

The compost crew

By Russel Barsh and Madrona Murphy

No, it's not a tiny spider, mite or tick! It's a member of the Sminthuridae, a family of the Collembola, commonly known as Springtails. Barely a sixteenth of an inch in length and looking a bit like a plump rabbit, it represents a diverse guild of tiny soil arthropods that help decompose plant material in fields, wetlands, and in the leaf litter on the forest floor.

Plant material is tough and fibrous. Dead leaves and leaf stalks can accumulate as “duff” or leaf litter on dry ground or at the bottom of a pond or lake, and lock up nutrients for years. Collembola and other tiny detritivores work their way slowly and persistently through this fibrous mat, facilitating further breakdown by soil bacteria and fungi, which they conveniently carry around with them. Collembola are among nature's most efficient composters. Soil scientists use the diversity and abundance of Collembola as an indicator of nutrient turnover and soil fertility.

Collembola get their common name from a spring-like “furcula” that looks like a flat tail. It can be folded under the body and latched in a closed position, then released with such force that it flings the little animal a considerable distance into the air: a very effective escape mechanism. Collembola the size of the “i” in this sentence can briefly achieve speeds over 4 feet per second while leaping 30 times their body length. That's like a human jumping 150 feet in a single bound—in a tenth of a second!

Until recently classified as primitive insects, Collembola are now regarded as an evolutionarily distinct line of the Arthropods or “joint-legged” animals that include both crustaceans and insects. Collembola may indeed look very much like the first animals to emerge from the sea and walk on land—tens of millions of years ahead of the earliest amphibians.

Unlike insects, Collembola do not metamorphose. They simply hatch out of their eggs as miniature copies of the adults. Then they grow very rapidly, so much so that they may have to moult their exoskeleton and grow a new one every week. That takes a lot of energy, so Collembola must chew their way through their environment day and night.

Collembola do not have exciting sex lives. In most species, the males leave little packets of sperm (spermatophores) scattered around like Easter eggs for the females to find, although some species the male inserts the spermatophore directly into a slot in the female like a coin into a piggy-bank. Some Collembola species are parthenogenic, which is to say that females produce viable eggs without any fertilization by males.

Collembola inhabit a world that is almost unimaginably different from the one we experience. Their eyes consist of a pair of small light-sensitive patches, just enough to be able to tell whether they are still safely covered with dirt and leaf litter. They sense their world chemically, through sensitive tasting cells on the tips of their antennae, and by the way fine hairs on their body brush against the objects around them. They drink through a tiny tube that protrudes between their legs, like miniscule elephants. Rarely more than a quarter of an inch long, and rarely living longer than a year, Collembola are nonetheless very diverse, with more than 7,000 species described so far.

There is a surprising diversity of Collembola here in the San Juan Islands, with a variety of colors from transparent or pearly white, to green, purple, red, and striped. All of them are very sensitive to herbicides, including over-the-counter products that contain glyphosate or 2,4-D. So if you care about the compost crew, and want good soil fertility, never area-spray your backyard for weeds!

Russel Barsh and his students at Kwiáht recently began an inventory of arthropod diversity in the islands' ponds and wetlands. Let them know if you see something strange and interesting.