

Note on Root-impressions in Greywacke

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[*Read before the Wellington Philosophical Society, July 14, 1936; received by the Editor, July 27, 1936; issued separately, March, 1937.*]

THE severe gale of February 2 of this year resulted in considerable destruction of the bush in the Tararua Range. The greatest intensity was felt on crests of spurs and ridges, where also the layer of soil is thinnest, so that overturning of a great many trees has exposed areas of bare rock under the overhang of their uptilted root-discs.

During a recent visit to such a devastated area near Field Hut, on the Hector Track, Southern Tararuas, the writer's attention was drawn by his companion, Mr A. J. D. Barker, to a number of instances of curious fluting and grooving of the freshly bared rock surface, suggesting at once impressions of branching root-systems. Indeed, it was possible in some cases to locate a portion of the exposed root-system of an overturned tree which exactly matches the pattern on the rock-surface. Although numerous examples could be found, they were typically in the shadow of a root-disc, so that the lighting was not good for photography.

There are two processes which might have resulted in the roots thus becoming embedded in the rock. First, when the tree is tossed by a gale, movements of the root must occur, so that one can conceive of frictional wear of the rock from this cause, assisted perhaps by the less vigorous but continual movements and pressure of growth. Abrasive ability will not be denied even soft wood when it is armed with particles of rock waste. In the second process, organic acids passing out of the roots will attack the rock, destroying certain of the constituent minerals and at the same time loosening others not directly subject to solution. Attack being most vigorous in their immediate neighbourhood, the roots will tend to occupy grooves across the rock wherever they touch it. Progressive increase in depth and width of these flutings follows as the roots expand, keeping pace with the process of solution which makes room for their growth, so that in time they become moulded into the solid rock. Once initiated in this manner, the furrows would tend to act as seepage channels for water percolating at the surface of the rock. This water is bound to contain dissolved acids derived from decaying organic matter in the humus between and around the surface roots, and will assist the process or rock solution.

While the first mentioned, frictional effect, is not entirely disregarded, it is considered to be secondary in importance to solution. The rock of this area varies between very fine-grained hard argillite and fairly coarse greywacke, containing some quantity of quartz, in sub-angular grains grading up to half a millimeter. Grooving is found in all types. In the finer varieties the groove surface is smooth, at times even showing a crude polish. This fact would seem to compel some recognition of frictional wear, although in such cases, when a piece is broken out, a zone of decomposition can at times be detected

penetrating the rock and concentric with the groove. However, furrowing is also seen in other places where movement must have been at a minimum; for example, directly beneath the central axis of massive root-systems. Further, when the rock is coarse-grained, an affected surface shows quartz grains standing out in strong relief, being unattacked by the acids, while the surrounding more easily dissolved feldspar has been removed. If movement was important, one would expect the quartz grains to have been torn out of place as soon as they projected a little above the surface, whereas in fact they appear to remain in position until nearly on the surface in many cases. During ordinary handling of specimens, grains of quartz fall out in the hand. Once freed by solution of neighbouring materials, the residual quartz, embedded in a pug of feldspathic clay products, is evidently squeezed round the root and out of the groove by pressure of the growing root, by slight "working" of the root during gales, and very likely also by percolating water. Concentrations of free quartz grains and kaolin may be found in initial hollows and crevices.

It may be mentioned in conclusion that the fluting phenomenon was generally observed where trees had been uprooted on ridge crests, as only in such situations is the humus covering sufficiently thin for these effects to be produced. Lower down the steep slopes the roots were seldom in contact with solid rock.

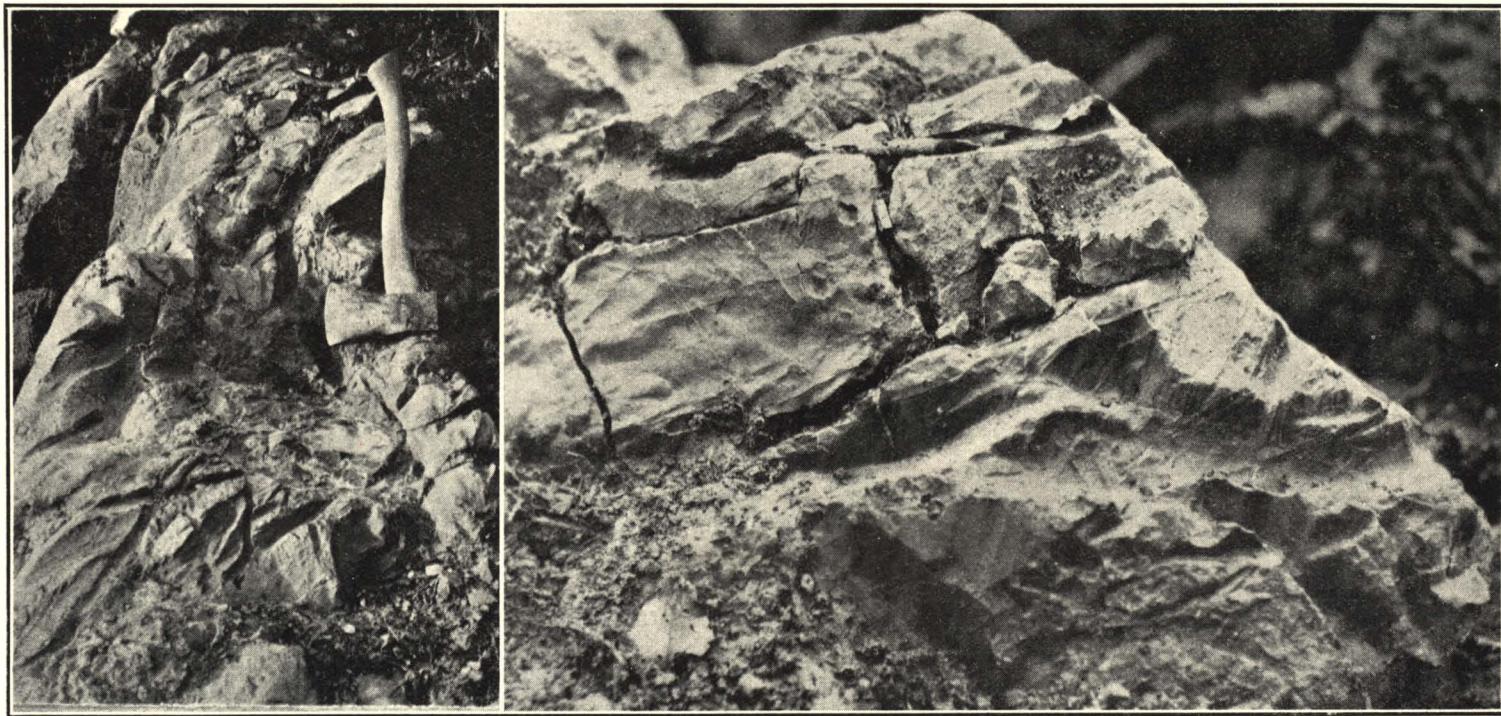


FIG. 1.—Impression of a large root at middle left of the photograph. Pattern of a branching root-system in foreground.

FIG. 2.—Root-moulded surface of greywacke. A broken piece of root is seen wedged in a deep groove at the top of the picture.