

A 3D Model set by Ken Gilliland

Nature's Wonders

Dragonflies & Damselflies

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Nature's Wonders

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Introduction

Dragonflies and Damselflies are among the most ancient insects on the planet. While these insects make the top 5 in beloved bugs along with ladybugs and butterflies, dragon and damselflies are efficient and ruthless killers. Their order, *Odonata*, which means the “toothed one” in Greek, refers to dismembering their prey adeptly with their mandibles and eating them while still in the air.

They are represented in human culture on artifacts such as pottery, rock paintings, and Art Nouveau decor. Their bright colors and agile flight are admired in the poetry of Alfred Lord Tennyson and the prose of H. E. Bates. They are used in traditional medicine in Japan and China, and caught for food in Indonesia. They are symbols of courage, strength, and happiness in Japan, but seen as sinister in European folklore.

Overview and Use

The set is located within the **Animals : Nature's Wonder** folder. Here is where you will find a number of folders, such as **Manuals**, **Resources** and **Fauna Libraries**. Let's look at what is contained in these folders:

- **Fauna Libraries:** This folder holds the actual species and poses for the "premade" fauna. The fauna for this set can be found in the following folder(s):
 - **Insects/Damselflies of the World**
 - **Insects/Dragonflies of the World**
- **Manuals:** Contains a link to the online manual for the set.
- **Props:** Contains any props that might be included in the set
- **Resources:** Items in this folder are for creating and customizing your fauna included in the set
 - **... Based Models:** This folder has the blank, untextured model(s) used in this set. These models are primarily for users who wish to experiment with poses or customize their own species. When using physical renderers such as Iray and Superfly, SubD should be turned to at least “3”. For DAZ Studios 3Delight renders, the SubD must be turned from the “High Resolution” setting to the “Base” setting (otherwise some areas will render incorrectly transparent).

Loading a Damselfly or Dragonfly using Poser

1. For this example, we'll create the Scarlet Meadowhawk.
2. Load Poser, select the FIGURES library and go to the "Animals", "Nature's Wonders" and then the Nature's Wonders Fauna Libraries Insect folder.

3. Go to the Dragonflies of the World folder and select the Firefly or Superfly sub-folder.
4. Select the Scarlet Meadowhawk (or a dragonfly of your choice) and load it by clicking the mouse.

Loading a Damselfly or Dragonfly in DAZ Studio

1. For this example, we'll create the Scarlet Meadowhawk.
2. Load DAZ Studio and go to the "Animals", "Nature's Wonders" and then the Nature's Wonders Fauna Libraries Insects folder.
3. Go to the Dragonflies of the World folder and select the 3Delight or Iray sub-folder.
4. Select the Scarlet Meadowhawk (or a dragonfly of your choice) and load it by clicking the mouse.

The InsectCam

All of the dragonflies and damselfies in this set have been scaled to their appropriate sizes in relation to human figure models. In some cases, these can be very small. With that in mind, this set comes with the "InsectCam".

The InsectCam is a camera set-up to focus on the default position of the insect. With Poser, it will also change the "hither" setting from its default value of 0.800 to 0.0 to allow close focus.

Sizing & Poser Issues

An issue that can appear when rendering in Poser, with only a dragonfly or damselfly (no other items) in the scene, is that it will produce a default square shadow. It is a known bug within Poser. To correct this issue, include a second larger item off-screen and the shadows will render correctly.

Posing the Dragonfly and Damselfly

With most figure-based models the center of the model is the "hip" area. Since these insects have three sets of hips, the center of this model is the middle hip called "Thorax2". Bending "Thorax3" will move all parts from the Thorax to the "Head" on the insect while bending "Thorax1" will move all parts from the Thorax to the tail ("Abdomen1-10" and Cerci parts).

General Information on Dragonflies & Damselflies

Dragonflies and damselflies were some of the first winged insects to evolve, some 300 million years ago. Modern dragonflies have wingspans of only two to five inches, but fossil dragonflies have been found with wingspans of up to two feet. Some scientists theorize that high oxygen levels during the Paleozoic era allowed dragonflies to grow to monster size.

