Aug 20, 2021

Hydra collecting for citizen scientists

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dx.doi.org/10.17504/protocols.io.bw7pphmn

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ABSTRACT

The freshwater cnidarian Hydra has been a model system for regeneration and developmental biology for over 250 years, but much remains unknown about their biodiversity and global distribution. As a citizen scientist, you can contribute to our understanding of Hydra in the wild by becoming a "Hydra Hunter". All it takes is a few simple materials and a little patience.

Collecting Hydra in the wild can be challenging. You will certainly not find them everywhere you look. Keep in mind that NOT finding Hydra is still useful information because this will help us understand the environmental factors that effect their distribution.

Metadata submission form: https://forms.gle/cAZCiiRCyE922G5t5

Please contact callen dot hyland at gmail dot com for more information or to receive a Hydra collecting kit.

Hydra collecting kits were purchased with a grant to Kimberly Sladek from the University of San Diego Associated Students Government.

Thank you to Rob Steele for helpful feedback on this protocol.

References:

Campbell, R. D. (1983). Hydra Collecting. In H. M. Lenhoff (Ed.). *Hydra: Research Methods*. New York: Springer Science + Business Media.

Martínez, D. E., et al. (2010). Phylogeny and biogeography of Hydra (Cnidaria: Hydridae) using mitochondrial and nuclear DNA sequence. *Molecular Phylogenetics and Evolution, 57*, 403-410. doi:10.1016/j.ympev.2010.06.016

DOI

dx.doi.org/10.17504/protocols.io.bw7pphmn

PROTOCOL CITATION

Callen Hyland, Kimberly Sladek 2021. Hydra collecting for citizen scientists. **protocols.io** https://dx.doi.org/10.17504/protocols.io.bw7pphmn

KEYWORDS

Environmental science, citizen science, biogeography, invertebrates, cnidaria

IMAGE ATTRIBUTION

Jan Hamrsky, www.lifeinfreshwater.net

CREATED

Aug 08, 2021

LAST MODIFIED

Aug 20, 2021

PROTOCOL INTEGER ID

52175

MATERIALS TEXT

These items can be purchased from many vendors, including scientific supply companies. Use the links below as examples. You may be able to find better deals or smaller quantities elsewhere. Since this is a protocol for citizen scientists, we have highlighted sources that can be accessed by anyone. EBay often has good deals on these items.

Glass pasteur pipettes, 5 3/4 inch
glass consumables

Fisher Scientific **1367820B**

Any brand of glass Pasteur pipette will do, just make sure you have bulbs that fit. Plastic Pasteur pipettes are not recommended because Hydra tend to stick to plastic.

Rubber bulbs for Pasteur pipette
Lab equipment

Heathrow Scientific **HS20622B**

Look for 2 mL latex rubber bulbs

Credit card sized magnifier lens
lab equipment

Outus **B06W5FCS4Q**

3X magnifying lenses can be purchased from many vendors. They are sold as reading aids and fire starters.

Plastic food storage container
Consumer product

Rubbermaid **007432886**

Any clear or white plastic container will work.

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Reading glasses
Consumer product

Equate **567223635**

Optional. Look reading glasses with at least 3.00 power.

Headband Magnifier
lab equipment

MagnifyLabs **MAG0020**

Optional

Toothbrush holder
Consumer product

HSYMQ **B08ZXGY5YC**

Optional, but highly recommended. Use a plastic toothbrush holder with a small amount of cotton or packing paper stuffed in both ends to protect your glass Pasteur pipette while traveling.

BEFORE STARTING

Make sure you have all collecting equipment and are prepared for a day outside in the field.
Familiarize yourself with the metadata submission form so you know what to keep track of when you are in the field.

If it will be a long walk to get to the collecting site, bring water, sunblock, and appropriate clothing for changing weather conditions. Be cautions around fast flowing streams, deep water, and slippery rocks.

Research your collecting locations before starting. Avoid private property and restricted areas. Respect the environment by avoiding sensitive habitats and by disturbing vegetation and wildlife as little as possible.

