



Sow bugs have a mottled, scalloped elegance. Pill bugs, which can ball up, are dark and streamlined.



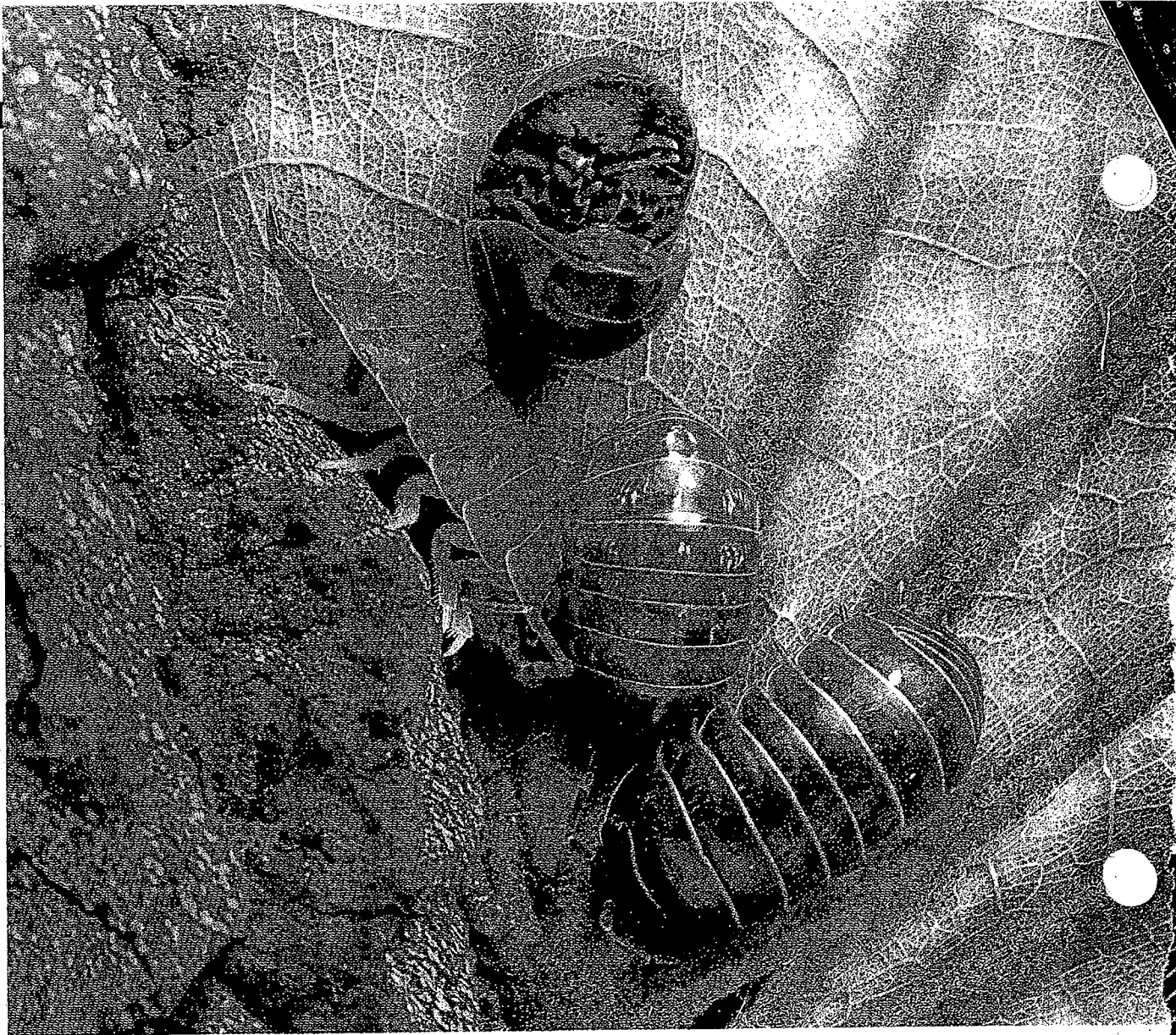
# HOW NOW, SOW BUG?

If they're crustaceans, shouldn't they taste like shrimp?

