CERAMBYCIDAE ASSOCIATED WITH THE HOST GENUS *Nothofagus* IN CHILE AND ARGENTINA[1] /

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Resumen

Los árboles del género Nothofagus *se consideran importantes para la producción comercial de madera en Chile. En la madera de algunas de estas especies se encuentra comúnmente graves defectos causados por insectos de la familia Ceramycidae. Este trabajo reúne la dispersa información publicada sobre los cerambicidos que se desarrollan en especies de* Nothofagus *en Chile y Argentina. Además, se presentan observaciones originales sobre nueve especies de cerambicidos con datos sobre huéspedes para* Acanthinodera cummingi *Hope,* Microplophorus castaneus *Blanch.* Callisphyris semicaligatus *Fairm. & Germain,* Lautarus concinnus *(Philippi),* Planopus laniniensis *Bosq,* Platynocera lepturoides *Blanch.*, Calydon submetallicum *(Blanch.),* Chenoderus testaceus *(Blanch.), y* Holopterus chilensis *Blanch. Existe información sobre 27 especies de cerambicidos que se desarrollan en* Nothofagus; *entre ellos 22 se encuentran en* N. dombeyi *(Mirb.) Oerst., cinco en* N. pumilio *Poepp. et Endl.), 10 en* N. antarctica *(Forst.) Oerst., dos en* N. alpina *(Poepp. et Endl.) Oerst., y seis en* N. obliqua *(Mirb.) Oerst.*

Introduction

Beech forests of the *genus* Nothofagus are restricted to the southern hemisphere in the South Pacific region. Similarities between indigenous forests of Argentina and Chile and the related forests in New Zealand are discussed by Clarke (14) and Schmithüsen (36). Unique ecological relationships have developed in these forests, particularly between *Nothofagus* spp. and the wood boring beetles of the family Cerambycidae that utilize these trees as hosts (10, 30).

There are ten species of beech trees in the genus *Nothofagus* native to Chile. The ranges of several of these species also extend into Argentina. Raulí, *N. alpina* (Poepp. et Endl.) Oerst.; coigüe, *N. dombeyi* (Mirb.) Oerst.; roble, *N. obliqua* (Mirb.) Oerst.; and lenga, *N. pumilio* (Poepp. et Endl.) Krasser are of major importance to the timber industry in Chile. Ñirre *N. antarctica* (Forst.) Oerst., a widely distributed species often found in association with lenga, is a shrub or a relatively small tree of little commercial importance. Chilean foresters have noted that the timber of some *Nothofagus* species often has much defect due to cerambycid damage. Cerambycids not only cause defect and occasional mortality, but also open infection courts for wood destroying fungi.

The literature on cerambycids associated with *Nothofagus* spp. in Chile and Argentina consists primarily of taxonomic studies, with only scattered information on host preferences. Biological investigations are practically non-existent.

The following authors report numerous original records of cerambycid species which develop in

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Nothofagus spp : Bosq (3, 6), Fairmaire and Germain (18), Havrylenko and Winterhalter (23), Monrós (28), and Peña (31, 32). In a monograph of the immature stages of the neotropical cerambycids, Duffy (16) has described the larval and pupal stages, and listed distributions and records of host plants for many Chilean and Argentine species. A biological sketch for *Cheloderus childreni* Gray in association with *N. dombeyi* in Chile has been described by Cameron and Real (8). No other detailed accounts of biologies of Chilean cerambycids are available in the literature.

The purpose of this paper is to review known associations of cerambycid larvae with *Nothofagus* spp., to report several new host records and to encourage further work in this area.

Methods

From 1971 to 1974 cerambycid larvae and adults were collected from *Nothofagus* species in the provinces of Cautín and Valdivia in southern Chile. Larval host relationships were established by rearing larvae and pupae from portions of branches and logs in screened laboratory rearing cages, or by physically extracting specimens from the inner bark and wood of trees showing external signs of beetle attack, such as entrance holes or frass. Adult specimens were identified by the authors and some identifications were confirmed by M. Cerda*. Numerous *Holopterus chilensis* Blanch. were captured by placing small wire cages (5x5x10 cm) over exit holes on the boles of host trees. The biology of this species was studied in detail and will be reported in a subsequent paper.

