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A

PRELIMINARY NOTE

ON THE



LIABILITY OF TRAVANCORE TIMBERS

TO

ATTACKS OF INSECTS.

BY

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## TABLE OF CONTENTS.

	Pages.
I. Introduction ... ..	1
II. General description of the nature and extent of damage by insect-attacks ... ..	2
III. Classification of woods according to the extent of damage ...	4
IV. Description of damage caused by insects to timbers under each class	5
<i>Plates.</i> ... ..	
( Index of Botanical and English names	
( Index of Vernacular names	

# A ROUGH PRELIMINARY NOTE ON THE LIABILITY OF TRAVANCORE TIMBERS TO ATTACKS OF INSECTS.

## I. INTRODUCTION.

The following note embodies the result of an examination of the nature and extent of attacks by insects on the wood specimens kept in the Office of the Conservator of Forests, Travancore. The specimens examined were collected by Mr. T. F. Bourdillon, F. L. S., the late Conservator of Forests, Travancore. It was about 20 years ago, in July, 1893, that he started the collection and though he never ceased to make occasional additions till he retired from service in May 1908, he seems to have collected most of the specimens herein referred to, by the end of 1895, and they are therefore probably 18 to 20 years old since their collection. Mr. Bourdillon appears to have allowed the wood samples to season for about six months after collection

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Note:—Mr. Bourdillon to whom a copy of the Note was forwarded, has sent a reply after perusal of the Note, and as his remarks are not without interest, they are extracted below:—

\* \* \* \* \*

"The Examination of the indigenous timbers of Travancore is a matter of the very highest importance, and I am glad that you have found time to turn your attention to it, and to encourage your subordinates to collect notes upon the different timbers which they may come across.

I enclose herewith a list of the timbers collected by me from 1893 to 1908, copied from an old note book. The procedure I adopted was, when I had brought the logs back to Quilon, to leave them to season for some months. I then had them sawn up into joists about 1 inches thick and 2 inches deep, and then sawed these joists up into pieces one foot long. Each specimen was therefore 1 ft. x 1 in. x 2 in. These were stacked away in my Bungalow in a spare space on shelves, and as they were lifted off the ground, I thought that they would be secure from insect-attacks; but I was mistaken. They were, it is true, kept out of the reach of white-ants, but there were in the roof of my Bungalow, as I afterwards discovered, vast numbers of a small beetle inhabiting the rafters, and these creatures soon found their way into my specimens. I had left them unnoticed for a long time, but when I came to examine them I found that a large number of the specimens had been riddled by the beetles, which seemed to have tried to enter all and had succeeded in boring the majority. I mention these details to explain how the specimens were protected from white-ants while in my Bungalow, but were very much exposed to the attacks of the small beetle above mentioned.

About a year before I retired I had the specimens brought to the office, polished and varnished and stacked in shelves, and finding that beetles were still boring the wood I had these creatures killed and the specimens poisoned. I hope that not much damage has occurred to them since then, though from the fact that a specimen of *Cynometra Bourdillonii* which I collected a very short time before I left, is bored, I conclude that some more boring occurred since then.

As you remark in your notes, some of the specimens were taken from immature trees, for some of the trees of Travancore grow to an immense size, and it was such a labour to fell a tree of 3 ft. or more in diameter that I confined myself to those of 1½ or 2 ft. and in that way I may have obtained immature specimens.

When your subordinates have in their hands the notes which you are printing they will be able to make further examination of the timbers mentioned. It will be interesting to know not only what species of insects attack the different trees, but at what age and under what conditions they attack them, and whether the attack occurs while the trees are alive or after they have been felled. These very pertinent enquiries are sure to lead to very important and interesting results".

\* \* \* \* \*

and then to have cut them into blocks 1 foot long, 4 inches broad and 2 inches thick, planed them on all sides and then varnished each specimen on one of its broader and narrower sides and, in a few cases, one of the ends also. These specimens were kept in an open rack in his office room. Besides these, duplicates of many of the specimens mostly planed but not cut into uniform length nor varnished, were kept in another open rack in the verandah of the Office. They remained in the racks until a few months ago, when they were taken up for examination.

It will thus be seen that all the specimens examined were kept free from contact with earth and from exposure to sun and rain. These conditions coupled with the fact that some of the specimens are of immature wood, indicate that the results and inferences recorded below cannot be taken as conclusive enough for any scientific generalisation regarding the liability to, or immunity from, damage by insects of the several species of woods herein dealt with. What is here recorded can therefore be taken only as a very rough indication of the extent of damage that the different woods undergo by attacks of insects under certain conditions. Should this note, however, induce other Forest Officers in this State and elsewhere to make further observations and experiments on the insect-resistant power of these and other woods under similar as well as different conditions and to record the results, then it will not have been written in vain.

As regards the origin of this note, it may here be explained that ever since the writer arrived in Travancore, he has been off and on looking at the specimens for reference and comparison, and, in the course of doing so, observed some of the specimens free from insect attacks while others exhibited different degrees of damage by small tiny beetles and white ants. As it is not often that a large collection of different kinds of timbers is found in one place with marks of attacks of insects, he thought it would be a useful record to jot down notes on the nature and extent of damage found in each specimen, and set Mr. T. Narayana Menon, an intelligent Graduate in Botany who has been since selected by the Cochin Darbar for training in Forestry in Europe, to record the information after carefully examining all available wood specimens of each species; and I am much indebted to him for the patient and careful manner in which he did the work. Of course, I have personally verified his notes with the wood specimens very minutely and corrected and revised them.

## II. GENERAL DESCRIPTION OF THE NATURE AND EXTENT OF DAMAGE CAUSED BY INSECT-ATTACKS.

The nature of damage as found in the timbers, consists of (1) narrow, tiny, vertical or slanting holes, (2) narrow longitudinal tunnels, and (3) shallow or deep and broad cavities and chambers.

The holes vary generally from  $1/20''$  to  $1/12''$  in diameter and from a mere shallow depression to the full thickness of the specimen, in depth. These holes are generally vertical and must have been made in almost every

case by a tiny coppery-brown beetle, a few dead specimens of which were found in the wood blocks. Sometimes, the holes lead to tunnels within the wood. They also take the form of superficial tunnels or grooves on the surface.<sup>1</sup> In some cases, such grooves and tunnels and mouths of the holes are covered with a powdery stuff resembling generally the color of the wood, probably the excreta of the boring insect. Whenever holes are referred to in this note without any further explanation, vertical holes  $1/20''$  to  $1/12''$  in diameter, are meant.

The tunnels are of varying diameter and mostly run along the length of the specimens. These seem to have been mostly bored by beetles. In some cases, white-ants have widened the narrow tunnels bored by beetles.

Of the cavities, those made by white-ants are the commonest. Very often, they are superficial and appear to have been formed by white-ants eating away portions of the wood. The interior of the wood also is frequently burrowed into chambers by white-ants, thus reducing the wood block to a mere shell. In the cavities thus formed by white-ants, granular powder resembling in color that of the wood and sometimes inter-mixed with darker grains as for example in *Gicotia rottleriformis*, was almost invariably found. The grains composing the powder are very small, longer than broad, more or less hexagonal and grooved longitudinally on each face. In the case of white-ant cavities and tunnels, as far as possible, their exact dimensions have been given except in very badly attacked specimens in which their measurements could not be conveniently and accurately taken.

In describing the extent of attack on any wood, its partially varnished specimens, when available, were first taken up and the marks of attack, if any, on varnished and unvarnished surfaces noted down separately. Then its unvarnished specimens, if available, were examined. Where heartwood and sapwood could be differentiated, the extent of damage on each was specially recorded. After examining all the available specimens, the extent to which its wood was attacked has been broadly summed up.

It may here be remarked that, as a rule, varnished surfaces of the specimens are found to have been much less attacked by insects than unvarnished ones.<sup>2</sup>

It is curious that no living beetle or any other kind of borer was found in any of the wood-blocks of which a large number was examined; but only three or four shells of dead beetles were found.<sup>3</sup> In some of the specimens, however, living white-ants were seen. The shells of the dead beetles and

<sup>1</sup> Mr. Bourdillon has added in the Note the following by a marginal remark:— "Showing that they were made before the wood was sawn up".

<sup>2</sup> Mr. Bourdillon, in a marginal remark in the Note, says "Or rather when the specimens were being varnished, the sides least damaged by insects, were selected for treatment".

<sup>3</sup> Mr. Bourdillon explains this by a marginal remark thus "Having found that beetles were still boring in the wood, after I had the blocks cut up, I had the blocks poisoned and the insects killed by inserting a wire covered with a rag dipped in carbolic acid in the bores".



samples of the granular powder found in some of the white-ant cavities are sent to the Forest Research Institute for identification of the former and examination of the latter.

### III. CLASSIFICATION OF WOODS ACCORDING TO THE EXTENT OF DAMAGE.

An attempt has been made to roughly classify the specimens of woods into five classes according to the degree of their immunity from attack. The following is a brief description of each of those five classes:—

*Class I. Perfectly immune*:— Specimens free from all kinds of insect attacks.

*Class II. Almost perfectly immune*:— Those that are attacked by borers or white-ants only to a very slight extent, the holes bored by beetles being not more than six in number and not generally exceeding  $\frac{1}{2}$ " in depth and  $\frac{1}{16}$ " in diameter, and portions of wood devoured by white-ants not exceeding  $\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ "  $\times$   $\frac{1}{8}$ " superficially.

*Class III. Fairly immune*:— Holes bored on specimens of this class, as a rule, are not more than a dozen in number. They may be an inch or two deep and some may even extend through the entire thickness of the specimen but they do not impair the utility of the wood to any appreciable extent; tunnels bored are not, as a rule, more than six in number and not exceeding  $\frac{1}{8}$ " in diameter. Portions of wood removed by white-ants are not more than  $\frac{1}{2}$ " deep and the area attacked, not more than 2 square inches on the whole.

*Class IV. Appreciably attacked*:— The number of holes bored are not more than two dozens, as a rule; tunnels bored do not exceed  $\frac{1}{4}$ " in diameter and one dozen in number; portions of wood removed by white-ants do not exceed one inch in depth and the area attacked, not more than 6 square inches on the whole. Specimens in which the extent of damage may be greater than that indicated in the foregoing description are sometimes included in this class when their central portions are fairly immune, while the outer portions are severely attacked and badly damaged.

*Class V. Badly attacked*:— Includes all the woods which are more severely attacked than those of class IV, the wood being rendered useless for any purpose.

To illustrate the above classes, a drawing of a wood specimen of each class representing typically the nature of attack and extent of damage as seen in perspective of the specimen, is appended. (See Plates I to V). My thanks are due to my office Assistant Draftsman Mr. Fernando for preparing the Plates.

Of the 150 species of woods described in the note, 8 fall in class I, 35 in class II, 72 in class III, 15 in class IV, and 20 in class V. As those in class II are only very slightly affected with hardly any damage to the wood,

they might perhaps be better put in class I, but in order to differentiate between woods which show no traces of insect attack and those that bear slight traces of such attack, they are classed separately. More extended observation and further study may lead to a complete change in the above classification which should therefore be considered as a very rough and tentative one.

The vernacular names of the woods are taken from Mr. T. F. Bourdillon's excellent book on "The Forest trees of Travancore", to which reference had to be frequently made in the course of the preparation of this note. As all the wood specimens referred to were collected by him alone, it is due to him to say that, but for his indefatigable labour and care in arranging and preserving the woods, this note could not have been written at all.

#### IV. DESCRIPTION OF DAMAGE CAUSED BY INSECTS TO TIMBERS UNDER EACH CLASS.

##### Class I. Perfectly immune :—

1. *Filicium decipiens*. Date of collection :—18-1-1894

Mal : *Väl muriccha, nìròli* :

Tam : *Ningal* :

A partially varnished specimen as well as an unvarnished one kept in the verandah rack are found perfectly free from traces of insect-attacks.

2. *Lansium anamalayanum*. Date of collection :—5-3-1907

Mal. *Vandakamin, Thèvathàli* :

Tam. *Santhana riri* :

No varnished specimen is available. There are three unvarnished specimens all of which are quite free from insect-attacks. The wood is perfectly sound in all the three, although all of them are cracked longitudinally, probably due to heartshake. This is the specimen selected for illustration as the type of this class of woods. *Vide* plate I.

3. *Pittosporum dasycaulon*. Date of collection :—5-9-1907.

There is only one unvarnished specimen and that is quite free from any trace of insect attacks. The wood is quite sound, the heart being a thin core of greyish-brown with white streaks and sapwood yellowish white or brown.

4. *Thespesia populnea*. Date of collection :—8-9-1907

Eng :—The Portia tree.

Tam :—*Pávarassam, Chìlanthi*.

Mal :—*Pávarassù*

പാവരട്ടു.

There is only an unvarnished specimen kept in the verandah rack, and it is completely free from insect-attacks.

5. *Eriolaena quinquelocularis*. Date of collection:—5-3-1907.

Tam—*Nai annam*  
(നായന്നം)

Only an unvarnished specimen is available and it is quite free from insect-attacks. The wood is slightly cracked owing to heartshake.

6. *Webera corymbosa*. Tam—*Kurā, pàcetti*.

Both varnished and unvarnished surfaces of the only available specimen are quite free from damage by insects.

7. *Eugenia* sp. (No. 232). In an only partially varnished specimen that is available, both varnished and unvarnished surfaces are quite unaffected by insects. The wood has slightly cracked due to heartshake. It is greyish-brown in colour and weighs about 62 lbs. per cubic foot.

8. *Cinnamomum gracile*. Date of collection:—5-12-1907.

Mal—*Attukarura*.  
(ആറ്റുകരൂര).

Only an unvarnished specimen is found and it is quite free from insect-attacks. The specimen is slightly warped both lengthways and breadthways.

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Class II. Almost Perfectly immune.

9. *Alangium Lamarckii*. Date of collection:—8-10-1895.

Tam—*Alangi, Acchanchedi*.  
Mal—*Arinjil, Valli thendi*.

In the only partially varnished specimen available, the varnished surfaces are quite free from insect-attack. One of the unvarnished surfaces has a dot-like depression about 1/16" in diameter and 1/20" deep in the heartwood. The wood has slightly cracked.

10. *Glochidion lanceolarium*. Date of collection:—28-2-1908.

There is only an unvarnished specimen kept in the rack inside the office room. It has a narrow slit about 1/5" long and 1/2" deep, but it is doubtful whether it is due to insect-attack. The specimen is otherwise perfectly immune. It was warped transversely over its whole length.

11. *Dalbergia latifolia*. Eng—Bombay Rosewood.

Tam—*Thôthagathi*.  
Mal—*Fetti, Vitti, Kàrùtti*.

An unvarnished specimen of mature heartwood (kept in the shelf inside the room) is almost quite free from insect attacks, there being on one of its surfaces away from the centre of heartwood only a very tiny hole about  $1/20''$  in diameter and  $1/10''$  deep. A partially varnished specimen of less mature wood has its varnished surfaces quite immune; on one of its unvarnished surfaces, there is a hole  $3/4''$  deep made by beetles; small superficial patches less than  $1/16''$  deep and one sq. inch in area on the whole, are eaten away by white-ants. Another unvarnished specimen similar to the second one, has 8 beetle-holes  $1/2''$  to  $1\frac{1}{4}''$  deep on one surface and on another 2 holes, one of which is  $1''$  deep while the other leads to a small tunnel below.

On the whole, the mature heartwood is almost perfectly immune from attacks of insects.

12. *Hopea parviflora*. Tam—*Kōngu, Pōngu*.  
Mal—*Thambayom, Kambayom*.

In the only partially varnished specimen available, there are on an unvarnished surface 2 beetle-holes  $1/4''$  deep besides 2 dot-like depressions, and on the varnished surface, one dot-like depression.

The wood is practically quite immune.<sup>4</sup> But in nature, I have seen large brown beetles attacking partially dead wood and making deep holes about  $1/3''$  in diameter. Even in living trees, marks of such damage are found on dead portions of trunks and branches. On the whole, however, the wood is very hard and good as timber.

13. *Schleichera trijuga*. Date of collection:—6-11-1894.  
Eng—The Ceylon oak.  
Tam—*Pūvan*.  
Mal—*Pūvam*.

In a partially varnished specimen of mature heartwood on the varnished surface which is away from the centre, there are about half a dozen scattered holes  $1/8''$  to  $1/4''$  deep, one of them leading to a small tunnel about  $3/4''$  long. Of the 3 unvarnished specimens kept in the verandah shelf, one is about  $2' 4''$  long and has on one side 2 small cavities  $1/4''$  wide and about  $1/4''$  deep, one of them leading to a tunnel about  $2\frac{1}{2}''$  long,  $1''$  wide and  $1/4''$  deep. Besides these, there are only about half a dozen holes less than  $1/8''$  deep and slight traces of white-ant attack without any appreciable damage. Another unvarnished specimen  $1' 7''$  long has on one side about a dozen holes mostly from  $1/8''$  to  $1/4''$  deep and one penetrating the entire thickness of the wood besides 3 short and narrow superficial tunnels; on another surface, there are over two dozen holes,  $1/8''$  to  $3/4''$  deep, a few of them leading to narrow tunnels within the

<sup>4</sup> Mr. Bourdillon in a marginal note remarks "Poles three or four inches in diameter obtained from young trees are very liable to the attacks of small beetles but as the tree grows older and the timber matures, the attacks of insects decrease."

wood; portions of the surface about 3 sq. inches in area and from  $\frac{3}{8}$ " to  $\frac{1}{2}$ " deep are eaten by white-ants. The third unvarnished specimen about 6" long has on one surface about 10 holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep besides a small superficial cavity 1" long,  $\frac{1}{8}$ " to  $\frac{1}{4}$ " broad and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep. On the whole, while heartwood away from the centre as well as sapwood have been slightly damaged by beetles and white-ants, mature central heartwood is practically quite immune. This is one of our strongest timbers, but little used probably owing to its toughness and heavy weight.

14. *Glochidion zeylanicum*. Date of collection:—28-2-1908.

Mal—*Nir vittil*.

Kan—*Vayal nannil*.

There is only a partially varnished specimen. On one of its varnished broad surfaces, there are half a dozen dot-like depressions less than  $\frac{1}{8}$ " deep. The specimen is knotty and cracked, due probably to heartshake.

15. *Cassia fistula*. Date of collection:—12-3-1895.

Eng—The Indian Laburnum.

Tam—*Konnei*.

Mal—*Konnu*.

A partially varnished specimen has its varnished surfaces which are close to the centre of heartwood perfectly immune from insect attacks; on the surface of heartwood away from its centre, there are a dozen beetle-holes most of them less than  $\frac{1}{8}$ " deep and none more than  $\frac{1}{4}$ "; the heartwood is not touched by white-ants; sapwood which forms only a very small portion of the specimen, is badly attacked by beetles. Four unvarnished specimens wholly of heartwood kept in the verandah rack, are all of them almost perfectly immune, there being not more than 3 or 4 tiny shallow holes only one of which is about  $\frac{1}{4}$ " deep while the others are hardly  $\frac{1}{8}$ ".

On the whole, the heartwood is practically quite immune from insect attacks.

16. *Mesua ferrea*. Date of collection:—28-2-1894.

Eng—The iron wood.

Tam—*Npngu*.

Mal—*Velutha pala, peri*.

Of two partially varnished specimens, the varnished surfaces of one are almost quite immune but for 2 depressions less than  $\frac{1}{8}$ " deep, while its unvarnished surfaces are completely free from attack. In the other specimen, a varnished surface has half a dozen beetle-holes from  $\frac{1}{2}$ " to 1" deep and an unvarnished surface also has the same number from  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep. Two unvarnished specimens kept in the verandah shelf have each from 2 to 6 holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep on one surface. One of the specimens has cracked.

The mature heartwood is almost perfectly immune while the sapwood and immature heartwood are liable to slight beetle attacks without the utility of the wood being seriously impaired. None of the specimens has been touched by white-ants.

Mr. Bourdillon in his book says, "Further, it is a curious fact that Nangu is very frequently riddled by some kind of borer which runs large tunnels through it big enough to admit a finger.\* This very much disfigures and weakens the timber."

17. *Bassia fulva*. Date of collection:—8-2-1896.

Mal.—Thandidian.

Two partially varnished and four unvarnished specimens are available for examination. In all these specimens, the heartwood which is brownish-red in colour is distinctly marked off from the pale-brown sapwood. The varnished and unvarnished surfaces of heartwood in both the partially varnished specimens are completely free from insect attack. In three of the unvarnished specimens also (kept in the verandah) the heartwood is practically free from attack but for the presence of 2 or 3 tiny holes less than  $\frac{1}{8}$ " deep on one of them. The sapwood in one partially varnished specimen, has on its varnished surface 3 holes  $\frac{1}{8}$ " to  $1\frac{1}{4}$ " deep; also a small patch of sapwood about half a sq: inch in area and  $\frac{1}{8}$ " to  $1\frac{1}{4}$ " deep has been removed by white-ants from one edge of the specimen. On the unvarnished surfaces, there are 5 holes, 2 of them being  $1\frac{1}{2}$ " deep and the rest  $\frac{1}{8}$ ". In another specimen, the varnished surface of sapwood is completely free from insect-attacks while an unvarnished surface has one hole  $\frac{1}{4}$ " deep. In an unvarnished specimen about  $1\frac{1}{2}$  feet long (kept in the verandah rack), the sapwood portion has a longitudinal tunnel 1' long,  $\frac{1}{4}$ " to  $\frac{3}{4}$ " deep and  $\frac{1}{2}$ " to  $1\frac{1}{2}$ " broad, besides half a dozen beetle-holes  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep. In the sapwood of another unvarnished specimen, 1 foot long, there are about half a dozen holes 2 of them being  $1\frac{1}{2}$ " to 2" deep and the rest from  $\frac{1}{8}$ " to  $\frac{1}{2}$ ". A superficial portion about 1 sq: inch in area and about  $\frac{1}{8}$ " deep is eaten away by white-ants.

In all the above specimens, the heartwood is practically quite immune but the sapwood has been attacked both by beetles and white-ants.

18. *Walsura piscidia*. Date of collection:—28-2-1894.

Mal. Per-illa-piccha.

The varnished surfaces of a partially varnished specimen, have one tiny dot-like depression and on one of the unvarnished surfaces, there is a small beetle-whole less than  $\frac{1}{10}$ " deep. Of three unvarnished specimens kept in the verandah rack, one is quite immune but for a small hole bored by beetles on a split edge of the wood and superficial traces of white-ant-attack without

\* Mr. Bourdillon adds, by a marginal remark in the Note, "Yes. In its green state, this tree often suffers from the attacks of a large borer which makes tunnels in the wood  $\frac{1}{2}$  inch in diameter."

damage. On some of the surfaces of the two remaining specimens, there are from 6 to a dozen holes riddled by borers, most of the holes being less than  $\frac{1}{4}$ " in depth and 3 or 4 about  $\frac{1}{2}$ " deep.

The specimens have been attacked by insects only to a very slight extent and the timber appears to be very good.

19. *Palaquium ellipticum*. Date of collection:—4-4-1894.

Tam—*Kättilapei*.

Mal—*Päla*; *Choppäla*; *Pächenthi*.

The varnished and unvarnished surfaces of a partially varnished specimen are absolutely free from insect attacks, while in another similar specimen, there is only one tiny dot-like depression about  $\frac{1}{40}$ " deep on an unvarnished surface. Out of 4 unvarnished specimens, two are free from attack, while the remaining two have each 3 holes varying from  $\frac{1}{8}$ " to  $\frac{1}{2}$ " in depth and about  $\frac{1}{16}$ " in diameter. Some of the specimens have slightly warped and cracked.

The wood is not touched by white-ants, and beetle attack is negligible.

20. *Nephelium Longana*. Date of collection:—18-1-1894.

Eng—The Longan or Eye-ball tree.

Tam—*Kätüpivan*, *Shempivan*.

Mal—*Shempinna*, *poripinna*, *múli*.

There are two partially varnished specimens one of which has on a varnished surface a shallow hole barely  $\frac{1}{8}$ " deep and a similar hole on an unvarnished surface. The other partially varnished specimen has one hole penetrating its entire thickness besides a dozen holes one of which is  $1\frac{1}{2}$ " deep and the rest  $\frac{1}{8}$ " to  $\frac{1}{4}$ " on an unvarnished surface. On the unvarnished surfaces of both the specimens there are a number of short, narrow, superficial grooves and dots filled with a fine powdery stuff, probably the excreta of beetles; these do not at all affect the utility of wood. An unvarnished specimen kept in the verandah rack, has only one beetle hole  $\frac{1}{4}$ " deep; the wood of the specimen has cracked owing to radial heartshakes, and along these cracks, beetles seem to have made slight attacks.

The wood is practically quite immune.

In these specimens, although annual rings are not quite conspicuous, they are distinct enough to be counted.

