

Classification, Nomenclature, and Identification of Insects and their Relatives

Classification: Classifying involves grouping things into categories based on similar characteristics. Insects, like all living organisms, can be classified according to their phylogenetic relationships. The classification system used by scientists involves a hierarchy beginning with a broad category and ending with a very specific category. In science, we classify organisms according to kingdom, phylum, class, order, family, genus, and species.

Nomenclature: Nomenclature refers to the naming of organisms. Each organism is given a name consisting of two words referred to as the scientific name. The first word represents the genus and the second the species. Scientific names are Latin and are either printed in italics or underlined if handwritten. The scientific name for the honey bee is *Apis mellifera*.

Identification of Insects and their Relatives: Insects are part of the phylum of animals called Arthropoda. All arthropods possess an exoskeleton, bi-lateral symmetry, jointed appendages, segmented bodies, and specialized appendages. The major arthropod classes can be separated by comparing their number of body regions, legs, and antennae.

PHYLUM ARTHROPODA

Major External Characteristics

1. Exoskeleton containing chitin
2. Body bilaterally symmetrical
3. Body segments grouped into specialized regions (= tagmata, plural)
4. Jointed appendages
5. These jointed appendages variously specialized for feeding, locomotion, sensing

Key to the Adults of the Common Classes of Arthropoda

- 1a. Two pairs of antennae (one pair may be reduced, difficult to see);
Number of legs variable. **Class Crustacea, go to 2**
- 1b. One pair of antennae or none. **3**
- 2a. Two distinct body regions (cephlothorax and abdomen);
Five pairs of thoracic legs. crayfish, lobsters, shrimp; **Order Decapoda**
- 2b. Three distinct body regions (head, thorax, abdomen);
Seven pairs of thoracic legs sowbugs, pillbugs, roly-polys; **Order Isopoda**
- 3a. No antennae; Two distinct body regions (cephlothorax and abdomen);
Four pairs of legs;. spiders, ticks, scorpions, etc; **Class Arachnida**
- 3b. One pair of antennae. **4**
- 4a. Three distinct body regions (head, thorax, abdomen);
Three pairs of thoracic legs. Wings present or absent. **Class Insecta**
- 4b. Two distinct body regions (head and trunk). **5**
- 5a. One pair of legs per trunk segment. centipedes; **Class Chilopoda**
- 5b. Two pairs of legs per trunk segment. millipedes; **Class Diplopoda**

CRUSTACEA

Class Crustacea (crus-ta'-ce-uh), the **crustaceans**. This is a very diverse class. Its members display much variation in the tagmata and the appendages. There are about 30,000 species of Crustacea. Most are aquatic, the majority of which are marine. Crustaceans includes lobsters, crabs, crayfish, shrimp, barnacles, and several less familiar forms. One of the latter is the Isopoda, the sowbugs and pillbugs or roly-polys. Most people will likely encounter only two orders, the Orders Decapoda and Isopoda.

Order Decapoda (dec'-o-po-da). **Lobsters, crayfish, crabs, shrimp.**

Two pairs of antennae (can be difficult to see both pairs) **Five pairs of legs** on the cephalothorax, the first pair usually with a large claw

Order Isopoda (eye'-so-po-da). **Sowbugs, pillbugs, roly-polys.**

Three tagmata (head, thorax and abdomen)

Two pairs of antennae: first pair is greatly reduced , seldom noticed

Seven pairs of legs, one pair on each thoracic segment

Abdomen small, more or less fused.

Most isopods are marine, living in seaweed and under stones in the water. There are a few freshwater forms. The only Crustacea to invade the land are the isopods. However, they have not severed all ties with the aquatic habitat for they are only found in places of high moisture. This includes places such as leaf litter and soil and beneath bark and stones. A few are occasionally pests of cultivated plants, but they usually feed on organic debris. Those that can roll into a ball are called pillbugs or roly-polys; those that can not form a ball are the sowbugs.

ARACHNIDA

Class Arachnida (uh-rak'-nid-uh), **spiders, ticks, mites, scorpions and others.** This is a diverse class which belongs to a subphylum of the Arthropoda known as the Chelicerata. Chelicerata are characterized as having two distinct body regions, a cephalothorax and an abdomen. Chelicerates have six pairs of appendages, the first

two pairs being mouthparts and the following four pairs being legs. They do not have antennae.

