

Watcombe beach during the first excursion. Of these last Dr. C. J. Stubblefield permits me to quote him as saying that the meniscus-arrangement of rock-particles suggests matter that has passed through the body of an animal, probably an annelid. They are doubtless the annelid tracks mentioned by Ussher and occur in deep red calcareous sandstone about three feet above the Watcombe Clay. Ussher, for some reason I cannot understand, included this rock with the Watcombe Clay, but it is clearly New Red Sandstone. The largest of these specimens I saw measured 14 by 1 inches. Publications show that even larger earthworms are known, but these structures are more likely to have been caused by marine or lacustrine worms on a shore; and their position close to the Watcombe Clay, which I am now sure is weathered Devonian sedimentary rock, and their apparent absence higher up as far north as Dawlish, suggest that their disappearance was due to the amount of iron in the water.

My difficulty about accepting the alluvial fan origin of the New Red Sandstone of South Devon is that I cannot see convincing evidence of radial dips which ought to be visible in the long, clear coast-sections. Perhaps someone else may succeed where I have failed.

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19th June, 1949.

AUTHIGENIC FELSPAR IN FULLER'S EARTH

SIR,—Dr. W. W. Black, in his letter¹ on an Occurrence of Authigenic Felspar and Quartz in Yoredale Limestones, states that he is aware of only one previous record of authigenic feldspars in Britain—those described by Reynolds.² Another, however, can be mentioned. Newton³ said that the clean, flaky feldspar crystals found in the Jurassic fuller's earth of Combe Hay, near Bath, and the Cretaceous earths of Nutfield and Woburn Sands were almost certainly authigenic. Not only were the optical characters measured, but samples were separated and analysed. Both Nutfield and Combe Hay material, which were similar, suggested the composition of anorthoclase. Brammell and Leech⁴ said later that the feldspars in the Nutfield fuller's earths were demonstrably authigenic but found that the feldspar crop (7.2 per cent in one of the commercial samples) was heterogeneous and the composition variable.

Not only, therefore, have we here records of authigenic feldspars in fairly large percentage, but descriptions of authigenic sphene, zircon, and apatite in the Cretaceous earths, and zinc blende, zircon, and apatite in the Jurassic earth.

In all probability these fuller's earths were chemical deposits, like limestone; under these conditions one may expect minerals beside the main ones to crystallize out. Glauconitic rocks would be expected to yield further examples. The form of the authigenic crystals is of interest in showing some characteristics of incipient crystallization as well as others of well-defined crystallinity.

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28th May, 1949.

¹ BLACK, W. W., 1949. *Geol. Mag.*, lxxxvi, 129.

² REYNOLDS, D. L., 1929. Some new occurrences of authigenic potash feldspar. *Geol. Mag.*, lxxvi, 390.

³ NEWTON, E. F., 1937. The petrography of some English fuller's earths and the rocks associated with them. *Proc. Geol. Assoc.*, xlviii, 175-197.

⁴ BRAMMELL, A., and LEECH, J. G. C., 1940. Montmorillonite in fuller's earth, Nutfield, Surrey. *Geol. Mag.*, lxxvii, 102-112.