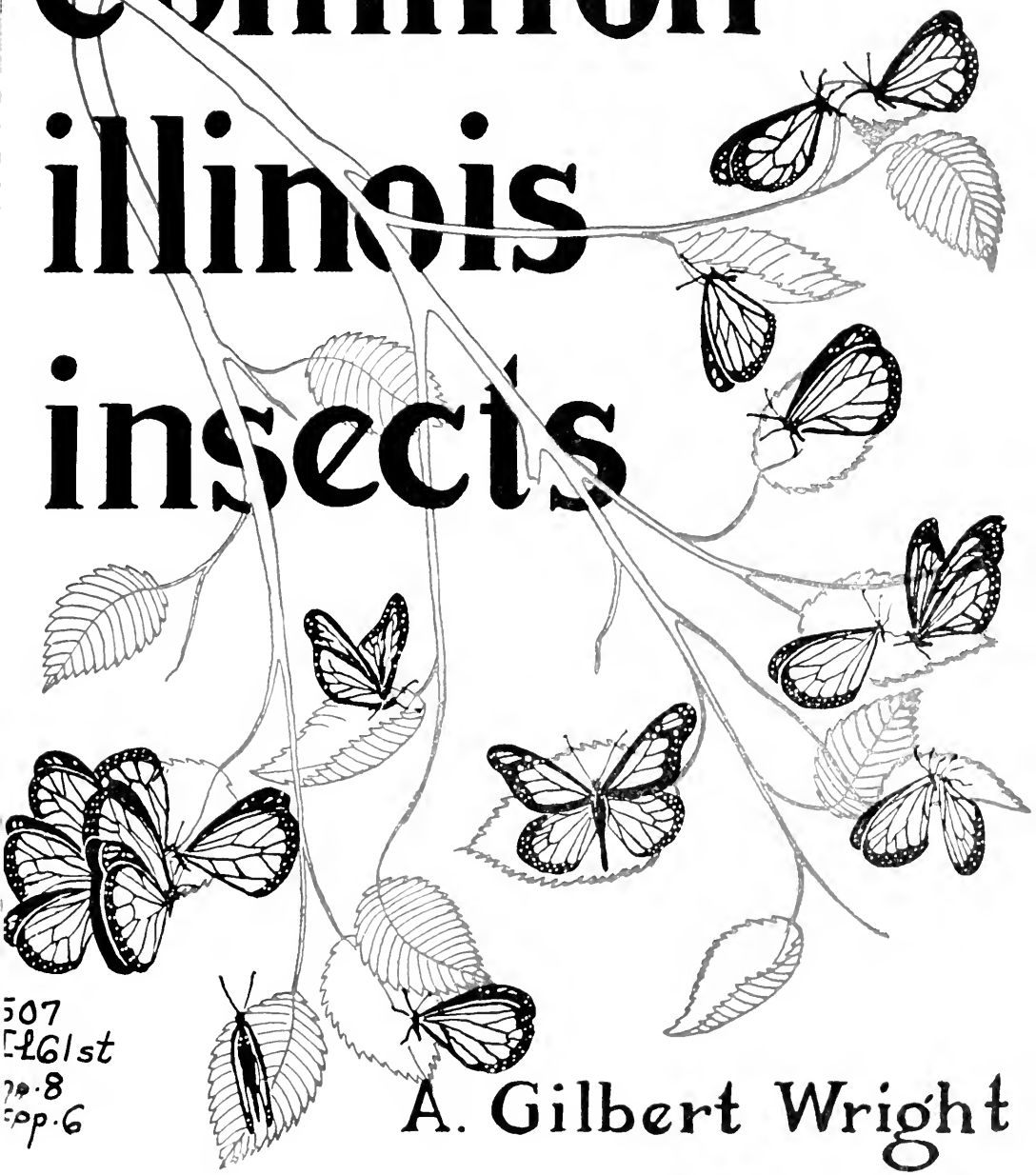
common illinois insects



A. Gilbert Wright

Illinois State Museum
Story of Illinois No. 8

STORY OF ILLINOIS SERIES

No. 1. Story of Illinois: Indian and Pioneer, by V. S. Eifert.

No. 2. Mammals of Illinois Today and Yesterday, by V. S. Eifert.

No. 3. Exploring for Mushrooms, by V. S. Eifert.

No. 4. Flowers that Bloom in the Spring, by V. S. Eifert.

No. 5. Invitation to Birds, by V. S. Eifert.

No. 6. Man's Venture in Culture, by Thorne Deuel.

No. 7. The Past Speaks to You, by Ann Livesay.

No. 8. Common Illinois Insects, by A. Gilbert Wright.

Address all enquiries to the MUSEUM DIRECTOR,
ILLINOIS STATE MUSEUM, SPRINGFIELD, ILLINOIS

7
(31930)

STATE OF ILLINOIS

ADLAI E. STEVENSON, *Governor*

DEPT. REGISTRATION & EDUCATION – ILLINOIS STATE MUSEUM

NOBLE J. PUFFER, *Director* – THORNE DEUEL, *Museum Director*

STORY OF ILLINOIS SERIES, NO. 8

COMMON ILLINOIS INSECTS

And Why They Are Interesting

by

A. GILBERT WRIGHT

Photographs by the author
except where otherwise noted

1951

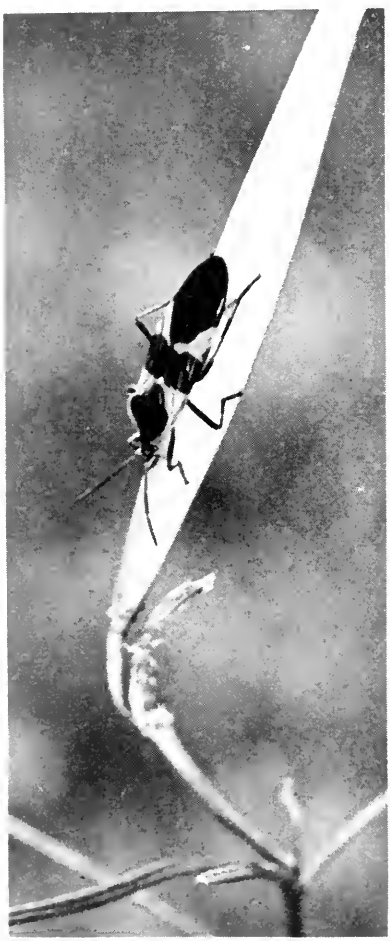
SPRINGFIELD, ILLINOIS

[Printed by authority of the State of Illinois.]

A WORLD AT YOUR DOORSTEP

Most people seem to know little about insects, even about the few kinds that are everyday pests. The reasons for this are rather hard to explain, considering that these animals are so numerous and generally so near at hand. School instruction about them is often meager and nearly always the injurious kinds are stressed unduly. It is to the larger universities that one must go to get an elementary course in entomology, the science of insect life. Our aim is to encourage a more widespread and balanced interest in insects, and briefly introduce the interesting ways of some of the common ones.

There are good grounds for extending one's knowledge in this direction. These Story of Illinois booklets are issued in order to promote a keener awareness of the environment in which we live. Insects make up a sizeable part of the living non-human environment. Three-fourths or more of all the kinds of animals on earth are insects. There are more than ten thousand kinds in Illinois to say nothing of the numbers of individual insects, the species populations. Insects also have a direct and indirect bearing on our lives. Some are fiends causing untold loss in dollars every year. Countless others are positive assets, making us richer or healthier, even enabling us to exist. Many kinds are probably neutral, as far as man's world is concerned. But even these are no less worth knowing about. Almost every person has a desire to know something about natural history and enjoys some direct personal contact with nature. It is here that insects play a rewarding role. They can be made to reveal something of the mysteries of existence, the complex relationships between living things, as well as provide delight for the eye, like the colorful wings of a butterfly.



Milkweed Bug (*Oncopeltus fasciatus*) Showy member of the Chinch-bug family that lives on milkweeds. (1½x)

An expedition for insect discovery can start in your own yard. A bird-seeker extends the range of his sight with glasses made for the purpose. A pocket magnifier of 6 to 14 power is the ideal "bird-glass" for insect students. A cheap lens

* 1½x means image in picture is one and one-half times actual size.

Measuring worm (Species unknown) Walks with loop, becomes a moth (Family Geometridae). White specks are eggs of wasp parasite. (4x)

is much better than none at all, but one of the doublets or triplets is recommended. The well-known net is essential if one wants to collect for keeps. Also a killing jar which can be a pickle-bottle with tight fitting lid. A small wad of cotton should be fastened to the lid and soaked with cleaning fluid (carbon tetrachloride). Turn over boards, look under bark, visit the beds of wild and cultivated flowers.

