

# COMMON BLUE BUTTERFLY

CARD 20

GROUP 5: INSECTS & SPIDERS



CLASS  
*Insecta*

ORDER  
*Lepidoptera*

FAMILY  
*Lycaenidae*

GENUS & SPECIES  
*Polyommatus icarus*



**The brilliant color of the blue butterfly makes it easy to spot. Still, identifying females may be difficult since only the males display the bright blue wing color.**

## KEY FACTS



### CHARACTERISTICS

**Wings:** 2 pairs, overlapping.

**Wingspan:** Up to 1 in.

**Coloration & form:** Males are metallic blue. Females are brown.

**Mouthparts:** Caterpillars, 1 pair biting jaws. Butterflies, sucking mouthpart called a *proboscis* rolled up under head when not in use.



### LIFECYCLE

**Eggs:** Laid singly on leaves.

**Egg to chrysalis:** 6 months in first generation each year. 6 weeks in second generation.

**Chrysalis to pupation:** 2 weeks.



### LIFESTYLE

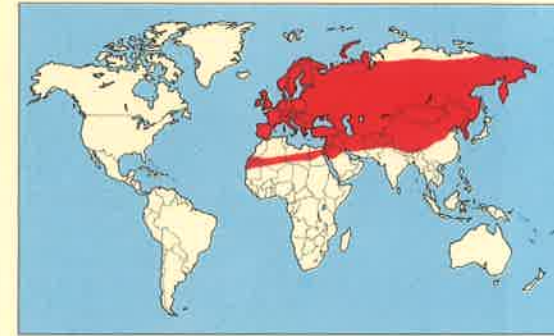
**Diet:** Caterpillars, leaves of plants. Butterflies, wildflower nectar.

**Lifespan:** 3 weeks as butterfly.



### RELATED SPECIES

Hairstreak and copper butterflies.



Range of the common blue butterfly.

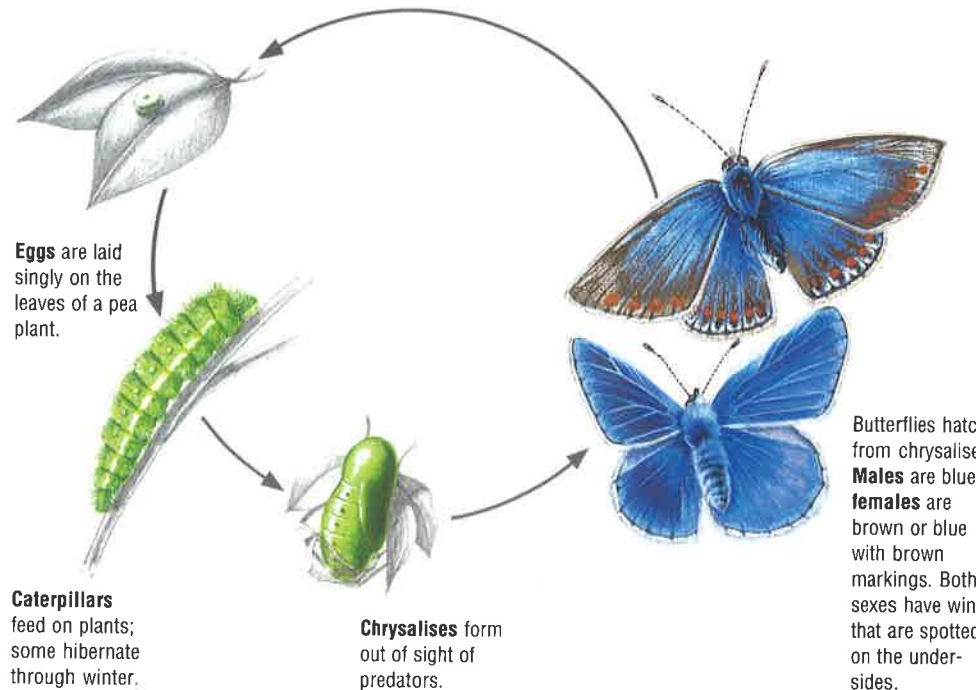
### DISTRIBUTION

Widespread throughout Great Britain. Blue butterfly species are found in North America, Europe, and North Africa.

### CONSERVATION

Intensive agriculture has demolished many former blue butterfly habitats, leading to the extinction of the large blue butterfly. The smaller adonis butterfly is similarly threatened because of the loss of its food plants in many areas.

## LIFECYCLE OF THE COMMON BLUE BUTTERFLY





*The common blue butterfly is a member of a large family of butterflies. Both it and its other blue relatives are small and extremely fast in flight. However, two of the blue species, and most female blue butterflies, are brown.*



### SPECIAL ADAPTATION

The caterpillars of some species of blue butterfly are fed on by ants. The ants feed on the sugary secretions, called *honeydew*, that the caterpillars produce.

Since the caterpillars provide food for the ant colony, the ants defend them from predators. They sometimes even move the caterpillars to more convenient feeding places.

### DID YOU KNOW?

- The wings of blue butterflies do not contain a blue pigment. The metallic blue coloration of the male is actually the reflection of light from the thousands of tiny scales that cover the butterfly's wing surface.
- Male common blue but-

terflies gather in groups to search for liquids found in fresh dung and urine and in puddles along river banks. This activity is known as *mud-puddling*, and its purpose is to increase the males' intake of minerals from which they make their sex hormones.

### HABITAT

The small, fast-flying common blue butterfly is fairly widespread throughout Great Britain. It can be found along with the adonis, chalkhill, and silver-studded blue butterflies.

Another related species, the small blue butterfly, is also found throughout Great Britain and is Europe's smallest butterfly. Still, its numbers are far fewer than those of the common blue butterfly.

*Left: The female blue butterfly has distinct orange markings around the edges of its wings.*

### FOOD & FEEDING

The common blue butterfly is found in great numbers in England because its food grows in most areas of the country. These include vetch, clover, trefoil, and other members of the pea family.

Most blue butterflies feed on these plants, but some species are more selective. The silver-studded blue butterfly prefers gorse, broom, and heather. Adult blue butterflies eat the sugary nectar of wildflowers such as marjoram and thistle.

### BREEDING

The common blue butterfly produces two generations of offspring each year. Adult butterflies hatch from the cocoon, or *chrysalis*, in the first week of June. They then mate, after which the females lay eggs singly on the upper side of food plant leaves.

