2)	5	

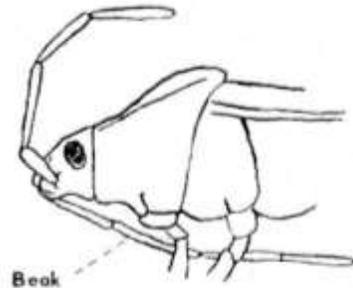


Figure 3

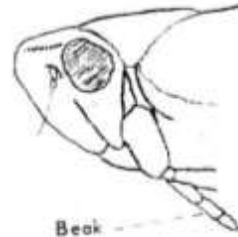


Figure 4

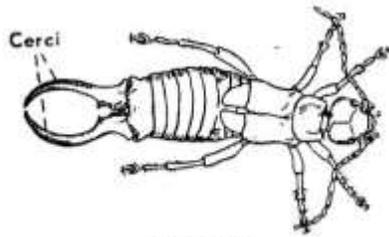


Figure 5

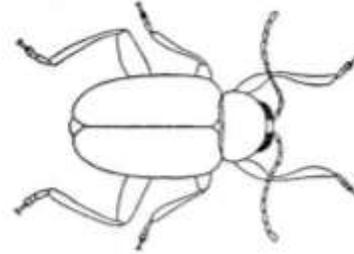
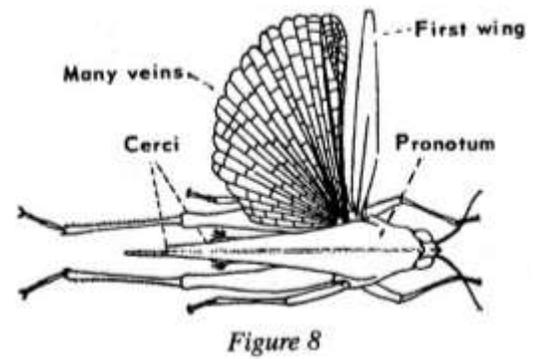
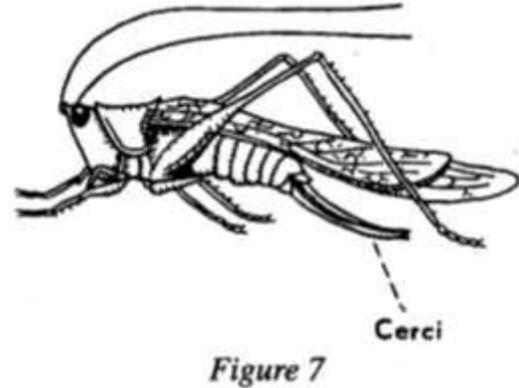
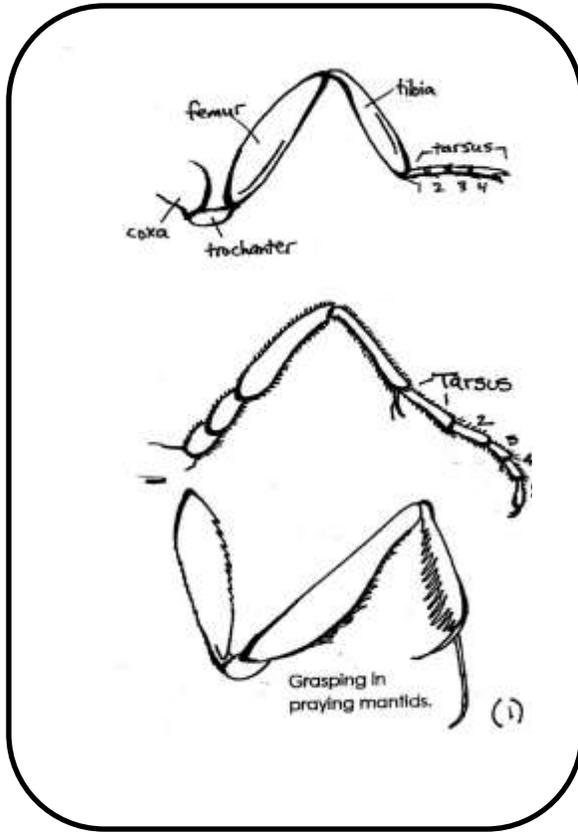


