Triassic rocks on the west. For about a hundred years this supposed dislocation has been known as the " Red Rock Fault ", and possibly demonstrated to generations of students working on Sheet 123. It is usually given the same status of certainty as is given to those other faults so clearly seen, from the mapping, to affect the Carboniferous rocks of the exposed coalfield, and in importance it is made to transcend them.

I have investigated the writings, maps, and sections referring to the relation between the Permo-Triassic and the Carboniferous in the Midlands, particularly those referring to the line of the " Red Rock Fault ", from Farey, Bakewell, Conybeare and Phillips, Murchison, Jukes, Hull, Green, and Lapworth, to the later works of the Geological Survey published during the first three decades of the present century (by Gibson, Wedd, T. I. Pocock, and others). In all these works (with one exception) we find, where there is obviously some break between the two formations, either a presumption that the break is one of simple unconformity or (more often) a postulation of a fault without any logical discussion and with hardly any records (and those equivocal ones) of practical observations on the ground. The exception is Pocock's careful description of the line of junction and his critical evaluation of the mapping and structural evidence (1906, pp. 55–57). He remarked: " Owing to this uncertainty at several points in the Macclesfield district, whether the boundary is natural or faulted, the Red Rock Fault is not drawn on the map " (in the region surveyed by him). The " Red Rock Fault " has indeed yet to be established.

REFERENCE

POCOCK, T. I., 1906. The geology of the country around Macclesfield, Congleton, Crewe and Middlewich. *Mem. Geol. Surv.*

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FOLD TERMINOLOGY

SIR,—I am prompted by a useful paper on the description of folds recently read to the Geologists' Association by M. J. Fleuty and published in its *Proceedings* (1964) to make a brief comment on procedure in defining geological terms and to make two suggestions about particular terms.

One of the important tasks in the advance of any science is the development of a precise terminology. However, in giving a precise meaning to a familiar word, which may have a variety of meanings in different contexts, we often impoverish our language, for then the word may no longer be available in those other contexts. It follows that great care should be taken in the selection of words for particular meanings not to cause any unnecessary restriction of their use in other perhaps more valuable ways. Above all it is desirable that mere priority should not be the basis for the selection of terms. Of course it is desirable that terms already defined should not be ignored or replaced by others on frivolous grounds. But the claims of clarity and significance are not frivolous. Some terms are bad terms because they have been badly chosen—they should be superseded so long as a general gain in clarity is ensured by so doing.

A case in point is the use of the word " envelope ". By analogy with the use of the term " wave-envelope " in optics the meaning of " fold-envelope " in tectonics in obvious. This is clearly the word to use in English where German has *Faltenspiegel*. But there are some who maintain that this term cannot be used because " envelope " has already been used for that part of a fold which invests its " core ". Presumably it is for this reason that Turner and Weiss (1963) propose the clumsy term " fold enveloping surface ". I wish strongly to recommend that this pedantic attitude should be ignored. In this

case there is no need to drop the use of " envelope " in relation to core if we do decide also to use " fold-envelope "; for in context, where the former will relate to one fold and the latter to a set, there can never be any confusion between them.

Where, as frequently occurs, fold axial planes are inclined to the fold envelope, and in consequence the limbs are alternately long and short, the folds are obviously asymmetric. The existence of such asymmetry may be highly significant. The obvious name for this important class of folds which includes, for instance, drag folds due to shearing movements, is " asymmetrical folds ". This is, indeed, the name used by Stočes and White (1935) and by Turner and Weiss (1963). In a footnote to his paper, Dr. Fleuty mentions this usage, but he nevertheless recommends the continued use of the term as descriptive of the attitude of a fold in space. Used in this way (for a fold with inclined axial plane and limbs dipping in opposite directions) the term is certainly widely known. But this is one of those terms, beloved of a certain type of examiner, which because they convey only a meaningless distinction are practically never encountered except in text-books. Thus it is a thoroughly bad case of the pre-empting of a useful word for a special case to the detriment of its use in more suitable ways. I should like to recommend that authors and editors accept the definition of Turner and Weiss and reject the original definition, which, they will find, " never will be missed ".

REFERENCES

FLEUTY, M. J., 1964. The descriptions of folds. *Proc. Geol. Assoc.*, **75**, 461–492.

STOČES, B., and C. H. WHITE, 1935. *Structural Geology*. London.

TURNER, F. J., and L. E. WEISS, 1963. *Structural Analysis of Metamorphic Tectonites*. New York.

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APPINITES IN THE CALEDONIDES

SIR,—The use by Dr. Janet Watson of the appinite suite in a discussion of "Conditions in the Metamorphic Caledonides during the period of Late-orogenic Cooling " (*Geol. Mag.*, **101**, 457–465, 1964) requires further examination, particularly with regard to the relationship of this suite to the large Caledonian granite masses and the correlation of the appinites of the South-western Highlands and with the Ach'uaine hybrids of the Northern Highlands.

The small pipe-like intrusions of the appinites in the S.W. Highlands were formed prior to and unconnected with the emplacement of the granitic plutons of the district. This is clear from the composition of xenoliths, cross-cutting relations on both regional and local scales and the time separation shown by intervening lamprophyre intrusion (Bailey, E. B., and H. B. Maufe, 1960, *Mem. geol. Surv. Scot.*, Sheet 53—2nd. ed., 188, 212, 259; Bowes, D.R., 1962, *Geol. Mag.*, **99**, 119–122). There is considerable evidence to suggest that the appinite association is both basaltic and volcanic. As well as the basaltic and lamprophyric chilled margins, as mentioned by Dr. Watson (p. 461), their chemistry is indicative of alkali basalt composition and their mineralogy indicative of crystallisation of basic magma under conditions of variable water vapour pressure (Bowes, D. R., E. D. Kinloch, and A. E. Wright, 1964, *Miner. Mag.*, **33**, 969–972). The appinites form pipe-like intrusions into explosion pipes (e.g. Bowes, D. R., and A. E. Wright, 1961. *Trans. Edinb. geol. Soc.*, **18**, 293–314) and both in chemistry (Walker, F., 1927, *Trans. roy. Soc. Edinb.*, **55**, 154) and in age relations, there is a close connection between the appinites and the Lorne and Glen Coe Lavas.

There is evidence of association with explosive activity in rocks in the Northern Highlands which, in composition, texture and mineralogical characteristics, are comparable with the appinites from their type area in the