

Order

ODONATA

Greek; odontos (tooth)

Family

Anisoptera

Greek, "unequal" and pteron, "wing"

Common name

Dragonfly



Photo: Mike Fleagle

2 pairs of wings with forewings slightly larger and back wings slightly smaller and wider.

Wings are held open horizontal and perpendicular to body.

Strong fliers with thick bodies.

The wings of the Dragonfly can move independently allowing precise navigation.

They can fly backwards, sideways and can hover in place.

The wings flap at 30 beats per second producing top speeds of 35 mph or about 100 body lengths per second.

Two compound eyes touch and make up the entire front of the head.



Photo: Mike Fleagle

Order

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Family

Zycoptera

Greek; zugós, “even” + pterá, “plural of wing”

Common name

Damselfly

Powdered Dancer *Argia moesta*

Carlsbad, NM 8/18

Photo: Mike Fleagle



Adult



Naiad

2 pairs of wings of equal and symmetrical size.

Wings at rest are folded together over abdomen.

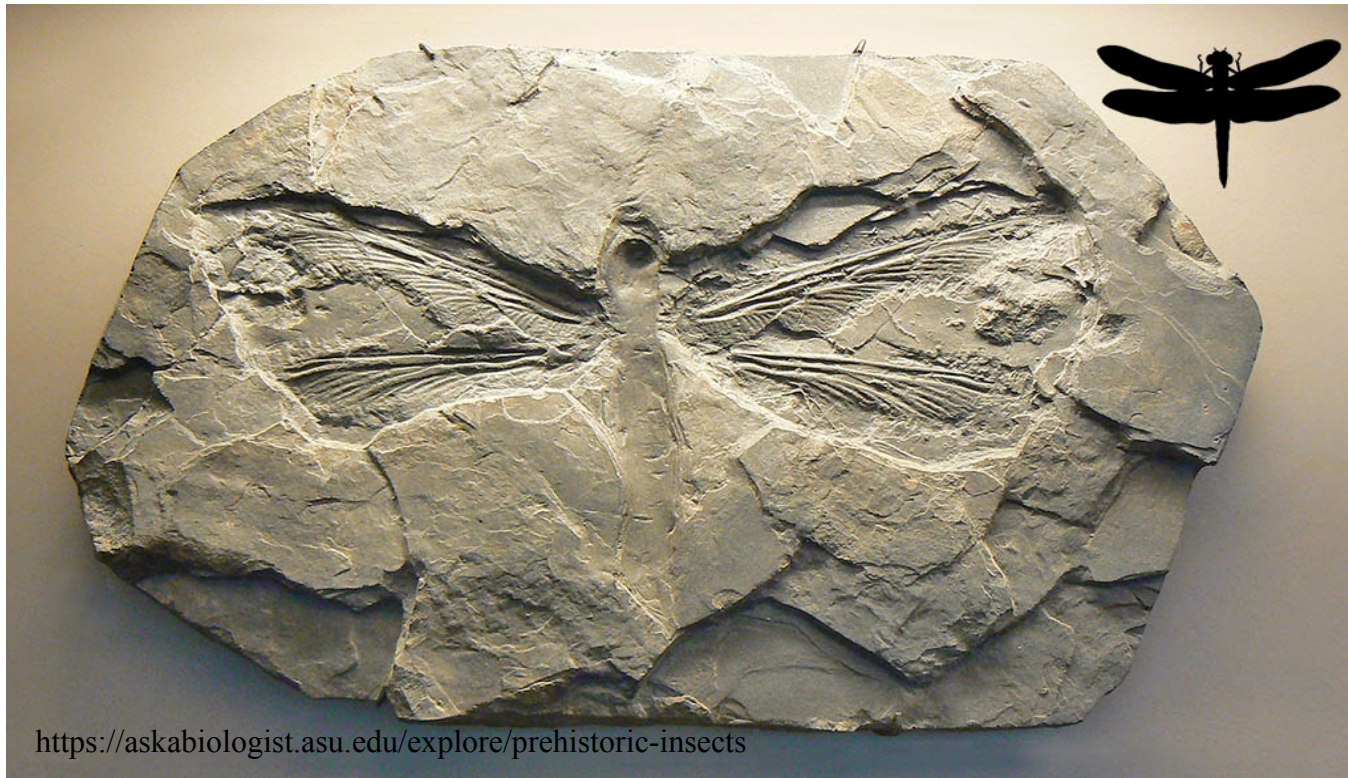
Weak fliers with thin bodies.

