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THE REDBAY AMBROSIA BEETLE (COLEOPTERA: CURCULIONIDAE) PREFERS LAURACEAE IN ITS NATIVE RANGE: RECORDS FROM THE CHINESE NATIONAL INSECT COLLECTION

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The redbay ambrosia beetle *Xyleborus glabratus* is one of the most destructive invasive insect species in North America. The beetle is associated with a symbiotic fungus *Raffaelea lauricola* T.C. Harr., Fraedrich & Aghayeva (Ophiostomatales: Ophiostomataceae) which is extremely pathogenic to North American trees in the family Lauraceae (Fraedrich et al. 2008) and causes a disease known as laurel wilt. Since the introduction of this symbiotic couple in the early 2000's, laurel wilt killed millions of trees, mostly in the genus *Persea*, throughout most of southeastern USA (J. A. Smith, pers. comm.).

One of the important unknown aspects of the biology of this invasive species is its conspicuous specificity to Lauraceae. Most ambrosia species are broad host generalists (Hulcr et al. 2007). Current data on the original host specificity of *X. glabratus* are ambiguous. Published records of tree species from which the beetle was collected includes mostly Lauraceae, but also occasionally unrelated plant families (Wood & Bright 1992; Rabaglia et al. 2006), and it is not possible to confirm the accuracy of many of these records. The current hypotheses can be summarized as follows:

H0: The beetle is an unusual ambrosia species even in its native region, specialized on Lauraceae.

H1: As most ambrosia beetle species, the redbay ambrosia beetle is a host generalist in its native region. The specificity to Lauraceae in North America is a rapid evolutionary-ecological change.

Determining the correct hypothesis is important for many reasons. For example, knowing the original host specificity of the beetle may explain its unusual semiochemical ecology (Kendra et al. 2011). Importantly, it may also help us predict whether the symbiotic couple requires Lauraceae for its survival in invaded ecosystems, or if it is likely to persist in other tree families when Lauraceae are eliminated.

Here we present previously unpublished host records of *Xyleborus glabratus* deposited in the National Zoological Museum of China, Institute of Zoology, Chinese Academy of Sciences, Beijing. These are the first published records of this beetle occurring on mainland China. Identity of all specimens identified as *X. glabratus* was checked for correctness. Chinese host tree names were associated with scientific names according to Chang (1998), Cheng & Fu (1978) and Li (1982).

The collection at the Institute of Zoology in Beijing contains 45 specimens of *Xyleborus glabratus*, mostly collected by Dr. Fu-sheng Huang and identified by Dr. Hui-fen Yin. This is more than the number of records from the rest of Asia by Wood & Bright (1992). Specimens originated in the Sichuan, Hunan and Fujian provinces. This collection displays greater morphological variation than the American non-native population, particularly in terms of beetle size, but the larger or smaller beetles are not confined to specific host species or locations. The majority of specimens were collected from trees in the family Lauraceae (Table 1).

The host list indicates that *Xyleborus glabratus* is not a strict specialist to trees from the family Lauraceae, but it strongly prefers them. While this is an unusual behavior for an ambrosia beetle in the tribe Xyleborini, there are several other xyleborines for which preference for a particular host group has been reported (Kirkendall 2006; Hulcr et al. 2007). This also confirms that the apparent bias to Lauraceae in the host tree summary in Wood & Bright (1992) is correct, and it explains the observation of Dr. J. Peña (UF Tropical Research and Education Center, pers. comm.) who found *X. glabratus* in Taiwan only in *Cinnamomum osmophloeum* Kanehira. The 2 collections from non-lauraceous trees may represent uncommon behavior of the species.

The CAS collection labels do not contain any information on whether the trees were killed by the beetle. However, no records of this behavior in Southeast Asia have ever been reported. Healthy populations of the host tree species reported here

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TABLE 1. HOSTS TREES OF *XYLEBORUS GLABRATUS* SPECIMENS IN THE NATIONAL ZOOLOGICAL MUSEUM OF CHINA.

Tree species	Family	Province(s)	Number of specimens
Phoebe zhennan	Lauraceae	Sichuan	21
Machilus nanmu	Lauraceae	Sichuan	6
Cinnamomum camphora	Lauraceae	Sichuan, Hunan	7
Phoebe neurantha	Lauraceae	Fujian	4
Schima superba	Theaceae	Fujian	1
Picea asperata	Pinaceae	Sichuan	6 (all the same collection)

occur in the areas where the *X. glabratus* specimens were collected, thus the authors doubt that *X. glabratus* displays tree-killing behavior in its native range.

The records explain the strong attraction of *X. glabratus* to phoebe oil, extracted from trees of the genus *Phoebe* (Kendra et al. 2011) and to many North American Lauraceae (Hanula et al. 2008). It also appears that occasionally the beetle is capable of colonizing non-lauraceous hosts, and it remains unknown whether or not it may eventually disappear from American ecosystems when all lauraceous of suitable size hosts have been eliminated. The origin of several *X. glabratus* from a pine tree (Table 1) is unclear, it may be an unusual or erratic behavior of those particular specimens, or an erroneous record.

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SUMMARY

The redbay ambrosia beetle *Xyleborus glabratus* is unusual among ambrosia beetles because of its host specificity to Lauraceae, but it isn't clear whether this is only a feature of the invasive American population. Our examination of the extensive collection in the Chinese Academy of Sciences suggests that *Xyleborus glabratus* strongly prefers Lauraceae also in its native Asia. These are also the first published records of the species from continental China, which highlights the value of entomological collections.

Key Words: host specificity, laurel wilt, *Persea*, symbiotic fungus, Theaceae, tree-killing behavior

RESUMEN

El escarabajo ambrosia *Xyleborus glabratus* es una especie insólita entre los escarabajos ambrosia, debido a su especificidad de hospederos de la familia Lauraceae, pero no está claro si esto es sólo una característica de esta población invasiva en los EE. UU. Nuestro examen de la extensa colección de la Academia de Ciencias de China sugiere que *Xyleborus glabratus* prefiere fuertemente hospederos de la familia Lauraceae también en su nativa Asia. Estos son también los primeros registros publicados de las especies en China continental, lo que destaca el valor de las colecciones entomológicas. Palabras Clave: especificidad de hospedero, marchitez del laurel, *Persea*, hongo simbiótico, Theaceae, comportamiento de matar árboles

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