

# SYMPOSIUM ON THE CRYSTALLIZATION OF METALS, ROCKS AND ICE

*held at the Royal Geographical Society's House, London*

on 7 December 1950

Chairman: Professor K. Lonsdale, F.R.S.

The following papers were read:

Dr. C. H. Desch, F.R.S.: The Crystallization of Metals.

Dr. A. G. MacGregor: Ice Crystals in Glaciers compared with Quartz Crystals in Dynamically Metamorphosed Sandstones.

Dr. P. G. Owston: The Crystallization of Ice.

Dr. MacGregor's and Dr. P. G. Owston's papers are printed below. Dr. Desch's paper, owing to unavoidable delay, will be published in a later issue of this Journal.

## ICE CRYSTALS IN GLACIERS COMPARED WITH QUARTZ CRYSTALS IN DYNAMICALLY METAMORPHOSED SANDSTONES\*

By A. G. MACGREGOR

(Geological Survey of Great Britain)

**ABSTRACT.** Attention is drawn to resemblances between two contrasted styles of mosaic crystallization—tessellate and equigranular as compared with irregularly interlocking (sutured) and inequigranular—that characterize ice in alpine glaciers and quartz in dynamically metamorphosed sandstones of the Moinian area of the northern Scottish Highlands. It is suggested that in both environments the contrasted types of mosaic are due to crystallization under conditions of shearing stress that were respectively minimal and maximal. Similarities are also pointed out between the orientation of the principal crystallographic axes of crystals in ice subjected to shearing stress, and the "girdle" arrangement of the principal crystallographic axes of quartz in Moinian metamorphic sandstones.

**ZUSAMMENFASSUNG.** Es wird auf die Aehnlichkeit zwischen zwei typischen Arten der mosaikförmigen Kristallisation hingewiesen—würfelförmig und gleichkörnig gegenüber ungleichmäßig verzahnt und ungleichkörnig—wodurch einerseits das Eis der alpinen Gletscher und andererseits der Quarz in dynamisch metamorphen Sandsteinen der Moinian Formation des nördlichen schottischen Hochlandes charakterisiert werden. Es wird vermutet, dass in beiden Fällen der festgestellte Typus des Mosaiks bedingt sei durch eine unter dem Einfluss von minimalen bzw. maximalen Scherspannungen erfolgte Kristallisation. Ferner wird die Verwandtschaft zwischen der Orientierung der kristallographischen Hauptachsen des durch Scherspannungen beanspruchten Eises und der umgürtenden Anordnung der kristallographischen Axen des Quarzes in metamorphen Sandsteinen der Moine Formation hervorgehoben.

### I. ALPINE RESEARCH ON GLACIER ICE

A concluding summary of some of the earlier work † of the Jungfrauoch Research Party of 1937–38, led by G. Seligman and with M. F. Perutz as crystallographer, has recently become available (Seligman<sup>16</sup>). Other inferences regarding the mechanism of glacier movement had been published previously (Seligman, p. 307, 312<sup>14</sup>).

As far as metamorphic petrology is concerned, Seligman's main conclusions of 1941<sup>14</sup> (first item below) and of 1949<sup>16</sup> (other items: Seligman, p. 262–65<sup>16</sup>), based on the study of the *more*

\* Communicated with the permission of the Director, Geological Survey & Museum.

† Certain results, also of petrological interest, but not mentioned in this summary, are considered in Section II.2.