Flight pattern is similar to butterflies.

Eyes are separated but equally complex as Anisoptera.

Damsels have spiracles and trachea but no valves or hair to filter the air.

In the Larval/Nymph/Naiad life phase Damsels have 3 gills extending from the last abdominal segment.



Fossil records show Odonata to be at least 300 million years old first appearing in the Paleozoic era.

Fossils and specimens trapped in amber have revealed wingspans as much as 2ft(600mm).

Today the largest dragonflies live in the tropics and have wingspans of 8in(200mm).

There are currently about 6000 species of Odonata.

They are present on every continent save Antarctica.

462 species of Odonata are known to occur in North America north of Mexico as of 2011.

A Checklist of North American Odonata, 2012



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Uploaded by ehjalmarson

Source iNaturalist.org

Original <https://www.inaturalist.org/photos/7715237>

Associated observations **Marl Pennant** *Macrodiplax balteata*

Observer ehjalmarson
 Date August 7, 2016 12:35 PM CDT
 Place 4200 E Pine Lodge Rd,
 Roswell, NM 88201, USA
 (Google, OSM)
 1 ID | Research Grade View »



Marl Pennant (*Macrodiplax balteata*)

[More Photos](#)

Both dragonflies and damselflies have abdomens with 10 segments.




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Source Flickr

Original <http://www.flickr.com/photos/7327719@N06/3869243892>

Associated taxa


Powdered Dancer
(Argia moesta)



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Uploaded by md-in-ns15

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Original <https://www.inaturalist.org/photos/14337056>

Associated observations

[5 photos »](#)

Seaside Dragonlet
Erythrodiplax berenice

Observer md-in-ns15

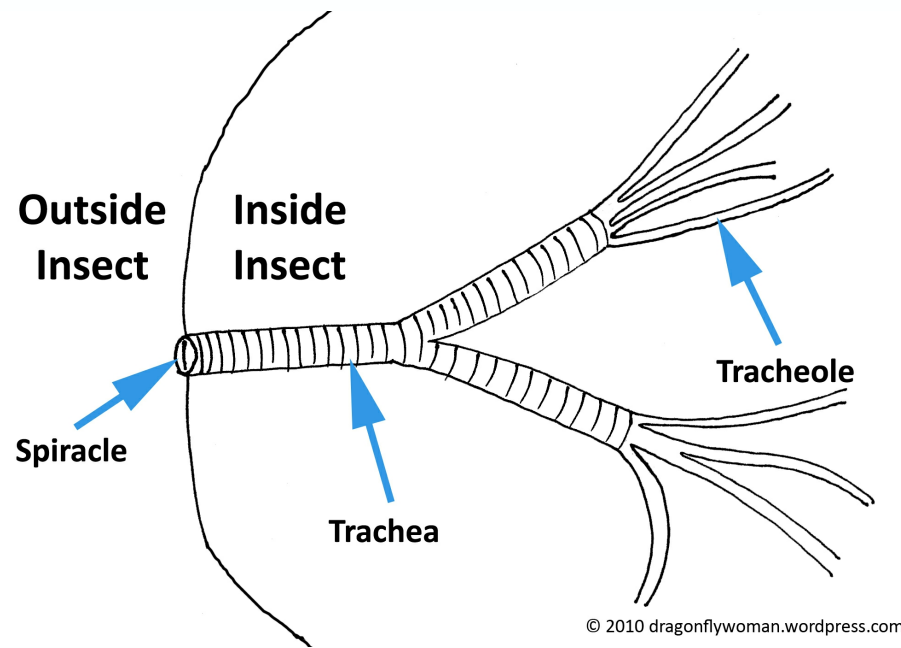
Date July 31, 2016 04:36 PM EDT

Place Canada (Google, OSM)

Each have compound eyes with as many as 30,000 separate eyes or ommatidia.

It has been demonstrated that the flight muscles are connected to the eyes in a reflex arc which results in the wings automatically changing positions and flap speed in response to visual input.

This may explain why they turn with such great speed. Achieving g-forces as great as 9.



There is an open circulatory system with a simple heart with multiple chambers contained within the abdomen.