The first pair of mouthparts are the chelicerae (sing., chelicera). They are three-segmented and pincher-like. In spiders, the terminal third segment is often called a fang. The second pair of mouthparts are the six-segmented pedipalps. They may appear leg-like (spiders) or claw-like (scorpions). The legs of most Chelicerata have seven segments. Compared to insects, whose legs have six segments, there is an extra segment, called the patella, between the third segment (the femur) and the fourth segment (the tibia). Common orders of Arachnida include:

a (cephlothorax and abdomen)

No antennae

Abdomen joined to cephalothorax by slender pedicel

Four pairs of legs

Mouthparts: One pair chelicerae and one pair of pedipalps

Eyes simple ocelli. Usually eight, sometimes fewer

Poison apparatus opens on the fangs of the chelicerae

Silk apparatus always present at end of abdomen, below anus

This is a large order, having about 2500 species in North America. Although nearly all spiders have venom glands, spiders seldom bite man. Only a few U.S. species are considered dangerous. In Nebraska, the **black widow** and the **brown recluse** are the only seriously venomous spiders

Order Acari (ak'-a-ri), the mites and ticks.

Two tagmata (cephlothorax and abdomen)

No antennae.

Abdomen broadly joined to cephalothorax (no pedicel).

Four pairs of legs in adults; only three pairs at hatching

Ticks and mites occur just about anywhere animal life is found. They may be terrestrial or aquatic, free-living or parasitic. They may feed on organic debris (beneficial scavengers) or on living plants or animals. Some of the plant feeders are serious pests of crops. Some of the parasitic forms are pests of animals and man. Some are vectors of diseases. A few of the predatory and parasitic mites are considered beneficial because they feed on insects or other pests. Over 30,000 species of ticks and mites have been described.

Order Scorpiones (scor-pi'-on-es), the **scorpions**.

Two tagmata (cephlothorax and abdomen)

No antennae

No pedicel between cephalothorax and abdomen

Four pairs of legs on cephalothorax

One pair of chelicerae and one pair of long, pincher-like

pedipalps
Abdomen with
seven broad segments
anteriorly, followed by

five narrower segments which end with a large stinger.

Scorpions feed mostly on insects and spiders which they catch with their pedipalps. They may or may not sting their prey. Scorpions do not ordinarily attack man, but they will sting if disturbed or cornered. Of the forty-some species that occur in the U.S., the sting of most is painful, but not dangerous. One Arizona species, however, is very venomous, and its sting can be fatal.

CHILOPODA

Class Chilopoda (chi-lo-po'-da), the **centipedes**.

Two tagmata (head and trunk)

antennae with

One pair of legs per trunk segment.

Mouthparts: one pair of mandibles and two pairs of maxillae

Appendages on the first trunk segment are clawlike poison
jaws or fangs with which centipedes paralyze their prey.

The class name refers to the lip- like appearance of the fused
bases of these appendages.

Eyes may be present or absent.

Centipedes are elongate and flattened. They are usually found in somewhat protected places, such as in leaf litter, in the soil, under bark, or in rotten logs. One species is commonly found in houses and other buildings. Centipedes are predatory and feed on insects, spiders, and other small animals. The larger centipedes can bite humans, but the bite is not serious and is no more painful than the sting of a bee or wasp. The common small centipedes of Nebraska are harmless to man. Overall, centipedes are beneficial natural enemies of insects.

DIPLOPODA

Class Diplopoda (dip-low-po'-da), the millipedes.

Two tagmata (head and trunk)

One pair of antennae, usually having seven segments

Two pairs of legs on most trunk segments (30 or more pairs total)

Mouthparts: one pair of mandibles, and one pair of maxillae

Eyes are usually present

Millipedes are usually cylindrical (sometimes slightly flattened). Except for the first three trunk segments, each segment has two pairs of short legs. Millipedes are found in damp places such as the soil, leaf litter, or under logs and stones. Most millipedes are beneficial scavengers of decaying plant material. A few attack living plants and are sometimes pests. Even fewer are predacious. Millipedes do not bite man, but many give off a foul-smelling fluid containing hydrogen cyanide which can be strong enough to kill insects placed in a jar with a millipede.

INSECTA

Class Insecta (in'-sec-ta), the insects.

Three tagmata (head, thorax and abdomen)

One pair of antennae

Three pairs of legs

May have wings, either one or two pairs

Insects are the most abundant life form now known to science. Around 1,000,000 species have been described and named. That is more than all the other known animals put together.