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On a Remnant of a Stripped Peneplain of Palaeozoic Age at Mount Sedgwick in Western Tasmania

By

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PLATE V

It is well established (Nye and Blake, 1938, pp. 22, 42) that a peneplain existed over much of Tasmania at the beginning of the Permo-Carboniferous sedimentation. Beds of Permo-Carboniferous and Trias-Jura sediments were laid down on this surface, and, apart from tilting, retain their original horizontal relations. At, or near, the close of the Trias-Jura sedimentation, the intrusion of a dolerite magma occurred on a widespread scale, forming huge dykes and sills. The sills were confined to the horizontally bedded strata, or to the plane of weakness at their base where they rested on the surface of the peneplain.

It is not known whether this peneplain extended to Western Tasmania, or whether it gave place to an irregular erosion surface in that region. The distribution of the Permo-Carboniferous rocks (see below) makes it clear that, even in the latter case, the irregularities of the erosion surface were nothing like as great as those existing to-day. This view is implicit in the opinion of Loftus Hills (1914, p. 25) that at one period ' the central plateau was practically continuous with the West Coast Range, which did not then exist as a separate mountain range '.

THE STRIPPED PENEPLAIN

At Mount Sedgwick, in the West Coast Range, there occurs a small plateau which appears to be an uncovered portion of this old peneplain. Mount Sedgwick, which is about 4000 feet high, is the highest peak of the West Coast Range in this part of Tasmania (Table I). The summit consists of a pyramidal hill of columnar dolerite, about 300 feet thick (1), portion of an originally thicker and more extensive sill or laccolith. The base of this sill or laccolith is practically horizontal (Plate V, fig. 1), and it lies on a flat surface composed of quartz-felspar-porphyry (Devonian age), West Coast Range Conglomerate (Silurian age),

(1) T. B. Moore (1894) gives the thickness of the dolerite as 800 to 1000 feet, but this is an exaggeration, and is contradicted by his further statement (p. 148) that he discovered a bed of glacial conglomerate containing coal measure (Permo-Carboniferous) fossils ' at an elevation of 3500 feet above sea-level, adjoining the greenstone on the south-east side of the mount.'

and possibly a small remnant of Permo-Carboniferous sandstone (2) at its north-east margin. The dolerite was, therefore, intruded practically between the base of the Permo-Carboniferous at this locality and the Palaeozoic erosion surface.

This surface continues as a small, relatively flat plateau, where it emerges from beneath the dolerite (Plate V, fig. 2). It has been scored by the Pleistocene glaciers, which carved hanging valleys in its margins (Plate V, figs. 1 and 3), and left channels now occupied by lakes. There seems little doubt, therefore, that this plateau, which forms the 'pedestal' on which the dolerite cap of Mount Sedgwick rests, is portion of a stripped peneplain, or of an erosion surface contiguous with the pre-Permo-Carboniferous peneplain that existed in other parts of Tasmania. Some conception of its extent can be obtained from the aerial view of it shown in Plate V, fig. 1. The dolerite summit of Mount Sedgwick appears on the right, and the dolerite-capped peaks of the Eldon Range show in the centre background. The photo is reproduced by the courtesy of Messrs. Nankivell, of Queenstown.

The surface of this uncovered erosion surface stands at about 3700 feet above sea level (3), and is not greatly lower that the present summits of the other mountains of the southern end of the West Coast Range (Table 1).

TABLE 1

Mountain.	*Height above Sea-level.*	*Source.*
	Feet.	
Sedgwick	4000	Blake
Tyndall	3875	Moore (1893)
Giekie	3950	Moore (1893)
Jukes	3790	Loftus Hills (1914)
Sorell	3730	Loftus Hills (1914)
Owen	3600	Loftus Hills (1914)
	3800	Gregory (1904)
Darwin	3340	Loftus Hills (1914)
Huxley	3200	Blake
Lyell	3050	Gregory (1904)

If its level is assumed to represent the general level of the erosion surface or peneplain in this region, then it is apparent that several of the present mountains formed monadnocks rising several hundred feet above the level of the peneplain.