Figure 6

Step	Characteristics	Go on to this step	Order, Suborder
4(3)	Beak arising from front part of head (Figure 3); front wings usually leathery at base and membranous (skin-like) at tip; tips generally overlapping when at rest (true bugs)		Hemiptera , suborder Heteroptera
4'	Beak arising from rear underside part of head, often appearing to rise at base of front legs (Figure 4); front wings of uniform texture throughout; tips not overlapping or only slightly overlapping when at rest (leafhoppers, cicadas, aphids, treehoppers)		Hemiptera , suborders Auchenorrhyncha & Sternorrhyncha
5(3')	Abdomen with forceps-like cerci (Figure 5); front wings (elytra) short leaving most of the abdomen exposed, tarsi 3-segmented (earwigs)		Dermaptera
5'	Abdomen without forceps-like cerci, or if cerci appear forceps-like, then wings cover most of abdomen, tarsi variable	6	
6(5')	Front wings without veins, usually meeting in a straight line down middle of back (Figure 6); antennae with 11 or fewer segments; hind wings narrow, usually longer than front wings when unfolded, and with few veins (beetles)		Coleoptera
6'	Front wings with veins, either held roof-like over abdomen or overlapping over abdomen when at rest (Figure 7); antennae generally with more than 12 segments; hind wings broad, usually shorter than front wings, and with many veins, usually folded fan-wise at rest (Figure 8)	7	



Step	Characteristics	Go on to this step	Order, Suborder
7(6')	Tarsi with 4 or fewer segments (see tarsi illustration above); usually jumping insects, with hind femora more or less enlarged (Figure 7) (grasshoppers, crickets)		Orthoptera
7'	Tarsi 5 segmented (see tarsi illustration above); running or walking insects, with hind femora not particularly enlarged	8	
8 (7')	Prothorax much longer than mesothorax; front legs modified for grasping prey (see illustration above); (mantids)		Mantodea
8'	Prothorax not greatly lengthened; front legs not modified for grasping prey (cockroaches)		Blattodea
9(2')	With two wings	10	
9'	With four wings	13	
10(9)	Body grasshopper-like; pronotum extending back over abdomen, pointed at tip (Figure 8); hind legs enlarged (pygmy grasshoppers, family Tetrigidae)		Orthoptera
10'	Body not grasshopper-like; pronotum not as above; hind legs not so enlarged	11	

(1) *Getting to Know the Insects*, Erin Hodgson, Extension Entomologist, Department of Entomology, Iowa State University

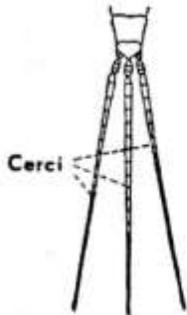


Figure 9

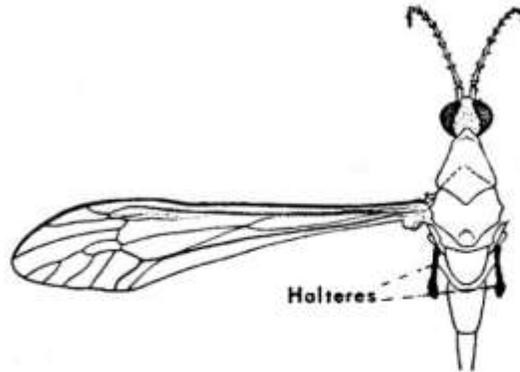


Figure 10



Figure 11

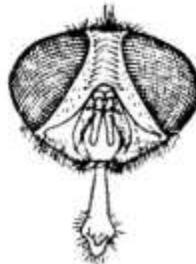


Figure 12



Figure 13

Step	Characteristics	Go on to this step	Order, Suborder
11(10')	Abdomen with thread-like or spine-like cerci (Figure 9); mouth parts small or undeveloped; halteres (Figure 10) may be present or absent	12	
11'	Abdomen without thread-like or spine-like cerci; mouth parts usually well developed, forming sucking beak (Figure 11) or tongue (Figure 12); halteres present (true flies, mosquitoes, gnats, midges)		Diptera
12	Halteres (Figure 10) present and hook-like' wings with only one forked vein (Figure 13); antenna long and conspicuous' very small insects, usually less than 3/8 inch long (male scale insects, family coccidae)		Hemiptera, suborder Sternorrhyncha
12'	Halteres absent; wings with many veins and cross-veins; antennae short, bristle-like, small; usually over 1/8 inch long (mayflies)		Ephemeroptera