BY PATRICIA GADSBY PHOTO ILLUSTRATIONS BY DANNY SMYTHE



**S**OMETHING WAS FEEDING ON MY SEEDLINGS AT NIGHT, so after dark I shone an accusatory flashlight over the wooden planters on my deck. I was expecting to find slugs, but what I saw were wood lice. These hard-shelled little oval animals are commonly called sow bugs in North America, or pill bugs if they're a sort that rolls into a ball. In my neck of the woods, on Cape Cod, they're everywhere. You find them hunkered under rocks and logs during the day, beneath flowerpots



and in the dank leaf litter. They even wedge themselves between the cedar shingles on the house, waiting for dark to venture, feelers tapping, out to forage. Were they my nocturnal plant predators?

I went to the insect books on my reference shelf but, oddly, none described wood lice. Nothing under sow bugs, either, or under pill bugs, roly-polies, or potato bugs, as they're also known. Muttering something about the inanity of field guides, I indignantly opened an Oxford dictionary, which quickly set me straight. "Wood louse, any small terrestrial isopod crustacean of the genus *Oniscus* . . ."

Sow bugs aren't insects. They are crustaceans, like lobsters and crabs. "Can we eat them?" my husband wondered. Once asked, it's a question hard to ignore, but first I wanted to know what crustaceans were up to in my yard. How the heck did they even survive on dry land? In fact, terrestrial isopods—the scientific name for the wood-louse branch of the crustacean class—are wildly successful, with 5,000 known species of sow bugs

**Wood lice are easy to rear in terraria. They often live for two years, some have made it to five.**

and pill bugs living virtually all over the globe. In fact, there are as many isopod species living on land as in water. When I called the Smithsonian Institution in Washington asking for a sow-bug expert,

the last thing I expected to hear was: "Hmm, don't think we have an active curator on those."

Plenty of zoologists in the United States study marine crustaceans, but not too many bother with their landed kin. Sometimes an entomologist pays them heed. But not for long because sow bugs aren't bugs. Funds to study them are hard to come by. They're not "economically important" like Maine lobster and Louisiana shrimp, said M. A. Alikhan, a biologist at Laurentian University in Ontario, Canada. Many terrestrial isopod species in North America aren't even American.

"They're immigrants, and zoologists tend to study native species," said Joan Jass, assistant curator of zoology at the Milwaukee Public Museum. "So they get left out." The familiar backyard species—sow bugs such as *Porcellio scaber* and *Porcellio laevis*, and the common pill

bug, *Armadillidium vulgare*—almost certainly came over from Europe in ships.

They are also notorious synanthropes, co-travelers with humans, said Robin Lawson, a specialist in population genetics at the California Academy of Science in San Francisco and one of the authors of a 1995 study mapping *A. vulgare*'s introduction to this country. The study showed that pill bugs in New England have genetic patterns like those in Britain and northern Europe, while pill bugs in the Southwest have patterns similar to those found in southern Europe. To Lawson, that suggested *A. vulgare* arrived in two separate migrations: with northern Europeans who settled in New England, and with southern Europeans—primarily the Spanish—who settled in the Southwest. The animals probably stowed away in a ship's ballast, in the earth and rocks used to weigh down and stabilize wooden boats.

"Their gene pattern is consistent with human history," said Lawson, a British transplant himself. A parallel story is written in the DNA of domestic American cats: in New England, cats have English-style coat genes, while in the Southwest they have Spanish-style genes.

Despite their immigrant status, land isopods have managed to find a few supporters in North America who say the animals are, by all accounts, enthralling oddballs. As ex-marine creatures on land, they battle against drying out. That's why garden-variety isopods stay out of the sun in wet, dark places and only go out at night. They still use a modified gill, an organ for extracting oxygen from water, but some species have supplemented it with a tube system for breathing in air. They brood their young in a marsupium, a covered pouch to which they funnel water and nutrients. To stay hydrated, some species drink from their rear ends. Sow bugs, said Richard Fox, a zoologist at Lander College in South Carolina, can sit on a wet spot, press together two

themselves. They needed a male only to make sons. And, as an added twist, a bacterium called *Wolbachia* skews sex ratios in many of the terrestrial isopod species. It has a feminizing effect on males, which allows them to function as females.

Were isopods responsible for my chewed-up seedlings? In general, they're scavengers. They eat dead leaves, rotten wood, even carrion—stuff already decomposed by hungry fungi and bacteria. But seedlings would be attractive, too, if they'd been nibbled upon by other pests and began to decay, says British zoologist Stephen Hopkin. On balance, though, these animals are worth having in the yard. They are champion composters and soil makers, almost up there with earthworms. Earlier this year, Lester Ehler, an entomologist at the University of California at Davis, discovered that pill bugs will voraciously scarf up the eggs of stinkbugs, a crop pest.

