Meddelelser om Grønland,

udgivne af

Commissionen for Ledelsen af de geologiske og geographiske Undersøgelser i Grønland.

Fire og tyvende Hefte.

Med 20 Tavler,
et særskilt heftet, farvetrykt Bilag
og en
Résumé des Communications sur le Grönland.

Kjøbenhavn.
I Commission hos C. A. Reitzel.
Bianco Lunos Bogtrykkeri.
1901.

substance has been deposited upon the original feldspar crystals and in parallel orientation with reference to them. The zinnwaldite also proves to be later than the elpidite. On the other hand, parisite, cordylite, ancylite and yttriumapatite are all of later origin than the zinnwaldite.

25. Tainiolite.

The investigation of this mineral has been attended with considerable difficulty, and the results obtained are such that the mineral cannot be said to be fully determined. This is especially the case as regards its chemical composition, because for want of a sufficient quantity of pure material a complete analysis could not be made. The material was also not altogether suitable for crystallographic examination, and for the results obtained no high degree of accuracy can be claimed.

Already when I observed this mineral on Narsarsuk for the first time, I clearly saw that it must be a mica, though the crystals had a habit that had not before been observed in any species of mica. This view was confirmed by the angular measurements which I made afterwards; though they could not be made with great accuracy, yet they showed that all of the forms present corresponded to known forms on other minerals of the mica group. And when at last the blowpipe examination of the mineral proved that it contained a considerable amount of lithia, there seemed to be sufficient reason for considering it as a variety of polylithionite [1]). Only after prolonged and laborious efforts could a small amount of pure material be obtained, on which an analysis was undertaken. Though this analysis could not be made complete, it fully showed that the

[1]) Figs. 9 and 10 on Plate III are there denoted as «polylithionite», which should be altered to «tainiolite».

mineral is not identical with any one of the species of mica hitherto known, but that it must be regarded as a new member of the mica group.

The name of tainiolite that I have given the mineral is derived from the Greek words *ταινία*, a band or strip, and *λίθος*, a stone, because the crystals always have the form of bands or strips.

Tainiolite has been found only as crystals, and the crystal individuals are, without exception, very small. The largest individuals observed measure 5^{mm} in length by 1^{mm} in breadth, and the thickness is generally extremely slight, even to such a degree that they bend when one blows on them.

Like the other micas, tainiolite belongs to the monoclinic crystal system. As already stated, the crystals do not allow of any accurate angular measurements. It is not, therefore, worth while calculating axial ratios for the mineral from the measurements obtained. Such ratios would at all events differ but slightly, if at all, from the axial ratios given for the biotite on page 111, viz.

$$a : b : c = 0{,}57735 : 1 : 3{,}27432. \quad \beta = 90°.$$

These axial ratios may then, for the present, be regarded as applicable also to tainiolite. Referred to these axial ratios, the forms observed on this mineral have the following symbols (Fig. 9, Plate III):

$$c = \{001\}, \quad b = \{010\}, \quad e = \{023\},$$
$$\vartheta = \{027\}, \quad \mu = \{\bar{1}11\}.$$

These forms have been determined from the following angular values:

	Measured	Calculated
(010) : (001) =	90°	90°
(023) : (001) =	65° 9′	65° 23′
(023) : (010) =	24° 44′	24° 37′

	Measured	Calculated
$(027) : (001) =$	$43° 33'$	$43° 6'$
$(\bar{1}11) : (001) =$	$81° 28'$	$81° 19'$
$(\bar{1}11) : (010) =$	$60° 27'$	$60° 23'$
$(\bar{1}11) : (\bar{1}\bar{1}1) =$	$60° 15'$	$59° 14'$

The tainiolite crystals form elongated bands or strips, attached by one end. The longitudinal direction of these crystals is parallel to the crystallographic a-axis. In the longitudinal zone they are generally bounded only by the faces of the third and the second pinacoids. They are flattened parallel to the former form, and owing to the thinness of the individuals it is in most cases impossible to determine the faces of the second pinacoid. Only as rare exceptions one meets with crystals thick enough to allow of the determination of these faces. However, individuals have been found with a thickness even equal to their breadth. Such individuals show not only the second pinacoid distinctly developed, but also the forms e and ϑ (the prisms of the first order).

The unattached end of the crystal bands generally is indistinctly or irregularly bounded. The thin individuals are either split up at the end into a number of points or irregularly rounded. Also the thicker individuals show in general an indeterminable rounding of their unattached end. Only on a few crystals a couple of terminal faces could be determined as belonging to the form μ.