POST-PALAEOZOIC FAULTING

Similar monadnocks also occurred further to the west, because granite pebbles, presumably derived from the Heemskirk massif, have been found near Zeehan in a tillite which is regarded as belonging to the basal stage of the Permo-Carboniferous (Twelvetrees and Ward, 1910, pp. 9, 42). Mount Heemskirk (2700 feet) and Mount Zeehan (2500 feet) stand considerably higher than this tillite, and presumably they stood still higher at the beginning of the Permo-Carboniferous.

(2) Fossiliferous sandstones containing casts of *Spirifer* and *Aviculopecten* have been collected from this point by Mr. W. Morris of the Survey Staff of the Lyell Comstock Mine.

(3) T. B. Moore (*loc. cit.*, p. 147) refers to Mounts Tyndall and Sedgwick as rising '1500 to 1600 feet above an elevated plateau, on which are situated Lake Dora and numerous other lakes and tarns at an altitude of 2400 feet above sea-level.' R. M. Johnston (*Proc. Roy. Soc. Tas.*, 1893, p. 100) also refers to 'the 2182 to 2400 feet plateau at their bases' (i.e., bases of Mounts Tyndall and Sedgwick). This plateau is not to be confused with the small peneplain remnant which is *part* of Mount Sedgwick.

Both they and the tillite are, however, much lower than the stripped erosion surface at Mount Sedgwick, which was also capped by Permo-Carboniferous rocks, so that one is forced to postulate either post-Palaeozic faulting between these two sets of monadnocks, or that the post-Devonian erosion surface was as irregular as the present-day surface.

Another line of evidence suggests that the former postulate is the correct one. Thus, Voisey (1938, p. 322) places the fossiliferous marine Permo-Carboniferous (Kamilaroi) beds between Malanna and Strahan, and along the northern side of the Henty River, in his Achilles Stage, which in this area is characterized by *Fenestella* and *Spirifer*, while in the Pelion district, where it occurs at a much greater altitude, it is characterized by *Fenestella*, *Spirifer*, and *Aviculopecten*. In view of the reported occurrence of *Spirifer* and *Aviculopecten* in the Permo-Carboniferous remnant at the north-east edge of the dolerite cap of Mount Sedgwick, it seems possible that the lowermost beds of the Permo-Carboniferous at this locality also belonged to the Achilles Stage; and since there is a difference in elevation of about 3000 feet between this locality and that of the Strahan-Malanna-Henty River localities, there is a suggestion (*a*) that these two localities were at more or less similar elevations at the beginning of the Permo-Carboniferous period, and (*b*) that the more westerly part of the region was faulted down in post-Palaeozoic times. Nye and Blake (1938, p. 21) suggest that such a fault, with a throw of the order of 2000 to 3000 feet, runs parallel to and west of the West Coast Range (presumably some miles to the west), and continues as far as the north coast.

In view of the dolerite cap on Mount Sedgwick, it is presumed that such faulting did not occur until after the close of the Mesozoic.

Relation to the Western Coastal Plain

This remnant of the Palaeozoic peneplain (erosion surface) stands at more than 1500 feet above the erosion surface which Gregory (1903, p. 179) termed the Henty peneplain, and which is now called the Western Coastal Plain (Nye and Blake, 1938, p. 4), and is regarded as having been formed during the Pliocene. The Coastal Plain is now considerably dissected as the result of rejuvenated stream action associated with changes of sea-level during the Pleistocene and Recent.

The difference in elevation between the West Coast Range and the Coastal Plain is not, however, directly due to the Tertiary faulting described above, nor as Loftus Hills (1914, p. 24) has pointed out, is it in any way connected with post-glacial uplift of the region.

The elevation of the West Coast Range conglomerates to their present position relative to the Queen River sandstones and shales in which the coastal plain is cut is thought to be due to Devonian (?) faulting, prior to the peneplanation of the area (Gregory, 1905; Edwards, 1939); and there is nothing to indicate that there has been any later fault movement. Differential erosion during the Tertiary has 'exhumed' this Palaeozoic fault line, so that the scarp which delimits the western side of the West Coast Range (Plate V, fig. 4) is probably a fault-line scarp. The eastern face of the range appears to be simply an erosion scarp; and some possibility exists that this may be true of the western scarp also, since the Queen River series may prove to be of Upper Ordovician, rather than Silurian, age (Hills and Edwards, 1941), in which case much of the evidence for the fault disappears.

