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STRAIGHT TALK ABOUT BUTTERFLY BIOLOGY

by Ann B. Swengel, 1995

Butterflies are insects. Insects are animals that lack backbones (known as "invertebrates"). They are also cold-blooded, since they do not maintain a constant internal body temperature. Instead, they use environmental condition to adjust their body temperature. Mature insects have three body parts or segments - head, thorax ("chest"), and abdomen ("belly"). The most obvious parts of a butterfly - the wings - are actually appendages (or accessories) to the thorax. Mature insects also have three pairs of legs, also appendages to the thorax. Six legs may not be apparent on a particular insect individual, however. It may have lost one or more of its legs or some of the legs in that species may be small and hard to see. The many groups of insects are quite diverse. They vary in number of stages in their life cycle and in the processes by which they develop from one stage to the next.

Butterflies belong to the insect group called the Order Lepidoptera. Butterflies are distinguished as a group by the pair of antennae on their heads. Their antennal tips are thickened and rounded. Another group in this order is the skippers. They have antennae with thickened tips that are bent and pointed. Both butterflies and skippers are usually active only during the day. They also share similar behavior patterns and habitats, so books usually discuss both butterflies and skippers at the same time. Often the term "butterfly" is used to include both butterflies and skippers, as is the case here. The Order Lepidoptera also includes moths, which have

many more kinds of species than butterflies do.

In fact, an area typically has about 10-15 times as many moth species as butterflies. But because most moths are nocturnal, they are less often noticed. Moth antennae look like feathers, combs, or thin threads.

Butterflies have four stages in their life cycle. They start as an egg. Out of the egg emerges a caterpillar, also known as a larva. The caterpillar resembles a worm, except that caterpillars crawl about on numerous pairs of legs. Caterpillars usually feed by chewing on plant matter. As the caterpillar grows, it periodically casts off its skin, replaced by a new, larger skin underneath. Each growth stage between sheddings is called an instar. The various instars of the same species can look quite different from each other. When the caterpillar is fully grown, it disperses to find a suitable place to go through the process of pupation. This involves casting off the skin once more. Underneath appears the form of the next life stage, a chrysalis, also known as a pupa. Inside the immobile chrysalis, metamorphosis occurs. This is the process that transforms the caterpillar into a butterfly. When metamorphosis is complete, the adult butterfly, also known as an imago, crawls out through a slit in the chrysalis shell but it has curled and crinkled wings that are not flightworthy. The butterfly slowly flaps its wings to force fluid out the wings' veins to expand and stiffen the wings for flight. This may require one to several hours. Adult butterflies feed by sipping

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on liquids through the proboscis, a tube extending from the face. When not in use, the proboscis is coiled up tightly and not easily visible. Adult butterflies mate and females lay their eggs so that the life cycle can start anew. A butterfly species is often easiest to find when in the adult life stage.

But before becoming an adult, the individual existed as the immature stages first.

Butterfly species vary in the seasonal timing and length of their life cycles. The time of year when a butterfly is in the adult stage is called the flight period. When a species is not in flight, it still exists but in an immature stage. Species with only one life cycle per year are called "univoltine." Univoltine species vary both in length of flight period - from 2-3 weeks to 2-3 months or more - and in time each year when flight usually occurs. In very cold climates, some species may require two years for each life cycle.

Such a species may have all individuals on the same timing, with adult flight occurring every other year. Or it may divide its individuals into two groups, with a flight each year because the two groups alternate with each other. Species with two or more life cycles per year are called "multivoltine." A multivoltine species may have distinct flight periods for each generation or "brood." If so, every flight is separated by times when no adults are seen because the species is in immature stages. Or a multivoltine species may be "homodynamic" and have overlapping flight periods. Such species are continuously seen, or nearly so, from the beginning of flight in the spring to the end of flight in the fall. The number of generations per year a species has may vary in different parts of its range, with more generations in warmer areas than in colder. It may also vary in the same region among years. In warm years a species may have more generations per year than in cold years.

Adult butterflies are usually active only

during the growing season when the day is sunny or warm. Because they are cold-blooded and active only during the day, butterflies use sunshine and/or hot air temperature to warm themselves and become active. At night and in cool weather, butterflies usually seek cover in a protected location. This is called "roosting." The species vary a great deal, however, in their behavioral response to weather conditions. Some species are more active in cooler temperatures, drizzle, or high wind than others. During very hot weather, some species may also become inactive or seek shelter to avoid overheating. Some species may also tend to be most active only at certain times of the day, regardless of the weather at other times.

The butterflies' annual cycle typically includes a period of diapause (inactivity) during very cold or very dry weather. In cold climates, butterflies hibernate or "diapause" (become immobile) during winter. In tropical climates, butterflies may enter diapause if the area has a prolonged dry season. The life stage in which butterflies diapause varies among the species, depending on the timing of their life cycle. But the diapausing life stage is usually the same for all individuals in a particular species. While not completely immobile, some species may become inactive during the hottest part of summer. This is called aestivation.

Caterpillars are particular about the kind of food they eat. This food is called the larval food plant, or host. The caterpillars of the most flexible species feed on many hosts. Because of this adaptability, the flexible (or "generalist") butterflies tend to be widespread and common. Most familiar butterflies of gardens and backyards are flexible species. Even so, the caterpillars of these flexible species usually feed mostly on plants belonging to only one or a few plant families. The caterpillars of the fussiest

("specialist") species may eat only one host species in a region or even throughout the species' entire range.

Adult butterflies also have feeding preferences. Adults tend not to be as picky about food as caterpillars but still show distinct eating patterns. Some butterflies feed mostly on flower nectar. Among these nectarers, some species prefer to visit one group of flowers, such as daisy-type blossoms, or one color spectrum, such as pink to purple blooms. Other butterflies rarely visit flowers but feed instead on mud, dirt, sap, dew, animal droppings, rotting fruit, and carrion.

Most butterfly species tend to remain in a particular area but some kinds have a strong tendency to wander widely. Butterflies that live their entire life cycle in a certain region are called "resident" because they live there yearround. Most species seen in an area are residents. Resident species that spend their entire life cycle in a very localized area are called "sedentary." Even though they may exhibit a very active flight behavior, they do not move (disperse) far from a particular area. Other butterflies tend to wander far from the place

where they grew up. They are called "immigrants" because the adults move to new places. It varies greatly among years as to when and how many immigrants arrive in a certain place. In mountains, altitudinal immigration may occur, when species from warmer habitats at lower elevations may fly a relatively short distance uphill into a habitat with a much colder climate. Rare in the butterfly world is true migration, in which a species moves regularly each year between summer breeding areas and overwintering areas. An example is the Monarch.

Butterflies live in terrestrial habitats throughout the world. Butterflies live in habitats on land (called "terrestrial") and do not live in water ("aquatic" habitats). Although the most kinds of butterflies live in the tropics, many kinds occur in temperate areas and a few even on alpine mountaintops and in the Arctic. Butterflies dwell in all kinds of terrestrial habitats. Certain kinds live in deserts; others in wetlands that have consistently emergent vegetation above the waterline. Some live in and near forests while others inhabit open grasslands. Some co-exist with people in urban parks and suburban yards while others haunt only pristine wild lands.