

Chapter 7

General Morphology and Biology of Grasshoppers

Grasshoppers include those insects in a number of families belonging to the superfamily Acridoidea in the order Orthoptera. Grasshoppers are most closely related to crickets and katydids and often are mistaken for these other orthopterans. Grasshoppers may be distinguished from other orthopterans primarily on the basis of external morphology.

A generalized diagram of a grasshopper is presented in Figure below. The most obvious and distinctive features of grasshoppers are their enlarged hind legs and their relatively short, thick antennae. The tegmina are another distinctive feature, but only in winged species.

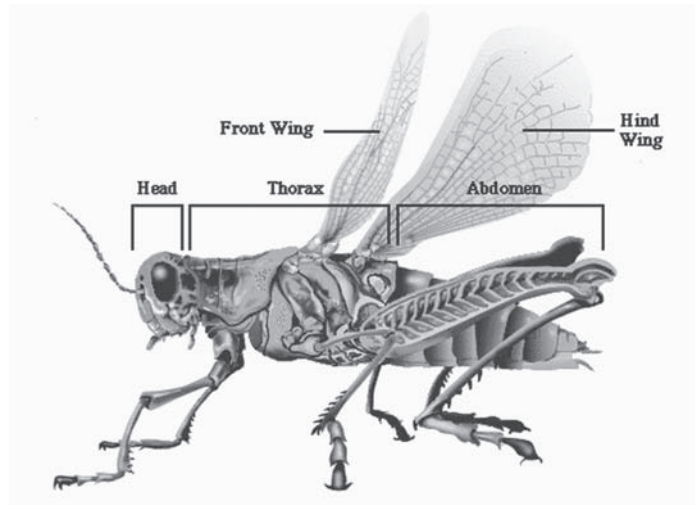


Figure: Body parts and regions of a typical grasshopper.

Grasshoppers are physiologically similar to most other insects. They have an external chitinous skeleton, an open internal circulatory

system, and they breathe through tiny openings in the sides of their abdomen called spiracles. Grasshoppers are poikilothermic or cold-blooded, and they rely upon thermoregulatory behaviour to maintain their body temperatures.

Grasshoppers are primarily herbivores and feed on various plants. Some species are host specific to certain plants; others feed on many different species and even families of plants. Grasshoppers locate host plants by visual and olfactory means. Further selection of plant tissue to eat is determined by smelling and tasting the plant tissue with chemical sensory receptors (sensilla) located on the mouthparts. The plant tissue is then chewed with the mandibles and consumed. Most grasshoppers rely on symbiotic bacteria in their gut to digest plant matter. Although grasshoppers are primarily herbivores, they will occasionally eat other disabled insects, including other grasshoppers, for additional protein in their diet. For example, grasshoppers are often seen on roads eating other grasshoppers that have been run over by automobiles.

Grasshoppers are typically medium to large insects. In New Mexico they range in size from the small males of *Psoloessa texana* Scudder (about 10 mm) to the large females of *Schistocerca nitens* (Thunberg) (about 70 mm). Most species are sexually dimorphic, the males being smaller than females. Size also varies geographically in many species, particularly with regard to elevation. For a given species, individuals from higher elevations are usually smaller than those from lower elevations.

Life Cycles

Grasshopper life cycles go from eggs through nymphal stages or instars to adults. Most New Mexico grasshoppers lay their eggs in the soil in late summer or autumn, and the eggs overwinter in the soil and hatch in the late spring in response to favourable temperature and moisture conditions. Grasshopper eggs are generally laid below the soil surface in a frothy material that hardens and protects them from adverse environmental conditions. Nymphs develop through a series of 5 or 6 instars, each slightly larger than the previous one. At the end of each instar, grasshopper nymphs shed their external skeletons or skins and grow into a larger exoskeleton. The wings develop as small pads on the thorax until the final molt to the adult state, when they are pumped full of blood and become fully extended. Grasshoppers generally develop from first-instar nymphs to adults in about 4-6 weeks. They become sexually mature shortly after molting