There are 11 families of dragonflies (3,012 known species) and 34 families of damselflies (2,942 species), all of which belong to the order *Odonata*, which means “toothed one” in Greek and refers to the dragonfly’s serrated teeth.

How is a Dragonfly different than a Damselfly? Here are the 4 key differences:

1. Dragonflies have much larger eyes than damselflies. The eyes of the dragonfly take up most of their heads, as they wrap around from the side to the front of the face. While the eyes of a damselfly are large too, there is always a gap or space between them.
2. Dragonflies have bulkier bodies that are both shorter and thicker in appearance than Damselflies, which have a body made like the narrowest of twigs.
3. Both dragonflies and damselflies have two sets of wings, however their wings have different shapes. Dragonflies have hind wings that broaden at the base, thus making them larger than the front set of wings. Whereas in Damselflies both sets of wings are the same size and shape, and they also taper down, becoming quite narrow where they connect to the body.
4. Finally, you can spot the difference when the insects are at rest. Dragonflies hold their wings out perpendicular to their bodies, like an airplane. Damselflies fold their wings up and hold them together across the top of their backs.

Larval Stage

Most of a dragonfly's life is spent in the larval stage where they molt from six to fifteen times. Depending on the altitude and latitude, larval development varies from the common one or two years to as many as six years. At that time, the nymph crawls up out of the water and molts one last time, emerging from its old skin as an adult with functional wings. Damselfly larvae, known as naiads or nymphs, are almost all completely aquatic. They proceed through about a dozen moults as they grow. Unlike butterflies and beetles, dragonflies and damselflies do not have an intermediate pupal stage before becoming an adult. Because of this, Odonata are said to be hemimetabolous, or undergo an "incomplete" or "gradual" metamorphosis.

In their larval stage, dragonflies and damselflies are aquatic and eat just about anything—tadpoles, mosquitoes, fish, other insect larvae and even others of their kind.

Vision and Hunting

Each of the dragonfly's enormous compound eyes, contains 30,000 facets, which bring in information about the insect's surroundings. Dragonflies have nearly 360-degree vision, with just one blind spot directly behind them. This extraordinary vision is one reason why they're able to keep watch on a single insect within a swarm and go after it while avoiding mid-air

collisions with other insects in the swarm. They not only have an exceptional field of vision, but they can see the world in colors we can't even imagine. According to New Scientist:

"We humans have what's known as tri-chromatic vision, which means we see colors as a combination of red, blue and green. This is thanks to three different types of light-sensitive proteins in our eyes, called opsins. We are not alone: di-, tri- and tetra-chromatic vision is de rigueur in the animal world, from mammals to birds and insects. Enter the dragonfly. A study of 12 dragonfly species has found that each one has no fewer than 11, and some a whopping 30, different visual opsins."



They are expert fliers that can fly straight up and down, hover like a helicopter and even mate in mid-air. Some species can reach a top speed of 18 miles per hour. They catch their insect prey by grabbing it with their feet in mid-air, tearing off the wings with their sharp jaws, so it can't escape, and eating it, all without needing to land. They're so efficient in their hunting that, in one Harvard University study, the dragonflies caught up to 95 percent of the prey released into their enclosure.

The New York Times reported:

"One research team has determined that the nervous system of a dragonfly displays an almost human capacity for selective attention, able to focus on a single prey as it flies amid a cloud of similarly fluttering insects, just as a guest at a party can attend to a friend's words while ignoring the background chatter. Other researchers have identified a kind of master circuit of 16 neurons that connect the dragonfly's brain to its flight motor center in the thorax. With the aid of that neuronal package, a dragonfly can track a moving target, calculate a trajectory to intercept that target and subtly adjust its path as needed ... As a rule, the hunted remains clueless until it's all over."

Dragonflies, which eat insects as adults, are a great control on the mosquito population. A single dragonfly can eat 30 to hundreds of mosquitoes per day.

