

THE AMATEUR SCIENTIST

by Shawn Carlson

Expert Secrets for Preserving Plants

The museum of natural history nearest you probably harbors an impressive collection of local plant life. Across the U.S., these archives provide an excellent physical record that current and future biologists can use to track how native plants have fared in response to natural and human forces. Historically, amateurs have played a key role in shaping the botanical record, most notably since the Northwest expedition of Meriwether Lewis and William Clark, who preserved and returned hundreds of plants that were then unknown to science. Today each new summer brings an army of botanical enthusiasts scouring the countryside, searching for fascinating flora.

To aid budding botanists, I thought I'd share some museum tips for specimen preservation. You can use these techniques to help add to the official record or simply to engage your family in a rewarding outdoor adventure. Just don't run afoul of the law. Whether on private or public land, collect only if you have permission to do so from the authority responsible for the property.

Specimen preservation begins in the field. I suggest photographing each plant before cutting it to keep a record of it in its natural setting. Also, mark on photocopies of a topographical map the exact locations of your finds. Paste these sheets into your field notebook. If the plant is under 15 centimeters (six inches) tall, collect the entire thing, roots and all. Otherwise, cut off a representative part, including flowers, fruits and any seed pods, which can often identify a plant better than its leaves. Tag each specimen with a small paper tab and record in your notebook the species' common name and scientific name if you know it, the date, and any details that a future botanist may need to know. Until you have finished your day's collecting, keep your cuttings hung upside down in the shade to minimize any crimping of their stalks as moisture begins to evaporate from their tissues.

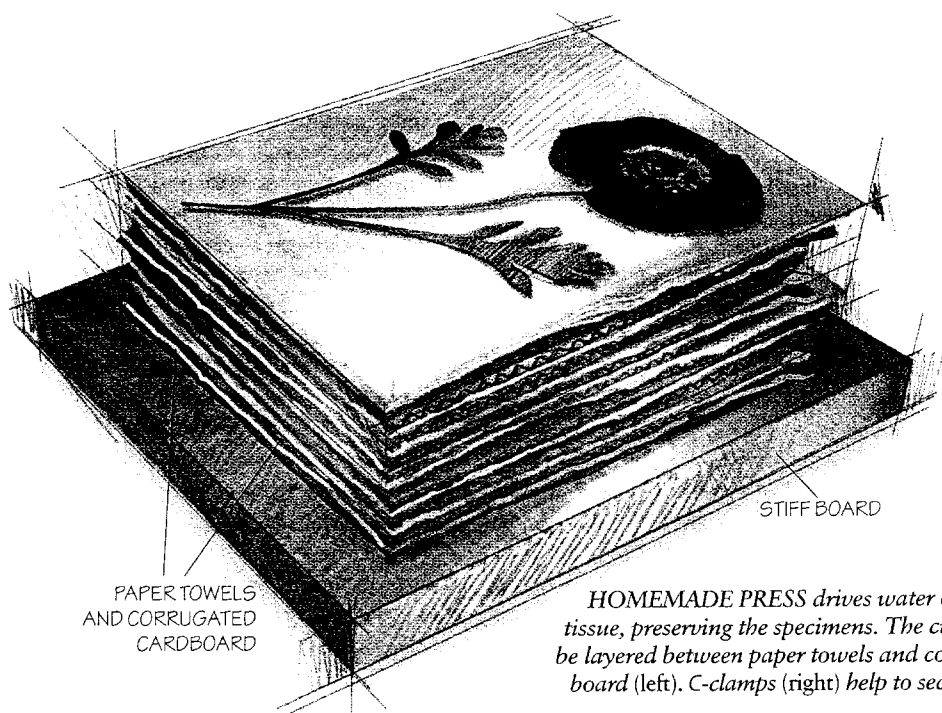
Because cut plants deteriorate quickly, process them as soon as you get home. Begin by dipping each specimen in warm and slightly sudsy water, followed by gentle agitation in clean water

to remove the soap. This process will kill bacteria and dislodge tiny crawlers. Thoroughly dry the foliage by blotting it with a paper towel.

