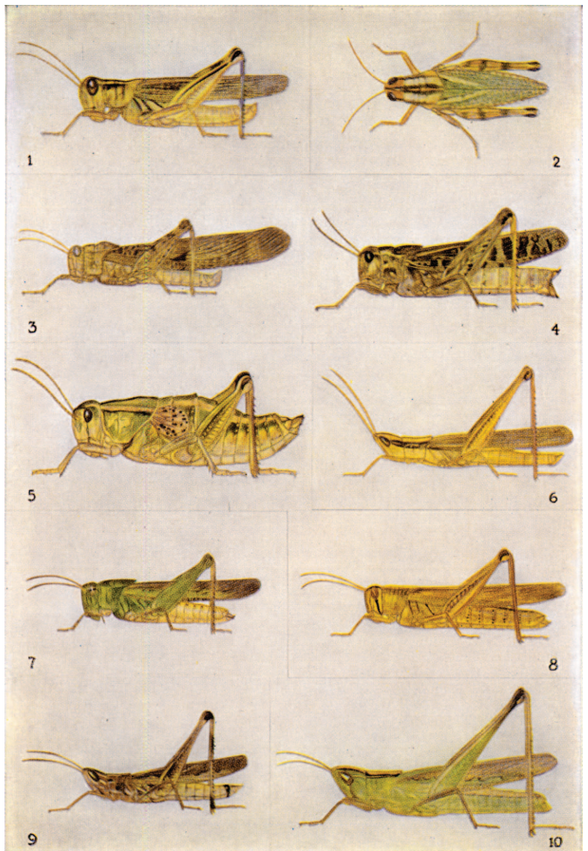
Insects on the Prairie

Valerie Wright



Crayon Drawings by Robert Cotton
Insects in Kansas, Report of the Kansas State Board of Agriculture, *June 1943*

Insects on the Prairie

Insects make up about ninety percent of the animals on earth. They live above and below ground and are found flying at high altitudes or living in water, soil, plant, or animal tissue–literally filling every niche possible for life.

The short life cycles and high reproductive rates of insects translate into more rapid evolutionary change (selection), which allows them to adapt to innumerable microhabitats. Their small size and ability to move give them advantages over plants. Like all animals, they have specific behaviors and can communicate with one another through sound, movement, chemicals, touch, color, and other means. The ability to fly allows many insects to spread over large areas. Some, like the monarch butterfly, migrate long distances.

About sixty-five percent of above-ground insects are plant feeders. If you know the host plant, nesting habits, territorial behavior, season of abundance, sound, or call, you can probably find the insect. Plants have associations with certain insects. Even toxic plants, like poison ivy, have insect pests, although fewer than non-toxic ones. Plants have evolved toxic chemicals to prevent damage by grazing animals, such as insects. Other plants have dense hairs, spines, sticky juices, waxes, and other mechanical means to keep insects away.

Insects are considered pests when they inconvenience human beings, directly or indirectly, by carrying

disease or damaging crops. Most insect populations found in unmanaged systems (as opposed to systems maintained by man) are responsive to their environment. An outbreak of a population of insects usually occurs because of environmental changes, like weather or the unusual or sudden availability of resources.

Insects dominate the prairie in numbers, species, diversity of habitat, and impact. They play many roles besides consumer of plant materials. There are predators, parasites, pollinators, decomposers, and scavengers. Some of the plant feeders are generalists, other are specialists. Whatever their role, most insects provide highly nutritious food sources for others. The following are two examples of important insects you are likely to encounter on the prairie.

GRASSHOPPERS

Among the plant feeders on the prairie, grasshoppers have the greatest above-ground biomass, especially late in the season, and can be found in population densities of up to ten per square meter. They are among the most important grazers on the prairie, ingesting two percent or more of the primary production and clipping or dropping another eight percent. The plant parts that fall to the ground are important for litter-feeding insects and others in the food chain. We see little visible damage in the true prairie, but grasshoppers can inflict heavy damage to commercial crops. There are more than one hundred species of grasshoppers in Kansas, most of which are not unique to the prairie. Considering that there are more than sixty species of grasses, the diversity in grasshoppers is much greater.

Although there are many different species of grasshoppers, they are not necessarily in competition for the same resources. The slant-faced grasshopper is notable for having no "chin." The pointed head and unique antennae set them apart, as does their preference

for feeding only on grass. You won't find them in crop fields or on the forbs or wildflowers of the prairie. Their true habitat is prairie and pasture. Other hoppers are grouped by a simple external character, a knob or spur between the first pair of legs. Next time you catch a grasshopper, have a look. Often the "spur" is visible with the naked eye. This group has the most species that are crop and garden pests.