Flight and Migration

Hundreds of dragonflies of different species will gather in swarms, either for feeding or migration. Little is known about this behavior, but the [Dragonfly Swarm Project](#) is collecting reports on swarms to better understand the behavior. Scientists have tracked migratory dragonflies by attaching tiny transmitters to wings with a combination of eyelash adhesive and superglue. They found that green darners from New Jersey traveled only every third day and an average of 7.5 miles per day (though one dragonfly traveled 100 miles in a single day). A dragonfly called the globe skinner has the longest migration of any insect—11,000 miles back and forth across the Indian Ocean.

Courtship

In both dragonflies and damselflies mating follows a choreographed routine. It begins with the male having to attract a female to his territory, while at the same time driving off rival males. When the male is ready to mate, he transfers a packet of sperm from his primary genital opening, near the end of his abdomen, to his secondary genitalia, near the base of his abdomen. The male then grasps the female behind the head with the Cerci at the end of his abdomen; since the structure of these varies between species they may help to prevent interspecific mating. The pair then flies in tandem with the male in front. Typically they will perch on a twig or plant stem and the female will then curl her abdomen downwards and forwards under her body to pick up the sperm from the male's secondary genitalia. This distinctive posture appears heart-shaped.

But he's not idle while he does this. Female dragonflies will usually mate with multiple partners, and in the oddest evolutionary quirk outside of the Brazilian Wandering Spider's erection-causing venom, dragonflies have developed barbs on their penises that serve no other purpose besides scooping a previous suitor's semen out of a female dragonfly. With all obstacles out of its way, the dragonfly will then mate—and all of this happens while the two dragonflies are airborne.

And in some cases, the male will continue to guard the female until the eggs are fertilized, preventing her from being raped by any other males to increase his chances of fatherhood.

Obelisking

The Dragonflies and damselflies often assume the obelisk posture. This is a behavior to prevent overheating on sunny days. The abdomen is raised until its tip points at the sun, minimizing the surface area exposed to solar radiation. When the sun is close to directly overhead, the vertical alignment of the insect's body suggests an obelisk.

Lifespan

While dragonflies and damselflies may live for two to six years in their larval stage, adults live for only a few weeks or up to a year, depending on their species.

Cardinal Meadowhawk

Sympetrum illotum

Type: Dragonfly

Range: Occurs in Canada, the United States of America, Mexico, Costa Rica (Cartago, San Jos), El Salvador, Guatemala (Alta Verapaz, Sacatepquez), Honduras, Nicaragua and Panama.

Habitat and Ecology: This species inhabits lakes and ponds in the northern part of its range, even very small ones such as backyard pools. In the southern United States and northern Mexico, it is commonly found on pools in rocky streams. Increasingly, however, it is restricted to montane marshy ponds farther south in Mexico and Central America. Often it is located in the same breeding habitat as *Sympetrum corruptum* in the Northwest but, unlike that species, it is rarely seen at any distance from water.

Size: Total Length: 36-40 mm (1.42 to 1.57 inches); abdomen: 23-26 mm (0.91 to 1.02 inches); hindwing: 26-29 mm (1.02 to 1.14 inches).

Description: The face is bright red in front and on top in mature males; browner in juveniles. The thorax is brown to bright red with two oblique white spots below the wings. The wings are diffused with yellow to deep red veins, There are one or two darker brown streaks extending at least to the first antenodal crossvein in the subcostal and or cubital areas of the wings. The legs are reddish brown. The abdomen is dark brownish to bright red and parallel-sided for most of its length. The caudal appendages red.

With the female Cardinal Meadowhawk, the subgenital plate is notched and extends beyond the end of the eighth abdomen segment, halfway to the ninth segment.



Rarity and Status: It is locally common in many populations. There are no threats presently affecting this species.