The eggs hatch after about nine days, and the caterpillars initially feed on the undersides of the leaves. As they grow larger, they shed their skin, revealing the new, soft skin below.

The caterpillars have five growth stages, called *instars*,



*Left: The male adonis is the brightest and most striking of all the blue butterflies. Still, its numbers are rapidly declining because its food plants are being destroyed by farming.*

during which they shed their skin four times (this process is called *ecdysis*). By the end of July, they change into chrysalises on the soil beneath the food plant.

In early August, a second generation of butterflies hatches from the chrysalises.

They mate and lay eggs again, but the development of the caterpillars is halted as they hibernate over the winter. In the following spring, they continue their development, forming chrysalises in early May and hatching in early June.



*Right: Common blue butterflies mate with wings folded upward. The pattern of spots on the undersides of the wings varies with each butterfly.*

*Left: An ant feeds on liquid secreted by a caterpillar of the chalkhill blue butterfly.*



# MOSQUITO

CARD 18

GROUP 5: INSECTS & SPIDERS

ORDER  
Diptera

FAMILY  
Culicidae

GENUS  
Anopheles & Culex



**The mosquito is known all over the world for its bloodsucking bite. But it is only the female that feeds on blood—the male drinks plant juices and is quite harmless.**

## KEY FACTS



### CHARACTERISTICS

**Length:** 1/3 in.

**Coloration:** Sometimes banded on legs and abdomen.

**Mouthparts:** Clustered needles for piercing and extracting fluids.



### LIFECYCLE

**Eggs:** 30-300.

**Lifespan:** Male, a few days. Female of many species find shelter over winter, laying eggs in spring. Tropical species breed during rainy season or all year if water is present.



### LIFESTYLE

**Habit:** Solitary, but large numbers may collect over swamps and pools.

**Diet:** Female, blood. Male, plant juices and fruit nectar.



### RELATED SPECIES

3,000 species worldwide, including several hundred in North America. Main malaria carrier is the African *Anopheles gambiae*.



Range of the mosquito.

### DISTRIBUTION

Mosquitoes are found worldwide. Because they thrive on warmth and humidity, the greatest number of species are in the tropics. Fewer species are found in the desert.

### CONSERVATION

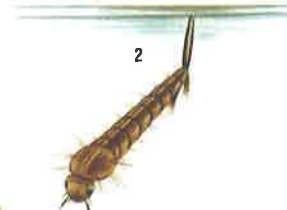
Throughout history people have tried to get rid of the mosquito. Although this effort continues, there is no sign of it succeeding.

## LIFECYCLE OF THE COMMON MOSQUITO

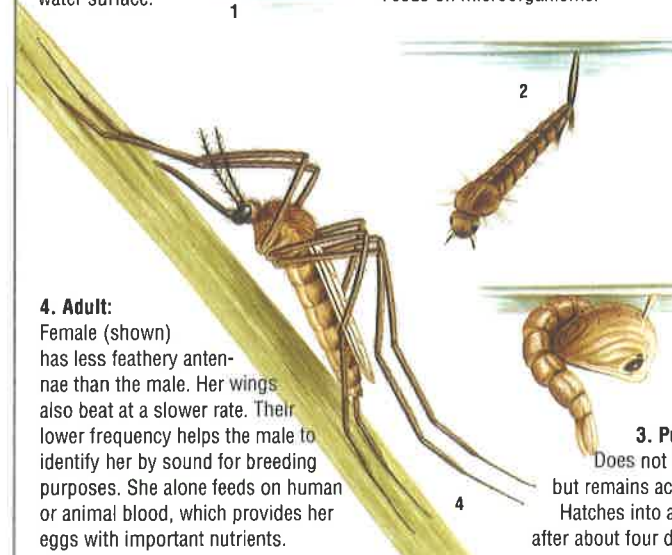
**1. Eggs:** Laid in standing or slow-moving water. Float like a raft on water surface.



**2. Larva:** Breathes through tube at tail that clings to water surface. Feeds on microorganisms.



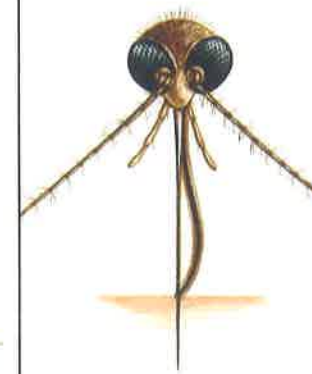
**4. Adult:** Female (shown) has less feathery antennae than the male. Her wings also beat at a slower rate. Their lower frequency helps the male to identify her by sound for breeding purposes. She alone feeds on human or animal blood, which provides her eggs with important nutrients.



**3. Pupa:** Does not feed but remains active. Hatches into adult after about four days.



## HOW THE MOSQUITO BITES



**Mouthparts:** The female has four needlelike mouthparts. These surround a long, grooved mouthpart closed by a cover that converts it to a bloodsucking tube. A fleshy sheath draws back as the point enters flesh.



*The mosquito is probably one of the most unpopular creatures in the world. For centuries people have swatted at or poisoned it, but it continues to flourish, feasting on the blood of humans and animals. With global warming, some species that are disease carriers may even spread.*

## HABITS

The mosquito is a small, two-winged fly, a slender relative of the house fly and blow fly. It has four wings arranged in two pairs and, like most flies, uses its short, club-shaped hind wings for balance. Known as *halteres*, these wings vibrate with the front wings and sense changes in direction, helping the mosquito to fly in a straight line.

Flies cannot eat solid food. They can take in only liquids. They suck the liquids up through their needlelike mouthparts, which function like mops or drinking straws.

The majority of blood-sucking mosquitoes attack only certain types of animals.

In North America the most common mosquito is *Culex pipiens*, the “house mosquito.” Most human mosquito bites in North America are the work of this species. It is common in northern Europe, but there another species does most of the biting.

*Below: The male has feathery antennae and eats fruit nectar, unlike the female.*



## FOOD & FEEDING

The male mosquito drinks nectar. Only the female drinks blood, which provides nourishment for her eggs. She usually seeks out a victim just before laying, although she can lay her eggs without feeding on blood.

The female uses subtle means to detect a victim. An

increase in the air’s carbon dioxide level alerts her to the presence of a human or other mammal. Flying upwind, she finds her target by sensing increasing temperature and moisture until she touches down. Bare skin is an obvious target, but clothing will not always deter her.

