with the granites are now known to belong for the most part to a somewhat earlier period of intrusion and not to be simply chilled marginal features. The bulk of them preceded the granite, though minor intrusions also followed. The statement of relationship between the granites and the rhyolites of the Buji Hills, given in Bulletin No. 1, p. 18, requires modification in this respect. Also the quartz-porphyry mentioned in Bulletin No. 1, p. 15, having originally formed part of the roof of the intrusion-chamber is probably invaded by the granite, not vice versa.

(3) The syenites of Bauchi Town (*G. and G.*, p. 135) have been shown to be connected with the older porphyritic gneissose granite (*G.S.N.Bull.* No. 9, p. 41). True syenitic differentiates of the younger granitic magma have however also been described (*G.S.N.Bull.* No. 4, p. 13).

(4) A Lower Cretaceous fossil, described by Dr. Spath (*G.S.N.Bull.* No. 12, p. 53), indicates the occurrence of rocks of a greater age in the Benue valley than originally anticipated. In the Gongola valley (*G. and G.*, p. 160), Cretaceous shales have been found near Fika and in a borehole farther north at Damagam, 20 miles east of Potiskum.

(5) The discovery of bonebeds in the north-west of the Protectorate *G.S.N. Occ. Paper* No. 2) has raised the question of the exact age of the Sokoto Series. I fear I was under a misapprehension when I reported the occurrence of Nummulitic limestone in this part of the country (*G. and G.*, p. 167). My own further inquiries have not resulted in any confirmation of the statement.

(6) The material described as "surface ironstone" (*G. and G.*, p. 199) is now commonly, though loosely, spoken of as laterite. Where it forms a crust on rocks decomposed in situ it marks the occurrence of primary lateritic weathering. Elsewhere it is a secondary laterite of varied origin.

(7) The red earthy drift of the Bauchi Plateau (*G. and G.*, p. 203) has been closely investigated and is now generally known as the Fluvio-Volcanic Series. The separation of an earlier from a later volcanic series in *G.S.N. Bull.* No. 1, p. 11) is, however, of doubtful application to the whole area. It is possible that there may have been only one extended period of volcanic activity.

J. D. Falconer.

London.
June, 1928.

THE MAGMATIC ORIGIN OF ORES.

Sir,—Whilst cordially agreeing for the most part with your interesting paper in the current number of The Geological Magazine, and especially with your broad interpretation of the term "magmatic", I shall be glad if you will allow me to make a few observations on one point.

The conception of an underlying granite bathylith as the source of the large fluorite deposits of Derbyshire is not easy of acceptance.

It is noteworthy that these deposits are concentrated in the regions of extensive vulcanicity during Lower Carboniferous times, on the eastern margin of the limestone massif, and in the inliers of Crich and Ashover. Further, they appear to be restricted to the uppermost 400 or 500 feet of the limestone, *above* the lava-flows.

It seems clear that large amounts of magmatic emanations, carrying silica and other minerals in solution, have arisen from some underground source, and that source appears to be always associated with the lava-flows and vents, and not with the olivine-dolerite intrusions. The Ember Lane vent at Bonsall; the Ashover vent; the Speedwell vent near Castleton; the Cracknowl vent near Bakewell, all illustrate this point. In the neighbourhood of the first three of these vents there are large replacements of limestone by quartz-rock (as shown by Dr. Bemrose) accompanied by much fluorite. Near the Cracknowl vent there are extensive, contemporaneous beds of massive chert, analogous to geyserite, with fluorite only in small quantity. It seems impossible to doubt that all these deposits have resulted from solutions of magmatic origin.

On the granite-bathylith hypothesis (waiving all difficulties as to location and depth below the surface) it would seem reasonable to expect fluorite to occur throughout the length and breadth and thickness of the limestone massif, instead of being restricted as shown above.

It seems possible that an explanation may be found in the chemical composition of the lavas themselves. Although essentially basaltic throughout, they vary greatly in their alkali-content, and consequently in their felspars. Without going into too much detail the following percentages from analyses kindly made by Dr. H. F. Harwood are suggestive.

Lower lava of Miller's Dale area :—		
Lower part of flow . . .	K_2O, 6·77.	Na_2O, 1·75
Upper part of flow . . .	K_2O, 0·69.	Na_2O, 2·39
Upper lava of Matlock area . .	K_2O, 7·39.	Na_2O, 0·35
Lava near Cracknowl vent . .	K_2O, 1·07.	Na_2O, 2·33

The felspar of the potash-bearing basalts is orthoclase, that of the more normal basalts is labradorite. It will be seen that, *so far as alkali-content is concerned*, the former have the constitution of a granite.

Is it not possible that there may be a direct relation between this granitic feature of some of the lavas and the fluorine emanations, probably SiF_4, which have formed the deposits in question? In that case the ascensionist theory holds its own without the aid of a granite bathylith.

In a future paper, when the work is completed, I hope to show the distribution of these two types of lava over the whole of the Derbyshire area.

H. C. SARGENT.

16*th June*, 1928.