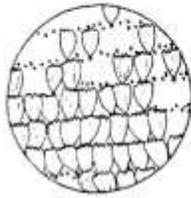


Figure 14



Coiled mouthparts

Figure 15

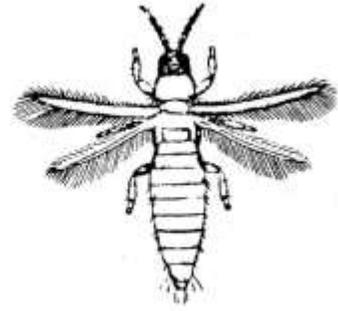


Figure 16

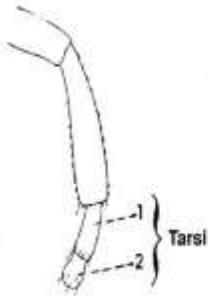


Figure 17

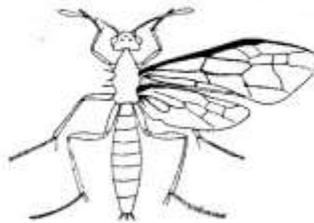


Figure 18

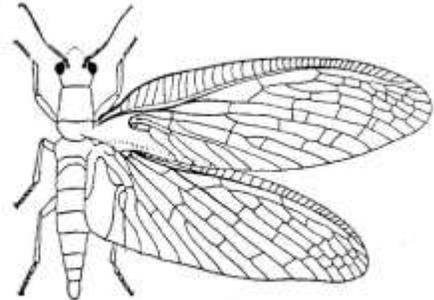


Figure 19

Step	Characteristics	Go on to this step	Order, Suborder
13(9')	Wings completely or almost completely covered with microscopic powder-like scales (Figure 14); mouth parts usually in the form of a long, coiled, tube-like beak or tongue (Figure 15); antennae many segmented (butterflies and moths)		Lepidoptera
13'	Wings not covered with scale, though they may be hairy (Figure 16); mouth parts not in the form of a coiled tube-like tongue; antennae of various kinds	14	
14(13')	Wings long and narrow, veinless or with only one or two veins, fringed with long hairs (Figure 16); tarsi (Figure 17) with only 1 or 2 segments, the last segment swollen; very small insects, usually less than 1/8 inch long (thrips)		Thysanoptera
14'	Wings not as above; if wings are somewhat long and narrow, then the tarsi have more than 2 segments	15	
15(14')	Hind wings smaller than front legs (Figure 18), usually with few veins	16	
15'	Hind wings as large as or larger than front wings, with as many or more veins (Figure 19)	20	



Figure 20

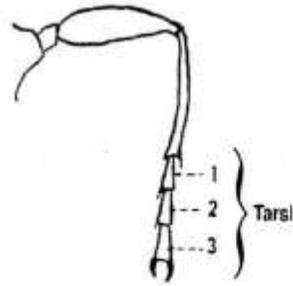


Figure 21

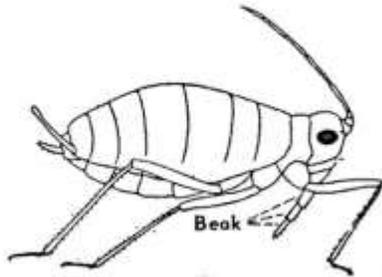


Figure 22

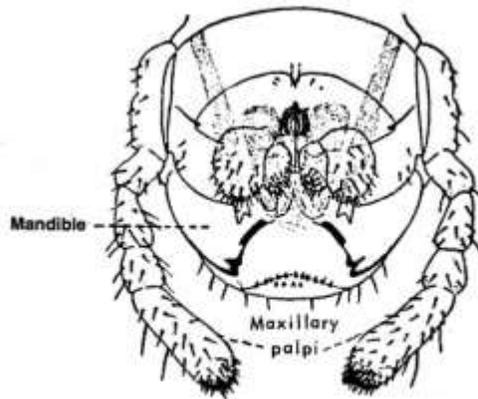


Figure 23

Step	Characteristics	Go on to this step	Order, Suborder
16(14')	Front wings with many cross-veins and cells; antennae short, bristle-like, small; abdomen with two or three long, thread-like cerci (Figure 9); delicate, soft-bodied insects (mayflies)		Ephemeroptera
16'	Front wings with few cross-veins and cells (Figure 20); antennae fairly long, or if short and bristle-like, then there are no thread-like cerci	17	
17(16')	Tarsi 2 or 2 segments (Figure 21)	18	
17'	Tarsi 4 or 5 segments	19	
18(17)	Mouth parts sucking, the beak rising at rear of head (Figures 4 and 22) (leafhoppers, cicadas, aphids, treehoppers)		Hemiptera, suborders Auchenorrhyncha and Sternorrhyncha
18'	Mouth parts chewing (Figure 23), very small insects (book lice, bark lice, psocids)		Psocoptera

