**Keys to the major groups**

**of terrestrial invertebrates**

(modified from a key by Patrick Foley, 2003, “A Key to the Major Terrestrial Invertebrates”

by S.M. Tilling, and a key from Kentucky 4-H Entomology)

Identification of terrestrial invertebrates is divided here into three keys based on broad taxonomic categories:

**Key A, common non-arthropod invertebrates**, includes taxa that lack jointed legs and chitinous exoskeleton.

**Key B, common non-insect arthropods**, includes those arthropods that possess 4 or more pairs of legs.

**Key C, common adult insects**, includes those arthropods that possess 3 pairs of legs on thorax and have 3 distinct body regions (head, thorax, abdomen). This key is actually a key to the Hexapoda because it also includes two non-insect orders (the Protura and Collembola). The Hexapoda is the subphylum that consist of these two orders (and a third order Diplura) and the orders of the Class Insecta, all of which have 3 pair of legs and 3 distinct body regions. However, insects have mouthparts that are exposed, whereas Protura. Collembola, and Dipura have mouthparts that are enveloped.

This set of keys excludes immature insects.

Start from the beginning until you are very familiar with each key. The characteristics that describe a taxon in its final couplet are not a complete description. The complete description includes all the preceding couplet descriptions that have directly led to that final couplet.

1. Key to common non-arthropod invertebrates

**1a.** Segmented body with jointed legs and chitinous exoskeleton: Phylum Arthropoda…...**KEY B**

**1b.** Body without jointed legs (worms, insect larvae, water bears, snails or slugs)….……..**2**

**2a.** Snails or slugs with foot, antennae, often a shell: Phylum Mollusca, Class Gastropoda………**3**

**2b.** Not as above…………………………………………………………….…………….………..**4**

**3a.** Body, when withdrawn into shell, is protected by a hard and horny cover – the operculum ……………………………………………………………… Subclass **prosobanchia**

**3b.** Body, when withdrawn into shell, is not protected by an operculum or the body cannot be fully withdrawn into the shell, or no shell present……………… Subclass **PULMONATA**

**4a.** Body obviously segmented……….………….**5**

**4b.** Unsegmented ………………………………...**8**

**5a.** Body with 4 pair of unjointed legs terminating with sharp claws………. **TardigradA**

**5b.** Not fitting description of 5a ………………………….…………………………………**6a**

**6a.** Usually with distinct head capsule, although this may be retracted into the body (if in doubt, look for antennae and external mouthparts)……………………………. **Insect** **larva**

**6b.** No head capsule…………………………………………………………………………….**7**

**7a.** Suckers present, usually at both ends of body. No clitellum…… Phylum Annelida,

Subclass **Hirudinea**

**7b.** More than 30 segments. There may be a band for formed by fused segments (the clitellum)………………………….Phylum Annelida, Subclass **Oligochaeta**

**8a.** Round in cross section, body long and thin ………………………..Phylum **Nematoda**

**8b.** Flat in cross section………………………………….………………………………….…**9**

**9a.** Eyes arranged in two groups, with 3 or 8 eyes in each. Can extend proboscis when alive. May have two longitudinal stripes down entire length of body……..Phylum **Nemertea**

**9b.** Either numerous eyes scattered over front, or two single eyes…..….

……………………………….……..…..Phylum Platyhelminthes, Class **Turbellaria**

B. Key to common non-insect arthropods

**1a.** 3 pairs of legs on thorax, 3 body regions (head, thorax, abdomen): Class Insecta …**KEY C**

**1b.** 4 or more pairs of jointed legs …………….……….………………………..……………..**2**

**2a.** More than 4 pair of jointed legs, numerous similar sections…..……………………..……..**3**

**2b.** No antennae, 4 pairs of legs, 2 (or apparently 1) body regions: Class Arachnida…..**7**

**3a.** Flattened ovalish body with 6 or 7 pairs of walking legs…. Class Crustacea, Order **Isopoda**

**3b.** Elongate body, length greater than three times the width: Superclass Myriapoda.….….….….**4**

**4a.** 2 pairs of legs per segment, antennae relatively short and not branched (8 or fewer antennal segments)………………………………………………………...…… Class **Diplopoda**

**4b.** Apparently one pair of legs/segment……………………………….…………………….……**5**

**5a.** Long-legs, flat body, large mandibles…………………………………….Class **Chilopoda**

**5b.** Short legs, cylindrical body……………………………………………….………………..….**6**

**6a.** Antennae branched, 9 pairs of legs……………………. Class **Pauropoda**

**6b**. Antennae not branched, 10-12 pairs of legs…………….. Class **Symphyla**

**7a.** Legs on same body region as abdomen, no distinct cephalothorax (prosoma)…Order **Acari**

**7b.** Legs on cephalothorax (prosoma), distinct from abdomen……………………………..**8**

**8a.** Large pincer-like pedipalps…………………………….……..………………………..**9**

**8b.** Smaller pedipalps……………………………………………………………………..**10**

**9a.** Abdomen ends in long tapering “tail” (telson), body more than 20 mm long………………………………………………………….………..Order **Scorpionida**

