Meddelelser om Grønland.

Meddelelser om Grønland,

udgivne af

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

Fire og tredivte Hefte.

Med 23 Tavler.

Kjøbenhavn.

I Commission hos C. A. Reitzel.

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Indhold.

Side

I. Ueber Albit von Grönland. Von **C. Dreyer** und **V. Goldschmidt** in Heidelberg. (Hertil Tavle I—V) 1

II. On the occurrence of *Fredericella sultana* Blumenb. and *Paludicella Ehrenbergii* van Bened. in Greenland. By **C. Wesenberg-Lund** 61

III Medfødte Misdannelser m. m hos den grønlandske Befolkning. Ved **Gustav Meldorf** 77

IV. On Gyrolite from Greenland By **O. B. Bøggild** 91

V. Geologiske og antikvariske Iagttagelser i Julianehaab Distrikt. Af **K. J. V. Steenstrup.** (Hertil Tavle VI—XXI.) 115

VI. Beretning om Undersøgelserne af Jakobshavn-Isfjord og dens Omgivelser fra Foraaret 1903 til Efteraaret 1904. Af **M. C. Engell.** (Hertil Tavle XXII—XXIII.) 155

VII. Contributions to the Ethnology and Anthropogeography of the Polar Eskimos. By **H. P. Steensby** 253

I.

Ueber Albit von Grönland.

Von

C. Dreyer und **V. Goldschmidt** in Heidelberg.

1907.

An den **Albit** knüpft sich eine Reihe interessanter Fragen. Er ist einer der wichtigsten Vertreter des unter den Mineralien seltenen triklinen Systems. Er bildet das eine Endglied der Reihe der Kalk-Natron-Feldspäthe, die in der Krystallographie, ebenso wie in der Petrographie eine wichtige Rolle spielen. Anderseits besteht eine enge Beziehung zwischen dem triklinen Albit und dem monoklinen Orthoklas, die man bei den Fragen über das Wesen der Isomorphie zu berücksichtigen hat.

Ferner ist der Albit ausgezeichnet durch Zwillings- und Viellingsbildungen, auch damit verbundenen Ablenkungen und Winkelschwankungen, Krümmungen und Facettenbildungen, die Gegenstand des genetischen Interesses sind. Er zeigt regelmässige Verwachsung mit dem Orthoklas, der einem andern Krystallsystem angehört. Er ist häufig und weit verbreitet und seit Jahrzehnten immer aufs Neue Gegenstand des vielseitigen Studiums. Es vergeht kein Jahr, das nicht Beobachtungen über den Albit brächte.

Trotz der Häufigkeit des Albits sind Krystalle, die sich zur Messung eignen, selten.

Die genaue Berechnung **der krystallographischen Elemente** stösst beim Albit auf besondere Schwierigkeiten, herrührend von gestörter Flächenausbildung. Diese Störungen dürften wesentlich hervorgebracht sein durch die erkennbare, wie versteckte Viellingsbildung nach dem Albitgesetz[1]. Auch isomorphe

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[1] Vgl. Zeitschr. Kryst. 1898. **29**. 381. Index. 1890. 2. 22.

Einlagerungen wirken störend da, wo der Albit nicht rein d. h. nicht das Grenzglied der Albit-Anorthit-Reihe ist.

In dem Index der Krystallformen wurde der Versuch gemacht (1890. **2**. 19—22), zuverlässige Elemente zu erhalten. Dies geschah auf Grund der Messungen von Max Schuster, eines äusserst zuverlässigen Beobachters, der sich gerade damals eingehend mit dem Albit befasste. Schuster hatte, um den Einfluss der Zwillingsbildung zu beseitigen, durch Abspalten solche Partien hergestellt, an denen dem Augenschein nach Zwillingsbildung nicht zu finden war.

Die auf Grund von Schusters Messungen gewonnenen Elemente weichen von denen der andern Autoren stark ab. Als daher bei Ausarbeitung der Winkeltabellen[1]) die Frage entstand, welche Elemente zu acceptieren seien, wurde die Tabelle für die Schusterschen Elemente ausgerechnet und daneben für die von Brezina[2]) angegebenen.

Spätere eigene Messungen am Albit liessen die Überzeugung gewinnen, dass die Schusterschen Elemente nicht haltbar seien, und es entstand der Wunsch, durch genaue Messungen und Discussion die Frage abzuklären.

Indessen erschien eine schöne Publication von G. Melczer[3]) «Daten zur genauern Kenntnis des Albits», die das Bekannte zusammenfasste und neue sorgfältige Beobachtungen und Berechnungen zufügte. Für Melczers Beobachtungen bot sich ausgezeichnetes Material von Nadabula, in scharfer Ausbildung und chemisch von idealer Reinheit.

Melczer gibt folgende Zusammenstellung derjenigen Elementangaben, die er für die zuverlässigsten hält:

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1) Berlin. Springer. 1897. 139 u. 140.
2) Min. Mitth. 1873. **3**. 19. Nach Messungen von Rath (Pogg. Ann. 1870. Ergzbd. 5. 425).
3) Zeitschr. Kryst. 1905. **40**. 571.

	$a : b : c$	α	β	γ
Des Cloizeaux-Lacroix	0.6333 : 1 : 0.5572	94°03′	116°27′	88°09′
v. Rath	0.6365 : 1 : 0.5593	94°05′	116°42′	87°51′
Klockmann	0.6330 : 1 : 0.5558	94°05′	116°31′	88°09′
Sella	0.6333 : 1 : 0.5575	94°04′	116°28′	88°08′
Glinka (Kerebinsk)	0.6341 : 1 : 0.5574	94°05′	116°27′	88°07′
— (Slatoust)	0.6350 : 1 : 0.5586	94°16′	116°44′	87°45′
Viola	0.635· : 1 : 0.557·	94°15′	116°32′	88°05′
Melczer (Nadabula)	0.6350 : 1 : 0.5578	94°06′	116°36′	87°52′

Man könnte zufügen:

Brezina (nach Rath)	0.6366 : 1 : 0.5582	94°15′	116°47′	87°52′

Ausserdem führt Melczer als unsicher folgende an:

Schrauf (Atlas)	0.6545 : 1 : 0.5550	93°36′	116°18′	89°18′
Rath (u. Breithaupt. Periklin)	0.6365 : 1 : 0.5592	93°18′	116°51′	89°13′
Bärwald (Kasbek)	0.5986 : 1 : 0,5480	91°07′	116°58′	85°20′
Beutell (Strigau)	0.6360 : 1 : 0.5558	94°40′	117°00′	88°00′
Goldschmidt (n. Schuster)	0.6187 : 1 : 0.5641	93°42′	116°48′	89°03′
Franck (Revin)	0.6388 : 1 : 0.5651	93°33′	116°31′	88°50′

Wir wollen sogleich das Resultat zufügen, das aus der folgenden Untersuchung des Albits von Grönland erhalten wurde und das als zuverlässig gelten dürfte:

Dreyer u. Goldschmidt	0.6373 : 1 : 0.5599	94°18′	116°41′	87°37′

Aus dieser Zusammenstellung geht hervor, dass starke Differenzen nicht mehr bestehen, die Elemente des Albit mit grosser Annäherung sicher gestellt sind.

Das Mittel aus allen mit Ausschluss der unsicheren ergibt:

Mittel	0.6349 : 1 : 0.5578	94°09′	116°35′	87°57′
Dreyer u. Goldschmidt	0.6373 : 1 : 0.5599	94°18′	116°41′	87°37′

Die Differenz ist am stärksten beim Winkel γ. Da beträgt sie 20′. Dies ist nicht auffallend, da die grösste Unsicherheit in den Winkeln der Prismenzone besteht.

Unsere Elemente stimmen sehr nahe mit den von Brezina berechneten, für die die Winkeltabelle ausgerechnet wurde. Trotz der geringen Differenz erschien es wünschenswert, für die verbesserten Elemente die Winkeltabelle neu zu berechnen wegen der grossen Zahl der hinzugetretenen neuen Formen.

Zur Neubestimmung der Elemente bot sich eine günstige Gelegenheit. Dr. G. Lincio brachte von einer Reise nach Kopenhagen die Nachricht, es befinde sich im dortigen Museum ein grosser Vorrat ausgezeichneter Albite von Grönland. Er hat selbst eines dieser Kryställchen gemessen. Die Ausbildung ist eine für Albit selten scharfe; auch zeigten die Analysen von Chr. Winther (durch Prof. N. V. Ussing freundlichst mitgeteilt), dass ein reiner Albit vorliegt.

Die Analysen von Chr. Winther ergaben folgende Zahlen:

Albit v. Kangerdluarsuk		Albit v. Narsarsuk		Berechnet	
SiO_2	= 68.80 %	SiO_2	= 68.80 %	SiO_2	= 68.7 %
Al_2O_3	= 19.43 -	Al_2O_3	= 19.40 -	Al_2O_3	= 19.5 -
CaO	= 0.00 -	CaO	= 0.20 -		—
K_2O	= 0.00 -	K_2O	= 0.00 -		—
Na_2O	= 11.86 -	Na_2O	= 11.68 -	Na_2O	= 11.8 -
	100.09 %		100.08 %		100.00 %

Durch Prof. N. V. Ussing in Kopenhagen wurde uns das ganze dort befindliche, dem mineralogischen Museum der Universität gehörige schöne Material zum Zwecke krystallographischer Bearbeitung zur Verfügung gestellt, wofür wir zu grossem Dank verpflichtet sind. Das Material stammt grösstentheils von den dänischen wissenschaftlichen Expeditionen her, die von der «Commission für die Leitung der geologischen und geographischen Untersuchungen in Grönland» ausgesandt wurden (Expeditionen von Bloch 1890, Flink 1897, Steenstrup 1899 und Ussing 1900); einige der untersuchten Krystalle sind während der letzten Jahre von Grönländern gesammelt und an das Kopenhagener Museum verkauft worden. Die Resultate der Untersuchung mögen im Folgenden mitgeteilt werden.

Besonders folgende Gründe waren ausserdem massgebend zum Eingehen in die Untersuchung:

1. Die neuen zweikreisigen Goniometer mit ihrer verbesserten Optik, mit Wechselsignal, vermehrter Lichtstärke und Okular-Abblendung machten es möglich, kleine und lichtschwache Flächen aufzufinden und zu symbolisieren, die sich bisher der Erkennung entzogen hatten. So war die Möglichkeit gegeben, manches Neue zu finden. Diese Hoffnung hat sich erfüllt. Unsere Kenntnis des Formensystems des Albits hat sich wesentlich erweitert.

2. Die in der Publication von Borgström und Goldschmidt «Krystallberechnung im triklinen System, illustriert am Anorthit» (Zeitschr. Kryst. 1905. **41.** 63) ausgearbeitete Methode der Elementberechnung ermöglicht auch für das trikline System die Elemente nicht aus fünf ausgewählten Fundamentalwinkeln zu berechnen, sondern zu dieser Berechnung alle guten Positionen aller gemessenen Krystalle zugleich in die Rechnung zu ziehen und unter sich auszugleichen. Diese Methode sollte angewandt werden.

Kritik und Übersicht beim Ausgleich gestattete das Schwankende zu eliminieren und so das Zuverlässigste allein der definitiven Rechnung zuzuführen. Nicht immer sind die best ausgebildeten Flächen am richtigsten Ort. So sind beim Albit die Prismenflächen mit dem Pinakoid $M = 0\infty$ (010), wenn noch so scharf und gut reflektierend, doch abgelenkt und unzuverlässig.

Die Untersuchung hat das bestätigt, was G. Melczer[1]) vom Albit von Nadabula sagt:

«Ein erschwerender Umstand war ferner, dass ich die zu M gemessenen Winkel ausser Acht lassen musste, weil ich mich gleich bei der Messung der ersten Krystalle überzeugte, dass dieselben, auch wenn sie gute, einfache Reflexe geben, gegen die Prismenflächen convergieren. Sie liegen nämlich nicht genau in den Zonen nP, ox, $y\bar{y}$ und, wo beide Flächen (010 und $0\bar{1}0$) gut ausgebildet sind, ist der Winkel um $\frac{1}{2}$ bis 1° kleiner als 180°».

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[1]) Zeitschr. Kryst. 1905. **40.** 484.

3. Diese Störung gerade in der Prismenzone ist genetisch von wesentlicher Bedeutung. Sie erklärt sich durch Ablenkung und schiefe Verwachsung infolge der Viellingsbildung nach dem Albitgesetz[1]).

Merkwürdig ist dabei, aber durchaus sicher gestellt, dass die Ablenkung die Terminalflächen nicht oder doch nicht so stark trifft, als die Prismen. Es entsteht die Aufgabe, die Ursachen dieses Gegensatzes klarzulegen. Zur Lösung dieser Aufgabe konnten die vorliegenden Untersuchungen beitragen durch Feststellung der Tatsachen.

4. Von den für Albit angegebenen Formen ist eine Anzahl unsicher. Es erschien wünschenswert, das Verzeichnis zu klären durch Bestätigung oder Ausscheidung des Unsicheren. Durch die Messungen am grönländer Albit wurden in der Tat einige Formen gesichert, die der Bestätigung bedurften. Andere schienen nach wie vor unsicher. Zur Prüfung der inneren Wahrscheinlichkeit der zweifelhaften Formen wurde die Discussion der Zahlenreihen[2]) herangezogen.

Literatur. Über Albit von Grönland ist noch nicht viel berichtet worden:

Flink, G. Beschreibung eines neuen Mineral.-Fundorts in Grönland. Zeitschr. Kryst. 1894. **23**. 366.

Ussing, N. V. Mineral. u. petrogr. Untersuchungen an grönländischen Nephelin-Syeniten. Meddel. om Grønland. 1894. **14**. 13. Ref. Jahrb. Min. 1899. **2**. 358.

Flink, G. Bericht über eine mineralogische Reise in Süd Grönland. Meddel. om Grønland. 1898. **14**. 221. Ref. Zeitschr. Kryst. 1900. **32**. 616.

Belowsky. Beiträge zur Petrographie des westlichen Grönlands. Zeitschr. d. geol. Ges. 1905. **57**. 15.

Bøggild, O. B. Mineralogia Groenlandica. Meddel. om Grønland. 1905. **32**. 460.

Ussing und Belowsky bringen keine Daten über beobachtete Formen am Albit. Flink berichtet über einen noch nicht genau bestimmten Fundort (1894). Er sagt:

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[1]) Zeitschr. Kryst. 1898. **29**. 381.

[2]) Zeitschr. Kryst. 1897. **28**. 29 flg. 426 flg.

«Das Mineral kommt nur als jüngeres Gebilde vor. Die Krystalle sind klar, wasserhell und sitzen meist an grösseren Individuen von Orthoklas, diesen in paralleler Orientierung bekleidend. Das Vorhandensein folgender Formen ist festgestellt worden:

010	130	150	110	$1\bar{1}0$	$1\bar{3}0$	$\bar{1}11$	001	$0\bar{2}1$
M	*f*	*L*	*T*	*l*	*z*	*p*	*P*	*n*

Die Krystalle sind nach dem Längspinakoid tafelartig ausgebildet. Zwillingsbildung nach derselben Fläche kommt fast an jedem Individum vor. Spez. Gew. = 2.624».