Ehler, Alikhan, and others who've raised various isopod colonies in their labs mentioned how fond the animals are of sliced potatoes and baby carrots. "And almonds. They love almonds. I give them almonds when they're really good," said Ehler.

They're also known for eating their feces—a way, it's surmised, to extract extra nutrients from their food, and to recapture precious copper. Nearly all crustaceans use a copper-based pigment to carry oxygen in their blood, instead of the more usual iron-based pigment hemoglobin. So avidly do wood lice hoard copper and other heavy metals—nickel, zinc, cadmium—that they've been used as pollution monitors in Europe, and even as mineral bioprospectors.

Can we eat them? I turned up a recipe for a marine isopod, *Bathynomus*, from the archives of Crust-1 (pronounced *crust-el*), a Web discussion group for crustacean biologists. *Bathynomus* is a deep-

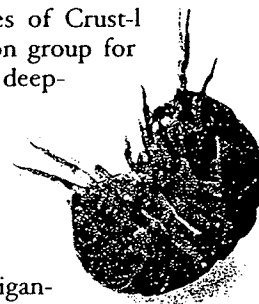
## 'HE WAITS FOR HER TO STRIP AND REVEAL HER OVIDUCTS'

pointy tail-end pieces called uropods, and make a tube that wicks water up into their bodies. (Pill bugs with short uropods sacrifice this talent for the ability to curl up, which foils ants, their major predators.)

Like other crustaceans, land isopods grow by molting. It's a two-part molt, back first, then front. "A male will often guard a molting female," said Richard Brusca, an invertebrate zoologist at Columbia University's Biosphere II campus in Arizona. "He waits for her to strip and reveal her oviducts, so he can be sure to mate with her first." Sex in these creatures is pretty plastic. For 14 years, Alikhan kept a colony of *Porcellio laevis* going in his lab without males. The females reproduced parthenogenetically—they made daughter clones of

water, tropical monster; it looks like a gigantic wood louse, sometimes reaching over two feet in length. Cooked in a microwave oven and shelled, it's reportedly "very similar to crabmeat, but tastes quite a bit sweeter." But a backyard *Porcellio*, not even a half-inch long, proved impossibly fiddly to peel. And its shell didn't redden nicely like shrimp or lobster when I cooked it. It looked as appealing as a dirty toenail.

Later I found someone who had actually tasted wood louse—and managed to survive. It was none other than Paul Harding, the renowned British isopodologist. "If you accidentally get one in your mouth, it's a most unpleasant experience," said Harding. "Basically it tastes of strong urine." □



- One method →
- Others mentioned below:

### Roly-poly trap

Make a sow-bug and pill-bug trap by cutting the top off a 2-liter soda pop bottle, and inverting the top onto the rest of the bottle, which is now cylindrical. Tape the joint. Bait the trap with dog food. Sow bugs and pill bugs will get in and not out. Release the prisoners in the compost heap; these tiny crustaceans are decomposers.

# Terrestrial Isopods

Many children are familiar with the terrestrial isopods (crustaceans) commonly called pill bugs, sow bugs, or wood lice. Terrestrial isopods are easily collected and kept in classrooms. Isopods are useful for many scientific investigations by elementary students.