*Left: In flight the female detects prey using such clues as increases in air temperature.*

*Right: Only the female feeds on blood, which nourishes the eggs she will soon lay.*



## MOSQUITO & MAN

Some species of mosquito carry serious, even fatal diseases such as malaria, yellow fever, and elephantiasis. Malaria is carried by mosquitoes of the genus *Anopheles*, widespread in the tropics. Attempts to control the mosquitoes by draining their breeding swamps and

using insecticides have often proved ineffective.

In the north malaria-carrying mosquitoes are rarely seen, and northern species such as *Culex pipiens* do not spread the disease. But as global warming takes place, disease-carrying mosquitoes may move north.

## LIFECYCLE

Like all flies, the mosquito has a four-stage lifecycle—egg, larva, pupa, and adult.

The female lays her eggs in standing or slow-moving water. The floating eggs rapidly hatch into legless aquatic larvae, which feed on microorganisms.

The larva breathes air through a short tube at its tail. The tail is fringed with unwater-repellent hairs that cling to the water surface. The larva hangs upside down from the surface by this tail. If disturbed, it flicks the tail to

*Left: When it emerges from the pupal state, the adult mosquito is ready to mate.*

break contact and wriggles into the water, floating up tail first when the coast is clear.

When fully fed, the larva sheds its skin and emerges as a pupa—the stage when it develops adult characteristics. Resembling a large-headed larva, the pupa is active but does not feed. Within a few days, its skin splits open and the adult mosquito comes out. Almost immediately it flies off in search of a mate.

The feathery antennae of the male are sensitive to the whine of a female’s wings. Attracted by this, he mates and soon dies, leaving the female to lay her eggs.



## DID YOU KNOW?

- Roughly half the world’s population is at risk from the diseases carried by some mosquito species.
- The female’s wings beat 500 times per second. The male’s vibrate even faster and whine at a higher pitch. When a male emerges from

the pupa, his wings beat at the same rate as a female’s, confusing other males.

- Mosquitoes lay eggs in unlikely places such as birdbaths. Most die if a pool dries up, but the eggs of some desert species survive years of drought.

# WOLF SPIDER

CARD 17

GROUP 5: INSECTS & SPIDERS

CLASS  
Arachnida

ORDER  
Araneae

FAMILY  
Lycosidae

GENUS  
*Lycosa* & *Pardosa*



The wolf spider gets its name for the stealthy, cunning way in which it hunts its prey—much in the same manner as the wolf.

## KEY FACTS



### CHARACTERISTICS

**Length:** Varies according to species. Male smaller than female.  
**No. of eyes:** 8.



### BREEDING

**Breeding season:** Temperate species, summer. Tropical species, year-round.  
**No. of eggs:** 40-100, depending on species.  
**Incubation:** 2-3 weeks.



### LIFESTYLE

**Habit:** Free ranging.  
**Diet:** Small invertebrates, especially insects, but also other types of spiders.  
**Lifespan:** 1 year in European species; 2 years in larger North American species.



### RELATED SPECIES

The largest European and American species of *Lycosa* grow up to an inch in length.



Range of the wolf spider.

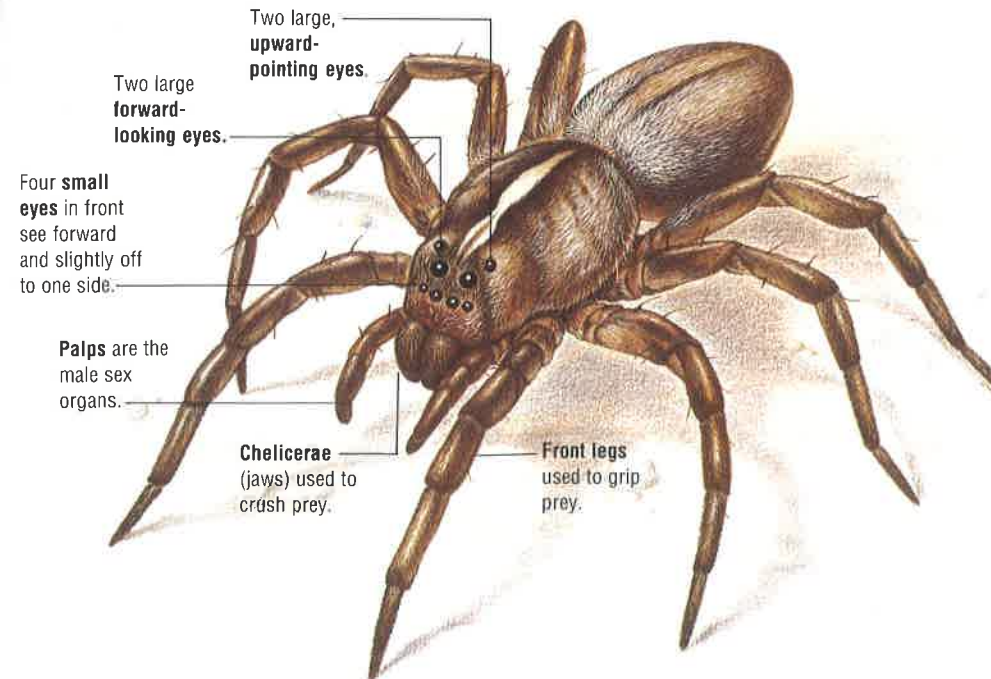
### DISTRIBUTION

Worldwide except polar regions.

### CONSERVATION

There are approximately 125 species of wolf spider in North America and 50 in Europe. One or two are fairly rare, but none are endangered.

## FEATURES OF THE WOLF SPIDER





*Most spiders catch their prey by ambushing it in the silken webs they spin on plants, trees, walls, and fences. Wolf spiders, instead, hunt down and catch their prey with the help of their acute eyesight.*

### HABITAT

Wolf spiders live successfully in a wide variety of habitats, where they are often the most dominant of the small predators. Their habitats include deserts, temperate and tropical forest, swamps, and mountains at lower elevations. Still, the habitat in which they are most commonly found is grassland, and they are especially abundant on the prairies of North America.

As many as 18 species of wolf spider can sometimes be found in one area. Several of the most numerous species inhabit all parts of the wolf spider's range and are particularly common in backyards. Others have a more limited range and may be found only on rocky coasts, sand dunes, stony hilltops, in salt marshes, or near the edges of inland waterways.

### DID YOU KNOW?

- The hunting wasp stings and paralyzes the wolf spider in its burrow, and leaves its own larvae behind to feed on the dying spider's body.
- Young wolf spiders cling to their mother's back but they never cover her eyes, which she uses to spot her prey.
- Large American species of

*Lycosa* can carry over 100 young spiders at a time.