In der zweiten Publication bestimmt Flink den **Fundort** als Narsarsuk unweit Igaliko (Südgrönland). Er berichtet weiter über Albit-Funde sowohl von Kangerdluarsuk als von Siorarsuit und Tutup Agdlerkofia am Tunugdliarfik Fjord. Diese Fundorte mit Ausnahme des letzteren haben Material geliefert, das der vorliegenden Arbeit zugrunde liegt:

Beobachtete Formen. Am Goniometer durchgemessen wurden 17 Krystalle. Doch wurde etwa die sechsfache Anzahl aufgesetzt und auf Ausbildung und Flächenreichtum geprüft. Folgende 34 Formen konnten mit Sicherheit nachgewiesen werden. Dabei sind die für Albit neuen Formen mit *, die bestätigten, bisher noch nicht ganz sicheren mit ·· bezeichnet

P	M	$\ddot{h}$	ζ	f	$\ddot{Z}$	$\overset{*}{K}$	T	l	$\ddot{a}$	z	$\ddot{L}$
0	0∞	$\infty 0$	$\infty 5$	$\infty 3$	$\infty 2$	$\infty\frac{5}{3}$	∞	$\infty\bar{\infty}$	$\infty\bar{2}$	$\infty\bar{3}$	$\infty\bar{5}$
001	010	100	150	130	120	350	110	$1\bar{1}0$	$1\bar{2}0$	$1\bar{3}0$	$1\bar{5}0$

e	n	$\overset{*}{\vartheta}$	$\overset{*?}{\Xi}$	x	y	$\ddot{W}$	$\overset{*}{\Gamma}$	γ	p	$\overset{*}{\Lambda}$	g
02	$0\bar{2}$	$0\bar{4}$	$0\bar{5}$	$\bar{1}0$	$\bar{2}0$	1	$\frac{\bar{1}}{3}\frac{1}{3}$	$\frac{\bar{1}}{2}\frac{1}{2}$	$\bar{1}1$	$\frac{\bar{3}}{2}\frac{3}{2}$	$\bar{2}2$
021	$0\bar{2}1$	$0\bar{4}1$	$0\bar{5}1$	$\bar{1}01$	$\bar{2}01$	111	$\bar{1}13$	$\bar{1}12$	$\bar{1}11$	$\bar{3}32$	$\bar{2}21$

∂	o	n	$\ddot{\eta}$	$\overset{*}{\xi}$	$\overset{*}{\varphi}$	$\overset{..?}{X}$	$\ddot{\chi}$	$\overset{*}{\omega}$	$\overset{*}{Q}$
$\frac{\bar{1}}{\bar{2}}$	$\bar{1}$	$\bar{2}$	$\bar{1}\bar{3}$	$\bar{1}\bar{5}$	$\bar{2}1$	$\bar{2}9$	$\bar{2}\bar{4}$	$\frac{\bar{3}}{\bar{1}}\frac{1}{\bar{2}}$	$\frac{\bar{1}}{\bar{2}}\frac{\bar{5}}{\bar{2}}$
$\bar{1}\bar{1}2$	$\bar{1}\bar{1}\bar{1}$	$\bar{2}\bar{2}\bar{1}$	$\bar{1}\bar{3}1$	$\bar{1}\bar{5}1$	$\bar{2}11$	$\bar{2}91$	$\bar{2}\bar{4}1$	$\bar{3}12$	$\bar{1}\bar{5}2$

Von diesen sind für Albit **neu** die 8 Formen $K \vartheta \Gamma \Delta \xi \varphi \omega Q$ und das noch etwas unsichere Ξ. In Goldschmidts Winkeltabellen aufgenommen sind: $P M \zeta f T l z e n x y \gamma p g \delta o u$.

Von den übrigen finden sich bei:

Jeremejev: Jubelb. d. k. russ. Berg. Inst. 1873. 2. 179: hW. Ref. Zeitschr. Kryst. 1900. **32.** 493.

Wiik: Finsk. Vet. Soc. Förh. 1884—26: Z. Ref. Zeitschr. Kryst. 1886. **11.** 311.

Klockmann: Zeitschr. D. geol. Ges. 1882. **34.** 417: aL.

Viola: Min. pet. Mit. 1895. **15.** 135: η.

Bowman: Min. Mag. 1902. **13.** 115: χY.

Die bei Fouqué (Ref. Zeitschr. Kryst. 1885. **10.** 636) angeführten Formen (012) und $(0\bar{1}2)$ beruhen auf einem Druckfehler.

Correctur: Zeitschr. Kryst. 1885. **10** 636. Zeile 8 v. u. lies: (021) $(0\bar{2}1)$ statt (012), $(0\bar{1}2)$.

$\{\bar{3}10\}$ $\{3\bar{1}0\}$ bei Glinka[1]) Zeitschr. Kryst. 1894. **22.** 63, Ref. Karnojitsky, ist ein Druckfehler, ebenso $\{111\}$ und zu lesen:

Correctur:

Zeitschr. Kryst. 1894. **22.** 63.	Zeile 4 v. u. lies:	$\{130\}$ $\{1\bar{3}0\}$ . . . $\{\bar{1}11\}$	statt	$\{\bar{3}10\}$ $\{3\bar{1}0\}$ . . . $\{111\}$
— — — 64.	— 11 v. o. —	$(1\bar{3}0):(0\bar{2}1)$	statt	$(3\bar{1}0):(0\bar{2}1)$
— — — —	— 6 v. u. —	$(1\bar{1}0):(1\bar{3}0)$	statt	$(1\bar{1}0):(310)$.

$\mathrm{I} = \bar{1}\frac{\bar{9}}{7}\ (\bar{7}97)$, $\mathrm{II} = \bar{1}\frac{\bar{5}}{7}\ (\bar{7}57)$ — Melczer. Zeitschr. Kryst. 1905. **40.** 583 als ziemlich gut reflectierend, die Symbole als sicher bezeichnet.

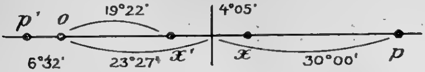
Trotzdem erscheinen dieselben als fraglich und der Bestätigung bedürftig. Die Symbole sind ungewöhnlich, passen nicht in die Reihe. Es liegt der Verdacht vor, dass die Flächen einer Zwillingslamelle nach dem Albitgesetz ihren Ort verdanken und nichts anderes sind als x-resp. o-Flächen.

Melczer giebt die gemessenen Winkel:

$$\mathrm{I} : o = (\bar{1}\bar{1}1) : (\bar{7}\bar{9}7) = 6^\circ 27'$$
$$\mathrm{II} : x = (\bar{7}\bar{5}7) : (10\bar{1}) = 19^\circ 30'$$

[1]) Glinka hat in Brief vom 23. Jan. 07 diesen Correcturen beigestimmt.

Es ist aber beim Albitzwilling, wie aus der Figur ersichtlich



$p'o = 6°32'$.
$ox' = 19°22'$.

Die Übereinstimmung mit Melczers Messung ist so gut, dass ein Zweifel an dieser Deutung kaum bestehen bleibt. Danach wären die Formen $\bar{1}\frac{9}{7}$ und $\bar{1}\frac{5}{7}$ zu löschen. In die Winkeltabellen aufgenommen sind ausser diesen folgende Formen[1]):

μ	ν	ε	ρ	ψ	Δ	π	σ	λ	τ
$\infty\frac{5}{4}$	$\infty\frac{\bar{5}}{4}$	$\frac{4}{3}0$	$\frac{\bar{4}}{3}0$	$\frac{5}{2}\frac{\bar{5}}{2}$	$\frac{\bar{4}}{3}\frac{4}{3}$	$\frac{\bar{6}}{5}$	$\frac{\bar{4}}{3}$	$\frac{\bar{3}}{2}$	$\frac{\bar{1}}{2}\frac{\bar{3}}{2}$
450	$4\bar{5}0$	403	$\bar{4}03$	$5\bar{5}2$	$\bar{4}43$	$\overline{665}$	$\overline{443}$	$\overline{332}$	$\overline{132}$
Ra.	Ra.	Fr.	Ra.	Ru.	Lev.	Dsc.	Ra.	Hes.	Ra.

Ausserdem sich in der Literatur angegeben[1]):

3∞	$\frac{4}{3}\infty$	$\infty\frac{7}{2}$	$3\bar{\infty}$	$\frac{5}{3}\bar{\infty}$	$\frac{4}{3}\bar{\infty}$	$\infty\frac{\bar{3}}{2}$	$\infty\bar{4}$	$\infty\bar{2}0$	$0\frac{1}{2}$	$0\frac{\bar{1}}{2}$
310	430	270	$\bar{3}10$	$5\bar{3}0$	$4\bar{3}0$	$2\bar{3}0$	$1\bar{4}0$	$1.\overline{20}.0$	012	$0\bar{1}2$
Gl.	Kl.	Kl.	Gl.	Kl.	Kl.	Vi.	Kl.	Kl.	Fou.	Fou.

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[1]) Dabei bedeutet:

Dx. = Descloizeaux Manuel 1862. **1**. 819.
Jer. = Jeremejew Jubelb. russ. Berg. Inst. 1873. **2**. 179. Ref. Zeitschr. Kryst. 1900. 32. 493.
Ru. = Rumpf Min. Mit. 1874. **4**. 98. Ref. Jahrb. Min. 1874. 868.
Ra. = v. Rath Zeitschr. Kryst. 1881. **5**. 27.
Kl. = Klockmann Zeitschr. d. geol. Ges. 1882. **34**. 410.
Fou. = Fouqué Bull. soc. fr. Min. 1883. **6**. 197. Ref. Zeitschr. Kryst. 1884. **10**. 636.
Gl. = Glinka Russ. Berg. Journ. 1889. **4**. 10. Ref. Zeitschr. Kryst. 1894. **22**. 63.
Fr. = Franck Bull Ac. Belg. 1891. (3) **21**. 605. Ref. Zeitschr. Kryst. 1894. **23**. 477.
Vi. = Viola Min. pet. Mitt. 1895. **15**. 135. Ref. Zeitschr. Kryst. 1898. **29**. 151.
Sl. = Slavik Bull. intern. Ac. Boh. 1902. 7. Ref. Jahrb. Min. 1903. 1. 201.
Bo. = Bowman Min. Mag. 1902. **13**. 115.
Me. = Melczer Zeitschr. Kryst. 1905. **40**. 571.

$\frac{\bar{3}}{4}0$	$\frac{\bar{5}}{4}0$	$1\bar{1}$	$\bar{1}\frac{5}{7}$	$\bar{1}8$	$\bar{1}.20$	$\bar{1}\frac{\bar{1}}{4}$	$\bar{1}\frac{\bar{9}}{7}$	15.16	$\bar{3}11$
$\bar{3}04$	$\bar{5}04$	$1\bar{1}1$	$\bar{7}57$	$\bar{1}81$	$\bar{1}.20.1$	$\overline{41}4$	$\overline{79}7$	15.16.1	$\bar{3}11$
Gl.	Sl.	Jer.	Me.	Kl.	Kl.	Kl.	Me.	Kl.	Bo.

Da es ebenso wünschenswert erscheint, das Formenverzeichnis abzuklären, als zu bereichern, so wurden die genannten Formen einer kritischen Durchsicht unterzogen.

$\frac{4}{3}\infty$; $\infty\frac{7}{2}$; $\frac{5}{3}\bar{\infty}$; $\frac{4}{3}\bar{\infty}$; $\infty\bar{4}$; $\infty\overline{20}$; $\bar{1}8$; $\bar{1}.20$; $\bar{1}\frac{\bar{1}}{4}$; **15.16** von Klockmann angegeben, wurden Gdt. Index 1890. 2. 22. als nicht genügend gesichert betrachtet und in das Formenverzeichnis nicht aufgenommen. Ausserdem waren als unsicher dort aufgeführt $\infty\bar{2}$ und $\infty\bar{5}$, die an unseren Grönländer Albiten wiedergefunden und somit bestätigt wurden.

$\bar{1}8$ und $\bar{1}.20$ nennt auch Viola (Min. petr. Mitt. 1895. **15**. 139). Sie stehen aber so hart an $M = 0\infty$ und so isoliert in der Reihe der Zone $\bar{1}9$, dass sie als Vicinale zu M anzusprechen und nicht unter die typischen Formen aufzunehmen sein dürften.

Auch die übrigen genannten Klockmannschen Formen bedürfen der Bestätigung.

$\bar{3}1$ (**$\bar{3}11$**) Bowman kann als gesichert gelten.

$r = \frac{\bar{4}}{3}0$ (**$\bar{4}03$**); $\sigma = \frac{\bar{4}}{3}$ (**$\overline{44}3$**); $\tau = \frac{\bar{1}\bar{3}}{2\,2}$ (**$\overline{13}2$**) von G. v. Rath angegeben, erscheinen gesichert.

$\mu = \infty\frac{5}{4}$ (**450**); $\nu = \infty\frac{\bar{5}}{4}$ (**$4\bar{5}0$**) sind dagegen aus der Reihe der gesicherten zu entfernen. Rath sagt über sie: «Combinations-Kanten annähernd $= 4—6°$ gemessen. Eine genauere Messung wird durch die starke vertikale Streifung der gemessenen Flächen verhindert. Ihre Messung entspricht etwa den Symbolen $\mu = \infty\breve{P}'\frac{5}{4}$ (450) und $\nu = \infty'\breve{P}\frac{5}{4}$ ($4\bar{5}0$)».

$\varepsilon = \frac{4}{3}0$ (**403**) findet sich bei Franck (Zeitschr. Kryst. 1894. **23**. 477 u. 478) als Referat aus dem Bull. soc. belg. Doch liegen hier Druckfehler vor, wie aus den Winkeln ersichtlich. Es ist nicht 403, sondern $\bar{4}03$.

Correctur.

Zeitschr. Kryst. 1894. **23**. Seite 477 Zeile 13 v. u. lies: $\{\bar{4}03\}$ statt $\{403\}$
— — — - — 478 — 2 v. o. — $(\bar{1}01):(\bar{4}03)$ statt $(101):(403)$
— — — - — — — 7 v. o. — $(010):(\bar{4}03)$ — $(010):(403)$
Die Form ist zu streichen.

$\psi = \frac{5\bar{5}}{2\,2}\,(5\bar{5}2)$ angegeben von Rumpf (Min. Mit. 1874. **4.** 98). Die Form liegt an einem ungewöhnlichen Ort, vereinzelt, durch eine einzelne Winkelmessung bestimmt. Flächenausbildung schlecht, Messung genähert. Die Form ist aus der Reihe der gesicherten zu streichen.

Correctur.

Hintze Handb. Min. 1891. 2. 1447. Zeile 12 v. o. lies: $\psi\,(5\bar{5}2)$ statt $(\overline{55}2)$.
— — — — 1448. — 14 v. o. — $(5\bar{5}2):(1\bar{1}0)$ statt $(\overline{55}2):(110)$.

$\pi = \frac{\bar{6}}{5}\,(\overline{66}5)$ findet sich bei Descloizeaux (Manuel 1862. 1. 318) als $b\frac{5}{12}$ ebenso in dem zugehörigen Atlas, Taf. 25 Fig. 146 an einem Periklin-Zwilling. Die zugehörige Messung von Marignac ist von Descloizeaux mit ? versehen. Schrauf hat in seinem Atlas (1864. Tf. 4. Fig. 28) Descloizeaux's Figur umgezeichnet.

Die Discussion der Zahlen der Zone hat die Form nicht wahrscheinlich gemacht. Sie ist bis zur Bestätigung als unsicher anzusehen.

$\lambda = \frac{\bar{3}}{2}\,(\overline{33}2)$ findet sich bei Descloizeaux (Manuel 1862. **1.** 318. 320) als $b\frac{1}{3}$ am Periklin, die Messung nach Marignac mit ?? versehen, um 1°4′ von der Rechnung differierend. Hessenberg (Senckenb. Abh. 1858. 2. 248. Albit v. Sterzing.) gibt die Form als $\frac{3}{2}P'$ aus Zone Po und xf. Er bemerkt aber dazu: «Die Fläche lieferte kein ganz vollkommenes Spiegelbild, und ich bin geneigt, sie als die Resultante eines sehr feinfurchigen Wechsels der beiden anliegenden Flächen $P'(o)$ und $\infty P'(T)$ anzusehen». Mit Rücksicht auf ihre innere Wahrscheinlichkeit darf die Form wohl doch als gesichert gelten.

$g = \bar{2}2\ (\bar{2}21)$ findet sich bei Lévy (Descript. 1837. Taf. 41 Fig. 7), nachgezeichnet von Schrauf (Atlas 1864, Taf. 3. Fig. 17) als φ. Die Form bedurfte der Bestätigung, da sie nur an einem Periklin beschrieben wurde, bevor das Periklin-Zwillingsgesetz bekannt war. Es liegt der Verdacht vor, dass es sich um eine Fläche handelt, die durch die Zwillingsbildung ihren Ort erhalten hat.

Die Form wurde an unseren Albiten mit Sicherheit nachgewiesen.

$\varDelta = \frac{\bar{4}}{3}\frac{4}{3}\ (\bar{4}43)$ findet sich bei Lévy (Descript. 1837. Taf. 41 Fig. 4. 5. 6. 7. 8), hiervon copiert bei Schrauf (Atlas 1864. Taf. 3 Fig. 16. 17) als δ. Von späteren Autoren nicht gefunden. Es liegt der Verdacht vor, dass die Lévyschen Beobachtungen anders zu deuten seien. Etwa, dass Zwillingsbildung bei der Deutung übersehen wurde.

