NEW RECORDS AND ACCOUNTS

First Host Plant Record for the Endemic Hawaiian Ambrosia Beetle *Xyleborus pleiades* Samuelson, 1981 (Coleoptera: Curculionidae: Scolytinae)

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Abstract. *Cheirodendron trigynum* (Gaudich.) Heller (Araliaceae) is documented as the first reported host plant for the endemic Hawaiian ambrosia beetle species *Xyleborus pleiades* Samuelson, 1981, based upon our rearing of an adult beetle from host plant wood collected in the island of Molokai.

Key words: *Cheirodendron trigynum*, Araliaceae, Xyleborini, Hawaii, Molokai

The native Hawaiian ambrosia beetle fauna (Coleoptera: Curculionidae: Scolytinae: Xyleboroni) contains 21 described endemic species of the xyleborine genus *Xyleborus* Eichhoff, 1864. The species are variably distributed among the six main Hawaiian Islands (Samuelson 1981, Nishida 2002), and which have been shown, according to phylogenetic analysis, to be descended from a single colonizing species having arrived in the Hawaiian Islands between 6 and 13.4 million years ago, as reported in Cognato et al. (2018).

Host plants are known for 16 of the endemic ambrosia beetle species, and although a few introduced exotic plant species have been recorded as hosts for a few of these beetles, the majority of host plants belong to native Hawaiian genera (Table 1). For instance, the Polynesian introduced "canoe plants" kukui nut, *Aleurites moluccana* (Euphorbiaceae), and ti, *Cordyline fruticosa* (Asparagaceae), are recorded as hosts for *X. rugatus* Blackburn, 1885.

Among the endemic *Xyleborus*, seven species inferred to be closely related based upon morphological and DNA data (Samuelson 1981, Cognato et al. 2018) appear to form a coherent group (these species are highlighted in bold in Table 1) that has been almost exclusively associated with the araliaceous plant genus *Cheirodendron* Nutt. ex Seem. (Araliaceae). This genus contains five species that together occur across the Hawaiian Islands (Wagner et al. 1999, WCSP 2020). Two of these beetles, *X. pele* Samuelson, 1981, and *X. pleiades* Samuelson, 1981, are the largest species of the endemic ambrosia beetle radiation in Hawaii, forming a species-pair that have recently been rediscovered after many years since they were last collected (Gillett et al. 2018, 2019). While the former species is associated with the genus *Cheirodendron*, the host plant of the latter species remained unknown until now (Samuelson 1981; Gillett et al 2018, 2019).

Table 1. Recorded host plants for the 21 endemic Hawaiian ambrosia beetles of the genus *Xyleborus*. Data from Samuelson (1981) with updated plant names, conforming to the World Checklist of Selected Plant Families (WCSP 2020). The seven ambrosia beetle species belonging to the araliaceous-associated group (see text) are highlighted in bold.

Ambrosia beetle species	Recorded host plant genera
Xyleborus agamus Perkins, 1900	Unknown
Xyleborus arcturus Samuelson, 1981	Unknown
Xyleborus dubiosus Perkins, 1900	*Bobea*, *Coprosma*, *Eugenia*, *Physalis*, *Pipturus*, *Psychotria*
Xyleborus exsectus Perkins, 1900	Unknown
Xyleborus hawaiiensis Perkins, 1900	*Cheirodendron*, *Dubautia*, *Pipturus*, *Polyscias*
Xyleborus hiiaka Samuelson, 1981	*Cheirodendron*
Xyleborus ignobilis Perkins, 1900	*Freycinetia*
Xyleborus kauaiensis Perkins, 1900	*Cheirodendron*
Xyleborus lanaiensis Perkins, 1900	*Pouteria*, *Sapindus*
Xyleborus littoralis Perkins, 1900	Unknown
Xyleborus mauiensis Perkins, 1900	*Cheirodendron*
Xyleborus molokaiensis Perkins, 1900	*Cheirodendron*, *Ilex*
Xyleborus nubilus Samuelson, 1981	*Myrsine*
Xyleborus oahuensis Perkins, 1900	*Melicope*
Xyleborus pele Samuelson, 1981	*Cheirodendron*
Xyleborus pleiades Samuelson, 1981	*Cheirodendron*
Xyleborus rugatus Blackburn, 1885	*Cordyline*, *Dracaena*, *Aleurites*
Xyleborus scabratus Schedl, 1941	*Xylosma*
Xyleborus simillimus Perkins, 1900	*Metrosideros*
Xyleborus obliquus Sharp, 1885	*Ilex*
Xyleborus vulcanus Perkins, 1900	*Acacia*, *Elaeocarpus*, *Melicope*

Cheirodendron was strongly suspected as being the host plant genus for *X. pleiades* (Gillett et al. 2019) based upon the fact that the beetle belongs to the group of species associated with araliaceous plants as mentioned above, and that this plant is abundant at one of the sites where the beetle was recently rediscovered, in The Nature Conservancy (TNC) Kamakou Preserve on Molokai (Gillett et al. 2019). Subsequent beetle sampling in humid rainforest-covered areas of Pepeopae Bog, in TNC Kamakou, undertaken as part of a survey of the native Hawaiian bark and ambrosia beetles across the archipelago, has revealed that *Cheirodendron trigynum* (Gaudich.) Heller, commonly known as ʻōlapa, is indeed the host plant for *X. pleiades*.

During the survey of Pepeopae Bog, an approximately 1 m long section of a recently dead *Cheirodendron trigynum* branch, showing evidence of ambrosia beetle attack (visible frass and bore-holes on the surface), was collected on 21.vi.2019 (approximate coordinates 21.1183, –156.9019; 1263 m elevation), cut into two pieces, brought to laboratories in Honolulu and Hilo, and monitored in the hope that adult ambrosia beetles would eventually emerge.

Subsequently, among several female specimens of both *X. mauiensis* Perkins,

1900, and *X. molokaiensis* Perkins, 1900 (both species previously known to use *Cheirodendron* as a host), a single female specimen of *X. pleiades* emerged in early September 2019 (8–10.ix.2019) in the Hilo laboratory. The specimen was preserved by FY in ethanol and was identified by CG using the keys in Samuelson (1981) and by comparison to other specimens previously collected in the area by CG.

With the confirmation of *C. trigynum* as a host plant for *X. pleiades*, all seven morphologically similar species in the subgroup of Hawaiian endemic *Xyleborus* described above are now associated with *Cheirodendron*. It will be very interesting to investigate whether eventual phylogenomic analyses will support the morphological hypothesis in grouping these similar species in a monophyletic clade. If this is the case, it can be hypothesized that specialisation on *Cheirodendron* has been an evolutionarily successful avenue, resulting in considerable diversification that has culminated in the emergence of fully one third of the currently described endemic Hawaiian *Xyleborus* species diversity.

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