Teach Ecological Concepts With Mud Dauber Nests

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Mud dauber nests are familiar sights on the walls of barns and other buildings and under bridges. These nests house not only the grub-like larvae their builders intended, but also a fascinating assemblage of other seldom-seen organisms.

Because they are readily available, harmless, and -- like owl pellets -- unique and unpredictable, mud dauber nests are engaging for students to dissect. They offer an authentic and inexpensive laboratory experience with real organisms that enables students to explore and understand important ecological concepts such as food webs and chains and the interactions between organisms. They also provide meaningful practice using dichotomous keys. All one needs for success are mud dauber nests, keys for identifying the organisms present, and some natural history or biological information on the organisms and their interrelationships.

In North America three species of mud dauber wasps are common, and their nests share the same guild of inhabitants. The black and yellow mud dauber (*Sceliphron caementarium*) occurs across the entire continent, making nests that look like a small blob of mud thrown on to a wall. The organ pipe mud dauber (*Trypoxylon politum*) is common east of the Great Plains; it constructs tubes of mud that resemble the pipes of an organ. The steel blue mud dauber (*Chalybion californicum*) typically uses nests made by the other two species; it also occurs across North America. Photographs of the three wasp species and their nests and cocoons are provided in Matthews (1997).

One may obtain mud dauber nests any time, but collecting them during the colder months (roughly October to April) ensures that the nests have been abandoned by their maker and that the living contents will be in a dormant stage. Restrict collections to current year nests, i.e.,

nests that lack holes made by exiting wasps from prior years. Use a putty knife to pry the nest gently from the substrate. (Nests built on wood surfaces are usually easier to remove intact than those built on cement or brick.) Place nests in resealable plastic bags with the date and locality written on the outside with a permanent marker. Bagged nests may be kept in the dormant stage almost indefinitely in a refrigerator, and brought out as needed for classroom use.

Provide sheets of white paper (or paper plates) to use as a dissecting surface, forceps, metric rulers, magnifying lens or dissecting microscopes, and vials with stoppers to hold nest contents. Dichotomous keys that will permit accurate identification of the organisms found in the nests can be photocopied from Matthews (1997), and Matthews et al. (1996). The latter also contains keys and illustrations of typical nest inhabitants that can be reproduced as overhead transparencies.

Most mud dauber nests can be carefully broken open using fingers. Nests and their contents are not hazardous and require few classroom precautions beyond the reasonable request that students wash their hands after conducting this activity. Encourage students to work slowly, measuring and recording data as they proceed. Cell compartments should be examined one at a time, and the contents removed with forceps. The contents of each cell should be placed in a separate vial or other container. (The compartments of an egg carton work well).

With the aid of low (from 10x to 40x) magnification and the provided keys, students soon learn to identify the various organisms obtained from their nests. When they have finished doing so, show them how to use a thumbnail carefully to pop one end off any cocoons they have found. Using a second set of keys will reveal whether these cocoons contain the original maker or a parasite or other inhabitant.

Have students chart the contents of their nests, including numbers and identities, and combine individual results into a class data set. Encourage students to research the life histories of the organisms they have identified. Useful information can be found in Matthews et al. (1996) and Matthews (1997). Additional available resources include a set of 20 slides on mud dauber biology and a 21-minute video tape illustrating life histories of common nest inhabitants (Riverview Press, P. O. Box 5955, Athens, Georgia 30604).

Once life histories are understood, the class can construct a food web of the nest inhabitants based on the total combined class results (for an example, see Matthews et al., 1996). In the process, ecological concepts like parasitism, commensalism, predation, trophic level, food pyramids, and energy flow will naturally emerge and become meaningful parts of the students' knowledge base.

From the materials collected during the dissections, some teachers may wish to develop a synoptic reference collection for future use. An inexpensive and durable way to preserve specimens is to place them on a layer of cotton batting inside a plastic Petri dish, add identifying labels, replace the dish cover, and secure the sides with cellophane tape.

References

Matthews, R. W., T. R. Koballa, Jr., L. R. Flage, and E. J. Pyle. 1996. WOWBugs: New Life For Life Science. Riverview Press, Athens, GA, 320 pp. [ISBN 1-888499-06-0]

Matthews, R. W. 1997. Teaching ecological interactions with mud dauber nests. American Biology Teacher, 59: 152-158.