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WOY '06: Spicebush Provides a Salad Bar to Some Caterpillars

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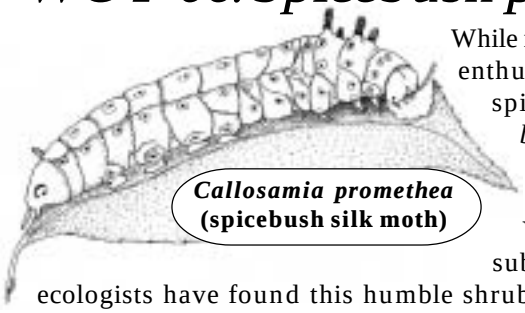
Conserving wild flowers and wild places

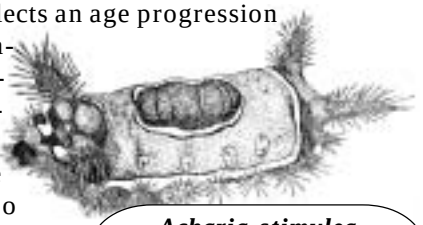
WOY '06: Spicebush provides a salad bar to some caterpillars



Callosamia promethea **(spicebush silk moth)**

While many wildflower enthusiasts appreciate spicebush (*Lindera benzoin*), the 2006 Virginia Wildflower of the Year, for its subtle beauty, plant ecologists have found this humble shrub to be a fruitful subject for scientific inquiry. The notes that follow relay just a few of the interesting nuggets that can be gleaned from a cursory study of the scientific literature about this plant.

Herbivory, moths: In a study of the impact of light regime and herbivory on spicebush growth conducted in southeastern Pennsylvania, various lepidopteran larvae were found to be important consumers of spicebush leaves. The three most abundant species found on spicebush in the study were all moth larvae. These include: 1) the saddle back caterpillar (*Acharia stimulea*), famous for the painful sting that it can inflict from its bristles; woolly bears (*Pyrrharctia isabella*), whose balance of brown and black bands merely reflects an age progression and not a forecast of impending winter's severity as commonly alleged in folklore; and the caterpillar of the promethea moth (also known as the spicebush



Acharia stimulea **(saddle back caterpillar)**

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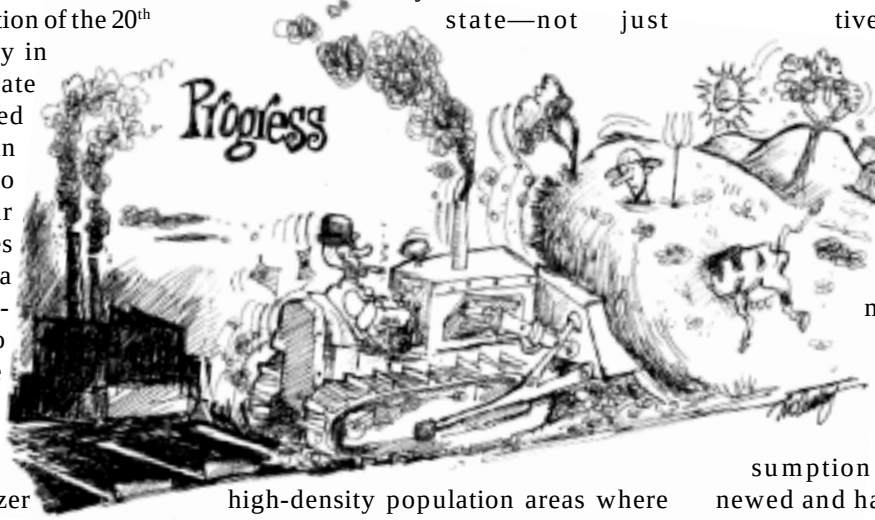
Conservation means always being ready to work

Philip Shabecoff, of the *New York Times Magazine*, once said that "So bleak is the picture…that the bulldozer and not the atomic bomb may turn out to be the most destructive invention of the 20th century." The difficulty in maintaining the delicate balance between the need to provide for our human comforts and the need to conserve and protect our natural resources serves as a challenge to some, a discouragement to others, and an irritant to still others who choose to ignore conservation in favor of other interests. Many of us live in areas where the bulldozer is king and development consists of reducing large natural areas to level, bare land so that as many dwellings as possible can be built on the site. I see this almost everywhere I travel in the state—not just high-density population areas where you most expect to see it.



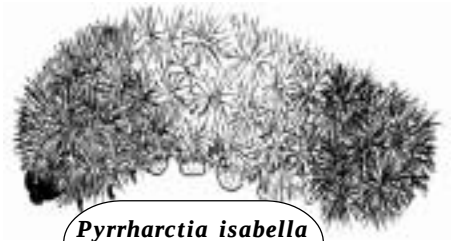
As development is completed at many of these sites, its residents are left with a habitat that has been traumatized, or so fragmented that all native plants—flowers, trees, shrubs, grasses—that lived in their natural setting are no more than a memory, and a rapidly fading one at that. A gloomy picture? Yes. Something the conservation-minded individual can stop? I don't think there are many of us who believe that development can be halted, consumption curbed, resources renewed and habitat, including air and

(See Conservation, page 2)

Caterpillars rely on spicebush

(Continued from page 1)