Die Form bedarf der Bestätigung.

$\zeta = \infty 5\ (150)$ (Rumpf Min. Mitt. 1874. **4.** 98). Gemessen $\zeta M = 16°$; berechnet $19°21'$; stimmt schlecht. Sollte diese Form nicht noch von andern beobachtet sein, so wäre sie erst durch die vorliegende Bestätigung zu den gesicherten gekommen.

$\infty\frac{\bar{3}}{2}\ (2\bar{3}0)$ von Viola angegeben (Min. pet. Mitt. 1895. **15.** 139) mit der Messung:

$$\infty\bar{\infty} : \infty\frac{\bar{3}}{2} = 11°47'; \quad \text{berechnet } 10°46'; \quad \text{Diff.} = 1°01'.$$

Die Diskussion der Zahlen lässt $\infty\frac{\bar{5}}{3}$ als wahrscheinlich erkennen. Auch ist $\infty\frac{5}{3}$ bekannt, $\infty\frac{3}{2}$ dagegen nicht. Es berechnet sich:

$$\infty\bar{\infty} : \infty\frac{\bar{5}}{3} = 13°44'; \quad \text{Diff.} = 1°53'.$$

Die Beobachtung liegt zwischen beiden Symbolen und unterscheidet sich von beiden um mehr als 1°. Die Form bedarf der Bestätigung.

$\sigma = \frac{\bar{4}}{3}(44\bar{3})$ findet sich bei Descloizeaux (Manuel 1862. 1. 318) als $b\frac{3}{8}$. Die Messung $pb\frac{3}{8} = 70°30'$ mit ? versehen. Rath giebt sie abermals (Zeitschr. Kryst. 1881. 5. 29) und zwar ohne Messung bestimmt durch zwei Zonen *ou* und *rM*. Die Form wird unsicher mit der Unsicherheit von $r = \frac{\bar{4}}{3}0$. Sie liegt an der Zwillingsgrenze, daher besteht der Verdacht der Ablenkung für *r* ebenso wie für σ. Mit Rücksicht auf die Zuverlässigkeit und Vorsicht der Beobachter kann die Form als gesichert gelten.

$r = \frac{\bar{4}}{3}0$ ($\bar{4}03$) ist durch Hessenberg (Senckenb. Abh. 1858. 2. 248.) als $\frac{4}{3}\bar{P}'\infty$ gesichert. Rath giebt sie (Zeitschr. Kryst. 1881. 5. 27, sowie Taf. 2. Fig. 7). Sie liegt an der Zwillingsgrenze und könnte abgelenkt sein. Eine Messung ist nicht gegeben.

Neumann giebt die Form als (*r*?) (Berl. Ak. Abh. 1830. 218) mit der Bemerkung: «Sie ist sehr unvollkommen, gewölbt und erlaubt nur eine ganz ungefähre Messung».

Gemessen:	$ry = 15°10'$	berechnet:	$16°37'$
—	$rx = 14°30'$	—	$13°11'$.

Descloizeaux (Manuel 1862. 1. 318) gibt Messungen $pa\frac{3}{4} = Pr = 62—65°$, berechnet $65°28'$.

Hessenberg hat sie mit Sicherheit für den Albit von Sterzing nachgewiesen. (Senkenb. Abh. 1858. 2. 247). Er nennt sie «glatt und unzweilfelhaft». Gemessen: $Pr = 64°52'$.

Nach brieflicher Mitteilung (14. Dez. 1906) hat Vrba die Form $\frac{\bar{4}}{3}0$ an Krystallen von Bobruvka (Mähren) durch folgende Messungen nachgewiesen.

Gemessen: $cr = 0 : \frac{\bar{4}}{3}0 = 65°35'$ (Mittel); berechnet: $65°28'$.

1$\bar{1}$ ($\bar{1}$**11**) von Jeremejew angegeben als $c = 'P$ (Jubelb. Petersb. Berg. Inst. 1873. 179; Ref. Zeitschr. Kryst. 1900. **32**.

495), jedoch ohne Winkel, Figur oder sonstige Angabe. Die Form bedarf der Bestätigung.

$\mathbf{\frac{\bar{3}}{4}0}$ (**$\bar{3}04$**) findet sich bei Glinka (Ref. Karnojitsky Zeitschr. Kryst. 1894. 22. 63) ohne Messung oder sonstige Angabe. Es liegt ein Druckfehler vor und ist zu lesen ($\bar{4}03$) statt ($\bar{3}04$).

Es bleiben danach ausser den am Albit von Grönland beobachteten Formen als gesichert nur die folgenden übrig:

r	λ	σ	Y	τ
$\frac{\bar{4}}{3}0$	$\frac{\bar{3}}{2}$	$\frac{\bar{4}}{3}$	$\bar{3}1$	$\frac{\overline{13}}{22}$
$\bar{4}03$	$\overline{33}2$	$\overline{44}3$	$\bar{3}11$	$\overline{13}2$
Rath.	Hsb.	Rath.	Bowm.	Rath.

$\mathbf{\frac{\bar{5}}{4}0}$ (**$\bar{5}04$**) von Slavik angegeben für Albite von Bobruvka (Mähren), jedoch nur auf Grund von Schimmermessungen (Bull. Böhm. Akad. 1902. Sep. S. 6). Nach brieflicher Mittheilung von Vrba (14. Dez. 1906) haben genauere Messungen das Symbol nicht bestätigt. Vielmehr liegt dort das auch von anderen Fundorten bekannte $\frac{\bar{4}}{3}0$ ($\bar{4}03$) vor. (Vgl. oben bei $\frac{\bar{4}}{3}0$). Danach ist das Symbol zu löschen.

Als **der Bestätigung bedürftig** sind danach anzusehen:

$\infty\frac{\bar{3}}{2}$	$1\bar{1}$	$\frac{\bar{4}\,4}{3\,\bar{4}}$	$\frac{\bar{6}}{5}$
$2\bar{3}0$	$1\bar{1}1$	$\bar{4}43$	$\overline{66}5$
Vi.	Jer.	Lév.	Dx.

Durch **Druckfehler und sonstiges Versehen** sind in die Formenverzeichnisse geraten und daher zu streichen:

3∞	$3\bar{\infty}$	$\frac{4}{3}0$	$\frac{\bar{3}}{4}0$	$\frac{\bar{5}}{4}0$	$1\bar{3}$	$\bar{1}\frac{5}{7}$	$\bar{1}\frac{\bar{9}}{7}$	$0\frac{1}{2}$	$0\frac{\bar{1}}{2}$
310	$3\bar{1}0$	403	$\bar{3}04$	$\bar{5}04$	$1\bar{3}1$	$\bar{7}57$	$\overline{79}7$	012	$0\bar{1}2$
Gl.	Gl.	Fra.	Gl.	Sl.	Vi.	Mel.	Mel.	Fou.	Fou.

Als **Vicinale** oder ganz unsichere Formen sind anzusehen:

$\frac{4}{3}\infty$	$\infty\frac{5}{4}$	$\infty\frac{7}{2}$	$\frac{5}{3}\bar{\infty}$	$\frac{4}{3}\bar{\infty}$	$\infty\bar{4}$	$\frac{5}{2}\frac{\bar{5}}{2}$	$\infty\frac{\bar{5}}{4}$	$\infty\overline{20}$	$\bar{1}8$	$\bar{1}.20$	$\bar{1}\frac{\bar{1}}{4}$	15.16
430	450	270	$5\bar{3}0$	$4\bar{3}0$	$1\bar{4}0$	$5\bar{5}2$	$4\bar{5}0$	$1.\overline{20}.0$	$\bar{1}81$	$\bar{1}.20.1$	$\overline{414}$	15.16.1
Kl.	Ra.	Kl.	Kl.	Kl.	Kl.	Ru.	Ra.	Kl.	Kl.	Kl.	Kl.	Kl.

Grosse Zahl der unsicheren Formen. Die auffallende Tatsache, dass wir beim Albit in der Literatur so viele unsichere Formen neben verhältnismässig wenig sichern antreffen, erklärt sich folgendermassen.

Die reichliche, selten fehlende Viellingsbildung (Compositbildung[1]), verbunden mit Ablenknng und schiefer Verwachsung bewirkt eine **Unsicherheit der Flächenposition.** Diese Unsicherheit trifft besonders die Hauptzonen, vor allem die Prismenzone. Hier begegnen wir fortlaufenden Reihen von Reflexen, die man nicht deuten kann, ohne den Krystall in alle seine Lamellen aufzulösen, dann Positionsschwankungen durch Ablenkung und Ausheilung einspringender Winkel.

Trotzdem (man kann auch sagen weil) hier genetisch das Manichfaltigste vorgeht, kommen nur die einfachsten Formen der Reihe zur sicheren Bestimmung als typische Formen. Alles andere bleibt unsicher oder ist vicinal und influenziert.

Kommen nun solche vicinale Gebilde in die Nähe eines typischen Ortes, so ist selbst der erfahrene und kritische Beobachter geneigt, solchen Gebilden ein Symbol zu geben, sie als typisch anzusehen. Wie viel mehr der minder Erfahrene, der in jedem Reflex neuer Position eine neue zu symbolisierende Form begrüsst.

Ähnlich wie in der Prismenzone ist es in den übrigen Zonen, von denen nur wenige genetisch wichtig sind. Die wichtigste von diesen ist [*xM*], dann [*PM*], [*Pl*], [*PT*].

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[1]) Ueber Composite vgl. Zeitschr. f. Kryst. 1907. **43**. 347.

Das Gesamtbild ist: Wenige Zonen mit vielen schwankenden, wenig typischen Positionen. Das ist das Bild einer Formenentwicklung wie sie die Compositbildung[1]) zu begleiten pflegt.

Schwierigkeit der Bestimmung und Deutung hängt mit diesen Verhältnissen zusammen. Es ist oft nicht leicht, die Zwillingsteile richtig zu trennen, für jede Fläche $\pm$, oben und unten zu unterscheiden. Besonders dann, wenn Viellings- oder Zwillingsbildung nach zwei Gesetzen zugleich vorliegt oder die Unterlage (Orthoklas) bestimmend und ablenkend auf die Flächenlage mitwirkt (Induction und Influenzirung[2])). Letzteres ist beim Albit häufig der Fall. Hier hat die zweikreisige Messung mit ihrer graphischen Discussion im gnomonischen Bild uns in den Stand gesetzt, die kritische Auflösung komplizierter Bildungen durchzuführen und dadurch eine Anzahl neuer Formen sicher festzustellen, unsichere zu beseitigen.

Aber auch diese klärende Bearbeitung ändert das Gesamtbild nicht: Wenige Zonen, mit vielen schwankenden, wenig typischen Positionen.

Die **Ausscheidung des Unsicheren** ist beim Albit mehr als bei andern Krystallarten nötig, da die Aufnahme des Unsicheren bei Deutung der an sich schon complicierten Verhältnisse verwirrend wirkt. Ist ein Symbol, wenn auch unsicher, angegeben, so verleitet dies einen folgenden Beobachter, einen Reflex ähnicher Position ebenso zu deuten, ohne die strenge Kritik anzuwenden, die eine neue Form erfordert. So erfährt die unsichere, oft unrichtige Form, eine scheinbare, unberechtigte Bestätigung.

Es empfiehlt sich, alle unsicheren Formen bis zur sicheren Neufindung bei allen Diskussionen als unrichtig oder nicht vorhanden anzusehen und sie nur in den Verzeichnissen zu führen, um die Angaben des Beobachters zu respectieren und sie andern, vielleicht anders Urteilenden, nicht vorzuenthalten.

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[1]) Ueber Composite vgl. Zeitschr. f. Kryst. 1907.

[2]) vgl. Zeitschr. Kryst. 1907. **42**. 596.

Discussion der Zonen. Es mögen die Zahlenreihen der wesentlichen Zonen discutiert werden und untersucht, wie sich die neu gefundenen resp. hier bestätigten, bisher unsicheren Formen einreihen.

Prismenzone [1]**.**

	M	ζ	f	$\ddot{Z}$	$\overset{*}{K}$	T	$\ddot{h}$	l	$\ddot{a}$	z	$\ddot{L}$	M	
$pq =$	0∞	$\infty 5$	$\infty 3$	$\infty 2$	$\infty\frac{5}{3}$	∞	$\infty 0$	$\infty\bar{\infty}$	$\infty\bar{2}$	$\infty\bar{3}$	$\infty\bar{5}$	$0\bar{\infty}$	
$q:p =$	∞	5	3	2	$\frac{5}{3}$	1	0	$\bar{1}$	$\bar{2}$	$\bar{3}$	$\bar{5}$	$\bar{\infty}$	
$\frac{1}{2}(v-1) =$	∞	2	1	$\frac{1}{2}$	$\frac{1}{3}$	0		0	$\frac{1}{2}$	1	2	∞	$= -\frac{1}{2}(1+v)$.

Die Reihe ist normal in ihren beiden Stücken TM und lM; h steht isoliert. Die neue Form K, sowie die Bestätigungen $ZhaL$ sind wertvolle Ergänzungen.

Längs-Domen-Zone $0q$.

	M	e	P	n	$\overset{*}{\vartheta}$	$\overset{*?}{\Xi}$	M
$pq =$	0∞	02	0	$0\bar{2}$	$0\bar{4}$	$0\bar{5}$	$0\bar{\infty}$
$\frac{1}{2}q =$	∞	1	0	$\bar{1}$	$\bar{2}$	$\frac{\bar{5}}{2}$	$\bar{\infty}$

Die Form $\Xi = 0\bar{5}$ ist auffallend; zu erwarten wäre $0\bar{6}$. Messung und Rechnung stimmen gut (vgl. S. 24), aber der Reflex ist verwaschen. Es wurde deshalb die Form als der Bestätigung bedürftig unter die unsicheren gestellt.

Zone $\bar{p}$.

	P	δ	o	σ	λ	n	l	
$p =$	0	$\frac{\bar{1}}{2}$	$\bar{1}$	$\frac{\bar{4}}{3}$	$\frac{\bar{3}}{2}$	$\bar{2}$	$\bar{\infty}$	
			0	$\frac{1}{3}$	$\frac{1}{2}$	1	∞	$= -(p+1)$

Auffallend ist die Zahl $\frac{\bar{4}}{3}$. Sie spricht gegen die Form σ, doch ist diese durch den erfahrenen und vorsichtigen Beobachter G. von Rath als sicher angegeben (s. oben S. 15).

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[1]) Im folgenden bedeute * neu, ·· bestätigt. Ferner bedeute v in der Rechenvorschrift z. Beisp. $\frac{1}{2}(v-1)$ die Glieder der vorhergehenden Reihe.

Zwischen *o* und *n* liegt eine lokale Entwicklung vor. Dieselbe hat Formen hervorgebracht (σ, λ), die nur mühsam gesichert sind.

Zone $p\bar{p}$.

	P	$\overset{*}{\Gamma}$	γ	p	$\overset{*}{\Lambda}$	g	l
$pq =$	0	$\frac{\bar{1}1}{33}$	$\frac{\bar{1}1}{22}$	$\bar{1}1$	$\frac{\bar{3}3}{22}$	$\bar{2}2$	$\bar{\infty}\infty$
$q =$	0	$\frac{1}{3}$	$\frac{1}{2}$	1	$\frac{3}{2}$	2	∞

Die Reihe ist normal. Die neuen Formen $\Gamma\Lambda$ passen gut hinein. Auch eine Form $\Delta = \frac{\bar{4}4}{33}$ ist angegeben, wurde jedoch für unsicher gehalten (siehe oben). Bestätigt sie sich, so haben wir eine schwache lokale Entwicklung zwischen *pg*, wie zwischen *on* der vorigen Zone.