- Young spiders leave their mother a week after their first *molt* (shedding of skin).
- The true tarantula is actually a European wolf spider. It is not the large, bird-eating spider that is often referred to as a tarantula.

### BREEDING

The male approaches the female cautiously, waving his front legs and the twin *palps* (sex organs) that are positioned in front of and below his head. This behavior enables the female to recognize him so that she does not mistake him for prey.

If the female is receptive to his advances, she allows the

male to climb on top of her. With his head facing her hind part, he inserts each palp alternately into her genital opening.

During mating the female often continues to move around and catch prey with the male on her back.

**Right:** *A female carries her newly hatched young on her back.*



**Above:** *Wolf spiders mating. The smaller male fertilizes the female with his palps.*

**Right:** *The long-legged British species of wolf spider on its web.*



### MATERNAL CARE

After mating, the female spider finds a safe spot and spins a silken pad. She deposits her eggs on it and encases them in a spherical sac made of silk. She then attaches the sac to her silk-producing organ, called a *spinneret*, where it remains for the two to three weeks until the eggs hatch. Throughout this period

the female defends her eggs fiercely.

The female senses when the eggs are ready to hatch and tears open the tough covering of the sac to release them.

The tiny spiders spend their first few days on the mother's back, and she carries them everywhere. They do not feed during this time.

### FOOD & HUNTING

The wolf spider lies in wait for small insects and other spiders and pounces on its prey when it comes within reach. Holding its victim in its strong legs and grasping it between powerful jaws (*chelicerae*), the spider crushes the animal and feeds on its juices.

Wolf spiders generally hunt in the daytime. At night they stay hidden in shallow burrows, where they are safe from predators. Some species spin silk to line their burrows, but unlike web-spinning (*orb*) spiders, the wolf spider does not use its silk to trap prey.



### NATUREWATCH

Wolf spiders are most active in the spring and summer and are easily seen at these times of the year. They like warmth and can be found on logs and stones in direct sun.

Wolf spiders can also be observed during mating. The male is smaller than the fe-

male and waves his front legs to attract her. Female spiders can be seen carrying their conspicuous white egg sacs on the end of their abdomens. The eggs hatch quickly in warm weather, and young spiders can be seen clinging to their mother's back.

# SILK MOTH

CARD 15



GROUP 5: INSECTS & SPIDERS

ORDER  
*Lepidoptera*

FAMILY  
*Bombycidae*

GENUS & SPECIES  
*Bombyx mori*



**The silk moth starts life as a tiny larva that devours mulberry leaves. Eventually it weaves a cocoon of silk within which it transforms itself into an adult moth.**

## KEY FACTS



**SIZES**  
Wings: 2 pairs.  
Wingspan: 4 in.  
Length: Caterpillar, over 3 in.  
Mouthparts: Caterpillar, 1 pair for chewing. Adult moth has only remnants of the caterpillar's mouthparts.



**BREEDING**  
Eggs: 300-500.  
Egg to pupa: Varies with temperature.  
Pupa to hatching: 2-3 weeks.



**LIFESTYLE**  
Habit: Nonflying, domesticated species.  
Diet: Mulberry leaves.  
Lifespan: Adult, 3-5 days.  
Caterpillar, 4-6 weeks.



**RELATED SPECIES**  
Related wild species include the Indian tussah silk moth, *Antheraea paphia*, and the atlas moth, *Attacus atlas*.



Domesticated range of the silk moth.

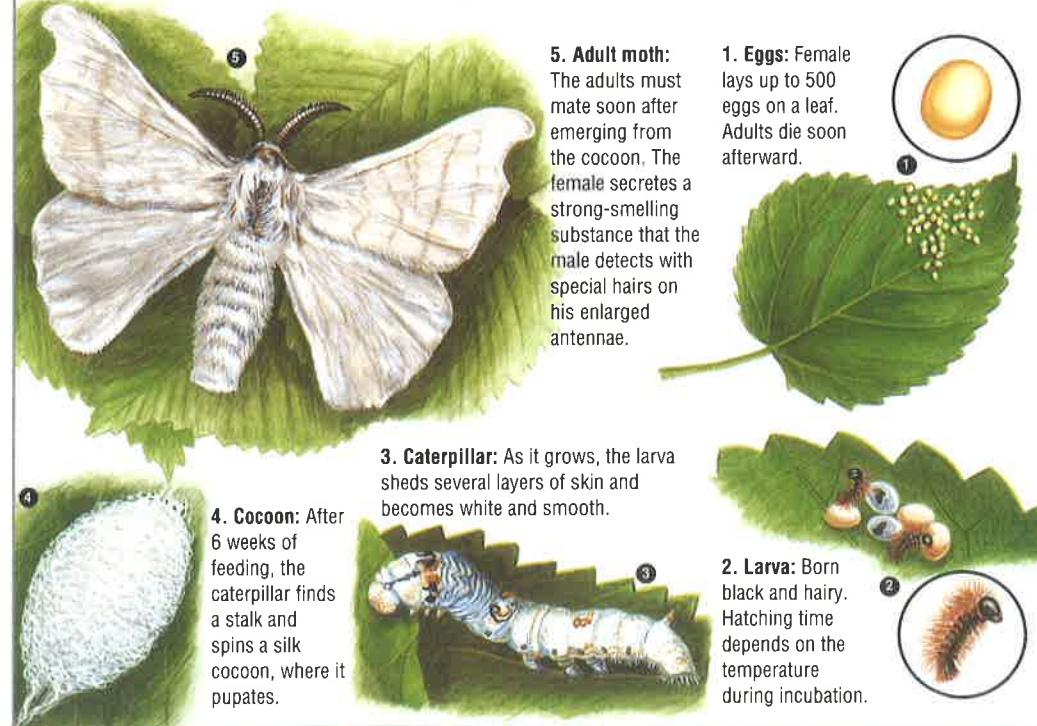
### DISTRIBUTION

Once native to Asia, the silk moth is now bred mainly in Japan and China. It is also farmed in the Soviet Union, India, Pakistan, Turkey, France, and Italy.

### CONSERVATION

The silk moth has been extinct in the wild for centuries. It now lives in large domesticated groups that are bred for size and silk quality. It is carefully protected from disease.

