

(about 560 m), is actually an isolated basalt outcrop.

Mount Karioi is generally a replica of the Pirongia cone, but as it is only 760 m high, it does not have some of the plants found on the uppermost parts of Pirongia.

The typical soils on both these residual volcanoes are brown to red-brown loams and brown granular clay loams, derived from deep weathering of the basalt rock (and, on Karioi, of andesite).

On the generally steep hillsides of the greywacke country grey-brown to yellow-brown clay loams predominate on top of blocky clay and weathering rock fragments. However, on the fairly wide and rounded ridge tops, indicative of a former plateau surface, more friable soils are derived from a series of deposits of volcanic ash. This was not emptied from Pirongia or Karioi, but from the rhyolite volcanic centres about Taupo and Rotorua.

## Vegetation

The forest below 600 m in the main block is typical of the southern Waikato: mixed hardwood forest with scattered podocarps and a fairly wide range of shrubs, ferns, vines, and epiphytes. The kauri, taraire, puriri, and hard beech of the northern Waikato are entirely lacking, though the "tree" coprosma (*Coprosma arborea* or mamangi) reaches its southern limit here.

The largest trees are rimu, miro, and rata, with most of the last-named unfortunately now dead or dying. They stand out above generally abundant tawa and kamahi, hinau, rewarewa, mangeao, pukatea, and kohekohe. The underwood is dominated by mahoe, pigeonwood, tree ferns, and in places nikau palms.

On the wider gully floors pukatea becomes very com-

mon, with some large kahikatea, whereas on the narrowest ridges the main hardwoods are kamahi and rewarewa. There is some tanekaha, and heketara and tawheowheo are the commonest shrubs. Kamahi forms almost pure stands on the exposed ridges leading to Koponui Trig.

Some of the most attractive native flowering shrubs occur in this lower forest — for example, lacebark, toropapa, taurepo, rangiora, and fuchsia. The flowering vines include not only the New Zealand passionfruit (kohia) and the common ratas, but also the very rare *Metrosideros carminea*. The dainty vivid-green fern *Lindsaea viridis* may be seen along streamsides, and the giant-fronded king fern (para) is in some damp gully recesses.

Also to be found are the unusual "five-finger" *Pseudopanax laetus* with very large leaves and purplish-red leaf stalks, and hutu, a tooth-leaved shrub with purplish branchlets which is most uncommon outside Westland.

Between 600 and 800 m on Mount Pirongia the forest changes by degrees as lowland plants drop out. Hardier ones take their place as increasing cloudiness, coolness, rainfall, exposure to the prevailing strong westerly wind, and steepening terrain and shallowing soil all have their effect. On the highest ridges and faces the vegetation is only 8 m high at best and some of it is a mere low scrub.

The conspicuous larger plants are kamahi, tawheowheo, tawari, broadleaf, haumakaroa, toro, stinkwood, horopito, neinei, toi, and mountain flax, with some stunted Hall's totara hardly peeping above the interlaced wind-shorn canopy.

In comparison with the Coromandel and Kaimai Ranges

there is a rather surprising dearth of southern elements of the New Zealand flora on the summit of this mountain. There are, for instance, no mountain toatoa, yellow-silver pine, pink pine, or beeches.

Kaikawaka trees occur in patches along the topmost ridges, from about Bald Spur to The Cone. Some, in sheltered spots, are quite large trees, their boles mantled by the large hanging moss *Weymouthia mollis* and myriads of small ferns. In the 1880s the first survey party on Pirongia was delighted to find a handy kaikawaka to fell and use for the first trig post. Southern rata also occurs on the mountain top, but is extremely rare.

Goats, opossums, cattle, and pigs have over decades wrought considerable damage in parts of the park, but it does appear that strenuous control efforts are beginning to reverse the trend.

The lower forest in the Karioi outlier is similar to that on the main block, except that kohekohe is more plentiful. In sheltered gullies above 500 m rata, tawa, rewarewa, and mangeao are scattered among dense mixtures of kamahi, mahoe, heketara, rangiora, and fuchsia.

On the almost continually wind-blasted rough ridges there is dense low forest or scrub like that on Mount Pirongia, though tawari, kaikawaka, and southern rata all seem to be absent.

## Wildlife

Various birds are present throughout the park, though it is likely that populations have changed as a result of losses through mustelids, cats, and rats and the early milling and clearing of land for farming.

Kingfisher, harrier hawk, and New Zealand pipit inhabit the border areas of forest and