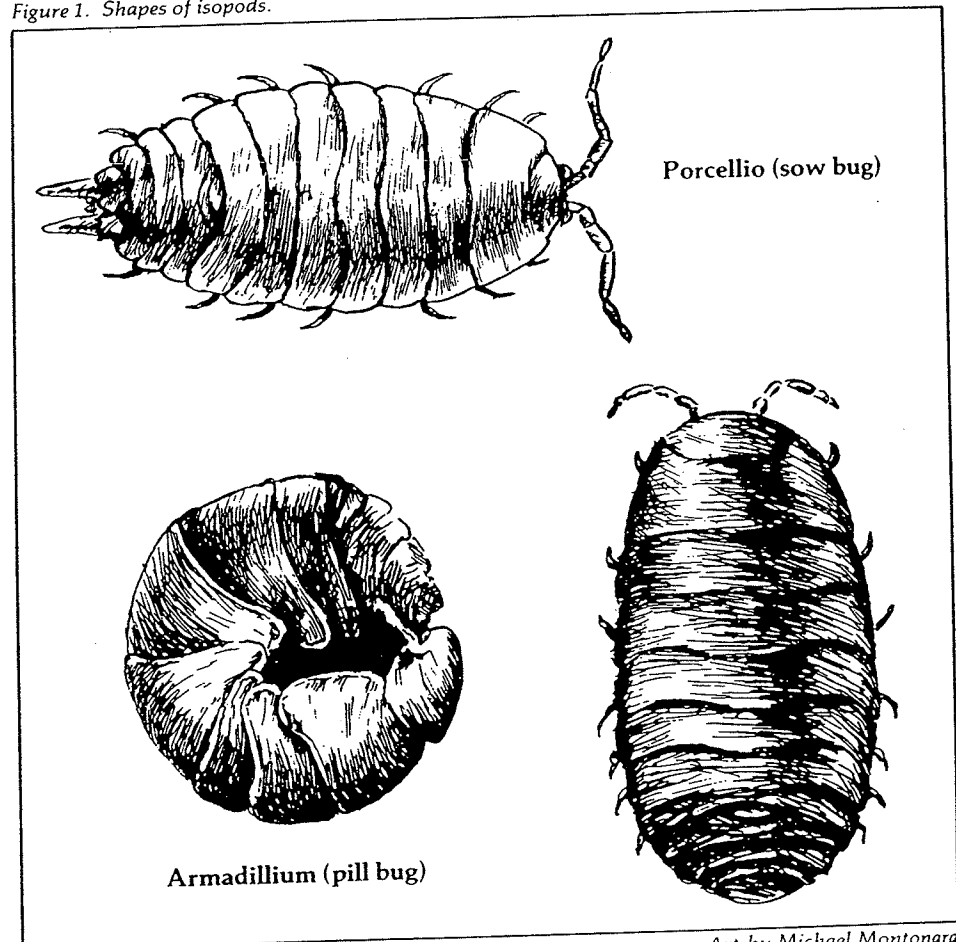
Their gray to blackish colored bodies are oval, flat, and 5 to 15 mm long. The sow bug or wood louse (species of *Porcellio*) has two tail-like appendages and a flattened body that let the animal right itself easily from an upside-down position. These isopods do not roll into a spherical shape but only flex their bodies slightly. Some isopods (species of *Armadillidium*) have a high domed body. They can roll into a spherical shape which gave them the name pill bug. (See Figure 1) Isopods may roll into "pills" when they are disturbed or perhaps to lessen water loss by evaporation when humidity is low.

using popsicle sticks to separate grass and other vegetation from the base of a building makes a good class field trip. Put the isopods in a container along with soil and vegetation to take back to the classroom. Do not close the container tightly. Another collection method is to put a raw hollowed-out white potato near a likely source of isopods, cover it with dead grass or leaves, and leave the trap for a day or two. (See Figure 2) If isopods are present, they will be attracted inside the raw potato trap.

#### Care

To keep classroom isopods, put 2 to 3 cm of rich woods soil or commercial potting soil in a plastic sweater or shoe box, terrarium, empty aquarium, or other container. (See Figure 3) Provide a darkened area by partially covering the soil with some material that allows for the free circulation of air. For ex-

Figure 1. Shapes of isopods.



Porcellio (sow bug)

Armadillidium (pill bug)

Art by Michael Montonara

## You can trap isopods with a cut raw potato.

Land isopods live in dark, moist places beneath undisturbed objects lying on the ground—rotting logs, boards, bricks, or rocks. Sometimes isopods can be found alongside buildings if there is enough moisture and a food source for them.

Finding and collecting isopods by

Reprinted from *Science and Children*, Carol D. and Carolyn H. Hampton, March 1979, pp. 60-61.

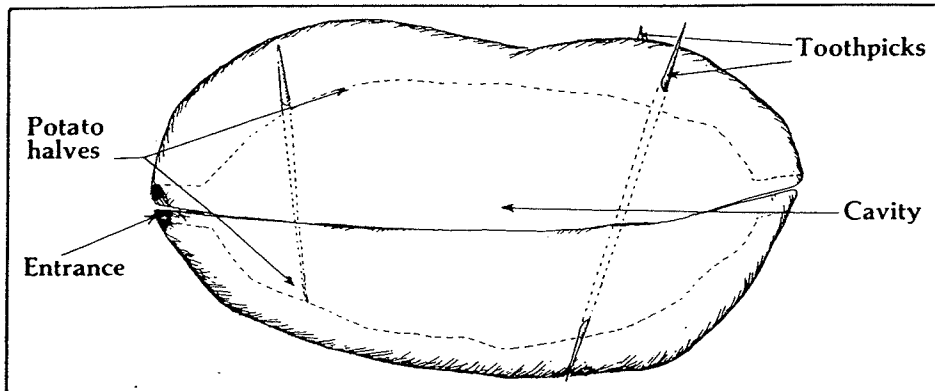


Figure 2. A potato trap for collecting isopods.

