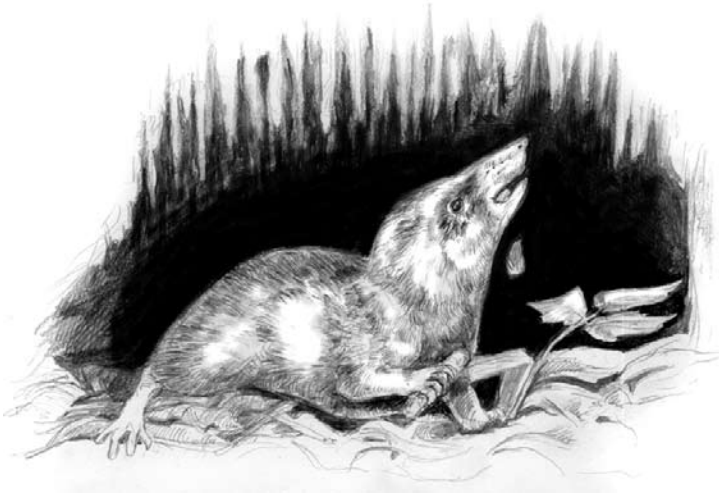
Subnivea

One brilliant moonlit night, with temperatures dropping into the sub-zero°F range I headed to one of the wildest open places I could reach without risk of frostbite. This large wetland meadow near a hilltop in the northern part of Halifax provided the perfect stage for the moonlight show, so I sat down to admire the sparkles and listen to the music of the winter night. The sparkles were there all right, but I heard not a sound—not a breeze, not the low rumble of distant traffic, not a plane, not a woof, or a crackle, or a hoot. This crystalline night enforced the notion that winter is a lifeless season. I wasn't fooled. I knew that within a couple of feet of where I sat there existed a realm in which the inhabitants, oblivious to the deep chill, busied themselves with the activities of their lives. Each winter this realm is created anew, and although it is as big as winter itself, it is a world we cannot enter, not even through a magic wardrobe. Scientists call this the subnivean environment—the zone of life beneath the snow. I call it Subnivea.

All winter the earth slowly releases heat, some stored over the long days of summer and some radiating from the planet's molten core. Snow, especially fluffy snow, is one of nature's fine insulators. Under more than about eight inches of snow, the surface of the earth remains within a few degrees of freezing regardless of the weather above. Moist warmer air moves up through the snowpack until it cools or escapes the snow. This process transforms the lower layers of snow into a weakened lacework of crystals called depth hoar. Within the depth hoar, caverns open and tunnels are excavated.



Here the plants and animals that populate Subnivea spend the winter.

Many of the mammalian residents are voles, a tribe of peaceful vegetarians. They spend much of their time in furry piles in soft nests, occasionally heading out to maintain their tunnels and eat. The voles of my forest are redback voles. True to their names, the top of their backs has a wash of rusty color. Red-backed voles eat seeds, fruit, fungi, berries and leaves. They prepare for winter by creating stores of food. I suspect red-backed voles were responsible for a pile of cut sedges I found dragged beneath a rock on a wooded hillside last fall. One of the most charming things I have learned about these voles is that they sing, sometimes in groups. I love to imagine a group of them trilling in a Subnivean chamber like miniature coyotes. Meadow voles populate nearly every open area. They maintain neatly clipped tunnels, outhouses, and sleeping chambers beneath the grass thatch.

Elsewhere in the neighborhood, the shrews, solitary flesh-eaters, manically seek prey. Shrews are renowned for their metabolic extravagance. They need a nearly constant supply of food. A shrew that hasn't dined in the past few hours is in on the brink of starvation. They emit echo-locating clicks to navigate. If their territorial borders are breached, shrieks and fisticuffs ensue until the intruder is driven away. While invertebrates have the most to fear from shrews, even the voles and mice must tremble when they encounter these hunters in the dark tunnels. Shrews use toxic saliva to paralyze their prey, and sometimes include other small mammals on their menu.

The little mammals in their wintery world are relatively safe from most predators when the snow is deep. There is, however, one predator that moves with grace and comfort between Subnivea and our world, the tiny short-tailed weasel. This weasel, also called an "ermine," meets many of its own winter energy needs on incursions beneath the snow.

Each fall the shrews and voles probably join me in praying to our chosen deities for snow. During the fall these small, active mammals become especially vulnerable. Tiny bodies lose heat quickly, so finding food and maintaining a well insulated, dry nest becomes critical. Cold rains are not just a matter of discomfort to these little beings. Once secure in the shelter and warmth of Subnivea, the mortality rate for small mammals drops. When snow is deep, Subnivea can be warm and secure enough that some creatures can keep raising families right through the winter.

The patchy snow that we had after a January thaw last year provided a window into this world. In the fields I could see the slightly humped grasses that revealed meadow vole tunnels. When I lifted a section of icy roof, I could see the neatly clipped, winding corridors and the soft balls of frayed plant fibers that were their nests. I tried to see what the voles might eat. I found a variety of evergreen weeds and ferns, seeds, fragments of leaf, and discovered that the bases of some of the grasses were still green. In the woods I found maple seeds and nibbled hemlock needles among the leaf litter. I found much less insect sign, but the hordes of insects that disappeared with the frost are not really gone. I trust the shrews know how to locate the eggs, larvae, pupae, and dormant adults ready to spring to life with the thaw. Some insects, spiders and other invertebrates remain active all winter in the shelter of Subnivea.

As we enter the heart of winter I look forward to many adventures on the surface of the sheltering snow. The denizens of Subnivea may look forward to many adventures beneath it.