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THE CORRELATION OF OPTICS AND LATTICE GEOMETRY OF MICROCLINE

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In Winchell's book (1951, p. 309) an optical orientation of the indicatrix of microcline was given in correlation to crystallographic angles $\alpha = 90°7'$, $\beta = 115°50'$, $\gamma = 89°33'$. Adhering to this traditional *optical* orientation the writer (1950) using x-ray methods found $\alpha = 89°18'$, $\beta \approx 116°$, $\gamma = 92°22'$ for an extreme microcline specimen (later called

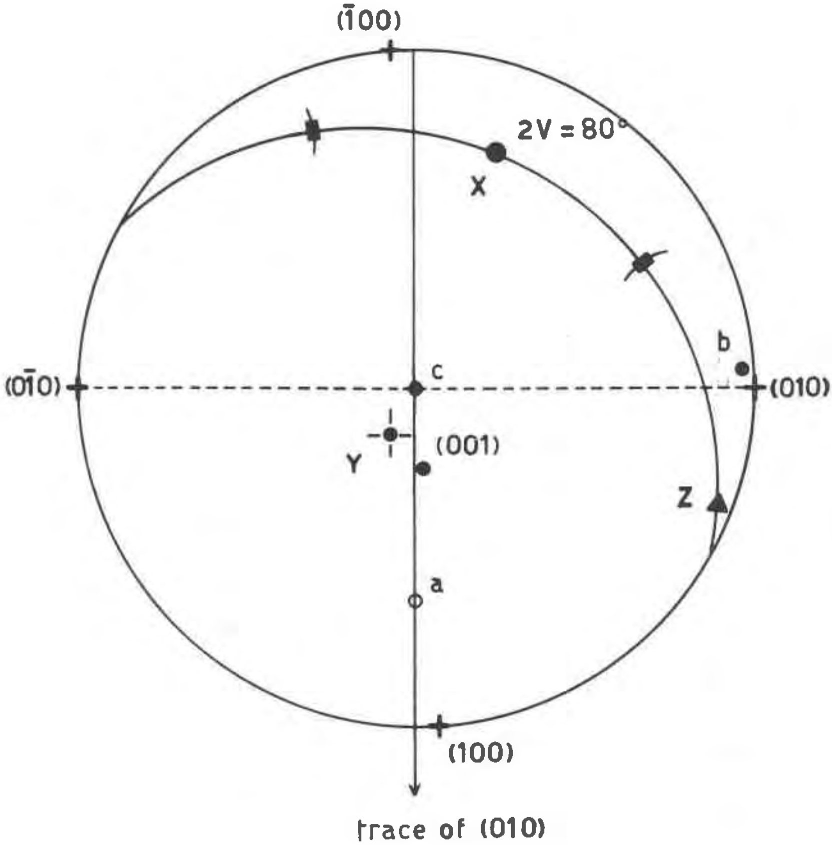

FIG. 1. Correlation of the microcline indicatrix with the old setting (Laves, 1950): $\alpha = 89.3°$; $\beta \approx 116°$; $\gamma = 92.4°$; $\alpha^* = 89.6°$; $\beta^* = 64°$; $\gamma^* = 87.7°$.

"maximum microcline"). Concurrent optical determinations by Chaisson (1950) who used the x-ray oriented specimen of the writer led to the correlation of Fig. 1.

Later it was shown by ion exchange experiments (production of microcline from albite, Laves, 1951a) that microcline and albite (low) have the same ordered $AlSi_3O_8$-framework. It thus appeared desirable to switch the old geometrical setting into a new one by rotating it through 180° about the b^* axis, for the following reason: After such a switch the order