Zone *po*.

	h	P	x	r	y	h	
$pq =$	$\infty 0$	0	$\bar{1}0$	$\frac{\bar{4}}{3}0$	$\bar{2}0$	$\bar{\infty}0$	
			0	$\frac{1}{3}$	1	∞	$= 1 - p$

Die Zone zeichnet sich aus durch die zwei wichtigen Flächen *xy*. Zwischen diesen eine kleine lokale Entwicklung, die das schwache *r* hervorgebracht hat. Zu erwarten wäre noch $\frac{\bar{3}}{2}0$. Die schwache Entwicklung entspricht derjenigen zwischen *on* und *pg* (vgl. das Projectionsbild Taf. 1 Fig. 21). Alle diese schwachen Entwicklungen liegen in dem Band zwischen den Parallelzonen $\bar{1}q$ und $\bar{2}q$. Merkwürdig ist die Schwäche von *x* an unseren Grönländer Krystallen.

Zone $\bar{1}q$.

	M	p	x	o	$\ddot{\eta}$	$\overset{*}{\xi}$	M
$pq =$	0∞	$\bar{1}1$	$\bar{1}0$	$\bar{1}$	$\overline{13}$	$\overline{15}$	$0\bar{\infty}$
$\frac{1}{2}(1-q) =$	»	0	$\frac{1}{2}$	1	2	3	∞

Die neue Form ξ passt gut in die Reihe.

Zone $\bar{2}q$.

		M	$\overset{*?}{X}$	g	$\overset{*}{\varphi}$	y	u	$\ddot{\chi}$	M
pq	=	0∞	$\bar{2}9$	$\bar{2}2$	$\bar{2}1$	$\bar{2}0$	$\bar{2}$	$\bar{2}4$	0∞
$1-\frac{q}{2}$	=			0	$\frac{1}{2}$	1	2	3	∞

Das von Bowman gefundene, hier bestätigte χ passt gut in die Reihe. Diese ist genau analog der vorhergehenden $\bar{1}q$. Die an Kryst. 6 gefundene Form $\bar{2}9$ passt nicht in die Reihe. Sie ist ihren Zahlen nach als Vicinale zu M anzusehen. Dagegen bildet die neue Form $\varphi = \bar{2}1$ eine werthvolle Ergänzung der Reihe.

Zone $\frac{\bar{1}}{2}q$.

		M	γ	δ	τ	$\overset{*}{Q}$	M
pq	=	0∞	$\frac{\overline{11}}{22}$	$\frac{\overline{11}}{22}$	$\frac{\overline{13}}{22}$	$\frac{\overline{15}}{22}$	$0\bar{\infty}$
$\frac{1}{2}-q$	=	»	0	1	2	3	∞

Die neue Form Q passt gut in die Reihe: Diese ist analog den beiden Reihen $\bar{1}q$ und $\bar{2}q$ und wäre ihnen gleich, wenn $\frac{\bar{1}}{2}0$ gefunden würde.

Zone $p1$.

		$\ddot{h}$	$\ddot{W}$	p	$\overset{*}{\varphi}$	Υ	$\ddot{h}$
pq	=	$\infty 0$	1	$\bar{1}1$	$\bar{2}1$	$\bar{3}1$	$\bar{\infty}0$
$\frac{1}{2}(p+1)$	=	∞	1	0	$\frac{\bar{1}}{2}$	$\bar{1}$	$\bar{\infty}$

Eine schwache Zone. Die neue Form φ passt gut.

Zone: $p-2=q$.

		T	n	$\overset{*}{Q}$	$\ddot{\eta}$	$\ddot{\chi}$	T
pq	=	∞	$0\bar{2}$	$\frac{15}{\overline{22}}$	$\overline{13}$	$\overline{24}$	$\bar{\infty}$
$q+2$	=	»	0	$\frac{1}{2}$	1	2	∞

Die schöne Reihe ist ganz normal. Die neue Form Q, sowie die bestätigten $\eta\chi$ passen gut.

Zone $p+q=-1$.

	l	δ	x	$\overset{*}{\omega}$	$\overset{*}{\varphi}$	l
$pq =$	$\infty\bar{\infty}$	$\frac{\bar{1}}{2}$	$\bar{1}0$	$\frac{\bar{3}1}{22}$	$\bar{2}1$	$\bar{\infty}\infty$
$2q =$	$\bar{\infty}$	$\bar{1}$	0	1	2	∞

Die neuen Formen passen gut.

Zone $3p+q=-4$.

	z	$\overset{*}{\vartheta}$	$\overset{*}{Q}$	o	r	$\overset{*}{\omega}$	g	z	
	$\infty\bar{3}$	$0\bar{4}$	$\frac{\overline{15}}{22}$	$\bar{1}$	$\frac{\bar{4}}{3}0$	$\frac{31}{22}$	$\bar{2}2$	$\infty\bar{3}$	
$-p =$	∞	0	$\frac{1}{2}$	1	$\frac{4}{3}$	$\frac{3}{2}$	2	∞	
				0	$\frac{1}{3}$	$\frac{1}{2}$	1	∞	$= v - 1.$

Die neuen Formen passen gut in die Reihe.

Die neuen und bestätigten Formen sind folgendermassen charakterisiert:

Z $= \infty 2$ **(120)** Wiik (Zeitschr. Kryst. 1886. **11**. 311) bedurfte der Bestätigung. Sie wurde an drei Krystallen mit 5 Flächen beobachtet.

Buchst.	Symbol	Krystall No.	Zahl der Flächen	Gemessen φ	Gemessen ρ	Berechnet φ	Berechnet ρ	Bemerkungen
Z	$\infty 2$	6	1	221°18′	90°00′	221°25′	90°00′	breit. Reflex gut
		10	1	41°11′	"	41°25′	"	schmal. Refl. sehr gut
		15	3	41°15′	"	"	"	alle schmal: Refl. schwach
				41°20′	"	"	"	alle schmal: Refl. zieml. gut
				221°10′	"	221°25′	"	alle schmal: Refl. gut

$K = \infty \frac{5}{3}$ **(350)**; neu, an 5 Krystallen mit 8 Flächen.

Buchst.	Symbol	Krystall No.	Zahl der Flächen	Gemessen		Berechnet		Bemerkungen
				φ	ρ	φ	ρ	
K	$\infty \frac{5}{3}$			{ 46°48′	90°—	46°40′	90°00′	sehr schmal. Refl. gut ab. schwach
		1	2	{ 227°00′	〃	226°40′	〃	sehr schmal, aber gut spiegelnd
				{ 46°25′	〃	46°40′	〃	schmal. Refl. gut
		2	2	{ 46°25′	〃	〃	〃	— — —
		9	1	46°56′	〃	〃	〃	schmal. Refl. unscharf
				{ 46°40′	〃	〃	〃	schmal. Refl. gut
		15	2	{ 46°15′	〃	〃	〃	sehr schmal. Refl. schwach
		20	1	—	—	—	—	schmal. Refl. mittelm.

$h = \infty 0$ **(100)** findet sich bei Jeremejew (Jubelb. Petersb. Berg. Inst. 1873), Ref. Zeitschr. Kryst. 1900. **32**. 493. Die Form fand sich an 6 der Grönländer Krystalle mit 8 Flächen.

Buchst.	Symbol	Krystall No.	Zahl der Flächen	Gemessen		Berechnet		Bemerkungen
				φ	ρ	φ	ρ	
h	$\infty 0$			{ 91°24′	90°—	90°28′	90°—	} äuss. schmal. Refl. sehr schwach
		4	2	{ 269°30′	—	270°28′	〃	
		6	1	91°00′	—	90°28′	〃	sehr schmal. Refl. sehr schwach
		13	1	91°02′	—	〃	〃	schmal. Refl. lichtschwach
				{ 90°50′	—	〃	〃	
		14	2	{ 271°04′	—	270°28′	〃	schmal, ausgedehnter Refl.
		15	1	90°26′	—	〃	〃	sehr schmal, sehr schwach. Refl.
		16	1	90°59′	—	〃	〃	— — —

$a = \infty \bar{2}$ **($\bar{1}$20)**. Von Klockmann gegeben. Konnte hier bestätigt werden. An 8 Krystallen mit 10 Flächen.

Buchst.	Symbol	Krystall No.	Zahl der Flächen	Gemessen		Berechnet		Bemerkungen
				φ	ρ	φ	ρ	
a	$\infty \bar{2}$			{ 318°46′	90°—	318°59′	90°—	sehr schmal. Refl. sehr schwach
		2	2	{ 318°55′	〃	〃	〃	schmal. Refl. gut.
		3	1	139°20′	〃	138°59′	〃	mässig breit. Refl. schwach
				{ 139°17′	〃	〃	〃	sehr schmal. Refl. unscharf
		6	2	{ 138°55′	〃	〃	〃	schmal. Refl. sehr gut
		10	1	318°59′	〃	318°59′	〃	sehr schmal. Refl. zieml. scharf
		11	1	318°57′	〃	〃	〃	sehr schmal. Refl. schwach
				318°52′	〃	〃	〃	— —
		16	2	138°52′	〃	〃	〃	sehr schmal. Refl. ziemlich gut

$L = \infty\bar{5}\,(1\bar{5}0)$. Von Klockmann gegeben. Konnte hier vielfach bestätigt werden. An 10 Krystallen mit 18 Flächen, oft mit vorzüglicher Ausbildung. Die besten Messungen gaben folgende Krystalle:

Buchst.	Symbol	Krystall No.	Zahl der Flächen	Gemessen		Berechnet		Bemerkungen
				φ	ρ	φ	ρ	
L	$\infty\bar{5}$	3	1	160°42′	90°—	160°44′	90°00′	mässig breit. Refl. sehr gut
		4	2	160°39′	"	"	"	schmal. Refl. gut
				160°41′	"	"	"	schmal. Refl. sehr gut
		6	2	160°42′	"	"	"	sehr schmal. Refl. gut
				160°38′	"	"	"	schmal. Refl. gut

$\vartheta = 0\bar{4}\,(0\bar{4}1)$. Neu. An 1 Krystall mit 1 Fläche.

Buchst.	Symbol	Krystall No.	Zahl der Flächen	Gemessen		Berechnet		Bemerkungen
				φ	ρ	φ	ρ	
ϑ	$0\bar{4}$	4	1	167°18′	65°51′	167°00′	65°51′	sehr klein, ab. eben u. wohlbegrenzt

Trotzdem nur eine Fläche beobachtet ist, wurde die Form als sicher angesehen, da die Fläche gut begrenzt ist und Messung und Rechnung gut übereinstimmen.

$?\Xi = 0\bar{5}\,(0\bar{5}1)$. Neu. An einem Krystall mit 5 Flächen.

Buchst.	Symbol	Krystall No.	Zahl der Flächen	Gemessen		Berechnet		Bemerkungen
				φ	ρ	φ	ρ	
Ξ	$0\bar{5}$	15	2	169°52′	70°18′	169°36′	70°12′	schmal, nicht ganz scharf, aber einheitl. reflekt.
				168°50′	70°25′			an 4 Lamellen, unscharf. Reflex verwischt

Trotz der guten Übereinstimmung von Messung und Rechnung erscheint die Form der Bestätigung bedürftig, da die Reflexe unscharf sind und die Zahl nicht gut in die Reihe passt (vgl. S. 19).

W = **1** (**111**). An zwei Krystallen mit je einer Fläche. Die Form wird von Jeremejew angegeben (Jubelb. Berg. Inst. Petersb. 1873. Ref. Zeitschr. Kryst. 1900. **32**. 193 als $p = \{111\} P'$, aber ohne Messung anzugeben. Sie konnte an den Grönländer Krystallen mit Sicherheit nachgewiesen werden.

Buchst.	Symbol	Krystall No.	Zahl der Flächen	Gemessen φ	Gemessen ρ	Berechnet φ	Berechnet ρ	Bemerkungen
W	1	3	1	66°57′	58°06′	67°13′	58°09′	schmal, gut leucht. Refl. unscharf
		15	1	67°20′	58°18′	"	"	sehr klein, glänz. Refl. schwach

$\Gamma = \frac{\bar{1}1}{33} (\bar{1}13)$. Neu.

Buchst.	Symbol	Krystall No.	Zahl der Flächen	Gemessen φ	Gemessen ρ	Berechnet φ	Berechnet ρ	Bemerkungen
Γ	$\frac{\bar{1}1}{33}$	11	1	33°30′	17°21′	33°44′	17°22′	ziemlich gross, vollkom. eben. Refl. sehr gut

Trotzdem die Form nur mit einer Fläche auftritt, ist sie durch deren gute Ausbildung und Übereinstimmung von Messung und Rechnung gesichert.

$\varDelta = \frac{\bar{3}3}{22}$. Neu.

Buchst.	Symbol	Krystall No.	Zahl der Flächen	Gemessen φ	Gemessen ρ	Berechnet φ	Berechnet ρ	Bemerkungen
Δ	$\frac{\bar{3}3}{22}$	14	1	$\bar{4}6°20′$	53°20′	$\bar{4}6°28′$	53°18′	ziemlich breit, vollk. eben, gut spiegelnd

Trotzdem die Form nur mit einer Fläche auftritt, ist sie doch durch deren gute Ausbildung und Übereinstimmung von Messung und Rechnung gesichert.

$\omega = \frac{\bar{3}1}{22}\ (\bar{3}12)$. Neu.

Buchst.	Symbol	Krystall No.	Zahl der Flächen	Gemessen		Berechnet		Bemerkungen
				φ	ρ	φ	ρ	
ω	$\frac{\bar{3}1}{22}$	6	2	$\bar{6}9°50'$	46°10′	$\bar{6}9°32'$	46°04′	stark leuchtend, mit gutem Refl.
				$\bar{6}9°46'$	46°10′			lichtschwächer. Refl. deutlich

Bei der Güte der Ausbildung, sowie Übereinstimmung von Messung und Rechnung, erscheint die Form gesichert.

$\varphi = \bar{2}1\ (\bar{2}11)$. Neu.

Buchst.	Symbol	Krystall No.	Zahl der Flächen	Gemessen		Berechnet		Bemerkungen
				φ	ρ	φ	ρ	
φ	$\bar{2}1$	6	2	$\bar{6}5°56'$	58°00′	$\bar{6}6°08'$	58°00′	gut leucht. Streif. Refl. zieml. gut

Bei der Güte der Ausbildung und Übereinstimmung von Messung und Rechnung erscheint die Form gesichert. Sie passt gut in die Zahlenreihe.

$Q = \frac{1\bar{5}}{22}\ (1\bar{5}2)$. Neu.

Buchst.	Symbol	Krystall No.	Zahl der Flächen	Gemessen		Berechnet		Bemerkungen
				φ	ρ	φ	ρ	
Q	$\frac{1\bar{5}}{22}$	8	1	179°48′	53°03′	179°34′	53°02′	schmal. Refl. schwach, aber gut

Die Form erscheint gesichert. Sie passt gut in die Zahlenreihe.

$X = \bar{2}9\ (\bar{2}91)$. Vicinale.

Buchst.	Symbol	Krystall No.	Zahl der Flächen	Gemessen		Berechnet		Bemerkungen
				φ	ρ	φ	ρ	
X	$\bar{2}9$	6	2	$\bar{1}5°40'$	79°28′	$\bar{1}5°55'$	79°23′	schmal, glänzend. Refl. schwach
				$\bar{1}5°42'$	79°28′	"		

Trotz dieser Festigkeit der Position, die sich im Auftreten mit je einer Fläche an beiden Individuen eines Zwillings zu erkennen gibt, möchten wir diese Form in Anbetracht des Symbols, der Nähe an $M = 0\infty$ und der Isoliertheit in der Zahlenreihe als Vicinale ansprechen. Sie wurde deshalb unter die unsicheren gestellt.

$\eta = \overline{13}$ ($1\overline{3}\overline{1}$). Von **Viola** nachgewiesen (Min. pet. Mitt. 1895. **15**. 140), jedoch nur an einem Krystall mit schwankender Position: Gemessen $\bar{1} : \overline{13} = 28°16'$; $30°05'$; $32°20'$. Diese Form findet sich an den meisten unserer Krystalle gross und gut ausgebildet. Sie ist geradezu charakteristisch für alle die hier untersuchten grönländischen Fundorte. Von den 17 gemessenen Krystallen wurde sie an 13 mit 23 Flächen beobachtet. Von den Terminalflächen ist sie an Häufigkeit bei unseren Krystallen nur von *Ppo* übertroffen. Einige der besten Messungen mögen im folgenden zusammengestellt werden.