21. *Casuarina equisetifolia*. Date of collection:—18-6-1895.

Eng—The Casuarina or Beefwood tree.

Tam—*Chauka*.

Mal—*Sámpiráni*, *Kättámuli*

A partially varnished specimen has two shallow holes  $\frac{1}{8}$ " deep on its varnished surface : otherwise the specimen is quite free from attack. • 3 unvarnished specimens are also practically free from insect-attacks, there being on them only 1 to 3 beetle-holes  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep.

Mr. Bourdillon says in his book on Travancore trees, that the annual rings are not visible in this wood ; but prominent brown or black concentric bands are seen in all the 4 specimens available.

22. *Pterocarpus marsupium*. Tam—*Véngai*.

Mal—*Vénga*.

There are two specimens, both unvarnished, kept in the verandah rack. One specimen is perfectly immune but for a single beetle-hole  $\frac{1}{8}$ " deep. In the other specimen, there is no other trace of insect-attack than a slanting beetle-hole 1" long.

For practical purposes, the wood may be taken as perfectly immune, judging from the above two specimens. But I have known cases of *immature timber* of this species seriously damaged by white-ants at Bangalore, by being reduced to a mere shell in the course of about 10 years after use in a building.

23. *Eugenia Jambolana*. Eng—Jambu.

Tam—*Nával* : *Náva*.

Mal—*Nága*.

A partially varnished specimen has a slanting beetle-hole  $\frac{1}{4}$ " deep and 3 narrow superficial grooves 1" to 2" long filled with a powdery stuff of pale yellow color on an unvarnished surface. An unvarnished specimen, kept in the verandah rack, has on one surface about half a dozen beetle-holes from  $\frac{1}{8}$ " to  $1\frac{1}{2}$ " deep mostly, one penetrating the whole thickness of the specimen, and, on another surface, over a dozen holes  $\frac{1}{8}$ " to  $1\frac{1}{2}$ " deep. Another unvarnished specimen 6" long is completely free from attack.

On the whole, the heart-wood is almost quite free from attacks of insects while the sapwood is liable to attack by borers. There is no trace of white-ant attack on any of the specimens.

24. *Hemicyclea travancorica*. Date of collection :—18-1-1894.

Tam—*Vellei pillai*.

In the only partially varnished specimen available, there are on a varnished surface away from the centre, about 10 tiny beetle-holes, most of them from  $\frac{1}{4}$ " to  $\frac{1}{2}$ " deep and one or two about  $1\frac{1}{2}$ ". On an unvarnished side which is nearer the centre of heartwood, there is no damage whatever by insect attack ; on another unvarnished surface, there is a linear superficial groove about  $\frac{3}{4}$ " long connecting two small holes.



The wood is almost quite immune towards the centre of heartwood. It takes a high polish and looks pretty with a smooth fine grain.

25. *Gluta travancorica*. Date of collection:—17-2-1904.

Eng—The red-wood tree.

Tam—*Shenkuránthi*.

Mal—*Thodappei*.

A partially varnished specimen of mature heartwood has only one beetle-hole  $\frac{1}{2}$ " in diameter and  $\frac{1}{4}$ " deep on a varnished surface, and is therefore practically quite immune. An unvarnished heartwood specimen less mature than the above, has on one surface 2 holes one of which has penetrated the entire thickness of the wood and another  $\frac{3}{4}$ " deep and a narrow superficial groove  $\frac{1}{2}$ " long; on another surface, 3 holes  $\frac{1}{10}$ " to  $\frac{1}{4}$ " deep. Another specimen similar to the second one, but partially varnished, has only 2 holes, one  $\frac{1}{8}$ " and the other  $1\frac{1}{2}$ " deep on an unvarnished surface. None of the specimens has been touched by white-ants.

On the whole, mature heartwood is practically quite immune, while immature wood is liable to be attacked by beetles.

This wood is one of the most handsome of all Travancore timbers for cabinet work.

26. *Tetrameles nudiflora*. Date of collection:—6-11-1894.

Tam—*Chini, piyei*.

Mal—*Chini, Vella pasa*.

There is only one partially varnished specimen, and strangely enough, both the varnished and unvarnished surfaces of this very soft and light wood are quite immune but for a small hole  $\frac{1}{2}$ " in diameter and  $\frac{1}{10}$ " deep on a varnished surface. Whether this immunity of the specimen from insect attacks is due to the inherent quality of the wood or to its accidental position on the rack, is hard to say.

Mr. Bourdillon says in his book on the "Forest trees of Travancore" that the wood is eaten by white-ants. The specimen under examination, however, is quite free from white-ant attack.

27. *Anogeissus latifolia*. Date of collection:—10-1-1894; 4-1-1895.

Tam—*Vekkáli*.

Mal—*Marukanchiram*.

A partially varnished specimen has, on one of its varnished surfaces, a very tiny hole  $\frac{1}{30}$ " in diameter and  $\frac{1}{8}$ " deep and on an unvarnished surface 2 holes  $\frac{1}{16}$ " in diameter and less than  $\frac{1}{8}$ " deep. Another similar specimen has on the varnished surface about half a dozen narrow superficial grooves less than  $\frac{1}{20}$ " deep and from  $\frac{1}{2}$ " to 1" long, filled for the most part with

a powdery substance of the same color as the wood. probably the excreta of the boring insect; on an unvarnished surface of the same, there are 5 beetle-holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep and  $\frac{1}{20}$ " in diameter, and on another unvarnished surface, there are 2 holes less than  $\frac{1}{8}$ " deep and a small groove  $\frac{1}{2}$ " long,  $\frac{1}{2}$ " to  $\frac{1}{6}$ " broad and less than  $\frac{1}{8}$ " deep.

On the whole, the wood is almost quite immune.

In one of the specimens, the outline of heartwood is marked by a narrow dark band, and along this band, the wood has slightly cracked.

28. *Hopea glabra*. Date of collection:—6-11-1894.

Tam—*Kara Kōngu*.

Mal—*Illa pōngu*.

The only partially varnished specimen available has on one of its varnished surfaces towards the centre of heartwood, 1 tiny hole  $\frac{1}{4}$ " deep and on an unvarnished surface, about half a dozen scattered holes from  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep but these do not at all seem to affect the utility of the wood.

29. *Ixora Notoniana*. Tam—*Kalilambili*.

Mal—*Irumbarippi*.

In a partially varnished specimen, the heartwood which forms only a small portion of it has both the varnished and unvarnished surfaces practically free there being only 2 or 3 very tiny holes less than  $\frac{1}{4}$ " deep; a varnished surface of sapwood is also almost quite free from attack but for a similar tiny hole less than  $\frac{1}{8}$ " deep; an unvarnished surface of sapwood has about half a dozen tiny holes mostly from  $\frac{1}{2}$ " to 1" deep and only one about  $1\frac{1}{2}$ " deep. An unvarnished specimen kept in the verandah rack has about 6 tiny holes  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep in heartwood and one hole  $\frac{1}{4}$ " deep in sapwood. Out of 2 other similar specimens about 6" long, one has a tunnel  $1\frac{1}{4}$ " long on one of the transversely cut ends in the heartwood, while in the sapwood, besides a shallow beetle-hole, there is a small cavity 3" long,  $\frac{1}{4}$ " wide and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep made by white-ants along one edge of the specimen with deep slit-like cavities  $\frac{1}{4}$ " long,  $\frac{1}{8}$ " broad and  $\frac{3}{4}$ " deep. Another unvarnished specimen entirely of sapwood about 1' 3" long kept in the verandah rack, has on one side an irregular cavity about 1" deep and  $\frac{1}{2}$ " to  $\frac{3}{4}$ " wide made by white-ants with a few beetle-holes close by. White-ants have also damaged the wood along two of the edges of the specimen.

On the whole, the heartwood is practically quite free from insect-attack while the sapwood is moderately liable to attack.

30. *Artocarpus Lakoocha*. Date of collection:—1-3-1894.

Mal—*Chima*; *Thitti-pilavu*.

In a partially varnished specimen, on the varnished surfaces there are half a dozen scattered holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep more towards the sapwood

than towards the centre; an unvarnished portion of heartwood is quite immune while sapwood which forms only a small portion of the specimen is largely attacked by beetles and white-ants. There are two unvarnished specimens kept in the verandah shelf. In one of them 14" long, the heartwood surface towards the centre has half a dozen beetle-holes mostly  $\frac{1}{8}$ " deep while one has penetrated the entire thickness of the specimen; on another surface away from the centre of heartwood and nearer the sapwood, about half a dozen holes  $\frac{1}{8}$ " to 1" deep mostly and one about 2" deep, are found; the sapwood is badly attacked by beetles and white-ants. The other unvarnished specimen is also similarly attacked.

On the whole, mature heartwood appears to be almost quite immune while the sapwood is badly attacked.

Mr. Bourdillon says that the wood is not eaten by white-ants.

31. *Careya arborea*. Date of collection:—28-2-1894.

Tam—Aymà: pèrta.

Mal—Pèrsha. Pèzhu.

A partially varnished specimen consisting, for the most part, of heartwood has on a varnished surface (heartwood) about half a dozen holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep and  $\frac{1}{20}$ " in diameter besides 4 dot-like depressions; on the unvarnished surfaces, both of heartwood and sapwood of the same specimen, no traces of attack whatever are found. A specimen of sapwood alone kept in the verandah has only 2 or 3 tiny holes  $\frac{1}{8}$ " to  $\frac{3}{4}$ " deep. This specimen as well as other unvarnished ones have warped to a considerable extent both longitudinally and transversely, and the sapwood specimen has cracked badly.

Judging from the above specimens, both heartwood and sapwood are almost quite immune from insect-attack.

32. *Flacourtia cataphracta*. Date of collection:—1-3-1894.

Tam—Vayankarei, charalu.

Mal—Vayankatha, thalira, kanji.

Only one partially varnished specimen is found. On one of its varnished surfaces, there is a dot-like depression, and on an unvarnished surface, there are 3 holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep. On one of the transversely cut ends, there is a hole  $1\frac{3}{4}$ " long and  $\frac{1}{20}$ " in diameter. There is no trace of white-ant attack.

The wood has a pretty grain and may be found suitable for cabinet work.

33. *Cynometra Bourdillonii* (Gamble). Date of collection:—20-5-1908

In an unvarnished specimen kept inside the office room, 2 holes about  $\frac{1}{8}$ " deep and  $\frac{1}{16}$ " in diameter are found on one surface. One piece of wood 2 feet long kept in the verandah shelf has only 3 holes  $\frac{1}{8}$ " to  $\frac{3}{4}$ " deep\*.

The wood is hard, heavy and smooth-grained and seems to be good. This is probably a new species as remarked by Mr. Bourdillon.

34. *Eugenia corymbosa*. Date of collection:—13-3-1908.

Mal—*Nyara*.

An only unvarnished immature specimen has 4 scattered holes  $\frac{1}{4}$ " to  $\frac{3}{4}$ " deep altogether. These do not detract from the utility of the wood.

35. *Diospyros ebenum*. Eng—The Ceylon Ebony tree.

Tam—*Karunkāli*.

Mal—*Karu*:—*mushtimbi*.

There is only an unvarnished heartwood specimen kept inside the room. On one of its broader surfaces, besides half a dozen dot-like depressions  $\frac{1}{2}$ " to  $\frac{1}{12}$ " in diameter and less than  $\frac{1}{20}$ " deep, there is a slanting beetle-hole  $\frac{3}{4}$ " long; also a very small patch of the wood about  $\frac{1}{10}$  sq. inch in area and from  $\frac{1}{20}$ " to  $\frac{1}{8}$ " deep, is eaten away probably by white-ants. On the other broader surface, there are 2 dot-like depressions and a small cavity  $\frac{2}{5}$ " wide and about  $\frac{1}{2}$ " deep probably bored by a large beetle before the tree was cut down; on one of the narrower sides, there are 2 narrow slanting holes, one of them  $\frac{3}{4}$ " long and the other 1". The wood is also cracked in 3 or 4 places due to heartshakes. The specimen does not seem to be made of perfectly mature heartwood; yet the attack on it is almost negligible.

This specimen has been taken as the type of the "almost perfectly immune" class of woods for illustration. *Vide* Plate II.

36. *Artocarpus integrifolia*. Date of collection:—10-4-1895.

Eng—The jack tree.

Tam & Mal—*Pilāvu*, *Pilā*.

In a partially varnished specimen, there are half a dozen holes on one of the narrower surfaces which is the side farthest from the centre of heartwood; most of the holes are from  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep and one is 1" long slantingly. There are 3 unplanned and unvarnished specimens of somewhat less mature heartwood all containing a few scattered beetle-holes of about  $\frac{1}{8}$ " depth, but in one or two cases, the holes penetrate the entire thickness of the specimens (2"). There are no traces of white-ant attack.

\* Mr. Bourdillon explains thus:—"As you will see from my list, this is the last specimen which I secured. This being so, the insects must have been at work after I left and after I had the other specimens poisoned".

Well-matured heartwood seems to be perfectly free, while immature wood is liable to be attacked by beetles.

37. *Albizia procera*. Date of collection:—4-1-1895; 8-9-1907.

Eng.—The white siris tree.

Tam.—*Vel vâgai*.

Mal.—*Karunthagara, jala vâga*.

A partially varnished mature specimen has its varnished as well as unvarnished surfaces completely free from insect attack. Of 7 unvarnished specimens kept in the verandah, 3 specimens probably of later collection are completely free except for a single hole about  $1\frac{1}{2}$ " deep, on one of them. The remaining 4 which belong to the older collection, are also almost quite immune there being not more than 2 to 6 holes from  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep and rarely 1" on each specimen. None of the specimens are damaged by white-ants though some show traces of their attack.

On the whole, the heartwood appears to be almost quite immune.

38. *Garcinia travancorica*. Date of collection:—10-4-1895.

"Vern.—*Malampõngu (Tinnevely)*"

Gamble.

There is only one specimen, the varnished and unvarnished surfaces of the heartwood portion of which are completely free from traces of insect-attack; in the varnished portion of sapwood, there is a tiny hole barely  $\frac{1}{12}$ " deep, and a narrow superficial groove  $\frac{1}{2}$ " long at one end of which is a beetle-hole about 2" deep (slanting) and  $\frac{1}{2}$ " in diameter; on unvarnished surfaces of sapwood, there are about half a dozen holes mostly  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep. One of them, however, penetrating the entire thickness of the specimen and another slanting one  $1\frac{1}{2}$ " long is connected beneath the surface with one of the vertical holes. A crack extends through the length of the heartwood starting from the centre and is evidently due to heartshakes.

The heartwood is quite immune, while the sapwood is liable to attack by beetles. There is no trace of white-ant attack.

39. *Actinodaphne Hookeri*. Date of collection:—10-4-1895.

Mal.—*Mala virinya*.

In a partially varnished specimen, the varnished surfaces are free from insect-attack but on the broader unvarnished surface, there are 9 small holes from  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep; while on the narrower one, there are 4 holes of the same depth. An unvarnished specimen has about half a dozen dot-like depressions and from one of its edges, white-ants have removed a small portion  $4$ " long,  $\frac{1}{8}$ " to  $\frac{1}{2}$ " broad and  $\frac{1}{10}$ " deep. There are very superficial traces of white-ant attack probably along a heartshake which is clearly shown in another specimen similarly attacked; no damage, however, is thereby done to the wood.

On the whole the wood has hardly suffered any appreciable damage by insects.

40. *Grewia tiliæfolia*. Date of collection :—1-3-1894/5-3-1907.

Tam—*Unnam ; unnu*.

Mal—*Chadicha*.

A partially varnished specimen of heartwood has on a varnished surface a very tiny hole  $\frac{1}{8}$ " deep and a similar hole on an unvarnished surface also: there is no other trace of attack by beetles or white-ants on the specimen. An unvarnished specimen kept inside the room—probably of later collection—consisting mostly of heartwood is quite free from insect attacks; the wood of this has, however, slightly cracked. Another unvarnished specimen—belonging to the old collection kept in the verandah has in the heartwood portion, 4 holes  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep some leading to small tunnels below the surface; the sapwood which forms only a small portion of the specimen has been considerably tunnelled through and eaten away by white-ants, reducing the greater part of the sapwood to a shell. A third unvarnished specimen has on one side of heartwood 3 beetle-holes from  $\frac{1}{2}$ " to  $1\frac{1}{4}$ " deep and on another side about half a dozen holes, some leading to long tunnels and cavities within the sapwood, made by white-ants.

Taking all the specimens together, it may be said that mature heartwood is practically quite immune while the sapwood is liable to be bored by beetles and destroyed by whiteants.

41. *Albizia odoratissima*. Date of collection :—22-5-1894.

Tam—*Karu Vagei ; chittileivagei*.

Mal—*Pulivaga ; nellivaga*.

A partially varnished specimen almost entirely of heartwood has no traces of insect-attacks on both varnished and unvarnished surfaces. In half a dozen unvarnished specimens each 6" long kept in the verandah rack, the heartwood has from 2 to 6 holes  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep and  $\frac{1}{20}$ " to  $\frac{1}{16}$ " in diameter. In 2 of these specimens the sapwood has been eaten away along one edge to a depth of about half an inch. In another similar specimen on one surface 3 superficial tunnels, 2" to 5" long,  $\frac{1}{4}$ " deep, and  $\frac{1}{16}$ " to  $\frac{1}{10}$ " broad opening at intervals by small slits, are found; on another side of the specimen, a portion of the wood  $\frac{1}{8}$ " deep, and less than 1 sq. inch in area has been removed by white-ants. The sapwood of most of these specimens has been appreciably attacked. In the sapwood portions there are from half a dozen to 2 dozen beetle-holes  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep, many of them leading to tunnels or chambers below subsequently widened by white-ants; holes extending along the length of the specimens and varying from 3 to 12 in number,  $\frac{1}{2}$ " to 4" in length, and  $\frac{1}{8}$ " to  $\frac{1}{4}$ ", and rarely  $\frac{1}{2}$ " in width, are also found in some of the specimens.

On the whole, the heartwood is practically immune, while the sapwood is appreciably attacked.

42. *Garcinia ovalifolia*. Mal—*Manja nangu*.

In a partially varnished specimen, there are on the varnished surfaces 5 holes  $\frac{1}{8}$ " to  $\frac{3}{4}$ " deep and  $\frac{1}{16}$ " in diameter; on the unvarnished surfaces of the same specimen, only 1 hole  $\frac{1}{3}$ " deep and 2 or 3 dot-like depressions are found; the wood has slightly cracked due to heartshakes. In an unvarnished specimen kept in the verandah, on one surface there are 8 holes most of them from  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep, one being  $1\frac{1}{2}$ ", and all about  $\frac{1}{10}$ " in diameter; on other surfaces there are 2 or 3 holes  $\frac{1}{8}$ " to 1" deep; there are some traces of white-ant attack also but no damage has thereby been done.

The wood seems to be on the whole practically free from damage by insects, and deserves to be better known in the timber market on account of its fine grain, handsome yellow color and comparatively great transverse strength.

43. *Gordonia obtusa*. Date of collection:—4-4-1894.

Kânie name—*Alângi, ola*.

A partially varnished specimen has its varnished surface perfectly immune; on an unvarnished surface, there is a narrow superficial groove  $\frac{3}{4}$ " long at one end of which is a slanting hole about  $\frac{1}{2}$ " deep; on another surface is also a hole  $\frac{1}{2}$ " deep. An unvarnished specimen has on one surface 6 holes mostly from  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep, one being  $1\frac{1}{2}$ ", besides half a dozen dot-like depressions and on another surface, 4 holes from  $\frac{1}{8}$ " to  $1\frac{1}{4}$ " deep. The wood has slightly cracked.

Although the timber appears to be good on the whole and is fine-grained and smooth, it is not used much, probably because it occurs only on the hills far away from markets.

Class III. Fairly immune.

44. *Randia Gardneri*. Date of collection:—28-2-1894/8-2-1896.

Tam—*Padarappan*.

A partially varnished specimen of mature heartwood has on its varnished surface 2 dot-like depressions less than  $\frac{1}{8}$ " deep and another hole  $\frac{1}{4}$ "; on the unvarnished surface, there is only one dot-like depression less than  $\frac{1}{8}$ " deep. Another partially varnished specimen has on its varnished surface 4 holes one penetrating the entire thickness of the specimen, another about  $2\frac{1}{2}$ " slanting and the rest  $\frac{1}{8}$ " and less deep, and 2 narrow grooves 1" & 2" long leading to two of the beetle-holes; an unvarnished surface has also 2 superficial narrow grooves  $1\frac{1}{2}$ " long leading to the hole penetrating the

entire thickness of the specimen, besides 2 holes  $\frac{1}{4}$ " and  $1\frac{1}{2}$ " deep. Out of the 3 unvarnished specimens kept in the verandah rack, one has on one surface about a dozen holes  $\frac{1}{8}$ " to  $1\frac{1}{2}$ " deep; on another surface also are found holes similar in number and depth, besides about a dozen narrow grooves 3" to 6" long,  $\frac{1}{8}$ " to  $\frac{1}{4}$ " broad and  $\frac{1}{16}$ " to  $\frac{1}{4}$ " deep made by white-ants along lines of previous attack by beetles; the wood has cracked due to heartshakes. Another unvarnished specimen has on one surface about 10 holes one of which penetrates the entire thickness of the specimen while the rest are from  $\frac{1}{4}$ " to 2" deep (slantingly); the opposite surface has a small superficial cavity about  $\frac{1}{4}$ " in diameter and  $\frac{1}{2}$ " deep (in a slant) over the hole which penetrates the whole thickness of the specimen, besides about half a dozen narrow grooves. Another specimen 13" long has on one surface 18 holes  $\frac{1}{8}$ " to 2" deep, one penetrating the entire thickness of the specimen, and half a dozen being over 1" in depth; most of the holes are close together at one end over which portion white-ants have traversed and formed a broad shallow depression; on the opposite surface, there are about half a dozen holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep besides 2 narrow grooves; the wood of the specimen has cracked to an appreciable extent due to heartshake.

The wood seems to be very fairly immune and has a fine close smooth grain.

45. *Dysoxylum malabaricum*. Date of collection:—11-10-1895—  
30-5-1903.

Eng—White cedar.

Mul—*Vella agit*.

There are 2 partially varnished specimens. On a varnished surface away from the centre in one specimen, there are 3 holes 2 of which penetrate the entire thickness while the 3rd is  $\frac{3}{4}$ " deep, besides 2 dot-like depressions and a narrow superficial groove  $\frac{3}{4}$ " long; on an unvarnished surface, there are about a dozen holes, 2 of them penetrating the entire thickness of the specimen while the rest are mostly from  $\frac{1}{4}$ " to 1" deep; on a transversely cut end, there is a tunnel 1" long and  $\frac{1}{4}$ " to  $\frac{1}{8}$ " wide opening into a cavity  $\frac{1}{3}$ "  $\times$   $\frac{1}{4}$ ". Another partially varnished specimen of central heartwood is quite immune; of 2 unvarnished specimens kept in the verandah shelf, one has about a dozen scattered beetle-holes, mostly from  $\frac{1}{4}$ " to 1" deep while some are 2" to 3" slantingly; on one surface of the same, white-ants have made a tunnel  $1\frac{1}{2}$ " long,  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep, and  $\frac{1}{4}$ " to  $\frac{1}{2}$ " broad; small superficial portions less than 1 sq. inch in area have also been removed by white-ants. In another similar specimen, the heartwood portion has about a dozen scattered beetle-holes  $\frac{1}{2}$ " to 2" deep (some slanting), while the sapwood portion of the specimen is badly attacked by white-ants.

The mature heartwood seems to be very fairly immune. The lightness, smoothness and handsome appearance of the wood ought to attract cabinet-makers.



46. *Eugenia kanarensis*.

A partially varnished specimen has on its varnished sides 2 distant holes  $\frac{3}{4}$ " and 1" deep and on an unvarnished surface one hole  $1\frac{1}{2}$ " deep; short slit-like cavities  $\frac{1}{2}$ " to 1" deep have been made on either side along longitudinal bands of darker wood which have slightly cracked, there being 2 or 3 such bands, resembling longitudinal sections of concentric rings, on both the broader surfaces.

On the whole, the wood seems to be very fairly immune from insect attacks.

(N. B.—*E. kanarensis* is given in Mr. Bourdillon's 'Forest trees of Travancore' as a synonym for *E. Gardneri*. A wood specimen of the latter about 2 ft. long which seems to be quite different from the specimen of *E. kanarensis* here described has been kept in the verandah-shelf. That specimen is almost quite immune, there being only half a dozen very shallow beetle-holes on the whole specimen, all less than  $\frac{1}{8}$ " deep).