Only three species of grasshoppers are thought to have evolved with the prairie. Others moved in to take advantage of the resources here. One of the more unique species is the small, silvery-green sagewort grasshopper that feeds exclusively on Louisiana sagewort, *Artemesia ludoviciana*, and so closely matches the color of the foliage that it is nearly invisible. This plant has many mechanisms to keep grazers away. No other grasshopper can survive on it.

The life cycle of grasshoppers, from egg to adult, is considered an "incomplete" metamorphosis, that is, changes in immatures, or nymphs, are seen only as gradual growth from a little grasshopper to a big one. Although there are no major changes of form, the nymphs do molt as they grow, as all insects must. You can find the cast skins hanging under leaves, especially from the last molt to adult. There is no chrysalis or pupa as in butterflies and beetles. Most adults have fully developed wings, which no other stage has. The front pair of wings is generally stiff and dull in color, while the second pair is folded beneath it like a fan. Coloration on these hind wings has evolved to avoid predators, especially in the group called "band-winged grasshoppers." A flash of color is visible when the wings are open in flight, making the grasshopper look larger and different than it does when sitting still. The predator looks for the large, colorful insect, while the camouflage coloration of the closed wings and a freeze in motion allows the grasshopper to go unnoticed. Try to find one after they fly and you'll see what I mean.

Grasshoppers are important food sources for other animals, like birds, rodents, and coyotes. Coyote scat in the late summer and fall is made up of nearly 25% indigestible parts (chitin) of insects, especially grasshoppers and cicadas. They are an excellent source of fat and protein.

THE CICADA

The earliest settlers associated the noisy swarms of cicadas with the only comparable thing in their knowledge, the devastating migratory locust, which, as you may know, is a grasshopper. The popular but incorrect name "locust" has been used so long for the cicada that it may never be eradicated. The cicada is a true "bug" (Order Homoptera) with sucking mouth parts, not chewing mouth parts like grasshoppers. Adults live only about one month, during which they mate but probably do not feed much. Some draw sap from trees.

There are several species of cicadas in Kansas, but two are abundant in most years on the prairie. The largest is brown and black, with conspicuous white patches, known as the Bush Cicada (*Tibicen dorsata*). It is one of the largest insects on the prairie (more than two inches from head to its wing tips) and well adapted to grasslands. The other is called the Prairie Cicada (*Malampsalta calliope*). It is quite small (less than one inch), light green or beige, blending in more with foliage. In some years they can be very numerous. These are not the well-known "periodical" cicadas, a name referring to the long life cycle of the 17-year cicada. The prairie cicadas have only a 2-4 year life span and are present every year.

The female has a powerful ovipositor with which she punctures and cuts stems and twigs of woody shrubs or trees. The eggs are placed in these cuts and hatch in a few weeks. The larvae fall to the ground, burrow until they find a juicy root, where they attach themselves and feed until full development a few years later. The twigs where eggs have been deposited often die, leaving "flags" of yellowed leaves at the ends of branches to indicate where the cicada has been at work. Emergence of the adults is from May to June for the Prairie Cicada and in summer for the Bush Cicada.

Along a prairie creek is the habitat of the woodland cicadas. When the Dog-Days Cicadas (*Tibicen pruinosa*), begin to sing, the chorus can become synchronous and ever louder as more males join in. It is only the males that sing, a fact honored by these lines, undoubtedly written by a male human counterpart.

Happy are cicadas' lives,

For they all have voiceless wives.

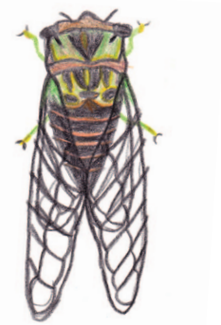
The sound comes from a cavity in the abdomen. Inside are three membranes. One is attached to a set of muscles, which vibrate the cavity, and the others resonate within the air pocket, magnifying the sound. For humans the deafening, irritating, vibrating noise of the males inspired this female version of the rhyme.

Unhappy are cicadas' wives.

Their husbands deafen all our lives.

In truth, cicada females must find this sound particularly seductive.

Grasshoppers and cicadas make up the vast majority of non-plant species in the prairie. The significance of the grasshoppers' role in sustaining the Flint Hills cannot be overestimated, while the cidadas' performance of night music for prairie dwellers cannot be ignored.



CICADA
Will McConwell

The K-State Insect Zoo in Manhattan, Kansas, explores the ecological importance of insects and offers visitors an interactive experience with live creepy crawlies. Located on the main campus, it is open year-round.

Valerie Wright's research interests include organisms, insects, and grassland habitats. She became an environmental educator and naturalist for the Konza Prairie Biological Station and an adjunct professor at Kansas State University in 1996, retiring in 2012.