# ENTOMOLOGY BULLETIN: NO.46
# FOREST INSECT PESTS OF PAPUA NEW GUINEA

## 2. Pin-hole borers (shot hole borers) attacks on logs , lumber and living trees

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### INTRODUCTION

Besides being concerned with insect pests of living trees the Entomology Branch of the Department of Forests is also concerned with insects that attack logs and converted timber (wood that has been cut into planks etc.). Beetles known as pin-hole borers (larger kinds called shot-hole borers) are such a group of insects. In Papua New Guinea these insects cause large losses to the timber trade every year. These same insects have added importance because they also attack plantation trees in special circumstances.

### DESCRIPTION AND BIOLOGY

There are many kinds of pin-hole borers in Papua New Guinea. They all belong to the two beetle families Platypodidae and Scolytidae. Adults of both families are small (size 1.0 mm to 12.0 mm), often slim insects. Their colours range from yellow to black. Four species are illustrated in the diagram (Fig 1).

The male and female beetles tunnel radially (towards the centre) into wood. Each pair (male and female) constructs a system of galleries (tunnels) in which eggs are laid and a brood of young raised (Fig 2). Eventually the young beetles emerge from the same entrance hole made by the parents. For the large kinds of pin-hole borers the young beetles of the new generation emerge 10 weeks after the parents have started the gallery, and emergence lasts 4 weeks. For the very small kinds emergence commences within 3 weeks and is over in a few days. The young beetles fly off to attack new logs.

The larval (grub) stages of pin-hole borers (Fig 2) do not feed on the wood, but on a fungus (yeast) called Ambrosia which grows on the gallery walls. The grubs graze the fungus at the gallery wall just as cattle graze grass. Because of the Ambrosia fungus these insects are also known as 'Ambrosia beetles'.

### HOW TO RECOGNISE ATTACK BY PIN-HOLE BORERS

<u>On split wood</u>:

- The holes have a diameter of 0.5 mm - 3.0 mm;
- The tunnels have no dust (other wood boring insects have tunnels packed with dust);
- The holes have elongated rings of stained wood around them.

<u>On the surface of logs</u>:

- Fine dust, or solid cylinders of dust are present, pushed out of the tunnels by the parent beetles.

<u>On the surface of living trees</u>:

- sap and gum exude (flow) out from the hole; any frass (waste) left by the insect is stained black

### ATTACK ON LOGS

Attack on logs commonly occurs in the forest (bush) and in the log-yard.

As the living cells of the sapwood die and decay they produce a chemical. The chemical gives off a smell resembling that