Buchst.	Symbol	Krystall No.	Zahl der Flächen	Gemessen φ	Gemessen ρ	Berechnet φ	Berechnet ρ	Bemerkungen
η	$\overline{13}$	3	1	$\bar{1}63°10'$	59°08′	$\bar{1}63°17'$	59°08′	sehr gross, Refl. vorzüglich
		6	2	$\bar{1}63°16'$	59°10′			sehr gross, Refl. vorzüglich
				$\bar{1}63°14'$	59°10′			sehr gross, Refl. vorzüglich
		12	2	$\bar{1}63°20'$	59°10′			kleines Dreieck. Refl. sehr gut
				$\bar{1}63°10'$	59°10′			schmal. Refl. gut

Mittel aus allen 23 Messungen: $\varphi = \bar{1}63°17'$ $\rho = 59°09'$

berechnet: $\varphi = \bar{1}63°17'$ $\rho = 59°09'$.

$\xi = \overline{15}$ ($1\overline{5}\overline{1}$). Neu.

Buchst.	Symbol	Krystall No.	Zahl der Flächen	Gemessen φ	Gemessen ρ	Berechnet φ	Berechnet ρ	Bemerkungen
ξ	$\overline{15}$	6	1	$\bar{1}69°50'$	70°10′	$\bar{1}69°59'$	70°08′	mässig breit. Refl. schwach aber einheitlich

Trotzdem nur mit einer Fläche ausgebildet, ist die Form gesichert in Anbetracht der guten Ausbildung und der Übereinstimmung von Messung und Rechnung.

$\chi = \overline{2}4\ (\overline{2}41)$, von Bowman beobachtet (Min. Mag. 1902. **13**. 115). Konnte hier nachgewiesen und dadurch bestätigt werden.

Buchst.	Symbol	Krystall No.	Zahl der Flächen	Gemessen		Berechnet		Bemerkungen
				φ	ρ	φ	ρ	
χ	$\overline{2}4$	15	1	$\overline{1}45°55'$	69°06'	$\overline{1}45°50'$	69°01'	an 2 Lamellen; sehr gute kleine Flächen. Refl. gut

$u = \overline{2}\ (\overline{2}\overline{2}1)$ eine seltene Form. An 3 Krystallen mit 4 Flächen beobachtet.

Buchst.	Symbol	Krystall No.	Zahl der Flächen	Gemessen		Berechnet		Bemerkungen
				φ	ρ	φ	ρ	
u	$\overline{2}$	6	1	$\overline{1}25°17'$	60°48'	$\overline{1}25°16'$	60°51'	sehr klein. Refl. schwach, zieml. gut
		11	1	$\overline{1}25°03'$	61°08'			sehr klein. Refl. schlecht
		15	2	$\overline{1}25°27'$	60°43'			sehr gross und gut. Refl. gut
				$\overline{1}25°20'$	60°43'			sehr gross und gut. Refl. gut

Die Berechnung der Elemente geschah nach der von Borgström und Goldschmidt publicierten Methode[1]). Es sind zünächst die **Positionswinkel** $\varphi\rho$ für alle guten Flächen jedes Krystalls zu berechnen aus den Ablesungen v und h, wobei

$$\varphi = v - v_0; \quad \rho = h - h_0.$$

Die Grösse h_0, die Polstellung des Instruments, ist leicht ermittelt. Sie wurde für unsere Messungen = 50° gemacht. Die Richtigkeit der Werte ρ hängt nun ab von einem guten und vorsichtigen Polarstellen des Krystalls am Goniometer.

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[1]) Zeitschr. Kryst. 1905. **41**. 63.

Diese bot keine Schwierigkeit infolge der jedesmal guten Ausbildung der Prismenzone als Zone. Der Ort der Prismen schwankte, aber nur innerhalb der Zone. Selten fiel ein Reflex aus der Zone heraus. So erscheinen für alle Messungen guter Flächen die Werte ρ gesichert.

Anders ist es mit den φ. Sind die v richtig abgelesen, so brauchen wir zur Berechnung der φ für jeden Krystall eine **ausgleichende Berechnung** von v_0. Dieser Berechnung von v_0 ist eine ganz besondere Sorgfall zuzuwenden. Geschieht sie unvorsichtig, so sind alle φ ungenau. Der Albit bietet hierfür eine besondere Schwierigkeit durch den Umstand, dass die Flächen der Prismenzone wegen Schwankens hierzu nicht zu brauchen sind. Speziell das hierfür so wichtige und bequeme, stets vorhandene und meist gross und eben ausgebildete $M = 0\infty$ versagt, da die Erfahrung zeigt, dass es aus den Zonen, denen es angehört, innerhalb der Prismenzone abgelenkt ist. Diese Ablenkung schwankt nach beiden Seiten d. h. nach T und l hin von 10′ bis über 1°. Im Durchschnitt beträgt sie etwa 20′. Auch die Prismen $Tlfz$ sind innerhalb der Prismenzone abgelenkt und schwankend, wenn auch ihre Reflexe noch so gut sind.

Es bleibt daher nur übrig, v_0 mit Hilfe der Zonen der Terminalflächen zu berechnen und zwar ausschliesslich aus den Quer-Parallelzonen $0q$ und $\bar{1}q$. Nur ausnahensweise konnte einmal die Zone $\bar{2}q$ herangezogen werden.

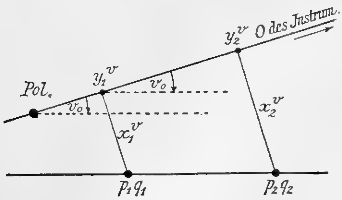
Die Berechnung von v_0 aus den Quer-Parallelzonen geschah aus je zwei Flächen p_1q_1 und p_2q_2 mit den Ablesungen $v_1\rho_1$ und $v_2\rho_2$ nach der Formel:

$$\operatorname{tg} v_0 = \frac{x_2^v - x_1^v}{y_2^v - y_1^v},$$

wobei $x_1^v = \sin v_1 \operatorname{tg} \rho_1$ $\quad x_2^v = \sin v_2 \operatorname{tg} \rho_2$

$y_1^v = \cos v_1 \operatorname{tg} \rho_1$ $\quad y_2^v = \cos v_2 \operatorname{tg} \rho_2$

Man combiniert so der Reihe nach je zwei Flächen einer Zone und nimmt aus allen erhaltenen guten Werten den Durchschnitt.



Text Fig. 1.

Fast alle Krystalle waren **Viellinge nach dem Albitgesetz.** Hierbei fällt jede Fläche beider Stellungen in die gleiche Querparallelzone, also $0q$ wieder in Zone $0q$, $\bar{1}q$ wieder in Zone $\bar{1}q$. Dies erfolgt mit grosser Strenge. Es kann also jede Fläche einer solchen Zone mit in die Rechnung gezogen werden, gleichgiltig, ob sie der ersten oder der zweiten Stellung angehört. Ausgenommen ist nur die stets abgelenkte Grenzfläche der Reihe $M = 0\infty$.

Anmerkung. Es bewährte sich bei unseren Krystallen regelmässig die Tatsache, dass bei den Viellingen nach dem Albitgesetz die Querparallelzonen $0q$ und $\bar{1}q$, auch $\bar{2}q$ und $\frac{\bar{1}}{2}q$ beider Stellung sich deckten und zwar ohne Ablenkung bis auf M, das aus der Zone gerückt ist, dass ebenso die Prismenzonen sich deckten, jedoch mit Ablenkung aller Flächen innerhalb der Zone.

Diese Tatsachen sind von wesentlichster Bedeutung für die Beurteilung der Vorgänge bei der Zwillingsbildung.

Es sind nicht die ganzen Partikel an der Zwillingsgrenze gegeneinander abgelenkt, wie wir das beispielsweise beim Cerussit von Mapimi[1]) und von Monteponi[2]) kennen gelernt haben. Es sind vielmehr für die einzelnen Partikel gewisse Vorzugsrichtungen (Flächennormalen) in der Kraftsphäre gegen andere abgelenkt, die ihre Richtung beibehalten haben.

In der Prismenzone sind alle Richtungen abgelenkt, in den übrigen Zonen nicht. Es entsteht die Frage, warum gerade in der Prismenzone?

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1) Gdt. Jahrb. Min. 1902. Beit bd. 15. 582.
2) Hubrecht Zeitschr. Kryst. 1905. 40. 170.

Es entsteht ferner die genetisch wichtige Frage: was sind bei den Zwillingen nach dem Albitgesetz die Verknüpfer, die Binder? Gewiss sind es die Bindezonen $[\infty q]$; $[0q]$ und $[\bar{1}q]$ als Ganzes. Ist nun in diesen der Hauptbinder die allen diesen Zonen gemeinsame Fläche $M = 0\infty$ resp. deren Normale oder sind es zugleich die sich fast genau deckenden ebenfalls gestörten Prismenflächen $Tl\,(fz)$.

Ist etwa gerade die **Ablenkung charakteristisch für die aktiven Binder**, die gleichzeitig tätig sind und widersprechende Anforderungen stellen? Ist gerade die Prismenzone dadurch als Zone fest, für die Einzelpositionen gestört, weil in ihr die aktiven Binder MTl liegen?

Sind dagegen in den Zonen $0q$ und $\bar{1}q$ die Normalen der Flächen $P = 0$, $e = 02$, $n = 0\bar{2}$ resp. $x = \bar{1}0$, $o = \bar{1}$, $p = \bar{1}1$ nicht aktive Binder und deshalb nicht abgelenkt?

Kann gerade die Störung als Kennzeichen für die Activität der Flächennormalen als Binder angesehen worden?

Ist etwa die grosse Nähe der Binder in der Prismenzone an der Ablenkung schuld, während bei etwas grösserer Distanz der Punkte eine Ablenkung nicht stattfindet?

Die vorliegende Untersuchung liefert Material zur Prüfung und endlichen Entscheidung dieser für die Krystallgenese wie für die Formenentwicklung wichtigen Fragen. Die eingehende Untersuchung der Fragen soll an anderem Ort geschehen.

Berechnung von v_0. Schema und Beispiel.

Als Beispiel möge die Berechnung von v_0 aus den Querparallelzonen $0q$ und $\bar{1}q$ für das obere Ende von Krystall 6 gegeben werden.

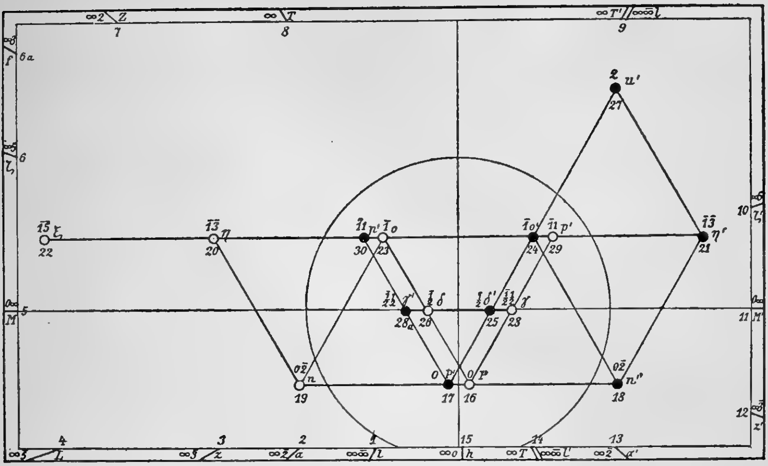
Die nächste Aufgabe ist die Berechnung von x^v und y^v aus den durch die Messung erhaltenen Winkeln v und ρ. Schema und Beispiel hierfür gibt die Tabelle I der folgende Seite.

Berechnung von $x^v . y^v$.

Tabelle I.
Schema u. Beispiel.

Formeln: $x^v = \sin v \operatorname{tg} \rho$ | $\rho = h - h_0$
$y^v = \cos v \operatorname{tg} \rho$ | $k = 50°$.

Journ. No.	Buchst.	Symbol	Qualität des Refl.	Messung v	Messung h	Messung ρ	log sin v log tg ρ log cos v	log x^v log y^v	x^v y^v
16	P	0	vorz.	6°55′	76°50′	26°50′	908 072 970 404 999 683	978 476 970 087	0.0609 0.5022
17	P'	0	sehr gut	22 47	76 50	26 50	958 799 970 404 996 472	929 203 966 876	0.1959 0.4664
18	n'	02	vorz.	310 23	99 21·	49 21·	988 180 006 633 988 151	994 813 987 784	$\bar{0}$.8874 0.7548
19	n	0$\bar{2}$	vorz.	79 27	99 21·	49 21·	999 260 006 633 926 267	005 893 932 900	1.1453 0.2133
20	η	$\bar{1}3$	vorz.	121 42	109 11	59 11	992 983 022 438 972 055	015 421 994 493	1.4263 $\bar{0}$.8809
21	η'	$\bar{1}3$	vorz.	268 12	109 11	59 11	999 979 022 438 849 708	022 417 872 146	$\bar{1}$.6756 $\bar{0}$.0526·
23	o'	$\bar{1}$	schlecht	150 05	84 10	34 10	969 787 983 171 993 789	952 958 976 960	0.3385 $\bar{0}$.5883
24	o	$\bar{1}$	schlecht	239 52	84 10	34 10	993 695 983 171 970 072	976 866 953 243	$\bar{0}$.5870 $\bar{0}$.3407·
25	δ'	$\frac{\bar{1}}{2}$	mittelm.	287 32	61 40	11 40	997 934 931 489 947 894	929 423 879 383	$\bar{0}$.1969 0.0622
26	δ	$\frac{\bar{1}}{2}$	schlecht	100 52	61 40	11 40	999 214 931 489 927 537	930 703 859 026	0.2028 $\bar{0}$.0389
29	p	$\bar{1}1$	schlecht	248 00	88 30	38 30	996 717 990 061 957 358	986 778 947 419	$\bar{0}$.7375 $\bar{0}$.2980
30	p'	$\bar{1}1$	mäss. gut	142 30	88 30	38 30	978 445 990 061 989 947	968 506 980 008	0.4842 0.6311



Text Fig. 2. Kryst. No. 6. Gnomon. Bild.

Zur Illustration diene das Projectionsbild Text Fig. 2 sowie die Figuren Fig. 6 Taf. 3, Fig. 21. 22. Taf. 1. 2.

Berechnung von v_0 aus den besten x^v und y^v der Zonen $0q, \bar{1}q$.

Tabelle II.
Schema u. Beispiel.

Formel: $\operatorname{tg} v_0 = \frac{x_2^v - x_1^v}{y_2^v - y_1^v}$.

Journal No.	Buchstaben Güte	$x_2^v - x_1^v$ $y_2^v - y_1^v$	log ... log ...	log tg v_0	v_0
19 : 18	$n : n'$ vorz. : vorz.	$\bar{2}.0327$ 0.5415	030 807 973 360	0.57447	104°55′
19 : 16	$n : P$ vorz. : vorz.	$\bar{1}.0844$ 0.2889	003 518 946 075	0.57443	104 55
19 : 17	$n : P'$ vorz. : s. gut	$\bar{0}.9494$ 0.2531	997 745 940 339	0.57406	104 56
17 : 18	$P' : n'$ s. gut : vorz.	$\bar{1}.0833$ 0.2884	003 475 946 000	0.57475	104 54
17 : 16	$P' : P$ s. gut : vorz.	$\bar{0}.1350$ 0.0358	913 027 855 388	0.57639	104 51
20 : 21	$\eta : \eta'$ vorz. : vorz.	$\bar{3}.1019$ 0.8282	049 163 991 814	0.57349	104 57

Tabelle II (Fortsetzung).

