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Shipping live Daphnia V.2

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We use this protocol and it's working

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Abstract

Background:
Daphnia are small zooplankton often used in laboratories as model organisms due their well-studied ecology and evolutionary history, small body size, short generation time, parthenogenetic reproduction, and simplicity of culturing under laboratory conditions. Occasionally laboratories may need to send different species or genotypes to collaborators for various reasons.

Purpose:
The purpose of this protocol is to set forth a recommended way in which to ship *Daphnia* specimens from one laboratory to another in a way that minimizes loss.

Guidelines

We have established that this protocol works for multiple species, including D. pulex, D. pulicaria, D. dentifera, D. magna, D. ambigua, D obtusa, and D. lumholtzi. It should work more broadly.

1. The main objectives are to control temperature (for most species, the problem is the package may get too hot), and oxygen. Oxygen can be depleted by decaying algae, so limit the the quantity of food you add to each tube. Well-fed Daphnia can be shipped without food, but may initially produce male offspring after being received.

2. In the U.S., most overnight shipping goes through the Memphis, TN airport because it is the least likely to experience weather disruptions. However, if you've only got one chance to send the *Daphnia*, check the weather report for Memphis and make sure it is clear.

Materials

50 ml conical/Falcon centrifuge tubes
Labels/Sharpie
Daphnia medium (filtered lakewater, ADaM, or other)
Food for *Daphnia*
parafilm
whirlpak or ziploc bags
insulated box
blue icepacks
packing material
packing tape

Safety warnings

N/A

Ethics statement

N/A

1 Label 50mL conical/falcon tubes with the species, genotype, and date in which the *Daphnia* were placed into the tubes.

2 Fill up the 50mL conical/falcon tubes with 45ml of filtered lake water or Artificial *Daphnia* Media (ADaM). Other *Daphnia* media, such as COMBO, may work.

3 Place up to 6 individuals per tube.

4 Feed individuals about 0.5mL of dilute *Ankistrodesmus falcatus* green algae or similar, then seal with cap.

5 Use parafilm to further secure the cap and tube by placing parafilm around the cap several times.

6 Place the tubes into a Ziploc bag or Whirlpak for secondary containment.

7 Use a box that is size appropriate for however many samples are being sent. Within the box make sure there is an insulated cooler box to help regulate temperature.

8 Place 1-3 frozen icepacks into the bottom of the cooler box and place the bags containing the tubes of Daphnia on top of the icepacks.

9 Double check to make sure nothing is leaking, if there is a leak grab a new tube and repeat the above steps.

10 10. Add packaging material such as bubble wrap to secure the tubes and prevent as much movement as possible during shipping.

11 11. Close and secure the package with packing tape and either procure stickers that say live animal or write on the box live animal, can also include on the box the species. In some cases, it may be sufficient to describe the contents simply as "water samples."

12 12. Print appropriate shipping label with sender and recipient information.

13 13. It is highly recommended to send these samples overnight for next day delivery.

14 14. Use a parcel service such as UPS or FedEx to ship to the appropriate destination. UPS is recommended as their live animal policy includes all crustaceans. FedEx claims that they will accept live crustaceans however depending on the location of shipment processing they may not accept the package.