Results

The cerambycid species observed in this study and those reported in the literature to develop in *Nothofagus* in Chile and Argentina are listed in Table 1. Species are grouped by subfamily and listed in alphabetical order within each subfamily. Indicated for each cerambycid are: the countries in which it has been collected, the *Nothofagus* species in which it has been reported to develop, whether or not it has been reported to develop in host genera other than *Nothofagus*, and the condition of the host (live, dead or dying, not specified by the author). The authors of these citations are referred to by numbers which correspond with the numbered list of literature cited.

In summary, twenty-seven species of cerambycid beetles are reported to develop in *Nothofagus* spp. Five additional species have been collected in the adult stage from – or the larvae are suspected to develop in – *Nothofagus* spp., but host relationships remain to be confirmed. Twenty-two species develop in coigüe, five in lenga, ten in ñirre, two in rauli and six in roble.

Seven species of cerambycids were observed to develop in *Nothofagus* species in this study, five of which are new host records. A brief summary for each of these observations follows.

Callisphyris semicaligatus Fairm. & Germain – One adult was extracted from a pupal chamber in a live 40-year old rauli (23.5 cm in diameter, 22 m in height and approximately 40 years old). This tree was located in a thinned stand of second growth rauli in the Villarrica Forest Reserve, northeast of Pucón. Approximately 40 percent of the trees in this stand had signs of cerambycid attacks. The larvae construct galleries in the center of the main stem, occasionally making holes to the exterior to extrude frass. The galleries reached a maximum of about 8 x 12 mm in cross section and a length of 1 to 2 m and contain a mixture of fibrous and granular frass.

Calydon submetallicum (Blanch.) – Numerous adults were reared from bolts of *N. obliqua* taken from fallen trees at Fundo Los Pinos, near Valdivia, and Fundo Quechuco, near San José de la Mariquina. The larvae feed in the phloem throughout their development and, upon maturity, bore into the wood to form the pupal chamber. The winding galleries are filled with tightly packed granular frass. Numerous parasitic wasps also emerged from the bolts containing larvae and pupae of *C. submetallicum*.

Chenoderus testaceus (Blanch.) – One adult emerged from dead wood of a *N. dombeyi* branchlet severed by a *Platynocera lepturoides* larva. The branch was collected near the city of Valdivia.

Holopterus chilensis Blanch. – Numerous adults were captured in wire cages as they emerged from pupal chambers within the boles of *N. obliqua* on the University Austral campus in Valdivia, on the Fundos Forestales of the University near Valdivia and on the Fundo Quechuco near San José de la Mariquina. The larvae enter trunks of live robles at the base of the tree and bore in the live wood below the soil level and up to several meters above the ground. Young trees of roble

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commonly are riddled with *H. chilensis* galleries, rendering the wood useless for lumber. This species prefers *N. obliqua*, but one adult was captured as it emerged from the bole of *N. dombeyi*.

Lautarus concinnus (Philippi) – One adult was extracted from a gallery in the wood of a live *N. dombeyi* in the Cordillera Pelada, south of Valdivia*.

Planopus laniniensis Bosq – Two adults were extracted from galleries in the live wood of large limbs of *N. dombeyi* on the Fundo Quechuco near San José de la Mariquina. A wood rotting fungus appears to be associated with this cerambycid species.

Platinocera lepturoides Blanch. – The larvae of this species initially bore in the wood of live branchlets of *N. dombeyi*. Infested branches often break and fall to the ground, where the insects complete their development within the severed branch. Several adults were reared from branchlets collected beneath a large opengrown coigüe near the city of Valdivia.

Discussion

As published reports of larval and adult host records for Chilean cerambycid beetles are brief and incomplete, conclusions discussed here can be only preliminary. Linsley (27) stated that species in the more primitive Prioninae and Lepturinae groups, with the exception of some specialized forms having restricted host ranges, are generally more polyphagus and the polyphagus species are usually associated with dead or decomposing wood. Conversely, cerambycid species developing in live wood are generally believed to be more host specific. As shown in Table 1, the Chilean Prioninae species, *Acanthinodera cummingi* Hope and *Microplophorus castaneus* Blanch. are both polyphagus and develop in dead wood. Both of these cerambycids were collected in this study from the dead wood in stumps of *Pinus radiata*. This is a new host record for the latter species and both are examples of a polyphagus indigenous insect adapting to an exotic host plant.

