Removal of Background in β-Sensitive Nuclear Emulsions

WE have tried to reproduce the procedure recommended by H. Faraggi[1] and G. Albouy[2] for removing the background on Ilford *G5* plates before experimental exposure. The treatment consists in suspending the plates for a certain time in water vapour of a given temperature. After we had made a number of unsuccessful attempts following the methods of other investigators[3], it occurred to us that the small chlorine content of Paris water might be responsible for the difference in the results. We tried water containing 12 mgm. chlorine per litre for the production of the water vapour, and found that we could remove the background at 60° C. in five hours (instead of twenty hours required by the French investigators) without affecting the sensitivity of the plates to subsequent β-rays if the plates were dried after the treatment. α-Tracks withstood this treatment. These results seem to throw some light on the process involved.

Details and further experiments under varying conditions will be published in the *Proceedings of the Vienna Academy of Sciences* (*Wien Ber.*).

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[2] Albouy, G., *C.R. Acad. Sci., Paris*, **230**, 1351 (1950). Albouy, G., and Teillac, J., *C.R. Acad. Sci., Paris*, **232**, 326 (1951).

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Interaction of Two Constituents in Ferromagnetic Materials showing Reverse Thermo-remanent Magnetism

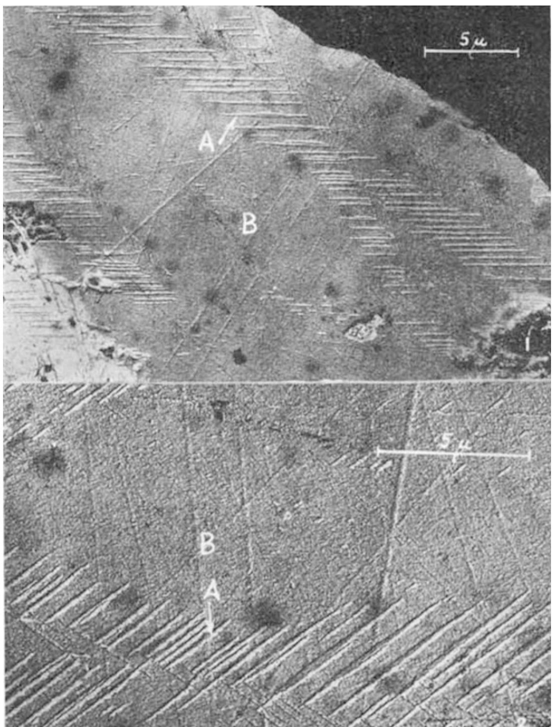
IN three earlier communications[1], we described the magnetic, chemical and crystallographic properties of the ferromagnetic minerals causing self-reversal of thermo-remanent magnetization of igneous rocks. The results of studies of these properties showed that most grains of ferromagnetic minerals in the Haruna dacitic rocks consist of two different ferromagnetic constituents; one called *A* is titanium-poor titanomagnetite having a crystal structure of inverse spinel type and Curie point around 500° C.; another called *B* is a solid solution of ilmenite and hæmatite (hæmo-ilmenite) having rhombohedral crystal structure and Curie point of about 230° C.

All the magnetic experiments showed that the reversed thermo-remanent magnetism of these minerals and their mother rock is due to the effect of close interaction of these two different ferromagnetic constituents during the process of their cooling in a magnetic field. This is in full agreement with Néel's[2] two-constituent theory of reverse thermo-remanent magnetism. But it was not clear how these constituents interact with each other in actual mineral grains.

It was found, on the other hand, that a simple mixture of these two constituents does not show reversed thermo-remanent magnetism even when the mixture is tightly compressed. Therefore, it may be presumed that the relationship of these constituents to each other is a form of intergrowth of one into another, thus resulting in a very close interaction between them.

Figs. 1 and 2 show electron-microscope photographs of etched surfaces of ferromagnetic minerals in the Haruna rock. The polished surfaces of the minerals were etched by hydrochloric acid for 15 min.; parts of constituent *A* (being approximately magnetite) can easily be etched, but parts of constituent *B* are scarcely affected. The original photographs have magnifications of 4,900 (for Fig. 1) and 8,000 (for Fig. 2). It is clearly shown in these figures that constituent *A* intergrows in echelon into constituent *B*. The width of strips of constituent *A* is approximately 0·2 μ. The length of the strips ranges apparently from 1 μ to 5 μ in the photographs; but it seems likely that these strips are more or less linked one to another along specified directions forming fairly long strips of narrow width.

Judging from the above-mentioned scale of strips of constituent *A*, we may presume that each strip consists of a single domain or several domains. In other words, the magnetization of these strips may be of the same order as the spontaneous magnetization of constituent *A*. Then the magnetic field caused by the strong magnetization of strips of constituent *A* in the neighbouring strips (of mean width 0·5 μ) of constituent *B* will be, on the average, opposite to the direction of magnetization of the strips of *A*, which must be parallel to that of the external magnetic force. The detailed calculations cannot be reproduced here, but it can be shown that the magnetic interaction between strips of constituents *A* and *B* mentioned above can result in reverse thermo-remanent magnetization.



Intergrowth of constituent *A* in echelon into constituent *B* in a Haruna ferromagnetic mineral