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Intercepted Silvanidae [Insecta: Coleoptera] From The International Falls, MN [USA] Port-Of-Entry

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Intercepted Silvanidae (Insecta: Coleoptera) from the International Falls, MN (U.S.A.) Port of Entry

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Abstract

Silvanidae species recorded in association with imported commodities, at United States ports-of-entry, have not been comprehensively studied. The present study examines the species of beetles of the family Silvanidae intercepted during agricultural quarantine inspections at the International Falls, MN port-of-entry. A total of 244 beetles representing two subfamilies, three genera, and four species of Silvanidae were collected between June 2016 and June 2017. Taxa were associated with 13 imported commodities and recorded from seven countries of origin. A substantial proportion (97.4%) of the records included *Silvanus lewisi* Reitter and *Ahasverus advena* (Waltl), two cosmopolitan species associated with dried stored products and various imported commodities. Both *Psammoecus simonis* Grouvelle and an undetermined species of the genus *Psammoecus* (sp. 01) were intercepted on a single occasion.

The introduction of non-native species as contaminants of global trade can dramatically alter ecosystems (Wittenberg and Cock 2001), reduce biological diversity (Kenis et al. 2007), and impose economic costs on forestry, agriculture and human health (Pimentel et al. 2002). Identifying non-indigenous species and creating species inventories have proven to be important, for such data contribute to the development of risk assessment methods for alien species and introduction pathways which provide the basis for prevention of biological invasions (Kenis et al. 2007). The family Silvanidae Kirby, 1837 (Coleoptera: Cucujoidea) includes approximately 500 described species divided between two subfamilies and about 58 genera (Thomas and Leschen 2010). Although the biology of most species is unknown, the family is generally considered to be fungivorous with a few known predatory species (Thomas and Leschen 2010). Silvanidae is cosmopolitan with the highest diversity in the tropics (Friedman 2015, Thomas 2002). At present, there are 32 species recognized in the United States, with at least 14 of those classified as exotic (Thomas and Yamamoto 2007), including several, widely distributed, common stored product pests (Thomas 2002). The United States Department of Agriculture (USDA) currently categorizes the Silvanidae as non-quarantine significant, however, there exists a paucity of data on the Silvanidae species recorded in association with imported commodities, at United States ports-of-entry. Herein, I report the Silvanidae taxa intercepted at the International Falls, MN [USA] port-of-entry. This study represents an initial review and characterization of the Silvanidae species collected in association with imported cargo along the northern border of the United States.

The intercepted Silvanidae were a result of agricultural quarantine inspections conducted by Department of Homeland Security, United States Customs and Border Protection (CBP) personnel between the dates of 10 June 2016 and 30 June 2017. Beetles were pinned and identified to species using Halstead (1973, 1993), Pal (1985), and Yoshida and Hirowatari (2014), and other reference material. Voucher specimens were deposited at the Smithsonian Institution National Museum of Natural History (Washington, D.C., USA) under the voucher numbers IFALLS0001 – IFALLS0025.

A total of 244 beetles, representing two subfamilies, three genera, and four species of Silvanidae were recorded from the International Falls, MN port-of-entry (Table 1). The dataset consisted of 75 individual interception events with an average of 3.17 (SE ± 0.46) beetles collected per interception. Species were recorded associated with 13 imported commodities (Table 2) and from seven countries of origin (Table 1). Overall, more than 74% (n = 57) of the interceptions were with three commodity types (Table 2). A total of 45.5% (n = 35) were associated with automobile parts, 16.9% (n = 13) with metal products, and 11.7% (n = 9) with tiles. The commodities that transit through the port-of-entry are represented by these products and not necessarily a reflection of beetle pref-

Table 1. Species and Origin of Intercepted Silvanidae [Insecta: Coleoptera] from the International Falls, MN USA Port-of-Entry

Subfamily	Species	China	Hong Kong	Malaysia	Philippines	South Korea	Taiwan	Vietnam	Total Number[1]
Brontinae									
	Psammoecus simonis Grouvelle						1 (1)		1 (1)
	Psammoecus sp. 01		1 (1)						1 (1)
Silvaninae									
	Ahasverus advena (Waltl)	24 (52)		1 (1)	2 (2)	2 (3)	1 (1)	2 (2)	32 (61)
	Silvanus lewisi Reitter	35 (171)	2 (3)				3 (3)	3 (4)	43 (181)
Total Number[1]:		59 (223)	3 (4)	1 (1)	2 (2)	2 (3)	5 (5)	5 (6)	77 (244)

[1]Number of Silvanidae interception events with the total number of collected beetles in parentheses.

Table 2. Commodities Associated with Silvanidae Interceptions from the International Falls, MN USA Port-of-Entry

Commodity	Interception Events (No. Beetles)[1]
Automobile parts	35 (155)
Conveyance (miscellaneous)	4 (5)
Electrical parts	1 (1)
Granite	2 (6)
Hardware	4 (9)
Laminate flooring	2 (2)
Limestone	3 (8)
Machine parts	1 (2)
Machinery	1 (2)
Marble tiles	1 (1)
Metal Products	13 (21)
Porcelainware	1 (6)
Tiles	9 (26)
Total Number:	77 (244)

[1]Number of Silvanidae interception events with the total number of collected beetles in parentheses.

erences for those goods. Collection remarks provided by CBP noted silvanid beetles were intercepted crawling on pallets and shipping container floors. Taking into account that shipping containers are exchanged on a continual basis, some intercepted taxa may be a result of contamination of the container and not necessarily from the stated commodity or origin.