**9b.** Abdomen ends abruptly, body less than 5 mm long………..Order **Pseudoscorpionida**

**10a.** Segmented abdomen (as viewed from underneath) joined broadly to cephalothorax (prosoma) , legs usually 1.5 times length of the body ……………………Order **Opiliones**

**10b.** Unsegmented abdomen joined narrowly to cephalothorax (prosoma)……Order **Araneae**

C. Key to common adult insects

**1a.** Without wings; all of the abdominal segments visible in a top view of the insect..................**2**

**1b.** With wings; wings may be difficult to see because the flying wings are hidden by hard wing covers (as with beetles). In these cases, the wing covers lie over the back and hide all of or parts of the abdomen.............................................................................................................**18**

**2a**. Without eyes or antennae.................................................................**3**

**2b**. Legs, antennae, and (usually) eyes present........................................................................................................**4**

**3a**. Without legs, eyes, or antennae; living under a waxy or cottony covering and occurring in colonies firmly attached to tree twigs, fruit, or leaves (e.g. scale insects)........................................................................................Order **HOMOPTERA**

**3b**. Head conical; body elongate and cylindrical.............................. Order **Protura**

**4a**. Abdomen ending in three long, thread-like tails; antennae long..........Order **THYSANURA**

**4b**. Abdomen without long tails; antennae may be long or short................................................**5**

**5a**. Antennae are shorter than the head, and not easily seen; body flattened from side-to-side or from top-to-bottom; parasites on animals..............................................................**6**

**5b**. Antennae longer than the head, easily seen; not usually parasites..........................**8**

**6a**. Body flattened from side-to-side; legs long and able to jump; with sucking mouthparts.........................................................................................Order **SIPHONAPTERA**

**6b**. Body flattened from top-to-bottom; legs short and not able to jump.........................................**7**

**7a**. Abdomen sac-like and without distinct segments; eyes clearly visible; tarsi 5-segmented; about 1 cm long; sheep parasites...........................Order **DIPTERA**

**7b**. Abdominal segments distinct; eyes small or absent; tarsi 1- to 2-segmented; less than 1/8 inch long.........................................................................Order **PHTHIRAPTERA**

**8a**. Body strongly constricted between the thorax and abdomen...........Order **HYMENOPTERA**

**8b**. Thorax and abdomen broadly joined........................................................................................**9**

**9a**. Body scaly; a coiled tongue sometimes visible; usually found on tree trunks...............

……………………………………………………………….Order **LEPIDOPTERA**

**9b**. Body not scaly.............................................................................................................**10**

**10a**. With a sucking beak; the beak of some may seem to come from between the front legs............................................................................................**11**

**10b**. Beak absent, chewing mouthparts...........................................**12**

**11a**. With 2 tube-like projections near the end of the abdomen; soft-bodied and living in colonies on plants; antennae long; beak arises near the front legs.........................Order **HOMOPTERA**

**11b**. Without tube-like projections on abdomen; beak arises from front of head...........................................................................................................Order **HEMIPTERA**

**12a**. Tarsi either 5-segmented or the hind legs adapted for jumping......................................**13**

**12b**. Tarsi with less than 5 segments and the hind legs not adapted for jumping...................**15**

**13a**. Hind legs adapted for jumping.............................................Order **ORTHOPTERA**

**13b**. Hind legs not adapted for jumping.........................................................................**14**

**14a**. Body flattened from top-to-bottom, head hidden from above by thorax..............

………………………………………………………..……..Order **BLATTARIA**

**14b**. Body stick-like, not flattened; head not hidden by thorax......Order **PHASMIDA**

**15a**. Ant-like appearance, except with soft, white bodies; 4-segmented tarsi; eyeless; antennae resemble a string of round beads; thorax and abdomen are broadly joined...Order **ISOPTERA**

**15b**. Not fitting the description of 15a; eyes usually well-developed.............................................**16**

**16a**. With a forked tail near the end of the body used for jumping; this tail may be folded under the body............................................................................................Order **COLLEMBOLA**

**16b**. Without a forked tail...........................................................................................................**17**

