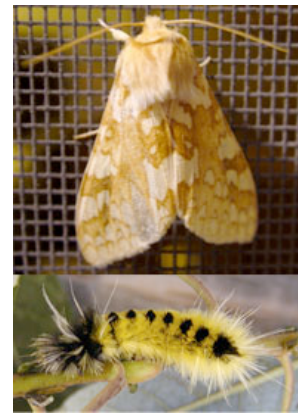


SPOTTED TUSSOCK MOTH or YELLOW WOOLLY BEAR

Class	Order	Family	Genus	Species
Insecta	Lepidoptera	Arctiidae	<i>Lophocampa</i>	<i>maculata</i>

Range:	Alberta, NW Territories, from the maritime provinces west in B.C. and south into Mts of N Carolina and west to S. California
Habitat:	Deciduous forests
Niche:	Nocturnal, arboreal, herbivorous
Diet:	Wild: poplars, birches, maples, willows and oaks Zoo:



Special Adaptations: Caterpillar has urticating hairs. They undergo complete metamorphosis. Adult has siphoning mouthparts. At rest it is curled up and can be unfurled into a long tube (proboscis) in order to probe deep into flowers. Caterpillars (larvae) have strong chewing mouthparts.

Other: This distinctive looking caterpillar is quite hairy and banded black, yellow and black. It also has long white hair tufts at each end. They have a wingspan of 35 - 45 mm (1.4 – 1.8 in). Hold wings in a roof like slope over body unlike butterflies who hold their wings vertical over their body.



SILK MOTH

Class	Order	Family	Genus	Species
Insecta	Lepidoptera	Bombycidae	<i>Bombyx</i>	<i>mori</i>

Range:	Origins from China
Habitat:	Deciduous forests
Niche:	Nocturnal, arboreal, herbivorous
Diet:	Wild: caterpillars white mulberry leaves, adults do not feed at all Zoo:



Special Adaptations: The moth phase of the life cycle cannot fly. Silkmoths have a wingspan of 3–5 cm (1.5–2 inches) and a white hairy body. Females are about two to three times bulkier than males, but are similarly colored. Undergo complete metamorphosis. The larvae have chewing mandibles for feeding on leaves, while the adults have sucking mouth parts.

Other: No longer a wild insect but was domesticated by humans for over 4,000 years for commercial silk production. While making a cocoon, a caterpillar produces silk at a rate of 25 feet/hour. A single cocoon may contain a half mile of unbroken thread. If the animal is allowed to survive after spinning its cocoon and through the pupa phase of its life cycle, it will release proteolytic enzymes to make a hole in the cocoon so that it can emerge as a moth. These enzymes are destructive to the silk and can cause the silk fibers to break down from over a mile in length to segments of random length, which ruins the silk threads. To prevent this, silkworm cocoons are boiled. The heat kills the silkworms and the water makes the cocoons easier to unravel.

ANISE SWALLOWTAIL BUTTERFLY

Class	Order	Family	Genus	Species
Insecta	Lepidoptera	Papilionidae	<i>Papilio</i>	<i>zelicaon</i>

Range:	Western North America, common in the Rocky Mountains west to California
Habitat:	fairly open country, and is most likely to be seen on bare hills or mountains, in fields or at the roadside
Niche:	diurnal, arboreal, herbivorous
Diet:	Wild: members of the carrot or parsley family (Apiaceae) including Anise and fennel and also some members of the citrus family, Rutaceae. Zoo: plants in parsley family including anise and sweet fennel



Special Adaptations: Complete metamorphosis. Uncommon for swallowtails to spend 2 or 3 years in chrysalides before emerging as adult butterflies. Like all swallowtail caterpillars, it has an orange "forked gland", called the osmeterium just behind its head. When disturbed, the osmeterium, which looks like a snake's tongue, everts and releases a foul smell to repel predators. When this caterpillar turns into a butterfly, they only take one big flight in April-July.

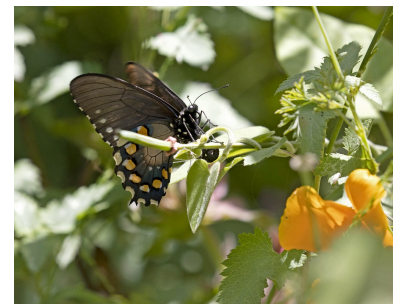
Other: In the butterfly stage both the upper and lower sides of its wings are black, but the upper wing has a broad yellow stripe across it, which gives the butterfly an overall yellow appearance. There are striking blue spots on the rear edge of the rear wing, and the characteristic tails of the swallowtails. In the first two instars, the caterpillar is dark brown, almost black, with an irregular white band at its middle. After that, it becomes greener at each successive molt until, in the fifth (last) instar, it is predominantly green, with markings in black, orange, and light blue.