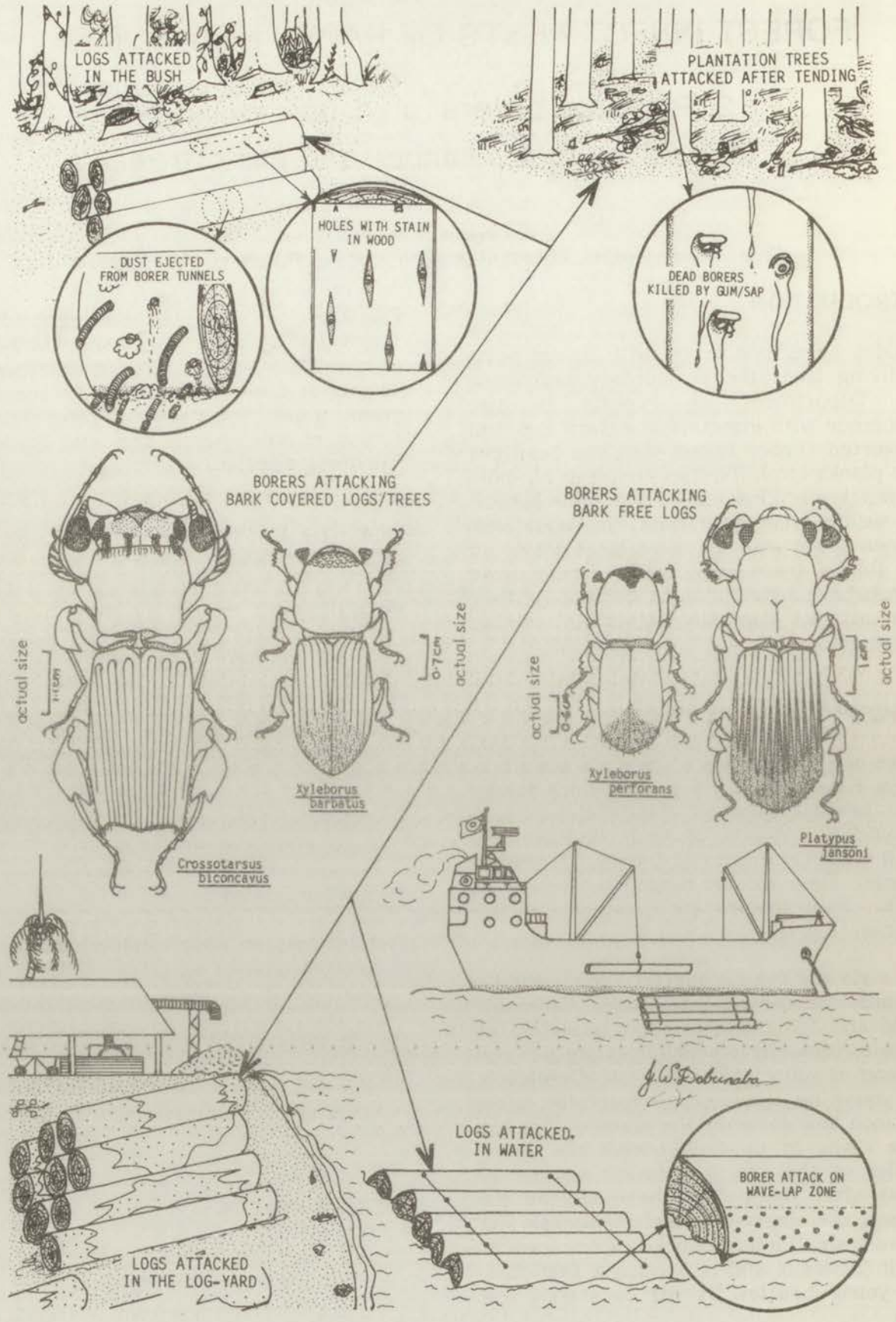
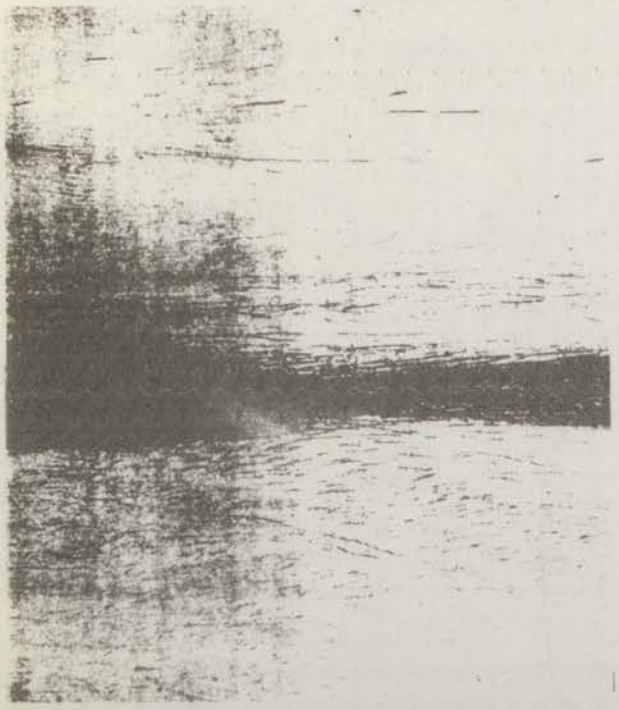
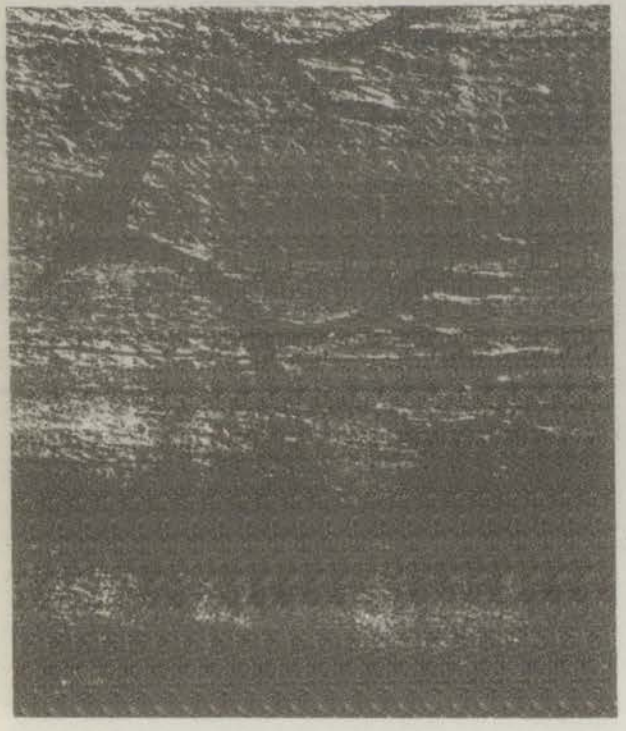



