

same cause. As all our trees are surface-rooting, it will at once be recognized that they are most susceptible to damage from this cause. Their roots radiate in every direction on the surface or a few inches below the surface; from them there spread innumerable root-fibres by means of which the tree obtains the nourishment it takes from the ground. The ground carries a dense growth of shrubs, ferns, mosses, astelias, fungi, &c. (not to mention numberless organisms of lower order existing in symbiotic—i.e., give-and-take—relationship with these). These protect the larger trees from draughts, modify the temperature, and keep the soil spongy and moist. If stock eat or break down these shrubs, ferns, &c. the conditions to which the trees have for millions of years been accustomed are altered; cold or hot winds rush through the forest; the rootlets are broken; the ground is so hardened by trampling that roots are exposed and the root-fibres cannot perform their functions; and the ground in summer does not contain the moisture which its former spongy condition enabled it to do. The trees, many of which have reached maturity and are on the decline (gradually, of course) sicken and die, and as the stock have eaten off all seedling trees that would naturally have replaced the others the end of the forest is sealed. There are, of course, some of the smaller trees (fuchsia, makomako, lacebark, mahoe, and ngaio) that will stand cattle grazing round them, and thrive in the open. A few big trees—e.g., totara and matai—in some districts thrive when growing far apart, and give quite a park-like effect to the landscape. These, however, are exceptions, and in our scenic reserves our aim is to preserve the whole “association.” When stock are allowed in forests they carry in their dung, hoofs, &c., seeds of noxious weeds which, with other seeds carried by the wind and birds, find suitable sites for germinating where the stock have made tracks and destroyed the native undergrowth. After the undergrowth is destroyed the forest becomes in summer very dry, and then fire is more likely to spread in it. I was told by Mr. Robert Wilson, of the Rangataua Milling Company, that when the fires were raging in his district in the summer of 1911 the bush which had been heavily stocked with cattle always suffered incomparably more damage than that in which cattle did not feed. Another danger brought about by the admission of stock is that rabbits will often make the bush a refuge, as the ground, now made dry, allows them to burrow and to hide under roots and fallen trees.

Animal Pests.

It is to be regretted that stoats and weasels are in most of our woods and cannot be exterminated. Cats are in many, but may later on be gradually killed out. Wild cattle and pigs are in some, but these will be easy to get rid of. Rabbits in Otago and Southland and in some places in the North Island have established themselves on scenic reserves, and the only practicable way to keep them in check is to give the adjoining farmers (from whose land they have generally come) a small subvention to trap them. On the Tongariro National Park the rabbit five years ago was practically absent; now, however, they are to be seen in dozens at a time. I found them only a few yards below the crater-lip on Ngauruhoe. Mr. Hugh Girdlestone found a dead black one on the summit of Ruapehu! They go high up these mountains, I find, after an aromatic native herb called *Ligusticum* (a relation to the parsley); but why they should go to the extreme summit, beyond the zone of vegetation, one cannot imagine, without it is that the wanderer is a male and has been chased from the tribe by a stronger rival. *En passant* it may be of interest to hear that a spider I picked up on the summit of Ngauruhoe during the big eruption that occurred three years ago turned out to be the third specimen found of a new species.

Native Birds.

My only *terra nova* this year has been Kapiti Island, where I saw the bell-bird (korimako), tui, pigeon, fantail, whitehead, wren, parrakeet, kingfisher, weka, and tomtit in plenty; in lesser degree the South Island robin, blue crane, hawk or harrier, morepork, long-tailed and bronze cuckoo were seen. As there is a better chance of preserving birds on Kapiti than in most other reserves, I would suggest that specimens of birds not already there (such as the kiwi, kakapo, crow, North Island robin, South Island tomtit, &c.) should be put on the island before they have become extinct.

Botanical.

On Kapiti Island Mr. B. C. Aston and myself discovered fifty-three plants not previously reported from there. The new *Senecio* that I discovered on the Wanganui Cliffs I found this year up the Mokau River. On Rainbow Mountain I found *Dracophyllum strictum*, *Corokia Buddleioides*, and *Phyllocladus glauca*; near Waitomo, at Kaikuri, *Aristotelia fruticosa*, *Herpolirion*, and *Uncinia rubra*; at Maclellennon River, *Plagianthus cymosus*; at Owango, *Gentiana Grisebachii*; at Taumarunui, *Calceolaria repens* and *Teucrium parvifolium*. These finds are of botanical interest solely. It is rather an interesting fact that the sharp, steep sandstone ridges, running from both watersheds down to the Wanganui River, carry (as far as high trees are concerned) almost pure black-beech (birch), *Fagus Solandri*, forest. On the ridges and spurs (also a similar sandstone formation) sloping into the valley of the Mokau (which is only about thirty miles distant) the black-beech is entirely absent, being replaced by red-beech (*Fagus fusca*). Edaphic factors seem to exercise little influence in the distribution of the red and black beech. They both grow on the acid soils of the Southern Lakes District; they both grow on the argillaceous soils of Wellington, the light volcanic basic soils of the Waimarino district, and the calcareous sandy soil of the Wanganui and Mokau ridges. They are alike in both requiring a dry well-drained soil, though in this respect the black-beech is less particular; neither is exacting in its requirements as regards humus. The climatic factors favouring them seem to be humidity of air and a fairly heavy rainfall; also, their ability to stand wind and cold gives them an advantage over other competitors. They are, however, peculiar as regards temperature, for though the red-beech seems invariably (from Ruapehu southwards) to ascend to a higher elevation than black-beech, yet the red-beech penetrates into the subtropical district of Mangonui, while the black-beech gets no further north than the East Cape.