PIPEVINE SWALLOWTAIL BUTTERFLY

Class	Order	Family	Genus	Species
Insecta	Lepidoptera	Papilionidae	<i>Battus</i>	<i>philenor</i>

Range:	North America and Central America
Habitat:	Wide variety of open habitats, open woodland and woodland edges
Niche:	Larvae: pipevine plants, Adults: nectar
Diet:	Wild: Zoo:



Special Adaptations: They are known for sequestering acids from the plants they feed on in order to defend themselves from predators by being a poisonous when consumed

Other: A California native



MONARCH BUTTERFLY

Lepidoptera
Family: Nymphalidae
Genus: *Danaus*
Species: *plexippus*



Range: N. America: from S Canada to N S. America. Bermuda, Hawaii, New Zealand, Australia, and other islands.
Habitat: Fields, meadows, weedy areas, marshes, and roadsides where milkweed spp. are common. During winter, migratory populations hibernate in fir, pine, oak and cedar forests.
Niche: varying depending on stage of metamorphosis, diurnal, herbivorous
Wild diet: Adults take nectar from milkweed flowers and a variety of other flowering species. Caterpillars eat milkweed leaves.
Zoo diet: milkweed (*Asclepias* spp.)
Life Span: (Wild) 4 generations/year: first three live ~ 2 to 6 weeks, migratory fourth lives ~ 8 mos
(Captivity) Butterflies will live 1 to 2 weeks
Sexual dimorphism: Female monarchs have darker veins on their wings, Males are slightly larger and have a spot (androconium) in the center of each hind wing from which pheromones are released.
Location in SF Zoo: South American Rainforest building

APPEARANCE & PHYSICAL ADAPTATIONS:

Monarch Butterflies have a recognizable orange and black pattern. The caterpillar is banded with yellow, black and white stripes. The head is also striped with yellow and black. There are two pairs of black filaments, one pair on each end of the body. The caterpillar will reach a length of 5 cm (2 in). The chrysalis is blue-green with a band of black and gold on the end of the abdomen. There are other gold spots on the thorax, the wing bases, and the eyes.

Monarchs are foul-tasting and poisonous due to the presence of cardenolide aglycones in their bodies, which the caterpillars ingest as they feed on milkweed. Both forms advertise their unpalatability with bright colors and areas of high contrast on the skin or wings. This phenomenon is known as "aposematism". Monarchs share this defense with the similar-appearing viceroy butterfly, in an example of Müllerian mimicry.

Caterpillar Length: 5 cm (2in) Adult Wingspan: 8.9-10.2 cm (3.5-4 in)

STATUS & CONSERVATION:

This species has yet to be assessed by IUCN. However, the North American migration is recognized by the IUCN as an endangered biological phenomenon due to threats faced at the wintering sites: logging, land clearing for agriculture in Mexico and coastal land development in California. Also, monarchs are on the World Wildlife Fund's list "10 to Watch in 2010", which compiles some of the most threatened species around the world.

MONARCH BUTTERFLY

COMMUNICATION & OTHER BEHAVIOR:

By eating milkweed, both the caterpillar and adult monarchs absorb toxic chemicals from the plant and become poisonous to most predators. It is thought that the bright colors of larva and adults function as warning colors.

During the summer months, 3 generations of monarchs complete their entire life cycle within a five-week period. However, the final summer (the 4th) generation has a much longer life span, living to an age of seven to eight months, while migrating as far as 3,000 miles. In the wintering grounds, millions of monarchs can gather and completely cover the trees in which they are roosting. How the species manages to return to the same over-wintering spots over a gap of several generations is still a subject of research; the flight patterns appear to be inherited, based on a combination of the position of the sun in the sky and a time-compensated sun compass that depends upon a circadian clock that is based in their antennae. One of these wintering areas is Pacific Grove, California approximately 120 miles S of San Francisco.

COURTSHIP & YOUNG:

The mating period for the overwinter population occurs in the spring, just prior to the migration from the overwintering sites. The courtship is fairly simple and less dependent on chemical pheromones in comparison with other species in its genus. Courtship is composed of two distinct stages, the aerial phase and the ground phase. During the aerial phase, the male pursues, nudges, and eventually takes down the female. Copulation occurs during the ground phase where the male and female remain attached for about 30 to 60 minutes. A spermatophore is transferred from the male to the female. Along with the sperm, the spermatophore is thought to provide the female with energy resources that aid her in carrying out reproduction and remigration. The overwinter population returns only as north as they need to go to find the early milkweed growth; in the case of the eastern butterflies that is commonly southern Texas.

The life cycle of a monarch is complete metamorphosis. The eggs are laid by the female during spring and summer breeding months. The eggs are creamy white and later turn pale yellow. They are elongate and sub-conical, with approximately 23 longitudinal ridges and many fine traverse lines. The eggs hatch after four days, revealing worm-like larvae, the caterpillars. The caterpillars consume their egg cases, then feed on milkweed. During the caterpillar stage, monarchs store energy in the form of fat and nutrients to carry them through the non-feeding pupa stage. The caterpillar stage lasts around 2 weeks.