The close tie-in that always exists between the plant and animal worlds is wonderfully displayed by insects. Everyone knows that animals depend on plants for food. (Eaters of other animals devour plant-eaters primarily.) It is among the plant-eating insects that most intimate and complex relationships are maintained between these two great kingdoms of living organisms. This point will again come up when bees and pollenization are discussed. The frequent use of specific food plants, called hosts, is well illustrated by the milkweed bug, whose young, called nymphs, feed exclusively on plants of the milkweed family. One may find these black and orange insects on any of several kinds of milkweed from June to October.

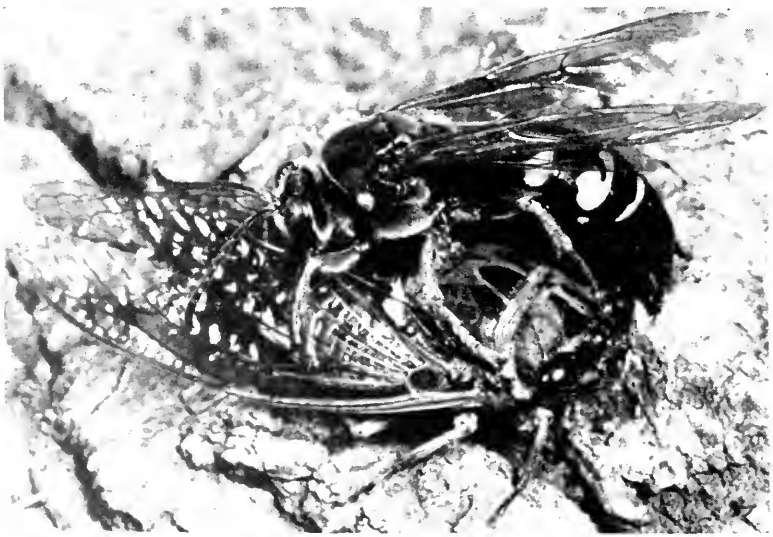
The great consumers of green foliage are the caterpillars. Some caterpillars feed on practically every kind of growing plant. They are the young or larvae of moths and butterflies and are as varied as the adults. A large group are known as measuring worms, inch worms, or

Saddle - back Caterpillar (*Sibine stimulea*) is protected by poisonous setae. (4x)

loopers. They are generally small and are peculiar in that they have no legs under their middle so that they are unable to crawl in the usual caterpillar manner. They move about by a series of loopings, arching the body high and then stretching out and moving forward. A particularly interesting feature is their habit of imitating twigs. They "go stiff" holding their fore-part outstreched and motionless.

As already said, caterpillars and other insects are often restricted to one or more specific kinds of food. The young or larvae are assured this certain food supply by the female parent in the laying of her eggs. This is well shown by the Dung Beetle, or Tumble-bug and the Cicada-killer Wasp. In both examples the egg is buried in the ground where the grub will be relatively safe and unmolested during its growth and later transformation to adult.

Tumble-bug (*Canthon vigilans*). The food provision for the Tumble-bug larva is a ball of cow dung, while for the Cicada-killer grub fresh meat has been supplied in the form of a living but paralyzed cicada. see below.



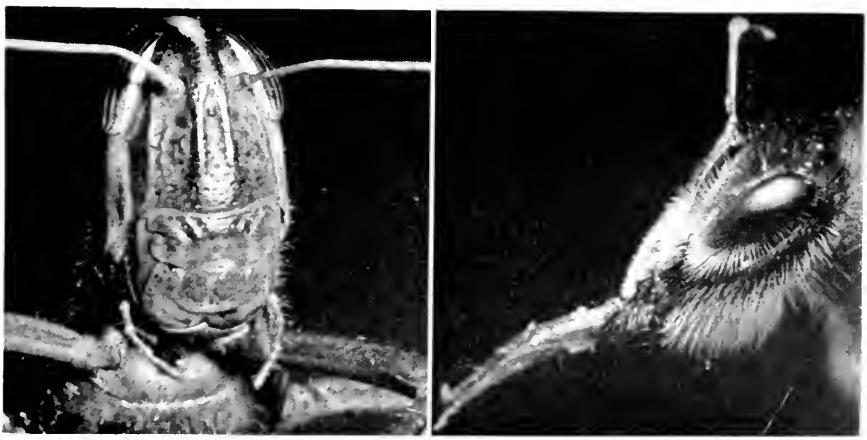
Cicada-killer (*Sphecius speciosus*) paralyzes cicada with sting, drags it to underground burrow and buries it with an egg. (2x)

If the life habits of insects are diverse, no less so are their body structures. The Saddle-back is a beautiful little caterpillar with green "saddle-cloth" and purplish brown "saddle". In contrast to the color camouflaged looper, it is a dazzling eye-catcher, whose many spike-like poisonous hairs are its armor.

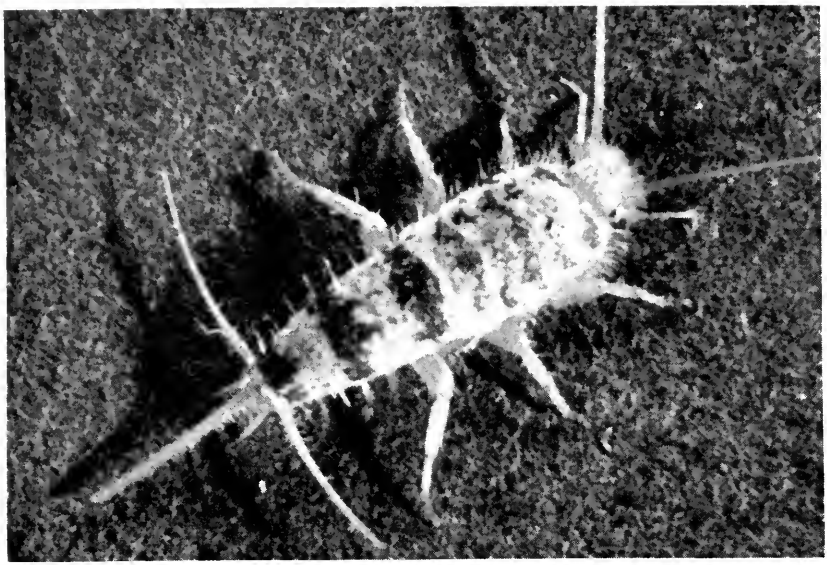
Mole Cricket (*Gryllotalpa hexadactyla*) Fore legs, mole-like, are used in burrowing under ground. (4x)

It is at once apparent that the Mole Cricket (first cousin of true crickets) is excellently equipped for a life in the soil. The shortened front legs are remarkably adapted for digging, the head streamlined, eyes small, and the 2nd and 3rd pairs of legs are fitted for pushing the body forward in underground tunnels.

The mouth parts of insects are worth noting for it is in the feeding equipment that insects show their greatest variations. Probably no structures in the entire animal kingdom better show "adaptive radiation", the specialized development in different directions of originally similar parts.



Feeding apparatus of Grasshopper differs greatly from that of Honey Bee. Among insects the mouth structure shows greatest diversity and is always related to food habits. Note hairs on eyes and face of bee that are of use in collecting pollen. (8x)



Silverfish (*Thermobia domestica*) This wingless household pest is one of the most primitive members of Class Insecta. (6x)

THE NAMES AND CLASSIFICATION OF INSECTS

People may be so bewildered by the diversity and number of insects that they are discouraged from trying to learn anything about them. It would be confusing indeed if the systematic zoologists had not done a great deal to put the animal house in order. As it now stands, almost any particular insect can be easily "pigeon-holed" into one of the larger insect divisions or groupings, such as Family or Order. Surprising progress can be made in getting to know insects by learning about these groups to which they belong.

A Latin name may seem useless but it always tells the specific kind of insect and it also tells the next larger group to which that insect belongs, called the Genus. The genus name always comes first, then the name for the species. The still larger groupings into which insects are classified, such as Family and Order, are not revealed by the scientific name.

Before looking further at the kinds of insects it should be noted how insects may be distinguished from the hosts of other little creatures that hop and crawl. The key to this is the distinctive body divisions of an insect, the head, thorax or midsection, and the abdomen. No other animals have such a clean-cut separation of the body regions. On most adult insect heads there are two large shiny many-faceted eyes, a pair of antennae or feelers, and three simple eyes, called ocelli. The thorax usually carries two pairs of wings and six legs. The abdomen has simple ring-like joints that end in the mating or egg-laying devices.

Insects are the most numerous of the invertebrates, the animals without a backbone. Insects belong to a branch of animals (Phylum) called Arthropods. This phylum contains, along with insects, the crayfishes, crabs, scorpions, spiders and thousand legged worms. These are placed in separate Classes of which the largest is Class Insecta.