47. *Eugenia sp.*(Mal—*Shemyaral*)(Eng—*Corymbosa*)

In a partially varnished specimen, the varnished surfaces which are towards the centre of heartwood are quite immune; on an unvarnished surface there are 9 beetle-holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep with only one hole more than 2" deep. Out of 2 unvarnished specimens kept in the verandah rack, one has about a dozen holes on one side, mostly less than  $\frac{1}{8}$ ", only one of them being about 1" deep, while the other surfaces are quite sound. The other specimen about 16" long has only 4 holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep; but the wood of this specimen has warped and cracked slightly.

Taken as a whole, the wood is very fairly immune.

48. *Terminalia tomentosa*. Date of collection:—30-5-1903.Tam—*Karu maruthu*.Mal—*Thembavu; Karimaruthu*.

In a partially varnished specimen, the varnished surfaces which are towards the centre are perfectly free, but on an unvarnished surface away from the centre there are 4 holes, one of them  $1\frac{1}{2}$ " deep and the rest from  $\frac{1}{8}$ " to 1" deep. In an unvarnished specimen kept in the verandah rack, on one surface away from the centre there are about a dozen holes one being about  $\frac{1}{2}$ " deep and the rest from  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep, and on another surface near the centre there are 2 holes  $\frac{1}{8}$ " deep.

The wood seems to be very fairly immune.

49. *Garcinia echinocarpa*. Date of collection:—10-4-1895.

Tam—*Madul*.

Mal—*Pura* (by kanies).

In a partially varnished specimen, on the varnished surfaces only 2 beetle holes  $\frac{1}{2}$ " and  $1\frac{1}{2}$ " deep are found; while on an unvarnished surface there are 5 holes  $\frac{1}{3}$ " to  $1\frac{1}{4}$ " deep. An unvarnished specimen, probably of later collection, is quite immune but for two tiny dot-like depressions less than  $\frac{1}{16}$ " in depth.

The wood has not been touched by white-ants. It seems to be hard, heavy, and strong.

50. *Garcinia Imberti*. Date of collection:—10-4-1895.

Tam—*Manja kánji*.

In a partially varnished specimen on a varnished surface away from the centre, about half a dozen holes  $\frac{1}{3}$ " to  $1\frac{1}{4}$ " deep and  $\frac{1}{10}$ " in diameter are found; on an unvarnished surface there is a narrow superficial tunnel about 1" long, opening out by a number of small slits; on another unvarnished surface towards the centre of heartwood there are 2 small holes about  $\frac{1}{3}$ " deep and one about 2" deep slantingly. In an unvarnished specimen one surface has a dozen holes  $\frac{1}{3}$ " to  $\frac{1}{4}$ " deep and 4 narrow grooves  $\frac{1}{4}$ " to  $1\frac{1}{2}$ " long; other surfaces of the specimen are completely immune.

The wood is not touched by white-ants and seems to be very fairly immune.

51. *Aglaia Roxburghiana*. Date of collection:—28-8-1893.

Tam—*Chokkala*.

Mal—*Pányáva*.

Two partially varnished specimens are available. On a broader varnished surface away from the centre of one of these specimens, are found 3 dot-like depressions less than  $\frac{1}{8}$ " deep and a superficial cavity  $\frac{3}{4}$ " long and  $\frac{1}{16}$ " to  $\frac{1}{4}$ " wide at one end of which is a beetle-hole about 1" deep; on a narrower varnished surface is a hole  $1\frac{1}{2}$ " deep and  $\frac{1}{10}$ "  $\times$   $\frac{1}{16}$ " wide at the opening; on an unvarnished heart-wood surface there are 4 holes  $\frac{1}{3}$ " to 2" deep over one of which is a small cavity 1" long,  $\frac{1}{16}$ " to  $\frac{1}{3}$ " broad and  $\frac{1}{3}$ " deep. The other partially varnished specimen is quite immune except for a tiny hole less than  $\frac{1}{8}$ " in depth on an unvarnished sapwood surface. An unvarnished specimen 4" long kept in the verandah rack, has only 2 beetle-holes  $\frac{1}{3}$ " deep.

On the whole, the wood is very fairly immune.

The good color, strength and fine grain of this wood ought to attract the attention of cabinet-makers.

52. *Eugenia lota*. Date of collection:—18-1-1894.

Only a partially varnished specimen is available. On the broader varnished surface which is away from the centre, there are 5 holes  $\frac{1}{16}$ " to  $\frac{1}{12}$ " in diameter one of them being  $1\frac{1}{4}$ " deep, another  $\frac{3}{4}$ ", and 3 others less than  $\frac{1}{4}$ " besides 2 or 3 dot-like depressions; there are also 2 small irregular superficial cavities one less than  $\frac{1}{4}$  sq. inch in area and the other a little over  $\frac{1}{2}$  sq. inch and about  $\frac{1}{3}$ " deep made by white-ants; a linear groove  $1\frac{1}{4}$ " long,  $\frac{1}{12}$ " broad and  $\frac{1}{16}$ " to  $\frac{1}{12}$ " deep and 2 small slits one  $\frac{1}{6}$ " long,  $\frac{1}{12}$ " broad, and  $\frac{1}{6}$ " deep and another  $\frac{1}{3}$ " long,  $\frac{1}{10}$ " broad and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep with a hole about  $1\frac{1}{2}$ " deep at the bottom of the groove are also found on the same surface; the narrower varnished surface is quite free from attacks; on the broader unvarnished surface towards the centre, are 2 holes  $\frac{1}{8}$ " and  $\frac{1}{2}$ " deep and  $\frac{1}{16}$ " in diameter, besides 2 dot-like depressions; on the narrower unvarnished side, there are 2 holes  $\frac{1}{8}$ " and  $\frac{1}{4}$ " deep.

On the whole, the wood is fairly immune from insect attack. It has however 3 or 4 slight cracks.

This specimen has been selected for illustration as the type of the "Fairly Immune" class of woods (Vide Pl. III).

53. *Tectonia grandis*.

Eng—The Teak tree.

Tam & Mal—*Tèkkku*.

There is only a partially varnished specimen. On the varnished surface there are 2 holes one  $1\frac{1}{4}$ " long and the other penetrating the entire thickness of the specimen besides a dot-like depression and a narrow superficial tunnel  $\frac{1}{4}$ " long and  $\frac{1}{8}$ " deep; on an unvarnished surface along a soft portion of the wood, is a narrow tunnel about 6" long into which opens the hole penetrating the wood from the opposite side. The specimen is not touched by white-ants.

It would be misleading to judge of the insect-resistant power of this admittedly excellent timber by means of this single specimen which is evidently a poor immature sample of teakwood.

54. *Bauhinia racemosa*. Date of collection:—8-10-1895.

Tam—*Vattáthi*; *maleiatthi*.

The only specimen available is a partially varnished one. A varnished surface of it away from the centre, has 4 holes one of which is  $1\frac{1}{2}$ " deep and the rest  $\frac{1}{2}$ " and less; an unvarnished surface has 2 holes, one about 2" deep slantingly and the other  $\frac{1}{2}$ "; there are 4 or 5 knots also, on some of which there are superficial cavities with a maximum depth of  $\frac{1}{2}$ ".

On the whole, the wood is very fairly immune.

55. *Stereospermum Xylocarpum*. Date of collection:—6-11-1894.

Tam—Páthiri.

Mal—Vedangkonnar; edangkorna.

There are 2 partially varnished specimens. On a varnished surface of one of them there is a hole penetrating the whole thickness of the specimen and a small superficial cavity less than 1 sq. inch in area and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep; on another varnished surface are 2 holes  $\frac{1}{8}$ " and  $1\frac{1}{2}$ " deep; the unvarnished surface has only the hole penetrating the entire thickness of the specimen from the varnished side. The other specimen has on its varnished surface 2 holes one  $1\frac{1}{2}$ " deep and another about  $2\frac{1}{2}$ " (slanting); on an unvarnished surface is a hole  $\frac{1}{2}$ " deep. Out of the 3 unvarnished specimens, one— $3\frac{1}{4}$  ft. long—has on a broader surface about a dozen holes, 4 of which penetrate the whole thickness of the specimen while the rest are from  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep, while on the other broader surface also there are a dozen similar holes; on one side there is a longitudinal groove 1' 7" long,  $\frac{1}{4}$ " to  $\frac{1}{2}$ " deep and about  $\frac{1}{2}$ " wide, probably bored in the timber by beetles before felling. Of the remaining 2 specimens one 10" and the other 8" long, the former has half a dozen holes one of which is  $1\frac{3}{4}$ " deep, another  $\frac{1}{4}$ ", and the rest less than  $\frac{1}{8}$ ", and the latter has 4 holes one of which is 2" deep slantingly, another about  $\frac{3}{4}$ " and the rest  $\frac{1}{8}$ ".

On the whole, the wood is fairly immune and seems to be good.

56. *Litsaea Zeylanica*. Date of collection:—8-10-1895.

Tam—Molaga shēmbaga palei.

Mal—Vayana.

A partially varnished specimen has on a varnished surface 3 holes one of which is  $\frac{1}{8}$ " deep, another  $\frac{1}{2}$ " and the third penetrates the entire thickness of the specimen, besides half a dozen dot-like depressions; on another varnished surface near the centre of heartwood there is only one beetle hole less than  $\frac{1}{2}$ " slantingly; on the unvarnished surface there is only the hole penetrating the whole thickness.

The specimen is of heartwood which seems to be fairly immune.

57. *Terminalia paniculata*. Date of collection:—6-11-1894.

Tam—Vem-maruthu; velleimaruthu.

Mal—Maruthu; peimaruthu; pillei maruthu.

A partially varnished specimen wholly of heartwood has one tiny beetle hole penetrating the entire thickness of the specimen; on a varnished surface there are 2 holes  $\frac{1}{2}$ " deep; on an unvarnished surface also there is similar hole  $\frac{1}{2}$ " deep while on another unvarnished surface, is a narrow superficial groove

1" long. Of three unvarnished specimens kept in the verandah rack, 2 are of the standard length while the third is  $14\frac{3}{4}$ " long. The latter has about half a dozen beetle-holes one of which is  $1\frac{1}{4}$ " deep, another 1", and the rest between  $\frac{1}{8}$ " to  $\frac{1}{2}$ "; white-ants have scraped off a small portion of the surface less than 1 sq. inch in area. The other 2 specimens are almost quite immune, on one of them there being only 3 holes  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep and on the other 2 holes less than  $\frac{1}{8}$ " deep besides slight white-ant attack extending over 2 sq. inches in area and  $\frac{1}{16}$ " to  $\frac{1}{4}$ " in depth.

On the whole, the timber is very fairly immune from beetle and white-ant attacks.

58. *Semecarpus Anacardiùm*. Date of collection:—6-11-1894.

Eng—The Marking nut tree.

Tam—*Shénkottei*; *Sheranikottei*; *thembari*.

Mal—*Thénkotta*; *Sámbiri*.

In the only partially varnished specimen available, there are on a varnished surface which is towards the centre, 2 beetle-holes  $\frac{1}{8}$ " and  $1\frac{1}{4}$ " deep and on an unvarnished surface one  $\frac{1}{2}$ " deep over which white-ants have eaten away a portion of the surface 1 sq. inch in area and  $\frac{1}{8}$ " deep.

Judging from this single specimen, the wood which is a light and soft one is very fairly immune from insect attacks.

59. *Vitex altissima*. Date of collection:—6-11-1894.

Tam—*Magilei*.

Mal—*Magila*; *Magilelu*.

There are 9 partially varnished specimens. On each of the varnished surfaces of these specimens there are only one or two holes from  $\frac{1}{2}$ " to 2" deep, and on some of them there are long, narrow, and deep tunnels in the interior of the sapwood as well as immature heartwood. In many of the unvarnished surfaces, there are about half a dozen holes  $\frac{1}{8}$ " to  $1\frac{1}{4}$ " deep; on an unvarnished sapwood surface of one of the specimens, white-ants have made a fairly long and deep cavity 7" long,  $\frac{1}{8}$ " to 1" wide and  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep. Two of the above specimens are not touched by white-ants. 8 unvarnished specimens of different lengths varying from  $2\frac{1}{2}$ ' to 10" are kept in the verandah rack. All of them except one are almost quite free from insect attacks, there being only a few stray beetle-holes on some of them and no white-ant attack. In the longest specimen ( $2\frac{1}{2}$ ' long), however, 3 wide tunnels 4" to 7" long,  $\frac{1}{4}$ " to  $\frac{3}{4}$ " deep and  $\frac{1}{2}$ " in diameter have been bored by large beetles.

On the whole, mature heartwood seems to be very fairly immune while immature heartwood and sapwood are somewhat damaged by insects.

60. *Lagerstrœmia Flos Regina*. Date of collection :—6-11-1894.

Tam—*Pumaruthu*.

Mal—*Mari maruthu ; nir maruthu*.

A partially varnished specimen is free from insect-attacks but for a small shallow tunnel  $1\frac{1}{4}$ " long and  $\frac{1}{16}$ " in diameter and one or two dot-like depressions on one of the varnished surfaces, and a tiny hole  $\frac{1}{4}$ " deep on an unvarnished surface. In an unvarnished specimen kept in the verandah rack, one beetle-hole penetrates the entire thickness of the wood, while on one surface there are about 2 dozen beetle-holes most of them  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep while a few lead to tunnels 1" to 3" long and somewhat deep in the wood, and on another surface white-ants have burrowed a cavity about 5" long,  $\frac{1}{8}$ " to  $\frac{1}{2}$ " broad and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep, besides half a dozen small cavities some shallow and some leading to chambers below.

Mature heartwood seems to be very fairly immune while immature heartwood is attacked moderately and sapwood is appreciably attacked.

61. *Dillenia pentagyna*. Date of collection :—6-11-1894.

Tam—*Naiihékku*.

Mal—*Punna, Kodapunna, Pattipunna, Vâlapunna*.

A partially varnished specimen has on a varnished side away from the centre of heartwood 3 holes  $\frac{1}{4}$ " to  $\frac{3}{4}$ " deep, besides a few other marks of beetle-attack without any damage ; the unvarnished surface towards the centre of heartwood is practically free, there being only two dot-like shallow depressions. An unvarnished specimen kept in the verandah has on one side 3 holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep and on another, 3 dot-like depressions less than  $\frac{1}{8}$ " deep ; very superficial traces of white-ant attack are found but without any damage to the wood. Another similar specimen has hollow cavities and chambers made by white-ants in the interior of the wood communicating with the outside by means of a few tiny holes and slits, no damage by white-ants being manifested externally. Another unvarnished specimen 6" long has been similarly attacked and converted into a shell.

Judging from two of the most mature of the specimens, the mature heartwood is very fairly resistant of insect-attack, but immature heartwood and sapwood are liable to damage by insects.

62. *Lagerstrœmia lanceolata*. Date of collection :—18-1-1894.

Eng—*Venteak*.

Tam—*Verala*.

Mal—*Venthékku*.

A partially varnished specimen is completely immune. In another partially varnished specimen on the varnished side along an edge which is away from the centre of heartwood, there is a white-ant cavity  $3\frac{1}{2}$ " long, 2"

wide, and  $\frac{1}{2}$ " to 1" deep, besides about half a dozen linear grooves and tunnels communicating with the outside by tiny holes and slits on the same surface; on an unvarnished surface especially towards the sapwood there are about a dozen small holes  $\frac{1}{8}$ " to  $1\frac{1}{2}$ " deep besides 2 or 3 small narrow shallow grooves  $\frac{1}{8}$ " to  $\frac{1}{2}$ " long and on another unvarnished surface 4 or 5 shallow white-ant grooves  $\frac{1}{2}$ " to 3" long,  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep and  $\frac{1}{16}$ " to  $\frac{1}{4}$ " broad. Of two unvarnished specimens kept in the verandah, one has only 3 beetle-holes  $\frac{1}{4}$ " to  $\frac{3}{4}$ " deep and a tiny superficial cavity  $\frac{1}{4}$ " deep and about  $\frac{1}{8}$ " wide. In the other specimen on the side nearer the centre of heartwood, there are about a dozen tiny holes less than  $\frac{1}{8}$ " deep while the sapwood portion has been reduced to a mere shell by white-ants.

Mature heartwood appears to be almost free from insect-attacks while the sapwood is badly riddled by beetles and devoured by white-ants.

63. *Litsaea glabrata*. Date of collection:—10-4-1895.

Mal—*Ongakanni*.

An unvarnished specimen kept on the rack inside the room, has 2 beetle-holes both of which are about 2" deep, one penetrating the entire thickness of the wood. In another similar specimen kept in the verandah, on a surface away from the centre are found about half a dozen holes  $\frac{1}{2}$ " to 1" deep and on another surface nearer the centre, 3 or 4 superficial grooves and tunnels—there are 2 tunnels one  $3\frac{1}{2}$ " long and another 1" and 2 grooves 1" &  $\frac{1}{2}$ " long and about  $\frac{1}{8}$ " deep. There are no traces of white-ant attack.

There is no heartwood. For a soft wood, it is very fairly immune.

64. *Amoora Rohituka*. Date of collection:—5-3-1907.

Mal—*Chem-maram*.

Sans—*Rohituka*.

3 unvarnished specimens are kept in the rack inside the room. The mature heartwood portions of two specimens are quite sound and free from insect-attack while the heartwood of the 3rd is cracked. The sapwood portions have on each surface about one to two dozen beetle-holes varying from  $\frac{1}{8}$ " to  $1\frac{1}{2}$ " in depth and  $\frac{1}{10}$ " in diameter. None of the specimens have been touched by white-ants.

The mature heartwood is almost quite immune while the sapwood is largely liable to attack by beetles.

65. *Strychnos Nux-vomica*. Date of collection:—12-3-1895.

Eng—The Nux-vomica or Strychnine tree.

Mal—*Kanjiram*.

Tam—*Yetti*.

A partially varnished specimen is completely immune but for 2 shallow holes less than  $\frac{1}{8}$ " deep and a small superficial cavity  $\frac{1}{4}$ " by  $\frac{1}{8}$ " wide and  $\frac{1}{4}$ " deep. Another partially varnished specimen has on its varnished surface about half a dozen holes  $\frac{1}{2}$ " to  $1\frac{1}{2}$ " deep and also 2 or 3 tunnels  $\frac{1}{2}$ " to 2" long and  $\frac{1}{2}$ " to  $\frac{1}{8}$ " in diameter. On the unvarnished surfaces there are over a dozen holes mostly  $\frac{1}{4}$ " to  $\frac{1}{2}$ " and one leading to a long tunnel in the interior over 6" long, and also about half a dozen superficial tunnels and grooves  $\frac{1}{2}$ " to  $1\frac{1}{2}$ " long, one of them being a slit 1" deep and the others  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep; in a cut end of the specimen there are 5 holes one of which is a tunnel  $\frac{1}{4}$ " by  $\frac{1}{16}$ " wide and over 6" long, the others being  $\frac{1}{16}$ " to  $\frac{1}{12}$ " in diameter and  $\frac{1}{2}$ " to  $3\frac{1}{2}$ " in length. Three unvarnished specimens are kept in the verandah rack, one 1'-10" long, another of standard length and the third 6". In the first specimen there are about half a dozen beetle-holes  $\frac{1}{4}$ " to  $\frac{3}{4}$ " deep; on one of the surfaces near a cut end of the specimen there are 3 tunnels 1" to 2" long,  $\frac{1}{4}$ " to  $\frac{1}{2}$ " deep and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " wide, around which 2 sq. in. of the surface have been scraped away by white-ants, and at the opposite end of the same surface, there are 2 slit-like cavities  $\frac{1}{8}$ " wide,  $\frac{1}{2}$ " and 1" deep (slantingly) and 2" and  $2\frac{1}{2}$ " long; the greater part of the specimen is almost quite immune. The 2nd specimen which is of standard length is also almost free from insect-attack, there being on one of its surfaces only half a dozen dot-like depressions, less than  $\frac{1}{8}$ " deep. The 3rd specimen 6" long has besides  $\frac{1}{2}$  a doz. dot-like depressions 4 beetle holes  $\frac{1}{20}$ " to  $\frac{1}{6}$ " in diameter and mostly  $\frac{1}{2}$ " deep, one of them leading to a tunnel 4" long and  $\frac{1}{2}$ " deep; on one of the cut ends there are 5 holes from  $\frac{1}{8}$ " in diameter to  $\frac{1}{3}$ "  $\times$   $\frac{3}{4}$ " in width, one of which extends through the whole length of the specimen while the others are  $\frac{1}{2}$ " to 1" long. The tunnels appear to have been riddled along portions damaged while cutting.

On the whole, the wood seems to be very fairly immune.

(Mr. Bourdillon says in his book that this wood is not eaten by white-ants as it is bitter, but in one specimen slight traces of white-ant attack are seen.)

66. *Strychnos potatorum*. Date of collection:—21-9-1895.

Eng—The clearing nut tree.

Tam—Thettan Kottei.

Mal—Thettanparel Kanjiram.

In the only partially varnished specimen available the varnished surface away from the centre has 2 beetle-holes less than  $\frac{1}{8}$ " deep and a dot-like depression while an unvarnished surface towards the centre, has 4 holes one of them  $1\frac{1}{2}$ " deep and the rest from  $\frac{1}{8}$ " to  $\frac{1}{2}$ "; and on another unvarnished surface there is a narrow tunnel 1" long; white-ants have scraped off a superficial portion of the wood 1 sq. in. in area and about  $\frac{1}{20}$ " deep.

The wood is very fairly immune from insect attacks. Small patches



and streaks of jet black hard wood varying in depth up to  $\frac{1}{2}$ " are found scattered on the specimen.

(N. B. Mr. Bourdillon says that there are no annual rings, but in the specimen concentric rings are fairly distinct.)

67. *Memeylon edule*. Date of collection:—28-2-1894.

Tam—*Kanyaru*.

Mal—*Kashava*; *Kanalei*; *anei kombi*.

One partially varnished specimen has on a varnished surface which contains only a small portion of sapwood about half a dozen holes  $\frac{1}{8}$ " to  $\frac{3}{4}$ " deep besides 3 or 4 dot-like depressions; on an unvarnished surface of sapwood, there are about half a dozen holes, 3 of which are about  $1\frac{1}{2}$ " deep and the rest from  $\frac{1}{8}$ " to  $\frac{1}{4}$ ", besides 3 or 4 small grooves; on a transversely cut end in sapwood, there is a short tunnel  $\frac{1}{4}$ " long and  $\frac{1}{8}$ " wide. In another partially varnished specimen, the varnished surface, consisting mostly of heartwood, has 3 holes  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep (slantingly) besides 4 tiny superficial grooves; the sapwood surface has 9 holes one of which is about 2" deep and the rest from  $\frac{1}{8}$ " to  $\frac{1}{2}$ "; a superficial portion 3" long, 2" broad and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep is reduced to a cavity by white-ants. In the third specimen, the heartwood portion which is varnished is almost quite immune there being only 2 or 3 dot-like depressions, while the unvarnished sapwood has half a dozen holes  $\frac{1}{8}$ " to 1" deep and also a small superficial cavity  $\frac{1}{2}$ "  $\times$   $\frac{1}{4}$ "  $\times$   $\frac{1}{4}$ " made by white-ants.

On the whole, the heartwood is very fairly immune while sapwood is more liable to insect-attacks.

The wood is smooth, even and close-grained and presents a handsome appearance.

68. *Carallia Lucida*.

Mal—*Varanga*; *Vallavom*; *Vallabham*.

A partially varnished specimen has on its varnished sides which are almost wholly of heartwood about half a dozen holes one of which is 2" deep slantingly while the others are about 1" deep; the unvarnished sapwood portion is appreciably tunnelled through by beetles and white-ants. There are 8 unvarnished specimens kept in the verandah shelf. Two of them consisting wholly of heartwood are almost quite immune there being only 3 holes  $\frac{1}{4}$ " to  $\frac{1}{2}$ " deep and a small superficial cavity  $\frac{1}{8}$ " to  $\frac{1}{4}$ " wide and  $\frac{1}{4}$ " deep in one specimen. The third specimen has its sapwood portion appreciably attacked and reduced to a shell by white-ants; on the heartwood surfaces there are numerous beetle-holes many of which are less than  $\frac{1}{4}$ " deep while others lead to cavities within the wood, and white-ants have devoured superficial

portions about 2 sq. in. in area and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep. Another specimen about 15" long has on its heartwood portion about a dozen holes, one  $1\frac{1}{2}$ " deep and the others mostly from  $\frac{1}{8}$ " to  $\frac{1}{4}$ ", while the sapwood portion has been reduced to a mere shell by white-ants. Another specimen 8" long has 6 holes  $\frac{1}{8}$ " to  $1\frac{3}{4}$ " deep and at one edge away from the centre, there is a tunnel 1" long and  $\frac{1}{4}$ " to  $\frac{1}{2}$ " in diameter; the wood has very badly cracked. Of 3 other specimens 6" long, 2 are almost free from attack, there being only 2 or 3 tiny holes less than  $\frac{1}{8}$ " deep in each and a short tunnel about  $1\frac{1}{2}$ " long and  $\frac{1}{4}$ " wide by the side of a crack in one of them. The remaining one, which has a small portion of sapwood, has over a dozen holes but most of them are tiny dot-like depressions only 3 or 4 reaching  $\frac{1}{4}$ " in depth; the sapwood portion has been tunnelled through to an appreciable extent by beetles.