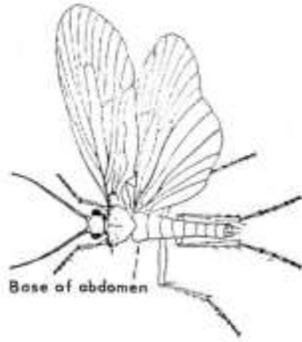


Figure 24

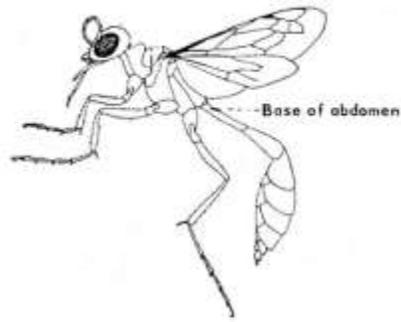


Figure 25

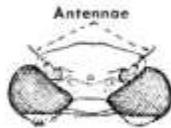


Figure 26

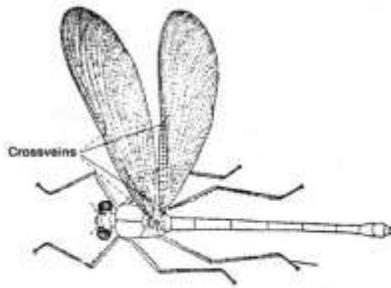


Figure 27

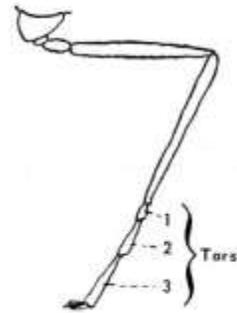


Figure 28

Step	Characteristics	Go on to this step	Order, Suborder
19(17')	Wings noticeably hairy; mouth parts usually very small except for the palpi; antennae usually as long as the body or longer; veins in front and hind wings similar; abdomen not narrow at the base; rather soft-bodied insects, not wasp-like (Figure 24) (caddisflies)		Trichoptera
19'	Wings apparently not hairy; mandibles well developed; antennae shorter than the body; fewer veins in hind wings than in front wings; abdomen usually narrow at base (Figure 25); rather hard-bodied, wasp-like insects (sawflies, ichneumon flies, ants wasps, and bees)		Hymenoptera
20(15')	Tarsi 3 or 4 segments (Figure 21)	21	
20'	Tarsi 5 segments	23	
21(20)	Antennae short, bristle-like and small (Figure 26); wings with many cross-veins, never held flat over the abdomen when at rest (Figure 27); tarsi three-segmented (Figure 28); body long and slender, $\frac{3}{4}$ to $3\frac{1}{2}$ inches long (dragonflies, damselflies)		Odonata
21'	Antennae long and conspicuous; wing veins variable, usually held flat over abdomen when at rest; $1\frac{1}{2}$ inches long or less	22	

