In the northern half of the Kaimanawa Ranges charred wood occurs in abundance in the pumice and also at the southern extremity in ash terraces where the Inland Patea Road crosses the Taruarau River.

At the present day the higher and more exposed ridges are for the most part bare of pumice. Their surface is typically of rock fragments carrying a sparse vegetation, but occasionally hummocks of pumice 2–3 feet high can be found, carrying a conspicuously denser vegetation. Frost striations and polygons are also developed on a large scale (Fig. 7) and appear to depend on a mixture of volcanic ash with greywacke fragments. These striations are actively working down-slope into unbroken tussock (Fig. 6) and elsewhere much of the exposed rock mantle is unweathered. This suggests a comparison with the Kaweka Range, from which much of the overlying pumice has been stripped by grazing and burning; in the Kaimanawa Ranges the indications are that browsing and particularly trampling by deer had a similar effect on the pumice blanket.

On the slopes of the range ash increases in depth and is remarkably stable, carrying a close cover of vegetation, and as slopes ease out it reaches a considerable depth. Gullies on the Taupo face have ash cliffs 300ft high, and within the range pumice wash forms characteristic terraces (particularly in the Waipakihi, Rangitikei and Ngaruroro valleys), which increase in height downstream to as much as 200 feet above the waterway (Fig. 10).

CLIMATE

Such factors as temperature, rainfall, evaporation, amount of sunshine and duration of snow cover have obvious effects on the distribution and composition of high country vegetation, but the difficulty of obtaining data on these is obvious and the need for it is only recently becoming apparent. The difficulty is acute in the case of the Kaimanawa and Kaweka Ranges, which together extend over one of the largest uninhabited areas of the North Island. Recording stations across the Inland Patea give a fair idea of the distribution of rainfall up to an elevation of 3,000ft in the southern part of the range, but in the north the stations round Lake Taupo lie in its basin and give no indication of the conditions in the ranges lying immediately above them.

Some conclusions about cloud and snow cover can be drawn by observation from the lower country around them, but most information depends on guessing from the topography and from the vegetation itself what the conditions are likely to be. Not unnaturally, with so large a margin of possible error, such estimates have tended to err on the conservative side and one illustration of this is a calculation not many years ago that the average discharge of the Tongariro River after allowing for evaporation was 37% higher than the total of the precipitation estimated for its catchment.

The need for the fuller utilization of hydro-electric resources and the growing awareness of the need for soil conservation and river control is now leading to investigation of hydrology in the high country and of its vegetation as a protection from erosion, and in consequence of this some information, mainly of rainfall, is already becoming available. Of particular relevance to the Kaimanawa Ranges is the recent hydrological survey of the Tongariro catchment for the Ministry of Works (Sutcliffe and Rangeley, 1960). This does not extend into the area of apparent highest rainfall, but gives valuable evidence of a steep increase of precipitation with altitude. From this the crest of the Middle Range (which had been reckoned to have a rainfall of under 100in from the appearance of its vegetation) is now given 140in.

(This illustrates the need for an upgrading of earlier estimates based on vegetation. For instance the Tararua Range at the time of a botanical survey