All the orders and families of insects have evolved from one another in many directions. Those living in the world today have descended from a line of ancestors that extends backward in time over 300 million years. In Coal-Age deposits of Illinois and in other rock formations elsewhere many ancestral forms of present day insects have been discovered as fossils. With the help of such petrified remains and through a close study of living insects it has been possible for scientists to determine the general trend of insect evolution. The living varieties may be grouped together in such a way as to demonstrate something of the various steps through which the main line of progress in development has been made. The most primitive insects are small and wingless and have no transformations from larva to adult (metamorphosis) as described in a later section. A common example of this insect type is the Silverfish or Firebrat (called Silverfish because of the shiny fish-like scales, Firebrat because of its frequenting of fire places.) Their

Nest of Mount-builder Ant. (*Formica exsectoides*) The highest level of care for young and most complex social behavior among invertebrates is attained by ants, bees and wasps, Order Hymenoptera.

living habits are simple with no complicated relationships with plants, no provisions for care of young by the parent. At the other end of the line of insect evolution one finds the social bees and wasps with their remarkable complexity of structure and living habits. The Mound builder Ant that may be found in rural areas in Illinois is an especially interesting social insect. Its huge nests are sometimes grouped in colonies of ten or fifteen hills (actual insect villages) numbering many millions of individual ants that maintain their homes for the life time of a man or longer.

There are some 25 or 30 Orders in the insect Class. It will suffice here to indicate only those that include the more common varieties.

Butterflies and Moths, and the butterfly-like Skippers, make up the large group known as the Order Lepidoptera. The word means scaly wings. Whoever has handled them has had the dust from their wings on his fingers. This powder consists of countless tiny shingle-like scales that when magnified show patterns of ridges and fluted edges. Young Lepidoptera are caterpillars, many of which are highly injurious to crops. A destructive household pest is the caterpillar of the clothes moth. Adult members of the order have sucking mouthparts, consisting of tubular "tongue" or proboscis for sucking nectar. The larvae (caterpillars) have chewing mouthparts.

Grasshoppers, crickets, roaches, and their relatives constitute the Order Orthoptera (word means straight-wings). These all have biting mouthparts, and are primarily eaters of green leaves or grass. In contrast to the Lepidoptera, the young of this order look like the adults; maturity is reached through gradual growth and periodical shedding of the skin. Giant roach-like ancestors of modern species lived in Illinois Coal Age forests. Walking Sticks are the largest members of this Order.

Cicadas, plant lice, leaf hoppers and tree hoppers are members of the Order Homoptera. All of these insects live on plants, sucking the sap through beaks which are always placed low on the underside of the head. They are sometimes confused with the Order Hemiptera (true bugs) that includes the stink bugs, squash bugs, bedbugs, wheel-bugs and water scorpions. These all have beaks and sucking mouthparts but the beak protrudes more conspicuously from the front of the head than in the order Homoptera.

The largest of all the insect orders is the Coleoptera, the beetles. More than a third of all insects are beetles, and it has been estimated that one fourth of all the kinds of living animals are members of this one order. Beetles are easily recognized because of their tough shiny backs, the elytra or wing covers, actually the thickened front pairs of wings. The hind wings are delicate and membranous like the wings of a wasp. Beetles have biting or chewing mouth parts. Young beetles are called grubs and differ as much from adults in appearance as do caterpillars.

Bees, wasps and ants, and their less well known relatives, the gall and parasitic wasps, form the order Hymenoptera, the insects with membrane-like wings. This order contains the most advanced of the invertebrates when it comes to intelligence and complex behavior. Only one other order, the Termites, Order Isoptera, can compare with this group in social organization.

INSECT GROWTH AND TRANSFORMATION

Except in primitive forms, like Silverfish, a series of changes occur which alter the appearance and habits of insects during their lifetime. This process of reaching maturity through distinct or separate stages is called *metamorphosis* and is illustrated here by four examples. Immature insects sometimes show a specialized fitness for a way of life that is quite different from parents or ancestors. Special adaptations of this kind in larvae illustrate sidewise evolution or *caenogenesis*.

1. The Cicada. In cicadas, grasshoppers and several other orders the changes taking place before maturity is reached are gradual. The young that emerges from the egg shows resemblance to the adult except the wings are missing. Young cicadas differ more from adults than do grasshoppers because cicada nymphs show more "sideways evolution". The young live in a much different environment than do the adults and have become especially adapted to it. (Young and adult grasshoppers eat the same food and may be found together in the same fields and pastures.)

The fore legs of the cicada nymph, as may be seen on page 10 are enormously enlarged, resembling somewhat those of the mole cricket, and are similarly fitted for digging earth during the long period that is spent underground before maturity is reached. During the growth of the cicada nymph the skin is shed from time to time. Short wing pads appear and these enlarge before the final transformation to the adult, when full sized clear wings appear and the underground dweller becomes a flying insect.

When the cicada nymphs emerge from the soil, after a short pause at or near the surface (resting stage) they proceed at night to move further in an upward direction. They scramble up the nearest tree or weed stem, the shell splits open along the back and the winged adult emerges. Within a very few days mating has taken place, the eggs are laid on branches of fruit or woodland trees, the grubs hatch and drop to the ground, begin to dig into the soil and a new life cycle has begun. How long cicada nymphs stay in the soil has been learned only with difficulty. It would seem that the common cicada nymph is underground for four years before it becomes adult. For most cicada species the time is still undetermined.

The most famous member of the Cicada Family is no doubt the Periodical Cicada, incorrectly called the seventeen year locust. The dramatic and noisy appearance of swarms of this species after long intervals has aroused the curiosity and wonder of mankind as long as there have been men on this continent. The reddish brown insect is slightly smaller than the common green and black harvest fly. Its life-story is similar but lasts much longer—17 years in northern states, 13 years in the southern part of the country. Not all the country's periodical cicadas appear the same year but some appear every year since there are at least twenty different broods and each brood has its own schedule for maturing. In Illinois both the 17 year and the 13 year races occur and the broods may overlap so that swarms may emerge in two or three successive years, in some localities.

Damage is sometimes done to fruit trees because of the way the female lays her eggs. Slit-like cuts are made on twigs by the knife-like

Nymph of common cicada (*Tibicen linnei*) These immature insects live underground. suck juices from roots of forest and fruit trees. (4x)

egg-laying apparatus (ovipositor) and into each cut fourteen to twenty eggs are deposited. A single twig may have four or five to fifteen or twenty egg-nests; these are sometimes broken off by the wind so that a

Common Cicada or Harvestfly (*Tibicen linnei*) Males only produce the familiar song heard in mid-summer. (2x)

Periodical Cicada (*Magicicada septendecim*). Both the 13 year and the 17 year varieties of this insect are found in Illinois. It was formerly contended by superstitious folk that the infrequent appearance of swarms of these insects portended war, a belief confirmed by the reddish "W" on the wings! (life size)

Skin shed when nymph of common cicada emerged from soil after period of 4 years (time varies with different species). (2x)

heavily infested tree will be made to look unsightly. Damage to trees by nymphs is considered of no importance.

2. The Monarch or Milkweed Butterfly. All butterflies and moths (Order Lepidoptera) go through a transformation known as complete metamorphosis. There is no resemblance, whatsoever, between the young, called a larva, and the adult, known as an imago. The larva might be considered a sort of food getting machine whose activity permits develop-

Two or three week old Monarch larva preparing to form chrysalis. ($1\frac{1}{2}$ x)

"Little green house with nails of gold" holds pupa for about 12 days. ($1\frac{1}{2}$ x)

ment of the egg producing and distributing adult. Between these two different active life-stages there is a quiet or pupal stage when there is a general breaking down and reorganization of living tissues. In this, the pupal stage, there are wing pads present but there are no signs of wings in the larva. This type of transformation is also typical of beetles, of wasps and their kind, flies, as well as the Order Neuroptera which contains the ant lion and the highly speciaized Siphonaptera (fleas).