## LIFECYCLE OF THE SILK MOTH





*The silk moth was first domesticated by the Chinese nearly 5,000 years ago. Silk is derived from the cocoon that the caterpillar spins to complete its transformation into an adult moth. This beautifully woven cocoon is produced from a single strand of silk that can be about a mile long.*

## LIFECYCLE

The silk moth has been domesticated for 5,000 years and is no longer found in the wild. Selective breeding has made it too large to fly, but it does not have to crawl far to find a mate. The female lays her eggs soon after mating.

The tiny caterpillar, or *larva*, is fully grown at about six weeks. It then attaches itself to a stalk and spins a large silk cocoon. The silk is produced by the caterpillar's salivary glands and comes out through

an organ called a *spinneret* that is near the mouthparts.

It takes a caterpillar over two days to spin its cocoon. Within this protective casing, it *pupates*, transforming itself into a winged moth.

The adult moth emerges after two to three weeks. But the moth damages the silk as it hatches, so most cocoons are collected earlier and the pupae inside are killed. The largest and finest cocoons are left to produce adults for breeding.

## SILKWORM & MAN

Several insects and spiders produce silk, but only the silk moth produces it in large enough quantities for commercial use. The Chinese are credited with discovering how to unwind this fiber from cocoons and turn it into a luxurious, strong fabric.

The first silk came from wild moths, but soon the Chinese began breeding them. By selecting only large moths and those that made the finest silk,

they developed the huge flightless insects of today.

Before the silk can be unwound, the cocoon must be soaked in very hot water to dissolve the *sericin*, a "glue" that makes the silk stick to itself. As the ends of the silk float free, they can be wound onto a reel. Because silk is so fine, several strands can be wound together. The remaining sericin helps to stick the fibers together.

*Left: The larvae eat continuously to store enough food for the cocoon stage.*

*Right: After two to three weeks, a fully formed adult moth emerges from its cocoon.*

## DID YOU KNOW?

- Legend has it that China lost its monopoly on silk in the fourth century when moth eggs were smuggled out in the headdress of a Chinese princess who married an Indian prince.
- The wedding dress of Queen Elizabeth II was

made of silk produced by moths in Britain.

- Silk is graded according to its fineness, or *denier*. Denier is the weight of a 1475-foot length of silk.
- "Wild silk" is produced by relatives of the silk moth in cocoons found in the wild.



## FOOD & FEEDING

The caterpillar must eat nearly all the time. When it is fed only mulberry leaves, it eats continuously and grows quickly. It will consume other leafy plants, but tests have shown that caterpillars given a mixed diet do not grow as rapidly or produce silk as fine as those fed only mulberry leaves.

When fully grown at about six weeks, the caterpillar stops eating and spins the cocoon in which it will change into an adult. The main function of the adult moth is to breed. Unlike the caterpillar, the adult moth does not need to feed and thus does not possess true mouthparts.

*Left: During their brief adulthood, the moths mate, and shortly afterward the female lays more than 500 eggs.*

*Right: The delicately spun cocoon protects the larva as it pupates, transforming itself into the adult silk moth.*





# POPLAR HAWK MOTH

CARD 13

GROUP 5: INSECTS & SPIDERS

CLASS  
*Insecta*

ORDER  
*Lepidoptera*

FAMILY  
*Sphingidae*

GENUS & SPECIES  
*Laothoe populi*



**The poplar hawk moth feeds and mates at night. During the day it rests on tree trunks where it is perfectly camouflaged because of its gray-brown wings.**

## KEY FACTS



### CHARACTERISTICS

**Wings:** 2 pairs.  
**Wingspan:** 4 in.  
**Coloration:** Gray-brown.  
**Mouthparts:** 2 mouthparts in caterpillar. 1 short *proboscis* (tonguelike organ) in adult.



### LIFECYCLE

**Eggs:** Laid in small groups.  
**Egg to chrysalis:** 4-5 weeks.  
**Chrysalis to hatching:** 8 weeks in summer, 6-8 months in winter.



### LIFESTYLE

**Habit:** Nocturnal.  
**Diet:** Caterpillars, leaves of poplar and willows. Adults, nectar.  
**Lifespan:** 3-4 weeks as an adult.



### RELATED SPECIES

There are no other members of the genus *Laothoe*. An infertile *hybrid* (mix) has been bred from the poplar and the eyed hawk moths, called the "popeye" moth.



Range of the poplar hawk moth.

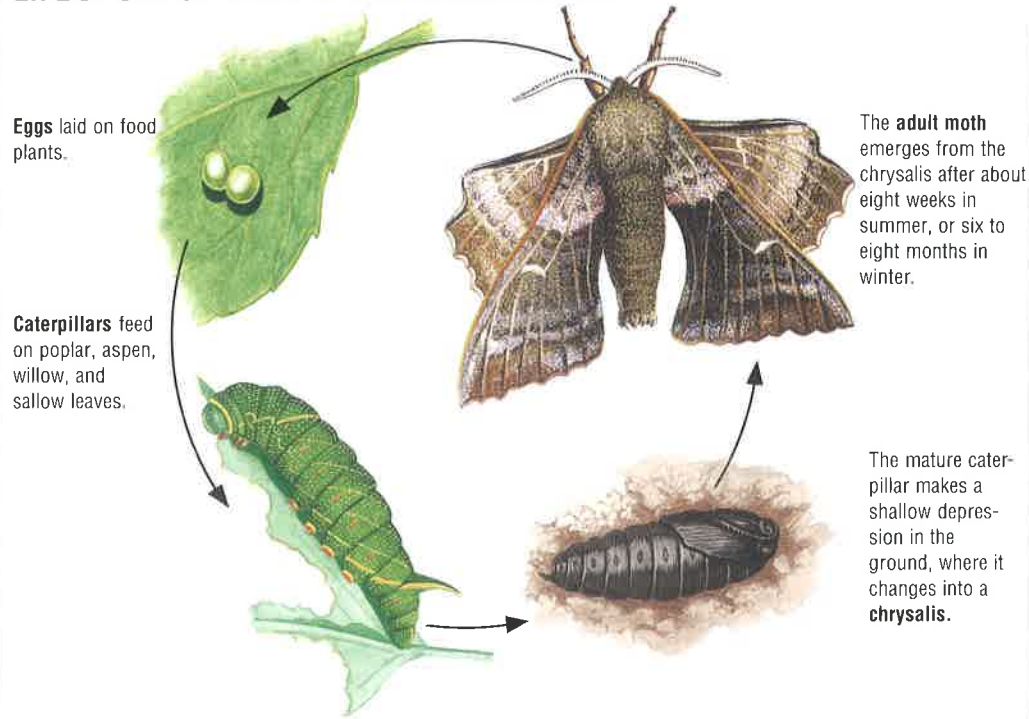
### DISTRIBUTION

Throughout Great Britain and the Channel Islands; a few scattered populations in Ireland.

