The occurrence of immiscible globules is considered to be a significant evidence of liquid immiscibility. The occurrence of such a chilled emulsion has been recently described by Hjelmquist[3].

No xenoliths identical with or even slightly resembling the mesostasis have been noticed in any of the ignimbrites from New Zealand studied by me, although I examined several hundred ignimbrite samples from numerous localities covering the whole Taupo volcanic zone. There is no evidence that the ignimbrite magma resorbed xenoliths of older ignimbrites and tuffs. Thus, Fitch's criticism opposing the operation of liquid immiscibility is in disagreement with the petrographic evidence afforded by fresh lenticulites and ignimbrites in general. Moreover, to ascribe the origin of a common volcanic rock type, such as ignimbrite, to decomposition of accidental xenoliths, which of necessity would be required to form the bulk of the rock, appears to be highly improbable, if not impossible.

It is significant that none of the countless witnessed nuée ardente eruptions has ever produced an ignimbrite and that the deposits produced by witnessed nuée ardente eruptions differ essentially from fresh ignimbrites. The inconsistencies of the nuée ardente hypothesis[2] suggest that the mode of emplacement of ignimbrites is of fundamentally different type from that of the nuée ardente. On the other hand, the operation of liquid immiscibility explains satisfactorily the textural features of the ignimbrites, and their mode and mechanism of emplacement.

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THE hypothesis that ignimbrite sheets are formed as a result of the eruption of a special kind of acid magma, which develops two immiscible liquid fractions on eruption, is strongly defended by Steiner. He rejects the objections raised in my criticism of his work[1], and repeats much of his original argument[2]. Steiner's hypothesis rests on a fundamentally different interpretation of the textural relationships seen in ignimbrites from that made by the majority of petrologists. Having proved that two contrasting glasses are present as recognizable phases in one ignimbrite, Steiner then assumes that the detailed textural pattern of all ignimbrites can be explained on the basis of this observation. Statistically convincing proof of the assertion that two contrasting phases are present in all ignimbrites is not given, and the volume difficulties inherent in his hypothesis are not considered.

The vast majority of the phenocrysts seen in ignimbrites are broken and abraded, whatever their composition, and Steiner's denial of this fact must throw doubt on his whole philosophy of petrographic interpretation. Without pursuing these differences, however, it is obvious that valid petrological hypothesis cannot be based on petrographic evidence alone, and, if they are to be accepted, Steiner's views on the origin of ignimbrites must withstand a field examination of the rocks. Again we find that the majority of field geologists have arrived at conclusions, regarding the origin of ignimbrites, fundamentally different from those suggested by Steiner's petrographic interpretation. The ash-flow hypothesis is now almost universally accepted on the basis of overwhelming field evidence, amply catalogued by such workers as Enlows[3], Martin[4], Ross and Smith[5], and many others.

One fact alone will illustrate the difference between Steiner's interpretation and those of other petrologists. He asserts that the lenticles and shreds having characteristically ramifying ends, common in many ignimbrite specimens, have a different origin from the rounded pumiceous inclusions seen in other examples. Though this may be so in some rare instances, field evidence indicates that in the vast majority of cases the lenticles are undoubtedly flattened and welded pumice lumps identical in origin to the rounded unwelded pumice lumps present in the unwelded parts of the same ignimbrite sheet. The transition from rounded to flattened pumice lumps in the same sheet can be observed in the field, and to deny it must only reveal a failure to make a thorough field examination of the rocks investigated.

The field evidence undoubtedly supports the hypothesis of collapse and welding for the production of the internal structures and textures of ignimbrites (see the references quoted by Ross and Smith[5]). In the face of the field evidence it is just not possible to accept Steiner's interpretation of the evidence available. The possible alternative origins for the contrasting glass phases seen in some ignimbrites, put forward in my criticism of Steiner, may not be applicable to all cases, but they suggest a more likely explanation of the facts than does his hypothesis. In this connexion, work on the presence of contrasting glass fractions in ignimbrites by Williams[6] is of interest.

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Relationships of Fauna and Substratum in the Palæoecology of the Chalk and the Chalk Rock

AN investigation of the palæoecology of the Chalk Rock of south-central England (Oxfordshire–Hertfordshire) has led me to believe that the most important difference between the Chalk Rock and normal Chalk environments was in the nature of the substratum.

The normal Chalk environment was presumably of soft-bottom type, with the bottom consisting of unlithified chalk-mud. The Chalk Rock, in contrast, marks hard-bottom conditions. Its general lithological features in the area examined, where a single main rock band is typical, are related to three occurrences: (*a*) penecontemporaneous lithification of chalk sediment; (*b*) erosion, with production of irregular surfaces and of pebbles of lithified sediment (so-called 'nodules'); (*c*) phosphatic and glauconitic impregnation of exposed erosion surfaces and pebbles, presumably hardening them further. Lithification of sediment before erosion is implied by its ability to form pebbles, and by the occurrence of reworked fossils of which, for example, molluscan examples include sharp internal moulds with the shell lost. An encrusting fauna (for example, serpulid and spirorbid