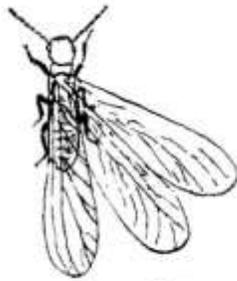


Figure 29

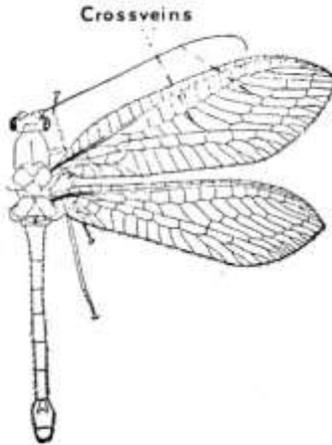


Figure 30

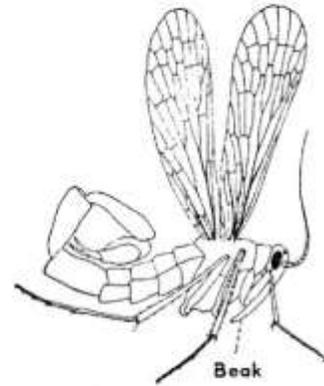
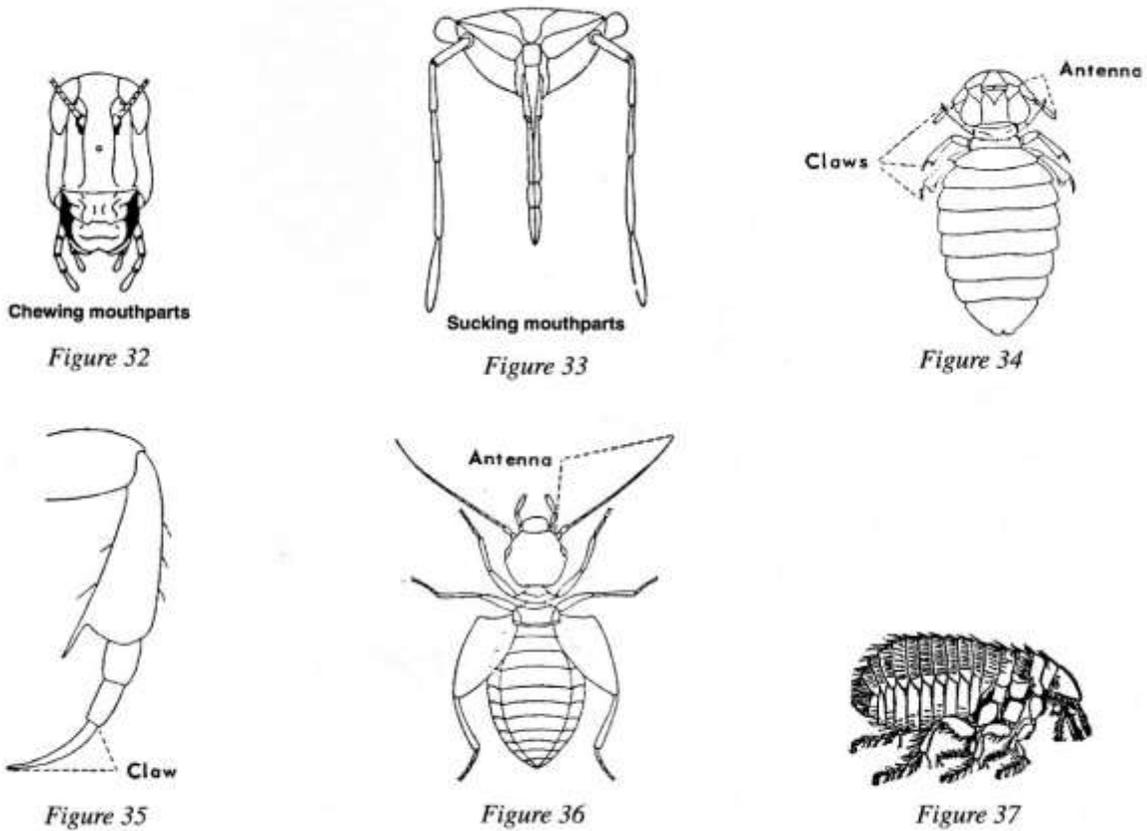


Figure 31

Step	Characteristics	Go on to this step	Order, Suborder
22(21')	Front and hind wings similar in shape, size, and number of veins, reaching well beyond the tip of the abdomen when at rest (Figure 29); no cerci; body 5/16 inch long or less (termites)		Isoptera
22'	Hind wings with the rear area much enlarged and folded fanlike when at rest; cerci present; bodies mostly 5/8 to 2 inches long (stoneflies)		Plecoptera
23(22')	Front edge of front wings with many cross-veins (Figure 30); mouth parts not formed into a beak (as in Figure 31) (fishflies; dobsonflies, lacewings, ant lions)		Neuroptera
23'	Front edge of front wings with not more than one or two cross-veins; mouth parts extended downward to form a "beak" (Figure 31) (scorpion flies)		Mecoptera
24(1)	Usually parasites; body more or less leathery, and flattened from the upper to lower sides of body or from side to side	25	
24'	Free-living, not parasitic; body usually not flattened or leathery	30	



Step	Characteristics	Go on to this step	Order, Suborder
25(24)	Mouth parts chewing (Figure 32)	26	
26(25)	Mouth parts sucking (Figure 33), sometimes beak or stylet is drawn up into the head and cannot be seen	27	
26(25)	Antennae with five or fewer segments (Figure 34); tarsi with one claw (Figure 35), parasites of animals, or with two claws, parasites of birds (chewing lice)		Phthiraptera , suborder Mallophaga
26'	Antennae with more than five segments (Figure 36); not parasitic (booklice, barklice, psocids)		Phthiraptera , suborder Psocoptera
27(25')	Body flattened on the sides (Figure 37); jumping insects (fleas)		Siphonaptera
27'	Body flattened from upper to lower sides; not jumping insects	28	