### CONSERVATION

The poplar hawk moth, like other European hawk moths, is in no danger of extinction. The only hawk moths in serious danger are those in the tropics, where their habitat is being destroyed.

## LIFECYCLE OF THE POPLAR HAWK MOTH





*The poplar hawk moth is but one of 1,000 species of hawk moth throughout the world; most are found in the tropics. Known also as sphinx moths, hawk moths display a wide variety of shapes and wing patterns.*

## DEFENSES

A wide range of mimicry and other defense characteristics is exhibited by all species of hawk moth. The poplar hawk moth's brown wings and shape blend in with the bark, as camouflage. But it lifts its forewings and reveals fiery red hind wings to frighten off an intruder.

The caterpillar of the elephant hawk moth can puff up its body to resemble a snake's head, complete with false eyes. The caterpillar of the convolvulus hawk moth has snake-head markings on its back end.

Adult hawk moths also display a wide range of markings, including spots and false eyes, that resemble those of their predators. The eyed hawk moth, for example, has large markings on its hind wings that resemble a bird's eyes.

The two species of bee hawk moth mimic bumblebees in form and color. Like bees, they feed on flowers during the day, rather than at night like nocturnal hawk moths.



Above right: *The eyed hawk moth scares enemies by mimicking the eyes of a larger animal.*

Left: *A tropical hawk moth imitates a snake.*



## FOOD & FEEDING

Caterpillars of the poplar hawk moth eat the leaves of poplar, they also eat the leaves of willow and poplar. The caterpillars have enormous appetites and eat several leaves a day.

In contrast, adult moths are

not constant feeders because they rely on energy stored in their bodies during the caterpillar stage. For the three to four weeks it spends as an adult, the hawk moth eats just enough flower nectar to allow it to mate and lay eggs before dying.

## DID YOU KNOW?

- Hawk moths are also called "sphinx" moths because some species resemble the Egyptian sphinx when they inflate their bodies.
- The convolvulus hawk moth migrates more than 1,000 miles from North Africa to northwestern Europe. The hummingbird hawk moth does not migrate during mild winters: it hibernates in dry stone walls.
- The death's head hawk moth mimics the sound of the queen honeybee to gain access to the hive. It punches holes in the cells' wax covering to feed on the honey.

## LIFECYCLE

The poplar hawk moth mates in May or June. The female lays round, shiny, yellow eggs on poplar, aspen, willow, or willow tree leaves.

Caterpillars hatch from the eggs seven days later. They are mainly green and have a yellow line that runs the length of their bodies. They also have orange-red breathing holes, called *spiracles*, and a thornlike spike near the end of their tails. The caterpillars wave the spiked end to scare away predators. Their backs are lightly colored, as camouflage, so that they resemble the leaves that they hang

from while feeding.

As caterpillars mature, they go through five growth stages, called *instars*, and split and shed their skin four times as they grow larger (this process is called *ecdysis*). The caterpillars leave their food plants and crawl to the ground as they near the final growth stage. They then develop into adults inside a protective case, called a *chrysalis*.

Each chrysalis hatches into an adult moth in late July. The moth mates, and the female lays a second generation of eggs, which go through all the growth stages.



Left: *Poplar hawk moths die soon after mating.*



## NATUREWATCH

The poplar hawk moth can be seen resting on tree trunks and fence posts during the day. It is common in both urban and suburban areas. The moth may be found in damp areas, where its food plants grow, such as along riverbanks and in woodland. The caterpillar's droppings can also be spotted on the ground beneath poplar trees.

The hummingbird, spurge, and elephant hawk moths also inhabit the poplar hawk moth's range. All three of these moths feed from a variety of flowering plants.

# PRAYING MANTIS

CARD 12

GROUP 5: INSECTS & SPIDERS

CLASS  
Insecta

ORDER  
Orthoptera

FAMILY  
Mantidae

GENUS & SPECIES  
Various



The praying mantis ambushes its prey and captures it with its spiny forelegs. A mantis feeds on all types of insects, including other mantises.

S. Dalton/N.H.P.A.

## KEY FACTS



### CHARACTERISTICS

**Length:** Species vary from 1/2-12 in.

**Mouthparts:** Biting.

**Wings:** Many species have none, others have 2 pairs.



### BREEDING

**Breeding season:** Summer in temperate areas. Year-round in the tropics. Elsewhere during the wet season.

**Eggs:** 10-400.

**Hatching:** 3 weeks-6 months, depending on temperature and humidity.



### LIFESTYLE

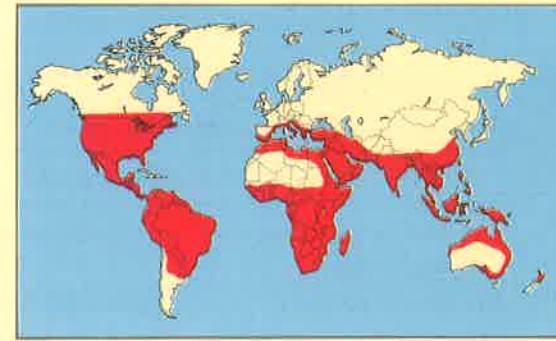
**Habit:** Solitary.

**Diet:** Other insects and spiders. Large species will also eat frogs, lizards, and nesting birds.



### RELATED SPECIES

Cockroaches and grasshoppers.



