Opossums in our Forests.

(M. R. Skipworth.)

It is doubtful whether any other country possesses such a history of mismanagement and lack of foresight in the introduction of fauna, as that of New Zealand. We are certainly without the English fox, which was successfully established in Australia, with the result that it is now the greatest animal pest in certain parts there. Fortunately, the attempts at acclimatization of this pest in New Zealand were unsuccessful. Where man introduces mammals and birds to a new country, without exercising efficient control over them after their successful establishment, the result is usually detrimental.

With forests in New Zealand that have been evolved almost entirely without the presence of mammals, the effect of release of the latter in recent years has been great. The silvicultural welfare of our native forests, however, has always been entirely neglected. The providing for New Zealand's future timber requirements has been entrusted to the planting of exotics, an unusual and daring policy, being on entirely new forestry principles. The Eucalypts and spruce have already been devastated by insect attack, certainly perhaps, aided by the choice of the wrong situation in many cases, and there is no reason to assume that our pine plantations, the majority of which are in an unnatural habitat, will remain immune from such attacks. Sir William Schlich referred to the fact that our indigenous forests "have practically been thrown overboard" as "certainly a very bold measure," and asked: "Whether it is safe to introduce exotic species on this large scale without risking the development of disease which may lead, in the end, to disastrous results?"

Apart from considerations of timber, our protection forests require correct silvicultural treatment for regeneration in order that they may be permanent. This correct silvicultural treatment consists in the maintenance of their natural conditions, with the exclusion of all things that tend to upset those conditions. For some years they have been subjected to the depredations caused by deer, pigs, goats and wild cattle, but the damage is largely recognized, some steps having been taken towards their extermination. It is peculiar that the acclimatisation societies, who are largely responsible for the presence of deer in such numbers, should share none of the expense involved in their extermination in districts where they are causing damage, but they are allowed to continue exercising protection over them in some districts, and introducing and protecting such pests as moose and wapiti. The chamois and thar, liberated in the Mt. Cook region, are already causing great damage to the mountain flora, and if allowed to multiply and spread along the Alps, they will be an extremely efficient force to wipe out the vegetation in those regions. In commenting on such acclimatisation mistakes the Hon. Geo. M. Thomson in his book "Naturalisation of Animals and Plants in New Zealand" states: "The whole history of acclimatisation efforts in New Zealand abounds in similar bungles and blunders, and while a certain measure of good has been achieved—notably in stocking our nearly empty rivers and lakes with fine food—and sport—fishes, yet the record of harm done is enormously greater. So called acclimatisation societies to-day are only angling and sporting clubs, and it is a question whether the whole control should not be taken up by the Government."

In the 'eighties and 'nineties various acclimatisation bodies and private persons introduced the Tasmanian and Australian opossums, and they were liberated in several different parts of the Dominion. They adapted themselves to the new conditions, which were ideal, and multiplied rapidly, spreading over many parts of the country. They were free from their natural enemies, trapping being the only thing which limited their numbers, whereas in Australia they are preyed on by the eagle and the great monitor lizard, or goanna, which is able to climb the trees and attack the opossum in its retreat. The effect of the opossum on our forests, however, has caused considerable argument. Past reports of the Director of the State Forest Service state that its economic value as a fur-bearing animal much outweighs the very slight damage that it causes, and recommend the extension of the opossum trapping industry by closed seasons in over-trapped areas, and the release of animals in unstocked regions. On the other side a number of observers throughout the Dominion report on damage done by the opossum both to native and exotic forests and also as to their effect on native bird life. Those who are opposed to the opossums certainly have all biological and silvicultural principles with which to support their argument. Two reports have been prepared for the Government, in order to decide on what policy should be pursued in the future with regard to the opossum. Both reports, one by Professor Kirk in 1920, and the other in 1924 by Mr. A. W. Perham of the State Forest Service, stated that the damage it caused was slight in comparison to its economic value.