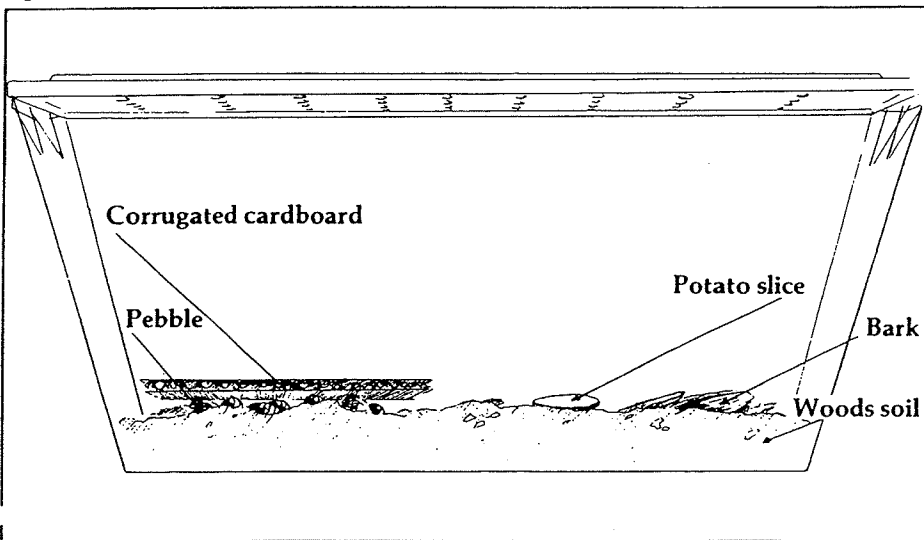
ample, support a piece of corrugated cardboard on a few pebbles or put a section of paper egg carton over half the soil. You can add a few pieces of decaying bark or wood. Sprinkle the container with water making sure the habitat is damp but not saturated. Put some isopods in the container. Once a month add a slice of raw potato. Alternate the potato diet with small pieces of raw carrot, lettuce, unsweetened breakfast cereal, and ripe fruit. Remove food that begins to mold. Cover the habitat with a lid that allows ventilation. If you see water standing in the soil, remove the lid and allow the excess water to evaporate. Once the habitat is set up there is little maintenance needed other than feeding and watering.

Isopods are prolific and will produce many young in three to four weeks. It is hard to sex isopods but a fertilized female is identified by the eggs carried in a brood pouch called a marsupium. The marsupium can be seen on the underside of the female between the legs of the third through the sixth body segments. Hatched young remain in the marsupium a few days before they are

visible in the habitat. They are pale immature replicas of the adults.

Isopods make good laboratory animals for demonstrating structure-function relationships and responses to changing environmental conditions. Isopods can be raised as food for toads, frogs, and lizards. Students can develop experiments to test isopods' responses to light intensity, color, food

Figure 3. Habitat for isopods.



preferences, temperature, and humidity changes. The resources include sources of activities as well as collection and maintenance information.

#### Resources

Barnes, Robert D. *Invertebrate Zoology*. Third Edition. W.B. Saunders Co., Philadelphia, Pennsylvania. 1974. Pp. 430-434.

Behringer, Marjorie P. *Techniques and Materials in Biology*. McGraw-Hill, Inc., New York City. 1973. Pp. 76-79.

Hunt, John D. "Race Them, Race Them." *Science and Children* 14:26-27; January 1977.

"Isopods." *Outdoor Biology Instructional Strategies*. Trial Edition, Set III. University of California, Berkeley, California. 1977.

Kramer, David C. "Isopods: The Un-Bugs." *Science and Children* 11:14-15; January/February 1974.

Morholt, Evelyn, et al. *A Sourcebook for the Biological Sciences*. Second Edition. Harcourt, Brace and World, New York City. 1966. Pp. 599-600.