**17a**. Oval-shaped and louse-like in appearance; antennae long, thread-like……………….

……………………………………………………………………….....Order **PSOCOPTERA**

**17b**. Body narrow; found on leaves and flowers...............................Order **THYSANOPTERA**

**18a**. With only one pair of wings, the hind pair reduced to small structures that resemble golf tees...........................................................................................................Order **DIPTERA**

**18b**. With two pairs of wings, although the first pair may be hardened and do not function in flight (as with beetles).....................................................................................................**19**

**19a**. Front wings thicker in texture than hind wings for all or part of their area.........**20**

**19b**. Front and hind wings both of the same texture throughout..................................**25**

**20a**. Front wings hard or leathery in texture throughout and almost always meeting in a straight line down the center of the back.....................................................................**21**

**20b**. Front wings parchment-like or leathery throughout or on the basal half only - they do not meet in a straight line down the center of the back. In the lace bugs, the entire top of the insect resembles lace.................................................................................................**22**

**21a**. Front wings short, leaving much of the abdomen exposed; a pair of pincher-like appendages extend from the end of the abdomen................................Order **DERMAPTERA**

**21b**. Front wings usually cover all of the abdomen; never with abdominal appendages........................................................................Order **COLEOPTERA**

**22a**. With a beak; basal part of the wing thickened and the tip membranous. Antennae with 5 or less segments......................................................................Order **HEMIPTERA**

**22b**. With chewing mouthparts; front wings parchment-like throughout; antennae with many segments............................................................................................................**23**

**23a**. Hind legs adapted for jumping........................................Order **ORTHOPTERA**

**23b**. Hind legs not adapted for jumping....................................................................**24**

**24a**. Front legs adapted for capturing prey ……..........,,...............Order **MANTODEA**

**24b**. Front legs not adapted for prey; body flattened from top-to-bottom; head hidden from above by thorax..................................................................................Order **BLATTARIA**

**25a**. Wings with scales on all or part of their area; mouthparts in the form of a coiled “tongue”...........................................................................,,,,....Order **LEPIDOPTERA**

**25b**. Wings without scales, although they may have hairs................................................**26**

**26a**. Wings long, narrow, veinless, and all 4 are of equal size and have fringes with long hairs; small insects about 1/10 inch long; tarsi 1- or 2-segmented.........Order **THYSANOPTERA**

**26b**. Not fitting the description in 26a........................................................................................**27**

**27a**. Mouthparts composed of a beak arising far back on the underside of the head near the front legs; wings held roof-like over the body, the hind pair smaller than the front pair.......................................................................................................Order **HOMOPTERA**

**27b**. Mouthparts not in the form of a piercing beak, although the front of the head may be prolonged into a long snout; wings not held roof-like over the body; usually the hind pair of wings are about the same size as the front pair OR the abdomen has 2 or 3 long, thread-like tails.......................................................................................................................................**28**

**28a**. With many cross-veins (more than 15) in each wing..............................................**29**

**28b**. With few cross-veins, or the veins are indistinct.....................................................**33**

**29a**. Antennae about as long as the head and thorax together, or longer......................................**31**

**29b**. Antennae short and bristle-like, about as long as head alone or shorter...............................**30**

**30a**. Hind wings much smaller than front wing; occasionally, hind wings absent; abdomen ending in 2 or 3 long, thread-like tails..............................................Order **EPHEMEROPTERA**

**30b**. Front and hind wings nearly equal in size; no abdominal tails............Order **ODONATA**

**31a**. Abdomen ending with 2 short tails.....................................................Order **PLECOPTERA**

**31b**. Abdomen without tails..........................................................................................................**32**

**32a**. Head prolonged into a snout; the tip of the abdomen sometimes resembles a scorpion tail...................................................................................................Order **MECOPTERA**

**32b**. Head not prolonged into a snout....................................................Order **NEUROPTERA**

**33a**. All four wings long, narrow, equal-sized, without distinct veins; wings about twice the body length..........................................................................................................Order **ISOPTERA**

**33b**. Not fitting the description in 33a.........................................................................................**34**

**34a**. Wings hairy; antennae thread-like and usually as long as or longer than the body; mouthparts indistinct; front and hind wings nearly equal in size............Order **TRICHOPTERA**

**34b**. Wings not hairy; chewing mouthparts present; hind wings noticeably smaller than the front wings.........................................................................................................................**35**

**35a**. Tarsi 2- or 3-segmented; small insects less than 1/8 inch long. Never constricted between the thorax and the abdomen............................................. ........................Order **PSOCOPTERA**

**35b**. Tarsi 4 or 5 segmented; size variable; most are constricted between the thorax and the abdomen.........................................................................................Order **HYMENOPTERA**

**Insect Anatomy:**

**Arachnid Anatomy:**