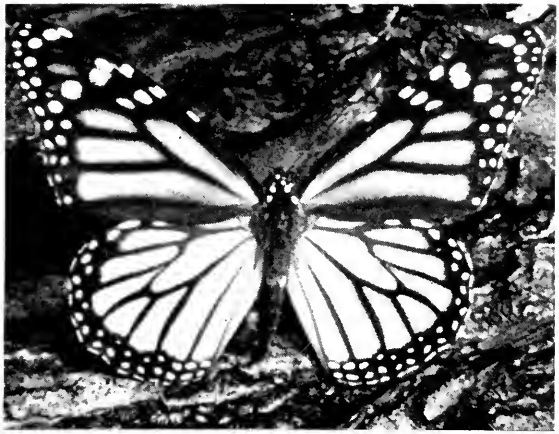
Orange-brown monarchs are handsome summer insects that occur from Southern Canada southward to South America. In Illinois these butterflies arrive from the south in May, produce three or occasionally four generations during the following five months and in the fall migrate to the Gulf States. Occasionally scattered individuals will hibernate here as adults. The flocks that gather in autumn before migrating swarm in great numbers on the twigs and branches of trees and bushes. The southern flight has been observed at tree top level in Springfield, in October. In the South the adults may remain active in the warmer sections, although winter hibernation is usual. Oddly enough the spring return to the north is never in flocks or aggregations but is an individual meandering activity.

The monarch appears about the time the milkweed first emerges from the ground; females lay their eggs on the tiny plants of any one of several kinds of milkweed, placing a few eggs only on a single isolated plant. Upon emerging from the egg the black banded greenish-yellow caterpillar with two pairs of fleshy "horns" or filaments (feelers) proceed at once to consume leaves of its food plant. It grows rapidly and as it grows it molts periodically. In a week or two it has attained a length of about two inches and is ready for the chrysalis or pupal stage. The change from caterpillar to chrysalis is made in half an hour.

A twig, fence rail, or other support, is sought by the nervous appearing larva that seems to know its time is getting short. The rear tip is fastened by an attachment web spun of silk so as to permit the body to swing downward. The banded skin is then moulted while the whitish grub-like pupa jerks and twirls and sways in the wind. A greenish liquid flows over the entire body. In an hour or two the jewel-like chrysalis has hardened.

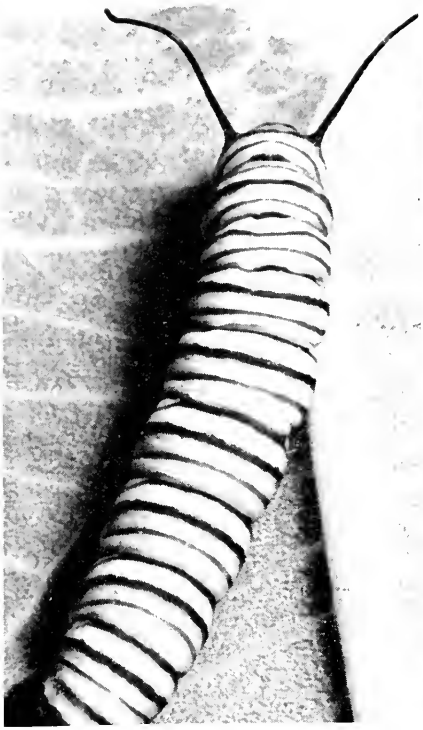
It has been noticed that only the newly emerged adults feed on the nectar of flowers. When feeding the wings are tightly closed over the back, although males will suddenly open their wings and close them again. After three or four days monarch butterflies cease feeding and begin to wander about, mating and laying their eggs.

3. The Cecropia Moth. Moths and butterflies belong to the same Order, Lepidoptera; they are similar in appearance and their life histories, in general, are much alike. But there are important differences between them. Moths are thicker bodied, their antennae are feathery, and most of them fly about at night. Butterflies have slender bodies, have knobbed antennae and fly in the daytime. The Chrysalis of the Monarch is typical of butterflies while with the moth the pupa or resting stage is generally spent in a silk lined cocoon. Many moth larvae burrow into the ground and make their pupal cell in the earth.



Adult Monarch (*Danaus plexippus*) overwinters in far South, gradually returns to Illinois in early summer. ($^3/_4$ x)

Swarm of Monarchs ready to migrate to Southern States. Chicago Tribune photo, taken in Chicago.

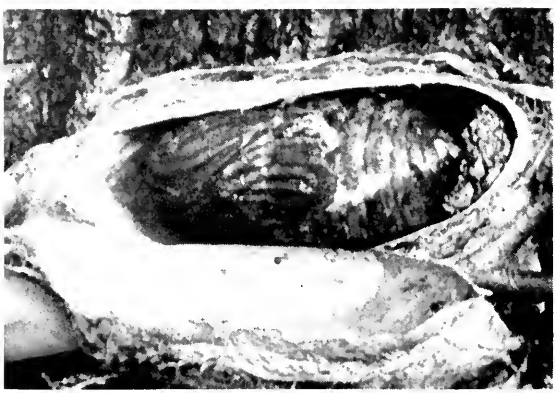


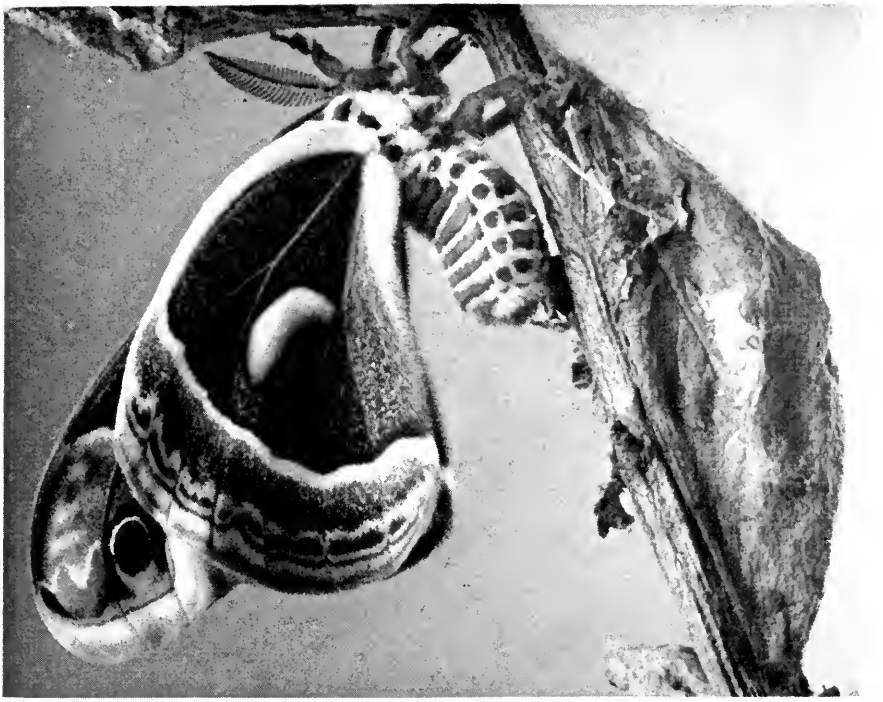
Monarch Caterpillar on leaf of food plant (Milkweed). (3x)

Cecropia caterpillar, feeds on maple, apple, elm and 50 other trees and shrubs. (¾ x)

A Cecropia cocoon is a tough, water-proof, two layered case of silk bound tightly to a twig and made inconspicuous by leaf fragments stuck on the outside. In this capsule the helpless pupa spends the winter, emerging in May or June as an adult.

Cecropia cocoon opened to show pupa a few weeks before emergence. (life size.) The silk is produced from glands under the skin that open on the upper lip. It is distributed all around the caterpillar and then inside the cocoon by zig-zag motions of the head.

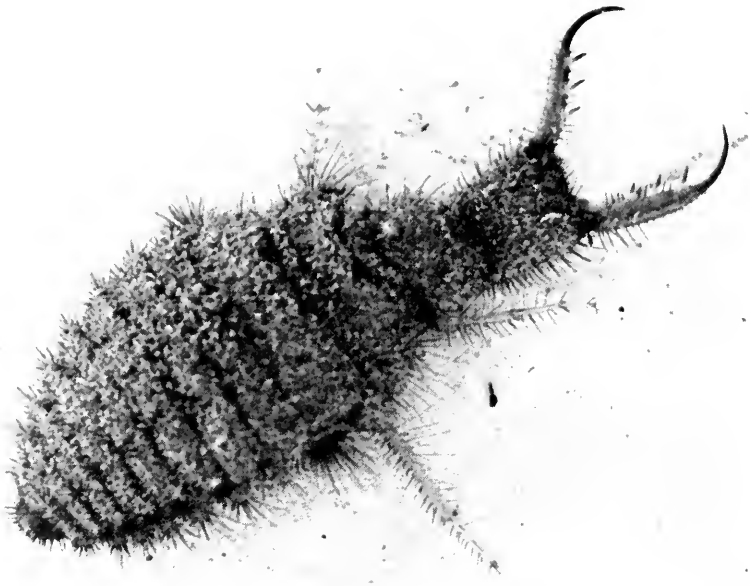




Male Cecropia Moth (*Samia cecropia*) dries its newly expanded wings before first flight. (Life size)

Of all kinds of moth cocoons the most elaborately constructed are those of the Giant Silkworms, Family Saturniidae. The largest member of this Family in Illinois (or in the U. S.) is the Cecropia Moth, shown here with the cocoon from which it had emerged a few minutes before the photograph was taken.