Range of the praying mantis

### DISTRIBUTION

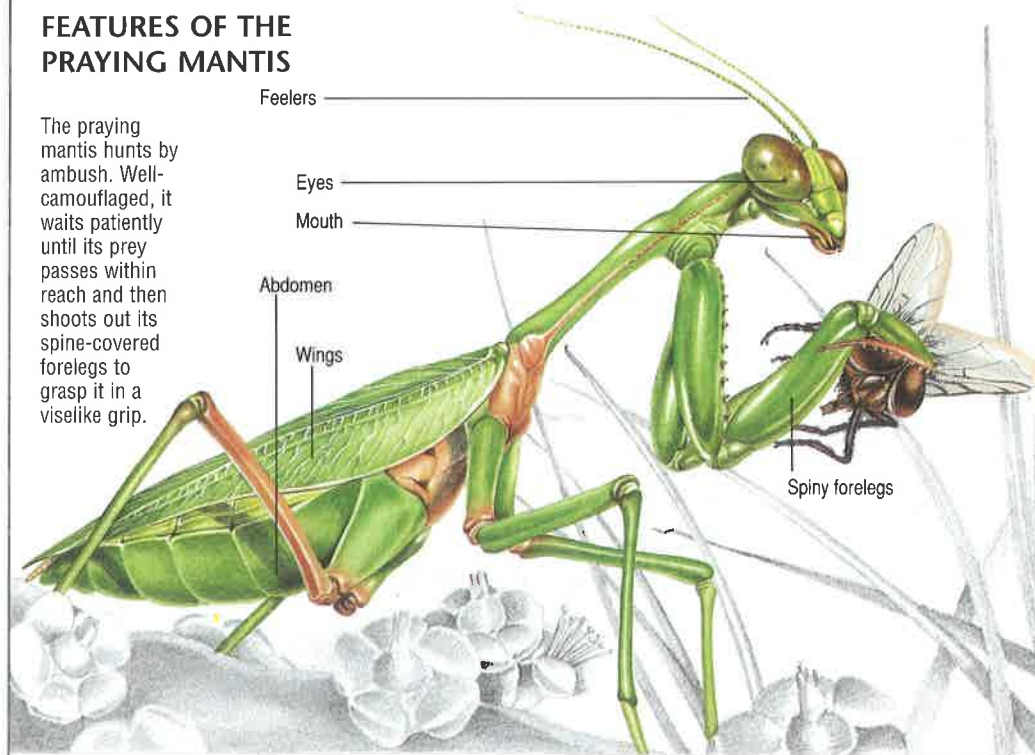
The nearly 2,000 species of mantis are widely distributed throughout tropical, subtropical, and warm, temperate areas of the world.

### CONSERVATION

Tropical mantis species are particularly at risk due to destruction of the world's rainforests.

## FEATURES OF THE PRAYING MANTIS

The praying mantis hunts by ambush. Well-camouflaged, it waits patiently until its prey passes within reach and then shoots out its spine-covered forelegs to grasp it in a viselike grip.



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*The cannibalistic habits of praying mantises ensure that they remain solitary creatures.*

*Because they feed on one another, mantises are widely spaced within their various habitats.*

### HABITAT

Mantises are found in a variety of habitats—including deserts, meadows, and savannahs—all through the warmer

parts of the world, especially in the humid tropical rainforests, where the majority of mantis species occur.



R. Maier/N.H.P.A.

### FOOD & HUNTING

Praying mantises do not actively hunt down their prey. Instead, they wait unmoving and virtually invisible on a leaf or stem, ready to seize any passing insect. When potential prey comes within range, the mantis thrusts its pincerlike

forelegs forward to grasp the insect. Any chance of escape is minimized by the viselike grip facilitated by the rows of hooked spines along the inner part of the mantis's front legs. The mantis bites its prey's head off first.

**Right:** *Mantises will prey on almost any insect small enough to be seized.*



O.C. Roura/Natural Science Photos

### BREEDING

The female praying mantis is widely known for her peculiar habit of biting the head off of her partner while they are mating. This cannibalistic act was once believed to be a regular practice. However, it now seems more likely that it is much rarer in female mantises in the wild than in captive mantises kept in cages.

After mating, the female lays her eggs in batches that are enclosed in a tough, spongy envelope called an *ootheca*. The *ootheca* is attached to fence posts, twigs, and stems, or sometimes buried in the ground. The females of some species of mantis stand guard over their eggs until the young emerge. They fend off attacks by parasitic wasps, which lay their eggs inside the eggs of the mantis.

The eggs hatch three weeks to six months after being laid. The young emerge from the eggs through tiny holes in the *ootheca*. Many species of mantis look like ants when they are small, but as they go through a series of *molts* (shed their skin), they begin to resemble adult praying mantises.

**Right:** *Mantises mating. Males are always smaller than females.*

**Below:** *Cannibalism is most common among captive mantises. Here, a common green mantis preys upon her partner after mating.*



K.P.-M./Premaphotos Wildlife



S&T Stuart/Aquila

**Right:** *A colorful African flower mantis relies on camouflage to avoid being preyed upon.*



P.&S. Ward/Natural Science Photos

**Above:** *An African mantis in a threat display to deter predators.*

### DEFENSE

Mantises have a number of enemies, particularly birds. In order to discourage them, large mantises will strike out at them with their spiny forelegs.

Smaller species seek to discourage an aggressor by suddenly exposing brightly colored wings, which often have false eye-spots to give the impression of a frighteningly aggressive face.

Such tactics are only necessary when the mantis has actually been seen. The first line of defense is to avoid detection at all. Most mantises are therefore well camouflaged. Grass-dwellers tend to be green, and tree-dwellers are often mottled brown.

### DID YOU KNOW?

- Large mantises will tackle and eat tree frogs and nestling birds.
- Flower mantises, from Africa and the Far East, so closely resemble flowers that insects will often land on

- them to get nectar.
- Whatever their size, mantises lay eggs of virtually the same size.
- The name *mantis* comes from the Greek word for prophet or soothsayer.

# EMPEROR DRAGONFLY

CARD 11

GROUP 5: INSECTS & SPIDERS



CLASS  
Insecta

ORDER  
Odonata

FAMILY  
Aeschnidae

GENUS & SPECIES  
*Anax imperator*



The bright blue male emperor dragonfly is extremely sharp-sighted and is one of the fastest flying of all insects.

## KEY FACTS



**SIZES**  
**Length:** Adult, 3 in. Larva, 2 in.  
**Wingspan:** 4 in.  
**Coloration:** Adult male: enamel blue body with central black stripe and green head; adult female: green head, brown body.  
**Wings:** 2 pairs, moved independently.



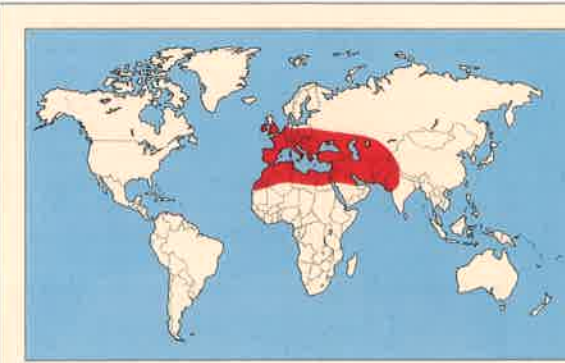
**BREEDING**  
**Eggs:** Cream colored, elongated; laid on plant stems.  
**Hatching time:** 3-4 weeks.