Keeled Skimmer

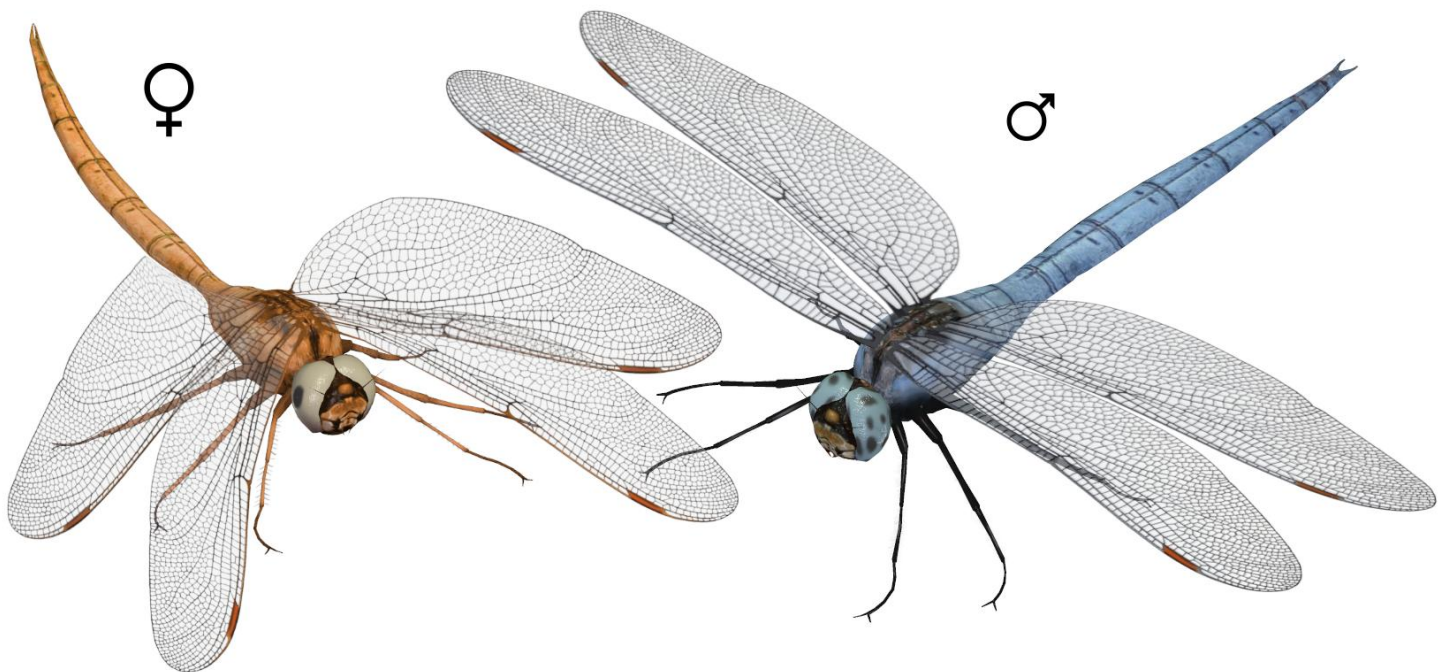
Orthetrum coerulescens

Type: Dragonfly

Range: The Keeled Skimmer occurs in Central and Southern Europe and is locally common in western Britain and Ireland.

Habitat and Ecology: Its typical habitat is acidic heathland, where it is often seen alongside golden-ringed dragonflies. Pools and streams in wet heathland sites are favored. It may be found resting low in heather at such sites. It breeds mainly in peat bogs and flies (in the UK) from June to September.

Size: Total Length: 40-44 mm (1.57 to 1.73 inches); abdomen: 27-30 mm (1.06 to 1.18 inches); hindwing: 28-34 mm (1.10 to 1.34 inches).



Description: This species resembles the black-tailed skimmer but is slimmer and the male has no black tip. The male develops a blue dusty looking coating over the whole length of the abdomen. Its eyes are blue-gray.

Females and immature males lack the black abdominal pattern. The pterostigma is orange and the thorax usually bears pale stripes. It has a pale, yellowish-brown abdomen with a medial black line.