On the whole, the heartwood is very fairly immune though liable to cracks; while sapwood is badly affected by beetles and white-ants.

69. *Symplocos macrocarpa*. Date of collection:—18-1-1894.

Tam—*Paralei*.

Mal—*Malamparala*.

A partially varnished specimen has on its varnished surfaces about a dozen holes 2 of them 1" and  $\frac{3}{4}$ " deep and the rest  $\frac{1}{8}$ " to  $\frac{1}{4}$ " besides 2 or 3 small superficial tunnels about 1" long and  $\frac{1}{16}$ " to  $\frac{1}{10}$ " wide; on the unvarnished surfaces there are 3 holes less than  $\frac{1}{8}$ " deep and 6 superficial tunnels 1" to 2" long and  $\frac{1}{16}$ " to  $\frac{1}{4}$ " in diameter made by beetles and some widened by white-ants. An unvarnished specimen 6" long, a portion of which (about  $\frac{1}{6}$ ) has been broken off, has only 6 beetle-holes  $\frac{1}{8}$ " to  $\frac{3}{4}$ " deep.

The wood is very fairly free from damage by insects, smooth, light, and fine-grained.

70. *Cinnamomum Zeylanicum*. Date of collection:—18-1-1894,

5-3-1907.

Eng—*The Cinnamon tree*.

Tam—*Karura; lavanga*.

Mal—*Karura; varana; edana; eringolam*.

There are 3 unvarnished specimens kept inside the room. One of them is perfectly free from traces of insect attack but has slightly cracked. Another has 3 holes  $\frac{1}{16}$ " in diameter and  $\frac{1}{4}$ " deep and a fourth, slanting one,  $\frac{3}{4}$ " deep. The third specimen has about 6 holes, 2 of which are about  $1\frac{3}{4}$ " deep, another  $1\frac{1}{4}$ " and the rest  $\frac{1}{8}$ " to  $\frac{1}{4}$ " besides a few dot-like depressions; at one of the transversely cut ends, there opens a tunnel-like hole 4" long, and  $\frac{1}{2}$ "  $\times$   $\frac{1}{4}$ " wide at its mouth. This hole might have originated in a heartshake, as the wood has slightly cracked above it, and subsequently widened by some insect.

This is a soft wood without heart and is, on the whole, very fairly immune from damage by insects.

71. *Ficus Talboti*. Date of collection:—8-9-1907.

Tam—*Itthi; kalitthi*.

Only one unvarnished specimen kept in the shelf inside the room is available. It has about 10 beetle-holes one of which is  $1\frac{1}{2}$ " deep, another  $1$ " and the rest from  $\frac{1}{8}$ " to  $\frac{1}{2}$ ", some being slanting. It is not touched by white-ants.

Soft as this wood is, it is very fairly immune.

72. *Bridelia retusa*. Date of collection:—6-11-1894.

Tam—*Mullu vengei; mullu maruthu*.

Mal—*Mukkayini; mullangayam*.

Kanic—*Olam; kalaru; asivei*

There is only a partially varnished specimen. On the varnished surfaces away from the centre, are found 4 holes  $\frac{1}{8}$ " to  $1\frac{1}{2}$ " deep and on an unvarnished surface near the centre one hole about  $2$ " deep besides a dot-like depression. The wood is flawed by numerous knots and at one knot on a varnished surface and at 2 knots on an unvarnished surface, beetles have riddled cavities  $\frac{1}{4}$ " to  $\frac{1}{2}$ " wide and  $\frac{1}{4}$ " to  $1$ " deep (some slantingly).

Judging from this single specimen, the wood seems to be very fairly immune, smooth and strong.

73. *Gmelina arborea*. Date of collection:—4-1-1895; 8-10-1895.

Tam—*Umi-thekku*.

Mal—*Kumbil*.

There are 4 partially varnished specimens. One of them is quite immune but for a single beetle-hole which penetrates the entire thickness of the specimen. Another specimen has its varnished surfaces quite free from attack while on an unvarnished surface towards the centre there are 5 holes, one of which is about  $2$ " deep slantingly, another  $\frac{1}{2}$ " and the rest  $\frac{1}{8}$ ". A third specimen has one hole penetrating the entire thickness of the wood while on its varnished surface towards the centre there is a hole about  $2\frac{1}{2}$ " deep in a slant besides 2 small cavities less than  $\frac{1}{4}$ " deep and  $\frac{1}{2}$  sq. in. in area; and on an unvarnished surface away from the centre there are 4 holes  $\frac{1}{4}$ " to  $\frac{3}{4}$ " deep and also white-ant attack extending over 3 sq. in. in area and  $\frac{1}{2}$ " to  $\frac{1}{4}$ " in depth forming pit-like depressions. The fourth specimen

has 2 beetle-holes penetrating its whole thickness; on a varnished surface there are 4 holes  $\frac{1}{8}$ " to  $1\frac{1}{4}$ " deep and on unvarnished surfaces about a dozen holes mostly from 1" to 2" deep; there are also 3 narrow superficial tunnels 1" to 3" long. 3 unvarnished specimens are kept in the verandah rack. One of standard size has about half a dozen holes one of which penetrates the whole thickness of the specimen, another 2" deep slantingly, another about 1" and the rest from  $\frac{1}{8}$ " to  $\frac{1}{2}$ ". Another specimen about  $1\frac{1}{2}$ " long has 6 beetle-holes 2 of which are about  $1\frac{1}{2}$ " deep and the rest from  $\frac{1}{8}$ " to  $\frac{1}{4}$ "; a tunnel-like hole runs through the whole length of the specimen originating from the centre, obviously due to a heartshake and perhaps slightly widened by white-ants and beetles; there is also a pretty wide superficial tunnel 3" long,  $\frac{1}{8}$ " to  $\frac{1}{4}$ " broad and  $\frac{1}{2}$ " deep besides 3 or 4 small cavities one of which leads to a tunnel 2" long and  $\frac{1}{4}$ " wide opening into the longitudinal tunnel. In another specimen about 9" long there are on each of the broader sides over 2 dozen holes  $\frac{1}{8}$ " to 2" deep, the majority however being less than 1" deep.

On the whole, the wood which has no heart, seems to be fairly immune and strong, despite the beetle-holes.

74. *Dysoxylum purpureum*. Date of collection:—2-2-1894.

Mal—*Kār āgil*; *povil-āgil*.

A partially varnished specimen has one hole penetrating its entire thickness; on a varnished heartwood surface there is a hole  $\frac{1}{8}$ " deep and on an unvarnished sapwood surface 2 holes  $1\frac{1}{4}$ " and  $\frac{1}{4}$ " deep, besides 2 dot-like depressions; the sapwood has also slightly cracked. An unvarnished specimen wholly of heartwood, kept in the verandah has a beetle-hole penetrating its entire thickness while on one surface there is a hole a little over  $\frac{1}{4}$ " deep and on another surface about half a dozen holes 2 of them about  $1\frac{1}{2}$ " and the rest from  $\frac{1}{4}$ " to 1" deep besides superficial traces of white-ant attack over 2 sq. in.

The wood has slightly cracked owing to heartshake.

The wood, especially the heart, seems to be good and fairly immune.

75. *Vatica chinensis*.

Mal—*Adakka payin*.

In a partially varnished specimen one beetle-hole penetrates the entire thickness of the wood; on an unvarnished surface away from the centre there are 9 holes mostly  $\frac{1}{4}$ " to  $\frac{1}{3}$ ", one being 1", and 3 narrow grooves  $\frac{1}{2}$ " to 1" long leading to the hole which penetrates the whole thickness of the specimen; on an unvarnished specimen there are about half a dozen holes  $\frac{1}{2}$ " to  $\frac{1}{4}$ " deep. An unvarnished specimen kept in the verandah shelf has on one

surface about a dozen holes  $\frac{1}{8}$ " to  $1\frac{3}{4}$ " deep and  $\frac{1}{20}$ " to  $\frac{1}{10}$ " in diameter, and on another surface there are 3 holes  $\frac{1}{8}$ " to  $\frac{3}{4}$ " deep.

The wood is even and close grained, smooth and hard, and fairly free from damage by insect-attack.

76. *Diospyros Candolleana*. Date of collection:—12-3-1895.

Mal—Kari.

A partially varnished specimen has on a varnished surface towards the centre only one slanting hole  $1\frac{1}{4}$ " deep and  $\frac{1}{2}$ " in diameter and on another varnished surface a hole  $\frac{1}{4}$ " deep (slightly slanting); on an unvarnished surface there are 6 holes  $\frac{1}{8}$ " to  $\frac{1}{3}$ " deep and one  $1\frac{1}{4}$ " (slanting); on an unvarnished surface of sapwood white-ants have made a superficial tunnel  $\frac{1}{2}$ " long,  $\frac{1}{8}$ " to  $\frac{1}{2}$ " broad, and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep; other portions attacked by white-ants are altogether about 2 sq. in. in area and less than  $\frac{1}{8}$ " deep; 3 beetle-holes  $\frac{1}{8}$ " to 1" deep are also found on the unvarnished sapwood surface. Two unvarnished specimens one of standard size and another 8" long are kept in the verandah rack.

On the former specimen, beetles have bored about a dozen holes  $\frac{1}{8}$ " to  $\frac{3}{4}$ " deep, mostly less than  $\frac{1}{4}$ ", and white-ants have made 3 or 4 superficial tunnels 1" to 2" long,  $\frac{1}{6}$ " to  $\frac{1}{6}$ " broad and  $\frac{1}{8}$ " to  $\frac{1}{3}$ " deep and also a superficial chamber about  $1\frac{1}{2}$  sq. in. in area and  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep. In the shorter specimen there are about 6 holes one of which penetrates the entire thickness of the specimen and the rest are  $\frac{1}{4}$ " to 1" deep; portions of the wood about  $1\frac{1}{2}$  sq. in. in area and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " in depth are removed from the surface by white-ants; the wood of the specimen has badly cracked by radial heartshakes and there are slight traces of white-ant attack along one of the cracks.

On the whole, the wood is fairly immune.

77. *Odina Wodier*. Date of collection:—5-11-1894; 8-9-1907.

Tam—Uthi; Urisa.

Mal—Kalasan.

Of 2 partially varnished specimens, one has 2 beetle-holes penetrating its entire thickness while on its varnished heartwood surface there are besides the 2 mentioned above 4 distant holes, one of which is 3" deep in a slant and the rest from  $\frac{1}{8}$ " to 1" (some slanting) and its unvarnished heartwood surface has also 4 holes less than  $\frac{1}{4}$ " deep besides a narrow tunnel about 3" long opening out by 2 small slits  $\frac{1}{4}$ " long; sapwood which forms only a small portion of an unvarnished surface is mostly eaten away by white-ants. Another similar specimen almost wholly of heartwood has only 2 holes penetrating its whole thickness besides a small hole about  $\frac{1}{2}$ " deep on an unvarnished surface; sapwood which forms only a small part of this specimen is also badly attacked by white-ants. Of two unvarnished specimens kept in the verandah shelf, one 6" long has 3 tiny holes less than  $\frac{1}{8}$ " deep and the wood has slightly cracked.

The other specimen of standard size has one hole penetrating its entire thickness besides 2 small holes less than  $\frac{1}{4}$ " deep.

On the whole, the wood seems to be very fairly immune considering its lightness and comparative softness.

78. *Dipterocarpus Boissillonii*. Date of collection:—10-3-1896.

Tam—*Káránjili*.

Mal—*Chárattá ānjili*.

Only an unvarnished specimen 6" long kept in the verandah rack is available. On one surface there are a dozen beetle-holes  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep and  $\frac{1}{16}$ " in diameter. It is not touched by white-ants.

Judged by this single specimen, the wood appears to be fairly immune from damage by insects.

79. *Dipterocarpus indicus*. Date of collection:—27-2-1894.

Tam—*Ennei*.

Mal—*Kalpayin ; vellaini*.

In a partially varnished specimen the varnished portion of heartwood has half a dozen holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep (slanting) and 2 narrow superficial grooves 1" to 2" long and about  $\frac{1}{16}$ " deep partly covered with a powdery substance, probably the excreta of beetles; on an unvarnished surface of heartwood there are a dozen holes  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep and 2 small cavities  $\frac{1}{16}$ " to  $\frac{1}{8}$ " broad and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep; there is also a longitudinal superficial fissure extending through the whole length of the specimen due to heartshake; sapwood which forms only a small part of the specimen has on its varnished surface about a dozen very irregular superficial grooves filled with the powdery stuff mentioned above, besides numerous tiny holes on the transversely cut end similarly filled up. In another partially varnished specimen consisting wholly of heartwood, on the broader varnished surface there are about half a dozen holes  $\frac{1}{4}$ " to  $\frac{1}{2}$ " deep besides 2 or 3 dot-like depressions; on an unvarnished surface there are 2 dozen holes  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep and 2 or 3 small superficial cavities. In an unvarnished specimen about 1'-4" long kept in the verandah, the heartwood portion has about half a dozen scattered holes one of which is  $1\frac{1}{4}$ " deep and the others  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep, while the sapwood is appreciably attacked by beetles and white-ants as in the other specimens.

On the whole, the heartwood is but slightly attacked on the surface and is therefore fairly immune, whereas the sapwood is appreciably attacked.

80. *Homalium travancoricum*. Date of collection:—5-3-1907.

• Only an unvarnished specimen 9" long kept inside the room is available. On the whole specimen, there are about 15 beetle-holes, one  $1\frac{3}{4}$ " deep, another leads to a hole slanting 9" deep while the rest are from  $\frac{1}{8}$ " to  $1\frac{1}{2}$ " deep and most of them are  $\frac{1}{16}$ " to  $\frac{1}{12}$ " in diameter. The wood is not touched by white-ants. It has badly cracked.

The timber seems to be fairly immune from serious damage by insects.

81. *Diospyros Bourdillonii*. Date of collection :—10-4-1895—2-10-1895  
—8-10-1895 & 24-1-1895

Tam—*Karum chatthi*; *karum thurara*.

Mal—*Kari*; *kodal*; *therikka*.

A partially varnished specimen, probably of latter collection, is practically quite immune but for a hole  $\frac{1}{2}$ " long pierced through one of the edges of the specimen. Another partially varnished specimen has on its varnished sapwood surface about half a dozen beetle-holes from  $\frac{1}{4}$ " to  $\frac{3}{4}$ " deep and from  $\frac{1}{16}$ " to  $\frac{1}{12}$ " in diameter; on the unvarnished surface the black heartwood has only one hole  $\frac{3}{4}$ " deep besides a dot-like depression while the unvarnished sapwood has about a dozen holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep mostly and one about 1" deep; white-ants have removed small portions of the sapwood about 1 sq. in. in area and  $\frac{1}{8}$ " to  $\frac{1}{5}$ " deep and at the bottom of one of the white-ant cavities is the beetle hole  $\frac{1}{2}$ " deep. 2 unvarnished specimens one 1'-7" long and the other 8 $\frac{1}{2}$ " long, are kept in the verandah rack. The shorter one is almost immune from insect-attack there being only 2 beetle-holes  $\frac{1}{8}$ " and  $\frac{1}{5}$ " deep; the wood has slightly warped and cracked. The longer specimen has its sapwood largely attacked by white-ants, there being superficial as well as internal tunnels about 1' long,  $\frac{1}{2}$ " to  $1\frac{1}{2}$ " broad, and  $\frac{1}{2}$ " to  $\frac{3}{4}$ " deep; there are a few tiny holes made by beetles both in heartwood as well as sapwood, 2 of the holes being  $1\frac{1}{4}$ " deep, and another  $\frac{1}{8}$ " besides 4 dot-like depressions.

On the whole, the wood seems to be fairly immune from insect-attacks. The thin core of heartwood is almost jet black, hard, and strong like ebony.

82. *Diospyros sp.* (Bourdillon's No. 239).

(Weight per c. ft. is 49-2 lbs. This may probably be a specimen of *D. Bourdillonii*).

A partially varnished specimen is almost free from insect-attack there being only a shallow hole less than  $\frac{1}{8}$ " deep and a short superficial groove  $\frac{1}{4}$ " long leading to a hole  $\frac{1}{2}$ " deep slantingly, on unvarnished surfaces.

Judging by this specimen alone, the wood is almost quite immune.

• In the central portion a dark line enclosing greyish-brown hard wood is formed: this may perhaps be the incipient heartwood not fully developed when the timber was felled.

83. *Bouquet Dalzielii*. Date of collection:—18-1-1894.

Tam—Nedu patta.

Mal—Manja nara; Kanakaitta.

A partially varnished specimen of mature wood has on a varnished side away from the centre 4 holes  $\frac{1}{8}$ " to  $\frac{3}{4}$ " deep besides half a dozen dot-like depressions and on an unvarnished surface which is nearer the centre there is one slanting hole 1" deep and 4 dot-like depressions; on a transversely cut end there is a hole 1" long and  $\frac{1}{8}$ " wide. An unvarnished specimen cut from the same piece of wood as the above, kept in the verandah rack, has on one side 2 holes  $\frac{1}{4}$ " and  $1\frac{1}{2}$ " deep and on another surface also 2 holes  $\frac{3}{8}$ " &  $\frac{1}{4}$ " deep; on a transversely cut end there is a tunnel 1" long and  $\frac{3}{8}$ "  $\times$   $\frac{1}{8}$ " at the opening besides a small cavity  $\frac{1}{4}$ "  $\times$   $\frac{1}{8}$ "  $\times$   $\frac{1}{8}$ "; there are also traces of white-ant attack without any appreciable damage. Two other unvarnished specimens of immature heartwood kept in the verandah rack, have considerable portions of the interior of the wood reduced to large cavities by white-ants; there are also a number of superficial beetle-holes. The wood of these specimens is also badly cracked probably owing to heartshakes. C.L.

The mature heartwood seems to be fairly immune, while the sapwood is seriously damaged by white-ants and beetles.

84. *Diospyros sulcata*. Date of collection:—15-2-1896.

Mal—Kari.

Only a partially varnished specimen is available. The varnished surfaces towards the centre have about 18 holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep besides a number of narrow superficial grooves filled with a fine powdery stuff, probably the excreta of insects; unvarnished surfaces have 2 dozen holes  $\frac{1}{4}$ " to  $1\frac{1}{2}$ " deep. There are scattered streaks and dots of dark wood in the specimen and holes in them are deeper than elsewhere. Traces of white-ant attack are also seen.

On the whole, the wood is fairly immune, insectattacks being more or less superficial. It is fibrous and the fibres are strong and long.

Well-defined concentric lines are seen on transverse sections, which may be annual rings, although Mr. Bourdillon does not make mention of them in his book.

85. *Hemicyclia venusta*. Date of collection:—3-4-1894.

Tam—Vellelambu; palla kanni.

Mal—Vella kasarv.

There is only a partially varnished specimen. One beetle-hole penetrates the whole thickness of the specimen while on a varnished surface there are 4



small superficial tunnels and cavities less than  $\frac{1}{4}$ " deep and  $\frac{1}{2}$ " long and on unvarnished surfaces, about a dozen holes  $\frac{1}{4}$ " to  $1\frac{1}{4}$ " deep; along an edge away from the centre, white-ants have made a superficial tunnel about  $4$ " long  $\frac{1}{4}$ " to  $\frac{3}{4}$ " broad, and  $\frac{1}{8}$ " deep opening out by tiny slits. The attack is chiefly on portions away from the centre.

There is no heart. The wood seems to be fairly immune from insect-attacks.

86. *Calophyllum tomentosum*.

Eng—Poon-spar

Tam—*Kattu pinnei*.

Mal—*Kattu punna; pinnapai*.

In 2 partially varnished specimens, the varnished surfaces are quite free from attack. On an unvarnished surface of one of them there is a hole  $\frac{1}{4}$ " deep and  $\frac{1}{8}$ " by  $\frac{1}{6}$ " wide and on a similar surface of the other there are 2 holes  $\frac{1}{4}$ " and  $1\frac{3}{4}$ " deep (slanting). On an unvarnished specimen about 2 ft. long kept in the verandah shelf, there are, near a cracked end of the piece on each surface from 2 to 3 dozen holes most of which are less than  $\frac{1}{8}$ " deep while about half a dozen are from 1" to  $2\frac{1}{2}$ " deep (slanting); there are also 2 or 3 superficial tunnels 1" to 2" long and less than  $\frac{1}{8}$ " wide; the attack on the specimen is superficial.

On the whole, the wood is very fairly immune, considering its lightness and somewhat loose texture.

Mr. Bourdillon says in his book that white-ants eat this wood. The specimens examined, however, show no traces of their attack but might have perhaps accidentally escaped it.

87. *Meliosma simplicifolia*. Date of collection:—3-4-1894.

Kanie name—*Kusavi; Kalavi*.

In a partially varnished specimen, one beetle-hole penetrates the entire thickness of the specimen; on a varnished surface there are 2 dot-like depressions and on an unvarnished surface 4 holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep; there is also a narrow tunnel 1" long along one edge of the specimen. An unvarnished specimen kept in the verandah rack has in portions away from the centre 3 superficial tunnels, 2 of them being 1" long and about  $\frac{1}{4}$ " wide and the third about 6" long and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " wide which probably originated at a point damaged while felling the tree, besides 5 holes of which one is about 2" deep slantingly and the rest from  $\frac{1}{8}$ " to  $\frac{3}{4}$ ".

Mature wood towards the centre is fairly immune.

88. *Bombax malabaricum*. Date of collection:— 6-11-1894.

English—*Cotton tree*.

Tam & Mal—Ilavu, Elavu.

There is only partially varnished specimen available for examination. On its varnished surfaces there are numerous beetle-holes many of them being very tiny and  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep and also numerous narrow superficial grooves filled with a powdery substance; on unvarnished surfaces the beetle-holes are somewhat less numerous and are as shallow as those on varnished side; white-ants have scraped off superficial portions of unvarnished surface making a few shallow grooves and cavities, in one of the latter there being a hole  $\frac{3}{4}$ " deep and  $\frac{1}{8}$ " in diameter—area of white-ant-attack on the hole is about 2 sq. in. and depth  $\frac{1}{8}$ "; on an unvarnished surface there are also 2 superficial tunnels 1" and  $2\frac{1}{2}$ " long and  $\frac{1}{10}$ " and  $\frac{1}{8}$ " in. diameter.

On the whole, the damage by insect-attack is more or less superficial in the specimen. Mr. Bourdillon says that the wood "is much bored by beetles and eaten by white-ants".

89. *Humboldtia Bourdillonii*. Date of collection 5-8-1907:—

Mal—*Adimundan*.

There is only an unvarnished specimen kept inside the room. It has about a dozen beetle-holes, 3 of them being  $\frac{3}{4}$ " and the rest  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep. The specimen is not attacked by white-ants.

The wood appears to be fairly immune from insect-attacks. It has a greyish-white colour and flawed by knots.

90. *Humboldtia* sp. (probably *H. Vahliana*). Date of collection:—  
8-10-1895.

Only an unplanned and unvarnished specimen about 8" long kept in the verandah rack is available. In the heartwood portion there are 4 holes one of which goes slanting through the wood to a length of  $2\frac{1}{2}$ " and the rest are  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep, while in the sapwood there are numerous extremely tiny holes  $\frac{1}{8}$ " deep bored by beetles.

The wood is fairly immune from insect-attack.

91. *Pterospermum rubiginosum*. Date of collection:—10-4-1895.

Tam— *Chittileipolavu*.

Mal— *Malamthodali*.

Káni— *Ele-Chulian*.

In a partially varnished specimen a varnished side mostly of heartwood has 3 beetle-holes, one about 2" deep, another  $\frac{1}{2}$ " and the third leading to a tunnel about 4" long and  $\frac{1}{16}$ " to  $\frac{1}{8}$ " wide and on an unvarnished heartwood surface 2 holes  $\frac{1}{4}$ " and  $1\frac{3}{4}$ " deep. There are 5 unvarnished specimens kept in the verandah rack, 3 of standard length and 2 about 6" long. In one of the former there are 6 holes  $\frac{1}{4}$ " to  $\frac{3}{4}$ " deep; in another about a dozen holes, 6 being about 2" deep on the longitudinal surfaces and on a transversely cut end 5 tunnels  $\frac{1}{2}$ " to 6" long, 4 of them being in portions damaged while felling the tree. In the third specimen of standard length white-ants have reduced portions of the sapwood to a mere shell; the wood of this specimen does not, however, seem to be so mature as that of the rest. One of the 2 smaller specimens is quite free from attack but the wood has cracked while the other specimen has about a dozen holes from  $\frac{1}{2}$ " to 2" deep.