The damage which they cause in the bush

has been reported by many observers, but it is difficult to obtain a reliable estimate of the amount. The following species are included in the diet of the opossum:—

The bark and foliage of the species of Nothopanax, and Melicytus.

Other trees or shrubs which are reported damaged are kohekohe, fuchsia, and hinau. The majority of broad leaf trees and shrubs are mentioned by different observers as forming contributions to its food supply. The fruits of the following are reported as being eaten:—Hinau, miro, matai, kahikatea, kotukutuku, maire and others. The opossum nips off the young shoots of many species, and this may even be observed in such a small patch of bush as that at Deans' Bush, Riccarton, where only a few odd opossums could be present. In their report on Kapiti Island, Professor Kirk and Mr. Bendall state (Transactions of the N.Z. Institute, Vol. LI.):—"In many parts of the bush the damage done by opossums is noticeable. Kohekohe, mahoe and passion flower are among the plants that most frequently show the marks of having been attacked. . . . . The only safe aim is their absolute extinction so far as Kapiti is concerned."

Perham reports that he has found few instances of extensive bark biting, chewed bark from the stomach of an opossum having been submitted to Professor Kirk for microscopic examination. The result was that cellular tissue of the outer bark layer was distinguished, but nothing could be found of inner bark tissue, although wood cells were also readily seen. It is not surprising, however, that phloem elements could not be recognized under such conditions, but if wood elements are palatable it must result in the destruction of the phloem.

That opossums do eat birds' eggs and young birds is an undisputed fact, but little information has been collected as to the extent of such a practice. Perham, in his report, states that he examined one hundred and twenty-three carcasses of opossums during the 1924 trapping season, and no evidence that the opossum eats birds was found. But from that aspect the investigation was useless, as few people would suggest that the opossum preyed upon mature birds. Professor Kirk, in examining the stomach contents of eighty-five animals, found in two cases, portions of unfledged birds, such as would be derived from eggs nearly hatched. This percentage is considered by investigators to be an almost negligible quantity, but taking these figures as a basis as an average per day for the diet of opossums, and estimating the numbers of opossums living in the bush during the summer months as 200,000, the number of birds destroyed would amount to at least 200,000 per annum. This is computed on taking the nesting season as fifty days, and each presence of bird remains as a mortality of one, but it is highly probable that in each case all the eggs or young in the nest are taken. As compared with the ravages of cats, stoats and weasels, this amount may be small, as Perham states, but the reason why so much attention has been focussed on the opossum, is that the State Forest Service encourages it, while it generally recognises the danger of the other animals. Considerable numbers of ground birds are killed by opossum traps in heavily trapped districts, the weka, kiwi and kakapo suffering heavily.

As the opossum lives on many of the foods necessary for the welfare of the birds, it may cause much damage in this direction. In ordinary seasons of plenty the effect may be small, it is in the lean year that it comes into serious competition with the birds for food supply. By killing kotukutuku and rata, it reduces the sources of available foods, and the continual presence of the opossum in one district might result in the extinction of these species. The opossum was liberated on Kapiti Island in 1897 and by 1919 it had considerably altered the supply of native bird foods.

Opossums are not present in any plantations in large numbers up to the present, but where they are present they have usually caused some damage. Mr Walter Gill, Conservator of Forests in South Australia, stated (Australian Forestry Journal, Jan., 1919) that they destroy young pine trees (P. halepensis and P. martitima) by stripping the bark from the leading shoots. In the December 1926 number of "Te Karere O Tane," W. Jas. Dunneth reports that opossums are present at the Conical Hill plantation, which is ten miles from the nearest native bush, and that "some Pinus ponderosa trees have been gnawed in several places near the top of the tree." In North Auckland, Professor Kirk states that they eat the young male cones of Pinus radiata. At the Ross Creek Plantations of the Dunedin City Corporation, numbers of seventeen year old Pinus resinosa have been ring-barked, the bark, in some cases, having been stripped off the whole of the tree. In all cases the trees were the most healthy and vigorous in the plantation. It is thus evident that several species of pines, at least, are palatable, and although at present opossums are not a serious danger to our exotic coniferous forests, there is no guarantee that they would not, under certain conditions, develop into such.