*Figure 1. Various kinds of pin-hole borer attacks in Papua New Guinea (All adults are 6 times their natural size)*



*Rot stain spreading from a tunnel, caused by pin-hole borer, in a living tree.*



*A "talis"* (Terminalia) *board showing pin-hole borer tunnels. The black outline is a result of Ambrosia fungus*

of fermenting beer. This smell attracts the beetles to the tree. For this reason some pin-hole borers which are attracted to beer are called 'beer-bugs'.

Attack in the Bush

Attacks by pin-hole borers on logs in the bush can start within hours after the felling of the log. But it takes a few days before the attack is serious. The attack can go on for many weeks. Galleries made by these insects commonly penetrate well into the heartwood. There may be hundreds of holes per square metre.

Attacks only occur where there is sapwood present in the log. Trees vary a lot in susceptibility (weakness to resist attack). Usually lighter white woods are more likely to be attacked than heavier red and brown hardwoods.

Attack is always heavier in wet weather than in dry weather. If the moisture content of the wood is below 50% the attractiveness to the insect is low. Where the local climate has a dry season there is then very little attack.

Attack in the log-yards

Pin-hole borers which attack wood in the log-yard differ from those which attack wood in the bush or forest. These pin-hole borers attack only areas of logs that have no bark. Removal of bark occurs as logs are dragged during the process of log extraction from the forest and later transport and storage in the log-yard.

There are not many kinds of pin-hole borers in this group but they occur in large numbers.

Attacks on logs in water

When logs are in water it is common for pin-hole borers to attack. In Papua New Guinea, though logs are rafted at many locations around the coast before loading on ships, they are not usually left long in the water. Therefore attack by pin-hole borers is not usually heavy. However in some other parts of the tropics where logs are rafted long distances down rivers, or left in

the sea for some time, attack by pin-hole borers can be heavy. The attack can be found along a 50 cm strip on both sides of the log. This strip is called the "wave-lap zone".

## ATTACK ON LUMBER

Attack on lumber (sawn timber) is unusual. The low moisture content of the timber makes it less attractive to pin-hole borers. If the lumber is unseasoned and has a high moisture content, then attack can occur. The pin-hole borers which attack bark-free logs will also attack stacked lumber. It is therefore important to note this when fresh cut timber with sapwood in it is stacked outside in wet weather.