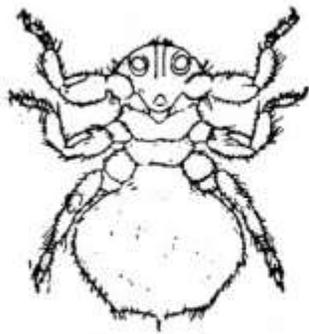


Figure 38

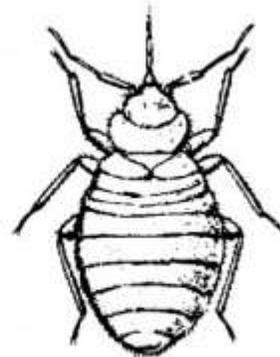


Figure 39

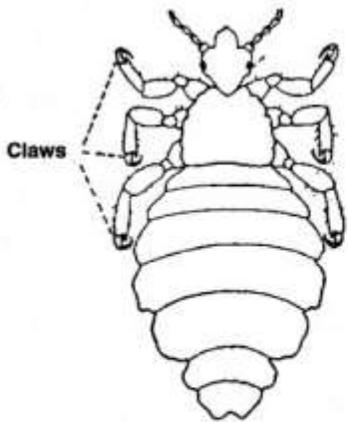


Figure 40

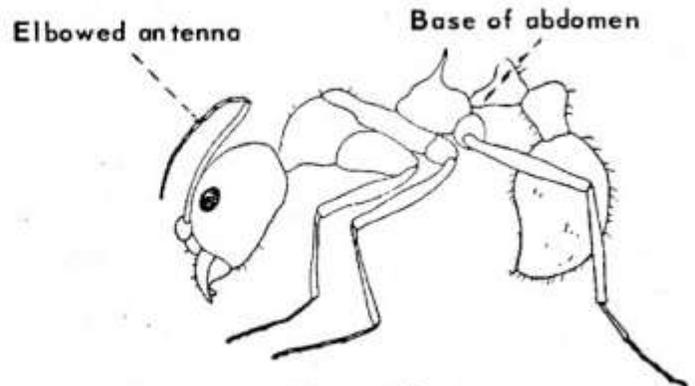


Figure 41

Step	Characteristics	Go on to this step	Order, Suborder
28(27')	Antennae hidden in grooves beneath the head (Figure 38) (louse flies)		Diptera
28'	Antennae not hidden, usually easy to see	27	
29(28')	Beak longer than wide, four segments (Figure 33), extending back beneath the body; tarsi with two small claws (Figure 39) (wingless bugs)		Hemiptera
29'	Head with only a short snout in front, the stylet pulled back into the head when not in use; tarsi with one very large claw (Figures 35 & 40) (sucking lice)		Phthiraptera, suborder Anoplura
30(24')	Abdomen very thin, small, or narrow at base (Figure 41); antennae usually elbowed (Figure 41); hard-bodied, ant-like insects (ants, wingless wasps, velvet ants)		Hymenoptera
30'	Abdomen not particularly thin at base; antennae not elbowed	31	

