

AUGITE-BIOTITE-DIORITE.

SIR,—Miss Reynolds's reply in the December number of *GEOL. MAG.* to my letter in the October number does no more than prove my contention that it is futile to quarrel about the application of rock names until we are agreed about the meanings of these names. It is quite clear that gabbro-diorite means one thing to Professor Bailey and me, and another to Miss Reynolds. She now says augite-biotite-diorite "certainly is not diorite", which leaves me wondering what her definition of diorite may be, and that it "obviously is not gabbro-diorite". If she means that it is not gabbro-diorite in Niggli's classification then, of course, I agree; but in her former letter she referred to Tröger as her authority. The fact is that these points, which seem so certain and so obvious to Miss Reynolds, are no more than personal impressions, and they can never be anything more until we all agree to use the same names in the same sense. That is the point I tried to make in my previous letter. "The beginning of knowledge is the investigation of terms."

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SIR,—May yet a third member of the British Association Committee on Petrographic Classification and Nomenclature venture to express an opinion on the use of the name "augite-biotite-diorite"?

The only principle involved is whether normal rock names should be applied to rocks demonstrably of hybrid origin. In so far as modern tendencies are concerned, the opinion is growing that many, perhaps most, syenites, diorites, and monzonites (syenodiorites) are of hybrid origin, and in the circumstances we cannot do other than use well-established names for rocks having certain mineralogical and chemical characters, regardless of their mode of origin. That being so, there are two names from which a choice must be made: is the rock a diorite or a gabbro? To this simple question it is impossible to give a simple, unqualified answer which will please all geologists, because it is a lamentable fact that the two may be distinguished by at least three different criteria: silica percentage, colour index, and kind of plagioclase. In the circumstances it is essential that petrologists should clearly indicate whose definition of the name finally chosen is being adopted, by placing the author's name in brackets after the rock name. This would prevent the minor shocks administered by suddenly meeting a common name used in an unfamiliar sense. Probably the most popular means of distinction between diorite and gabbro is silica

percentage. On this basis it was incorrect to call the rock a diorite, as its silica is 49 per cent, which places it well within the limits of the basic group. From this point of view the rock is undoubtedly a gabbro; and consistent with this naming are the facts that it contains much coloured mineral, the chief, judging from the published figure, being clino-pyroxene, though biotite is recorded as dominant in the mode. The rock differs from normal (calc-alkaline) gabbro in two respects: a high content of biotite, and the more strongly sodic character of the plagioclase. Both facts should be conveyed in the name chosen by using a suitable qualifier. I suggest that "hybrid sodi-potassic gabbro" is the correct naming from my point of view; and there is little difference between this and the name arrived at by following Shand's scheme, according to which it would be "biotite-rich soda-gabbro (Shand)". By the way, there is no incongruity in this naming, which is eminently reasonable and self-explanatory.

Two minor points in this discussion will bear further examination. What exactly is meant by Miss Reynolds's statement (GEOL. MAG., 1936, p. 560) that augite-biotite-diorite is certainly not diorite? To say that augite-biotite-diorite is not diorite in its bare essentials is to admit that a wrong name has been used: for the same principles apply as in naming fossils, flowers, or any other natural objects. It is like saying that *Didymograptus murchisoni* var. *geminus* is not *Didymograptus*. The "augite-biotite-" part of the name plays the same role as the trivial part of the fossil name: diorite is the genus, determined on broad characters; augite-biotite-diorite is a species, so named on its trivial characters.

Finally this discussion has raised the question of the meaning to be attached to hyphenated words. Apparently three different meanings have been attached to different times to "gabbro-diorite": this is sufficient, in my mind, to disqualify the name from use altogether. In a classification based rigidly on silica percentage there is only one gabbro-diorite, the rock, not yet discovered, which contains exactly 45.00 per cent of silica. If it contains 44.99, it is a gabbro, if 45.01 it is a diorite.

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