

1961). However, basalt occurs in both areas. In the Bay of Islands it varies in age, in the case of the Kerikeri basalts, from either Miocene (Bell and Clarke, 1909) or Pliocene? (Kear and Hay, 1961), to Holocene in the case of the Takahe basalt to the south. The New England basalts probably were all extruded in the early to mid-Tertiary (Voisey, 1945), and those near Glen Innes have recently been dated as Oligocene (Cooper *et al.*, 1963). However, in many parts of both areas lithologic similarity exists between the basalts. They are mostly dark, fine-grained olivine basalts, although many of the younger Takahe basalts in the southern area of the Bay of Islands are scoriaceous.

BASALTIC SOILS OF THE BAY OF ISLANDS

In general the soils of the Bay of Islands developing on basalt may be grouped into two subdivisions. First there are the soils which are here termed red earths, since they show remarkable similarities both in field morphology and thin section to the tropical and subtropical red earths. These would seem to correspond, at least in part, to the weakly leached Papakauri soils and the moderately leached Kiripaki soils described by Gibbs (1964). They are brownish-red to red in colour, the redder colours being associated usually with scoria and basic ash rather than with the compact basalt. The A₁ horizon is shallow and granular with a silty-clay texture. The B horizon is friable and in thin section is characterised by uniformly distributed unorientated clay and resembles the *Braunerde* fabric described by Kubiena (1948, 1953). It is suggested that this horizon is formed by the chemical processes of weathering and oxidation *in situ* with no significant additions by translocation or illuviation and as such would be described in the European nomenclature as a (B) horizon. As will be noted from Fig. 1, the depth of the horizons varies considerably from one catenary position to another. In some areas, most notably on the

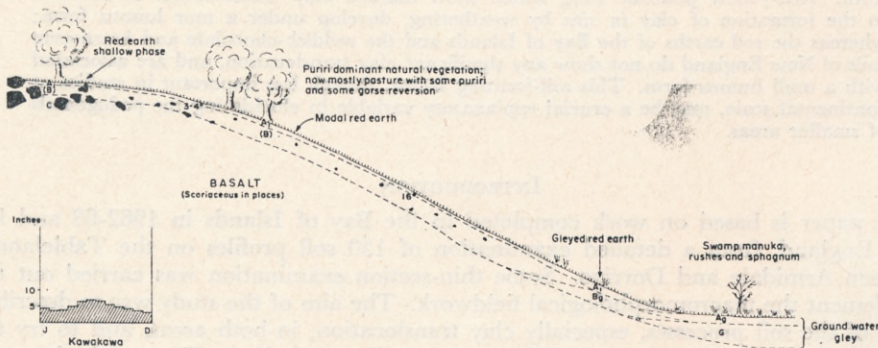


FIG. 1.—Near Kawakawa, N.Z. Generalised catenary sequence of soils on basalt, showing relationships of topography, vegetation, soil type, and climate (inset). Shallow soils with large basalt “floaters” (black) occur on the upper slopes, well developed red earths on the middle slopes, with ground-water gley soils and swamp vegetation in the valley bottom. The inset shows mean monthly rainfall at Kawakawa.

interflaves, hummocks of basaltic boulders occur and the surrounding soils are shallow and stony. On the lower slopes the profile is deep with a well-developed (B) horizon of fine subangular blocky structures and only a small percentage of small basaltic “floaters”. At the base of the catena the water table is present at or near the surface for most of the year, and a gleyed red earth or ground-water gley is developing. These soils, illustrated in the generalised catenary sequence in Fig. 1, are most commonly found in the south, developing on the younger Takahe basalts, which are probably only 10,000 years old (Northland Region, 1964) and scoriaceous in places.

The second broad soil group associated with basalt in the Bay of Islands corresponds, in some respects at least, to the strongly-leached red and brown loams