

are produced on a flint when flaking, and which are not found upon implements which have been exposed to atmospheric conditions, these fragments would in time, by thermal effects, 'weather out' and leave a clean-cut groove behind.

When I proceeded to test my theory by examining a series of striated flints in my collection I found various specimens which seem to me to show striæ in different stages of weathering. Thus one black glossy flint given me by Mr. E. St. H. Lingwood, of Westleton, Suffolk, and found by him on a ploughed field at that place, showed a shattered scratch extending for about  $1\frac{1}{4}$  inches across its surface. To prove that such a scratch could easily be deepened I attacked part of it with a steel probe and found that I could easily remove the thin plates of flint which were produced when the initial shattering took place. I then took a pointed flint flake and cleared away the remaining splinters of flint in the groove I had made, and this specimen, therefore, now exhibits a shattered line over half its length, and the other half a deepish groove.

This question of the 'weathering out' of scratches appears to me to be of some importance, because what we have looked upon as deep striæ caused by great pressure are in all probability merely 'weathered out' scratches, the initial stage of which would not require any very great pressure to produce. I give it as my opinion that every scratch imprinted upon a flint must have a shattered portion on the sides and floor of the scratch, and, further, this shattered portion, if exposed long enough to thermal effects, must 'weather out' and the scratch alter in depth and appearance until all the thin fragments are gone. If a flint gets striated, and then becomes covered by some impervious material such as clay, then it will be protected from thermal changes and no 'weathering out' of the scratches take place. This perhaps offers an explanation for the smallness of the striæ on the flints from the Chalky Boulder-clay, as compared with those showing on stones from below the Red Crag. The latter were scratched and then exposed on the pre-Crag land surface, and consequently got 'weathered out', while those in the Boulder-clay have been protected by the nature of the material in which they lie, and many of them exhibit typical unweathered out, shattered, scratches. In this note I refer solely to the striæ which are developed upon the hard portion of the flints, not to those upon the softer cortex.

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## NOTICES OF MEMOIRS.

### GEOLOGICAL SURVEY OF SOUTHERN RHODESIA.

THE following is an abridged statement from the Report of the Director, Mr. H. B. Maufe, for the year 1912 (fol. ; Salisbury, Rhodesia, 1913): As a result of the detailed work amongst the metamorphic rocks, it is becoming increasingly clear that they are divisible into three series, one of which consists of three groups: (a) a greenstone schist group, including epidiorite, (b) a banded iron-stone group, and (c) a conglomerate and grit group. The second series consists of ultra-basic rocks, some of which contain chromite and asbestos. The third series comprises a very variable group of fine-grained and frequently schistose acid rocks, which have not hitherto

been recognized as a distinct series. Moreover, a consideration of the distribution of gold-bearing quartz reefs and the mode of occurrence of an important class of auriferous impregnations has led up to what is probably the point of greatest practical importance resulting from the year's work, namely, that the gold deposits of the Territory are closely associated with the last-named series of acid igneous rocks.

The north-western portion of the Wankie coal-field, including the main basin in which the colliery is situated, has been mapped by Mr. Lightfoot, whose geological work has determined the succession of rocks and the structure of this field. The discovery of fossil plants is interesting, as proving what perhaps was never seriously doubted by geologists, that the Wankie coal-beds belong to the lower part of the Karoo system. The main coal-seam is known to be a very thick one, and the best in the sub-continent for steam-raising purposes. The survey of the district now shows that the basin in which the colliery is situated, although bounded in parts by faults, is simple in structure, and remarkably free from faults and other disturbances. Estimates of the resources of the field made previous to the survey showed a very large reserve. Not only is this now confirmed, but a large addition may be made with considerable confidence. Mr. Lightfoot points out that probably 600,000,000 tons of coal could be taken out of the district mapped by him. Investigations were made, partly in conjunction with the Chemist to the Agricultural Department, into a number of deposits of limestone and clay, with special reference to their suitability for the manufacture of Portland cement; and a syndicate has proved by trial tests that such a cement, exceeding the requirements of the revised British standard specification in strength, etc., can be made out of materials occurring near Bulawayo, and that a sufficient quantity of them is available.

Observations on the relation of the soil, or more accurately the subsoil, to the underlying rocks have resulted in the collection of a considerable amount of evidence showing that the soils are largely residual accumulations, and that two of the most important factors in determining their character are (1) the nature of the underlying rocks, and (2) the behaviour of the soil-water.

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#### REVIEWS.

- I.—CARADOCIAN CYSTIDEA FROM GIRVAN. By F. A. BATHER, M.A., D.Sc., F.R.S. Trans. Roy. Soc. Edinburgh, vol. xlix, pt. ii, No. 6. 4to; pp. 359–530, with 6 plates and 80 text-figures. Edinburgh: Robert Grant and Son, 107 Princes Street, 1913. Price 15s. 6d.

(PLATE XIII.)

**I**F we examine the various members in almost any grade of the Animal Kingdom we shall meet with some so unlike, *superficially*, our conception of the type, as to cause us, at first sight, to doubt their right to a place in the phylum to which they have been assigned by the systematist. But a careful study of the larval stages of development of many such erratic forms has usually led to the recognition of their true position. It is within the memory of the writer that *Lepas anatifera* was arranged with the Mollusca in the Shell