

# The Butterflies and Skippers of Joshua Tree National Park



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620 photographs and thorough accounts for each of Joshua Tree's 92 species. The text – by leading butterfly expert Gordon Pratt – explores the little-known life cycles and plant associations of these fascinating creatures, making the book both a field guide for beginners and a thorough resource for more advanced nature enthusiasts. There are many photographs of important plants, as well as eggs, caterpillars, and chrysalises augmenting photos of the adult butterflies.

**Gordon F. Pratt** has studied butterflies intensively all his life, including during his career as a Professor of Entomology at the University of California, Riverside. He authored or co-authored numerous scientific papers over the past four decades, including landmark studies of the Euphilotes blues and the Mormon Metalmark complex of butterflies. He worked closely in the field and lab with the late lepidopterist **John F. Emmel**, whose deep knowledge of these butterflies contributed much to this book. **Joseph Zarki** is a retired Park Ranger who specialized in public education at Joshua Tree National Park. He is author of a book on the park's history. **Dennis Walker** designed the book and contributed most of the photographs. He has maintained the website [socialbutterflies.com](http://socialbutterflies.com), which documents his passion for southern California butterflies, since 2007. Mr. Walker arranged for the printing of the book locally through his Darkbloom Press.

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Sample pages follow

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## Great Purple Hairstreak

*Atlides halesus corcorani*

### Adult

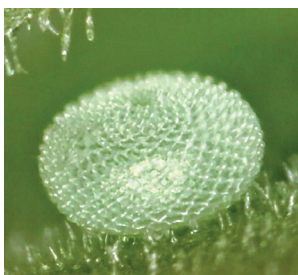
The great purple hairstreak is one of the most beautiful butterfly species in JOTR. The adults are highly colorful, with iridescent greens, reds, blues, and purples. The great purple hairstreak belongs to a tropical genus of hairstreaks that likely came to North America when the South American continent came into contact with North America during continental drift over two million years ago. Note the two pairs of tails and the dark coloration with red markings and iridescent blue and green patches ventrally. The purple coloration, which is the reason for its name, is present dorsally on the wings. The male has an androconial patch of scales on the dorsal forewing. This patch contains pheromones used to attract females. This hairstreak is often found hilltopping on prominent peaks within JOTR. On these peaks, the males may perch on the tops of bushes and other vegetation. By tapping the branches, these butterflies can be induced to fly out. They often return to the very branch on which they had been perching. This hairstreak is found throughout the park from early March until as late as mid-November, with most individuals being found from May through September.

### Food plants

The female great purple hairstreak lays her eggs upon leaves of mistletoe in the *Phoradendron* genus. There are several species of *Phoradendron* in JOTR, which can generally be distinguished by the host plant on which they are found. These mistletoe species are parasites of junipers, oaks, sycamores, cottonwoods, and mesquite in JOTR. Normally the host for desert mistletoe is mesquite. Pratt has sometimes found hundreds of eggs (many of which are hatched) on a single clump of mistletoes on sycamore.

### Pre-adult

The broad-shaped caterpillar is generally the same green color and shape as mistletoe species with broad leaves, and is extremely cryptic on those plants. The caterpillar usually stands out on mistletoes that are simply branches without distinct leaves, such as occur in the desert mistletoe. The chrysalises can be found within the leaf litter at the base of the tree with mistletoe even in winter. Pratt has found them at the base of sycamores that have mistletoe parasites on them more than 20 feet above the ground. It seems that these caterpillars crawl to the ground to pupate; the chrysalises found in leaf litter are not fastened down to a substrate with silk so the chrysalises could pupate in the tree and later fall with the falling leaves. Caterpillars often spin silk and fasten themselves to a substrate with girdles of silk, which keeps the chrysalis from being moved from rain and wind. Caterpillars do crawl for hours during what is called the wandering stage, so it is possible they crawl to the base of the trees. These chrysalises resemble rat feces in shape and size, which are often common in leaf litter and may provide some cryptic protection. As with many hairstreaks, these chrysalises remain in diapause throughout the winter, and adults emerge in mid-spring.



