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Agrilozodes suarezi (Coleoptera: Buprestidae) as secondary colonizer of a *Sclerolobium* sp. branch girdled by *Oncideres saga* (Coleoptera: Cerambycidae)

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Dead and decaying wood is a substantial part of forest biomass, providing shelter, food, and microhabitat for different organisms (Seibold et al. 2015). Primary wood colonization may inhibit or stimulate further colonization in response to interactions inside each trunk piece, such as larval competition or gallery openings, subsequently used by secondary colonizer species (Calderón-Cortés et al. 2011; Victorsson 2012).

The twig girdler guild is diverse and widely distributed in neotropical and northern regions of the American continent. The genus *Oncideres* Lepeletier & Audinet-Serville (Coleoptera: Cerambycidae) is composed of twig girdler beetles that are distributed from the US to Argentina (Monné 2002). *Oncideres* species girdle and lay eggs along host plant branches (Lemes et al. 2013, 2014; Paro et al. 2014). Branch girdling stops phloem flow, which is retained around the larvae, making the wood more nutritious (Forcella 1982). As a side effect, the abundance, frequency, and richness of secondary colonizers increase following girdling by other species (Calderón-Cortés et al. 2011). Secondary colonization has been associated with branches girdled by different twig girdler species, such as *Oncideres germarii* Thomson in Argentina, *Oncideres pustulata* LeConte in the US, *Oncideres albomarginata chamela* Chemsak & Giesbert in México, as well as *Oncideres captiosa* Martins, *Oncideres humeralis* Thomson, *Oncideres ocularis* Thomson, and *Oncideres saga* (Dalman) in Brazil (Hovore & Penrose 1982; Di Iorio 1994; Neto & Link 1997; Paulino Neto et al. 2006; Calderón-Cortés et al. 2011; Lemes et al. 2013, 2015).

Oncideres saga occurs in Argentina, Brazil, and Paraguay as a generalist twig girdler species, girdling branches of host plants with different diam and vertical positions (Monné 2002; Paro et al. 2014). A *Sclerolobium* sp. branch (Fig. 1A), girdled by *O. saga*, was collected in early Oct 2014 in "Porto Capim" site, a secondary semidecidual forest, in the Rio Doce State Park, in Minas Gerais State, Brazil (19.771225°S, 42.626844°W) (Carvalho & Ribeiro 2018). The branch was found on the ground without leaves. It was cut into pieces, transported to the laboratory, and stored in a cardboard box, and moistened once a mo for 1 yr.

A total of 28 adult beetles from 4 species emerged from the branch. Individuals of *Agrilozodes suarezi* (Cobos) (Coleoptera: Buprestidae) (Fig. 1D), *Tropidion signatum signatum* (Audinet-Serville) (Coleoptera: Cerambycidae) (Fig. 1C), *Agrilus* sp. 1 (Coleoptera: Buprestidae) (Fig. 1E), and *O. saga* (Fig. 1B) emerged from the *Sclerolobium* sp. branch girdled by the latter species (Table 1).

The number of *O. saga* individuals that emerged from the girdled branch was higher than that of the secondary colonizers (Table 1). The branch condition, which had no leaves and low moisture, may have influenced secondary colonizer emergence. *Oncideres saga* individuals were the last and largest to emerge from the girdled branch, confirming its longer larval development (Table 1). The beetle development on branches depends on its exposure period, moisture content and season, all related to insect activity (Norhisham et al. 2013; Foit & Cermák 2014; Lee et al. 2014). The results corroborate the pattern reported for *O. albomarginata chamela* in *Spondias purpurea* L. in a dry tropical forest of Mexico (Calderón-Cortés et al. 2011).

Tropidion signatum signatum is widely distributed in Brazil, being reported in Bahia, Piauí, Santa Catarina, and São Paulo states (Moraes & Berti Filho 1974; Favretto et al. 2013; Galileo et al. 2013; Nascimento

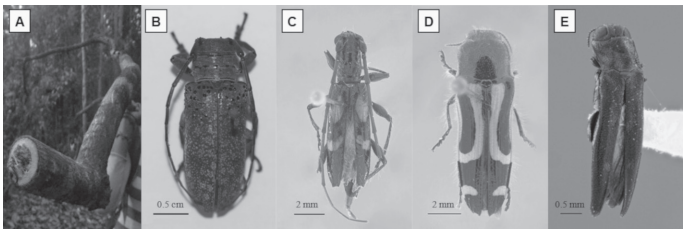


Fig. 1. *Sclerolobium* sp. branch girdled by the twig girdler (A), the twig girdler beetle *Oncideres saga* (Coleoptera: Cerambycidae) (B), and secondary borer beetles, *Tropibidion signatum signatum* (Coleoptera: Cerambycidae) (C), *Agrilozodes suarezi* (D), and *Agrilus* sp. 1 (Coleoptera: Buprestidae) (E), emerged from this branch.