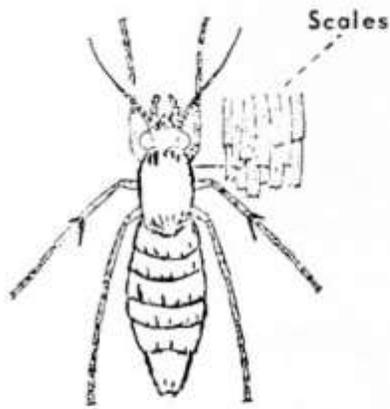


Figure 42

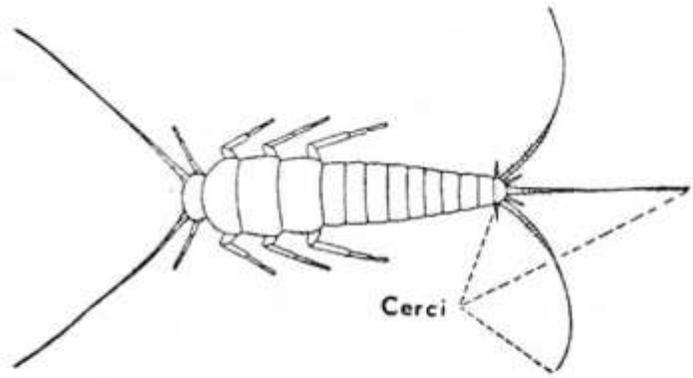


Figure 43

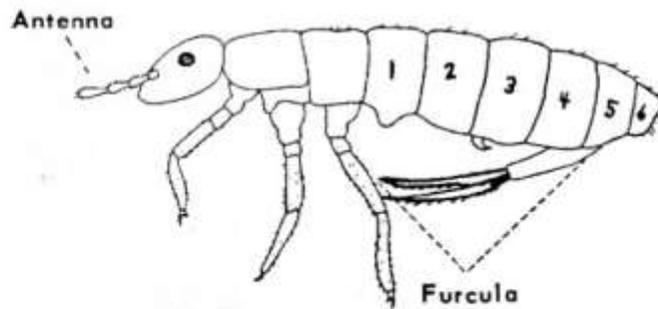


Figure 44

Step	Characteristics	Go on to this step	Order, Suborder
31(30')	Body covered with scales (Figure 42)	32	
31'	Body not covered with scales	33	
32(31')	Abdomen with three long, threadlike cerci (Figure 43), and with spine-like hairs or spikes on some abdominal segments; mouth parts chewing (silverfish, bristletails, firebrats)		Thysanura
32'	Abdomen without tails or spine-like hairs (Figure 42); mouth parts sucking, usually in the form of a long, coiled, threadlike tube or tongue (Figure 15) (wingless moths)		Lepidoptera
33(31')	Mouth parts hidden within the head; abdomen with spine-like hairs on some segments, or with a furcula near the end of the abdomen (Figure 44); usually less than 1/4 inch long	34	
33'	Mouth parts not as above, easily seen, and either sucking or chewing; size variable	35	

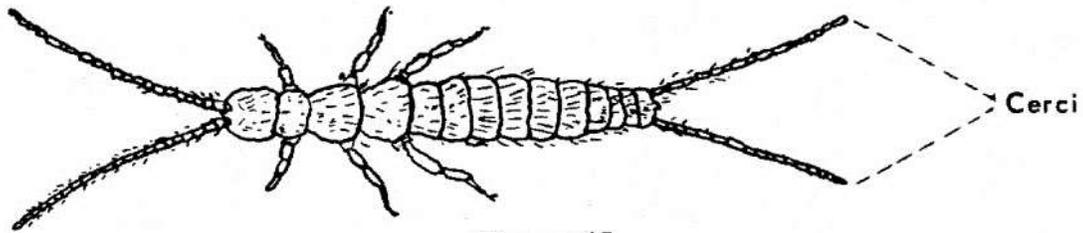
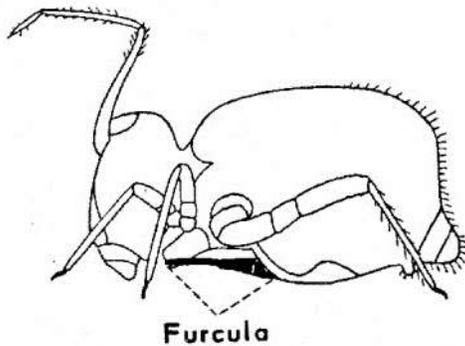


Figure 45



Furcula

Figure 46

Chewing mouthparts

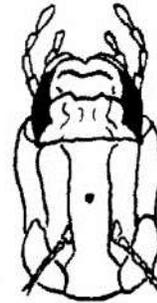


Figure 47

Step	Characteristics	Go on to this step	Order, Suborder
34(33')	Antennae long and with many segments; abdomen with at least nine segments, with spine-like hairs on some segments; without a furcula near the end of abdomen, but with two, short to long, forceps-like cerci at the end of the abdomen (Figure 45) (japygids, campodeids, projapygids). These insects are light-colored, about ¼ inch or less, and are found in damp places under bark, stones, or fallen trees, in rotting wood, etc.		Thysanura
32'	Antennae short, with six or fewer segments; abdomen with six or fewer segments (Figure 44), usually with a furcula beneath or near the end of the abdomen (Figures 44 & 46) (Springtails)		Collembola
35(33')	Mouth parts sucking, with beak long and pointing backward from the hear, or cone-shaped and pointing downward (Figure 33)	36	
35'	Mouth parts chewing (Figure 47); if beak-like, then the beak is fairly long and pointed downward (Figure 50)	38	

