

CORRESPONDENCE.

THE GENESIS OF LEUCITE AND MELILITE ROCKS.

SIR,—I have read with great interest the account given by Drs. Holmes and Harwood of the volcanic rocks near Ruwenzori (*Quart. Jour. Geol. Soc.*, lxxxviii, 370). The descriptive part of this paper is altogether admirable, but I find myself in two minds regarding the theoretical part. Not for the first time, I am torn between admiration of an ingenious theory and inability to believe it. Dr. Holmes will have it that leucite and melilite rocks are differentiates of the primary peridotite magma that is assumed to underlie the granitic and basaltic skins of the earth. This peridotite zone is generally thought to begin some 40 miles beneath the surface and to extend down to a depth of about a thousand miles. Dr. Holmes shows clearly that if this magma sheds enough olivine and eclogite it will leave a residue having approximately the composition of olivine-leucite, and that if it sheds olivine and enstatite the residue will approximate to melilite-basalt. Given a magma of a sufficiently accommodating disposition, these results might indeed be realized; but it seems to me that invoking the aid of a world-wide magma in order to explain a local rock-facies is dangerous. It is like using a steam-roller to crack a nut; you cannot limit its action and it is certain to crack a whole lot of other things besides the nut. In short, if the world-wide peridotite magma behaves as Holmes supposes, *it must do so at similar depths all round the world, not only in Uganda, and olivine-leucites and melilite-basalts should be the commonest instead of the rarest of rocks.* That such rocks are in general most rare, although abundant at a few localities, is to my mind the clearest proof that they are due to a local cause, not a world-wide one.

Dr. Holmes claims, on the basis of a few determinations of BaO, SrO, and other minor chemical constituents, that there is a "community of geochemical associations" between leucite-melilite rocks and mica-peridotite. I wonder whether that most accurate analyst, Dr. Harwood, shares his colleague's faith in the validity of this argument? Most of the minor constituents to which Holmes alludes are present in such trivial quantities as to affect only the second decimal place, and accurate determination of such minute quantities is not possible by gravimetric methods when one uses only a half or one gram of rock. I suggest that the difference, to which Holmes refers, in the strontia content of rocks from eastern Australia and southern Rhodesia is just as likely to be characteristic of a particular analyst or a particular batch of reagents as of the rocks themselves. Until the minor constituents of rocks are

determined in samples at least ten times as large as those ordinarily used in rock analysis, it will be unwise to base any far-reaching deductions on the proportions of these constituents.

Dr. Holmes refers briefly to Daly's hypothesis of limestone-assimilation as an alternative to his own theory, but rejects it on the twofold ground that no limestone is known in the Ruwenzori region and that reaction with limestone "provides no way of ensuring a regional excess of K_2O over Na_2O ". The first point is not conclusive; nobody travelling over the red granite country of the Transvaal would ever imagine that there was a massive limestone several miles beneath the granite; but there is. Holmes describes blocks of melanite-pyroxenite and tremolite-amphibolite among the ejectamenta of the Ruwenzori volcanoes; there are no minerals more characteristic of limestone contacts than melanite and tremolite. It would be extravagant to claim that these few specimens prove anything about the genesis of the lavas with which they are associated, but at least they form a more solid basis for speculation than the comparison of infinitesimal amounts of the rarer oxides. As for Holmes' second point, I have shown in my paper on the granite-syenite-limestone contact of Palabora (*Trans. Geol. Soc. S. Africa*, xxxiv, 81) that rocks extremely rich in K_2O and almost deprived of Na_2O have been formed in that region in consequence of reaction between granitic magma and limestone.

I hope Dr. Holmes will take my criticism in the spirit in which it is offered, and that when he and the officers of the Uganda Geological Survey come to describe the leucite rocks of the Bufumbiro volcanoes they will not allow the fascinating game of speculating about the earth's interior to blind them to indications that may lie just beneath their feet.

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