areas the valuable work of Professor Hickling receives special commendation. The variable character of the Permo-Triassic deposits is noted: where most completely developed these rocks are capable of a tripartite division into Collyhurst Sandstone, Manchester Marls, and Bunter Sandstone, but the latter is the most persistent member.

The structure of the district is considered to be controlled by (*a*) the north-south Pennine fold, and (*b*) the east-west Rossendale anticline, the folding and faulting seen being all part of the same movements.

The general stratigraphical succession closes with a chapter on the Glacial and Recent geology, wherein the features connected with the retreat of the ice are especially interesting, but justice is hardly done to much that is shown on the map.

G. L. E.

MAP OF THE BRITISH ISLES, WITH GEOLOGICAL BOUNDARIES. By F. SMITHSON. London: Thomas Murby & Co., 1932.

THESE clearly printed maps, on a paper calculated to take colour well, are intended for the use of students. The boundary lines and legend correspond closely to the 25 miles to the inch map of the Geological Survey, but the scale is smaller, 100 miles being about 1·8 inches. They should prove extremely useful in teaching, as there is nothing better than the colouring of maps to impress on students the distribution of geological formations. The prices are: 2*d*. each for single copies; 1*s*. 3*d*. per dozen; 14*s*. per gross; postage extra.

CORRESPONDENCE.

COMPUTATION OF ROCK ANALYSES.

SIR,—Computations from rock analyses are frequently made to obtain two, three, or four parameters, which can be plotted on variation diagrams of several kinds, triangular diagrams, or tetrahedra, in order to demonstrate chemical relationships which are not obvious from inspection of the analyses. The methods most used are those of Becke, Osann, Niggli, and von Wolff. In order to plot sets of three or four parameters with tri-linear or tetrahedral co-ordinates, it is necessary that the sum of the parameters shall be a constant for different rocks—usually taken as 100 for convenience in plotting, though Osann has used 20 and 30 at different times.

The procedure for the Osann and von Wolff methods is as follows:—

(*a*) Calculate the molecular quotient (percentage/molecular weight) of each constituent to four places of decimals, using tables such as von Eckermann's "Molekular Quotidienten".

(*b*) Calculate the molecular proportions to two places of decimals, by reducing the sum of the molecular quotients to 100. It is sometimes stated that this can be done by slide rule, though to get sufficient accuracy for the silica, and sometimes for the other constituents, a cylindrical rule is necessary.

(*c*) Combine these molecular proportions in various ways to give the parameters of the rock in the two systems.

(*d*) Re-calculate the sum of these parameters to 100 (20 or 30 in Osann's method) to one decimal place. This can be performed by slide-rule.

The point is that operation *b* is unnecessary, and that time can be saved and accuracy increased by combining the molecular quotients in operation *c* to give the parameters. The whole operation thus involves only one reduction of a set of three or four figures to a summation of 100, with a required accuracy of 0·1, and avoids the previous reduction of a set of some ten figures to a summation of 100 with a required accuracy of 0·01.

Operation *b* is not included in descriptions of the Becke and Niggli methods.

A. A. Fitch.

Faculty Club,
University of California,
Berkeley,
California.
16th February, 1932.

THE CLAY PEBBLE BED OF ANCON, ECUADOR.

Sir,—We welcome Mr. Baldry's letter regarding the Clay Pebble Bed of Ancon, which appears in the January issue of the Geological Magazine, and while a full discussion must await the publication of his paper, we desire to make a few preliminary remarks.

In the course of a recent brief visit to Peru, one of us had the opportunity of seeing some of the evidence which Mr. Baldry had accumulated in support of his theory, and was very much impressed by it. We believe that the conception of slip planes, presumably implying a state of tension, may be useful in helping to elucidate to a certain extent the geological structure of this part of the South American continent, though we should like to point out that the area covered by the theory is likely to extend much further north than the Santa Elena Peninsula and probably includes a very considerable region of coastal Ecuador. There is a significant difference, however, viz., that the principal zone of disturbance in the Peninsula itself, as well as in the area north at least as far as Manta, is intimately associated with dolerite dykes, and we are anxious to know what part, if any, these intrusions play in Mr. Baldry's theory.[1]

[1] George Sheppard, "The Igneous Rocks of South-west Ecuador," *Jour. Geol.*, xxxviii, 1930.