Nashua River Watershed Investigations for Grades K - 8

Lesson # 6-1

Title: 6-1 Dragonflies: Prehistoric Predators Live On!

Grade level & Standard: Grade 6
6MS-LS4-2 - Construct an argument using anatomical structures to support evolutionary relationships among and between fossil organisms and modern organisms. Include evidence showing that:

a. Some organisms have similar traits with similar functions because they were inherited from a common ancestor.
b. Some organisms have similar traits that serve similar functions because they live in similar environments, and
c. Some organisms have traits inherited from common ancestors that no longer serve their original function because over time, their environments have changed.

Objective:
Students will observe present day dragonflies (image or actual), observe a dragonfly fossil (made by teacher) and create a 2 foot dragonfly model of a prehistoric dragonfly.

Background:
Present day dragonflies look very similar to their Paleozoic ancestors but they are much smaller today. Prehistoric dragonflies had a 25 inch wingspan. Today the span averages 2 to 4 inches. Excess oxygen produced by blue green algae (Precambrian) may have influenced their size. Fossils of the first winged archaic insects date back to the late Carboniferous period about 300 million years ago. These insects were in the order *Paleodictyoptera*, which is the oldest group of winged insects. *Paleodictyoptera* were the precursors to the modern day *Odonata*. Dragonflies are one of the oldest insects still around today. Through evolution, the dragonfly has changed only slightly from their ancestors and maintains many of the same traits (shape, wing design, eye size, flight pattern, life cycle). The main reason scientists know about the large dragonflies is that their bodies' hard outer shell (exoskeleton) created fossils that are

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easy to identify.

Vocabulary:

- **Thorax** - second part of dragonfly where wings and legs attach
- **Fossil** - the remains or impression of a prehistoric organism preserved in petrified form or as a mold or cast in rock
- **Paleozoic** -the era of geologic time from 570 to 240 million years ago

Discussion points: Why are present dragonflies shaped so much like prehistoric dragonflies? What successful behavior and physical characteristics can we discover?

Blue Dasher dragonfly adult perches horizontally on shoreline vegetation.
Photo taken by Kimberly King

ACTIVITY #1

Materials:

- Clay
- Plaster of Paris (1 spoonful water and 2 spoonfuls plaster)
- Paper plate, cup, and plastic spoon
- Dragonfly model made of plastic foam or pipe cleaners
- Dragonfly adult body to observe under dissecting scope
- Dragonfly larvae in water (can be ordered from Carolina.com or collected)
- Photographs or drawings can be used in place of actual dragonflies (attached).
- *Computer:* *https://www.youtube.com/watch?v=6uFeo_fh3uA*
  Dragonflies: The Flying Aces of the Insect World, National Science Foundation

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Procedure:

1. Teacher demonstrates how a dragonfly creates a fossil using clay and a dragonfly model. Press the dragonfly model into clay, remove the dragonfly and then fill the impression with plaster of paris (replacement fossil). Let it harden and show students. This can be done with students creating fossils.
2. Create three stations - adult dragonfly under scope, dragonfly larvae in water, dragonfly actually flying on computer simulation.
3. Students then visit stations and sketch one adult and one larva from their observations.

ACTIVITY #2

Materials:

- images of prehistoric and present day dragonflies
- 2 pieces of cardstock with dragonfly images copied from templates
- scissors
- colored markers or pencils
- Exacto knife (to cut the slits)

Procedure:

1. Teacher copies the template onto paper or clear material before the lesson.
2. Ask students why they think dragonflies were so large in prehistoric times. Look at the two images and find similar traits with similar functions between the ancestor and the present day dragonfly. What is the same and what is different? Why have dragonflies been so successful? They were one of the first insects to appear on earth and they still look quite similar.
3. Have students cut out shapes in teams (2-4). They can color the body.
4. Teacher cuts the slits and students fit the body parts together.
5. This is close to the actual size of prehistoric dragonflies.