In almost all the specimens, the beetle-holes are far apart and do not seem to affect the utility of the wood. The mature heartwood seems to be fairly immune while immature heartwood as well as sapwood is liable to beetle and white-ant attacks.

92. *Aglaia Maice*. Date of collection:—8-10-1895.

There are 3 partially varnished specimens. In one of them, a varnished heartwood surface has 4 holes  $\frac{1}{4}$ " to  $1\frac{3}{4}$ " deep bored by beetles and an unvarnished heartwood surface one hole  $\frac{1}{2}$ " deep; varnished surface of sapwood which forms only a small portion of the specimen has 2 extremely tiny holes  $\frac{1}{8}$ " and  $\frac{3}{4}$ " deep while on its unvarnished surface there is a hole over 2" deep besides a tunnel about 3" long, 1" deep and about  $\frac{1}{2}$ " to  $\frac{1}{8}$ " wide made by white-ants. In another specimen of immature heartwood one hole penetrates the entire thickness of the specimen; on one of its varnished surfaces there are 7 holes  $\frac{1}{8}$ " to  $\frac{3}{4}$ " deep and on another varnished surface 8 holes some being shallow while others lead to tunnels  $\frac{1}{2}$ " to  $1\frac{1}{2}$ " long and  $\frac{1}{16}$ " in diameter which traverse its superficial portions and open out by means of small holes at intervals, besides over a dozen holes  $\frac{1}{8}$ " to 2" long, some of them penetrating the entire thickness of the specimen; the attack is chiefly on the side away from the centre. In the third specimen a varnished surface has 4 holes 2 of them  $\frac{1}{2}$ " deep and the other two 2" deep; an unvarnished surface has about a dozen holes  $\frac{1}{4}$ " to  $1\frac{1}{2}$ " deep and  $\frac{1}{10}$ " in diameter. An unvarnished specimen kept in the verandah has only 6 holes most of them being 1" to 2" deep slantingly; the wood of this specimen has cracked.

The mature heartwood seems to be fairly immune while sapwood is appreciably attacked by beetles and white-ants. The wood is very smooth and fine-grained as remarked by Mr. Bourdillon.

93. *Eugenia* sp. (Bourdillon's No. 295).

A partially varnished specimen has 3 distantly scattered holes penetrating its entire thickness; besides these a varnished surface has a hole  $\frac{1}{2}$ " deep and a narrow groove  $\frac{1}{2}$ " long leading to one of the holes; beetle-attacks on unvarnished surfaces are similar to those on the varnished sides. The wood is not attacked by white-ants.

Judging by this single specimen, the wood is fairly immune from beetle-attack and completely so from white-ant attack.

94. *Eugenia montana*. Date of collection:—6-11-1894.

Mal—*Poriyil*.

In a partially varnished specimen there are 3 beetle-holes penetrating the whole thickness of the wood; on one of its varnished surfaces, besides the above there are 5 holes  $\frac{1}{8}$ " to 2" deep slantingly the majority being about 1" deep; an unvarnished surface has half a dozen similar holes. On an unvarnished specimen kept in the verandah there are altogether 6 holes  $\frac{1}{2}$ " to 1  $\frac{1}{3}$ " deep. 3 shorter pieces about 6" long kept in the verandah have from 1 to 6 holes  $\frac{1}{2}$ " to 1" deep, 2 of them being 1  $\frac{1}{4}$ " (slantingly).

The wood is fairly immune from damage by beetle-attack and it is not touched by white-ants.

95. *Hemigyrosa deficiens*. Date of collection:—5-3-1907.

Only an unvarnished specimen about 9" long kept inside the room is available. On all the surfaces together there are over 4 dozen beetle-holes the greatest depth being 1  $\frac{1}{2}$ " on one of the broader sides and another is  $\frac{1}{2}$ " long slantingly on a narrower side; many of the holes are however shallow being  $\frac{1}{2}$ " or less deep.

On the whole, the wood is fairly immune, and appears to be pretty strong and smooth.

96. *Pygeum Wightianum*. Date of collection:—6-11-1894.

Tam—*Palangkacchi; attā nārei*.

Mal—*Nāi kambagom; sheththuri*.

Kanik—*Mutta kongu; rathioan*.

Of the 2 partially varnished specimens available, one has on one of its varnished surfaces a tiny hole less than  $\frac{1}{8}$ " deep while on the unvarnished surfaces there are 5 holes one of which is 1  $\frac{1}{2}$ " deep and the rest  $\frac{1}{4}$ " to  $\frac{3}{4}$ " besides a few short fine oblique cracks. In another similar specimen 4 holes penetrate its entire thickness; on its varnished surface there are 8 holes  $\frac{1}{2}$ " to 2" deep; the unvarnished surface which is nearer the centre of heartwood than the varnished has besides the holes penetrating the entire thickness of the specimen, 3 or 4 narrow grooves  $\frac{1}{2}$ " to 1  $\frac{1}{2}$ " long; the wood of this specimen also has oblique cracks as in that of the previous one. Out of half a dozen unvarnished specimens kept in the verandah rack, two are of the standard size and have in their heartwood

portions about half a dozen beetle-holes  $\frac{1}{2}$ " to  $1\frac{3}{4}$ " deep; the sapwood which forms half the thickness of both the specimens has numerous beetle-holes and tunnels in the interior while considerable portions of its surface have been scraped off by white-ants. Another specimen about 11" long consisting wholly of heartwood has, on the surface nearer the centre, only 2 shallow tiny holes less than  $\frac{1}{8}$ " deep, while on the surface away from the centre there are 5 or 6 holes  $\frac{1}{4}$ " to 1" deep besides a slit  $\frac{3}{4}$ " deep,  $\frac{1}{4}$ " long and  $\frac{1}{12}$ " broad; the wood of this specimen also has cracked as in the others. 2 other specimens 6" long, mostly of heartwood, have their surfaces towards the centre practically immune but for 2 very tiny holes less than  $\frac{1}{2}$ " deep and a small depression less than  $\frac{1}{8}$ " deep on one of them; on the surface away from the centre of one there are half a dozen holes  $\frac{1}{4}$ " to 1" deep and a few dot-like depressions, while on a similar surface of the other, white-ants have made a cavity 1" long,  $\frac{1}{4}$ " broad, and  $\frac{3}{4}$ " deep; a portion of the soft wood has been completely eaten away. Another smaller specimen 3" long is quite immune but for 2 holes  $\frac{1}{8}$ " and  $\frac{1}{4}$ " deep and a dot-like depression.

On the whole, the heartwood seems to be fairly immune while the sapwood is appreciably attacked. The wood seems to be liable to crack obliquely, unless carefully seasoned in shade.

97. *Machilus mācrantha*. Date of collection:—1-3-1894.

Tam—Kola māvu.

Mal—Urāvu.

Of the 2 unvarnished specimens kept in the shelf inside the room, one has about half a dozen beetle-holes, 2 of them penetrating the entire thickness of the specimen while the rest are  $\frac{1}{8}$ " to 1" deep. The other specimen has on each of its broader sides about a dozen holes one of which has penetrated its entire thickness; another is about  $1\frac{3}{4}$ " deep slantingly and the rest from  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep. Another specimen about  $1\frac{1}{2}$ " long kept in the verandah rack has over 2 dozen beetle-holes, 2 of which penetrate its whole thickness; another leads to a hole over 4" long slantingly and the rest are mostly  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep. None of the specimens bears any traces of white-ant-attack.

On the whole, the wood seems to be fairly immune from damage by insects. Mr. Bourdillon says that the wood is liable to be eaten by insects.

98. *Melia composita*. Date of collection:—18-1-1894.

Mal—Malavēmbu.

Tam—Kuran Vēmbu (South Travancore).

Only a partially varnished specimen is available. The varnished and unvarnished surfaces of heartwood have each about 10 holes  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep;

the sapwood which is unvarnished and forms a small portion of the specimen is eaten away by white-ants to a considerable extent.

Light and soft as it is, the heartwood seems to be fairly immune.

99. *Nephelium stipulaceum*. Date of collection:—10-4-1895.

Mal—*Paviri Mûlei*.

Kanie—*Kanam Mauili*.

In a partially varnished specimen, on a varnished surface there are 5 or 6 holes, one  $1\frac{1}{2}$ " deep, another  $\frac{3}{4}$ ", two 1" and  $1\frac{1}{4}$ " (slantingly), the rest being dot-like depressions less than  $\frac{1}{8}$ " deep and on another varnished surface one hole 1" deep; the unvarnished surfaces are quite immune from insect-attack, there being, however, a deep crack extending through the whole length of the specimen along a concentric ring, due probably to some injury when the tree was young. An unvarnished specimen kept in the verandah rack has on 3 of the surfaces from 2 to 3 dozen tiny holes (on each surface) which lead to tunnels and cavities below and an appreciable portion of the interior of the wood which seems to be immature appears to have been thus reduced to cavities by white-ants.

The partially varnished specimen which consists of more mature heartwood than the unvarnished one, seems to be fairly immune while the latter is appreciably attacked by white-ants. In the specimens of this timber, heartwood and sapwood are not distinctly marked off, but somewhat irregular longitudinal strands of soft wood come between portions of harder wood and the attack is mainly in the softer portions.

100. *Wrightia tomentosa*. Date of collection:—22-5-1894.

Tam—*Thonthapâlei*.

Mal—*Mailampâla*; *neelampâla* (Kottayam).

Only a partially varnished specimen is available. On the broader varnished surface, there are 4 holes, 2 of them extending through almost the entire thickness of the specimen, one  $\frac{1}{2}$ " deep and the other less than  $\frac{1}{2}$ "; on the narrower varnished surface there are 2 tiny holes less than  $\frac{1}{8}$ " deep; on the broader unvarnished surface are found about half a dozen holes, one almost penetrating the entire thickness of the specimen and the rest being mostly from  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep and one hole  $\frac{1}{8} \times \frac{1}{10}$ " at the opening is  $\frac{3}{4}$ " deep slantingly. There is no trace of white-ant attack.

The wood is fairly immune, its utility not being seriously affected by the insect attacks.

101. *Olea dioica*. Date of collection:—12-3-1895.

Tam—*Yedalei*; *parava idalei*.

Mal—*Edana*; *vidana*; *pâl-arana*.

Only a partially varnished specimen is available. Both varnished and unvarnished surfaces, especially the latter, are covered with a network of very shallow, narrow grooves filled up with a powdery substance. Interspersed among these grooves are very tiny holes most of them being less than  $\frac{1}{8}$ " deep and a few 1" to  $1\frac{1}{2}$ "; there are numerous such holes on unvarnished sides and about a dozen on varnished surface. There are only very slight traces of white-ant attack.

The insect-attack is very superficial and has not affected the wood.

102. *Cedrela Toona*. Date of collection:— 15-2-1896 ; 30-5-1903.

Eng.—Red cedar.

Tam.—*Theerathāram*.

Mal.—*mathanri vēmbu; vedi vēmbu; mala vēppa*.

Two partially varnished specimens are available. On a varnished surface of one of them consisting entirely of heartwood, there are 5 holes  $\frac{1}{4}$ " to 1" deep (some slanting) and on an unvarnished surface 3 holes 2",  $1\frac{1}{2}$ " and 1" deep besides 4 narrow superficial grooves and tunnels  $\frac{3}{4}$ " to  $2\frac{1}{4}$ " long. In the other specimen 2 holes penetrate the entire thickness and a varnished heartwood surface has besides the above, one hole  $1\frac{3}{4}$ " deep and 3 or 4 narrow superficial tunnels 7' to 8' long opening out at intervals by small slits and holes; an unvarnished surface has about a dozen holes many of them leading to narrow tunnels beneath the surface; sapwood which forms only a small portion of the specimen has a few narrow grooves and a short superficial tunnel about  $\frac{1}{2}$ " long and  $\frac{1}{4}$ " in diameter. A large dressing wardrobe in my possession made of this wood has been badly damaged in the upper portion to a length of about 2 ft. and the planks are reduced to mere shells by insects, while the lower portion shows no signs of damage.

On the whole, the wood may be considered to be fairly immune, as the insect-attack have not affected the utility of the wood to any appreciable extent in the specimens. Mr. Bourdillon says that the wood is not eaten by insects nor bored by beetles; but this opinion has to be modified in the light of the present condition of the dressing wardrobe mentioned above.

103. *Bushinia malabarica*. Date of collection:—6-11-1894.

Tam.—*Atthi*.

Mal.—*Arām puli*.

A partially varnished specimen has one hole penetrating the hole thickness of the wood; on its varnished surfaces there are 9 holes 2 of them about 2" deep slantingly and the rest from  $\frac{1}{2}$ " to  $\frac{1}{2}$ " deep and a superficial white-ant

cavity about 1 sq. in. in area and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep at one end besides 5 short superficial grooves filled with a powdery substance; the insect-attacks on the varnished surface, particularly those of white-ants, are chiefly found in the sapwood portion; on unvarnished sides the heartwood has about a dozen holes mostly  $\frac{1}{2}$ " to 2" deep and one 2 $\frac{1}{2}$ " deep slantingly while the sapwood is reduced to cavities by white-ants to a considerable extent. There are 3 unvarnished specimens 2 $\frac{1}{2}$ ', 2' and 1' long. The first of these has about a dozen holes  $\frac{1}{8}$ " to  $\frac{3}{4}$ " deep; the wood of this specimen has slightly cracked. The specimen 2' long has about 40 beetle-holes of which 6 are 1" to 1 $\frac{1}{2}$ " deep and the rest  $\frac{1}{8}$ " to 1"; this specimen is also slightly cracked. The specimen 1' long has altogether about a dozen holes, one penetrating its entire thickness while another is 2" deep in heartwood, and the rest are from  $\frac{1}{4}$ " to 1 $\frac{1}{2}$ "; there is also a small white-ant cavity  $\frac{1}{3}$ " x  $\frac{1}{4}$ " x  $\frac{1}{4}$ " on one of the surfaces.

On the whole, the heartwood is fairly immune being liable to damage by beetles only to a small extent; the sapwood is liable to attacks of beetles and white-ants, the latter attacking it appreciably.

104. *Xanthophyllum flavescens*. Date of collection:—1-3-1894.

Tam—Muttai;

Mal—Madakka; Mottel.

In a partially varnished specimen one beetle-hole penetrates its entire thickness; on its varnished surfaces towards the centre, there are about a dozen holes 4 of them about 1" deep and the rest  $\frac{1}{8}$ " to  $\frac{1}{2}$ "; one unvarnished surface which is away from the centre has over 4 dozen holes, most of them in a group, a dozen of which are from 1" to 1 $\frac{1}{2}$ " deep and the rest from  $\frac{1}{8}$ " to 1", besides 3 narrow grooves  $\frac{1}{2}$ " to  $\frac{3}{4}$ " long, some of them leading to holes beneath. An unvarnished specimen 7" long kept in the verandah rack has only one hole  $\frac{1}{4}$ " deep; the wood of this specimen has cracked.

One of the specimens is almost quite free from insect-attack while the other is appreciably attacked by beetles on the side away from the centre. The wood takes a high polish.

105. *Calophyllum Wightianum*. Date of collection:—6-11-1894.

Tam—Serupinai.

Mal—Cherupunna, Attupunna; pora-punna;  
manjapunna.

There are 2 partially varnished specimens. One of them of more mature heartwood than the other, has a hole penetrating the entire thickness of the specimen; on the varnished surface away from the centre there are 3



narrow tunnels  $\frac{3}{4}$ " to  $1\frac{1}{4}$ " long, 2 of them leading to small superficial cavities; one  $1\frac{1}{4}$ " long  $\frac{1}{3}$ " broad and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep, and another 1" long  $\frac{1}{8}$ " to  $\frac{1}{4}$ " broad and  $\frac{1}{4}$ " deep; on the same surface along one edge which consists of sapwood there is a narrow tunnel extending right through the whole length of the specimen opening at one of the cut-ends as a small hole  $\frac{1}{10}$ " in diameter and on the surface by small slits and holes; on the unvarnished surface towards the centre of heartwood besides the beetle-hole penetrating the entire thickness of the specimen, there are only 2 dot-like holes less than  $\frac{1}{8}$ " deep. The other partially varnished specimen has on the varnished side consisting of sapwood a superficial cavity  $1\frac{1}{4}$ " long  $\frac{1}{8}$ " to  $\frac{1}{2}$ " broad and  $\frac{1}{8}$ " to  $\frac{3}{8}$ " deep, and on an unvarnished surface 5 or 6 holes  $\frac{1}{8}$ " to  $\frac{1}{3}$ " deep and 2 narrow superficial tunnels 1" and  $2\frac{1}{4}$ " long. In an unvarnished specimen kept inside the room, the heartwood surface has only one hole  $\frac{1}{8}$ " deep while the sapwood surfaces have about a dozen holes mostly  $\frac{1}{8}$ " to  $\frac{3}{4}$ " deep and one of them leading into a tunnel 3" long inside the wood. Four other unvarnished specimens—2 of the standard length, one 6" long and the other 4", are kept in the verandah shelf. Portions of one specimen of standard size are burrowed into chambers and tunnels to an appreciable extent; the other similar specimen has only one superficial tunnel 3" long,  $\frac{1}{4}$ " to  $\frac{3}{4}$ " broad and  $\frac{1}{4}$ " to  $\frac{1}{8}$ " deep and  $\frac{1}{2}$  holes  $\frac{1}{8}$ " to  $\frac{3}{4}$ " deep in the sapwood. The 2 smaller specimens have each about half a dozen holes from  $\frac{1}{8}$ " to  $\frac{3}{4}$ " deep.

On the whole, the heartwood is fairly immune while the sapwood is appreciably damaged by insects.

106. *Blepharistemma Corymbosum*. Date of collection: — 1-3-1894.

Mal—Nir kurunda.

In a partially varnished specimen 2 beetle-holes penetrate its whole thickness; on a varnished surface besides these there is a hole 1" deep starting from the adjacent unvarnished surface, and on an unvarnished side there are 5 holes, one of which leads to a tunnel about 4" long, 2 being about  $1\frac{3}{4}$ " deep and 2 others  $1\frac{1}{4}$ "; one hole is about  $\frac{1}{8}$ " in diameter and the rest  $\frac{1}{16}$ ". An unvarnished specimen  $1\frac{1}{2}$ " long kept in the verandah rack has besides some dot-like depressions, about 3 dozen holes 2 of which penetrate the entire thickness of the specimen, about a dozen  $1\frac{1}{2}$ " to  $3\frac{1}{2}$ " deep (some slanting) and the rest from  $\frac{1}{8}$ " to 1"; from one of the transversely cut-ends there are 2 or 3 slit-like tunnels  $\frac{1}{4}$ " to  $\frac{1}{2}$ " long and  $\frac{1}{10}$ " wide mostly, one  $3\frac{1}{2}$ " long and another leading to a hole opening on one of the surfaces. The wood is not attacked by white-ants.

The timber appears, on the whole, to be fairly immune. Mr. Bourdillon says in his book that the wood is not bored by beetles but this remark is not borne out by the condition of the specimens examined; probably when he observed the wood, it was free from beetle-attack.

107. *Chrysophyllum Roxburghii*. Date of collection:—4-4-1894.

Tam—Kattibuppei.

Mal—Pala; atha.

Kanic—Pal Elingi.

In a partially varnished specimen 2 holes penetrate the entire thickness of the wood; on its varnished surface towards the centre there are besides the above, 3 holes 2 of them about 1" deep and another  $\frac{3}{4}$ "; an unvarnished surface away from the centre has over 30 holes, about a dozen of them being 1" to  $1\frac{1}{2}$ " deep and the rest  $\frac{1}{4}$ " to 1"; the holes are in scattered groups varying from 2 to 7 at a place. An unvarnished specimen 6" long  $4\frac{1}{2}$ " broad, and 2" thick has only one hole leading to a curved tunnel 4" long.

The wood is not touched by white-ants. One specimen is very fairly immune while another is appreciably attacked by beetles on the side away from the centre but the beetle-attack has not seriously detracted from the utility of the timber. Mr. Bourdillon says that the wood is bored by beetles and soon decays.

108. *Canthium pergracile*. Date of collection:—1-3-1894.

Mal—Palaga; Anei kumbi.

A partially varnished specimen has on its varnished surfaces 3 dot-like depressions less than  $\frac{1}{8}$ " deep and on an unvarnished surface 2 holes 1" deep, a superficial tunnel about 4" long opening out by a small slit  $\frac{1}{8}$ "  $\times$   $\frac{1}{16}$ " and a superficial white-ant chamber less than 1 sq. inch in area and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " in depth. An unvarnished specimen about  $1\frac{1}{2}$ ' long kept in the verandah rack has about 4 dozen holes  $\frac{1}{8}$ " to 1" deep, most of them leading to tunnels and chambers made by white-ants in the interior of the wood.

Mr. Bourdillon says that the wood of this tree is not used but that it is good. It is seen to be smooth and fine-grained and while portions of the wood towards the centre are very fairly immune, those away from it are liable to white-ant attack to an appreciable extent. The partially varnished specimen kept inside the room is fairly immune.

109. *Stereospermum chelonoides*. Date of collection:—6-11-1894.

Tam—Pombathiri.

Mal—Karingkura.

In a partially varnished specimen, a varnished surface of sapwood away from the centre has 4 holes leading to small shallow cavities  $\frac{1}{4}$ " to  $\frac{3}{4}$ " long,  $\frac{1}{8}$ " to  $\frac{1}{2}$ " broad and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep, made by white-ants; on an unvarnished surface there are about a dozen holes  $\frac{1}{8}$ " to  $\frac{3}{4}$ " deep, some leading to small cavities as on the varnished surface; from a transversely cut-end, 3 tunnels one of them  $\frac{1}{20}$ " in diameter and about 4" long, others  $\frac{1}{8}$ " to  $\frac{1}{4}$ " wide and  $\frac{1}{2}$ " to 1" long run

into the wood; there is only a small patch of heartwood in this specimen and it is quite immune but for a dot-like depression. An unvarnished specimen kept in the verandah rack has on one surface half a dozen holes one of which is over 1" deep while the rest are from  $\frac{1}{8}$ " to  $\frac{1}{4}$ "; from another surface white-ants have removed a portion of the wood  $4\frac{1}{2}$ " long  $\frac{1}{8}$ " to  $\frac{1}{2}$ " broad and  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep, and on the same surface there is a tunnel about 1" long slantingly and  $\frac{1}{8}$ " to  $\frac{1}{2}$ " wide, bored by beetles and a superficial cavity  $1\frac{1}{4}$ " long,  $\frac{1}{4}$ " broad and  $\frac{1}{8}$ " deep into which open 3 holes  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep; on another side there are about half a dozen grooves and slits 1" to 2" long  $\frac{1}{8}$ " broad and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep. Another unvarnished specimen about 5" long has 6 holes  $\frac{1}{8}$ " to  $1\frac{3}{4}$ " deep and also the same number of tunnels some  $\frac{1}{20}$ " in diameter and others  $\frac{1}{8}$ "  $\times$   $\frac{1}{2}$ " wide and some of which extend almost through the whole length of the specimen, and in one or two cases the holes lead to internal tunnels.

There is no distinct heartwood. While the partially varnished specimen is fairly immune, the unvarnished ones are subject to attacks but not to the extent of seriously affecting the utility of the wood.

110. *Elaeocarpus tuberculatus*. Date of collection:—10-4-1895.

Tam—Ruthracham.

Mal—Pilalu; Naggara, Koda vâsi; ammakaram.

There is only one partially varnished specimen. Varnished surface of heartwood has 6 holes one of which is about 2" deep and the others from  $\frac{1}{4}$ " to  $\frac{1}{2}$ " and also a narrow superficial tunnel  $2\frac{3}{4}$ " long and  $\frac{1}{12}$ " to  $\frac{1}{8}$ " deep; on the unvarnished heartwood surface 2 shallow holes less than  $\frac{1}{8}$ " deep, and a superficial tunnel 1" long opening out by 2 small holes are found; considerable portion of the sapwood is reduced to a shell by white-ants; there are numerous beetle-holes also in sapwood especially on a small varnished portion but most of the holes are less than  $\frac{1}{4}$ " deep.

The heartwood is fairly immune while the sapwood is appreciably attacked. For a soft light wood like this, the damage by insects is surprisingly small.

111. *Baccaurea courtallensis*. Date of collection:—28-2-1894.

Mal—Mutta thuri; Muttakai; pucei.

