ON THE FELDSPAR CRYSTALS FROM BUNKEIMEN, KOREA

By

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With 3 Text-figures

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In the granitic region of Ryūenri, Bunkeimen, Bunkeigun, Keisyōhokudō, Tyōsen (Korea), many crystals of feldspar are frequently found in the pegmatites. Their crystal forms and crystal faces were briefly described in "Minerals in Tyōsen."[1]

Recently large twin crystals of feldspar were collected in this region. The author studied the feldspar morphologically. A preliminary report of this study was delivered by the author at the 45th Annual Meeting of the Geological Society of Japan, which was held in Tokyo in April, 1938.

All of the crystals recently found are pale brown coloured and they reach from a few centimeter to 10 centimeters in length and 3 to 5 centimeters in diameter. Owing to the twinning and the development of the crystal along the clino-axis, they show tetragonal prismatic appearance. The twinning is recognized by the pronounced re-entrant angle at the end of the crystals. Their crystal faces are more or less weathered, so that a reflecting goniometer could not be used. The inter facial angles of the crystals were, therefore, measured by a contact goniometer, and rarer and narrower crystal faces were determined by their zonal-relationship. The identified crystal faces are as follows: c(001), m(110), x($\bar{1}$01), y($\bar{2}$01), and b(010), z(103) and n(210), which latter two rarely exist.

Two crystals are selected and their forms figured by Parker's method[2] (Figs. 1 and 2). Fig. 3 is their stereographic projection.

1) Bull. Min. Surv. Tyōsen, **2**, 54, (1932).
2) R. L. Parker: Kristallzeichnen. (1929).

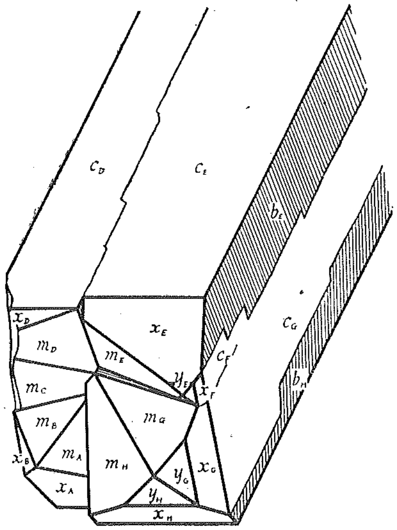

Fig. 1.

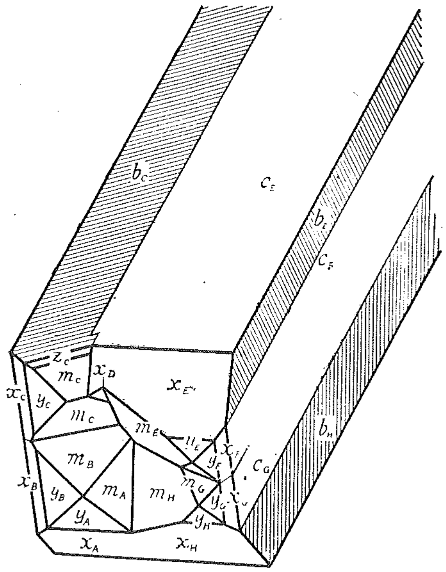

Fig. 2.

Twin crystal of feldspar from Bunkeimen.

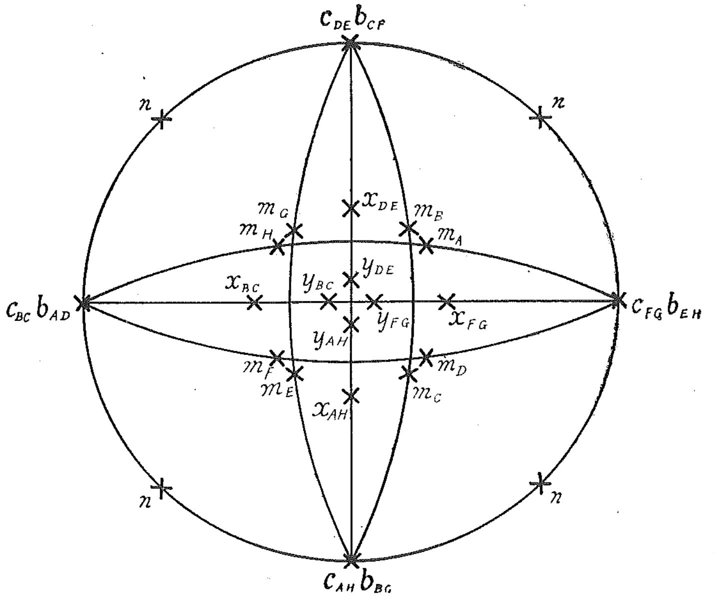

Fig. 3. Stereographic projection of the form of the twin crystal of feldspar which represents pseudo-tetragonality in the direction [100].