Data sheets / handouts: (attached)

- Dragonflies Past and Present: size comparison illustration
- Dragonfly activity templates
- Dragonfly anatomy images
- Dragonfly Lab Observations Data Sheet

Extension:

- http://www.desertmuseum.org/center/edu/docs/6-9_Prehistoric_6.pdf

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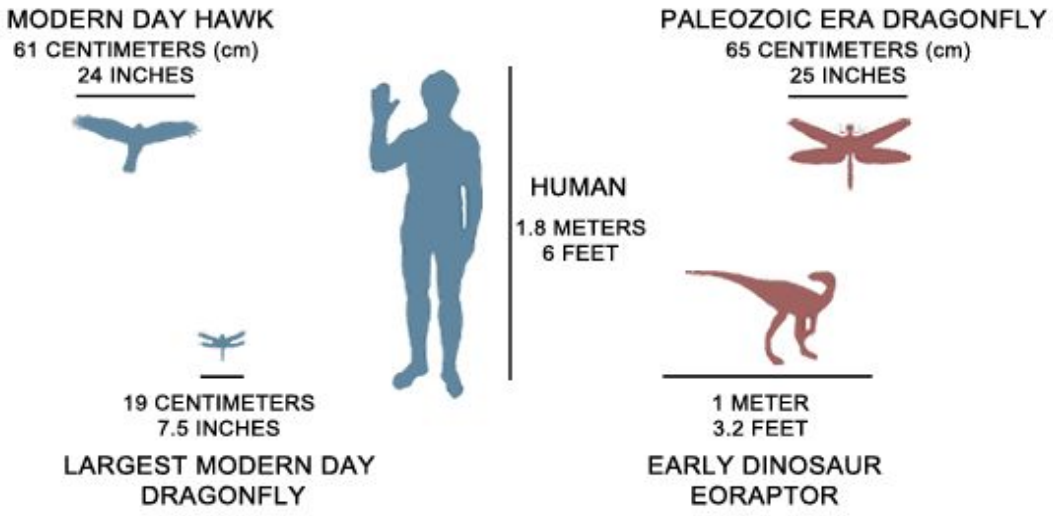
Dragonflies Past to Present: size comparison



(https://askabiologist.asu.edu/explore/prehistoric-insects)

Cast of early dragonfly compared to a modern day insect in the upper right corner.

Cast of early insect, *Meganeuridae*, on display in the Evolution Gallery of the Museum des Sciences Naturelles, Brussels. The fossil cast is compared with a modern day dragonfly in the upper right.

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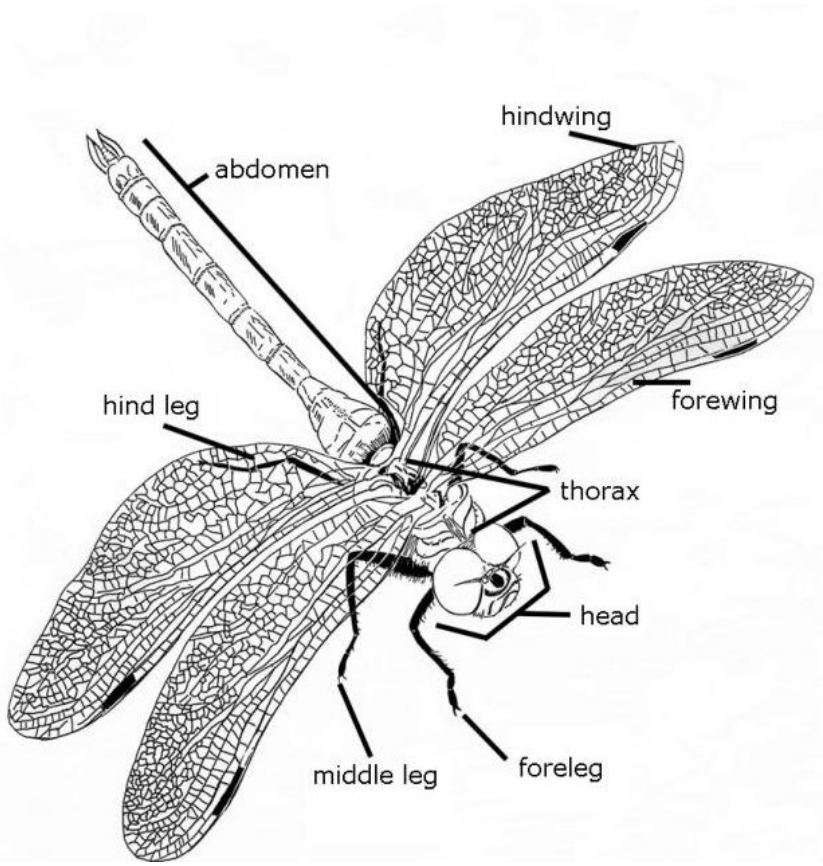
Adult Dragonfly Anatomy