Three unvarnished specimens are kept in the verandah rack. One of them has altogether 2 dozen holes  $\frac{1}{8}$ " to 1" deep, many of them leading to tunnels beneath; at one cut end there are 8 tunnels from  $\frac{1}{8}$ "  $\times$   $\frac{1}{4}$ " to  $1\frac{1}{2}$ "  $\times$   $\frac{1}{8}$ " to  $\frac{3}{4}$ " wide and these are at places previously damaged while felling. Similar tunnels have been bored also in another specimen 6" long. The third specimen has only 3 or 4 tiny beetle-holes less than  $\frac{1}{8}$ " deep, but white-ants have made

a large tunnel extending through the whole length of the specimen and  $\frac{1}{2}$ " to  $\frac{3}{4}$ " wide.

Two of these specimens are fairly immune while the other is appreciably damaged by white-ants.

112. *Bischofia javanica*. Date of collection:—3-4-1894.

Tam—*Malachithiyar; nannal*.

Mal—*Thiruppu; Nira—Venneeri vagha*.

(Oorallies' name on Cardamom Hills).

There are 2 partially varnished specimens. The varnished surfaces of one of them are quite free from marks of insect-attack while on an unvarnished surface there is a superficial tunnel about 3" long,  $\frac{1}{16}$ " to  $\frac{1}{8}$ " broad, and  $\frac{1}{8}$ " deep in heartwood and another small tunnel  $\frac{1}{4}$ " long. In the other specimen the heartwood portion is almost quite immune but for a small cavity which is the opening of a hole passing through the sapwood portion; in the sapwood which forms only a small portion of the specimen, there is a tunnel about 4" long,  $\frac{1}{4}$ " deep and  $\frac{1}{8}$ " wide; a hole which penetrates the entire thickness of the wood is also found. Out of 5 unvarnished specimens kept in the verandah, 4 have been attacked by white-ants. In one of them the damage is superficial while in the rest, large portions of the wood have been eaten away; beetle-attack on these specimens is negligible. In 3 of the specimens the wood has cracked and probably this gave ingress to white-ants.

The varnished heartwood is almost quite immune while unvarnished specimens are badly attacked by white-ants but they are free from damage by attacks of beetles. According to the Timber Trades Journal quoted by Gamble, "although above ground, it warps and cracks and white-ants attack it, in wet ground or under water it is almost imperishable".

113. *Ficus hispida*. Date of collection:—28-2-1908.

Tam—*Pei-atthi; chona-atthi; ottanali*.

Mal—*Erumanakku*.

There is only an unvarnished specimen kept in the verandah rack. On one of its narrower surfaces there are over 50 beetle-holes  $\frac{1}{8}$ " to  $1\frac{1}{4}$ " deep and  $\frac{1}{16}$ " to  $\frac{1}{10}$ " in diameter, most of them being only  $\frac{1}{2}$ " deep or less; the other surfaces have each about a dozen similar beetle-holes; the transversely cut ends have about 4 dozen holes  $\frac{1}{16}$ " to  $1\frac{1}{2}$ " in diameter and most of them  $\frac{1}{4}$ " to 1" long and a few 2" long. Wood inside the holes and tunnels is reduced to fine powder. The specimen is not touched by white-ants.

The beetle-attack though apparently appreciable is only superficial and the interior of the wood appears to be sound. This may therefore be

considered to be fairly immune. The block has slightly cracked.

114. *Trema orientalis*. Date of collection:—4-1-1895.

Eug—The charcoal tree.

Tam—Ambaratthi, oman, Mudalei, Mini.

Mal—Ama, pottama.

In a partially varnished specimen, the varnished surfaces have about 30 beetle-holes half a dozen of which are about 2" deep, and the rest from  $\frac{1}{8}$ " to  $\frac{1}{2}$ ", a few of them leading to long tunnels within the wood, and also 4 superficial grooves  $\frac{1}{2}$ " to 2" long; unvarnished surfaces have over 10 holes one of which is about 2" deep and the rest  $\frac{1}{8}$ " to  $\frac{1}{2}$ " and considerable portions have been removed by white-ants, the total area of attack being 3 sq. in. and depth  $\frac{1}{8}$ ".

It is a soft wood without any heart. Though the superficial portions are appreciably attacked, the interior portions of the wood seem to be fairly sound and unaffected by insect-attack.

115. *Hardwickia pinnata*. Date of collection:—18-1-1894.

Tam—Koda palei; madeyan sampirani.

Mal—Shurali; kijavu; kolaru.

Kanie—Uram.

There are 3 partially varnished specimens, considerable portions of them being sapwood. In one of them half of which is heartwood, on the varnished heartwood surface there are about 12 holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep besides superficial traces of some insect-attack without damage; an unvarnished surface of heartwood is quite free from attack; sapwood, which is unvarnished, is very badly attacked by beetles there being numerous holes on the surface, and in the interior of the wood a number of tunnels filled with a powdery substance; the whole of the sapwood is badly attacked and in some cases reduced to powder.

Another similar specimen has on its varnished heartwood surfaces about 18 beetle-holes  $\frac{1}{4}$ " to  $1\frac{1}{2}$ " deep with 3 or 4 narrow superficial tunnels  $\frac{1}{4}$ " to 1" long; both varnished and unvarnished sides of sapwood are badly attacked by beetles though to a slightly less extent than in the former. In the third specimen in which the heartwood forms only a trace, the varnished heartwood surfaces have half a dozen holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep; sapwood portions both varnished and unvarnished, are badly attacked there being numerous beetle-holes and tunnels as well as white-ant chambers. Of 2 unvarnished specimens kept in the verandah rack, one is 3 ft. long and contains 75% of heartwood and another is of standard length with about 60% of heartwood.

The heartwood surfaces of the first have on the whole about 30 holes, one of which is  $1\frac{1}{2}$ " deep, another  $\frac{1}{2}$ " and the rest about  $\frac{1}{8}$ " besides 3 narrow superficial tunnels  $1$ " to  $1\frac{1}{2}$ " long; the sapwood is very badly attacked by beetles and white-ants, the latter having devoured whole portions of it in some places. The other unvarnished specimen has on its heartwood about 50 holes, only half a dozen of which are  $1$ " deep, all the rest being less than  $\frac{1}{4}$ "; white-ants have made 3 superficial tunnels  $\frac{1}{2}$ " to  $1\frac{1}{8}$ " long and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " wide; interior of the sapwood has been reduced by white-ants into a mere shell.

In a couple of broad thick planks sawn from a fresh-felled tree about 6 months ago, a number of holes and tunnels were found throughout the sapwood. On examination a large number of grubs in different stages of development and one small tiny live beetle were found. The tunnels were filled with a fine powdery stuff, excreta of the grubs, and above the mouths of the holes, heaps of the same powder were also found which first attracted attention. The whole of the sapwood has been damaged badly while the heartwood has been hardly touched by the insects. The grubs and the beetle and a sample of the attacked wood are sent to the Forest Research Institute for identification of the insect.

On the whole, while the sapwood has been very badly attacked by beetles and white-ants, the damage on heartwood is more or less superficial and the heartwood may, therefore, be considered to be fairly immune. Heartwood of mature trees was found by me to be completely free from traces of insect attacks.

#### Class IV. Appreciably Attacked.

##### 116. *Diospyros Embryopteris*. Tam and Mal—*Panicchu*.

There is only a partially varnished specimen. On one of its varnished surfaces, there are over 10 holes  $\frac{1}{4}$ " to  $1$ " deep and  $\frac{1}{12}$ " in diameter, besides a superficial white-ant cavity  $1\frac{1}{2}$ " long  $\frac{1}{2}$ " to  $\frac{3}{4}$ " broad and  $\frac{1}{2}$ " to  $\frac{3}{4}$ " deep and a superficial tunnel  $2$ " long and  $\frac{1}{4}$ " in diameter; an unvarnished surface has about 30 holes  $\frac{1}{4}$ " to  $1$ " deep and a superficial white-ant tunnel  $4\frac{1}{2}$ " long and about  $\frac{1}{2}$ " in diameter.

The specimen is appreciably attacked but the damage does not extend deeper than  $1$ " into the wood.

##### 117. *Mastixia arborea*. Date of collection:—3-4-1894.

In a partially varnished specimen, a varnished surface has about 40 holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep and 4 small superficial cavities  $\frac{1}{8}$ " to  $\frac{3}{4}$ " long,  $\frac{1}{4}$ " broad and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep, many of the holes and cavities leading to shallow tunnels and chambers beneath the surface; on one of the transversely cut ends, 2 tunnels are bored, one of which is  $3$ " long and  $\frac{1}{8}$ "  $\times$   $\frac{1}{16}$ " wide and the other  $\frac{1}{8}$ " to  $\frac{1}{4}$ " wide leads to a superficial tunnel  $3$ " long and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " broad, the attack chiefly being on surfaces away from the centre; the narrower varnished surface is quite free from attack; the unvarnished surface which is away from the centre has also about 40 beetle-holes  $\frac{1}{4}$ " to  $\frac{1}{2}$ " deep and 5 tunnels  $2$ "

to 7" long,  $\frac{1}{8}$ " to  $\frac{3}{4}$ " broad and about  $\frac{1}{2}$ " deep made by white-ants. An unvarnished specimen about 7" long kept in the verandah rack has altogether about a dozen holes one of which leads to a tunnel over 6" long in the interior of the wood; other holes also appear to lead to similar tunnels.

On the whole, the wood is appreciably attacked in portions away from the centre, while the central portion may be considered to be fairly immune.

118. *Diospyros nilagirica*. Date of collection:—3-4-1894.

Tam—Kara

Only a partially varnished specimen is available. On a varnished heartwood surface, there are two holes  $1\frac{1}{4}$ " and  $\frac{1}{8}$ " deep and 4 narrow superficial tunnels which are mostly continuations of tunnels passing through sapwood and which open out by 2 or 3 small slits  $\frac{1}{8}$ " to  $\frac{1}{4}$ " long; the unvarnished surface of heartwood has 12 holes  $\frac{1}{8}$ " to  $1\frac{1}{4}$ " deep; both varnished and unvarnished surfaces of sapwood are appreciably attacked by white-ants, there being numerous chambers and slit-like tunnels, some of them running throughout the whole length of the specimen; there are also about half a dozen narrow superficial tunnels and numerous holes  $\frac{1}{16}$ " to  $\frac{1}{12}$ " in diameter, many of the latter leading to cavities below the surface; along one edge of the sapwood, white-ants have made continuous tunnel-like chambers about  $\frac{1}{2}$ " broad and  $\frac{1}{4}$ " and more deep, extending through the whole length of the specimen.

Portions of the wood removed from the centre are appreciably attacked by beetles and white-ants. This specimen has been selected for illustration as a type of the "appreciably attacked class." Vide Plate IV.

119. *Ficus glomerata*. Date of collection:—10-4-1895.

Tam & Mal—Atthi.

A partially varnished specimen has on a varnished surface about 30 holes  $\frac{1}{4}$ " to 1" deep bored by beetles and on an unvarnished surface about 40 holes  $\frac{1}{2}$ " to 1" deep, besides half a dozen superficial cavities and grooves less than  $\frac{1}{2}$ " long and  $\frac{1}{4}$ " deep.

The specimen is appreciably attacked superficially but is not so seriously damaged as to be quite useless.

120. *Terminalia travancorensis*. Date of collection:—24-1-1896.

Tam—Pei kadukkai.

Mal—Kattu kadukka, chulamarithu.

In a partially varnished specimen, a varnished surface has about half a dozen tiny holes the deepest being 1" and a narrow groove above  $2\frac{1}{2}$ "

long: an unvarnished surface has 6 narrow superficial grooves 1" to 2" long some leading to holes 1" deep besides some tunnels deep in the wood. An unvarnished specimen kept in the verandah has on one surface over 40 holes mostly  $\frac{1}{4}$ " to  $\frac{3}{4}$ " deep and some 1" to 2" deep slantingly and  $\frac{1}{16}$ " to  $\frac{1}{8}$ " in diameter; on another side, there are about 30 holes many of them leading to white-ant chambers in the interior of the wood. There are 3 more specimens of different lengths kept in the verandah. On one of the surfaces of a specimen 10" long, portions of the wood 3 sq. inches on the whole and  $\frac{1}{8}$ " to  $\frac{1}{6}$ " deep, have been eaten away by white-ants; on another surface, there are about a dozen holes and on another, half a dozen  $\frac{1}{4}$ " to 1" deep. Another specimen 8" long has on 2 of the surfaces about 6 holes  $\frac{1}{8}$ " to  $\frac{3}{4}$ " deep besides superficial traces of white-ant-attack over an area of 2 sq. inches, and deep: on a cut-end, there are 3 tunnels one of which is  $4\frac{1}{2}$ " long and another about 6" and the third  $\frac{1}{2}$ ". Another specimen 6" long has half a dozen beetle-holes one of which is  $1\frac{1}{2}$ " deep and the rest  $\frac{1}{8}$ ".

On the whole, the wood, especially the sapwood portion is liable to insect-attack to an appreciable extent.

121. *Dialium travancoricum*. Date of collection:—10-4-1895.

Mal—*Malampuli*.

There is only one unvarnished specimen about 10" long kept in the verandah shelf. In the heartwood portion, there are about 30 holes  $\frac{1}{2}$ " to 2" deep; sapwood has been converted into a system of tunnels and cavities by borers and white-ants; on the transversely cut ends, there are openings of numerous tunnels  $\frac{1}{16}$ " to  $\frac{1}{10}$ " in diameter.

The heartwood is appreciably attacked by borers while the sapwood is very badly damaged both by beetles and white-ants. The heartwood portion though obviously immature, is strong and not rendered unutilisable; mature heartwood would probably be immune from insect-attacks.

122. *Turpinia nepalensis*.

Tam—*Kanali*.

Mal—*Pambu vetti, santha*.

Only a partially varnished specimen is available. On the varnished surfaces, there are 6 beetle-holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep and 5 superficial white-ant cavities 2" to 4" long,  $\frac{1}{8}$ " to  $\frac{3}{4}$ " broad and  $\frac{1}{4}$ " to  $\frac{1}{2}$ " deep; on an unvarnished surface, there are over 10 holes similar to those on varnished surface; white-ants have removed superficial portions over an area of 2 sq. inches altogether and to a depth of  $\frac{1}{8}$ " to  $\frac{1}{4}$ ".

Interior of the wood does not appear to have been much affected but externally it is appreciably attacked.



123. *Sarcocephalus Missouris*.Tam & Mal—*Attu canji*.

Only an unvarnished specimen kept in the verandah rack is available. On one of the broader surfaces, there are about 15 holes and on the other broader surface nearly 30 holes, half a dozen being 1" to 1 $\frac{3}{4}$ " deep and the rest  $\frac{1}{3}$ " to 1"; on the transversely cut ends, there are about a dozen holes (varying from  $\frac{1}{16}$ " in diameter to  $\frac{1}{3}$ "  $\times$   $\frac{1}{8}$ " in width at the opening, and 3" to 6" long.

On the whole, though the wood is appreciably attacked by beetles, the attack is more or less superficial and the specimen being somewhat immature, what is found in it cannot be taken as a guide regarding the insect-resistant power of this timber.

124. *Albizia stipulata*. Date of collection:—6-11-1894.

Eng—The Sau tree.

Tam—*Pili vègei, chila vègei*.Mal—*Potta vèga, motta vèga*.

In a partially varnished specimen, the varnished surfaces of heartwood have 20 beetle-holes  $\frac{1}{16}$ " to  $\frac{1}{12}$ " in diameter and mostly  $\frac{1}{2}$ " or less deep; some leading to superficial tunnels not more than  $\frac{1}{2}$ " deep from the surface; the unvarnished surfaces of heartwood have about 30 holes  $\frac{1}{3}$ " to  $\frac{3}{4}$ " deep, some of them leading to shallow cavities and tunnels below the surface; on the transversely cut ends, there are about half a dozen tunnels 1" to 6" long and  $\frac{1}{7}$ " to  $\frac{3}{4}$ " wide, some of them probably originating from points damaged while felling the tree; both varnished and unvarnished surfaces of sapwood have numerous beetle-holes, many of them opening into tunnels and white-ant-chambers in the interior of the wood. An unvarnished specimen kept in the verandah shelf has its heartwood portion quite immune, while in the sapwood there are 3 holes  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep and 2 white-ant cavities 2 $\frac{3}{4}$ "  $\times$   $\frac{3}{4}$ "  $\times$   $\frac{1}{2}$ " and 1 $\frac{3}{4}$ "  $\times$   $\frac{3}{4}$ "  $\times$   $\frac{1}{2}$ " besides a narrow groove leading to a tunnel 3" long. Another specimen 6" long has on its heartwood surface only one hole 1 $\frac{1}{4}$ " deep while in the sapwood, there are about 18 holes  $\frac{1}{8}$ " to 2" deep slantingly and half a dozen small tunnels  $\frac{1}{2}$ " to 1" long and less than  $\frac{1}{8}$ " to  $\frac{1}{16}$ " wide.

In the partially varnished specimen, heartwood is appreciably attacked, while sapwood is badly damaged and in the unvarnished specimens, the heartwood is seen to be almost quite immune while sapwood is moderately attacked.

125. *Gomphandra axillaris*. Date of collection:—3-4-1894.

Only one partially varnished specimen is available. A varnished surface which is away from the centre is attacked by white-ants to a consider-

able extent, area attacked being about 11" long and 1" to 1½" broad and depth of the cavities ⅛" to ½" and on the same surface there are about 15 holes ⅓" to ½" deep leading to cavities in the interior of the wood; a narrower varnished side is quite immune; on an unvarnished side near the centre, there are about 2 dozen holes ⅓" to ½" deep besides a few narrow superficial grooves filled with a powdery substance; on the cut-ends, there are over a dozen tiny holes similarly filled with powdery matter. The wood has cracked along a heartshake.

On the whole, the wood is very appreciably attacked away from the centre, while the central portion is less seriously attacked.

126. *Vateria indica*. Date of collection:—2-3-1894.

Eng.—The Piney varnish or Indian Copal tree.

Tam.—*Vellei kunthirikkam*.

Mal.—*Payni; paini*.

In a partially varnished specimen, on the varnished surfaces there are over a dozen tiny holes ⅛" to ½" deep leading to short narrow tunnels beneath the surface; unvarnished surfaces are also similarly attacked; on the transversely cut ends, there are about a dozen tunnels 1" to 5" long and ⅓" to ¼" in diameter at the openings. An unvarnished specimen kept in the verandah rack has about half of its wood removed by white-ants. Another similar specimen 6" long has 6 tiny holes ¼" to 2" deep, on the cut ends there are about half a dozen narrow tunnels ½" to 1½" long.

The wood seems to be rather appreciably attacked both by beetles and white-ants; but the interior central wood is not so seriously damaged as the outer portions. Mr. Bourdillon says "it appears not to be bored by beetles".

127. *Parinarium travancoricum*. Date of collection:—10-4-1895.

In a partially varnished specimen, a varnished side has about 10 holes apparently not very deep being only from ⅛" to ¾" but which seem to lead to chambers and tunnels in the interior of the wood; a broader unvarnished surface has about half a dozen similar holes while on the narrower unvarnished surface, white-ants have made a cavity 7" long, ¼" to ¾" broad and ½" deep besides 3 small slits and cavities leading to long narrow tunnels in the interior of the wood; superficially, the wood of the specimen does not seem seriously damaged but internally it appears to be badly tunnelled through. An unvarnished specimen a little over 2 feet long kept in the verandah shelf appears to be fairly immune, there being altogether about 50 very tiny holes ¼" to ½" deep mostly and rarely ¾"; most of these holes however lead to tunnels and white-ant chambers in the interior of the wood. 2 small pieces less than 6" long kept in the verandah rack are both badly tunnelled through to a greater extent than in the case of the other specimens.

• On the whole, the wood is appreciably attacked though it does not seem so externally. Judging from the appearance and weight of the longest piece, it cannot, however, be said that the insect-attacks have rendered the wood quite useless as timber.

128. *Kurrimia bipartita*. Date of collection:—3-4-1894.

Tam—Kadapla.

Only a partially varnished specimen is available. On a varnished surface, there are about 30 holes  $\frac{1}{8}$ " to 1" deep and white-ants have eaten away 2 portions of the wood 1" and 2" long and  $\frac{1}{8}$ " to  $\frac{3}{4}$ " wide; the broader unvarnished surface has also about 30 holes  $\frac{1}{8}$ " to  $\frac{3}{4}$ " deep and a longitudinal white-ant cavity 6" long  $\frac{1}{2}$ " to  $\frac{3}{4}$ " broad and  $\frac{1}{3}$ " to  $\frac{3}{4}$ " deep besides 3 short narrow grooves and cavities; on the cut-ends, there are 6 tunnels  $\frac{1}{2}$ " to 1" long and  $\frac{1}{8}$ " to  $\frac{3}{4}$ " wide; there seem to be white-ant chambers in the interior of the wood.

On the whole, the specimen has been appreciably attacked though it does not seem to have been rendered quite useless by the insect-attack.

129. *Humboldtia decurrens*. Date of collection:—10-4-1895.

Mal—Kunthani; malam thoduppu.

In a partially varnished specimen, a varnished surface has about a dozen holes  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep and half a dozen narrow grooves  $\frac{1}{4}$ " to  $\frac{1}{2}$ " long, and a portion of the wood about 10" long,  $\frac{1}{2}$ " to 1" broad and  $\frac{1}{4}$ " to 1" deep is destroyed by white-ants; on unvarnished sides, are found about 30 holes  $\frac{1}{4}$ " to  $\frac{3}{4}$ " deep on the broader surface and about 40 on the narrower, besides a few shallow narrow grooves and tunnels  $\frac{1}{2}$ " to 2" long, some of which are filled with powdery matter; there are also some internal cavities. In this specimen, attack of beetles is fairly extensive but superficial, while damage by white-ants is pretty deep on one side. An unvarnished specimen of less mature wood 1"–3" long kept in the verandah rack is attacked to a greater extent than the previous one; more than half the wood has been eaten away and reduced to a shell by white-ants; there are also numerous beetle-holes all over the specimen.

Beetle-attack is as extensive as in the previous specimen while white-ant attack is more damaging.

On the whole, the wood is liable to insect-attack to an appreciable extent.

130. *Celtis tetrandra*. Date of collection:—5-3-1907.

Tam—Murangan; kuniya.

In 3 unvarnished specimens kept inside the room, the extent of attack is more or less the same. In these specimens, on the surfaces away from the

centre there are 7 or 8 dozen holes about  $\frac{1}{12}$ " in diameter and  $\frac{1}{4}$ " to  $\frac{1}{2}$ " in depth as a rule; on the surfaces near the centre are found similar holes but less numerous; holes on the transversely cut ends are particularly numerous and are from  $\frac{1}{2}$ " to 2" long. White-ant attack is comparatively slight; in one of the specimens, there are 2 white-ant cavities 2" and 3" long,  $\frac{1}{2}$ " to 1" wide and  $\frac{1}{2}$ " to 1" deep; in another, a few internal cavities and tunnels about  $1\frac{1}{4}$ " deep have been made.

On the whole superficially the wood is badly attacked by beetles while white-ant attack is deeper in one specimen. The interior of the wood, however, does not seem to have been very much affected and the timber may therefore be considered to be fairly immune.

*Class V. Badly Attacked.*

131. *Pterospermum reticulatum*. Date of collection:—1-3-1894.

Tam—*Chinna polarū; muli polacu; thōlpulī.*

Mal—*Mala vāram.*

Kanie—*Ponangka.*

In a partially varnished specimen the broader varnished surface has about a dozen beetle-holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep and a white-ant cavity extending almost through the whole length of the specimen,  $\frac{1}{2}$ " to  $1\frac{1}{2}$ " in width, and  $\frac{3}{4}$ " to  $1\frac{1}{4}$ " in depth; a narrower varnished surface is almost quite immune; unvarnished surfaces have about 3 dozen beetle-holes  $\frac{1}{4}$ " to  $\frac{1}{2}$ " deep and rarely  $\frac{3}{4}$ " besides a number of narrow tunnels, slits and cavities, some communicating with internal chambers which run right through the whole length of the specimen.

An unvarnished specimen of standard length kept in the verandah rack has about 20 tiny holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep on each of the broader surfaces and along a narrower side white-ants have made a tunnel 5" long and  $\frac{3}{4}$ " deep; otherwise this specimen is fairly sound and strong.

Another unvarnished specimen is similarly attacked as the previous one; the wood of this has cracked and along the crack, white-ants have made long and deep tunnels and chambers rendering the wood practically useless.

Another smaller specimen about 5" long appears to be very fairly immune externally there being only 4 or 5 small holes and a tunnel 1" long,  $\frac{1}{8}$ " broad and  $\frac{1}{4}$ " deep but there seem to be cavities in the interior of the wood.

