

Highway, only results in a deeper active zone with disastrous effects, and it is clearly desirable to increase the surface insulation or to introduce a neutralizing layer of cold air, particularly under warm buildings.

Even in England we have frost heaving in the hilly districts. During the severe winter of 1939-40 examples of frost heaving on the roads were seen in the Cotswolds and on the Great North Road, whilst in Switzerland^{4, 5} Sweden¹ and Germany² it constitutes one of the main difficulties in road construction.

It is of interest to note the climatic conditions under which permanently frozen ground occurs in relation to the conditions required for glaciers and ice caps. In Alaska, where the deep freezing is a relic of the Pleistocene age, the mean annual temperature seems to be about -2°C . or lower, but there is evidence of one or more warmer periods of partial thawing and refreezing since Pleistocene times and there is further evidence of gradual thawing to-day. Over most of the perennially frozen ground the annual precipitation is less than 38 cm. Cool, dry climates are therefore necessary for permanently frozen ground, whilst cool humid climates are required for ice caps and glaciers. Presumably it is the insulation of the ice that prevents frozen ground occurring under the lower parts of glaciers.

Many intricate soil structures are likely to result from the thawing of frost heaved silts and fine sands and it seems probable that some of those interesting patterns seen in the so-called late fluvioglacial deposits can be explained on this basis.

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BRITAIN'S STRUCTURE AND SCENERY. By L. DUDLEY STAMP.
London: Collins, 1946, pp. xvi + 255

THIS excellent book dedicated to that true lover of the countryside the Rt. Hon. the Lord Justice Scott, P.C., is one of a series termed the "New Naturalist," whose aim is to interest the new reader in the wild life of Britain by recapturing the inquiring spirit of the old naturalist. This particular volume, in the method of its approach and in the hands of such an experienced exponent of geology and geography as Professor Dudley Stamp, certainly goes a long way to achieve the object in view.

It is clearly printed and amply provided with illustrations and diagrams, including 32 single and composite coloured plates, largely from Professor Stamp's own colour photographs. There is an intentional absence of technical terms and geological jargon. The volume should therefore make a wide appeal both to naturalists and country-loving laymen. It is the kind of book, too, which should be the means of enlisting the interest of schools, in which the geological background of much of physical geography is often so inadequately taught.

Of particular interest to the members of this Society and readers of its Journal are Chapter 10 on the "Scenery of Glaciation" and Chapter 14 on the "Great Ice Age and After." In the former chapter it is emphasized that on account of the relatively recent date of the last Glacial Epoch and in the absence of any major earth building movement since the ice receded, the scenery of a large part of Britain is the scenery of glaciation. A clear picture is drawn of the effects of glacial erosion on the one hand, and the constructional features of drift, moraines and boulder clay on the other. There is also a description of the formation of glacial lakes, which in their several ways have had such an influence upon the later drainage system of the British Isles. The development of good agricultural soils in some areas, such as "limed" drifts deposited by ice which had passed over chalk outcrops, is duly noted. The subject of soil formation and distribution, a subject in which the author is an acknowledged expert, is dealt with more generally in Chapter 11.

Geology is a science which provides ample scope for difference of opinion. But surely it would seem unnecessary to perpetuate the theory, as the author does at page 89, that the bergschrund is the locus of plucking action in the erosion of cirques. This idea has been exploded by W. V. Lewis (as hinted at by the author) and others before him, and it is misleading to revive it. In speaking of drumlins (p. 86) the author does not appear altogether certain that their formation, considered to be due to the stagnation of a heavily debris-charged ice-sheet, can be thus so easily explained. It would seem, however, that innumerable examples, particularly those found in North America, satisfactorily confirm this explanation. When referring to the study of *roches moutonnées* (p. 90) the author makes the usual textbook mistake of attributing the term to the appearance of sheep at rest. It was de Saussure who first coined the phrase from the resemblance of these rock forms to the sheep-skin wigs in fashion in his day.

The author emphasizes the difficulties that have been encountered in constructing an exact sequence of events during and since the Great Ice Age. He describes the applications of modern technique to the problem and the important advances made by a fuller use of geomorphological examination, particularly by pollen analysis of stratified peat, as worked out by H. Godwin in the East Anglian Fenland. A vivid though necessarily summarized picture is painted of the whole fascinating theme of changing conditions, as the ice-sheets waxed and waned and glacial and interglacial climates followed each other, while ancient man, animals and plants migrated with the shifting ice-fronts on the shores of the glacial lakes. Due reference is made to the geochronological scale worked out for Scandinavia, and an appropriate warning sounded against attempts at too close a correlation between the recognized continental glacial deposits and the proved multiple drifts of the British area.

The remaining twenty-two chapters, covering external geological processes, both cause and effect, and describing the chief natural regions of Britain, are written with lucidity and are admirably illustrated.

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