## Marine blue

*Leptotes marina*

### Adult

The marine blue is relatively common in JOTR, being found at practically all seasons, elevations, and habitats. The marine blue, the ceraunus blue, and the Reakirt's blue can often be found flying together, chasing each other around mesquite and catclaw trees in spring when these trees are in flower. These blues can be very difficult to identify as they fly rapidly about.

The lack of an orange aurora, wavy bands of white and brown on the ventral wings, and the absence of spots on the ventral hind wing other than the two eyespots at the wing's edge distinguish this species from the ceraunus and Reakirt's blues. The marine blue is generally slightly larger than both the ceraunus and Reakirt's blues, although there is size overlap. Both of the latter have well-defined spots on the hind wing in addition to the eyespot. Also, there are far more multiple wavy lines on the forewing of the marine blue than on either the ceraunus or the Reakirt's blue. The echo blue, since it has poorly defined markings, can appear similar to the marine blue, but it lacks the wavy lines and lacks the eyespot on the ventral wings. The echo blue also often has poorly-defined spots on the remainder of the hind wing which are absent in the marine blue. The western tailed blue differs in having tails as well as a prominent orange spot on the ventral hind wing. The silvery blue can have heavy or reduced spotting, but lacks markings towards the edge of the ventral wings.

### Food plants

The marine blue caterpillar food plants include the flowers and developing seeds of many of the Rosaceae, Fabaceae, and Plumbaginaceae. Female marine blues have even been observed laying eggs upon male flowers of fourwing saltbush (*Atriplex canescens*), so it is possible there are many other food plants. Whether caterpillars can complete development upon male fourwing saltbushes is not clear at this time.

### Pre-adult

The pale blue-white egg is laid often within the flower buds of the food plant. The egg hatches within a few days depending upon temperature. The caterpillar is slug shaped, usually green, and with variable markings of white and red and with reduced prominent setae. How this species spends diapause through the winter is not clear, but it seems likely to be in the chrysalis. However, no chrysalis in captivity has exhibited extended development time. It could be that no actual diapause occurs in this species, and development simply slows in wintertime and, when spring comes, marine blues move into habitat where the butterfly died out during the winter.



## Mourning Cloak

*Nymphalis antiopa*

Surprisingly, the mourning cloak is present in many areas of the Mojave Desert. Wherever there is a moist stream or spring and there are willows, there are food plants for the mourning cloak. The mourning cloak is one of the most distinctive butterflies found in JOTR.

### Adult

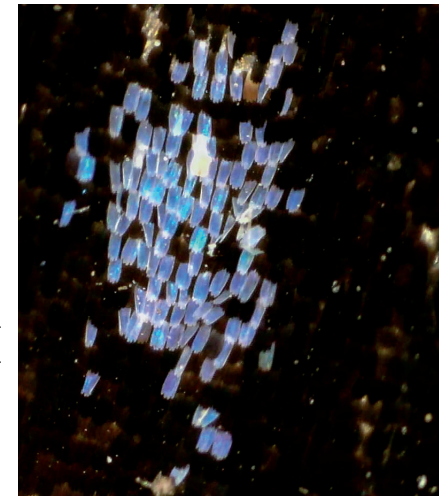
It is large, dark red-brown, and with yellow borders. Nothing is very similar to this species. Only swallowtails in flight could confuse a novice, though swallowtails differ greatly in wing shapes and the yellow bands are not at the borders of the wings. Note also the blue spots that are found within a dark band bordering the yellow border. Like the preceding species, this butterfly overwinters as an adult.

### Food plants

Generally the mourning cloak in the desert uses willows (*Salix* species) as caterpillar food plants. Planted elms are also used in neighborhoods just outside of JOTR. Hackberry (*Celtis reticulata*), which is closely related to elm, is another potential food plant and is used elsewhere by this butterfly. These trees are at Willow Hole in JOTR.

