This investigation was undertaken while the writer was stationed at the Waipoua Forest and was spread over about a year. Besides climbing the trees, much observation was done from the ground. It is probable, in fact certain, that some species were missed, but they would not be many, as considerable care was taken in examining each tree. It is quite easy to spend a couple of hours "wandering about" in the head of a large kauri!

**Common Names used:**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Totara</td>
<td><em>Podocarpus totara</em></td>
</tr>
<tr>
<td>Rimu</td>
<td><em>Dacrydium cupressinum</em></td>
</tr>
<tr>
<td>Kahikatea or White Pine</td>
<td><em>Podocarpus dacrydioides</em></td>
</tr>
<tr>
<td>Miro</td>
<td><em>Podocarpus ferrugineus</em></td>
</tr>
<tr>
<td>Tanekaha</td>
<td><em>Phyllocladus trichomanoides</em></td>
</tr>
</tbody>
</table>

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**TERMITES IN NEW ZEALAND.**

By A. F. CLARK.

Termites, which are often erroneously called white ants are social polymorphic insects belonging to one of the most ancient groups. Their nearest relatives appear to be the cockroaches, from which they probably separated in some very distant era.

The social organisation, the differentiation of forms and functions, has attracted the attention of many investigators in various parts of the world. Termites form colonies, the individuals of which are divided into castes, in some cases a caste having more than one form.

The winged insects form the reproductive caste and are present in the colony during the spring, summer or autumn. The compound eyes and dark wings are fully developed and usually upon a dull or showery day the insects leave the colony and undertake a colonising flight. The flight is irregular and weak and upon alighting the wings are broken off at a transverse suture near the base. The now wingless pairs seek suitable shelter under logs or debris, in crevices of wood or in branch stubs, where they mate and form a new colony; the original pair becoming the king and queen or royal pair. In most cases the body of the queen becomes greatly swollen owing to the development of the ovaries allowing prolonged and prolific egg laying. The early stages of the wing forms are known as nymphs and can be distinguished from other forms by the presence of wing buds.
The workers are the most numerous members of the colony. Blind, white in colour and soft bodied with inconspicuous jaws, they are usually the smallest of the forms. Nevertheless, it is this caste which performs the major work of the colony. The workers gather food, feed the royal pair, the soldiers and the young, build mounds, tunnels or nests and generally act as scavengers. True workers are not found in one group of wood-dwelling Termites (the Calotermitidae) their functions being carried out by the nymphs or larvae of the winged or the soldier forms.

The soldiers are wingless, sterile and generally blind and have elongated heads with conspicuously large jaws. The head is hard and is used for blocking up holes or passageways, while the jaws serve to deal with enemies such as ants or other invading insects. In addition to their function of defence, the soldiers also seem to direct the activities of the colony to some extent.

The Neotenic royalties are substitute reproductive forms which are in the nymphal stage. It would appear that in the event of the death of either of the royal pair, some nymphal stages can be brought rapidly to a sexually mature stage where they are able to replace either of the reproductive forms.

The food of Termites generally consists of cellulose, but they may feed upon such varied substances as leather, bone, leaves, grass and sugar. There are several matters in connection with feeding upon cellulose which are still not perfectly understood. One interesting discovery is that the intestine of the Termite contains a very large number of Protozoa and it appears that the presence of these Protozoa is essential for the digestion of cellulose. In the laboratory many Termites can be kept alive on a diet of filter paper.

According to their food habits Termites have in some cases been classified as Rotten Wood Termites, Dry Wood Termites and Subterranean Termites. In New Zealand we are interested now in the two latter groups. The New Zealand species, Calotermes brouni and Stalotermes ruficeps belong to the dry wood group. They do not form mounds but construct irregular and at times extensive burrows in timber, a characteristic feature of their workings being the large number of fecal pellets which are deposited. If the surface of the infested timber is broken, these pellets often pour out in a steady stream. Both species belong to the Calotermitidae and exhibit little social organisation in their colonies, true workers not being present.

C. brouni is found in the forest, infesting logs, stumps and dead portions of kauri, rimu, matai, totara, white pine and Nothofagus spp. amongst the native timbers and Pinus radiata and Cupressus macrocarpa amongst the introduced. It is probable that other hosts will be noted in the future. Puriri and C. macrocarpa are particularly favoured hosts. C. brouni will attack at ground level or enter through

173
the stub of a dead branch. *S. ruficeps* appears to have a somewhat similar host range and similar habits. In addition to being forest insects, at least one species, *C. browni*, is found infesting houses. It would appear that the damage caused by this Termite to houses is steadily increasing especially in the Auckland District, where foundations, flooring, linings, weatherboarding and studs are, at times attacked. The use of puriri for blocks or piles appear to be a pre-disposing factor to Termite attack. It remains to be seen whether *S. ruficeps* is also infesting houses.

Another species named from New Zealand but now thought to be of Australian origin is *Calotermes insularis* which is found at times in hard wood poles. Little is known of this insect in New Zealand, but in Australia it is reported to be of importance, damaging forest trees particularly in south eastern Victoria.

Unfortunately our New Zealand Termites have been reinforced by the addition of the Australian Termite, *Coptotermes lacteus* which the writer lately discovered to be established in Auckland. *C. lacteus* belongs to the subterranean group of Termites and is reported to be responsible for most of the damage caused around Sydney. It occurs in New South Wales and Victoria. It is, of course, impossible to say, at the present time, how serious the establishment of this Australian Termite will prove to be, but its presence in New Zealand cannot be viewed with other than considerable concern. Already it has been found severely damaging houses and it remains to be seen how far it has spread throughout the country.