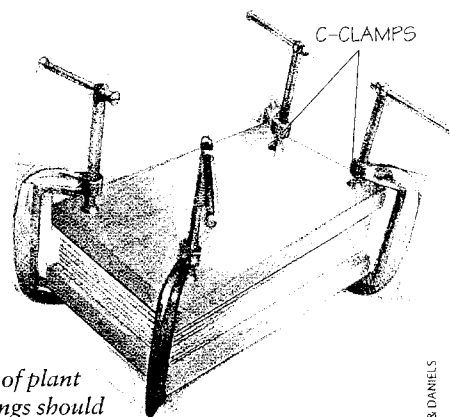
Plants are best preserved by pressing and drying them. Begin by placing three layers of paper towels on top of a stiff board that measures about 30 by 45 centimeters (12 by 18 inches). Then gingerly lay out your cleaned plant, making sure to display different views (front and back) of its leaves. Large flowers should be split with a sharp knife and opened flat with their internal parts face up. Place three more layers of paper towels on top, followed by a sheet of corrugated cardboard and three additional layers of paper towels. Then lay out your next specimen. You can stack up to 10 cuttings this way.

Place a second stiff board on top of the stack and apply steady, firm but gentle pressure to drive water out of the plant tissue and into the absorbent paper. Use a weight or four large C-clamps positioned near the corners. Or if you prefer, you can buy a professional press from a biological supply house. One of the largest is BioQuip in Gardena, Calif. (310-324-0620; product no. 3115; \$40). Or check out Fisher Science Education in Burr Ridge, Ill. (800-955-1177; product no. CQS17670; \$30).

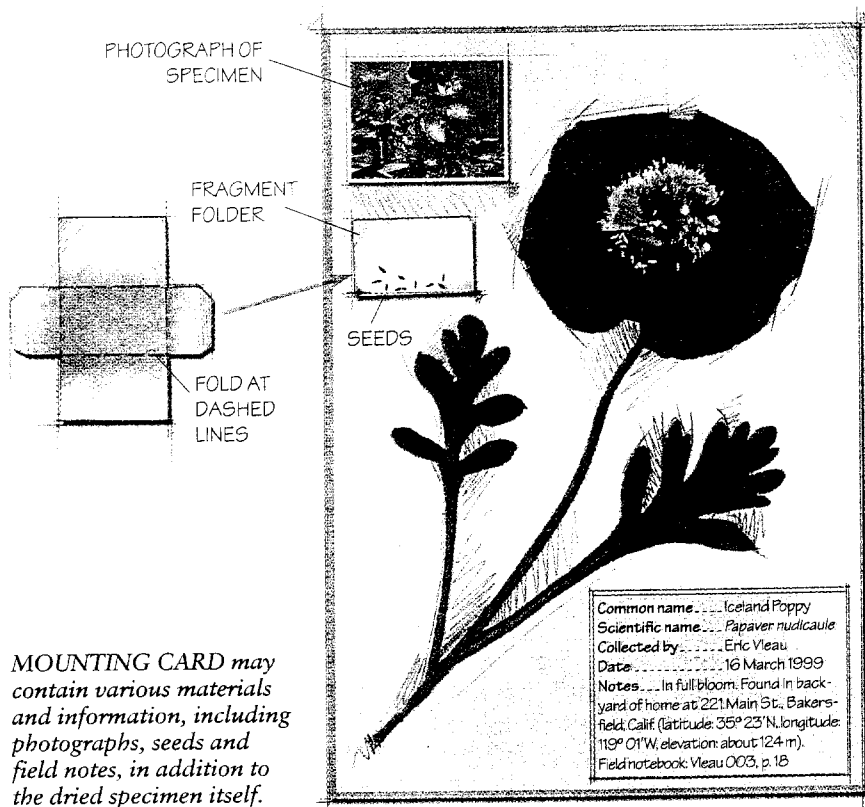
Store your press on a warm, sunny windowsill. You'll need to refresh the paper every few days depending on how much water your specimens contain. Most cuttings do well with paper chang-



HOMEMADE PRESS drives water out of plant tissue, preserving the specimens. The cuttings should be layered between paper towels and corrugated cardboard (left). C-clamps (right) help to secure the setup.



