

some eggs being subjected prematurely to a cold environment. It is unclear to what degree this incomplete development occurs under natural conditions.

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SOURWOOD DEFOLIATION BY LETTERED SPHINX (*DEIDAMIA INSCRIPTA*) IN GREAT SMOKY MOUNTAINS NATIONAL PARK (LEPIDOPTERA: SPHINGIDAE)

Additional key words: Black bear, grape.

The Lettered Sphinx, *Deidamia inscripta* (Harris), is a familiar, widespread moth that occurs from South Dakota, extreme southern Quebec, and Massachusetts to northern Florida and Mississippi (Hodges 1971, Covell 1984). It is a univoltine, early season sphingid, flying from late April through mid May over much of its range (Hodges 1971). Reported hosts include grape (*Vitis*), ampelopsis (*Ampelopsis*), and Virginia creeper (*Parthenocissus*), all members of the Vitaceae (Forbes 1948, Hodges 1971, Covell 1984). Here we report widespread use and defoliation of a heath, sourwood (*Oxydendrum arboreum* (L.) DC) (Family Ericaceae), in the Appalachians.

DLW first noticed the presence of *Deidamia* on sourwood in West Virginia in 1995 near Parsons, Tucker County, West Virginia. More than a dozen larvae were collected on a small 2 m high tree, but the caterpillars soon consumed all the foliage that had been gathered for them, and as a result the identification of both foodplant and sphingid remained unknown. In 2000 when DLW started visiting Great Smoky Mountains National Park as part of the Park's "All Taxa Biodiversity Inventory," the sphinx was again encountered in large numbers—this time both the host and moth were identified to species. May visits to the Park in 2001–2003 yielded enormous numbers of the caterpillar from sourwood, especially from drier, open woodlands

where Virginia pine (*Pinus virginiana* P. Mill.) was a dominant tree. During the third week of May in 2003, Eric Hossler and DLW observed numbers commonly in excess of 20–30 late instar *Deidamia inscripta* per shrub along the Foothills Parkway East, above Cosby, Cocke County, Tennessee—many smaller plants were defoliated by the larvae. KL first noted *Deidamia* in the Park more than a decade earlier. The following are two excerpts from the Park's "Observations Database."

1988-May-28 Location: Chilhowee Mt. along Foothills Parkway and west end of the Park. Observation: About half of the smaller trees of this species [*Oxydendrum*] are significantly or entirely defoliated. Examined several, found only 1 large sphinx-type larva, green. This defoliation was not observed in 1986 or 1987. K. Langdon.

1990-May-20 Location: Foothills Parkway Walland to Look Rock Observation: Most Sourwoods at least partially defoliated. On some, defoliation is 100%, only leaf mid-veins left. Collected green sphinx larvae for rearing, but they died. K. Langdon.

We report here an instance of large-scale defoliation in the spring of 2004, again along the Foothills Parkway East. The pictures shown here (figs. 1–3) were taken below the summit of the Parkway (N35°49.227' and W83°13.032'). Most of the smaller, 2–4m shrubs growing along the road had been stripped or were soon to be defoliated by the caterpillars. Road surfaces near



FIGS. 1-6. All images taken along the Foothills Parkway East, near Cosby, Cocke County, Great Smokies Mountain National Park, 16 May, 2004. **1.** Sourwood shrubs stripped of foliage. **2.** This 2 m plant had 49 actively feeding larvae. **3.** Branch at base of shrub in foreground of Fig. 1: 12 of the 18 larvae counted on the branch are visible (arrows). **4.** Regurgitating caterpillar. **5.** Vomit released by held caterpillar. **6.** Alarm posture of *Deidamia inscripta* last instar.

defoliated trees had densities of up to 8 smashed larvae per square meter. One 20 m stretch of the Parkway had 118 smashed or wandering caterpillars. Immediately upslope from this section of the Parkway, a sourwood tree (approximately 4.5 m in height) yielded 91 caterpillars. Given the number of caterpillars smashed along the highway and wandering in the vicinity of the aforementioned shrub, it is likely that many caterpillars had already matured or departed in search of additional foliage. On this same tree, 18 larvae were counted on a limb near the ground (fig. 2). The shrub shown in fig. 3 yielded 49 larvae—it, too, was destined to be stripped. We estimate that the majority of the larvae along the Parkway were in their last two instars on 15–17 May, although few had obtained their final mass. Because many younger caterpillars were present and one adult Lettered Sphinx was seen at light nearby (15 May at Cosby Creek), it was evident that the sourwood in the Park would continue to be impacted for 2–4 weeks beyond what we show here. Along the 6-mile length of the Foothills Parkway East, shrubs and plants under 3 m were mostly or completely defoliated by 17 May, 2004. Many larger trees, i.e., those in excess of 6 m, appeared as if they would come through the season with some intact foliage. Grape, also growing at the site, had Lettered Sphinx caterpillars, but in far lower densities—a search of one patch yielded eight *Deidamia* in five minutes. In contrast to the sourwood plants along the Parkway, grape vines had little to no obvious feeding damage.

Brian Scholtens (personal communication), who ran a blacklight bucket trap along the Parkway on the night of 15 May, noted five *Deidamia* caterpillars about his bucket trap the following morning. Prior to this, he had never noted multiple sphingid caterpillars anywhere in North America while servicing light traps. Upon returning home from blacklighting in the west end of the Park at 0030 h, Brian Scholtens and DLW noted over 50 *Deidamia* caterpillars crawling along a 6-mile stretch of the Little River Road east of Cades Cove, Sevier County, TN. All were counted in our headlight beams, while traveling at speeds mostly in excess of 40 mph. Neither one of us had ever experienced a phenomenon such as this.

Given the remarkably high densities reported here, it is odd that sourwood would have gone heretofore unnoticed as a host for such a large and familiar insect. What we find equally extraordinary and perplexing is

that densities appear to be chronically high—one wonders why natural enemies, be these birds or parasitoids, are not extracting higher tolls on these caterpillars. KL recalls an account by Arthur Stupka, the GSMNP naturalist from 1938 to 1963, mentioning “black bears feeding on caterpillars in sourwood” (although we have been unable to locate an original source with Stupka's observations).

Deidamia caterpillars are quick to throw their body an alarm display: the larva releases its grip, arches the head back over the abdomen, and holds the thoracic legs up and splayed apart (Fig. 6). Green fluid may be pushed from the mouth (Fig. 4). If agitated further, the caterpillar produces considerable amounts of a watery, but somewhat sticky, green vomit (Fig. 5). DLW found it bitter to the taste ($n=3$), but not as bitter as the foliage of sourwood itself. It was somewhat difficult to wash away, being either mucilaginous or basic. Additionally, the caterpillars attempted to bite when held or are otherwise harassed.

Also noteworthy is the taxonomic jump in foodplant choice from Vitaceae to Ericaceae. While it would seem unlikely that the populations on sourwood are evolutionarily distinct, it certainly wouldn't hurt to have a closer look at sourwood-feeding populations. Larval vouchers, collected from both grape and sourwood, have been deposited at the University of Connecticut.

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