With the exception of *Callisphyris semicaligatus*, all species of Lepturinae found in association with *Nothofagus* are reported to develop exclusively in live trees belonging solely to this host genus. This dependency would appear to contradict the general polyphagus habits of the Lepturinae, but these species are associated with hosts restricted to limited ranges in Chile and Argentina.

The species in the unique subfamily Oxypeltinae, recently created by Duffy (16) and revised by Cerda (11), develop exclusively in live *Nothofagus* trees. The Cerambycinae are reported to develop in dead or dying *Nothofagus* host material and several also develop in other host genera. One notable exception is *Holopterus chilensis* which appears to be almost exclusively restricted to the live wood of *N. obliqua*. No conclusions can be drawn for the Lamiinae due to the scarcity of host records for species in this subfamily.

More cerambycid species are associated with coigüe than with any of the other *Nothofagus* species. Coigüe has a wide geographical distribution in Argentina and Chile and it grows on a variety of sites in association with many other tree species (7, 37). The wide variety of habitats in which coigüe grows probably accounts for the large number of cerambycids which utilize it as a host. Conversely, the relatively limited distribution of raulí may account for the small number of cerambycid beetles reported to develop in this species.

The record of *Callisphyris semicaligatus* in young stands of raulí could be of major significance to the forest industry in Chile since plans to reforest large areas of cut-over native forests with raulí currently are under consideration. *C. semicaligatus* has been reported to cause mortality to young trees of *N. dombeyi* in Argentina (23, 38). Another species, *C. vespa* Fairm. and Germain, severs large branches of fruit trees, (*Prunus* and *Malus* spp.) in Chile and Argentina (3, 32, 34). Gara (19) observed extensive wood boring damage by an unknown cerambycid larva in vigorous stands of raulí in the Fundo Jauja, 45 km east of Collipulli in Chile. It is possible that this damage also was caused by *C. semicaligatus*.

Many cerambycid beetles have been reported to develop in the wood of *Nothofagus* species in Argentina and Chile, and some of these beetles cause considerable damage. Clearly, as the value of *Nothofagus* timber steadily increases, there is a need for further research to document additional host associations and to study the biologies of the more damaging cerambycid species.

* Specimen collected by Pedro Real, Universidad Austral de Chile, Valdivia, Chile.

Table 1. Species of Cerambycidae associated with the genus *Nothofagus* in Chile and Argentina*.

Subfamily, genus and species	Distribution	Larval host and host condition: *N. alpina*	*N. antarctica*	*N. dombeyi*	*N. obliqua*	*N. pumilio*	Possible *Nothofagus* association	Other host genera
Prioninae								
Acanthinodera cummingi Hope	C				NS–13, 17, 33, 34			NS–2, 13, 17 33, 34 D–32, 40
Microplophorus castaneus Blanch.	A, C		D–6, 13, 23 NS–26	D–6, 13, 23 NS–22, 24		D–6, 13		D–3, 13, 23, 28, 40 NS–32
Microplophorus magellanicus Blanch.	A, C		D–13			D–13		
Lepturinae								
Adalbus crassiconis Fairm. & Germain	A, C		L–23			L–23	NS–18	
Callisphyris semicaligatus Germain & Fairm.	A, C	L–40**	L–23	L–23, 28			NS–18	L–23, 28
Lautarus concinnus Philippi	A, C		L–12, 23	L–39**			NS–25	
Planopus laniniensis Bosq	A, C			L–40**				
Planopus octaviobarrosi Cerda	C			L–38 NS–10				
Platynocera lepturoides Blanch.	C			L–40**				
Sibylla coemeterii Thomson	A, C			NS–6	L–6, 28			
Sibylla flavosignata Fairm. & Germain	A, C			NS–12			NS–18	
Sibylla integra Fairm. & Germain	A, C			L–23				
Sibylla livida Germain	C			L–31 NS–32			NS–12	
Oxypeltinae								
Cheloderus childreni Gray	A, C			L–6, 8, 11, 23, 24 NS–21, 32 D–28	L–8, 31		NS–20	
Cheloderus peñai Kuschel	A, C					NS–32	NS–11, 29	
Oxypeltus quadrispinosus Blanch.	A, C	L–6, 11	L–11	L–6, 11, 23 NS–3		L–6, 11 NS–3, 20	NS–18	

Table 1 (Cont.)