(https://m.espacepourlavie.ca/en/three-part-body)

Dragonfly Nymph Anatomy

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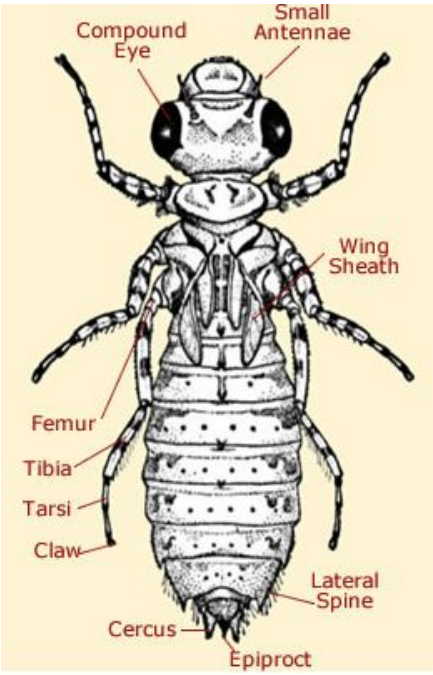

(Images source: Mitten, Mandy. "Dragonfly Anatomy - Illustration & Diagram Of A Dragonfly.")

Prehistoric Predators Live On Data Sheet **NRWI 6-1**

1. Observe the adult dragonfly.
2. Draw the image with the following parts labeled: **head, thorax, abdomen, foreleg, midleg, hind leg, forewings and hind wings.**
3. Include detail in drawing.

4. Observe dragonfly larvae.
5. Draw the image with the following parts labeled:

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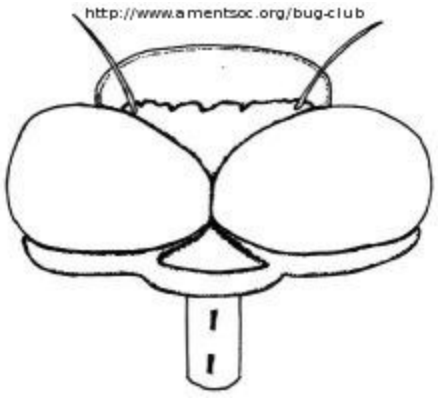
Head, thorax, compound eye, antennae, wind sheath and leg.