As in other insects the liquid carrying CO_2 and O_2 is called Hemolymph.

The respiratory system is made up of spiracles/trachea.

These are openings through the exoskeleton of the abdomen to the outside.

The trachea subdivide until they are at the cellular level.

Gas exchange occurs via diffusion at the cellular level.

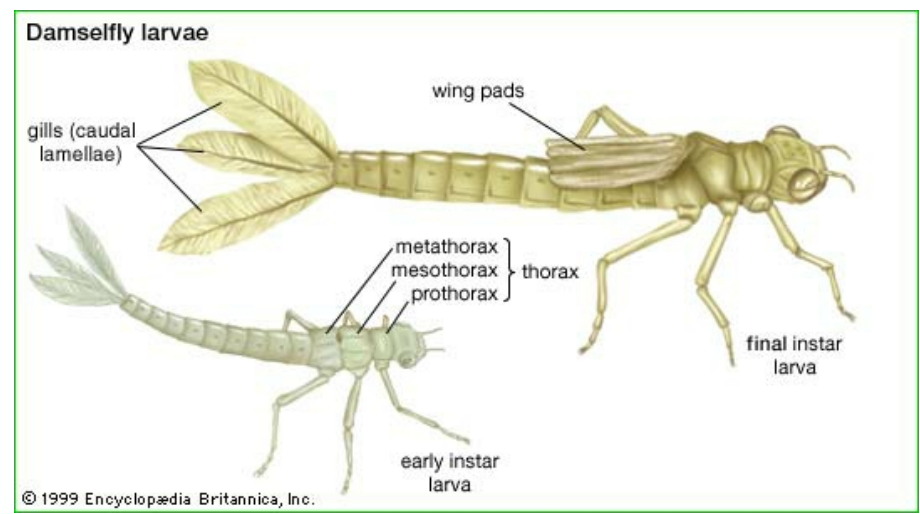
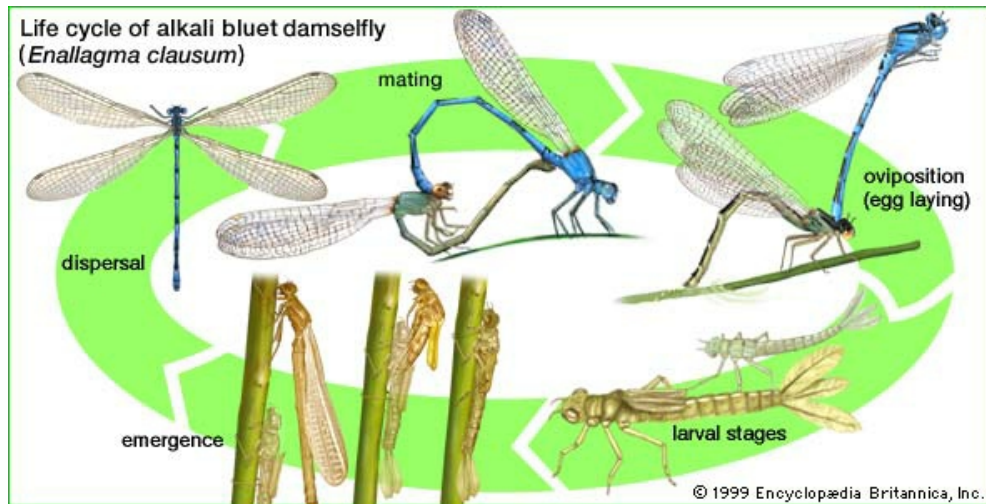


Both families are ectothermic or exothermic and cold blooded.

Both damsel and dragonflies have developed strategies to stay warm.

Such as positioning themselves with the least or most exposure to the sun called obelisking.

Large dragons can warm themselves by shivering using their wing muscles to generate heat.



The adult phase of the odonata life cycle is brief and dependant on temperature.