Journal No.	Buchstaben Güte	$x_2^v - x_1^v$ $y_2^v - y_1^v$	log ... log ...	log tg v_0	v_0
20 : 29	$\eta : p$ vorz. : schl.	$\bar{2}.1638$ 0.5829	033 522 976 559	0.56963	105°04′
20 : 24	$\eta : o'$ vorz. : schl.	$\bar{2}.0133$ 0.5401·	030 391 973 251	0.57140	105 01
20 : 23	$\eta : o$ vorz. : schl.	$\bar{1}.0878$ 0.2926	003 655 946 627	0.57028	105 03
20 : 30	$\eta : p'$ vorz. : mitt.	$\bar{0}.9421$ 0.2498	997 408 939 766	0.57642	104 51
30 : 21	$p' : \eta$ mitt. : vorz.	$\bar{2}.1598$ 0.5784	033 442 976 373	0.57069	105 02·
30 : 29	$p' : p$ mitt. : schl.	$\bar{1}.2217$· 0.3332	008 698 952 267	0.56431	105 15
30 : 24	$p' : o'$ mitt. : schl.	$\bar{1}.0712$· 0.2903	002 989 946 284	0.56705	105 10
30 : 23	$p' : o$ mitt. : schl.	$\bar{0}.1457$ 0.0428	916 352 863 094	0.53258	(106 21)
23 : 21	$o : \eta'$ schl. : vorz.	$\bar{2}.0141$ 0.5356·	030 409 973 887	0.56522	105 13
23 : 29	$o : p$ schl. : schl.	$\bar{1}.0760$ 0.2903	003 181 946 288	0.56893	105 06
23 : 24	$o : o'$ schl. : schl.	$\bar{0}.9255$ 0.2475·	996 638 939 358	0,57280	104 58
24 : 21	$o' : \eta'$ schl. : vorz.	$\bar{1}.0886$ 0.2881	003 686 945 953	0.57733	104 49·
24 : 29	$o' : p$ schl. : schl.	$\bar{0}.1505$ 0.0427·	917 738 863 094	0.54644	(105 52)
29 : 21	$p : \eta'$ schl. : vorz.	$\bar{0}.9381$ 0.2453·	997 225 938 970	0.58255	104 39
16 : 18	$P : n'$ vorz. : vorz.	$\bar{0}.9483$ 0.2526	997 696 940 243	0.57453	104 55

Mittelwert von v_0. In obige Berechnungstabellen wurden bereits die Positionen schlechter Reflexe nicht aufgenommen. So z. B. δ, γ. Die erhaltenen Werte v_0 differieren bis 1°. Wir können sie nach der Qualität der Flächen in zwei Gruppen teilen:

Sehr gute		Minder gute	
aus nn'	$v_0 = 104°55'$	aus ηp	$v_0 = 105°04'$
- nP	$= 104\ 55$	- $\eta o'$	$= 105\ 01$
- nP'	$= 104\ 55$	- ηo	$= 105\ 03$
- $P'n'$	$= 104\ 54\cdot$	- $\eta p'$	$= 104\ 51\cdot$
- PP'	$= 104\ 51\cdot$	- $p'\eta'$	$= 105\ 02\cdot$
- $\eta\eta'$	$= 104\ 57$	- $p'p$	$= 105\ 15$
- Pn'	$= 104\ 55$	- $p'o'$	$= 105\ 10$
		- [$p'o$	$= 106\ 21$] (!)
		- $o\eta'$	$= 105\ 13$
		- op	$= 105\ 06$
		- oo'	$= 104\ 58$
		- $o'\eta'$	$= 104\ 49$
		- [$o'p$	$= 105\ 52$] (!)
		- $p\eta'$	$= 104\ 39$

Die Sicherheit von v_0 hängt ab von der Sicherheit der Position der beiden combinierten Flächen und der Güte des Reflexes, sowie von der Distanz der Flächenpunkte. Ist diese Distanz gross, so können auch schwächere Positionen gute v_0-Werte liefern, ist diese klein, so werden die Werte v_0 besonders unsicher. Dies ist z. B. bei $p'o$ und $o'p$ der Fall. Diese differieren stark von allen andern Werten und sind am besten aus der Rechnung fortzulassen.

Wir stehen nun vor der Frage, ob wir für v_0 das Mittel aus den sehr guten Werten annehmen sollen, oder das Mittel aus allen unter Ausscheidung von $p'o$ und $o'p$, oder endlich das Mittel aus allen. Im Zweifel stellen wir die drei Werte nebeneinander.

Mittel aus den 7 besten Werten...... v_0 = 104°55′
Mittel aus allen, ausser *p′o* und *o′p*... - = 104 59
Mittel aus allen .... - = 105 05.

Das Mittel aus den 7 besten Werten ist offenbar das richtigste, in Anbetracht der geringen Schwankungen. Immerhin gibt das Mittel aus allen Werthen mit Ausschluss der beiden [ ] eine gute Controle. Der Werth 104°55′ dürfte nicht um mehr als 1/2′ ungenau sein. Das Mittel aus allen 105°05′ ist ungenauer.

Tabelle III. **Zusammenstellung der besten Werth**

No. des Kryst.	$P = 0$		$n = 0\bar{2}$		$e = 02$		$p = \bar{1}1$	
	φ	ρ	φ	ρ	φ	ρ	φ	ρ
3	81°49′	**26°51′**	**154°31′**	**49°21′**	....	....	**$\bar{3}$6°58′**	**38°42′**
4	**82 02**	**26 51**	....	....	....	....	**$\bar{3}$7 04**	**38 50**
	82 00	**26 51**	....	....	....	....	**$\bar{3}$7 03**	**38 50**
5	**81 58**	**26 52**	....	....	....	....	....	....
	81 50	**26 50**	....	....	....	....	....	....
6	**82 00**	**26 50**	**154 32**	**49 21**	**22°43′**	**52°18′**	($\bar{3}$7 35)	**38 50**
	82 08	**26 50**	**154 32**	**49 21**	....	....	**$\bar{3}$6 55**	**38 50**
7	(82 35)	26 45	**154 35**	**49 19**	....	....	....	....
	82 13	26 45	**154 31**	**49 19**	....	....	....	....
8	....	....	....	....	....	....	**$\bar{3}$6 50**	**38 44**
	....	....	....	....	....	....	**$\bar{3}$7 00**	**38 46**
9	81 50	26 50	....	....	....	....	**$\bar{3}$6 57**	**38 46**
	....	....	....	....	....	....	$\bar{3}$7 12	38 48
12	82 11	**26 51**	**154 31**	**49 21**	....	....	$\bar{3}$7 14	38 43
	82 14	26 51	**154 31**	**49 21**	....	....	....	....
13	**81 59**	**26 52**	....	....	....	....	**$\bar{3}$7 01**	**38 38**
	81 59	**26 52**	....	....	....	....	**$\bar{3}$7 00**	**38 38**
14	(81 47)	26 49	....	....	....	....	**$\bar{3}$6 56**	**38 41**
	81 58	**26 51**	....	....	....	....	**37 02**	**38 41**
Mittel	**82°00′**	**26°50′**	**154°31′**	**49°20′**	(22°43′)	(52°18′)	$\bar{3}$6°58′	38°44′

In der gleichen Weise berechnen wir v_0 bei allen Krystallen und bilden dann die $\varphi = v - v_0$.

Nachdem für jeden Krystall v_0 bestimmt ist, berechnen wir für alle seine Flächen die Positionswinkel $\varphi\rho$ durch Subtraktion aus den Ablesungen vh. Dabei ist:

$$\varphi = \boldsymbol{v} - \boldsymbol{v}_0; \qquad \rho = \boldsymbol{h} - \boldsymbol{h}_0;$$

h_0, die Polstellung des Instruments ist bekannt. Wir hatten genau $h_0 = 50°$ gemacht.

$\varphi\rho$ nach Krystallen und Formen. **Tabelle III.**

$o = \bar{1}$		$\eta = \bar{1}3$		$y = \bar{2}0$		$g = \bar{2}2$	
φ	ρ	φ	ρ	φ	ρ	φ	ρ
$\bar{1}$35°18′	**34°05′**	**$\bar{1}$63°19′**	**59°09′**	....	....	....	....
....	....	....	....	**$\bar{8}$6 37′**	**55°45′**	....	....
....	....	....	....	**$\bar{8}$6 37**	**55 45**	....	....
$\bar{1}$35 08	34 14	....	....	....	....	....	....
$\bar{1}$35 09	34 14	....	....	....	....	....	....
134 50	34 10	**$\bar{1}$63 17**	**59 11**	$\bar{8}$6 38	**55 47**	**$\bar{5}$0°30′**	**62°13′**
134 57	**34 10**	**$\bar{1}$63 13**	**59 11**	$\bar{8}$6 38	**55 47**	**50 30**	**62 13**
$\bar{1}$35 06	34 04	**$\bar{1}$63 16**	**59 09**	....	....	....	....
$\bar{1}$35 08	34 04	**$\bar{1}$63 16**	**59 09**	....	....	....	....
....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....
135 13	34 18	**$\bar{1}$63 20**	**59 11**	**$\bar{8}$6 38**	**55 43**	....	....
135 15	34 18	**163 20**	**59 11**	**86 38**	**55 43**	....	....
....	....	....	....	$\bar{8}$6 44	**55 45**	....	....
....	....	....	....	$\bar{8}$6 44	**55 45**	....	....
(134 48)	34 18	....	....	....	....	**50 23**	**62 09**
134 51	34 18	....	....	....	....	**50 35**	**62 09**
135°06′	34°10′	**163°17′**	**59°10′**	**86°38′**	**55°45′**	$\bar{5}$0°30′	62°11′

Auswahl der besten Werte $\varphi\rho$ aus allen Krystallen geschieht am besten wie in der Tabelle III (S. 36—37). Darin sind die sichersten Positionswinkel fett gedruckt, die mindest sichern in ( ).

Anmerkung zu Tab. III. S. 36. 37. Für **Bildung der Mittelwerte** ist der mathematische Weg der, jedem Wert ein Gewicht beizulegen, das sich zusammensetzt aus der Zahl der Beobachtungen und einer für die Qualität eingesetzten Zahl. Der rationelle Weg dagegen ist der, auf grund alles Bekannten das Zuverlässigste auszuwählen. Man wird den mathematischen Weg beachten, aber sich davor hüten, das Beste durch Heranziehen von Geringerem zu verderben.

Wo die Grenzen sind zwischen strenger Rechnung und Entscheidung aus sonstiger Beurteilung der Verhältnisse, darüber lassen sich Vorschriften nicht aufstellen. Die oberste Regel ist vernünftig verfahren, unter vorsichtiger Erwägung aller Momente.

In der Regel wurde folgendes Verfahren als das beste befunden:

A. Bilduug des Mittels aus den besten Werten allein,
B. Bildung des Mittels aus allen brauchbaren Werten.

Vergleich von A und B. Sind beide gleich, so ist der beste Mittelwert gesichert. Differieren beide, so gibt die Differenz ein Anhalten, in welchen Grenzen A durch B zu modifizieren ist. In der Regel ist A ein grösseres Gewicht beizulegen und sein Wert durch B nur wenig zu modifizieren.

Auf diese Weise sind die Mittel- oder wahrscheinlichsten Werte in obiger Tabelle uud in den folgenden Rechnungen gebildet.

Es liegt in diesem Ausgleichsverfahren etwas persönliche Willkür. Doch ist diese einer rigurosen aber ungerechten mathematischen Vorschrift vorzuziehen. Letztere lässt sich ja von persönlicher Willkür auch nur scheinbar freimachen. Es bleibt die Auswahl des Brauchbaren und das gegebene Gewicht noch immer willkürlich.

Berechnung der Elemente der Projection: x'_0; y'_0: $p'_0 \sin\nu$; $p'_0 \cos\nu$; q'_0 aus den Positionswinkeln $\varphi\rho$.

Aus den ausgewählten besten Werten $\varphi\rho$ berechnen sich dann die Coordinaten:

$$x' = \sin\varphi \operatorname{tg}\rho; \qquad y' = \cos\varphi \operatorname{tg}\rho;$$

aus diesen die Elemente nach den Formeln:

$$x' = x'_0 + pp'_0 \sin\nu \qquad y' = y'_0 + qq'_0 + pp'_0 \cos\nu.$$

Im folgenden mögen Schema und Beispiel für Ausrechnung und Ausgleich gegeben werden.

Berechnung von $x'y'$ aus den Mittelwerten $\varphi\rho$. Wir rechnen nach folgenden **Schema:**

Tabelle IV.
Schema u. Beispiel.

Formeln: $x' = \sin\varphi \operatorname{tg}\rho$
$y' = \cos\varphi \operatorname{tg}\rho$.

Buchst.	Symbol	φ	ρ	log sin φ log tg ρ log cos φ	log x' log y'	x' y'
P	0	**82°00′**	**26°50′**	999 575 970 404 914 356	969 979 884 760	0.5010 0.0704
n	$0\bar{2}$	**154 31·**	**49 20·**	963 358 006 607 995 558	969 952 002 165	0.5007 $\bar{1}$.0511
e	02	(22 43	52 18)	958 678 011 188 996 493	969 866 007 681	0.4997 1.1935
p	$\bar{1}1$	$\bar{3}6$ 58·	38 44·	977 923 990 436 990 249	968 357· 980 685	$\bar{0}$.4826 0.6410
o	$\bar{1}$	$\bar{1}35$ 06	34 10	984 873 983 171 985 024	968 044 968 195	$\bar{0}$.4791 $\bar{0}$.4808
η	$\bar{1}3$	**$\bar{1}63$ 17**	**59 10**	945 885 022 409 998 125	968 294 020 534	$\bar{0}$.4819 $\bar{1}$.6045
y	$\bar{2}0$	**$\bar{8}6$ 38·**	**55 45·**	999 925 016 706 876 776	016 631 893 482	$\bar{1}$.4666 0.0861
g	$\bar{2}2$	$\bar{5}0$ 30	62 11	988 741 027 769 980 351	016 510 008 120	$\bar{1}$.4625 1.2056

Berechnung und Ausgleich von x'_0; $p'_0 \sin\nu$ aus den $x'y'$. Wir fassen die Werte von gleichem p zu je einer Gruppe zusammen und berechnen nach folgendem **Schema:**

Tabelle V. Schema u. Beispiel. Berechnung von $x'_0 \cdot p'_0 \sin \nu$.

Gruppe	Buchst.	Symbol	Zahl der Werthe	p	$x' = x'_0 + pp'_0 \sin \nu$		$x'_0 = 0.5012$ eingesetzt
	P	0	14	0	0.5010		
I	n	$0\bar{2}$	7	0	0.5007	Mittel: $0.5009 = x'_0$	
	e	02	1	0	(0.4997)		
	p	$\bar{1}1$	13	$\bar{1}$	$\bar{0}.4826$		
II	o	$\bar{1}$	11	$\bar{1}$	$\bar{0}.4791$	Mittel: $\bar{0}.4809\cdot = x'_0 - p'_0 \sin \nu$	$0.9821\cdot = p'_0 \sin \nu$
	η	$\bar{1}3$	7	$\bar{1}$	$\bar{0}.4808$		
III	y	$\bar{2}0$	8	$\bar{2}$	$\bar{1}.4666$	Mittel: $\bar{1}.4659 = x'_0 - 2p'_0 \sin \nu$	$1.9671 = 2p'_0 \sin \nu$
	g	$\bar{2}2$	4	$\bar{2}$	$\bar{1}.4625$		

Aus Gruppe I berechnet sich $x'_0 = 0.5009$ }
- — II. III — — - $= 0.5040$ }

Der Wert aus I ist der bessere. Das zeigt sich in der Übereinstimmung der Werte aus P und n. Der nicht so sichere aus e sucht ihn herabzuziehen. Es erscheint daher nicht richtig, ihn durch den aus II. III wesentlich heraufzusetzen. Als **bester Wert** erschien:

$$x'_0 = \mathbf{0.5012}.$$

Dies eingesetzt gibt aus II: $p'_0 \sin \nu = 0.9821\cdot$ }
- — - - III: - - - $= 0.9835\cdot$ }

Dem Wert aus II wurde das grössere Gewicht beigelegt. Es erschien als

bester Wert $p'_0 \sin \nu = \mathbf{0.9826}$.

Berechnung von y'_0; q'_0 und $p'_0 \cos \nu$. Wir fassen wieder die Werte mit gleichem p zu je einer Gruppe zusammen und rechnen nach folgendem **Schema** (siehe Tabelle VI S. 41).

Berechnung von q'_0.

Aus P und n folgt: $q'_0 = 0.5607\cdot$
- $P\eta y$ folgt: $q'_0 = 0.5609$
- po folgt: $q'_0 = 0.5609$

Es erschien als:

Bester Wert: $q'_0 = \mathbf{0.5608}$.

Tabelle VI. Schema u. Beispiel. Berechnung von $y'_0, q'_0, p'_0 \cos \nu$.