Template for Dragonfly Model



Head

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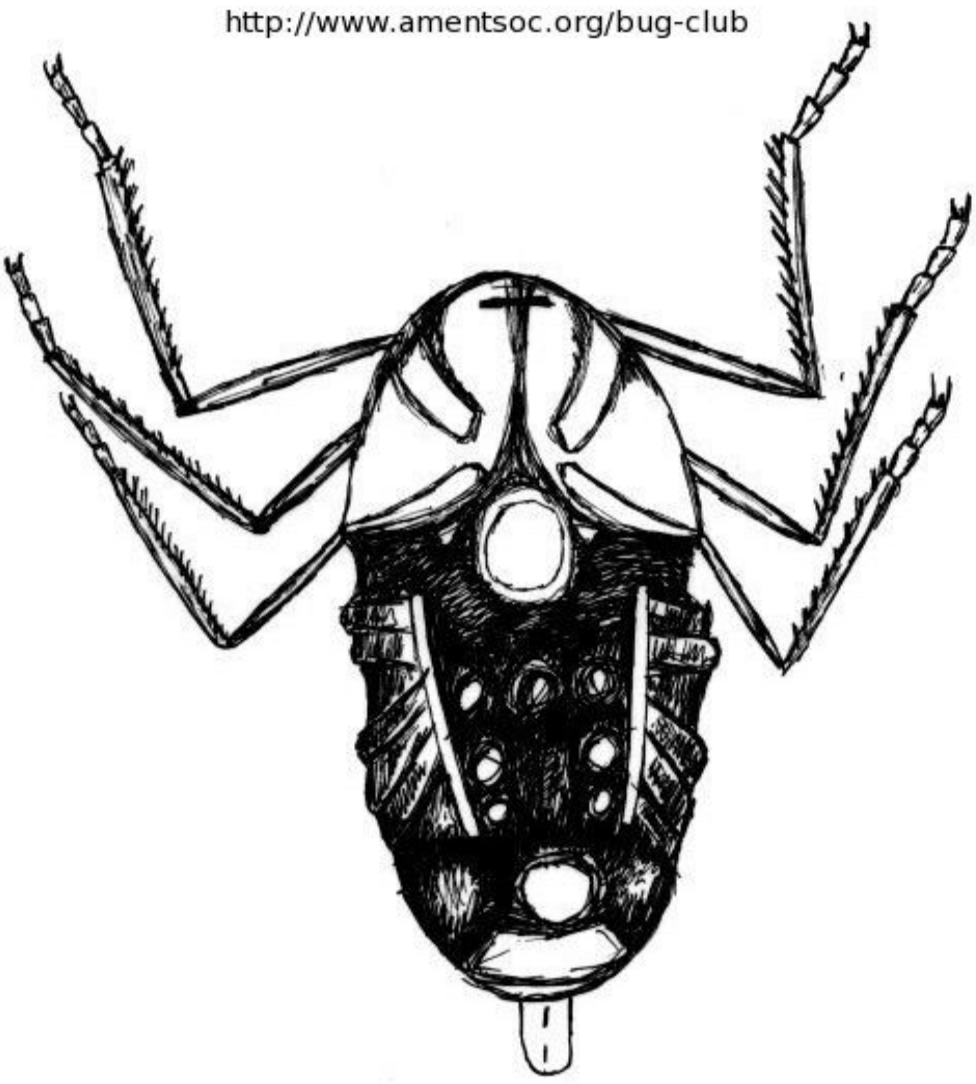

Thorax

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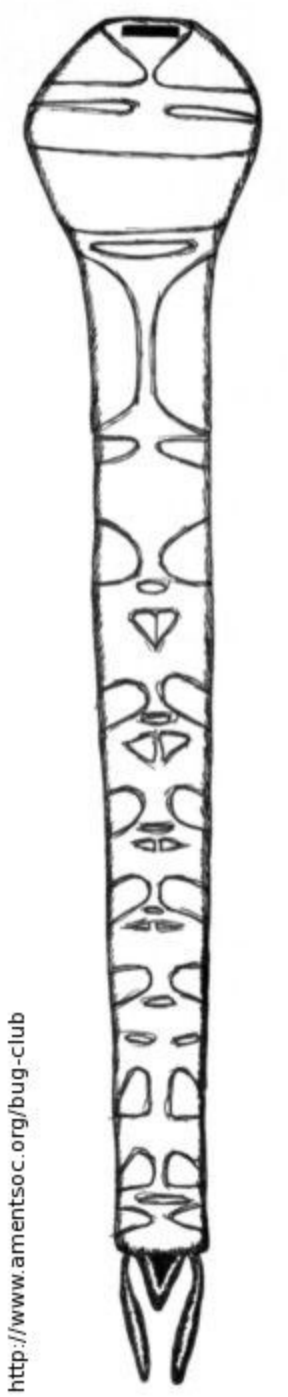