Either view of the origin of the West Coast Range supports the contention of Loftus Hills (1914, p. 25) that the King River is an antecedent stream which developed on the surface of the post-Devonian sediments, and subsequently was superimposed on the West Coast Range conglomerates; and that the wide alluvial flats that mark its course at the Long Marsh are caused by the slowing up of the river where it enters its gorge tract between Mount Huxley and Mount Jukes.

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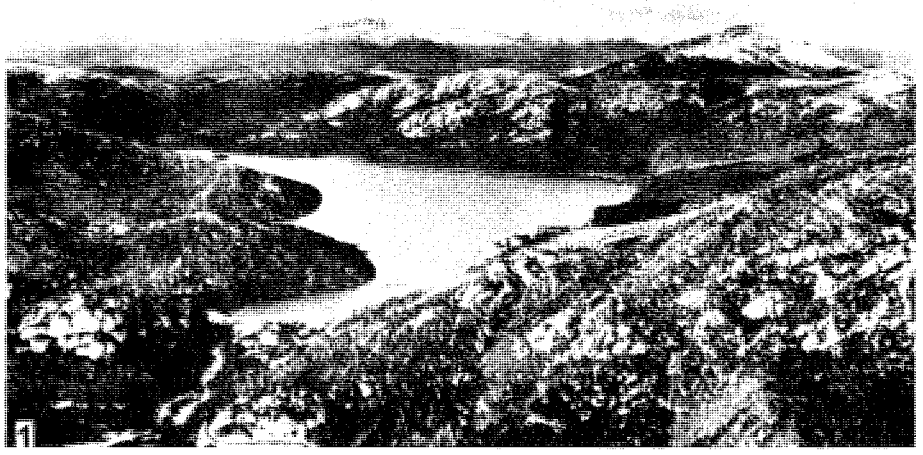
PLATE V

FIGURE 1.—Aerial view of Lake Margaret, showing the dolerite cap of Mount Sedgwick (on the right) resting on the surface of the Palaeozoic peneplain. Lake Margaret occupies a hanging valley eroded in this peneplain remnant. The dolerite-capped peaks of the Eldon Range show in the centre background. (T. F. Nankivell photo.)

FIGURE 2.—Showing the flat surface of the stripped peneplain remnant where it emerges from beneath the dolerite cap of Mount Sedgwick (eastern side).

FIGURE 3.—A U-shaped hanging valley on the eastern margin of the peneplain remnant.

FIGURE 4.—View of the southern end of the West Coast Range from the Lake Margaret haulage, showing the 'exhumed' fault-line scarp which delimits the western side of the range from the eastern margin of the Western Coastal Plain (dark foreground).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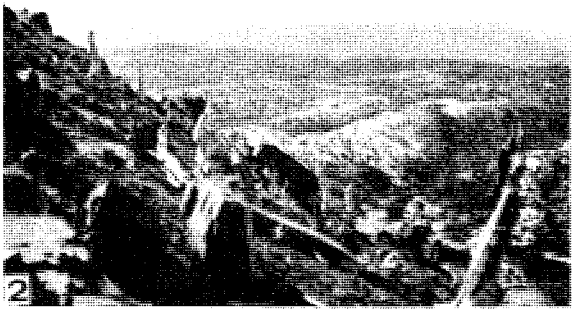
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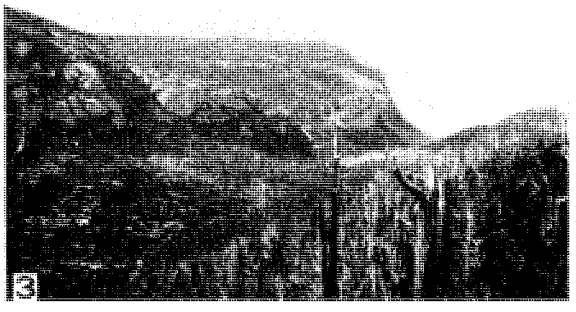
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