## ATTACK ON LIVE TREES

### In plantations

During the commercial thinning of klinki pine and hoop pine plantations (at Bulolo and Wau) the live trees left standing are often damaged. Pin-hole borers will attack these damaged trees. Sudden changes within the environment also result in pin-hole borer attacks. Factors such as the arrival of very dry weather or heavy defoliation of tree crowns by caterpillars can be the cause of these attacks. Such attacks are known in kamarere, talis, teak and wattle in Papua New Guinea, mostly at low altitudes but some do occur in the highland areas. Forest operations could also be another contributing factor, even though these do not obviously damage the trees.

Pin-hole borers attacking the trees are killed by the sap and gum flow from the tree. Usually within a few months the holes made by the beetles are covered up by the growth of the tree. Evidence of the damage cannot then be seen from just looking at the bark surface. However when the tree is cut down, many short radial tunnels surrounded by stain will be found throughout the wood. These are an obvious defect.

### In natural forest

Pin-hole borer attacks are also found in large commercial natural stands of old beech trees on Mt. Giluwe. After felling many of these trees are found to have numerous short galleries in the wood. These trees are probably dying from root-rots. The condition could cause chemical changes which attract pin-hole borers to the tree.

Similar damage can occur after logging operations in natural forest particularly along skidder tracks, around logging ramps and near logging roads. Trees which suffer most are Calophyllum, oak, taun and walnut. The pin-hole borers are always killed by the gum flow from the trees, however galleries of different lengths remain within the wood to cause defects.

## ECONOMIC IMPORTANCE

Attack by pin-hole borers on logs kept too long in the bush or log-yard can cause serious timber degradation. The presence of holes in the wood makes it unsuitable for use as veneer or plywood. Galleries made by the insect attack can cause rot to enter the trees and this reduces the strength of the timber. Annual losses as a result of pin-hole borer damage to logs reach more than a million kina.

Inefficient log inspection at ports in this country and infestation on ships by these insects can cause quarantine problems at export destinations.

Attack on live plantation trees is serious only if the tree is grown for plywood or furniture timber, because the holes cause a visual defect. In Fiji, live plantation mahogany potentially worth $23 million as veneer was reduced in value by two thirds because of heavy pin-hole borer attack. Many of the beech trees in the natural Mt. Giluwe stands cannot be used for furniture because of the attack. The rot that gains access to the wood, following pin-hole borers attack, also causes large financial loss.