Moths of the giant silkworm family have degenerate mouth parts that are of no actual use. Adults never eat during the week or 10 days of their existence since they are concerned only with mating and the production of eggs. The sex attraction and nuptial flights of the males in this group are especially noteworthy. The feather-like feelers are much enlarged in the males and function as organs of smell. With these sensitive organs the presence of a cecropia female moth as much as three miles away may be detected when the wind is favorable. The mating flights of this species occur just before dawn when a single female may attract several dozen or even a hundred males. Experiments were conducted near St. Louis by Phil and Nellie Rau in an effort to determine the sensitivity of this and other Saturniid species. Male Cecropias reached the female with one half of each antenna off, or with one entirely removed, but none arrived when both feelers were missing.



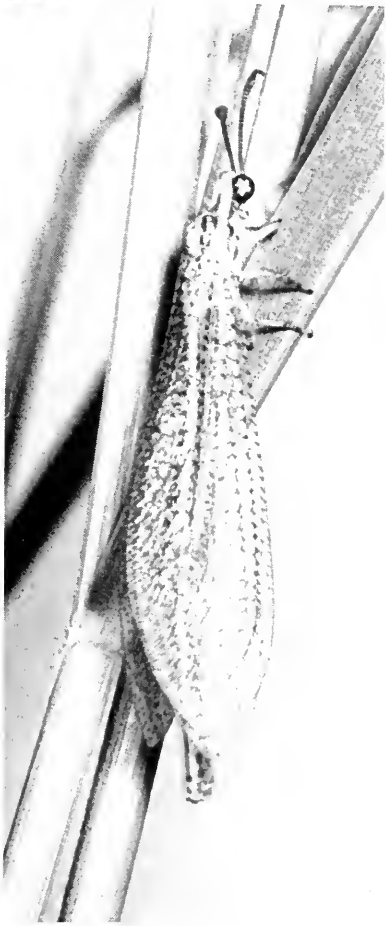
Ant lion larva (*Myrmelion*) enlarged to show flat sand-shovel head and powerful jaws. (10x) The bite is poisonous and liquifies the muscles and internal parts of the prey so that they can be siphoned out through grooves on the underside of the mandibles.

4. The Ant Lion. The food-getting manner of this animal is unique and provides another interesting example of "sideways evolution" in the larva, as mentioned in discussing the nymph of the cicada. Crater construction and capture of prey by ant lions may sometimes be observed in the daytime, although the insects are usually more active at night.

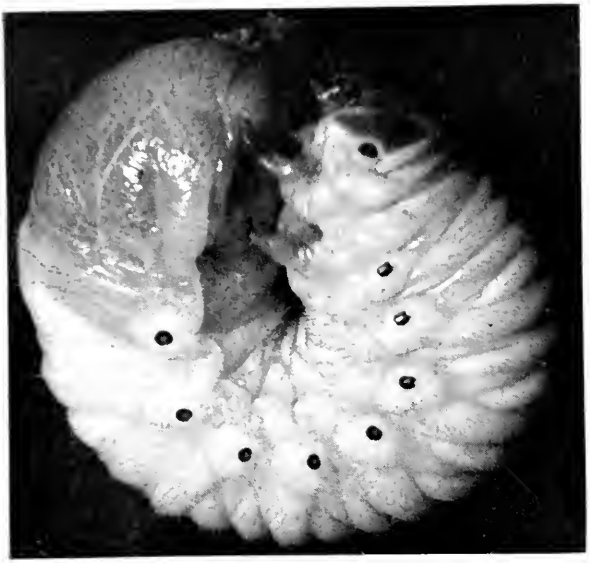
Two-inch crater in dry sand made by ant lion for trapping insects. (Actual size.) At the apex or bottom of the completed cone the larva buries itself, all but the head and pincer-like jaws which lie exposed and ready for seizing a meal. The meal is an ant or other insect or small spider that chances to come sliding down the loose walls of the crater.

Cocoons of sand and silk hold pupa before transformation to adult. (Actual size)

The inconspicuous eggs (not illustrated) are laid by the adult in or on the ground. In about two weeks they hatch into little woolly larvae that are particularly suited to living in loose dry soil or sand. Soon after emerging from the egg the pit-making larvae (not all ant lions dig pits) begin construction of their pit-falls. The entire body acts as a sort of plow as the larva crawls backwards, its usual mode of moving about. The pointed abdomen turns a broad furrow while frequent jerks of the flat head flip sand grains from the depression. Following a circular or spiral path the ant lion's pit-fall is completed in a matter of minutes when the animal is hungry. If objects too large to be flipped by the head are encountered they are tunneled under, loaded on the back and heaved from the edge of the pit. Escape from this trap by the victim is made more difficult by a hail of sand tossed up by the jerking head of the "lion". Once the spiked jaws are able to grasp the prey, the meal is assured.



Ant lion adult (*Myrmelion*). A graceful insect with lacy wings. (Life size)



A serious pest to crop plants, the White Grub is larva of June Beetle (species unknown) (4x)
White grubs eat the roots of corn and other cultivated crops. The 8 pores (spiracles) open into the air tubes (Tracheae)

KINDS THAT CAUSE TROUBLE

Insects as the great menace to mankind have been given such publicity in recent decades that now nearly everyone thinks of these animals primarily as man's enemies. Of course it would be wrong to ignore the crop damage by insects in this great agricultural area of central United States. The harm done by insects to human possessions, like clothing, buildings, stored items of all sorts, and their impairment of health through the spread of disease is also a serious matter. However, in figuring up the losses inflicted by the various injurious kinds it should never be forgotten that other kinds of insects are highly important for man's very existence. If it is true that under certain conditions as much as 20 per cent of a crop is lost to chinch-bugs or grasshoppers, etc., it is also true that without certain other insects there would have been no crop whatsoever. An entomologist once proposed that damage done by harmful insects should be counted as a commission for the vastly greater amount of service rendered by the beneficial varieties.

Often the trouble with insects begins with man himself. Some of the most destructive insect pests were imported from foreign countries without bringing their natural insect enemies along with them—enemies that would have kept a limit to their increase. Poor control of insects is frequently due to ignorance of the life habits of the trouble-maker. It is now apparent that to be effective the measures taken for control of harmful insects must be based on an understanding of their life histories, physiology and anatomy.

The carpet beetle is considered the worst pest of fabrics and stored clothing. Only the grubs do damage and these may require as much as three years to complete their growth.

Hairy grub of Carpet Beetle (*Anthrenus scrophulariae*) eats woolen fabrics. This European insect first became a pest in U. S. in 1874. Pin-head sized adult beetle feeds on the pollen of flowers. (30x)

Archenemy of mankind among insects. grasshoppers have caused serious crop damage from ancient to modern times. Differential "hopper" (*Melanopus differentialis*), is one of largest harmful species in State. (Life size)

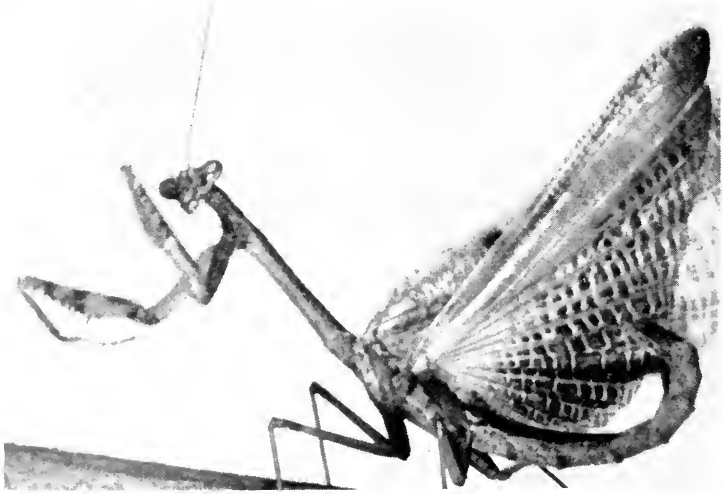
Cockroaches are probably the most unpopular of all insect pests since they contaminate food and produce an unpleasant odor. The natural home of all roaches is in or near the tropics. The five or six common species would probably not be pests if their northward range had not been extended by heated houses and other buildings.

Oriental Cockroach (*Blatta orientalis*) originally came from Asia, now abundant in every country. Egg capsule (ootheca) protrudes from the abdomen. (Life size.)