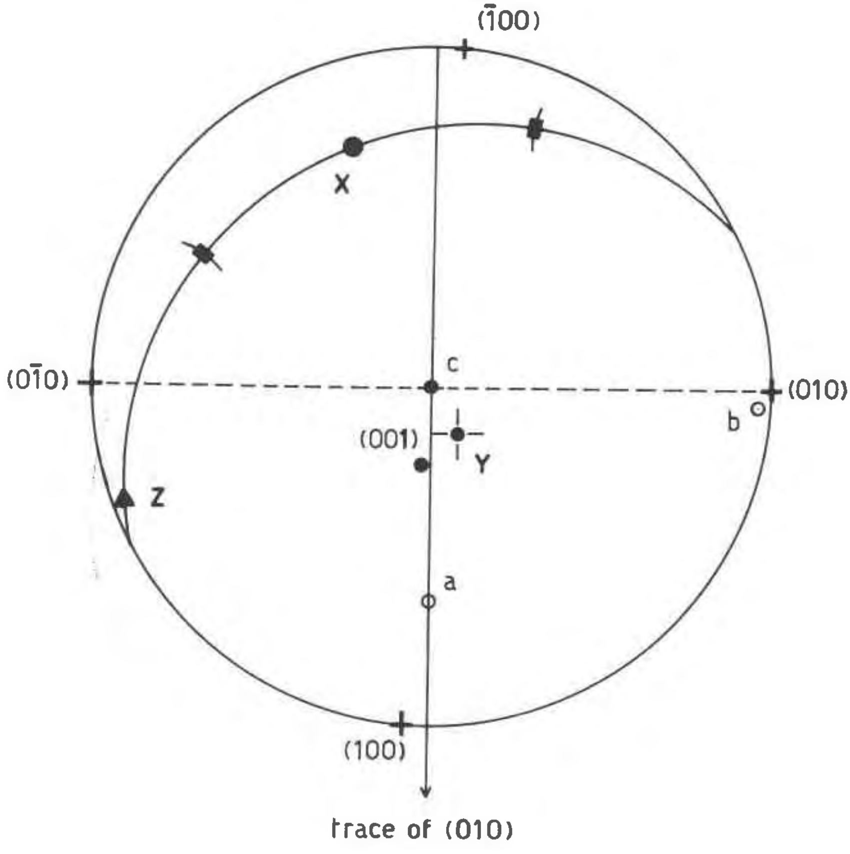

FIG. 2. Correlation of the microcline indicatrix with the new setting (Laves, 1951): $\alpha=90.7°$; $\beta\approx 116°$; $\gamma=87.6°$; $\alpha^*=90.4°$; $\beta^*\approx 64°$; $\gamma^*=92.3°$.

In both figures positive lattice directions are drawn as small dots if "above" the equator, and as circles if below. In both figures the projections of c and b^* (010) are chosen conventionally (as in Winchell, 1951). However, the angles α and γ are drawn with exaggeration to show better the sense of deviation from the monoclinic symmetry.

relations in microcline and albite would be "parallel" whereas with the old setting they would be "anti-parallel" (or in "albite-twin-relation"). A new setting with

$$\alpha = 90°42, \qquad \beta \approx 116°, \qquad \gamma = 87°38$$

was therefore proposed (Laves, 1951b).

This proposal of "switching" has now been widely accepted (see *e.g.* Deer *et al.*, 1963, p. 15). However, it is not always realized that changing the old setting into the new one also necessitates a switching of the indicatrix into a position sketched in Fig. 2.

It may be thought that such arguments be a matter of semantics. However, a very practical purpose may sometimes be served by determining optically whether or not adjacent microcline and albite areas have a "coherent" $AlSi_3O_8$-framework. For example the plate-perthite intergrowth, a late stage microcline perthite development, may be mentioned (Laves and Soldatos, 1962).

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MECHANICAL TWINNING IN ACID PLAGIOCLASES

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After crystal-structural, physico-chemical, and petrological evidence had been adduced (Laves 1952a) to show that the high and low-temperature forms of $NaAlSi_3O_8$ differ as regards their Al/Si distribution, it was further shown (Laves 1952b) that the mechanical-twinning behavior of acid plagioclases furnishes additional evidence to confirm this conclusion.

Accepting the general correctness of Taylor's 1933 determination of the feldspar structure and by using only straightforward arguments concerning structure theory and twinning mechanisms, it was shown that