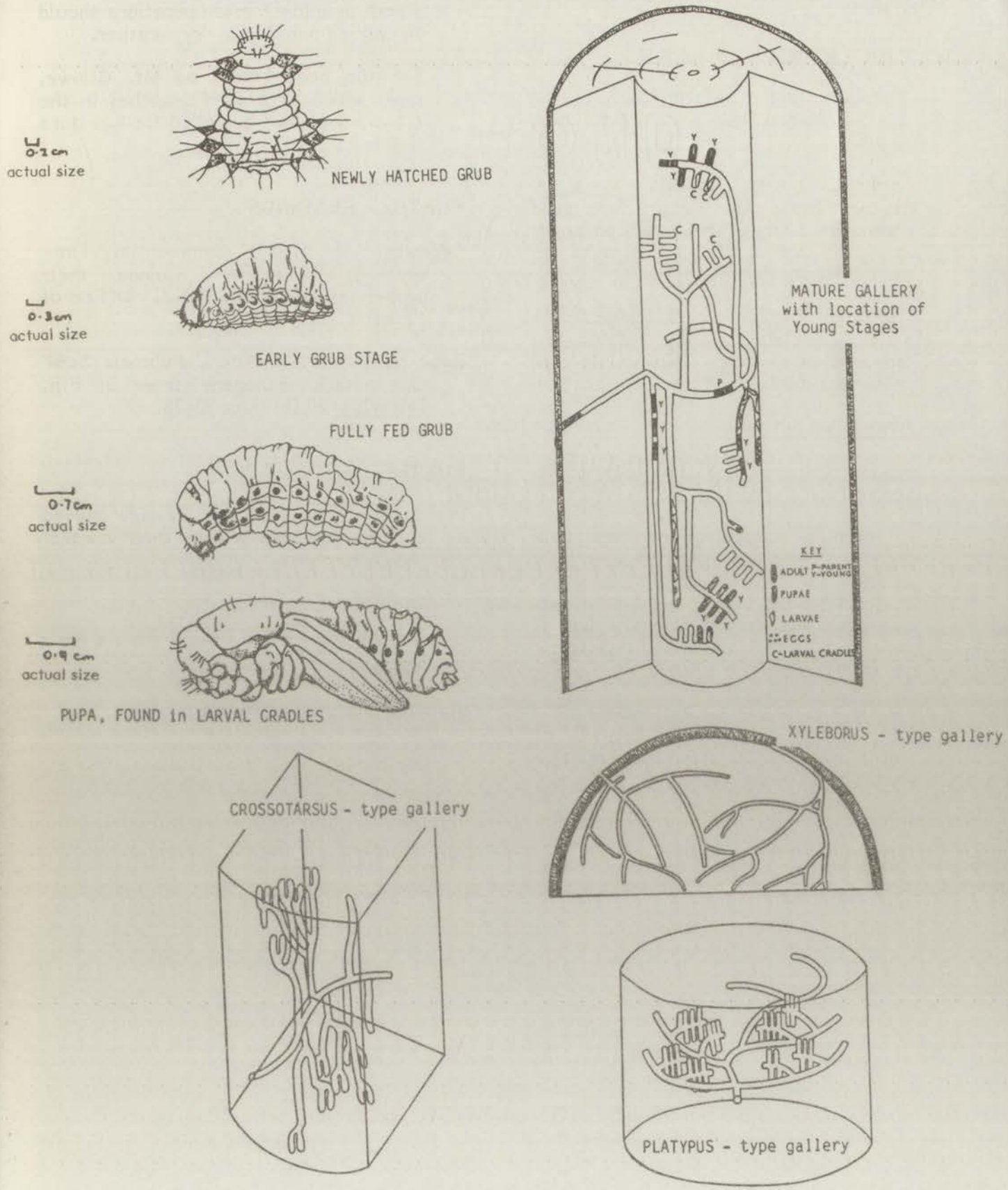



*Figure 2. Different kinds of galleries caused by pin-hole borers and the young stages of pin-hole borers.*

## CONTROL

a) Attack on logs

- Transport logs from the bush to the sawmill immediately and convert them to lumber.
- Spray to run-off with 0.5% Gamaphex in diesolene. This will give good protection to logs for 6 weeks or longer in wet weather, if quick removal to sawmill is not possible.
- Use 0.5% Gamaphex in diesolene with a water repellent on logs rafted for longer than a week. This should give protection for a month.

b) Attacks on lumber

- Season timber immediately after it has been cut.
- If normal seasoning is impossible lumber should be either dipped in a solution of chemicals poisonous to insects (Dip Diffusion), or the poisonous chemicals are forced into the boards under pressure (Pressure Impregnated).

c) Attack on live trees

- In plantations, tending (removal of weeds using sarifs) after the first two years should be restricted.
- Where possible forest operations should be carried out only in dry weather.
- For the beech trees on Mt. Giluwe, trees which have dead branches in the crown should not be felled for furniture timber.

## FURTHER READINGS

Eddowes, P. J. (1977) Commercial Timbers of Papua New Guinea, their properties and uses. P.N.G Office of Forests. 195; XIV pp.

Roberts, H. (1977) When ambrosia beetles attack mahogany trees in Fiji. Unasylva 29 (117), p. 25-28.

## FURTHER INFORMATION

For further information on damage caused by wood-boring insects and their control you should contact:-

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*(Illustrations: J.W. Dobunaba).*