

trial in each particular case. An attempt to prepare a scale of stocking classes for *Pinus radiata* from aerial photographs was only partially successful, the indications being that if site-quality were taken into account such a scale could be developed. These investigations will continue as time and staff permit.

FOREST PATHOLOGY RESEARCH

(1) *Entomology*.—The local epidemic of *Sirex noctilio* which has been developing in Rotorua Conservancy over the last three years has continued. Investigation of dying *Pinus radiata* has shown that death is directly attributable to mass attack by *Sirex*, and that the killing is caused by the action of the associated fungus upon the rays and water-conducting elements of the wood. It is significant that an insect, normally regarded as purely secondary, should be capable of becoming of primary importance. The epidemic is probably associated with an unusual series of hot dry summers, coupled with the existence of ideal breeding-sites in the form of trees left after felling operations. It is probable that if more aggressive insects, such as bark beetles, were to be introduced, the trees would be killed before they became susceptible to *Sirex*, which would then revert to its position of secondary importance. The fact that *Sirex* has been able to develop to this extent is in itself an indication of an unhealthy condition within the stands, and of the heavy mortality which may be expected should a dangerous species be introduced.

Following the investigation of *Pinus radiata* in which the effects of climate, soil, aspect, insects, and fungi were studied, *Sirex noctilio* was selected as a specific subject for research. While it will be several years before proof of many of the more obscure points is obtained, it has become clear that *Sirex* is the vector for a fungus which is capable of killing *Pinus radiata* and other pines. The predisposing conditions for successful attack are now under investigation. The study was made with particular reference to *Pinus radiata* in the Rotorua Conservancy; but general information was collected regarding dates of emergence and oviposition throughout New Zealand for both *Sirex* and its parasite, *Rhyssa persuasoria*. Information was also obtained regarding *Sirex* attack on other species of pine. *Rhyssa* has been bred out from material collected in Whakarewarewa Forest and liberated in new localities.

Breeding experiments were initiated to study the life-history of *Navomorpha lineatum*, which attacks branches of Douglas fir. The study was complicated by the presence of a second species, *N. sulcatum*, which apparently attacks branches killed by the first species. Routine work in entomology included the following:—

- (a) Collection and identification of forest insects.
- (b) Life-history studies, breeding under controlled and uncontrolled conditions.
- (c) Compilation of data from returns submitted by outside observers.
- (d) Advice to field staff, and identification of specimens sent in.

(2) *Mycology*.—Special attention was given to the identification, distribution, and importance of fungi-forming mycorrhizæ with forest trees, particularly with exotic species. Fungi attacking *Sirex*, *Rhyssa*, scale insects, and cicadas were studied, and the following routine projects were dealt with:—

- (a) Collection, preservation, and identification of forest fungi.
- (b) Maintenance of stock cultures of forest fungi.
- (c) Toxicity tests for wood-preservatives.
- (d) Advice to field staff, and identification of specimens sent in.

Other investigations included the causes of mortality in *Pinus radiata* regeneration following fire; the deterioration of timber in fire-damaged indigenous trees; *Cytaria* disease, *Nothofagus menziesii*; *Platypus* attack in beech and tawa; *Lyctus* attack on tawa timber; *Charagia* damage to beech poles; insects and fungi in forest nurseries; heart-rot fungi and sapstain in sawn timber.