### Pre-adult

The female mourning cloaks lay large clusters (100-200) of small green barrel-shaped eggs on leaves or branches of the food plant, generally species of willows in the desert. These eggs have nine ribs that are very similar to other *Nymphalis*, *Vanessa*, and *Polygonia* species. The eggs hatch within a couple of weeks and the caterpillars remain communal for most of their development. The caterpillars are very similar to the California tortoiseshell caterpillars, but are not as variable. Generally, the bases of the black dorsal scoli are red. This combination of black and red is aposematic coloration and suggests these caterpillars are toxic or bad tasting. Often the caterpillars crawl off the food plant to pupate.



This page, above: magnified view of the blue scales on a mourning cloak dorsal wing. Facing page clockwise from top: adult feeding on *Buddleia* flowers; pupa; gregarious caterpillars; a last instar larva; a cluster of eggs; newly-emerged adult showing the ventral wings.



## Queen

*Danaus gilippus*

The queen is largely a desert butterfly and is less commonly observed in coastal or high elevations with non-desert environments. For this reason, the queen is mostly observed in the lower elevations of JOTR, while the monarch may favor the higher elevations. The difference between the queen and monarch is discussed above under the monarch butterfly. They are closely related and can be similar enough to be misidentified by inexperienced observers.

## Adult

The monarch and queen are large and similar in size, although the monarch can be quite a bit larger than the queen. They differ in ground color since the monarch is orange-red (particularly the male), while the queen is more maroon. The dorsal bands on the monarch, which follow the veins, are thick on the fore and hind wings, while they are virtually absent in the queen. Note the enlarged part of a vein just below the discal cell (**left, top photo**). This enlarged part of the vein holds the male pheromone and its presence distinguishes it from a female.

The queen and monarch are mimicked by the viceroy (*Limenitis archippus*). Normally the viceroy mimics the queen where the two are present, while it mimics the monarch where the queen is absent. In California, the Arizona viceroy (*Limenitis archippus obsoleta*) mimics the local queen. The Arizona viceroy at one time may have wandered into JOTR from the Colorado River, where the species was common many years back. On occasion this viceroy may have wandered as far west as Orange County. These records may be doubtful since they were in high school student collections. Unfortunately, the Arizona viceroy has virtually disappeared from the Colorado River, so it is extremely unlikely it will turn up in JOTR.

*cont'd.*





## Food plants

The food plants of the queen are somewhat different from the monarch's, although there is overlap. The queen seems to prefer the reed milkweeds (*Asclepias subulata* and *A. albicans*), desert milkweed (*A. erosa*), and the vine milkweeds (*Funastrum* species). These milkweed species are largely found in the desert, while the more coastal species seem less favored. This bias could be due to where queens are generally found – in the desert – and these milkweeds are found there. If more queens immigrated into coastal environments, these other milkweeds would be used more frequently. Certainly the vine milkweeds occur frequently with the monarch, yet they are rarely used, while the vine milkweeds are frequently used by the queen as a caterpillar food plant.

## Pre-adult

Like the monarch, the queen female oviposits (lays her eggs) singly upon the milkweed food plant. Often female queens lay their eggs in the milkweed flowers or flower buds of the reed milkweeds, which is due to these plants usually not having leaves. Eggs are often laid individually on the underside of leaves of milkweeds



that have large leaves, such as *A. erosa*. When eggs of both *Danaus* species are found together, the queen egg is visibly smaller.

The queen caterpillar can be distinguished as early as the second instar, when the fleshy protuberances on the first abdominal segment are present, while they are absent for all the instars of the monarch. The mature caterpillar of the queen has these protuberances, which helps separate it from the monarch. The queen caterpillar also differs from the monarch in color patterns.



Facing page: mid-instar and last instar queen caterpillars and host *Asclepias albicans*, also above top left. Top right and above: climbing milkweed. A queen egg and second instar larva are pictured on p.198, bottom.



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