Nearly all interceptions (97.4%, n = 75) consisted of two common synanthropic taxa, *Silvanus lewisi* Reitter and *Ahasverus advena* (Waltl) (Fig. 1), which are often imported on stored grains, dried products, and various commodities in transit (Halstead 1973, Yoshida and Hirowatari 2014). *Silvanus lewisi* was the most commonly intercepted species, accounting for 55.8% of all records (n = 43). This species, whose known distribution includes the Indomalayan region and China, is often transferred and distributed worldwide on wood packing, dunnage, and stored products (Halstead 1973, Halstead and Mifsud 2003). *Silvanus lewisi* has also been introduced and is now established in Florida since at least 1998 (Peck and Thomas 1998). The second most common species, *A. advena*, comprised 41.6% (n = 32) of the interception records. This cosmopolitan taxon, native to the Neotropics, is distributed in most warm temperate and tropical regions and feeds on surface molds of stored food and dried food products (Friedman 2015). Though this species is abundantly transported to various countries with dried stores (Halstead 1993), it has been imported on commodities such as wood and dry plant products (Friedman 2015). Although, not directly tested here, a correlation may exist between the number of interceptions and establishment in the wild. The two most commonly intercepted silvanid beetles, both exotic taxa, are now established in the United States.

Noteworthy was the genus *Psammoecus* which was collected on two occasions. *Psammoecus simonis* Grouvelle (Fig. 1) was intercepted with metal products from Taiwan and is a species widely distributed in the Indomalayan region with records known from India, Indonesia, Japan, Madagascar, Malaysia, Philippines, and Sri Lanka (Yoshida and Hirowatari 2014) as well as from Taiwan (Yoshida, pers. comm.). An unidentified species of the same genus (here as *Psammoecus* sp. 01) (Fig. 1) consisted of a female similar to the Asian species *P. trimaculatus* Motschulsky, *P. triguttatus* Reitter and *P. labyrinthicus* Yoshida & Hirowatari in addition to the African species *P. personatus* Grouvelle (Yoshida, pers. comm.). These taxa are often confused and difficult to separate morphologically and their identification requires comparison of dissected male genital parameres (Yoshida and Hirowatari 2014). However, the species *P. trimaculatus* has been introduced in both Brazil (Thomas and Yamamoto 2007) and Florida (Thomas 2015) where it is now considered widely established.

Developing non-indigenous species inventories provides data and the underlying support for the creation of risk assessment methods for both alien species and invasion pathways (Kenis et al. 2007). The present study is a preliminary evaluation of the Silvanidae species recorded in association with imported cargo from the International Falls, MN port-of-entry. Although it is possible that further inspections, over an extended time period, may yield additional taxa, this

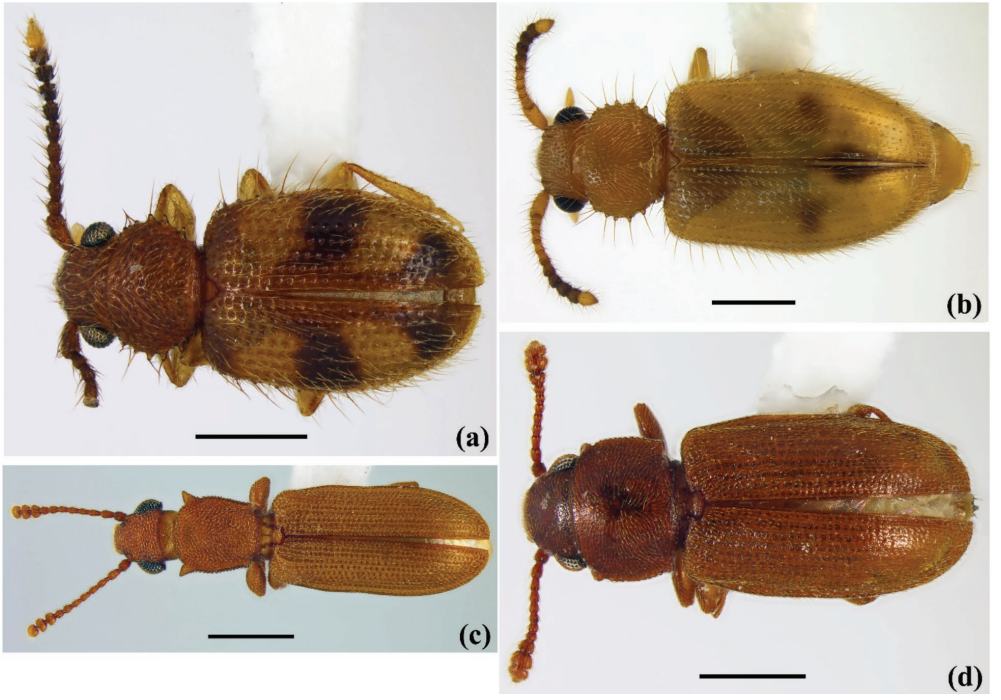

Figure 1. Silvanidae species intercepted from the International Falls, MN port-of-entry. *Psammoecus simonis* Grouvelle (a); *Psammoecus* sp. 01 (b); *Silvanus lewisi* Reitter (c); and, *Ahasverus advena* (Waltl) (d). Scale bars: 0.5 mm per unit. Photos courtesy of G. D. Ouellette, U.S. Department of Agriculture.

work serves as an initial base to support future studies on Silvanidae of quarantine importance.

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