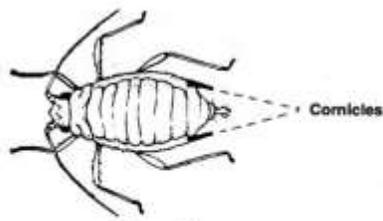


Figure 48



Figure 49

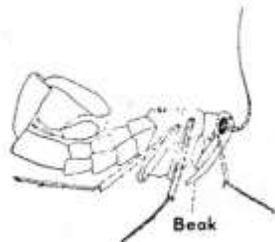


Figure 50

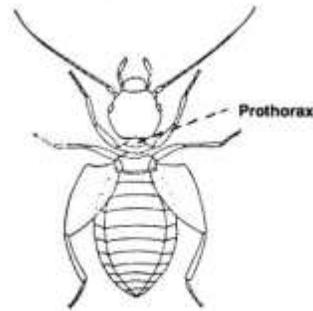


Figure 51

Step	Characteristics	Go on to this step	Order, Suborder
36(35)	Body long and narrow; tarsi with one or two segments and often without claws (Figure 17); beak cone-shaped; very small insects, usually less than 1/8 inch long (Figure 16) (thrips)		Thysanoptera
36'	Body usually more or less oval; tarsi usually three-segmented (Figure 28), with well-developed claws, size variable	37	
37(36')	Beak arising from rear under part of head (Figures 4 & 22); abdomen often with a pair of cornicles (Figure 48) (aphids)		Hemiptera , suborders Auchenorrhyncha & Sternorrhyncha
37'	Beak arising from front part of head (Figures 1 & 3); abdomen without cornicles (wingless bugs)		Hemiptera , suborder Heteroptera
38(35')	Cerci forceps-like (Figure 49) (earwigs)		Dermaptera
38'	Cerci absent, or if present, then not forceps-like (Figure 52)	39	
39(38')	Mouth parts in the form of a beak pointing downward (Figure 50); tarsi 5 segments (Figure 54); insect usually less than 5/16 inch long (Figure 50) (wingless scorpion flies)		Mecoptera
39'	Mouth parts not as above; tarsi and size of insect variable	40	

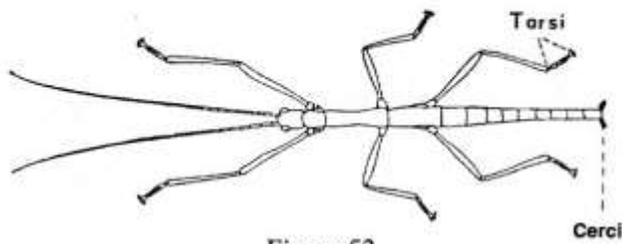


Figure 52

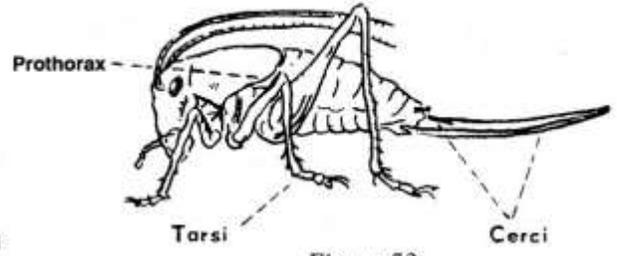


Figure 53

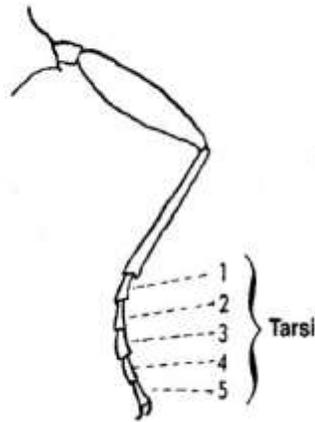


Figure 54

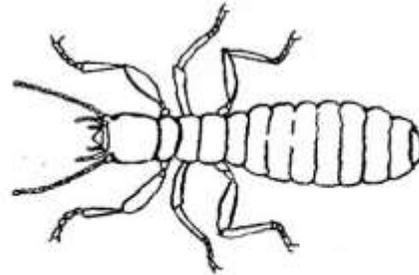


Figure 55

Step	Characteristics	Go on to this step	Order, Suborder
40(39')	Small louse-like insects (Figure 51) less than 3/16 inch long; no cerci; tarsi 2 – 3 segments; prothorax (Figure 51) very small (booklice, barklice)		Psocoptera
40'	Not louse-like, insect usually more than 3/16 inch long; tarsi 3-5 segments; cerci present (Figures 52 & 53); prothorax large (Figure 53)	41	
41(40')	Hind legs are large, fitted for jumping (Figure 53); tarsi 4 or fewer segments (crickets and grasshoppers)		Orthoptera
41'	Hind legs not large, not fitted for jumping (Figure 52); tarsi four- or five-segmented	42	
42(41')	Tarsi 4 segments; whitish, soft-bodied, living in wood or ground; insect 5/16 inch long or less (Figure 55) (termites)		Isoptera
42'	Tarsi 5 segments; appearance not as above (Figure 52) (walkingsticks)		Phasmatodea