Abdomen

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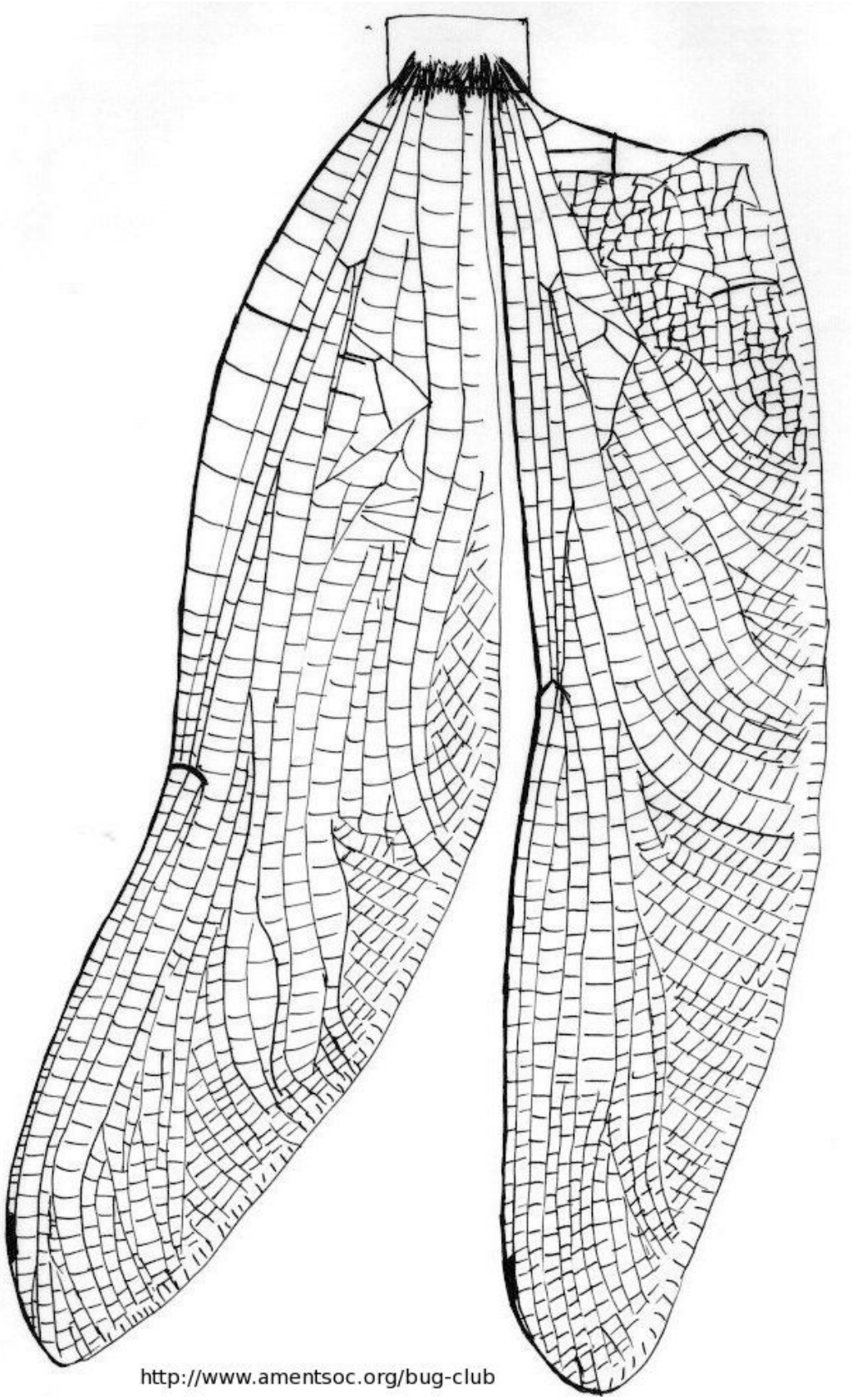
Left and Right Wings Below:



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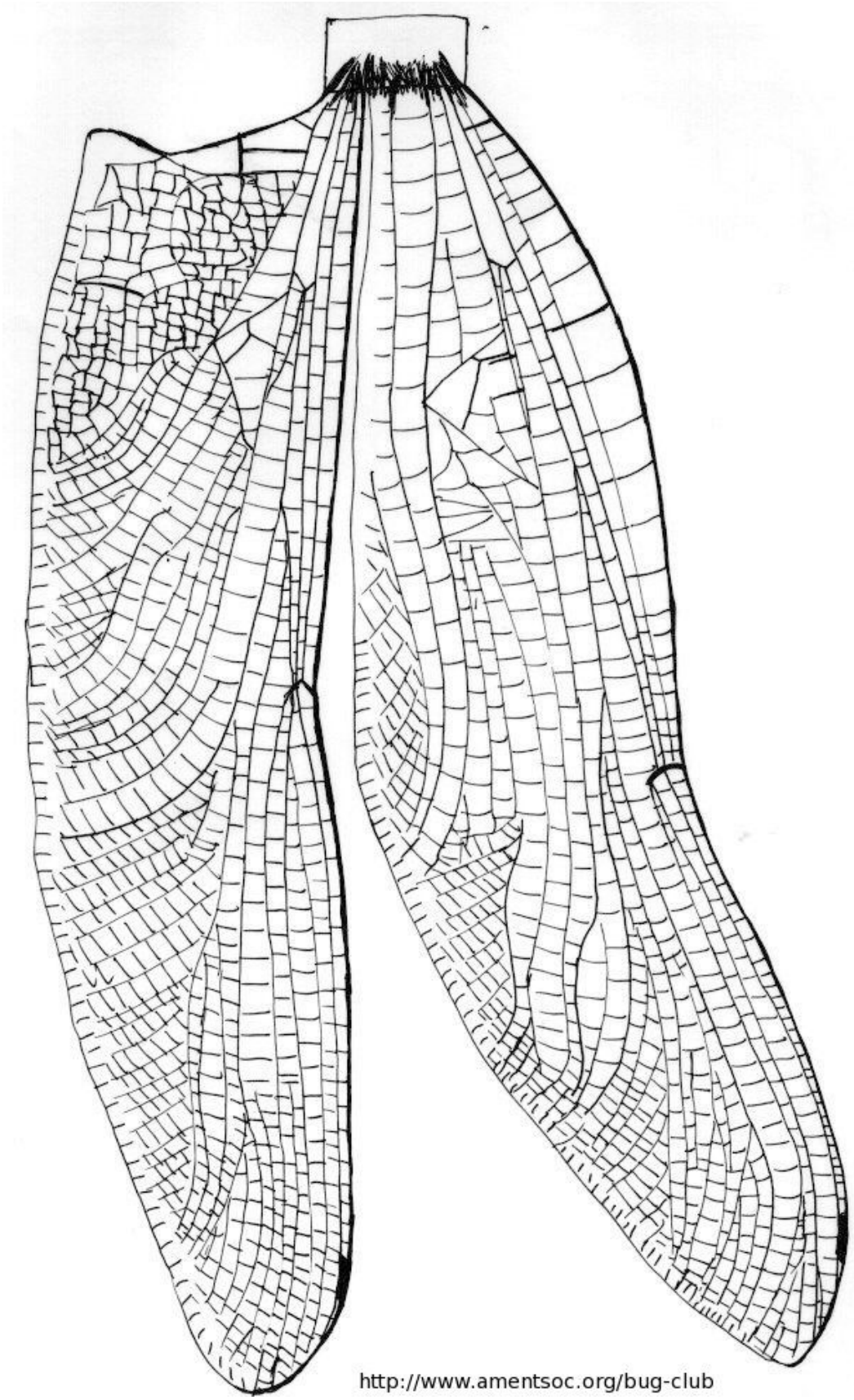

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Completed dragonfly model

Photo Mary Marro

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