**LIFESTYLE**  
**Habit:** Active hawkler.  
**Diet:** Adult: winged insects; nymph: invertebrates, tadpoles.  
**Lifespan:** Adult, about 4 weeks; nymph, 2 years.



**RELATED SPECIES**  
 A subspecies of *Anax imperator* occurs in southern Africa.



Range of the emperor dragonfly.

### DISTRIBUTION

Found in Europe, the British Isles, northern Africa, the Middle East, and northwestern India.

### CONSERVATION

Extremely vulnerable to the effects of water pollution and drainage. Its future depends on the survival of clean, unpolluted ponds, lakes, and waterways.

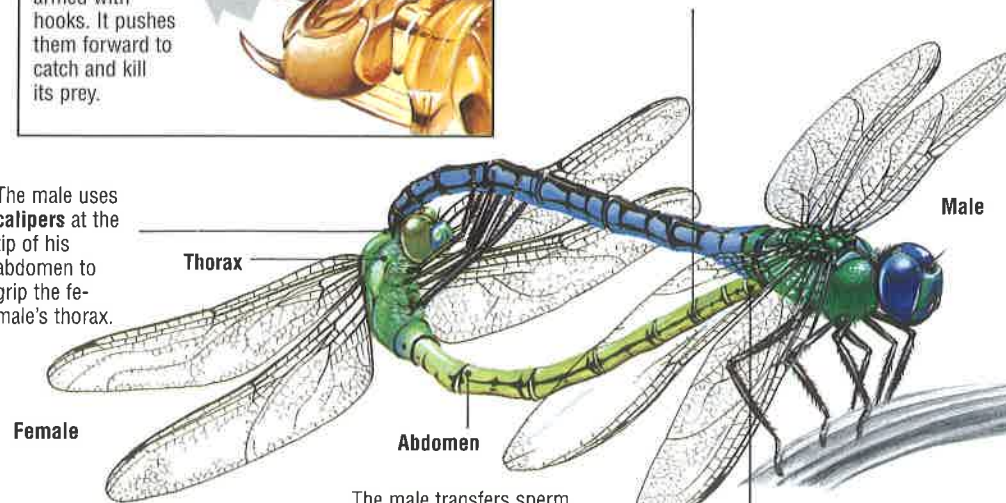
## SPECIAL FEATURES OF THE EMPEROR DRAGONFLY

The larva has an extended jaw armed with hooks. It pushes them forward to catch and kill its prey.



**The copulation wheel:** The female arches her body under the male to mate. They may fly in tandem while they are mating.

The male uses **calipers** at the tip of his abdomen to grip the female's thorax.



The male transfers sperm from the tip of his abdomen to accessory sexual organs. The female then **fertilizes** the eggs.

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*The emperor dragonfly has remained unchanged for 230 million years. Despite being able to beat its wings only 30 times a second (10 times slower than a bee), it has no difficulty hunting down more highly evolved insect species.*



### FOOD & FEEDING

The adult dragonfly is able to catch most of its prey while it is flying. It plucks insects out of the air with its legs. The emperor dragonfly is rarely still, and its huge, multifaceted eyes enable it to detect prey up to 40 feet away.

Almost any flying insect is suitable prey. The dragonfly eats small insects even while it is flying, but takes larger prey to a resting perch.

The emperor dragonfly's larvae also hunt. They propel themselves through their underwater habitat by expelling water rapidly from their intestines. Their extendable jaws, armed with deadly hooks, enable the larvae to catch and kill such food as water lice and nymphs.

**Right:** *The shovel-like jaw of the larva is used to capture a variety of freshwater animals.*

### HABITS

The male emperor dragonfly is almost continuously airborne, in search of a mate or prey that may stray into its territory.

The dragonfly's territory is always over a freshwater pond or lake. The defending dragonfly will attack the trespasser

immediately by flying under him to force him up and away from the water.

The green and brown female stays away from the water until she is ready to breed, so she is sighted less frequently.

### LIFECYCLE

Most of the dragonfly's life is spent underwater as larva. It emerges as a winged adult for a few weeks a year to mate and lay eggs.

Usually, mating takes place in the high branches of a tree along the pond's bank, but sometimes, it will occur in the air. The male pursues the female until he is able to settle on her back. The mating procedure is known as the "copulation wheel" (see back cover). The female fertilizes the eggs, then uses her *ovipositor* (a special egg-laying organ) to lay them. To protect her eggs

from being eaten by fish, she places them into slits that she has cut into the stems of pondweed.

The eggs develop in about three weeks, depending on the temperature of the water. The larva, or *nymph*, that hatches is wingless and lives in the water. It *molts* (sheds its skin) 10 to 15 times during the two years it takes to mature. Almost all of its growth occurs in the summer.

In the last stage of development, the larva crawls out of the water and dries its skin in the sun. As the skin splits, the adult dragonfly emerges. Once its soft wings have hardened, it can fly.

**Left:** *The adult dragonfly lives for only a few, brief weeks.*

**Right:** *The legs form a basket in which insects are caught in flight and then transferred to the jaws to be eaten.*



### DID YOU KNOW?

- Dragonflies always rest with their wings spread open.
- Dragonflies and their larvae are a popular food in some Asian countries.
- There are more than 30,000 facets in a dragonfly's eye.
- Very few birds can outfly and hunt down dragonflies. The fast-flying, agile hobby is a match, however.
- The dragonfly's front and hind wings beat alternately, not together, unlike most insects. This gives the insect better flight control.



**Above and right:** *The emperor dragonfly guarantees that its larvae hatch at the same time, allowing a better chance for the adults to breed successfully.*



### NATUREWATCH

The emperor dragonfly is usually recognizable by its large size. The male has a deep blue abdomen, divided by a black stripe down the center of its back. Its head is green. Up close, it can be identified by the distinctive, rounded edges of the hind wings. The female is green and brown and is much less conspicuous than the male.

During summer, the adult male patrols his territory—usually flies 6 to 20 feet above the water. When it does rest, it perches briefly on the edge of a reed bed or in a tree.

Adults can be found near any stretch of unpolluted, fresh water within their range. Larvae emerge from the water as early as May.