Subfamily, genus and species	Larval host and host condition						
	Distribution	*N. alpina*	*N. antarctica*	*N. dombeyi*	*N. obliqua*	*N. pumilio*	Possible *Nothofagus* association	Other host genera
Cerambycinae								
Callideriphus laetus Blanch.	*A. B. C*			D–23 NS–17	D–23 NS–17		NS–22	D–23 NS–2, 17
Calydon globithorax (Fairm. & Germain)	A, C**			NS–6				
Calydon havrylenkoi Bosq	A		NS–6	D–6, 23				
Calydon submetallicum Blanch.	A, C		D–23	D–23, 28 L–38	D–40 NS–18, 22		D–32 NS–24	NS–24, 34
Chenoderus bicolor Fairm	C					D–40**		
Chenoderus octomaculatus Fairm.***	A, C			D–23				
Chenoderus testaceus Blanch.	A, C			D–40**	NS–16			D–1, 38
Chenoderus tricolor Fairm & Germain	A, C						NS–6, 18	
Grammicosum Flavofasciatum Blanch	A, C			D–28 NS–22	NS–3, 6			D–28
Xenocompsa flavonitida Fairm. & Germain	*A, C*			NS–15				
Holoptera chilensis Blanch.	A, C			L–40 NS–32	L–40**			
Maripanus decoratus Germain	A, C			NS–4, 23				
Phymatioderus bizonatus Blanch.	A, C			D–23				NS–16, 35
Lamiinae								
Azygocera picturata Fairm. & Germain	A, C						NS–18, 38	
Paroectropsis decoratus Cerda	C						NS–9	
Tuberopeplus chilensis Breun.	C						NS–29	

* A – Argentina, B– Brazil, C – Chile, L – live, D – dead or dying, NS – host condition not specified; numbers refer to literature citations with the following additions: 38 – Ernesto Krahmer, Valdivia, Chile, personal communication; 39 – Pedro Real, Universidad Austral, Valdivia, Chile, personal communication; and 40 – This study.

** New record.

*** Since the submission of this article, a new genus, *Achenoderus*, has been proposed for *Chenoderus octomaculatus*; NAPP, D. S. Revisao do gênero *Chenoderus* Fairmaire et Germain, 1859 (*Coleoptera, Cerambycidae*). Rev. Brasil, Biol. 39(3):571-585. 1979.

Summary

Several tree species in the genus *Nothofagus* are of major importance to the timber industry in Chile. Serious defects caused by cerambycid beetles are commonly found in the wood of some *Nothofagus* species. This paper summarizes the widely scattered information on cerambycids which develop in *Nothofagus* species in Chile and Argentina. Original observations of host plants are presented for the following nine cerambycid species: *Acanthinodera cummingi* Hope, *Microplophorus castaneus* Blanch., *Callisphyris semicaligatus* Fairm. and Germain, *Lautarus concinnus* (Philippi), *Planopus laniniensis* Bosq., *Platynocera lepturoides* Blanch., *Calydon submetallicum* (Blanch.), *Chenoderus testaceus* (Blanch.) and *Holopterus chilensis* Blanch. *Nothofagus* is the reported host for the larvae of 27 cerambycid species; 22 species develop in *N. dombeyi* (Mirb.) Oerst, 5 in *N. pumilio* (Poepp. et Endl.), 10 in *N. antarctica* (Forst.) Oerst., 2 in *N. alpina* (Poepp. et Endl.) Oerst, and 6 in *N. obliqua* (Mirb.) Oerst.

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