Wheel-bug (*Arilus cristatus*) Sucks juices from caterpillars and other insects with its poisonous beak. (2x)

SIX-LEGGED BENEFACTORS

While mankind is engaged in waging continual war with certain insect pests other insect species serve him ably as allies. In fact, the insect friends of man do more than he could ever do himself in keeping the harmful kinds under control. The insect destroyers of insects are either *predators* or *parasites*. Predators, like the Mantis and the Wheel Bug, catch and devour their prey. The Wheel bug stalks its victims, while the Mantids will chase and seize grasshoppers and other insects in mid-air.



Praying Mantis (*Stagomantis carolina*) feeds entirely on other insects, is harmless to man, and should not be killed. (Slightly over life size)

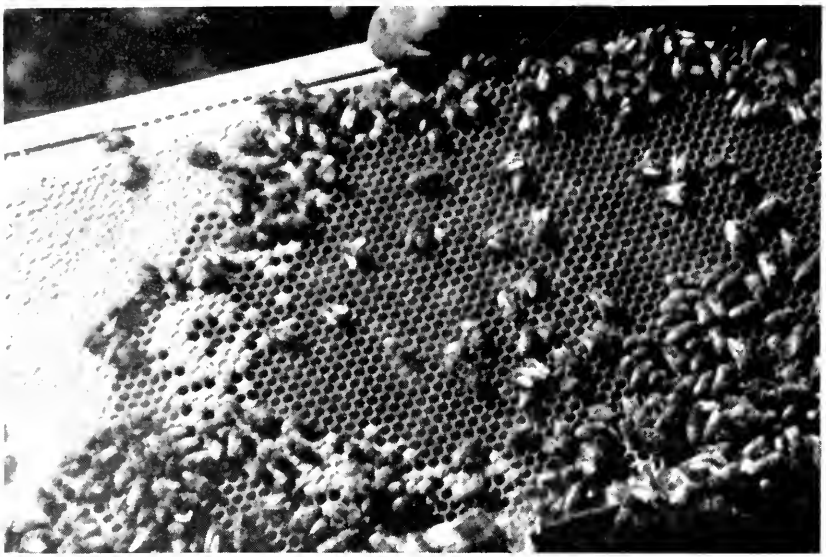
Saddle-back (*Sibine stimulea*) destroyed by parasites. Millions of destructive caterpillars are victims of parasitic wasps whose larvae grow inside body and emerge to spin cocoons. (3x)

Long-tailed Megarhyssa (*Megarhyssa lunator*). Belongs to large family of wasps that kill insect enemies of man. (life size)

Parasites differ from the predators in that they enter the body of the victim, called the host, feeding on blood or tissues until full grown. By this time the host is dead or nearly so, and the parasite transforms to adult which mates and lays its egg on another victim. The long "sting" on the body of the Long-tailed Megarhyssa is actually an egg laying organ (ovipositor) used in inserting the eggs in the burrows of a pestiferous insect, the elm and maple borer (pigeon tremex). After hatching from the egg the parasitic larva crawls along the burrow until it finds the wood-boring larva, its victim.

A great number of caterpillars of moths, including pests like the army worm, the white-marked Tussock moth, and the tent caterpillar are destroyed by the parasitic larvae of smaller wasps belonging to the family Ichneumonidae. There are still other wasp families, the Chalcidae and the Braconidae whose members parasitize caterpillars and other insects. The cocoons (not eggs) shown on the Saddle-back caterpillar are typical of silken Braconid cocoons so commonly seen on tomato worms.

It is a fact worth noting that the number of young parasites may be much greater than the number of eggs actually laid, since many embryos are developed from a single egg (*polyembryony*).



Brood comb from hive of Honey Bee (*Apis mellifera*)

In Illinois the honey produced every year by our one domesticated insect (Apis mellifera) is valued at over a million dollars. In addition a quarter million pounds of beeswax worth a hundred thousand dollars are also manufactured by these insects. Important as is this honey and wax for our use and welfare, their value is small when compared to the importance of honey bees, and countless other insects, in the cross pollinizing of plants. About 85 percent of all flowering plants, including most agricultural crops, require insect pollination for their existence. Without insects as pollinators there would be no crops, no gardens, vegetables or flowers, no fruits, no shrubs, no tobacco, and little of the plant growth that enriches our landscape.

Pollen basket (corbicula) on hind leg of Honey Bee into which pollen is packed for transporting to hive, where it is fed to young as bee-bread. (6x)

Flowering plants and pollen collecting insects like Bumblebee (Bombus) are closely dependent on each other for their existence. (life size)

So close has been the interrelations between insects and flowering plants that evidence of mutual dependence may be seen in the structure of both organisms. The showy blossoms and sweet fragrance of plants is for the attraction of insects and not for the delight of human senses. Nectar seeking insects cannot obtain nectar without picking up pollen grains as well, which are then carried on to the next flower, assuring the plant's reproduction. Bees show the most extensive specialized structures in relation to flowers. The mouth, as already shown, is lengthened for sucking up nectar. The body is clothed with countless hairs, even the eyes, so that the whole animal is literally a device for brushing up pollen. Bee larvae feed on bee-bread made from pollen and honey and a device for the transporting of quantities of pollen may be found on the hind legs of workers. Into this pollen basket (corbicula) is packed the grains that are combed from the body by combs and scrapers on the feet.

More might be said about insects as human benefactors. Many insects live in the soil in tremendous numbers (65 millions per acre). The majority of these contribute to the enrichment of the soil through their exertions, interchange of soil particles, burrows allowing better drainage, and their dead bodies. As scavengers insects perform a useful service, removing as they do the quantities of dead and decaying animal and plant remains. They are an exceedingly important link in the food chain that maintains a balance in nature. They form far more than half the food supply for birds, fresh-water fishes, reptiles, amphibians and small mammals.

COMMON ILLINOIS BUTTERFLIES

COMMON ILLINOIS BUTTERFLIES

Photo by Charles Hodge

Family: Papilionidae
Expanse: 2½ to 3 inches

1. Zebra Swallowtail (*Papilio marcellus*)

The light bands crossing the wings are greenish white. The caterpillar feeds on leaves of the pawpaw. The early spring form appears in late March or early April. A slightly larger late spring form appears the middle of April while the still larger summer form appears early in June. Insects with variations in markings in different seasons or sexes are referred to as being polymorphic.

Family: Nymphalidae
Expanses: 1¼ to 1⅝ in.

2. Pearl Crescent (*Phyciodes tharos*)

Orange and black markings on upper side. On the under side the forewing has a network of brown lines. The caterpillar feeds on wild asters, hibernates in the fall and resumes feeding in the spring until about the middle of May when it pupates. First brood of adults appears in late May. A second brood appears in July.

Family: Papilionidae
Expanses: 2¾ to 3¼ in.

3. Black Swallowtail (*Papilio ajax*)

Wings are velvety black with yellow spots. Sometimes called parsnip butterfly since caterpillars feed on wild parsnip, carrots etc. Overwinters in chrysalis stage. Flight is rapid but irregular and generally near the ground. Two or three broods appear during the season.

Family: Pieridae
Expanse: 2½ in.

4. Southern Dogface (*Zerene caesonia*)

Wings are lemon-yellow bordered with black. Abundant in southern part of State, as it occurs commonly in Southeastern and Southwestern U. S.

Family: Papilionidae
Expanse: 3 to 5 inches

5. Tiger Swallowtail (*Papilio glaucus*)

Chiefly yellow with black stripes and borders with yellow spots. Females are dimorphic, (they appear in two distinct patterns of color) one of which is similar to the yellow male, the other almost entirely black. Larva feeds on poplar, ash, cherry and other trees.

