Host Range in *Prionoplus reticularis* White

By JOHN S. EDWARDS,

Department of Zoology, Auckland University

[*Received by the Editor, March 3, 1959.*]

Abstract

THE host range is examined of an indigenous prionine, *Prionoplus reticularis* White, a gymnosperm feeder which has become established in exotic conifer forest throughout New Zealand.

P. reticularis is reported from fourteen species of gymnosperm and two angiosperms. The endemic hosts are characteristic of lowland podocarp forest. Only two genera, *Phyllocladus* and *Libocedrus* are without record of attack. Cessation of sap secretion appears to set the early limit to colonization of wood. Host selection within *Podocarpus* and *Dacrydium* accords with recent views on the taxonomy of these genera.

The first record of *Prionoplus reticularis* from an exotic conifer dates from 1914. It has since then become an important primary coloniser of fallen timber in exotic forest.

AMONG the native animal species that have invaded the new environment offered by man in the form of exotic conifer forest, the prionine beetle *Prionoplus reticularis* White has been one of the most successful, both in terms of widespread distribution and of biomass. Its assumption of a dominant role in the breakdown of fallen and standing dead wood in *Pinus* plantations throughout New Zealand stems from an early adoption of the newly introduced conifers. In view of this "opportunist" activity, it is of interest to examine its discrimination among indigenous gymnosperms.

As Duffy (1953) has observed, the majority of cerambycids favour either angiosperm or gymnosperm hosts, although a predominantly angiosperm feeder may utilize a limited number of gymnosperms, as is the case with the European *Prionus coriarius* which is known from 13 angiosperms and 3 gymnosperms. *Prionoplus* on the other hand is a gymnosperm feeder, with only 2 records, one of them very doubtful, from angiosperms.

In the following table all the indigenous gymnosperms are listed, for it is of interest to note which species have apparently proved unsuitable. References apply to first records, or additional states in which the particular host has been attacked.

The following observations arise from the table:—

1. *Prionoplus reticularis* is reported to attack fourteen species of gymnosperms and two species of angiosperms, all of them as dead wood, though not necessarily in decayed condition.
   (Unpublished observations suggest that cessation of active sap secretion sets the early limit to successful colonization.)
2. All endemic hosts have a lowland distribution, and are characteristic of, or associated with Lowland Podocarp Forest, and Podocarp Semi-swamp Forest. (Cockayne's nomenclature.)

INDIGENOUS GYMNOSPERMS

* Species.	Common Name.	Alt. Range.	Reference.	Occurrence.
Agathis australis	kauri	s.l.–2,000ft	Broun, 1879	Logs.
			Hudson, 1892	Logs and timber.
			Kelsey, 1947	Sound heart and sap.
Libocedrus (two spp.)	cedars		No records.	
Podocarpus				
totara	totara	s.l.–3,000ft	No records	
hallii		s.l.–2,000ft	No records	
acutifolius		sub-alpine	No records	
nivalis		sub-alpine	No records	
ferrugineus	miro	s.l.-3,000ft	G. G. Hole pers. comm.	Logs, Nelson.
spicatus	matai	s.l.–2,000ft	Broun, 1879	Logs.
			Hudson, 1928	Timber.
			Kelsey, 1947	Weatherboards.
dacrydioides	kahikatea	s.l.–2,000ft	Broun, 1879	Logs.
			Hudson, 1928	Poles, rafters.
			Kelsey, 1947	Sound timber.
Dacrydium				
kirkii		s.l.–2,000ft	No record (rare)	
biforme		2,000-4,500ft	No record	
bidwillii		2,000-4,500ft	No record	
cupressinum	rimu	s.l.–2,500ft	Broun, 1879	Logs.
			Hudson, 1892	Poles, rafters.
			Kelsey, 1947	Building timber, weather boards.
intermedium		s.l.–4,500ft	G. B. Sweet, pers. comm.	Logs.
colensoi		s.l.–3,000ft	No record (rare)	
laxifolium		2,500–4,000ft	No record	
Phyllocladus (three species)			No records.	

EXOTIC GYMNOSPERMS

*Species.	Common Name.	Alt. Range.	Reference.	Occurrence.
Pinus				
radiata	Pine		Gourlay, pers.comm.	Raised from logs, 1914.
			Miller, 1925	Dead trees and branches.
			Clarke, 1932	Overmature trees.
			Kelsey, 1947	Sap-stained timber.
taeda	Pine		Pers. obs.	Riverhead forest, logs.
Pinus spp.	Several other species of *Pinus*, including *P. laricio* and *P. pinaster*, provide suitable hosts (verbal reports).			
Larix decidua	Larch		Kelsey, 1947	Timber.
			Pers. obs.	Logs.
Pseudotsuga douglasii	Oregon pine		Kelsey, 1947	Timber.
Cupressus macrocarpa			Pers. obs.	Log.