Before accepting the opossum as an asset

and encouraging it, the authorities should take into account every future possibility. When deer were liberated, few people thought that they would become the pest that they are now. When it is realized that the regeneration of our native bush must play an important part in providing for our future timber requirements, everything will be done that will favour such regeneration. A healthy stocking of native birds for pollination, seed dissemination and insect control purposes will be required. It is impossible that the opossum, for its fur-bearing qualities, would be encouraged under such conditions, where it is a factor (perhaps small) against the regeneration and permanence of our timber and protection forests.

It appears that the opossum has an exceedingly wide range of vegetable foods at least, but what would be the result if the crop of forest tree berries failed, as it did in 1877, when it drove rats and birds (mainly paroquets) out of the bush in search of food in the settled areas? If such a season of poverty should occur again, what would the opossum do under such circumstances? Would they be able to find sufficient food in the bush under such conditions, or would they be forced to migrate to any adjacent orchards and plantations? In many districts their favourite plant foods are being destroyed by their own depredations and those of deer and goats—thus Nothopanax, Melicytus, Fuchsia, etc., are vanishing—so leaving them more dependent on tree fruits, which have cycles of good and bad seed years. In the United States the squirrel is giving trouble to the foresters, on acount of the depletion of its natural food resources, with the result that migrations are sometimes made, in times of want, to adjacent plantations. By nipping off the terminal and lateral buds of such species as Pinus sylvestris, larch and spruce, it may cause considerable damage. It is the unusual season, when supplies are scarce and the depth of snow has rendered ground supplies unavailable, that damage is severe. (See "Red Squirrel Damage to Coniferous Plantations and its Relation to Changing Food Habits" by N. W. Hosley, "Ecology," Jan., 1928.)

The supporters of the opossum assume that the price obtainable for the skins will always be sufficient remuneration for the labour expended in trapping them, and thus they will always be able to be kept under control by trapping. But is this assumption correct? Will there always be a demand for opossum skins, and if so, might it not be supplied by farming the animals under control, with the production of skins at a price that would render the trapping of the wild animal unprofitable? Silver foxes are farmed commercially in Canada, and the production of rabbit skins in England from rabbit farms is greater in number per annum than that exported from New Zealand—perhaps the opossum will be added to the list of commercially farmed animals.

It is considered that the reports so far submitted do not definitely establish the innocuousness of the opossum. To completely satisfy all critics more detailed investigation seems called for. The stomach contents of a large number of animals trapped mainly in the nesting season, should be examined. They should be trapped in many districts, and the class and condition of flora, the numbers and conditions of animals and birds noted, and if possible, the effect of a bad seed year on their diet, should be examined. The forest policy of the future should be taken into account, the silvicultural welfare of native and exotic alike being examined. An investigation with these objects in view would definitely and finally show the true relation of the opossum to the forest.

Some Growth Measurements in Canterbury Exotics.

(D. Kennedy.)

With a view to obtaining accurate data regarding growth and yield of the exotic plantations in Canterbury, the School of Forestry in 1925 established the first of a series of permanent sample plots in the various plantations throughout the province, upon which growth could be periodically measured, and comparative data regarding species, sites and methods of treatment obtained which would be invaluable in planning future forestry operations. The data derived from such a project include the study of growth and the elaboration of yield tables on a basis of comparative development in three forms, namely: The comparative rate of growth and comparative form of different species under the same conditions. The effect on form and on volume growth of varying site qualities, and the effect on growth and development of silvicultural practice in the way of preparation of the soil, thinning, etc.

To carry out the first part of this programme demands a choice of stands of various species growing under uniform conditions of site and receiving uniform treatment. These requirements are well filled by