10. A chemical investigation of some minerals from Lille Arøe and Øvre Arøe in the firth of Langesund.

By

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In the 7:th issue (Vol. IV, Part I) of the Bulletin mr G. FLINK published crystallographical descriptions of some rare minerals from the neigbourhood of Langesund in Norway. The minerals are: eudidymite, epididymite, diaspore, and albite. For a complete description of the minerals, embracing also their chemical composition, mr FLINK has handed over to me some material for chemical examination, and I have had three of the minerals, *viz.* epididymite, albite, and diaspore, analyzed in my laboratory by Dr. ROB. MAUZELIUS. In the present paper I give an account of the results of the chemical investigation of the minerals, preceded by a few statements of their mode of occurence etc., quoted from mr FLINK's article. Both of the minerals derived from Lille Arøe, *viz.* epididymite and albite occur in the eastern parts of that islet in a mineral vein that comes out at the border of the sea, and which contains numerous drusy cavities. Besides the aforesaid two minerals, aegerine, astrophyllite, lithium mica, fluorite, analcite, and natrolite, also occur there. The first two are of primary origin; the crystals in the drusy cavities project from the undecomposed rock and are coated by the secundary minerals in the form of crusts.

1. Epididymite from Lille Arøe.

This mineral, previously found only on the Narsarsuk plateau in South Greenland, occurs associated with eudidymite, which has the same composition, as small, generally well developed crystals not above 10 mm. in lenght, in most cases only observable with the aid of a magnifier.

Adopting the axial system obtained from measurements on the Greenland epididymite

$$a : b : c = 1.7274\ 1 : 1.0680$$

mr FLINK found on the mineral from Langesund the following forms:

c(001), *m*(100), *n*(310), *k*(015), *g*(012), *s*(058), *e*(023), *d*(011), *f*(021).

The crystals are mostly developed prismatically in the direction of the *a*-axis. The mineral shows two cleavages at right angles with each other, one parallel to *c* (001), eminent; the other parallel to b (010), very distinct. (FLINK.)

Twinning is so predominant that simple crystals are comparatively rare; the *c*-axis serves as twinning axis. The mineral also forms twins with eudidymite, the basal plane being common to the two minerals and he *a*-axis of epididymite parallel to the edge (001 : 111) on eudidymite (FLINK).

Specific gravity = 2.55 (MAUZELIUS).

Of the analyses un MAUZELIUS has given the following account.

0.3762 gr. of undried material lost 0.0043 gr. = 1.43 % at a temperature of + 108° C. The remainder, 0.3709 gr., was used in the analyses I.

0.3868 gr. of undried material lost 0.0052 gr. = 1.74 % at a temperature of + 110° C. The remaining 0.3816 gr. were used for determining the water percentage.

		Found	Calculated
I.	SiO_2	72.04	73.44
	BeO	10.22	10.24
	Na_2O	12.66	12.65
	K_2O	0.27	—
II.	H O	4.51	3.67
		99.70	100.00

The above percentages correspond to the formula

$$H\,Na_2\,Be\,Si_3\,O_8,$$

with which the analysis agrees quite well.

2. Albite from Lille Arøe.

This mineral occurs associated with the foregoing and is evidently formed earlier than the other minerals occurring in the same drusy cavities, *viz.* eudidymite, epididymite, analcite, natrolite, etc. However, it is a secondary formation owing its origin to the primary minerals (soda orthoclase, elæolite etc.) having been decomposed and given rise to the younger ones. In habit these albite crystals are prismatic, occasionally almost acicular in the direction of the *c*-axis, which form of development was quite unexpected for albite; it was, therefore, only after a very close crystallographical examination that the mineral could be identified as albite.

The crystals are always simple twins according to the albite law; the fine needles, which are extremely easily broken parallel to the basal

terminal face, then show a longitudinal twinning-line with a salient and a re-entering angle of about 7°. Polysynthetic twinning does not occur.

In the vertical zone, the crystals are bounded by the following forms.

$b(010)$, $m(110)$, $f(130)$, $z(1\bar{3}0)$. (FLINK.)

Quite fresh crystals are enamel-like and very brilliant. The crystals are often in course of alteration proceeding from the surface inwards, first attacking the fundamental prism, on which a number of longitudinal channels are formed; these gradually grow deeper, extend to the other faces in the vertical zone, and penetrate the whole of the crystal, which becomes porous, very fragile and resembling a stem of decayed wood.

Specific gravity 2.587 (FLINK).

0.2156 gr. undried material lost 0.0027 gr. = 1.25 % at a temperature of 115° C. The remainder, 0.2129 gr., was used for the analysis I. 0.4738 gr. undried material last 0.0048 gr. = 1.02 % at + 150°. The remainder, 0.4690 gr., was used for the determination of the water, analysis II.

I.	SiO_2	65.99
	Al_2O_3	19.96
	Na_2O	11.34
	K_2O	1.45
II.	H_2O	1.04
		99.78

Consequently the chemical analysis confirms the result of the crystallographical investigation, the composition of the mineral fully agreeing with that of albite. However, the water amounting to more than 1 %, and the percentage of silicic acid being nearly 3 % too low indicate an incipient decomposition to which the enamel-like appearance probably also is due.

Diaspore from Øvre Arøe.

This mineral, previously met with in the Langesund region only as microscopical inclusions, occurs in Øvre Arøe near the shore in the natrolite, being found there rather abundantly as a secondary formation. Between the natrolite columnes, which are irregularly bounded and sometimes as thick as a finger, there are small interspaces generally quite filled with diaspore in fine violet-blue scales; also implanted crystals independently developed occur, tabular parallel to $b(010)$, about 0.5 cm in diameter and a fraction of 1 mm in thickness. Their sides are bounded $h(210)$, $e(011)$, and $d(031)$ (FLINK).

Specific gravity = 3.34—3.36 (different material).

0.3815 gr. of undried material lost 1.18 % at + 120° C. The remainder, 0.3770 gr., was fused with soda, and the fused mass was

made a bisulphate, which was fused again. Nevertheless it was only partially decomposed, so that the same procedure had to be repeated.

The analysis gave the following result.

SiO_2	0.21
Al_2O_3	84.38
H_2O	15.70
	100.29

The alumina contains small traces of Fe_2O_3 and TiO_2. The water was determined as loss on ignition.