1 Gather your materials:
- Notebook and pen
- White or clear plastic container (a medium-sized food storage container is ideal)
- Glass Pasteur pipette + rubber bulb
- Screw-cap vials (either glass or plastic)
- Magnifying glass, high powered reading glasses, or headband magnifier
- Optional: plastic toothbrush holder to protect your glass pipettes

The Hydra Collecting Kit contains:
- Plastic food storage container
- Two glass Pasteur pipettes + one rubber bulb

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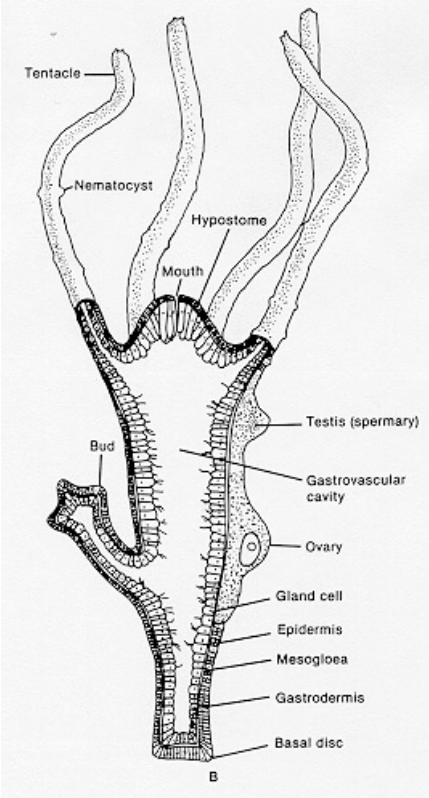
- Credit card-sized magnifying glass
- Three glass screw-cap vials

2 Familiarize yourself with the appearance and anatomy of Hydra so you know what you are looking for.



Hydra anatomy in cross section.
Image credit: Encyclopedia of Science

If you want to Google Hydra to learn more about its biology, try using terms like "Hydra cnidaria" or "Hydra biology". If you just Google "Hydra" most of your results will be about Greek myths and Marvel movies.

3 Select your collecting location.
Hydra are found in fresh water bodies all over the world. Look for ponds, lakes, rivers, and streams with accessible shoreline. Especially promising areas will have slowly moving water, abundant small invertebrates, and water plants to which Hydra can attach.

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Hydra habitat. Image credit: Kimberly Sladek

Hydra habitat. Image credit: Kimberly Sladek

4 Once you are at the collecting site, record metadata about the environment:

- Name of the location
- GPS coordinates
- Date and time
- Brief description of the location
- Any wildlife observed
- Human activity observed
- Description of the weather including air and water temperature. You can measure it if you have a thermometer, otherwise provide an estimate.

To find your GPS coordinates you can drop a pin on your location using Google Maps, use the iPhone Compass app, or use a dedicated GPS smartphone app.

It's fine to note just that there are small invertebrates present in the water, or to describe the organisms that you are familiar with (e.g. snails, water beetles), but If you want to identify aquatic invertebrates, see this guide: https://www.macroinvertebrates.org/

You can access the metadata submission form with your mobile device and fill it out while you are in the field, or you can write everything down in your notebook and fill out the form when you get home.
https://forms.gle/cAZCiiRCyE922G5t5

5 Hydra attach to submerged surfaces (rocks, sticks, leaves, reeds, stems of water plants, shells) through their basal disk, so this is likely where you will find them in the water. Fill your plastic container with water, then pick up various items from the water and place them in your container. Use your magnifier to examine every side looking for Hydra. If there are none, put the items back into the water and repeat.

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Searching for Hydra.
Image credit: Victoria Rodriguez

Searching for Hydra.
Image credit: Kimberly Sladek

Hydra can be difficult to spot since they are less than a centimeter long. It can be especially challenging if there is algae on the surfaces you are examining. Here are some tips for what to look for. Add a comment if you have additional suggestions.

- Hydra may be extended or contracted. If extended you will notice the cylindrical body column. If contracted, they will appear spherical on the surface of the item you are examining. Either way, they will look more "geometrical" than the surrounding algae and debris.
- Look for fine tentacles extending up into the water column.
- Hydra can be either green or brown. In the author's experience, green Hydra are much darker green than surrounding algae and aquatic plants. Brown Hydra look tan or translucent.

Brown Hydra attached to a rock. Image credit: Jan Hamrsky, www.lifeinfreshwater.net/hydra

6 Did you find Hydra? If so, use the Pasteur pipette to fill a vial with water, then use the Pasteur pipette to scrape the Hydras off the surface and then suck them up and transfer them to the vial. Cap the vial leaving a small amount to air.

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Record the number of Hydra you found at that location.

Brown Hydra collected near Eugene, Oregon.
Image credit: Callen Hyland.

If possible, keep the Hydra in water from the site where they were collected. If you need to transfer the Hydra into a different container, you can use commercial spring water (e.g. Arrowhead). Do not use tap water or drinking water.

7 Make sure to fill out the metadata submission form for every site you visit. Fill out a separate form for each site, even places where you did not find Hydra (under "number of Hydra found" record 0 if you did not find any).
https://forms.gle/cAZCiiRCyE922G5t5

If you collected Hydra, contact callen dot hyland at gmail dot com for the next steps.

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