Gruppe	Buchst.	Symbol	p	Zahl der Werthe	$y' = y'_0 + q q'_0 + p p'_0 \cos \nu$	$q'_0 = 0.5608\cdot$ eingesetzt	$y'_0 = 0.0705$ eingesetzt
I	P	0	0	14	**0.0704** $= y'_0$	$0.0704 = y'_0$	
	n	$0\bar{2}$	0	7	**$\bar{1}$.0511** $= y'_0 - 2q'_0$	$0.0706 = y'_0$	
	e	02	0	1	$(1.1935 = y'_0 + 2q'_0)$	$(0.0718 = y'_0)$	
II	p	$\bar{1}1$	$\bar{1}$	13	$0.6410 = y'_0 + q'_0 - p'_0 \cos \nu$	$0.0801\cdot = y'_0 - p'_0 \cos \nu$	$\bar{0}.0096\cdot = p'_0 \cos \nu$
	o	$\bar{1}$	$\bar{1}$	11	$\bar{0}.4808 = y'_0 - q'_0 - p'_0 \cos \nu$	$0.0800\cdot = y'_0 - p'_0 \cos \nu$	$\bar{0}.0095\cdot = p'_0 \cos \nu$
	η	13	$\bar{1}$	7	**$\bar{1}$.6045** $= y'_0 - 3q'_0 - p'_0 \cos \nu$	$0.0780\cdot = y'_0 - p'_0 \cos \nu$	$\bar{0}.0075\cdot = p'_0 \cos \nu$
III	y	$\bar{2}0$	$\bar{2}$	8	**0.0861** $= y'_0 + 0 - 2p'_0 \cos \nu$	$0.0861 = y'_0 - 2p'_0 \cos \nu$	$\bar{0}.0078 = p'_0 \cos \nu$
	g	$\bar{2}2$	$\bar{2}$	4	$1.2056 = y'_0 + 2q'_0 - 2p'_0 \cos \nu$	$0.0839 = y'_0 - 2p'_0 \cos \nu$	$\bar{0}.0067 = p'_0 \cos \nu$

Berechnung von y'_0.

Aus Pn folgt: $y'_0 = 0.0705$ }
" ηy folgt: $y'_0 = 0.0700$ }
" poy folgt: $y'_0 = 0.0741$

Es erschien als:

Bester Wert: $y'_0 = 0.0705$

Berechnung von $p'_0 \cos \nu$.

Aus ηy folgt: $p'_0 \cos \nu = \bar{0}.0076$
Mittel aus allen: $p'_0 \cos \nu = \bar{0}.0082\cdot$

Es erschien als:

Bester Wert: $p'_0 \cos \nu = \bar{0}.0079\cdot$

Zusammenstellung der Elemente. Wir haben jetzt die fünf Elemente in der ersten Form

$x'_0 = 0.5012$	$q'_0 = 0.5608\cdot$	$p'_0 \sin \nu = 0.9826$
$y'_0 = 0.0705$	$h = 1$	$p'_0 \cos \nu = 0.\bar{0}079$

Nun ist das Problem der Elementbestimmung gelöst, die Ausgleichung vollzogen. Es bleibt noch die **Umrechnung der Elemente** in andere Formen. Dies geschieht in der in Zeitschr. Kryst. 1905. **41.** 85 flg. angegebenen Weise. Es berechnen sich:

Elemente der Projektion	Polar-Elemente		Linear-Elemente	
$x'_0 = 0.5012$	$p_0 = 0.8767$	$x_0 = 0.4472$	$a_0 = 1.1384$	$a = 0.6367$
$y'_0 = 0.0705$	$q_0 = 0.5004$	$y_0 = 0.0629$	$b_0 = 1.7880$	$b = 1$
$p'_0 = 0.9826\cdot$	$r_0 = 1$	$d = 0.4516$	$c_0 = 1$	$c = 0.5593$
$q'_0 = 0.5608\cdot$	$\lambda = 86°24'$	$h = 0.8922$	$\alpha = 94°15'\cdot$	
$\nu = 90°28'$	$\mu = 63°28'$		$\beta = 116°37'\cdot$	
$h = 1$	$\nu = 90°28'$		$\gamma = 87°41'$	

Diese Elemente können derzeit als die best gesicherten gelten. Sie kommen den von Brezina nach Rath berechneten nahe; weichen dagegen stark ab von den in dem Index (**2.** 19) und den Winkeltabellen nach Schuster gegebenen Elementen. Diese letzteren sind also zu beseitigen.

Da durch die vorliegenden Untersuchungen das Formenverzeichnis des Albit sich wesentlich verändert hat, desgleichen die Elemente verbessert sind, erschien es richtig, eine neue Winkeltabelle auszurechnen. Dieselbe ist im folgenden gegeben.

Sie wurde in zwei Teile geteilt:

Sichere Formen

Unsichere Formen.

Letztere sind von Wert, um dem Leser die eigne Kritik über schwankende Formen zu erleichtern. Dagegen wurden die ganz unsicheren die unrichtigen Formen weggelassen.

Elemente.

$p_0 = 0.8767$	$\lambda = 86°42'$	$a = 0.6367$	$\alpha = 94°15'$	$x_0 = 0.4472$	$d = 0.4516$
$q_0 = 0.5004$	$\mu = 63\ 28$	$b = 1$	$\beta = 116\ 37·$	$y_0 = 0.0629$	$\delta = 81°59·'$
$r_0 = 1$	$\nu = 90\ 28$	$c = 0.5593$	$\gamma = 87\ 41$	$h = 0.8922$	

Winkeltabelle. **Sichere Formen.**

No.	Buchst.	Symbol	Miller	φ	ρ	ξ_0	η_0	ξ	η	x' (Prismen) $(x:y)$	y'	$d' = \operatorname{tg}\rho$
1	P	0	001	81°59'·	26°51'	26°37'·	4°02'	26°34'	3°36'·	0.5012	0.0705	0.5061·
2	M	0∞	010	0 00	90 00	0 00	90 00	0 00	90 00	0	∞	∞
3	h	$\infty 0$	100	90 28	"	90 00	"	89 32	0 28	1.2348	"	"
4	ζ	$\infty 5$	150	19 21·	"	"	"	19 21·	80 38·	0.3514	"	"
5	f	$\infty 3$	130	30 24	"	"	"	30 24	59 36	0.5868	"	"
6	Z	$\infty 2$	120	41 25	"	"	"	41 25	48 35	0.8822	"	"
7	K	$\infty\frac{5}{3}$	350	46 40·	"	"	"	46 40·	43 19·	1.0602	"	"
8	T	∞	110	60 38	"	"	"	60 38	29 22	1.7772	"	"
9	l	$\infty\bar{\infty}$	$1\bar{1}0$	120 04	"	"	"	59 56	$\overline{30}$ 04	$\bar{1}.7274$	"	"
10	a	$\infty\bar{2}$	$1\bar{2}0$	138 59	"	"	"	41 01	$\overline{48}$ 59	$\bar{0}.8698$	"	"
11	z	$\infty\bar{3}$	$1\bar{3}0$	149 50	"	"	"	30 10	$\overline{59}$ 50	$\bar{0}.5812$	"	"
12	L	$\infty\bar{5}$	$1\bar{5}0$	160 44·	"	"	"	19 15·	$\overline{70}$ 44·	$\bar{0}.3494$	"	"
13	e	02	021	22 48	52 18·	26 37·	50 00·	17 51	46 49·	0.5012	1.1922	1.2933
14	n	$0\bar{2}$	$0\bar{2}1$	154 30·	49 21	"	$\overline{46}$ 26	19 03·	$\overline{43}$ 13·	"	$\bar{1}.0512$	1.1645
15	ϑ	$0\bar{4}$	$0\bar{4}1$	167 00·	65 51	"	$\overline{65}$ 17·	11 50	$\overline{62}$ 45·	"	$\bar{2}.1729$	2.2300
16	x	$\bar{1}0$	$\bar{1}01$	$\overline{80}$ 44	26 00	25 42·	4 29·	$\overline{25}$ 38	4 02·	$\bar{0}.4814$	0.0785	0.4877
17	r	$\frac{\bar{4}}{3}0$	$\bar{4}03$	$\overline{84}$ 16	39 06·	$\overline{38}$ 58	4 38·	$\overline{38}$ 52·	3 36·	$\bar{0}.8089$	0.0812	0.8130
18	y	$\bar{2}0$	$\bar{2}01$	$\overline{86}$ 37	55 42·	$\overline{55}$ 40	4 56·	$\overline{55}$ 34	2 47·	$\bar{1}.4640$	0.0865	1.4666
19	W	1	111	67 13	58 09	56 01·	31 56·	51 33	19 12·	1.4839	0.6233	1.6095
20	Γ	$\frac{\bar{1}}{3}\frac{1}{3}$	$\bar{1}13$	33 44	17 22	9 51·	14 36	9 32·	14 22·	0.1737	0.2601	0.3128
21	γ	$\frac{\bar{1}}{2}\frac{1}{2}$	$\bar{1}12$	1 36	19 33	0 34	19 32·	0 32	19 32·	0.0099	0.3549	0.3551
22	p	$\bar{1}1$	$\bar{1}11$	$\overline{36}$ 58·	38 40·	$\overline{25}$ 42·	32 35·	$\overline{22}$ 04·	29 57	$\bar{0}.4814$	0.6394	0.8003
23	Λ	$\frac{\bar{3}}{2}\frac{3}{2}$	$\bar{3}32$	$\overline{46}$ 28·	53 18	$\overline{44}$ 12·	42 44	$\overline{35}$ 32·	33 31	$\bar{0}.9726$	0.9238	1.3414
24	g	$\bar{2}2$	$\bar{2}21$	$\overline{50}$ 29·	62 12·	$\overline{55}$ 40	50 21·	$\overline{43}$ 02	34 15	$\bar{1}.4640$	1.2071	1.8975

No.	Buchst.	Symbol	Miller	φ	ρ	ξ_0	η_0	ξ	η	x' (Prismen) $(x ; y)$	y'	$d' = \operatorname{tg} \rho$
25	δ	$\frac{\bar{1}}{2}$	$\bar{1}\bar{1}2$	177°14′·	11°39′	0°34′	$\overline{11}$°38′	0°33′·	$\overline{11}$°38′	0.0099	$\bar{0}$.2059	0.2061
26	o	$\bar{1}$	$\bar{1}\bar{1}\bar{1}$	$\overline{135}$ 03·	34 16·	$\overline{25}$ 42·	$\overline{25}$ 45	$\overline{23}$ 26·	$\overline{23}$ 29·	$\bar{0}$.4814	$\bar{0}$.4824	0.6815
27	σ	$\frac{\bar{4}}{3}$	$\bar{4}\bar{4}3$	$\overline{129}$ 29·	46 21	$\overline{38}$ 58	$\overline{33}$ 41	$\overline{33}$ 56·	$\overline{27}$ 23·	$\bar{0}$.8089	$\bar{0}$.6665	1.0481
28	λ	$\frac{\bar{3}}{2}$	$\bar{3}\bar{3}2$	$\overline{127}$ 55	50 58·	44 12·	$\overline{37}$ 11·	$\overline{37}$ 46	$\overline{28}$ 32·	$\bar{0}$.9726	$\bar{0}$.7588	1.2336
29	u	$\bar{2}$	$\bar{2}\bar{2}1$	$\overline{125}$ 16	60 51	$\overline{55}$ 40	$\overline{45}$ 59·	$\overline{45}$ 29·	$\overline{30}$ 17	$\bar{1}$.4640	$\bar{1}$.0352	1.7930
30	η	13	131	$\overline{163}$ 17	59 08·	$\overline{25}$ 42·	$\overline{58}$ 02·	$\overline{14}$ 17·	$\overline{55}$ 18	$\bar{0}$.4814	$\bar{1}$.6029	1.6736
31	ξ	$\bar{1}5$	$\bar{1}51$	$\overline{169}$ 59	70 08	"	$\overline{69}$ 51	$\bar{9}$ 25	$\overline{67}$ 51	"	$\bar{2}$.7257	2.7679
32	φ	$\bar{2}1$	$\bar{2}11$	$\overline{66}$ 08·	58 00·	$\overline{55}$ 40	32 55	$\overline{50}$ 52	20 03·	$\bar{1}$.4640	0.6474	1.6008
33	Y	$\bar{3}1$	$\bar{3}11$	$\overline{75}$ 00	68 27·	$\overline{67}$ 46	33 14·	$\overline{63}$ 57·	13 55·	$\bar{2}$.4466	0.6554	2.5309
34	χ	$2\bar{4}$	$2\bar{4}1$	$\overline{145}$ 50	69 01	$\overline{55}$ 40	65 07·	$\overline{31}$ 37·	$\overline{50}$ 35	$\bar{1}$.4640	$\bar{2}$.1569	2.6069
35	τ	$\frac{\bar{1}}{2}\frac{3}{2}$	$\bar{1}32$	179 15·	37 29	0 34	$\overline{37}$ 29	0 27	$\overline{37}$ 29	0.0099	$\bar{0}$.7667	0.7668
36	Q	$\frac{\bar{1}}{2}\frac{5}{2}$	$\bar{1}52$	179 34·	53 02	0 34	53 01	0 20·	$\overline{53}$ 02	0.0099	$\bar{1}$.3287	1.3288
37	ω	$\frac{\bar{3}}{2}\frac{1}{2}$	312	$\overline{69}$ 32·	46 04·	$\overline{44}$ 12·	19 57	$\overline{42}$ 26	14 35	$\bar{0}$.9726	0.3629	1.0381

Unsichere Formen.

No.	Buchst.	Symbol	Miller	φ	ρ	ξ_0	η_0	ξ	η	x' (Prismen) $(x : y)$	y'	$d' = \operatorname{tg} \rho$
—	F	$\infty\frac{\bar{3}}{2}$	$2\bar{3}0$	130°50′	90°00′	90°00′	90°00′	49°10′	40°50′	$\bar{1}$.1571	∞	∞
—	Ξ	$0\bar{5}$	$0\bar{5}1$	169 36.	70 12·	26 37·	$\overline{69}$ 54·	9 46	$\overline{67}$ 44·	0.5012	$\bar{2}$.7338	2.7794
—	⅃	$\frac{\bar{4}}{3}\frac{4}{3}$	$\bar{4}43$	$\overline{44}$ 18	49 11·	$\overline{38}$ 58	39 39·	$\overline{31}$ 54·	32 48·	$\bar{0}$.8089	0.8290	1.1583
—	π	$\frac{\bar{6}}{5}$	$\bar{6}65$	$\overline{131}$ 10·	42 00·	$\overline{34}$ 08	$\overline{30}$ 40	$\overline{30}$ 15·	$\overline{26}$ 08·	$\bar{0}$.6779	$\bar{0}$.5929	0.9006
—	S	$\bar{1}8$	$\bar{1}81$	$\bar{6}$ 01	77 42·	$\overline{25}$ 42·	77 38·	$\overline{55}$ 53	76 20	$\bar{0}$.4814	4.5654	4.5907
—	X	$\bar{2}9$	$\bar{2}91$	$\overline{15}$ 55	79 23·	$\overline{55}$ 40	78 58·	$\overline{15}$ 38	70 56·	$\bar{1}$.4640	5.1342	5.3390

Folgende Formen wurden in die Winkeltabelle **nicht aufgenommen**. Dieselben sind ganz unsicher oder durch ein Versehen in das Formenverzeichnis gekommen, oder endlich als Vicinale angesehen worden.

3∞	$\frac{4}{3}\infty$	$\infty\frac{5}{4}$	$\infty\frac{7}{2}$	$3\bar{\infty}$	$\frac{5}{3}\bar{\infty}$	$\frac{4}{3}\bar{\infty}$	$\infty\frac{\bar{5}}{4}$	$\infty\bar{4}$	$\infty\overline{20}$	$0\frac{1}{2}$
310	430	450	270	$3\bar{1}0$	$5\bar{3}0$	$4\bar{3}0$	$4\bar{5}0$	$1\bar{4}0$	$1.\overline{20}.0$	012
$0\frac{\bar{1}}{2}$	$\frac{4}{3}0$	$\frac{\bar{3}}{4}0$	$\frac{\bar{5}}{4}0$	$1\bar{1}$	$\frac{5}{2}\frac{\bar{5}}{2}$	$\bar{1}\frac{5}{7}$	$\bar{1}.20$	$\bar{1}\frac{\bar{1}}{4}$	$\bar{1}\frac{\bar{9}}{7}$	15.16
$0\bar{1}2$	403	$\bar{3}04$	$\bar{5}04$	$1\bar{1}1$	$5\bar{5}2$	$\bar{7}57$	$\bar{1}.20.1$	$\overline{41}4$	$\overline{79}7$	15.16.1

Beschreibung der einzelnen Krystalle.