Fig. 9, Plate III represents a combination of the determinable forms (with the exception of ϑ) as occur on crystals of tolerable thickness. On the thin crystals the faces of the third pinacoid are always smooth and brilliant. On the thicker individuals these faces generally are striated longitudinally, which striation is due to an alternation of the principal face c and the contiguous forms ϑ or e. The faces of all the other forms are strongly striated parallel to the direction of micaceous cleavage in the mineral.

Twinning is extremely rare among the tainiolite crystals; only a single twin crystal has been found. It is a contact twin, represented by Fig. 10, Plate III. One of the individuals crosses the other at an angle of 60°; their composition face is the third pinacoid. It looks as if one of the individuals were lying loose on the other. This form of twinning is exactly the same as that occurring with epididymite.

The mineral is colourless and usually pefectly clear. The thicker individuals, however, show a distinct tinge of blue. Lamellae parallel to the third pinacoid show in parallel polarized light total extinction parallel to the second pinacoid, with which also the plane of the optic axes is parallel. The acute bisectrix emerges in front of the *c*-axis, making an angle of about 5° with it. The apparent angle between the optic axes is perceptibly smaller than with polylithionite. With the aid of the micrometer ocular and Schwartzmann's scale the angle $2E$ was found to be about 50°. The double refraction is negative and not very strong.

The hardness of tainiolite could not be determined with accuracy. There is, however, no reason for assuming it to differ essentially from the hardness of other species of mica, *i. e.* 2,5 — 3. The cleavage of the mineral is as eminently perfect as in muscovite. If the strips are gently bent to a slight extent, they will resume their original position. The limit of elasticity may, however, easily be exceeded, for when bent with some force the individuals will remain curved.

By weighing in benzole the specific gravity of the mineral has been found to be 2,86 (at a temperature of 16° C., Mauzelius).

Before the blowpipe in the forceps the mineral fuses easily to a colourless blebby glass colouring the flame intensely red. It is completely, but somewhat slowly decomposed by hydrochloric acid.

As already mentioned, it has been troublesome to procure the material for a chemical analysis. As the difficulty offered in this respect was already seen when the mineral was discovered at the locality, a comparatively large number of specimens on which the mineral occurred were collected. From these the diminutive crystal strips have been detached and examined. Many of the individuals proved to be so intimately associated with minute scales of graphite, feldspar splinters etc., that they could not be used, but had to be rejected. The whole quantity of pure material which could thus be obtained, amounted after having been dried at 110° C., only to 0,0970 gr. On this small quantity the analysis has been performed by Mauzelius with the following result.

		Molecular ratios		
SiO_2	52,2	0,864		3,07
Al_2O_3	2,7	0,072		
FeO	0,6	0,008	0,559	2,00
MgO	19,1	0,473		
K_2O	11,5	0,122		
Na_2O	1,8	0,029	0,264	0,94
Li_2O	3,8	0,113		
Loss	8,7	0,483 *)		1,72
	100			

*) Calculated as H_2O.

On the assumption that the loss in the analysis is water, the chemical formula of the mineral would consequently be

$$3\,SiO_2 \cdot 2\,MgO \cdot (K_2, Na_2, Li_2)\,O \cdot 2\,H_2O$$

or

$$(MgOH)_2\,(K, Na, Li)\,Si_3O_8 + H_2O.$$

The loss in the analysis can hardly be anything but water or fluorine, most probably both. As, however, hydroxyl and fluorine often play the same part in minerals, replacing each other isomorphously, and as, moreover, these two substances have nearly the same molecular weight, it is of but little importance with regard to the formula for the mineral, whether one or the other of them is present. At all events the composition of the mineral is very remarkable, as it most essentially differs from the composition of every other species of mica hitherto known. Yet there can be no doubt but the mineral is a member of this group. The physical as well as the geometrical properties of tainiolite are all in perfect accordance with those of the minerals of the mica group. As well known, this group presents great heterogeneity in chemical composition, and as yet no acceptable generalisation can be said to have been attained in this respect. Each new member that is discovered will contribute to throw light upon the whole. It is therefore highly desirable that a sufficient amount of tainiolite may be procured for a complete analysis. As the mineral is not very rare at the locality, this is by no means beyond possibility.

Tainiolite has been found only at the localities Nos. 1 and 6 on Narsarsuk. The mineral is here developed in small drusy cavities, in the interspaces between larger crystals of feldspar and aegirine. The tainiolite strips occur generally attached to the feldspar, often in part implanted in it, and then so firmly that they can only with great difficulty be detached. The most noteworthy among the accompanying minerals is narsarsukite; it was in searching for this mineral that tainiolite was discovered. Another mineral that is a constant companion of tainiolite is graphite in small brilliant rounded crystal plates.

26. Neptunite.

A brief summary of the description of this mineral previously published by me [1]) and founded on the material found in the Lützen collection, may here be given.

[1]) Zeitschr. f. Kryst. Vol. 23, 1894, p. 346.