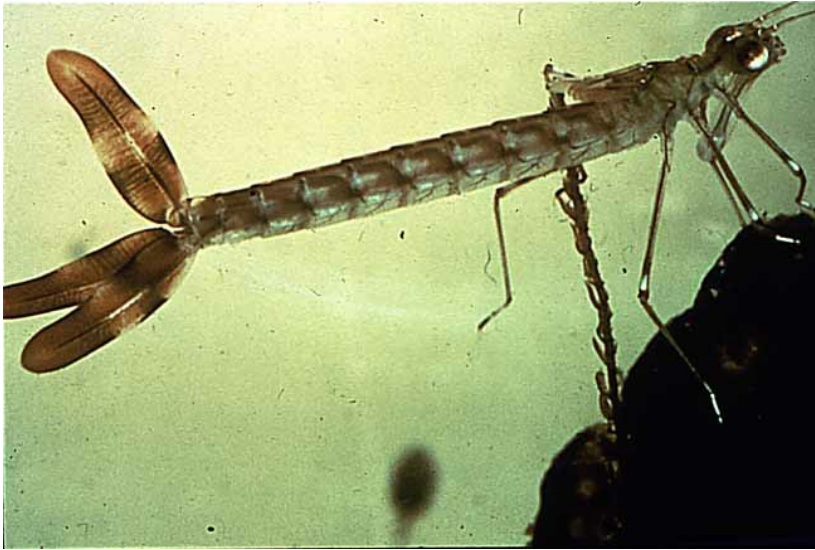
In Maryland their end of life is at most October.

Eggs have been laid and placed in the water or on grasses in the water.

Some species of Odonata insert their eggs in stems of grass or reeds where once the nymph emerge from the eggs they will fall into the water.

Eggs hatch in 2-5wks or in some species the eggs will winter over and hatch in the spring.

Once the eggs hatch a larva/Nymph/Naiad will emerge.



Damselfly nymph



Darner dragonfly nymph



Skimmer nymph

The aquatic stage is the longest for both families of Odonata.

Dragonfly Nymphs can live underwater for years.

The length of time in the aquatic stage is dependant on many things most importantly temperature.

I have read several journal articles claiming nymph life cycles as long as 10 to 15 years.

As they grow they molt their skins perhaps as many as a dozen times.



In this stage the Odonata are just as deadly a predator as when they are in flight.

Just as in the adult Odonata their mandibles/labrum can spring out to capture prey in serrated horizontally moving jaws that saw prey in to bits.

An environmental stimulus will signal the nymph to climb out of the water onto the nearest perch to molt for the last time.

They will pump haemolymph into their wings and wait till the new exoskeletons harden.

Photos; LIFEINFRESHWATER.NET Jan Hamrsky

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Greek, "une"

Common name

Dragonfly



Pantala flavescens or Wandering Glider migrates 11,000 miles across the Indian Ocean from SW India over the Maldives archipelago to the east coast of Africa in a 4 generation migration that utilizes Monsoon winds to carry it at altitudes of greater than 6,00 feet.



New Scientist

“Rassim Khelifa from the University of Zurich, Switzerland, witnessed the behaviour for the first time in the moorland hawk dragonfly (*Aeshna juncea*). While collecting their larvae in the Swiss Alps, he watched a female crash-dive to the ground while being pursued by a male.

The female then lay motionless on her back. Her suitor soon flew away, and the female took off once the coast was clear.

He observed 27 out of 31 females plummeting and playing dead to avoid males, with 21 of these plays successful. “Females may only behave in this way if male harassment is intense,” he says.”



Odonata as biomarkers for environmental health

“Biologists are now considering dragonflies as biological indicators of a healthy environment and make recommendations in order to preserve the habitats frequented by these insects.” Bulletin of the Entomological Society of Malta (2013) Vol. 6 : 5-127

**Odonata can be useful as bioindicators, but mainly as one among a mosaic of correlated habitat (and especially microhabitat) attributes that together correlate with “water quality” and stages of ecological succession, including degradation caused by human impact.” Libellula 12 (3/4). 91-102-1993 Are Odonata useful as bioindicators?
Philip S. Corbet**

REFERENCES, RESOURCES & LINKS

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Odonata Central <https://www.odonatacentral.org/index.php/FieldGuideAction.get/id/46996>



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species

Meganeuropsis Permiana



Meganeuropsis fossils. The left photo is superimposed with modern dragonflies with 4 inch wingspans. Photos by Ghedoghedo and Mark Sloan of Harvard Museum of Natural History.

Meganeuropsis lived during the Permian period, 248 to 290 mya. It belongs to the extinct order of griffinflies (Protodonata), related to dragonflies. Meganeuropsis grew to a wingspan of at least 2.5 feet