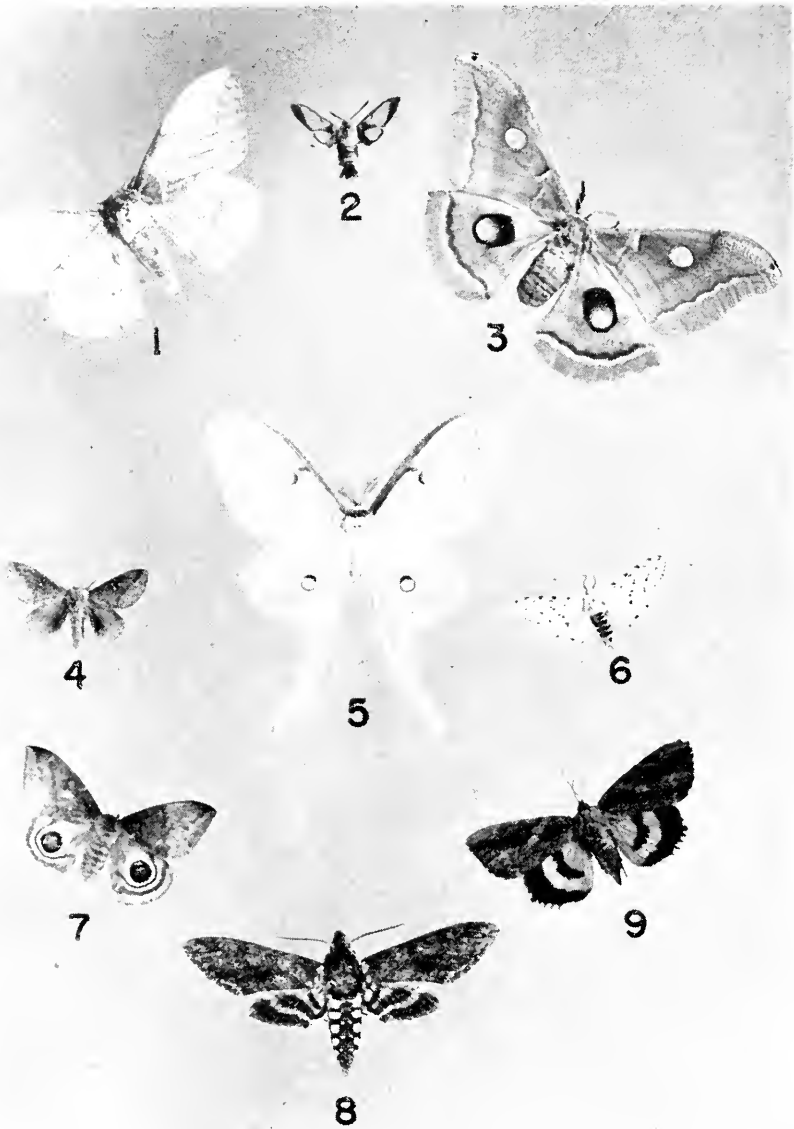
Family: Nymphalidae
Expanse: 2 to 2¼ inches

6. Red Admiral (*Vanessa atalanta*)

Wings are brownish-black with a bright orange band across each front wing. Underside has a network of fine white lines on a gray background, with several eye spots on hind wings. Found all over North America, Europe, Northern Asia and Africa.

(Continued on page 30)

COMMON ILLINOIS MOTHS



COMMON ILLINOIS MOTHS

Photo by Charles Hodge

Family: Citheroniidae
Expanse: 4 to 5½ inches

1. The Imperial Moth (*Eacles imperialis*)
Sulphur yellow, banded and speckled with purplish-brown. Larvae are 3 inches long when full grown and feed on a great variety of forest trees. They go into the ground to pupate and do not make cocoons.

Family: Sphingidae
Expanse: 1½ to 1¾ inches

2. Bumblebee Hawkmoth or Clearwing (*Haemorrhagia diffinis*)
Belongs to a group of hawkmoths in which the middle portion of the wings are transparent. The body is yellowish, banded with black. The larva feeds on the bush honeysuckle and the snow-berry.

Family: Saturniidae
Expanse: 4 to 5 inches

3. Polyphemus Moth (*Telea polyphemus*)
A brownish or yellowish moth with transparent spots on wing. The larva feeds on oak, butternut, elm, maple, apple and other trees. It is a light green color with a vertical yellow or white line on each segment of the abdomen. The cocoon is usually enclosed in a leaf.

Family: Citheroniidae
Expanse: 2 to 2½ inches

4. Honey-locust Moth (*Adelocephala bicolor*)
Upper side of fore-wings and under side of hind wings are yellowish brown with black. The under side of the fore wings and upper side of hind wings are pink. Larva feeds on honey-locust and Kentucky coffeetrees.

Family: Saturniidae
Expanse: 3¾ to 4¼ inches

5. Luna Moth (*Tropaea luna*)
Wings are light green in color, marked by brownish ringed transparent spots. Generally found only in woodland areas. Larva feeds on hickory, walnut and other forest trees.

Family: Arctiidae
Expanse: 2 inches

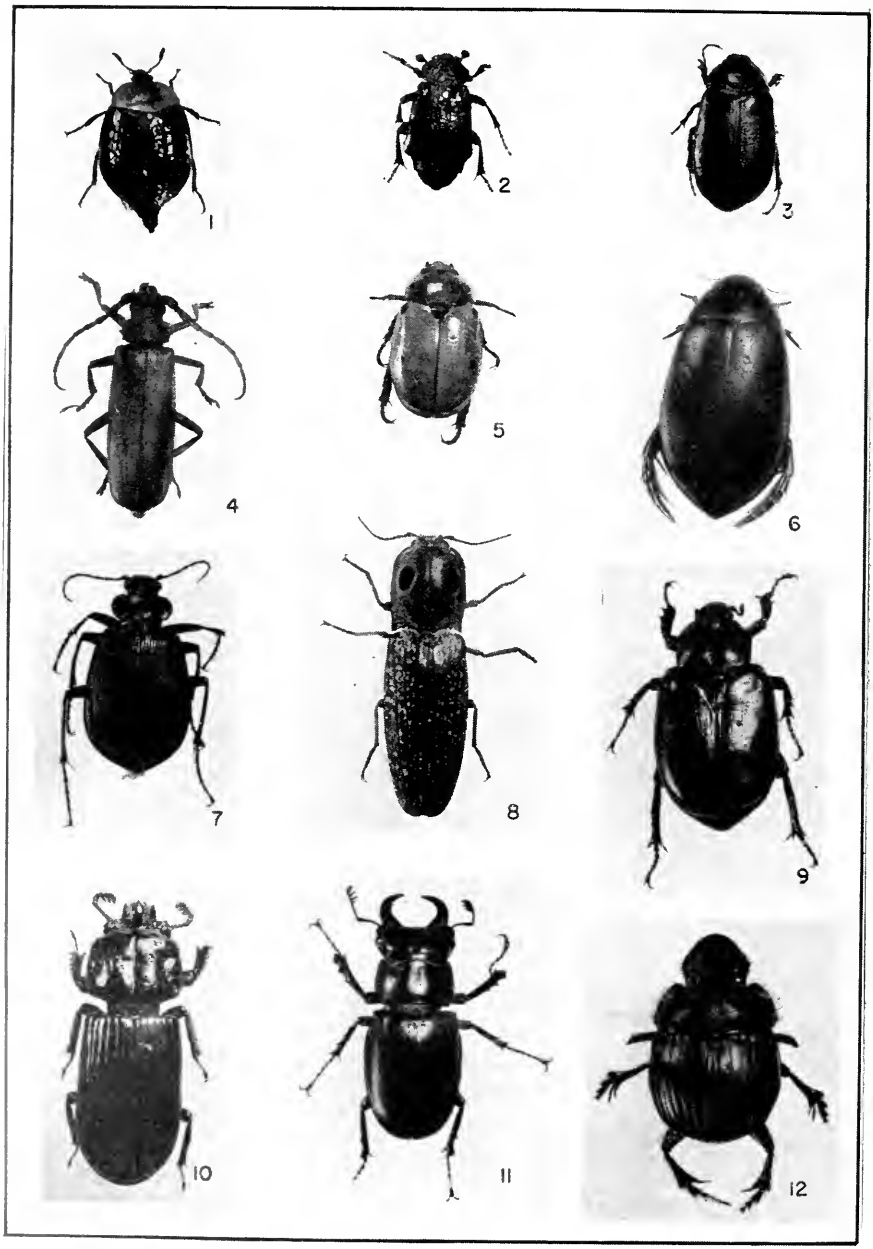
6. Acrea Moth (*Estigmene acraea*)
The caterpillars of this moth, called woolly-bears, are hairy yellowish-brown insect pests that feed on garden and crop plants. The adults are dimorphic, males have hind wings yellow above and below while both wings are white in female. Abdomen of both sexes are yellow, marked with black spots.

Family: Saturniidae
Expanse: 2½ to 3 inches

7. Io Moth (*Automeris io*)
Ground color of adult is purplish yellow. The eye spots on the hind wings are blue and black.

(Continued on page 31)

COMMON ILLINOIS BEETLES



COMMON ILLINOIS BEETLES

Illustrations show beetles life size.

Family: Silphidae

1. The Carrion Beetle (*Silpha americana*)

As scavengers these and other carrion eaters are of genuine service although their mode of existence may seem repulsive.

Family: Silphidae

2. The Burying Beetle (*Necrophorus tomentosus*)

These insects bury carrion, such as small dead mammals and birds, by digging away the soil from below. The eggs are then laid by the female near the hidden food supply which will be consumed by the grub when it hatches.