Despite its seemingly weak flight which appears skittish, with frequent hovering, and landing, it can fly quite a distance from water. When perched, its wings are held forward.

Rarity and Status: It is locally common in many populations. There are no threats presently affecting this species.

Orange-tailed Marsh Dart

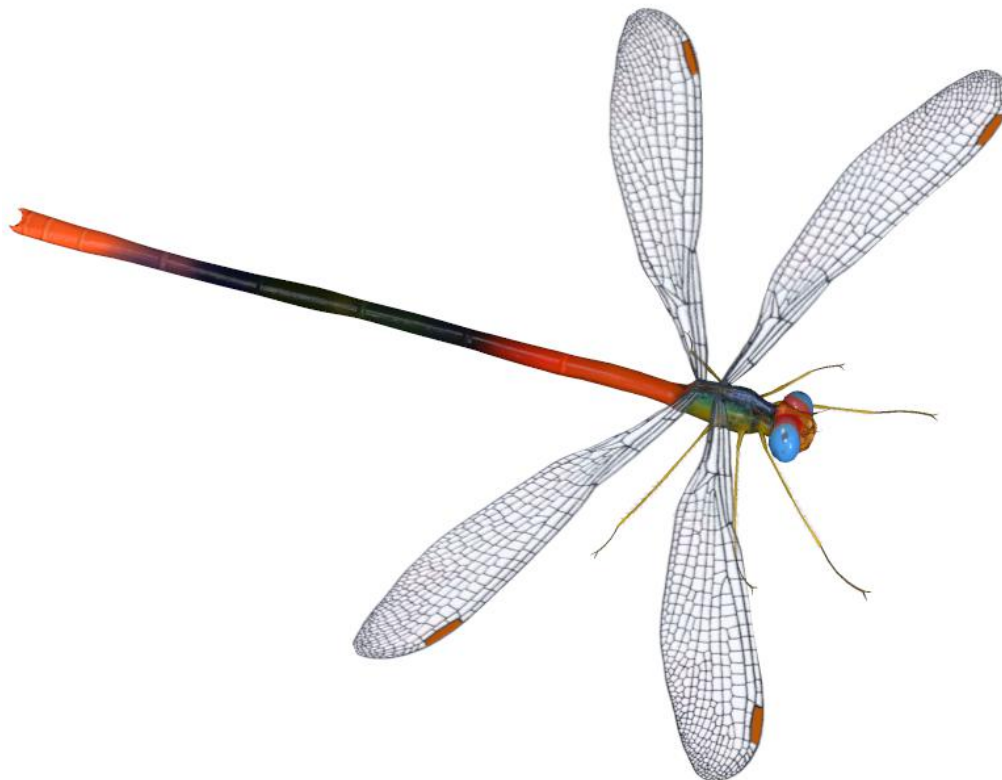
Ceriagrion cerinorubellum

Type: Damselfly

Range: Occurs in Asia (Bangladesh, China, Indonesia, India, Sri Lanka, Myanmar, Malaysia, Philippines, Peninsular Malaysia, Singapore, Thailand, and Vietnam)

Habitat and Ecology: They live around ponds, rivers, and canals.

Size: Total Length: 36-40 mm (1.42 to 1.57 inches); ; abdomen: 31-35 mm (1.22 to 1.38 inches); hindwing: 20-21 mm (0.79 to 0.83 inches).



Description: They have a pale green head and distinctive orange-colored segments at the base and end of the abdomen. In the female, the orange segments at the base of the abdomen are much duller than in the male.

Rarity and Status: It is locally common in many populations, being the most common damselfly in Asia. There are no threats presently affecting this species.

Vivid Dancer

Argia vivida

Type: Damselfly

Range: Occurs in Canada, the United States of America, Mexico, Nicaragua and Columbia.

Habitat and Ecology: This species inhabits streams and rivers of the arid southwest.