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Table 1. Primary and secondary beetle colonizers, emergence period, number of individuals (N), and body size (length and width) of the species emerged from a *Sclerolobium* sp. branch girdled by *Oncideres saga* (Coleoptera: Cerambycidae).

Species	Emergence period	N	Length (mm)	Width (mm)*
Primary/ Cerambycidae				
Oncideres saga (Dalman)	1 May 2015 to 15 Aug 2015	23	19.50 ± 3.20	7.22 ± 1.27
Secondary/ Buprestidae				
Agrilozodes suarezi (Cobos)	20 Oct 2014 & 27 Oct 2014	2	12.18 ± 0.97	3.91 ± 0.59
Agrilus sp. 1	15 Oct 2014 & 18 Oct 2014	2	3.55 ± 0.49	0.65 ± 0.21
Secondary/ Cerambycidae				
Tropidion s. signatum (A-Serville)	23 Oct 2014	1	13 ± 0	4 ± 0

*Length and width is represented by mean ± standard deviation.

et al. 2016). The emergence of this beetle from the *Sclerolobium* sp. branch girdled by *O. saga* confirms that this species is opportunistic, because its emergence also has been reported from non-girdled *Lonchocarpus neuroscapha* Benth. branches in São Paulo and from a *Nectandra* sp. branch girdled by *O. saga* in Argentina (Moraes & Berti Filho 1974; Di Iolio 1994).

The observation of the *A. suarezi* emergence from a girdled *Sclerolobium* sp. branch was the first report of its secondary colonization on a branch girdled by *O. saga*. *Agrilozodes suarezi* specimens collected at Petrópolis, Rio de Janeiro, Brazil, were described as *Dactylozodes suarezi* Cobos, and repositioned to the *Agrilozodes* genus (Cobos 1962; Bellamy 2005). The genus *Agrilozodes* has 6 species reported in Brazil, most from Rio de Janeiro State (Portela & Mermudes 2013). This is the first report of this beetle in Minas Gerais State, Brazil.

The colonization of insects on a *Sclerolobium* sp. branch girdled by *O. saga* shows that wood-boring insects invaded these branches after girdling. The shorter larval stage of secondary colonizers seems to be a strategy to reduce or avoid competition with larger twig girdlers. The colonization of *A. suarezi* in a host plant is reported for the first time.

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Summary

A large number of invertebrates use dead wood as shelter, food, and as a microclimate refuge. Ecological succession in this substrate depends on primary colonization, stimulating or inhibiting future successions. Twig girdler beetles girdle and lay eggs inside the bark of branches and trunks of different host plants. Branch girdling blocks the phloem flow, making it more nutritive for offspring and future colonizers. This study, in the State Park of Rio Doce (PERD), Minas Gerais, Brazil, is the first report of a secondary colonization by borers on a *Sclerolobium* sp. branch girdled by *Oncideres saga* (Coleoptera: Cerambycidae). A *Sclerolobium* sp. branch, girdled by *O. saga* was collected in Rio Doce State Park, cut into pieces, and brought to the laboratory, where it was stored in a cardboard box and moistened monthly. A total of 28 adult beetles of 4 species emerged from this branch. *Agrilozodes suarezi* was found for the first time developing inside a branch of its first host plant. The life history of insects of the genus *Agrilozodes* is poorly known, because this is the first report of aspects of its biology.

Key Words: Buprestidae; host tree; Rio Doce State Park; twig girdler beetles

Sumário

Um grande número de invertebrados utiliza madeira morta como abrigo, alimento e refúgio microclimático. A sucessão ecológica neste substrato depende da colonização primária, estimulando ou inibindo futuras colonizações. Besouros serradores roletam e ovipositam no interior da casca de galhos e troncos de diferentes plantas hospedeiras. O roletamento do galho obstrui o fluxo do floema, tornando o local mais nutritivo para sua prole e futuros colonizadores. Este estudo foi o primeiro relato de colonização secundária de broqueadores em um galho de *Sclerolobium* sp. anelado pelo serrador *Oncideres saga* (Coleoptera: Cerambycidae) no Parque Estadual do Rio Doce (PERD), em Minas Gerais, Brasil. Um ramo de *Sclerolobium* sp., roletado por *O. saga* foi coletado no Parque Estadual do Rio Doce, seccionado em partes e levado ao laboratório, onde foi mantido em caixa de papelão e umedecido mensalmente. Um total de 28 besouros adultos de 4 espécies emergiram deste galho. *Agrilozodes suarezi* foi encontrado pela primeira vez se desenvolvendo no interior de um galho de sua primeira planta hospedeira. A história de vida de insetos do gênero *Agrilozodes* é pouco conhecida, sendo este o primeiro relato de aspectos de sua biologia.

Palavras Chave: Árvore hospedeira; besouros serradores; Buprestidae; Parque Estadual do Rio Doce

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