INDIGENOUS ANGIOSPERMS

Beilschmeidia tawa	tawa	s.l.–1,000ft.	Kelsey, pers. comm.	Sound timber.

EXOTIC ANGIOSPERMS

Quercus sp.	oak		G. M. Thomson, 1922	Probably in error for *Ochrocydus huttoni* Pasc.

* Names according to Cheeseman, 1925.

3. Only one of the potentially suitable lowland species is without record of attack, and it (*D. colensoi*) is very rare.
4. Two gymnosperm genera—*Libocedrus* and *Phyllocladus*—include no recorded hosts for *Prionoplus.*
5. The first record, in 1925, of *Prionoplus* having extended its host range to an exotic species was made when *Pinus* was first coming into economic prominence. The first entry into *Pinus* may thus have been considerably earlier than 1925, and since that time, with the introduction of further species, the host range has continued to expand.
6. Selection of hosts within the genus *Podocarpus* shows an interesting correlation with recent views on the taxonomy of the genus. Cranwell and von Post (1936), employing pollen structure, and Hair (1953) on cytological evidence, consider *P. totara, P. hallii, P. acutifolius* and *P. nivalis* to form a closely related group. None of these is attacked by *Prionoplus.* It does, however, attack *P. ferrugineus* and *P. spicatus,* which are considered to form a second distinct group, while *P. dacrydioides,* which in the opinion of Cranwell and von Post should be included in the genus *Dacrydium,* becomes placed with species acceptable to *Prionoplus.* The host preferences of *Prionoplus* thus provide biological evidence which supports a taxonomic revision based on pollen structure and chromosome number.

In early European times *Prionoplus* was abundant throughout New Zealand (Wakefield, 1873), presumably as a characteristic insect species of the lowland podocarp forests, and to the north in kauri forest. Thus it is that Broun (1879) notes: "It must not be supposed that the ligniperdous proclivities of *Prionoplus reticularis* are restricted to *Dammara australis* (now *Agathis australis*), or that its ravages are an unwanted evil. I have seen the larva at work in rimu and kahikatea logs . . ." Hudson (1892) also notes its occurrence in thin timbers, and is the first to record its activities in sound timber of posts, rails and rafters of houses. The first record of an exotic host is by Miller (1925) who records *Prionoplus* from trunks and branches of dead *Pinus radiata,* although it had been raised from *P. radiata* in 1914 by E. S. Gourlay. Clarke (1932) notes that the habit of entering dead parts of overmature *Pinus* has earned *Prionoplus* unwarranted blame as the cause of their death. *Prionoplus* is now present in *Pinus* plantations throughout New Zealand, where dead wood in the form of stumps, fallen logs and branches, or thinnings, are available.

As a primary coloniser, rapidly reducing logs to frass, producing habitats for secondary colonisers and admitting water to the log, *Prionoplus* must be regarded as a minor influent in these forests.

ACKNOWLEDGMENTS

I am grateful to Mr. G. B. Rawlings, Mr. E. S. Gourlay, and others quoted in the above table, for valuable observations.

REFERENCES

BROUN, T., 1876. Notes on the Coleoptera of Auckland, New Zealand. *Trans. N.Z. Inst. 8*: 262.

CLARKE, A. F., 1932. Insects infesting *Pinus radiata* in New Zealand. *N.Z. J. Sci. Tech., 13,* 235.

CRANWELL, L. M. and VON POST, 1936. Post-Pleistocene pollen diagrams from the Southern Hemisphere. *Geog. Annaler,* 1936.

DUFFY, E. A. J., 1953. A monograph of the immature stages of British and imported timber beetles (Cerambycidae). *Brit. Mus. (Nat. Hist.)*.

HAIR, J. B., 1953. The chromosomes of the New Zealand gymnosperms. *Abstracts 8th N.Z. Sci. Congress, Auck. Paper 66, Sectn. C.*

HUDSON, G. V., 1892. *Manual of New Zealand Entomology.* London.

——— 1934. *New Zealand beetles and their larvae.* London.

KELSEY, J. M., 1947. Insects attacking milled timber, poles and posts in New Zealand. *N.Z. J. Sci. Tech. 28* (B). 65.

THOMSON, G. M., 1922. *The naturalization of plants and animals in New Zealand.* Camb. Univ. Press.

WAKEFIELD, C. M., 1873. Remarks on the Coleoptera of Canterbury. *Trans. N.Z. Inst., 5.* 302.

JOHN S. EDWARDS,
Department of Zoology,
Downing Street,
Cambridge, England.