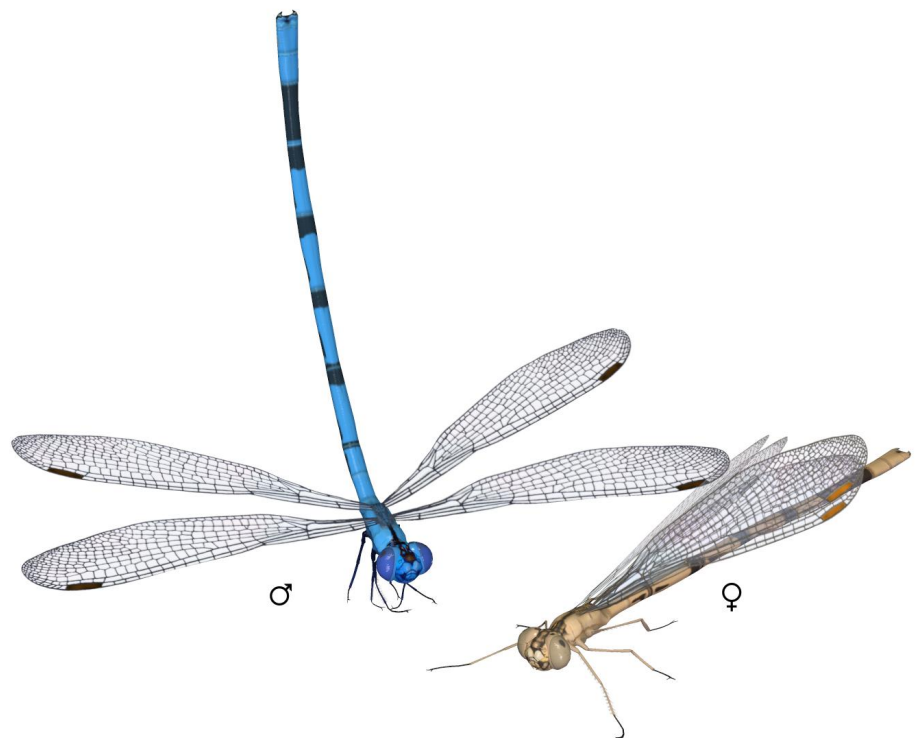
Size: Total Length: 29-37 mm (1.14 to 1.46 inches); abdomen: 23-32 mm (0.91 to inches1.26); hindwing: 19-25 mm (0.75 to 0.98).

Description: The male's face is blue with the top of the head darker, almost violet. The postocular spots are large and broadly connected with the compound eyes. The pale blue occipital bar is generally confluent with these spots. The pterothorax is blue with a black middorsal stripe that is broader than the pale blue antehumeral stripe. The dark humeral stripe is widest at its ends appearing as only a hairline in the middle. The legs are

blue with black stripes exteriorly and the tarsi are black. The wings are generally clear, but may have some amber. There are 4 (sometimes 3 or 5) and 3 postquadrangular cells in the fore- and hindwings, respectively. The abdomen is blue with a black spot dorsally on segment 1. Segment 2 generally has a full-length black stripe dorsolaterally. Segments 3-6 each have a middorsal black stripe extending anteriorly for the majority of each segment. Segment 7 is nearly all black and segments 8-10 are nearly all blue with a black ventrolateral stripe.

The female is similar, but paler, and generally brown overall. The middorsal thoracic stripe is subequal in width to the antehumeral stripe. The femora are paler than in the male and the tibiae are yellowish-brown. The abdomen is generally like that of the male, but somewhat variable and usually darker. The hind margins of the mesostigmal plates develop into obtusely angular lobes projecting over the mesepisternal pits. Mesepisternal tubercles are present.

Rarity and Status: It is locally common in the United States, but is critically endangered in Alberta and threatened in the rest of Canada.



Special Thanks to:

.. to my beta tester, FlintHawk

Sources:

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Discover Life (<http://www.discoverlife.org/mp/20q?guide=Anisoptera>)

Odonata Central (<http://www.odonatacentral.org/>)

Odonata of India (<http://www.indianodonata.org/>)

The Dragonfly Website (<http://dragonflywebsite.com/>)



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