On the whole, the wood is very badly liable to attack by white-ants and to a smaller extent by beetles.

132. *Vernonia arborea*. Date of collection:—5-3-1907.

Tam—*Suthū.*

Mal—*Kadavāri; eerakathira; malanperuvā.*

Kanik—*Karanthel; kirama.*

Only an unvarnished specimen kept inside the room is available.

On each of its broader surfaces there are about a dozen holes  $\frac{1}{4}$ " to  $\frac{1}{2}$ " deep along one edge of the specimen, a portion 10" long.  $\frac{1}{4}$ " to  $\frac{3}{4}$ " deep and 1" to 2" broad is eaten away by white-ants; over a knot a cavity  $\frac{3}{4}$ "  $\times$   $\frac{1}{2}$ " wide at the opening, leads to a pretty large tunnel formed along a heartshake in the interior of the wood.

On the whole, though the wood is badly attacked along pre-existing defects, such as knots and heartshakes, the other portions seem quite sound.

133. *Heptapleurum Wallichianum.* Date of collection:—5-3-1907.

Two unvarnished specimens are kept inside the room.

In one of them, holes bored by beetles, though very numerous, are as a rule only  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep while in the other, the beetle-holes go up to  $\frac{1}{2}$ " in depth and communicate with shallow cavities beneath the surface.

In the former specimen, the cut ends have only a very few holes but in the latter there are many all less than  $\frac{1}{2}$ " in depth.

White-ant attack is slight in both specimens.

On the whole, the specimens, though very badly attacked superficially by beetles and slightly by white-ants, do not indicate that the interior of the wood is appreciably damaged.

134. *Polyalthia fragrans.* Date of collection:—18-1-1894.

Mal—*Nedunär.*

Kanik—*Chela; ulambatti; kodang; pullareti.*

In an only partially varnished specimen available, the broader varnished surface has about 3 dozen holes  $\frac{1}{8}$ " to  $\frac{3}{4}$ " deep and half a dozen tunnels and grooves 1" to 2" long,  $\frac{1}{8}$ " to 1" broad and  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep; on the broader unvarnished surface also there are about 3 dozen holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep and some 1"; on the cut ends there are over 15 holes 1" to 3" long and  $\frac{1}{8}$ " to  $\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " to 1" wide; superficial chambers have been bored by white-ants reducing portions of the wood to a shell.

On the whole, the specimen has been badly attacked by beetles and to some extent by white-ants. It seems, however, to be of immature wood.

135. *Callicarpa lunata.* Date of collection:—5-3-1907.

Tam—*Vettelei patta.*

Mal—*Thin perivellum; unmathekku.*

There is only a partially varnished specimen. The broader varnished

surface has about 6 beetle-holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep and a white-ant cavity  $4\frac{1}{2}$ " long,  $\frac{3}{4}$ " to  $1\frac{1}{4}$ " broad and  $\frac{1}{8}$ " to  $1$ " deep besides 2 smaller cavities; the narrower varnished surface is almost quite immune; the broader unvarnished surface has about 40 holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep; an edge of the wood  $\frac{1}{2}$ " to  $\frac{3}{4}$ " wide has been eaten away by white-ants; along a crack there is a slit-like tunnel  $2$ " long,  $\frac{1}{2}$ " wide, and  $\frac{1}{4}$ " deep; white-ants have made deep chambers in the interior of the wood besides 2 or 3 small superficial cavities.

On the whole the wood is badly liable to insect-attacks.

136. *Symplocos spicata*.

Tam—*Kambli vetti*.

The only specimen kept in the verandah shelf is practically free from beetle-attack, there being only 2 tiny holes  $\frac{1}{8}$ " or less deep. White-ants, however, have badly damaged the wood along cracks due to heartshake and in a knotty portion which has been scooped out into a large cavity around which a number of superficial cavities have been made; portions attacked by white-ants are altogether  $9$ " long,  $1$ " to  $1\frac{1}{2}$ " wide and  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep and in this area there are deep narrow slits  $2$ " to  $4$ " long, some extending through the whole thickness of the specimen.

On the whole, the wood is badly attacked by white-ants while it is practically free from attacks by beetles. As the damage on the specimen seems to have originated along pre-existing flaws in the wood, the condition of this specimen should not be taken as a reliable index of its inherent liability to insect-attacks.

137. *Xylopiia parvifolia*. Date of collection:—1-3-1894.

Tam—*Kalpotta*.

Mal—*Santhu*.

Only a partially varnished specimen is available for examination. On varnished surfaces there are over 10 dozen holes mostly  $\frac{1}{8}$ " to  $\frac{1}{4}$ " deep and rarely  $\frac{3}{4}$ ", many of them leading to white-ant chambers and tunnels below; beetle-attack on unvarnished surface is similar to the above; white-ants have made tunnels and chambers in considerable portions of the wood away from the centre.

The wood, especially the outer softer portion, is very badly liable to beetle and white-ant attacks.

138. *Garcinia cambogia*. Date of collection:—27-2-1894.

Tam—*Kodukkappuli*.

Mal—*Kodapuli: pinaru*.

Kanic—*Chigiri, kodayan*.

In an only partially varnished specimen available, the broader varnished surface has about a dozen holes  $\frac{1}{2}$ " to  $\frac{3}{4}$ " deep and 4 longitudinal cavities 1" to 6" long,  $\frac{1}{4}$ " to  $\frac{1}{2}$ " broad and  $\frac{1}{4}$ " to  $\frac{3}{4}$ " deep; the varnished surface also has about a dozen beetle-holes and large cavities and chambers  $\frac{1}{2}$ " to  $\frac{3}{4}$ " deep made by white-ants reducing the major part of the unvarnished side to a shell.

On the whole the wood is very badly damaged superficially to a maximum depth of about 1", mostly by white-ants and to a small extent by beetles.

139. *Givotia rottleriformis*. Date of collection:—21-9-1895.

Tam—Vandarlei.

In a partially varnished specimen, a varnished surface has over 10 beetle-holes  $\frac{1}{8}$ " to  $1\frac{1}{4}$ " deep and a large irregular cavity about 8" long,  $1\frac{1}{2}$ " to 2" broad and  $\frac{1}{2}$ " to  $\frac{3}{4}$ " deep made by white-ants; on an unvarnished surface there are over 25 beetle-holes and a large superficial tunnel  $\frac{1}{4}$ " in diameter; there are also a number of chambers in the interior of the wood extending from 1" to  $1\frac{1}{2}$ " in depth.

On the whole, beetles and white-ants have badly damaged the wood.

140. *Buchanania latifolia*. Date of collection:—1-3-1894.

Tam—Morala.

Mal—Mungapeza, Mungapezhu.

Kanie—Mora kangi; mura.

Only a partially varnished specimen is available; its varnished surface have about 3 dozen tiny beetle-holes  $\frac{1}{8}$ " or less deep and white-ant attack over an area of 2 sq. in. and to a depth of  $\frac{1}{4}$ " to  $\frac{1}{2}$ " besides a few superficial grooves originally made by beetles and some of them subsequently widened by white-ants; the unvarnished surfaces are attacked by white-ants and beetles to a greater extent reducing portions of the wood to a mere shell, but this attack is from the side of knots and heartshakes, the other portions being affected only superficially.

On the whole, the wood is badly attacked by white-ants and beetles, the latter attacking it superficially.

141. *Beilschmiedia Bourdillonii*.

Mal—Mora kutthi.

In a partially varnished specimen both varnished and unvarnished surfaces, especially the broader sides have numerous fine beetle-holes  $\frac{1}{2}$ " or less deep and a number of white-ant chambers not exceeding  $1\frac{1}{4}$ " in depth; on the cut ends, there are about 15 beetle-holes, most of them from 1" to  $1\frac{1}{2}$ " long filled with a powdery stuff; the interior of the wood is converted into tunnels and chambers by white-ants.

Wood-specimen of *Lansium anomalayanum*, typical of Class I,—the "Perfectly Immune."

PLATE I.



The wood is badly liable to beetle and white-ant attacks.

142. *Alstonia scholaris*. Date of collection :—6-11-1894.

Tam—*Mukkam palei* ;

Mal—*Ezhila pāla* ; *kodapālā* ; *pāla* ;

On a partially varnished specimen, a varnished surface has about 2 dozen holes many of them opening into tunnels and chambers below ; on the unvarnished surfaces there are also about 2 dozen holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep ; a large portion of the wood has been reduced to a mere shell by white-ants. A tunnel from a transversely cut end is  $1\frac{1}{2}$ " long and  $\frac{3}{4}$ "  $\times$   $\frac{1}{4}$ " wide at the opening ; there are white-ant cavities deep inside the portions away from the centre which are more seriously damaged than those nearer the centre. In specimens collected about 2 years ago, there are innumerable tiny beetle-holes not exceeding  $\frac{1}{2}$ " in depth, chiefly confined to the outer wood, the central portion being hardly affected.

On the whole, the wood is badly liable to attack by beetles as well as white-ants and particularly by the latter in portions of the wood away from the centre.

143. *Milium velutina*. Date of collection :—6-11-1894.

Mal—*Kana kaitha* ; *rilāni*.

Only a partially varnished specimen is available. All the surfaces except the narrower varnished side have numerous holes  $\frac{1}{8}$ " to  $\frac{1}{2}$ " deep riddled by borers and superficial cavities made by white-ants ; at the cut-ends are beetle-holes completely filled or only closed at the mouths with a powdery substance.

The specimen has been, on the whole, badly subjected to insect-attacks.

144. *Diospyros oricensis*. Date of collection :—10-4-1895.

In the only varnished specimen available, both varnished and unvarnished surfaces are very badly attacked by white-ants whole portions of the wood both external and internal having been eaten away by them. The beetle-holes though numerous especially on unvarnished surface are only from  $\frac{1}{4}$ " to  $\frac{1}{2}$ " deep.

The specimen is very badly attacked by white-ants and superficially by beetles. The small black obony patches and streaks found scattered on the specimen are hard and unaffected by insect-attacks.

145. *Stephegyne parvifolia*. Date of collection :—18-1-1894.  
21-9-1895.

Mal—*Malam thumba*.

There is only an unvarnished specimen kept in the verandah rack. On

its 2 broader surfaces there are about 30 beetle-holes  $\frac{1}{4}$ " to  $\frac{3}{4}$ " deep ; there are also about a dozen slits and small superficial cavities leading to deep and long chambers in the interior of the wood.

The wood is badly attacked internally and reduced to a mere shell though superficially the traces of attack are not so conspicuous.

146. *Ecodia Roxburghiana*. Date of collection :—12-3-1895.

Mal—Kāndei ; Kattu shambagom.

An only partially varnished specimen available is seen to be badly attacked by white-ants on both varnished and unvarnished sides ; white-ants have made numerous tunnels and cavities especially on a broader varnished surface and a narrow unvarnished side which are more remote from the centre than the others ; the largest cavity extends through the whole length of the specimen and is  $\frac{1}{2}$ " to 1" broad and  $\frac{1}{2}$ " to 1" deep, the other chambers being less than  $\frac{1}{2}$ " deep. Portions nearer the centre are attacked to a smaller extent than those more remote. Beetle-holes are comparatively few and less than  $\frac{3}{4}$ " deep.

The wood is on the whole badly liable to white-ant attack superficially to a depth of  $\frac{1}{2}$ " to 1".

147. *Diospyros microphylla*. Date of collection :—27-2-1894.

Tam—Chinna thuvare ; molaghu thuvare ;

Mal—Thovara kari ; kattu thovara.

There is only a partially varnished specimen, both the varnished and unvarnished surfaces of which, and especially the latter, are closely riddled over with beetle-holes about  $\frac{1}{16}$ " in diameter and  $\frac{1}{2}$ " deep.

The whole of the interior of the wood has been reduced into a shell consisting of deep cavities, tunnels, and galleries.

This is one of the worst-attacked of all the specimens of timbers examined and seems to be quite useless.

148. *Cyclostemon macrophyllus*. Date of collection :—12-3-1895.

Mal—Mala payin.

There is only a partially varnished specimen. It is a mere shell with a very thin layer of the surface alone left, (more of the varnished surface is left than the unvarnished) showing a number of small holes and slits while, beneath are large tunnels, cavities, and galleries with very thin papery sheets of wood, hiding them from the outer view.

This is one of the worst-attacked specimens and has been selected as the type of this class for illustration. See Plate V.

(In one of the tunnels of this specimen was found a dead tiny coppery-brown beetle and a few living white-ants.)

149. *Garcinia Morella*. Date of collection:—12-3-1895.

Eng—*Gamboje tree*.

Tam—*Makki*.

Mal—*Chigiri*.

In an only partially varnished specimen available both the varnished and unvarnished surfaces are very badly attacked by white-ants and to a lesser extent by beetles which have bored numerous very shallow holes. The whole specimen is reduced to a shell partitioned off into cavities, tunnels, and galleries by thin papery sheets of wood.

This wood is very badly attacked by white-ants and only superficially by beetles.

150. *Ostodes zeylanica*. Date of collection:—5-5-1904.

There is only an unvarnished specimen about 9" long kept inside the room. White-ants have eaten away almost the whole of the interior of the wood leaving the specimen a mere shell; beetle-holes are also fairly numerous.

Judging from this single specimen available this is the worst wood as regards liability to white-ant-attack, the damage by beetles being comparatively slight and superficial.

Plate I.

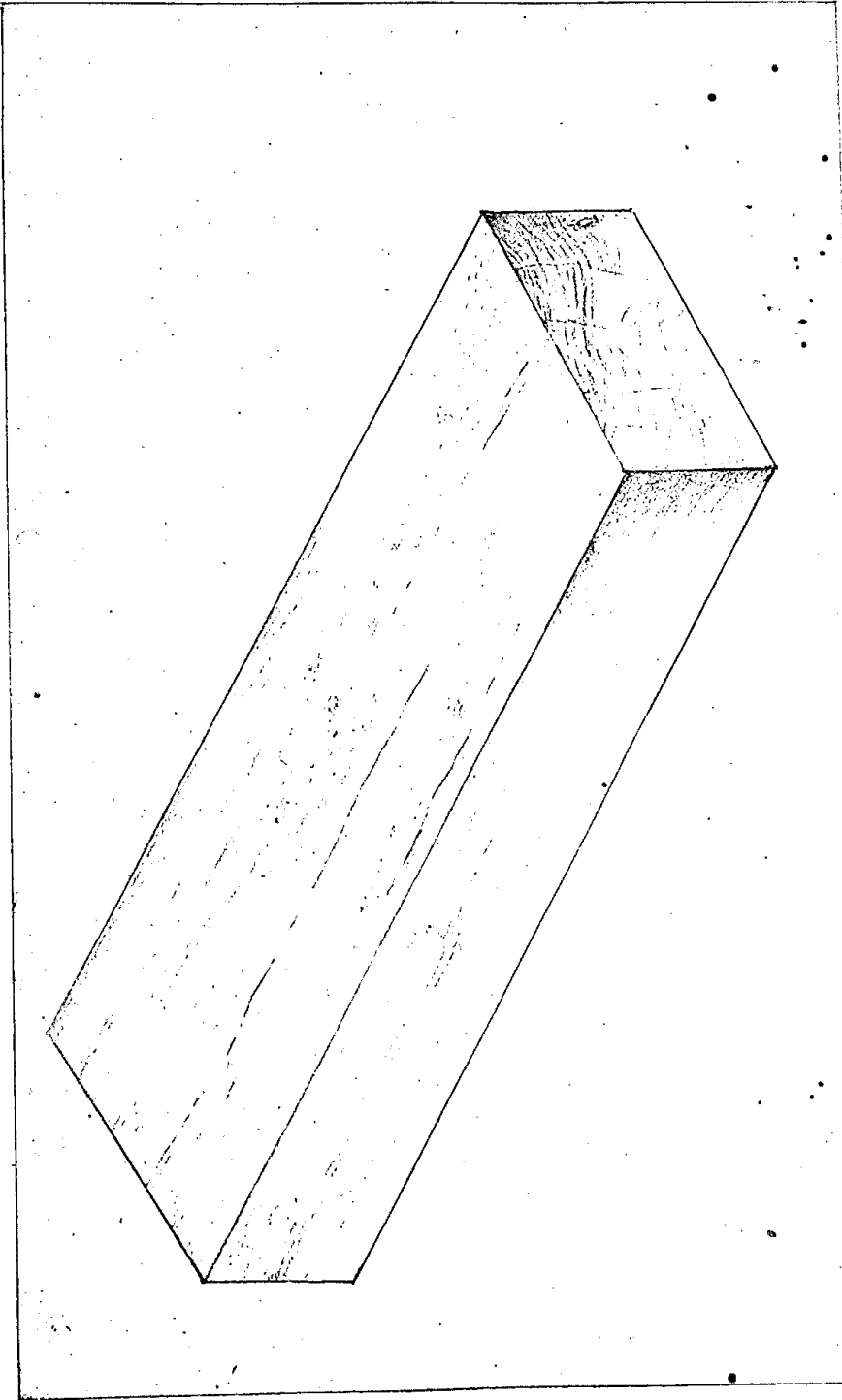


PLATE II.

Wood-specimen of *Diospyros Ebenum*, typical of Class II.—the “Almost perfectly Immune.”

*a, a*—Beetle-holes.

*b*—A small shallow cavity made by white-ants.

*c, c*—Extremely fine cracks in the wood.

*d, d*—Concentric rings, probably annual.

Plate II.

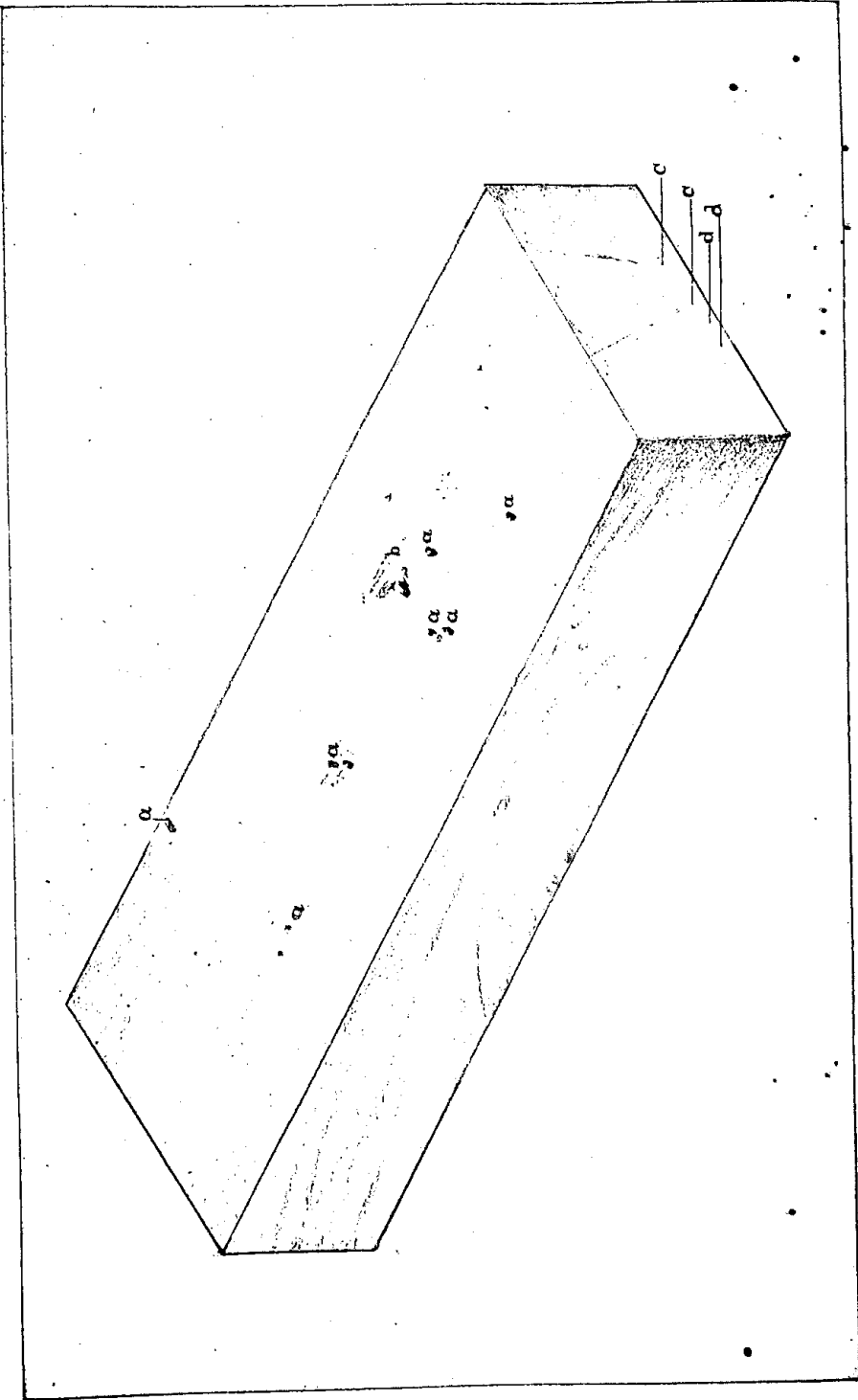


PLATE IV.

Wood-specimen of *Diospyros nilagirica*, typical of Class IV.—the “Appreciably attacked.”

*a, a*—Beetle-holes.

*b, b*—Tunnels made by beetles.

*c, c*—Cavities made by white-ants probably entering through holes and tunnels made by beetles.

*d, d*—Concentric rings, probably annual.

Plate IV.

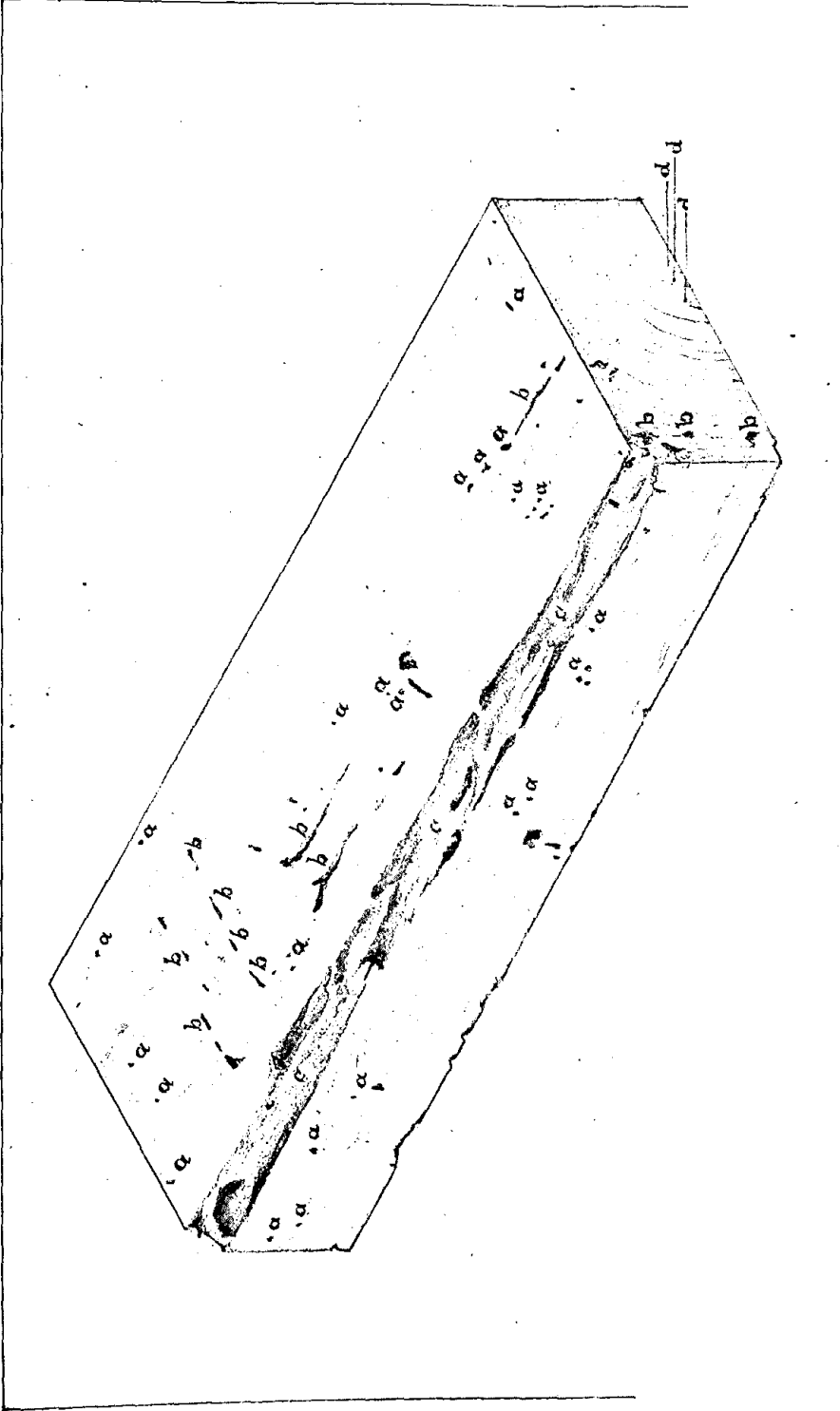




PLATE V.