In the pupa or chrysalis stage, the caterpillar spins a silk pad on a twig or leaf and hangs from this pad by its last pair of prolegs. It hangs upside down in the shape of a "J" and then molts, leaving itself encased in an articulated green exoskeleton. At this point, hormonal changes occur, leading to the development of a butterfly. The chrysalis darkens (actually becomes transparent) a day before it emerges and its orange and black wings can be seen.

The mature butterfly emerges after about two weeks of the pupal stage and hangs from the split chrysalis for several hours until its wings are dry (often in the morning). Meanwhile fluids are pumped into the crinkled wings until they become full and stiff. Some of the orangey fluid (called meconium) drips from the wings. Finally (usually in the afternoon), the monarch spreads its wings, quivers them to be sure they are stiff, and then flies away, to feed on a variety of flowers, including milkweed flowers, red clover and goldenrod.

MONARCH BUTTERFLY

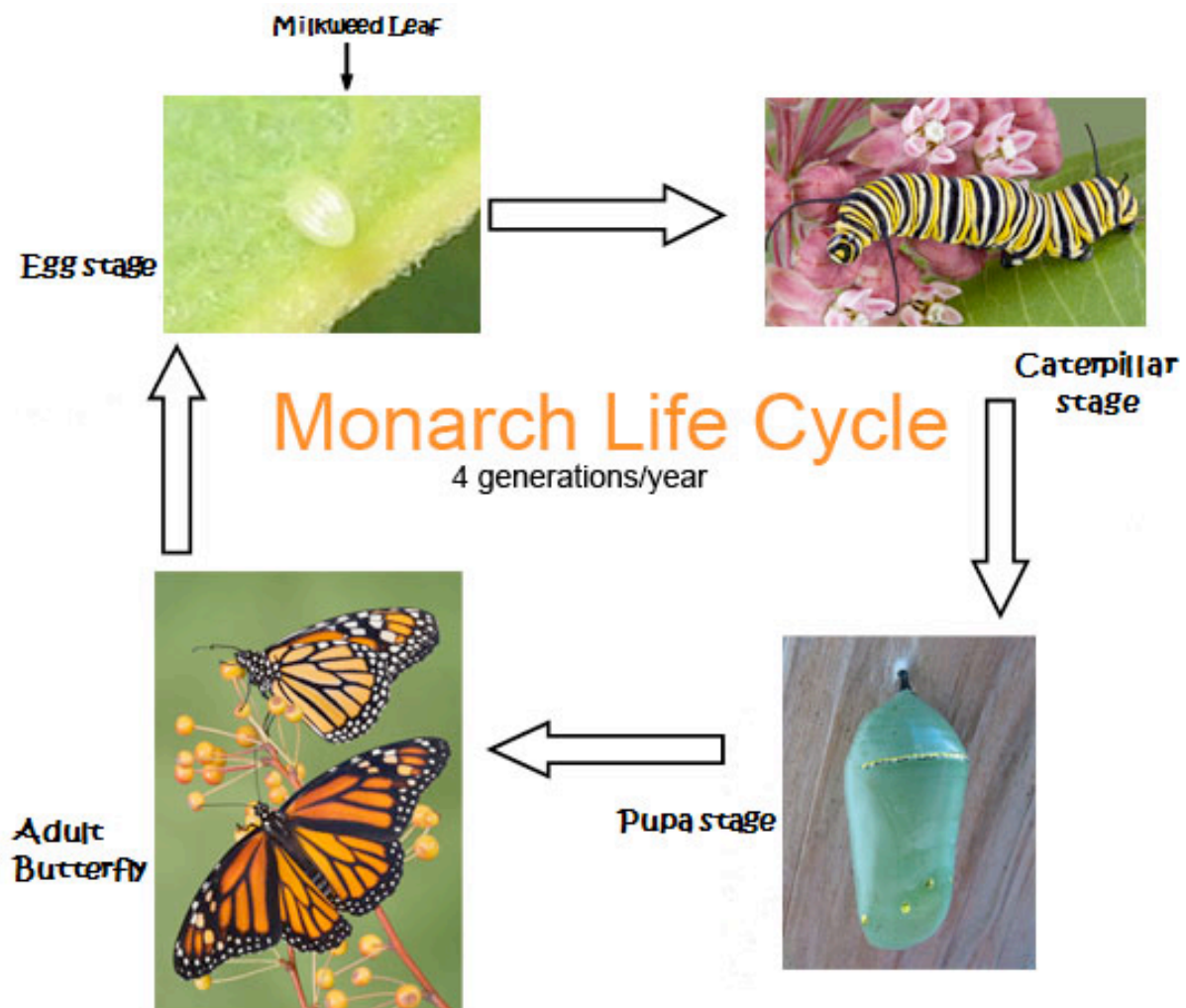
MISCELLANEOUS:



monarch caterpillar becoming a chrysalis



monarch butterfly emerging from a chrysalis



Sources:

<http://www.monarch-butterfly.com/>

<http://carnivoraforum.com/index.cgi?board=insects&action=print&thread=6445>

created 2010, updated 2011