Family: Scarabaeidae

3. May-Beetle or June-bug (*Lachnosterna rugosa*)

These are the beetles that come buzzing around porch or street lights at night. The adults may do damage to trees by consuming the leaves while the larvae are often pests to crop plants and garden vegetables.

Family: Cerambycidae

4. The Straight-bodied Prionid (*Orthosoma brunneum*)

Larvae of members of this family are wood borers that often do great damage to trees. Prionid larva infests pine.

Family: Scarabaeidae

5. The Spotted Pelidnota (*Pelidnota punctata*)

These beetles commonly live on grape vines. The larva lives among decaying roots and stumps of various trees.

Family: Dytiscidae

6. Diving Beetle (*Dytiscus fasciventris*)

Diving Beetles attack and devour other aquatic insects as well as snails, salamanders, tadpoles and small fishes. They breathe at the surface and carry air down with them under the wing covers near the breathing pores (spiracles).

Family: Carabidae

7. The Searcher (*Calosoma scrutator*)

This bright green ground-beetle belongs to a genus known as caterpillar hunters and is considered especially beneficial because of its destruction of hairy tent caterpillars.

Family: Elateridae

8. Eyed Elater or Click Beetle (*Alaus oculatus*)

Largest click beetle in Illinois. So called because when placed on its back it will flip into the air with a clicking sound. The click is caused by a projection on underside of the thorax that snaps into a socket. Larvae of click beetles are called wire-worms. There are many kinds. Some are beneficial as scavengers (consuming dead trees) while others are destructive to crops, particularly corn, small grains, potatoes and other vegetables.

(Continued on page 30)

Family: Scarabaeidae

9. Hermit Flower Beetle (*Osmoderma eremicola*)
Deep mahogany brown and highly polished. Larva feed on decaying wood while adults feed on pollen. This is one of our largest species.

Family: Passalidae

10. Horned Passalus (*Passalus cornutus*)
Adults and lavae are found in rotten logs. Both make a faint rasping sound and it is believed that parents and offspring communicate with one another, and are social beetles. Adults prechew the wood for the larvae.

Family: Lucanidae

11. Stag Beetle (*Pseudolucanus capreolus*)
Mandibles of male are sometimes branched like antlers. Males also fight stag-like for females. Often attracted by light but usually live in woodland areas. Larvae resemble white grubs of June-Beetles, and are found in trunks and roots of old decaying trees.

Family: Scarabaeidae

12. Tumble-bug or Dung Beetle (*Pinotus carolinus*)
One of the largest of our scarab beetles. Its earth boring habits are similar to *Canthon laevis* mentioned on page three.

(BUTTERFLIES—Continued from page 25)

Family: Pieridae
Expanse: 1¾ to 2 inches

7. & 8. Orange Sulphur (*Colias eurytheme*)
This bright insect sometimes swarms by the thousands in open fields. Alfalfa is a preferred food plant. The male (7) is readily distinguished from female (8) by the solid black wing borders which in female are spotted. There are several color phases including an albino or white phase of the female which is very common.

Family: Nymphalidae
Expanse: 3 to 4 inches

9. Great Spangled Fritillary (*Argynnis cybele*)
The underside, with the conspicuous silver spots, is illustrated. Above it is cinnamon-brown with darker areas at the wing bases and marked with black. The larvae feed on violets.

Family: Nymphalidae
Expanse: 2½ inches

10. The Question Mark (*Polygonia interrogationis*)
Sometimes called the Violet-tipped Anglewing. Upper side is bright orange with dark cinnamon brown on outer part of wings and spotted with black on inner areas. Underside is brown, with a silver crescent-shaped spot and a round dot that resembles a question mark. Adults hibernate and appear at first sign of spring. First generation appears in July while the second overwintering generation comes out late in August.

Family: Nymphalidae
Expanse: 2½ to 3 inches

11. The Viceroy (*Basilarchia archippus*)

Ground color is bright brownish red, with prominent black veins. Differs noticeably from its close relatives, most of which are dark, and shows striking resemblance to the Monarch, which it is said to mimic. Even its method of flight is more like that of Monarch than other members of genus to which it belongs. Larva feeds on willow, poplar, aspen and cottonwood.

(MOTHS—Continued from page 27)

Family: Sphingidae
Expanse: 4 to 5 inches

8. Tomato Sphynx (*Protoparce quinquemaculata*)

The larva of this moth is the tomato worm, which feeds on leaves of the tobacco and potato as well as the tomato. It is greenish with a series of stripes running length-wise on each side. The pupa buried in the soil is naked and has a tongue case resembling the handle of a pitcher. The moth is of various shades of gray marked with black. Spots on the sides of the abdomen are yellow, bordered with black.

Family: Noctuidae
Expanse: 3 to 3½ inches

9. The Poplar Underwing (*Catocola amatrix*)

The Underwing moths are striking in appearance when the wings are fully expanded but otherwise inconspicuous, since the fore-wings are dull gray marked with zigzag lines. They are seldom seen except by collectors, since they fly only at night. At rest on a tree trunk the moths are practically invisible. The larvae feed on leaves of forest trees.

HOW TO LEARN MORE ABOUT INSECTS

A great many books have been written about insects and it would be impossible to give anything like a summary of all those most useful. A number of well illustrated accounts, available in most public or school libraries, are here listed.

For young boys and girls.

The Boy's Book of Insects, by E. W. Teale, published by Blakiston Company, Philadelphia, Pa., 1943.

Insect Life, by E. W. Teale, published by the Boy Scouts of America. New York, 1944.

The Insect Parade, by Bertha M. Parker, published by Row Peterson and Co., Evanston, Illinois. (Also other insect booklets by the same author and publisher).

Insect Adventures, by J. H. Fabre, published by Dodd, Mead and Co., New York, 1929; also other insect books by same author.

4-H Club Insect Manual, by M. P. Jones, published by the U. S. Dept. of Agriculture, Misc. Publication no. 318, 1943.

Good reading about insects in general for older boys and girls and grownups.

Insects in Your Life, by C. H. Curran, published by Sheridan House, New York, 1951.

A Lot of Insects, Entomology in a Suburban Garden, by F. E. Lutz, published by G. P. Putnam's Sons, New York, 1941.

New Horizons, by E. W. Teale, published by Dodd, Mead and Company, New York, 1942.

Insects, Their Ways and Means of Living, by R. E. Snodgrass, published by Smithsonian Institution Series, New York.

Bees, their Vision, Chemical Senses, and Language, by Karl von Frisch, Cornell University Press, 1950.

The Ways of a Mud Dauber, by George D. Shafer, Stanford University Press, Stanford, California, 1949.

Books that will aid in collecting and naming insects.

How to Know the Insects, by H. E. Jaques, published by Wm. C. Brown Company, Dubuque, Iowa, 1947.

How to Know the Immature Insects, by H. F. Chu, published by Wm. C. Brown Company, Dubuque, Iowa, 1949.

The Insect Guide, by Ralph B. Swain, published by Doubleday & Co., Inc., Garden City, New York, 1948.

Fieldbook of Insects, by F. E. Lutz, published by G. P. Putnam's Sons, New York, 1935.

The Butterfly Book, The Moth Book, by W. J. Holland, published by Doubleday, New York, 1914 (plates in the 1914 editions are superior to those in later editions.)

How to Know the Butterflies, by J. H. and A. B. Comstock, published by Comstock Publishing Co., Ithaca, New York, 1936.

Butterflies, by R. W. Macy and H. H. Shepard, published by The University of Minnesota Press, 1941.

How to Collect and Preserve Insects, by H. H. Ross, published by the Illinois Natural History Survey, Urbana, Ill., 1944.

On Controlling Insect Pests.

202 Common Household Pests of North America, by H. Hartnack, published by Hartnack Publishing Co., Chicago, Ill., 1939.

The Gardener's Bug Book, by C. Wescott, published by American Guild and Doubleday and Co., Garden City, N. Y., 1946.

Destructive and Useful Insects, by C. L. Metcalf and W. P. Flint, published by McGraw Hill, New York, 3rd edition, 1951.

Many bulletins and leaflets of the U. S. Dept. of Agriculture.

MUSEUM BOARD OF ADVISERS

HON. VINCENT Y. DALLMAN, Chairman
Editor, Illinois State Register, Springfield

H. J. VANCLEAVE, Ph.D.
University of Illinois, Urbana

FAY-COOPER COLE, Ph.D.
University of Chicago, Chicago

HON. ROBT. H. BECKER, Outdoor Editor
Chicago Tribune, Chicago

M. M. LEIGHTON, Ph.D., Chief
State Geological Survey, Urbana