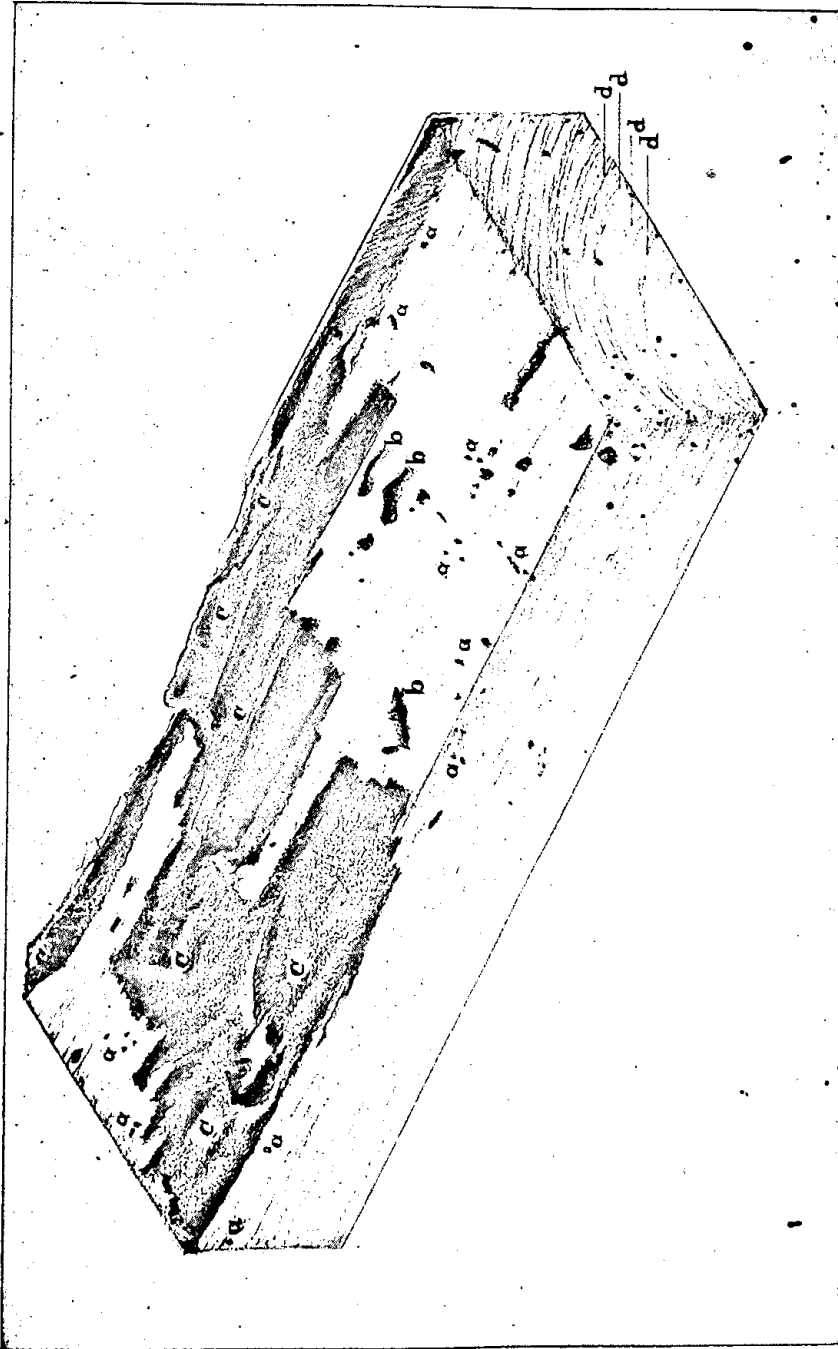
Wood-specimen of *Cyclostemon macrophyllus*, typical of Class V.—the "Badly attacked."

a, a—Beetle-holes.

b, b—Very shallow groove-like depressions made by white-ants.

c, c—Tunnels and cavities made by white-ants.

d, d—Concentric rings, probably annual.



INDEX OF BOTANICAL NAMES.

Botanical name of timber.	Serial No. in the Note.	Page.	Botanical name of timber.	Serial No. in the Note.	Page.
<b>A.</b>			<b>D.</b>		
Actinodaphne Hookeri ...	39	16	Casuarina equisetifolia } ...	21	10
Aglaiia Maire ...	92	38	Casuarina tree ...	102	42
Do. Roxburghiana ...	51	21	Cedrela Toona ...	130	54
Alangium Lamarckii ...	9	6	Celtis tetrandia ...	13	7
Albizzia oderatissima ...	41	17	Ceylon Oak ...	35	15
Do. procera ...	37	16	Ceylon Ebony tree ...	107	45
Do. stipulata ...	124	52	Chrysophyllum Roxburghii ...	114	48
Alstonia scholaris ...	142	59	Charcoal tree ...	70	29
Amoora Rohituka ...	64	26	Cinnamom tree ...	8	6
Anogeissus latifolia ...	27	12	Do. zeylanicum ...	70	29
Artocarpus integrifolia ...	36	15	Cleaving nut tree ...	66	27
Do. Lakoocha ...	30	13	Cotton tree ...	88	37
<b>B.</b>			Cyclostemon macrophyllus ...	148	60
Baccaurea courtallensis ...	111	46	Cynometra Bourdillonii ...	33	14
Bassia fulva ...	17	9	<b>E.</b>		
Bauhinia malabarica ...	103	42	Dalbergia latifolia ...	11	6
Do. racemosa ...	54	22	Dialium travancoricum ...	121	51
Beefwood tree ...	21	10	Dillenia pentagyna ...	61	25
Beilschmiedia Bourdillonii ...	141	58	Diospyros Bourdillonii ...	81	34
Bischofia javanica ...	112	47	Do. Candolleana ...	76	32
Blepharistemma corymbosum ...	106	44	Do. Ebenum ...	35	15
Bocagea Dalzellii ...	83	35	Do. Embryopteris ...	116	49
Bombax malabaricum ...	88	37	Do. orixensis ...	144	59
Bombay Rosewood ...	11	6	Do. microphylla ...	147	60
Bridelia retusa ...	72	30	Do. nilagirica ...	118	50
Buchanania latifolia ...	140	58	Do. sulcata ...	84	35
<b>C.</b>			Do. sp. (Bourdillon's No. 239) ...	82	34
Callicarpa lanata ...	135	56	Dipterocarpus Bourdillonii ...	78	33
Calophyllum tomentosum ...	86	36	Do. indicus ...	79	33
Do. Wightianum ...	105	43	Dysoxylum malabaricum ...	45	19
Canthium pergracile ...	108	45	Do. purpureum ...	74	31
Carallia lucida ...	68	28	<b>E.</b>		
Careya arborea ...	31	14	Eleocarpus tuberculatus ...	110	46
Cassia fistula ...	15	8	Eriolena quinquelocularis ...	5	6

Botanical name of timber.	Serial No. in the Note.	Page.	Botanical name of timber.	Serial No. in the Note.	Page.
<i>Eugenia kanarensis</i> ...	46	20	<i>Hopea glabra</i> ...	28	13
Do. <i>corymbosa</i> ...	34	15	Do. <i>parviflora</i> ...	12	7
Do. <i>Jambolana</i> ...	23	11	<i>Humboldtia Bourdillonii</i> ...	89	37
Do. <i>lata</i> ...	52	22	Do. <i>decurrens</i> ...	129	54
<i>Eugenia montana</i> ...	94	39	Do. sp. ( <i>H. Vahliana</i> ) ...	90	37
Do. sp. ( <i>E. Corymbosa</i> ) (shen nyaral, vern.) ...	47	20	<b>I</b>		
Do. sp. ( <i>Bourdillon's</i> No. 232) ...	7	6	Indian Copal ...	126	53
Do. sp. ( <i>Do. Do. 235</i> ) ...	93	38	Indian Laburnum ...	15	8
<i>Evodia Roxburghiana</i> ...	146	60	Iron wood ...	16	8
Eye ball tree ...	20	10	<i>Ixora Notoniana</i> ...	29	13
<b>F.</b>			<b>J.</b>		
<i>Ficus glomerata</i> ...	119	50	Jambu ...	23	11
Do. <i>hispida</i> ...	113	47	Jack tree ...	36	15
Do. <i>Talboti</i> ...	71	30	<b>K.</b>		
<i>Filicium decipiens</i> ...	1	5	<i>Kurrimia bipartita</i> ...	128	54
<i>Flacourtia Cataphracta</i> ...	32	14	<b>L.</b>		
<b>G.</b>			<i>Lagerstræmia Flos-Reginæ</i> ...	60	25
Jamboge tree ...	149	61	Do. <i>lanceolata</i> ...	62	25
<i>Garcinia Cambogia</i> ...	138	57	<i>Lansium anomalayanum</i> ...	2	5
Do. <i>echinocarpa</i> ...	49	21	<i>Litsea glabrata</i> ...	63	26
Do. <i>Imberti</i> ...	50	21	Do. <i>zeylanica</i> ...	56	23
Do. <i>Morella</i> ...	149	61	Longan tree ...	20	10
Do. <i>ovalifolia</i> ...	42	18	<b>M.</b>		
Do. <i>travancorica</i> ...	38	16	<i>Machilus macrantha</i> ...	97	40
<i>Sivotia rottileriformis</i> ...	139	58	Marking-nut tree ...	58	24
<i>Hochlidion lanceolarium</i> ...	10	6	<i>Mastixia arborea</i> ...	117	49
Do. <i>zeylanicum</i> ...	14	8	<i>Melia composita</i> ...	98	40
<i>Gluta travancorica</i> ...	25	12	<i>Meliosma simplicifolia</i> ...	87	36
<i>Imelina arborea</i> ...	73	30	<i>Memecylon edule</i> ...	67	28
<i>Comphandra axillaris</i> ...	125	52	<i>Mesua ferrea</i> ...	16	8
<i>Condonia obtusa</i> ...	43	18	<i>Miliusa velutina</i> ...	143	59
<i>Creteria tiliaefolia</i> ...	40	17	<b>N.</b>		
<b>H.</b>			<i>Nephelium Longan</i> ...	20	10
<i>Hardwickia pinnata</i> ...	115	48	Do. <i>stipulaceum</i> ...	99	41
<i>Hemicyclca travancorica</i> ...	24	11	<i>Nux-vomica</i> ...	65	26
Do. <i>venusta</i> ...	85	35			
<i>Hemixyrosa deficiens</i> ...	95	39			
<i>Leptapleurum Wallichianum</i> ...	133	56			
<i>Lomalium travancoricum</i> ...	80	33			

INDEX OF BOTANICAL NAMES.

iii

Botanical name of timber.	Serial No. in the Note.	Page.	Botanical name of timber.	Serial No. in the Note.	Page.
<b>O.</b>			<b>Strychnos Nux-vomica</b> ... 65 26		
Ocina Wodier ...	77	32	Do. potatorum ...	66	27
Olea dioica ...	101	41	Symplocos macrocarpa ...	69	29
Ostodes zeylanica ...	150	61	Do. spicata ...	136	57
<b>P.</b>			<b>T.</b>		
Palaquium ellipticum ...	19	10	Teak tree ...	53	22
Parinariium travancoricum ...	127	53	Tectona grandis ...	53	22
Piney Varnish tree ...	126	53	Terminalia paniculata ...	57	23
Pittospermum dasycaulon ...	3	5	Do. tomentosa ...	48	20
Polyalthia fragrans ...	134	56	Do. travancorensis ...	120	50
Poon spar ...	86	36	Tetrameles nudiflora ...	26	12
Portia tree ...	4	5	Thespesia populnea ...	4	5
Ptorocarpus Marsupium ...	22	11	Trema orientalis ...	114	48
Pterospermum reticulatum ...	131	55	Turpinia nepalensis ...	122	51
Do. rubiginosum ...	91	37	<b>Y.</b>		
Pygeum Wightianum ...	96	39	Vateria indica ...	126	53
<b>R.</b>			Vatica chinensis ...	75	31
Randia Gardneri ...	44	18	Venteak ...	62	25
Redwood tree ...	25	12	Vernonia arborea ...	132	55
Red cedar ...	102	42	Vitex altissima ...	59	24
<b>S.</b>			<b>W.</b>		
Sau tree ...	124	52	Walsura piscida ...	18	9
Sarcocephalus Missionis ...	123	52	White Siris tree ...	37	16
Schleichera trijuga ...	13	7	White cedar ...	45	19
Semecarpus Anacardium ...	58	24	Webera corymbosa ...	6	6
Stephegyne parvifolia ...	143	59	Wrightia tomentosa ...	100	41
Stereospermum chelonoides ...	109	45	<b>X.</b>		
Do. xylocarpum ...	55	23	Xanthophyllum flavescens ...	104	43
Strychnine tree ...	65	26	Xylopiia parvifolia ...	137	57

## INDEX OF VERNACULAR NAMES.

T Stands for Tamil, M for Malayalam, K for Kanie.

Name of wood specimen.	Serial No. in the Note.	Page.	Name of wood specimen.	Serial No. in the Note.	Page.		
Acchen chedi T.	...	9	6	Chokkala T.	...	51	21
Adakka payin M.	...	75	31	Chona-atthi T.	...	113	47
Adimundan M.	...	89	37	Choppala M.	...	19	10
Alanji T.	...	9	6	Chula maruthu M.	...	120	50
Arna M.	...	114	48	Edana M.	...	70, 101	29, 41
Ambarattbi T.	...	114	48	Edangkorna M.	...	55	23
Ammakarom M.	...	110	46	Eerakathira M.	...	132	55
Ammei M.	...	67, 107	28	Eetti M.	...	11	6
Anei kombi M.	...	108	45	Elavu T.	...	88	37
Anei kumbi M.	...	103	42	Eli chulian	...	91	
Aram puli M.	...	9	6	Ennei T.	...	79	33
Aringil M.	...	72	30	Eringolan M.	...	70	29
Asiveri K.	...	107	45	Erfilpalei T.	...		
Atha M.	...	8	6	Erumanakk M.	...	113	47
Attu Karuva M.	...	96	39	Ezhilapala M.	...	142	59
Atta narei T.	...	105	43	Ilavu M.	...	88	37
Attapunna M.	...	103,	42	Illa-pongu M.	...	28	13
Atthi T. & M.	...	119	50	Irumbarippi M.	...	29	13
Attuvangi T. & M.	...	123	52	Itthi T.	...	71	30
Ayma M.	...	31	14	Jalavaga M.	...	37	16
Chadicha M.	...	40	17	Kadapla T.	...	128	54
Charalu T.	...	32	14	Kadavari M.	...	132	55
Charattanjili M.	...	78	33	Kadavu K.	...	72	30
Chauku T.	...	21	10	Kalavi K.	...	87	36
Chela K.	...	134	56	Kalpotta T.	...	137	57
Chem-marom M.	...	64	26	Kalasan M.	...	77	32
Cherupunna M.	...	105	43	Kalikambili T.	...	29	13
Chigiri M. & K.	...	133 &	57	Kalitthi M.	...	71	30
		149	61	Kal payin M.	...	79	33
Chilavagei T.	...	124	52	Kambagom M.	...	12	7
Chil. nthi T.	...	4	5	Kambivetti T.	...	136	57
Chima M.	...	30	13	Kanakaitha M.	...	83, 143	59
Chini T. & M.	...	26	12	Kanalei M.	...	67, 146	60, 28
Chinnapolavu T.	...	131	55	Kanali T.	...	122	51
Chinnathuvarei T.	...	147	60	Kanam Mayili K.	...	99	41
Chittilei polavu T.	...	91	37				
Chitilei vagei T.	...	41	17				

INDEX OF VERNACULAR NAMES.

V

Name of wood specimen.		Serial No. in the Note.	Page.	Name of wood specimen.	Serial No. in the Note.	Page.
Kanji	M.	32	14	Kura	T.	6
Kanjiram	M.	65	26	Kuranvembu	T.	98
Kanyavu	T.	67	28	Kusavi	K.	87
Kar-agil	M.	74	31	Kuviya	T.	130
Karakongu	T.	28	13			
Karanthai	K.	132	56	Lavanga	T.	70
Kar-anjili	T.	78	33			
Kari	M.	76, 84, 81	32, 35	Madakka	M.	104
				Madeyan Sampirani	T.	115
Karinkali	T.	35	15	Madul	T.	49
Karingkura	M.	109	45	Mailampala	T.	100
Karitti	M.	11	6	Makki	T.	149
Karu	M. & T.	35, 118	15, 50	Malapayin	M.	148
Karimaruthu	M.	48	20	Malavembu	M.	98
Karumaruthu	T.	48	20	Malavirinya	M.	39
Karuvagei	T.	41	17	Malachithiyam	T.	112
Karumchatthi	T.	81	34	Malamparala	M.	69
Karunthagara	M.	37	16	Malampuli	M.	121
Karunthuvarei	T.	81	34	Malamthodali	M.	91
Karungali	T.	35	15	Malamthodappu	M.	129
Karuva	T. & M.	70	29	Malamthumba	M.	145
Kashava	M.	67	28	Malamperuva	M.	132
Kattukadukka	M.	120	50	Malampongu	T.	38
Kattumuli	M.	21	10	Malavembu	M.	98
Kattypunna	M.	86	36	Malei atthi	T.	54
Kattu punnei	T.	86	36	Malei veppu	T.	102
Kattu-puvan	T.	20	10	Malavuram	M.	131
Kattushambagom	M.	146	60	Manimaruthu	M.	60
Kattuthovara	M.	147	60	Manja Kanji	T.	50
Kaitu-illupoi	T.	19, 107	10	Manja nangu	M.	42
Kirana	K.	132	56	Manja nara	M.	83
Kiyavu	M.	115	48	Manja punna	M.	105
Kodagan	K.	138	57	Marukanchiram	M.	27
Kodangi	K.	134	56	Maruthu	M.	57
Kodapalei	T.	115	48	Mathagirivenbu	M.	102
Kodapala	M.	142	59	Mayila	M.	59
Kodavasi	M.	110	46	Mayilei	T.	59
Kodukkapuli	T.	138	57	Mayilelu	M.	59
Kodal	M.	81	34	Mini	T.	114
Kodapuli	M.	138	57	Molaga shambaga palei	T.	56
Koddappuuna	M.	61	25	Molaguthuvarei	T.	147
Kolamavu	T.	97	40	Morala	T.	140
Kolavu	M.	115	48	Mora Kanji	K.	140
Kongu	T.	12	7	Morakutthi	M.	141
Konna	M.	15	8	Mottavagei	M.	124
Konnei	T.	15	8	Mottal	M.	104
Kumbil	M.	73	30	Mudelai	T.	114
Kunthani	M.	129	54	Mukkampalei	T.	142

Name of wood specimen.	Serial No. in the Note.	Page.	Name of wood specimen.	Serial No. in the Note.	Page.
Mukkayani M.	72	30	Pal Elingi K.	107	45
Mulipolavu T.	131	55	Palan kacchi T.	96	39
Mklei M.	20	10	Palla kanni T.	85	35
Mullaingayam M.	72	30	Pambavetti M.	122	51
Mullavengei T.	72	30	Paniccha M. & T.	116	49
Mullunaruthu T.	72	30	Paralei T.	69	29
Mungapezhu M.	140	58	Parava idalei T.	101	41
Mura K.	140	58	Pathiri T.	55	23
Murangan T.	130	54	Pattipunna M.	61	25
Mushtinbi M.	35	15	Pavetti T.	6	6
Muttakai M.	111	46	Pavirimulei M.	99	41
Muttakongu K.	96	39	Payni M.	126	53
Muttathuri M.	111	46	Pei-atthi T.	113	47
Muttei T.	104	43	Pei-maruthu T.	57	23
			Pei-kadukkai T.	120	50
Naga M.	23	11	Peri M.	16	8
Naggara M.	110	46	Per-illa piccha M.	18	9
Naikambagom M.	96	39	Perla T.	31	14
Naithekkku T.	61	25	Perzha M.	31	14
Naiunom T.	5	6	Pezhu M.	31	14
Nangu T.	16	8	Pila T. & M.	36	15
Nannal T.	112	47	Pilalu M.	110	46
Nava T.	23	11	Pilavu T. & M.	36	15
Naval T.	23	11	Pili vagei T.	124	52
Nedunar M.	134	56	Pillei maruthu M.	57	23
Nedanatta T.	83	35	Pinaru M.	138	57
Neelampala M.	100	41	Pinnapei M.	86	36
Nellivaga M.	41	17	Piyei T.	26	12
Ningal T.	1	5	Pombathiri T.	109	45
Nirkurunda M.	106	44	Ponangka K.	131	55
Nirnaruthu M.	60	25	Pongu T.	12	7
Nira M.	112	47	Porapunna M.	105	43
Niroli M.	1	5	Pori punna M.	20	10
Nirvittil M.	14	8	Poriyil M.	94	39
Nyara T.	34	15	Pottama <sup>3</sup> M.	114	48
			Pottavaga M.	124	52
Olam K.	72	30	Pu-maruthu M.	60	25
Omam T.	114	48	Pulivaga M.	41	17
Ongakatni M.	63	26	Pullarei K.	134	56
Ottanali T.	113	47	Punna M.	61	25
			Punapa M.		
Pachenthi M.	19	10	Punyava M.	51	21
Padarappan T.	44	18	Pura M. & K.	49	21
Paini M.	126	53	Puvam M.	13	7
Pal-arana T.	101	41	Puvan T.	13	7
Pala M.	19, 107, 142	10	Puvarassam T.	4	5
			Puvarassu M.	4	5
Palaga M.	108	45	Puvei M.	111	46



INDEX OF VERNACULAR NAMES.

vii

Name of wood specimen.	Serial No. in the Note.	Page.	Name of wood-specimen.	Serial No. in the Note.	Page.
Puvil-agil M.	74	31	Unu T.	40	17
Rethiyan M. & K.	96	39	Uram K.	115	48
Ruthracham T.	110	46	Uravu M.	97	40
			Urisa T.	77	32
			Uthi T.	77	32
Sambiri M.	58	24	Valmuriccha M.	1	5
Sampirani M.	21	10	Valapunna M.	61	25
Santhana viri T.	2	5	Vallithondi M.	9	6
Santha M.	122	51	Vallabhom M.	68	28
Santhu M.	137	57	Vallovam M.	68,149	28
Shempunna	20	10	Vandakamin M.	2	5
Shempuvan T.	20	10	Vandarlei T.	139	58
Shenkottei T.	58	24	Varana M.	70	29
Shenkuranthi T.	25	12	Varanga M.	68	28
Shemnyaral	47	20	Vattathi T.	54	22
Sherankottei T.	58	24	Vayalnammal K.	14	8
Shetthuri M.	96	39	Vayankarei T.	32	14
Shurali M.	115	48	Vayana M.	56	23
Shutthi T.	132	55	Vayankatha M.	32	14
Sirapinnei T.	105	43	Vedangkonnai M.	55	23
			Vedi vembu M.	102	42
Thalra M.	32	14	Vekkali T.	27	12
Thambagom M.	12	7	Velvagei T.	37	16
Thandidiyan M.	17	9	Vella agil M.	45	19
Thekku T. & M.	53	23	Vella kasavu M.	85	35
Thembarei T.	58	24	Vella pasa M.	26	12
Thembavu M.	48	20	Vellaini M.	79	33
Thenkotta M.	58	24	Vellei kunthiri-		
Thettan kottei T.	66	27	kam T.	126	53
Thettanparal-			Vellei maruthu T.	57	23
kanjiram M.	66	27	Vellei pillei T.	24	11
Therikka M.	81	34	Vellelambu T.	85	35
Thevathali M.	2	5	Velutha pala M.	16	8
Thevatharam T.	102	42	Venmaruthu T.	57	23
Thinperivellam M.	135	56	Vennceri Vagha K.	112	47
Thirippu M.	112	47	Venga M.	22	11
Thittipilavu M.	30	13	Vengei T.	22	11
Thodappei M.	25	12	Venthekku M.	62	25
Tholpali T.	131	55	Vettileipatta T.	135	56
Thontha palei	100	41	Vevala T.	62	25
Thothagathi	11	6	Vidana M.	101	41
Thovarakari M.	147	60	Viluni M.	143	59
			Vitti M.	11	6
Udambatti K.	134	86	Yedalei	101	41
Unnam T.	40	17	Yetti T.	65	26
Umithekku T.	73	30			
Unnathekku M.	135	56			