

material of the calcareous concretions embedded in the greywacke occur sparingly in the conglomerate. Usually poorly preserved leaf-impressions are abundant near this bed, which may be an interformational conglomerate. Dykes of basic to intermediate composition intersect these sedimentary rocks.

*Cretaceous Rocks.*—The Cretaceous rocks consist of basal conglomerates and sands with interbedded sandy mudstones and argillaceous sandstones. Laterally the coarser sediments grade to sandy mudstones containing thin impure limestone bands which occasionally exhibit cone-in-cone structure. Coal fragments are scattered throughout all these beds, and in the mudstones may be sufficiently plentiful to form layers 2 in. or 3 in. thick, but nowhere has anything approaching a workable seam been noted in them. In the mudstones are concretions that contain fragments of saurian bones, and overlying it is a greensand that at one point contains a phosphatic layer and at another a Cretaceous faunule resembling that from the lower sandstones of Herring River in the Clarence Valley.

*Amuri Limestone.*—Only in the neighbourhood of Monkey Face and the northern end of Whale Back are the beds correlative with the Amuri stone typical of that rock. Elsewhere it is represented by calcareous sandstone or argillaceous sandstone, all more or less glauconitic, the more glauconitic facies presenting a mottled appearance due to the presence of numerous fine worm-borings with a non-glauconitic filling. This bed has a similar distribution to that of the Cretaceous rocks.

At the headwaters of the Counting Stream an andesitic, or possibly more acid, rock overlies the Cretaceous greensand. Its relation to younger beds could not be ascertained, though the presence of the Amuri limestone in this locality is indicated by drift material.

No fossils indicating the age of the Amuri limestone and beds with it were found. About 25 chains south of Isolated Hill Trig. the upper surface of the glauconitic calcareous sandstone which here represents the Amuri stone is capped by an indurated band of sandy limestone 6 in. to 8 in. thick, bored by marine organisms and containing phosphatized nodules. To the east of Mount Cookson Trig. a greensand appears to overlie the limestone, and at other localities tuffs or basaltic flows overlie. No marked erosion surface has been observed at the top of the Amuri stone, and fossil evidence in proof of unconformity is wanting, but the general tenor of the evidence strongly suggests unconformable relationship with the overlying strata.

*Cookson Beds.*—These consist of breccias and stratified tuffs with basaltic and basanitic flows and pillow-lavas. At many points impure limestone bands are interbedded with the tuffs. The flows are highly vesicular, and contain abundant analcite and usually calcite or opal. Zeolites are also abundant in some flows and dykes. One igneous conglomerate band, at least, is interbedded with the flows, and marks an erosion interval during a period of quiescence in vulcanicity. The tuffs have almost the same distribution as the rocks previously described, but they have not yet been observed north of the Conway. The flows are less widely distributed. The Cookson Beds are thought to be of Waiarekan age.

*Isolated Hill Limestone.*—An igneous conglomerate caps the igneous rocks at many localities, and at many points it is set in a calcareous matrix. As the boulders decrease in number the conglomerate grades to a bryozoan limestone. The limestone is from 150 ft. to 200 ft. thick at Mount Cookson and is as widely distributed as the tuffs; it is markedly lenticular. There is an abundant and readily available supply of this stone, which should prove to be high-grade agricultural lime. The limestone is probably of Ototaran age.

*Sugar-loaf Beds.*—At the limestone gorge of the Lottery, Waiau Survey District, a greensand from 16 in. to 36 in. thick rests on the phosphatized surface of the Isolated Hill stone, and is overlain by a conglomerate band, 8 in. to 16 in. thick, containing angular pebbles of the limestone and sub-angular igneous pebbles. The section is terminated by a fault. Other sections proving disconformity below the sugar-loaf beds also occur. Concretionary sandstones and argillaceous sandstones overlie the greensand or conglomerate, and interbedded is a more resistant band which grades to the arenaceous limestone that crops out as the Sugar-loaf Hill, south of Waiau Township. Deposition continued till a thickness of about 1,400 ft. of sandstone accumulated, when the erosion of previously deposited beds resulted in the formation of a conglomerate band containing pebbles of sandstone bored by marine organisms, and reworked fossil and saurian bone fragments. This conglomerate crops out on the south bank of the Waiau-uha, a mile and a half east-north-east from Isolated Hill. The Sugar-loaf beds probably represent the Hutchinsonian and Awamoan stages.

*Bourne Conglomerate.*—The position of this bed in the sequence is uncertain. It accumulated after the deposition of the Sugar-loaf sandstones began, but it might be older or younger than the Sugar-loaf limestone. It is limited to a comparatively small area about a mile east of the confluence of the Mason and Lottery, and it consists of blocks of Isolated Hill limestone and greywacke, up to 18 ft. across, with smaller fragments of tuff and igneous rocks. It crops out close to a fault, and its origin is probably to be ascribed to the accumulation of blocks derived from movement along this fault during the deposition of the Hutchinsonian or Awamoan beds with which it is embedded.

*Highfield Beds.*—Argillaceous sandstones overlie the conglomerate band on the south bank of the Waiau-uha, and these are succeeded by gravels and sandstones. They are contemporaneous with similar sandstones and gravels that crop out elsewhere. Some Pliocene fossils were obtained from these beds. At all the localities where the gravels have been observed in contact with the sandstones there is no marked angular unconformity. In the gravel cliffs bordering the Mason about half a mile north of Waiau the Highfield gravels dip at steep angles and the younger Lyndon gravels rest on their truncated edges.

*Lyndon Beds.*—These beds consist of gravels and loosely consolidated sandstones. They unconformably overlie the older beds, and have themselves been involved in warping and fault movements. The older gravels of the present river system truncate them.

*Late Pleistocene and Recent.*—Terrace and river gravels, and the lake silts of the Charwell comprise these deposits.