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MOUNTING CARD may contain various materials and information, including photographs, seeds and field notes, in addition to the dried specimen itself.

es every two or three days, and they dry completely in about three weeks. But thick, fleshy leaves require daily replacements and can take four weeks to dry. Next, to kill any remaining tenacious pests, place the dried plants in a plastic bag and consign your collection to a freezer for at least three days.

Museum herbariums mount their specimens on cards measuring 29 by 42 centimeters (11½ by 16½ inches). BioQuip sells paper cards of that size for \$1.70 per dozen (product no. 3135), and a buffered acid-free rag variety goes for \$4.25 per dozen (product no. 3137). Fisher's price is \$29 for 100 sheets (product no. CQS17676A). For those on a limited budget, ordinary card stock, though much smaller, works well and is available for under \$10 in reams of 250 sheets from any office supply store. But if you want your collection to be studied one day by botanists yet unborn, stay with acid-free paper.

Because dried plants are quite brittle, use extreme care when mounting them. Dilute some white glue by about one third with water and smear a thin layer onto a cookie sheet. Coat the backside of your specimen by gently settling it into the liquid. Delicately remove the plant, blot it on a sheet of newspaper and position it onto the mounting card.

Dab all parts of your specimen with a paper towel to remove any excess glue. Place a sheet of wax paper and cardboard on top and use your plant press to secure the arrangement until the adhesive sets.

Although my early efforts using ordinary Elmer's white glue have held up nicely now for some 25 years, most professionals rely on a concoction they call "botany paste." BioQuip sells two-ounce containers for a little over \$3. (By the way, if you know a recipe for this substance, please share it on the Web-based discussion area for this project at the address given below.)

Transfer all the relevant information about each specimen from your field notebook to an acid-free paper label and glue it to the mounting sheet. Seeds and other loose parts can be stored by inserting them into thumb-size paper envelopes, known as fragment folders, which can then be glued or stapled to the sheet. You can easily make your own folders, or you can buy them pre-cut from BioQuip in packages of 100 (product no. 3211BA; \$15). And don't forget to include any photographs you took, which can be glued directly to the mounting cards. If the old adage is correct, each picture could save you a thousand words of exposition.

Last, you'll need to store your collection. My cuttings are organized inside loose-leaf picture albums that I keep inside two nested plastic trash bags. The specimens are contained within the innermost bag, which is tightly sealed. A fumigant bundle made of moth flakes wrapped in cheesecloth sits inside the outer bag next to the opening of the inner bag. Changing the moth flakes every six months or so has kept away pests.

Living near an ocean allows me to collect sea plants. These organisms, however, present two special challenges. First, a plant that has washed up onto the beach is often long dead and is probably already home to thriving colonies of bacteria. But sea plants are quite tough and can tolerate rougher handling than their land-bound cousins. So, as soon as I get them home, I submerge them in hot and very soapy water for 10 minutes to suppress any bacteria.

The second problem is more subtle. Seaweed, if treated in the usual way, will rot. That's because the salt in its tissues absorbs moisture directly from the air. Thus, the plant remains perpetually wet. Fortunately, the salt can be leached easily away by a thorough soaking in distilled water. Pour into a basin at least 50 times more water by weight than the plant and let things sit for eight hours. Then do it all again. Adding a few drops of bleach each time will help keep new colonies of bacteria from taking hold while the salt diffuses out of the cells.

Once disinfected and thoroughly leached, seaweed can be pressed like any other plant. Rather than spreading out the foliage by hand, however, try arranging the plant while it is still floating in the basin. Gently scoop a sheet of card stock underneath the seaweed and carefully bring them both out of the water together. This technique captures the plant's natural motion, creating a more beautiful and realistic-looking specimen. 5A

The author gratefully acknowledges informative conversations with Judy Gibson of the San Diego Natural History Museum. For more information about this and other projects from the Amateur Scientist, check out the Society for Amateur Scientists's Web page at www.the-sphere.com/SAS/WebX.cgi. You may also write to the society at 4735 Clairemont Square, Suite 179, San Diego, CA 92117, or call 619-239-8807.