A large number of twin-laws of feldspar are recorded in the literature. Tetragonal prismatic crystals of feldspar, which are elongated in the direction of clino-axis, have been well known due to the Baveno-twinning, Manebach-twinning or Baveno-trilling or Baveno-fourlings.

Our feldspar crystals from Bunkeimen, are composed of eight separate parts (A, B, C, D, E, F, G, and H) and the relations between them are as follows:

A–B,	C–D,	E–F,	G–H	Baveno-twin
B–C,	D–E,	F–G,	H–A	Parallel-growth
A–D,	B–G,	C–F,	E–H	Manebach-twin

Our feldspar crystals may be recognized as cylic-eightlings, repeating Baveno-twin and Parallel-growth with reference to each other. A similar twin crystal of feldspar has been found in Sinano of Japan[3], and according to C. IWASAKI it was described as a quardruple twin-crystal of the Baveno and Manebach type.

The relative position and the development of parts of a twin crystal are described as follows: the crystal faces of c(001) and x($\bar{1}$01) are recognized in all twinned parts. But x-face can be seldom found on an imperfectly developed crystal. Since the pair of twinned parts in Baveno-twin develop unequally, b(010)-face of the one part occupies the same plane of the c-face of the other's. When y($\bar{2}$01)-face, which is very rough, does not develop in the one part of Baveno-twins, y-face also does not appear in the other part. But the exception occurs is the case as shown in Fig. 2; namely, one crystal part has two like crystal m-faces. Each part of a twin crystal, generally, has a crystal face of m(110), but sometimes it does not develop. When two crystal parts take parallel position with each other, the m-face does not appear in both the parts. In such case the crystal looks like one crystal. When one pair of the twin crystal of Baveno-type is more developed than the other three parts, z(130) and n(120) faces are found on the edge of the former.

It is probable that the predominance and the development of the crystal faces of each crystal part of a twin crystal will depend upon the development of a part of twin crystals in Baveno-type. It may be supposed that our feldspar crystals have actually been formed by such a twinning of the "twin-unit", which is a part of

3) C. Iwasaki: Jour. Geol. Soc. Tōkyō, **5**, 1-4, (1897)

twin crystals in Baveno-type; consequently four "twin-units" are united with each other as respects the b-face. Now if the twinning axis is taken in the direction [100][4] and one pair of twin crystals of Baveno-type is taken as the "twin unit", our feldspar crystals will show the tetragonal prismatic appearance along the clino-axis, by four-fold revolution in this direction of this twin unit. Such twin crystals represent, consequently pseudotetragonal form.

From these operations arise two cases: the first of the present twin crystals, having the crystal face c(001) as prismatic crystal face of the pseudotetragonal twin crystal; and in the second b(010) develops in place of c(001) of the first case. Vom Rath[5] distinguished the above described two cases saying that the former are due to juxtaposition-twinning and the latter to penetration-twinning.

Under the microscope our feldspar shows microperthitic structure owing to enclosure of string-shaped belbs parallel to the orthopinacoid. The host of it almost alters into the kaolinic substance, but the belbs still remain fresh and clear. The proportion of the volume of the host and belbs is determined by the integration-stage of Leitz Co. and was found to reach 70 to 30 ratio. The host of this microperthitic feldspar is orthoclass and the bels are albite by their optical characters. In the thin section, normal to [100], the optical orientation of the orthoclase, shows that it is related to Baveno-fourlings, and determined optical constants are as follows:

Ext. Angle $X \wedge a = +5°$ on (010)
Ext. Angle $X' \wedge 010 = 0°$ on (001)
$(-)\ 2V = 64° \sim 66°$

The albite belbs show polysynthetic albite-twinning, with measured optical constants as follows:

Ext. Angle $X' \wedge a = +17°$ on (010)
Max. Ext. $\perp 010 = +15°$
$(+)\ 2V = 74° \sim 76°$

In conclusion, the author wishes to express his thanks to Professor Z. HARADA, who was constant in giving him helpful advice and encouraging guidance.

4) N. Katayama: Jour. Geol. Soc. Tokyo. **40**, 331-336, (1933).
5) vom Rath: Zeit. Deutsch. Geol. Gesel. **14**, 440, (1862).