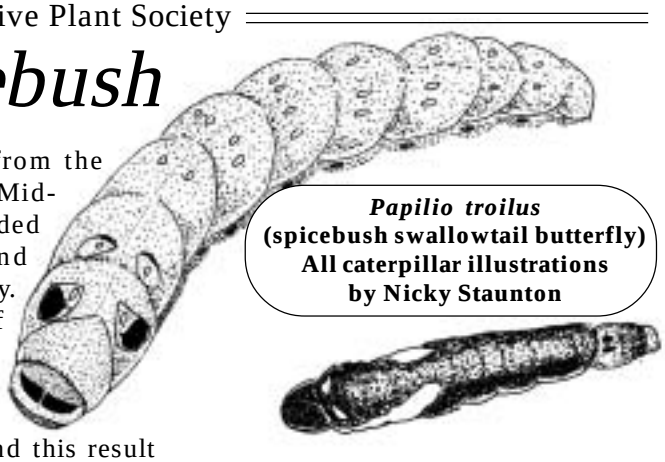
silk moth, *Callosamia promethea*), among the largest and most beautiful of North American moths. These moth caterpillars are all generalist feeders, being able to thrive on a wide variety of host plant species. This study found that herbivorous caterpillar abundance per spicebush plant does not differ by sex or by habitat of the shrub, i.e., caterpillar abundance is essentially similar on staminate (male) and pistillate (female) individuals whether in the sun or shade. However, herbivore damage, expressed as a percentage of total leaf area eaten was somewhat greater in shady habitats,



Pyrrharctia isabella **(woolly bear)**

possibly a consequence of the fewer leaf layers found in the shade compared with the denser leaf canopy of sun-exposed plants. (R. A. Niesenbaum, "The effects of light environment on herbivory and growth in the dioecious shrub *Lindera benzoin* (Lauraceae)," *American Midland Naturalist* 1992. 128: 270-275.)

Herbivory, spicebush swallowtail butterfly (*Papilio troilus*): In contrast to the moth larvae mentioned above, caterpillars of the spicebush swallowtail are much more specialized in their food requirements. As implied by its name, spicebush is one important larval food plant and sassafras (*Sassafras albidum*), a related plant, is another. Interestingly, the butterfly ranges into peninsular Florida, where neither spicebush nor sassafras occurs. Here, the caterpillars eat leaves of redbay (*Persea borbonia*), also a member of Lauraceae. In a thorough, comparative study, it was found that Florida caterpillars survived better on redbay than did caterpillars from the Midwest. Conversely, Midwest caterpillars succeeded better on spicebush and sassafras than on redbay. Also, total duration of the larval stage was greater for caterpillars reared on redbay than on spicebush / sassafras, and this result held for larvae from the Midwest, from Florida, and for hybrid larvae resulting from crosses between individuals from these two regions. The scientists suggest that redbay contains a toxic compound absent in spicebush / sassafras and that the two caterpillar populations tested differ in their ability to detoxify it. (J. K. Nitao et al., "Larval adaptation to Lauraceous hosts: geographic divergence in the spicebush swallowtail butterfly," *Ecology* 1991, 72: 1428-1435.)



Papilio troilus **(spicebush swallowtail butterfly) All caterpillar illustrations by Nicky Staunton**

Frugivory, cedar waxwings and American robins: Seed dispersal by birds is, conceptually, a simple matter: plant makes fruit with seed(s) consumed by bird that drops undigested seed in a distant location. In detail, however, dispersal by fruit-eating birds has myriad variations, both on the plant and bird sides of the equation. Two recent studies examined the differing strategies employed by cedar waxwings and thrushes (including robins) in the dispersal of several species of trees and shrubs of eastern North America. Relative to other common fleshy-fruited plants tested, spicebush fruits are notable in containing low levels of sugar but high levels of protein and lipid (fats, but also aromatic terpenes). Another important factor is that spicebush seeds are relatively large. Waxwings quickly digest and absorb sugars, but their assimilation of lipids is much slower. Also, waxwings swallow and, eventually, defecate all fruit seeds consumed in their diet. Sugar-rich fruits with small seeds (like honeysuckles and wild grapes) work well for waxwings. On the other hand, spicebush presents problems for hungry waxwings: the lipid-rich pulp digests slowly and the large inedible seeds contribute much weight and bulk with no nutritional return. In nature, waxwings seldom consume spicebush seeds. Thrushes, including the American robin, operate differently. These birds digest lipid-rich fruits relatively efficiently and they also tend to regurgitate the inedible seeds, thus improving the nutritional quality of the food volume entering their digestive system. Robins and other thrushes thus serve as dispersal agents for spicebush, albeit the distances involved usually amount to the span between the point of ingestion and the next convenient perch where seed regurgitation occurs. As a general rule, seeds adapted for through-passage and defecation by birds are protected by thick seed coats whereas those adapted for dispersal by seed-regurgitating birds have thin seed coats. Spicebush seeds, with their thin seed coat, fit this general pattern. Also, experimental evidence shows that removal of the lipid-rich fruit pulp by fruit-eating birds is essential for germination of spicebush seeds and this hint from nature should be followed by gardeners wishing to propagate spicebush from seed. (G. A. Meyer & M. C. Witmer, "Influence of seed processing by frugivorous birds on germination success of three North American shrubs," *American Midland Naturalist* 1998, 140: 129-139 and M. C. Witmer & P. J. Van Soest, "Contrasting digestive strategies of fruit-eating birds," *Functional Ecology* 1998, 12: 728-741.)

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