Das Material teilt sich nach Fundort und Ausbildung in vier Gruppen:

1. Albit von Siorarsuit, sehr flächenreich.
2. Albit von Kangerdluarsuk, flächenärmer.
3. Albit von Narsarsuk flächenärmer. Aufgewachsen auf Orthoklas.
4. Albit von Nunasarnausak (nur ein kleines Handstück).

Krystall 1 von Siorarsuit. (Taf. I Fig. 1). Wasserhell. Dimensionen 1.3 : 0.6 : 09mm. Der einzige einfache d. h. nicht verzwillingte Krystall, der sich trotz aufmerksamen Suchens in dem reichen Material finden liess. An beiden Enden ausgebildet.

Combination:

Buchst.:	P	M	ζ	f	$\overset{*}{K}$	T	l	z	n	y	p	o	$\ddot{\eta}$	γ
Symbol:	0	0∞	$\infty 5$	$\infty 3$	$\infty\frac{5}{3}$	∞	$\infty\bar{\infty}$	$\infty\bar{3}$	$0\bar{2}$	$\bar{2}0$	$\bar{1}1$	$\bar{1}$	$\overline{13}$	$\frac{\bar{1}}{2}\frac{1}{2}$

Das vorzüglich ausgebildete Kryställchen brachte die **neue Form** $K = \infty\frac{5}{3}$ **(350)** mit zwei schmalen, doch gut spiegelnden Flächen.

Die Form zeigte sich weiterhin noch an 4 Krystallen, im ganzen mit 8 Flächen. Sie ist als typische Form gesichert. (vgl. S. 19 und 23).

Ferner brachte das Kryställchen die Bestätigung der bisher unsicheren Form η = **$\bar{1}$3 (1$\bar{3}$1)** (vgl. S. 27) mit zwei kleinen glänzenden Flächen mit einfachem Reflex.

Gemessen:	$\varphi\rho = \bar{1}63°21'$; 90°-	berechnet: $\varphi\rho = \bar{1}63°17'$; 90°-
	$\bar{1}63\ 28$; "	

Die Form ist als typisch gesichert. Sie kehrte fast bei jedem von unseren Krystallen wieder und zeigte sich als eine der Hauptformen unserer grönländischen Fundorte.

Es möge hervorgehoben werden, dass die **Ablenkung in der Prismenzone auch hier bei dem einfachen Krystall** gefunden wurde. Es ist anzunehmen, dass versteckte Lamellen nach dem Albitgesetz auch dieses Kryställchen durchsetzen und an den Ablenkungen Schuld sind.

Die Flächen $M = 0\infty$ (010) sind beide vortrefflich ausgebildet, der Reflex vorzüglich, und trotzdem sitzt er nicht an seinem Ort, differiert vielmehr um — 10′ resp. + 24′ von dem aus den Terminalflächen berechneten Ort. Fläche und Gegenfläche sind nicht parallel. Die praktische Folge ist, dass man zum Zwecke einer genauen Ortsbestimmung des 0-Meridians (Berechnung von v_0) die M-Flächen nicht verwenden kann, auch nicht die anderen Prismenflächen, wenn sie noch so gross, glatt und einheitlich reflektierend sind, sondern nur die Terminalflächen.

Theoretisch sind diese Ablenkungen in der Prismenzone von höchstem Interesse. Sie finden sich bei allen von uns untersuchten Krystallen.

Krystall 2 von Kangerdluarsuk (Taf. I Fig. 2). Dimensionen: 2.5 : 1.5 : 3mm. Zwilling nach dem Albitgesetz. Beide Individuen im Gleichgewicht.

Combination:

Buchst.:	P	M	ζ	f	$\overset{*}{K}$	T	l	$\ddot{a}$	z	n	p	o
Symbol:	0	0∞	$\infty 5$	$\infty 3$	$\infty\frac{5}{3}$	∞	$\infty\bar{\infty}$	$\infty\bar{2}$	$\infty\bar{3}$	$0\bar{2}$	$\bar{1}1$	$\bar{1}$

Die Ausbildung der Flächen ist sehr gut. Die Prismenflächen zeigen trotz vortrefflicher Ausbildung die beim Albit gewohnten Ablenkungen und zwar:

Ablenkungen:

M um $-18'$; $-30'$;	l um $+11'$; $-20'$;	T um $-17'$; $+2'$;
	f - -6; -30;	ζ - $+14$; -6.

Die Prismenflächen sind gestreift. Ausser den typischen Flächen zeigen sich Vicinale in der Prismenzone. An dem Krystall wurde die neue Form $K = \infty\frac{5}{3}(350)$ wiedergefunden. Ausserdem zeigte sich:

$a = \infty\bar{2}(1\bar{2}0)$ als schmale gut glänzende Fläche (vgl. S. 23) mit gutem Reflex. Von Klockmann zuerst angegeben, durch Viola bestätigt; konnte an 7 Krystallen, öfters von ziemlicher Breite, mit Sicherheit nachgewiesen werden.

Krystall 3 von Siorarsuit (Taf. 2 Fig. 3) von derselben Stufe, wie Krystall 1. Farblos, durchsichtig, etwas trüb. Dimensionen: 0.8 : 0.6 : 1.7^{mm}. Zwilling nach dem Albitgesetz. Der linke Krystall (im Bild farblos), klein und unvollkommen ausgebildet im Verhältnis zum rechten (blau). Das Verhältnis beider ist aus dem Kopfbild (Fig. 3[a]) ersichtlich.

Combination:

Rechter Krystall:	P	M	ζ	f	T	l	z	$\ddot{L}$	n	$\ddot{W}$	p	o	$\ddot{\eta}$
Linker — :	·	M	ζ	f	T	l	z	·	·	·	p	·	·
Symbol :	0	0∞	$\infty 5$	$\infty 3$	∞	$\infty\bar{\infty}$	$\infty\bar{3}$	$\infty\bar{5}$	$0\bar{2}$	1	$\bar{1}1$	$\bar{1}$	$\overline{13}$

Die Prismen mit dem Pinakoid zeigen wieder ihre Ablenkung trotz guter Ausbildung:

Ablenkungen:

M um $-33'$; $-9'$;	ζ um $+5'$; $+21'$;	f um $+4'$; $-35'$
T - -18; -8;	l - -5; -16;	z - -7; -26.

Der Krystall zeigte die von Jeremejew und Bowman angegebene seltene Form $\boldsymbol{W} = \mathbf{1(111)}$; (vgl. S. 25). Dieselbe erscheint als schmaler leuchtender Streif in Zone *PT*. Sie liess sich noch an Krystall 15 nachweisen und ist unter die sicheren Formen einzureihen.

L $= \infty\bar{5}\ (1\bar{5}0)$; von Klockmann gegeben, von Glinka und Viola wieder angeführt, tritt an 10 von unseren Krystallen auf. An Krystall 3 als schmaler Streif, wohl begrenzt und mit sehr gutem Reflex. Die Form ist gesichert (vgl. S. 24).

$\eta = \overline{13}\ (\overline{131})$ erscheint hier gross und vorzüglich ausgebildet.

Krystall 4. (Taf. 2 Fig. 4). Wasserheller Krystall von Narsarsuk. Zwilling nach dem Albitgesetz. An beiden Enden ausgebildet. Dimensionen: 2 : 1.3 : 3mm. Beide Individuen im Gleichgewicht.

Combination:

Buchst.:	P	M	$\ddot{h}$	f	T	l	z	$\ddot{L}$	e	n	$\overset{*}{\vartheta}$	y	p	$\ddot{\eta}$
Symbol:	0	0∞	$\infty 0$	$\infty 3$	∞	$\infty\bar{\infty}$	$\infty\bar{3}$	$\infty\bar{5}$	02	$0\bar{2}$	$0\bar{4}$	$\bar{2}0$	$\bar{1}1$	$\overline{13}$

Die Prismenzone mit verhältnismässig kleinen Abweichungen; nur bis 8'.

h $= \infty\mathbf{0}$ **(100)** bisher nur von Jeremejew angegeben (vgl. S. 23) erscheint als äusserst feiner Streifen mit sehr schwachem, doch einstellbarem Reflex. Die Form fand sich noch an weiteren 6 Krystallen, jedesmal als sehr feiner Streifen. Sie ist schwach aber sicher.

$L = \infty\bar{5}\ (1\bar{5}0)$ und $\eta = \overline{13}\ (\overline{131})$, schon an Krystall 1 und 3 gefunden, erscheinen hier wieder, η unten als herrschende Fläche.

$\vartheta = \mathbf{0\bar{4}\ (0\bar{4}1)}$ ist **neu** für Albit. Nur an diesem Krystall gefunden, mit einer kleinen wohlbegrenzten Fläche. Sie ist gesichert und passt gut in die harmonische Reihe (vgl. S. 19 u. 24).

$e = 02\ (021)$ gehört zu den seltensten und schwächsten Flächen unserer Grönländer Albite. Sie ist sehr klein und wurde nur noch an Krystall 6 mit einer kleinen Fläche nachgewiesen.

Krystall 5 (Taf. 3 Fig. 5). Wasserheller Krystall von Siorarsuit. Vertreter eines für diesen Fundort häufigen, geradezu charakteristischen Typus. Dimensionen: 1.2 : 0.5 : 2^{mm}. Dem Bau nach entspricht der Krystall den von G. Rose (Pogg. Ann. 1865. **125**. 457. Taf. 4) beschriebenen Roc-tourné-Zwillingen: «Er ist, wie es Naumann ausdrückt (Mineralogie 1877. 643) ein Kontaktzwilling in bezug auf den brachydiagonalen, Durchkreuzungszwilling in bezug auf den makrodiagonalen Hauptschnitt». Der Habitus ist jedoch ein anderer. Dort herrschen *MPy*; hier $zfnp\ddot{\eta}$.

Die Kryställchen sind zart, säulenförmig gestreckt nach den Prismen. Selten an beiden Enden ausgebildet. Sie stehen in grösserer Zahl, wie Kornhalme nebeneinander. Eine Abart des selben Typus zeigt Krystall 8, eine andere Krystall 9. Bei den letztern ist *M* grösser als bei Krystall 5.

Combination:

P	M	f	l	z	n	x	p	γ	δ	$\ddot{\eta}$
0	0∞	$\infty 3$	$\infty\bar{\infty}$	$\infty\bar{3}$	$0\bar{2}$	$\bar{1}0$	$\bar{1}1$	$\frac{\bar{1}}{2}\frac{1}{2}$	$\frac{\bar{1}}{2}$	$\overline{13}$

Die Ablenkungen in der Prismenzone betrugen:

Bei M:	$+10'$	und	$-1'$;	bei z:	$+9'$	und	$+8'$;
	$+10$	—	$+5$;		$+24$	—	-30;
bei l:	$+4'$	und	$+38'$;	bei f:	$-12'$	und	$+2'$;
	$+7$	—	$+19$;		-34	—	-4.

Eine Gesetzmässigkeit in diesen Ablenkungen konnte bisher nicht gefunden werden. Nur das scheint sich zu wiederholen, dass je schmäler das *M* ist, desto kleiner seine Ablenkungen.

Krystall 6 (Taf. 3 Fig. 6). Wasserhell von Siorarsuit. An beiden Enden gut entwickelt. Dimensionen: 1.1 : 0.5 : 1.3^{mm}. Zwilling nach dem Albitgesetz. Er ist der formenreichste von allen gemessenen Krystallen von vorzüglicher Ausbildung und ungewöhnlichem Reichtum in den Terminalflächen.

Combination:

P	M	$\ddot{h}$	ζ	f	Z	T	l	$\ddot{a}$	z	$\ddot{L}$	e	n
0	0∞	$\infty 0$	$\infty 5$	$\infty 3$	$\infty 2$	∞	$\infty\bar{\infty}$	$\infty\bar{2}$	$\infty 3$	$\infty 5$	02	$0\bar{2}$
x	y	γ	p	∂	o	$\ddot{\eta}$	$\overset{*}{\xi}$	$\overset{*}{\varphi}$	g	$\overset{*?}{X}$	$\overset{*}{\omega}$	
$\bar{1}0$	$\bar{2}0$	$\frac{\bar{1}}{2}\frac{1}{2}$	$\bar{1}1$	$\frac{\bar{1}}{2}$	$\bar{1}$	$\overline{13}$	$\overline{15}$	$\bar{2}1$	$\bar{2}2$	$\bar{2}9$	$\frac{\bar{3}}{2}\frac{1}{2}$	

ξ = **$\overline{15}$ ($\overline{15}1$)** für Albit **neu** fand sich nur an diesem Krystall, ist aber auf grund der guten Ausbildung und der Übereinstimmung von Messung und Rechnung gesichert (vgl. S. 27). Ihre Zahl passt gut in die Reihe (vgl. S. 20).

φ = **$\bar{2}1$ ($\bar{2}11$)** für Albit **neu**. Schmal, 2 Flächen mit gutem Reflex. Gesichert (vgl. S. 21 u. 26).

?X = **$\bar{2}9$ ($\bar{2}91$)**, für Albit **neu**. 2 schmale Flächen mit gutem Reflex. Messung und Rechnung stimmen gut (S. 26), aber die Symbolzahl ist so auffallend (vgl. S. 21), dass die Form vielleicht als Vicinale anzusehen ist. Sie wurde deshalb mit ? versehen und in der Winkeltabelle unter die unsicheren Formen gestellt.

ω = **$\frac{\bar{3}}{2}\frac{1}{2}$ ($\bar{3}12$)**, für Albit **neu**. Schmale kleine Fläche in Zone yp. Bei der guten Übereinstimmung von Messung und Rechnung gesichert (S. 26). Sie passt gut in das Formensystem des Albit (S. 22).

$Z = \infty 2\ (120)$
$a = \infty\bar{2}\ (1\bar{2}0)$
$L = \infty\bar{5}\ (1\bar{5}0)$
$\eta = \overline{13}\ (\overline{13}1)$
} bedurften der Bestätigung. Sie sind an unseren Krystallen nicht selten.

Krystall 7 (Taf. 3 Fig. 7). Wasserhelles Bruchstück von Kangerdluarsuk. Dimensionen: 1.5 : 1.2 : 1mm. Ein gleichseitig ausgebildeter Zwilling nach dem Albitgesetz, der Vertreter eines mehrfach gefundenen Typus, charakterisiert durch die grossen und gut ausgebildeten o neben den grossen P, daneben schmal $\ddot{n}$ und η.

Combination:

P	M	ζ	f	l	z	n	o	$\ddot{\eta}$
0	0∞	$\infty 5$	$\infty 3$	$\infty\bar{\infty}$	$\infty\bar{3}$	$0\bar{2}$	$\bar{1}$	$\overline{13}$

Krystall 8 (Taf. 3 Fig. 8). Wasserhell, von Siorarsuit. Dimensionen: 0.8 : 0.4 : 0.8^{mm}. Ähnlich Krystall 5 (vgl. S. 49) und wie dieser ähnlich gebaut mit den Roc-tourné Zwillingen. M stärker entwickelt. Das hintere Krystallpaar von dem vorderen teilweise umschlossen.

Combination:

P	M	ζ	f	l	z	n	p	γ	δ	$\overset{*}{Q}$
0	0∞	$\infty 5$	$\infty 3$	$\infty\bar{\infty}$	$\infty\bar{3}$	$0\bar{2}$	$\bar{1}1$	$\frac{\bar{1}}{2}\frac{1}{2}$	$\frac{\bar{1}}{2}$	$\frac{\bar{1}}{2}\frac{\bar{5}}{2}$

$Q = \frac{\bar{1}}{2}\frac{\bar{5}}{2}(\overline{152})$, für Albit **neu**, wurde nur an diesem Krystall mit einer Fläche gefunden. Messung und Reflex stimmen gut (vgl. S. 26), auch passt die Form gut in die Zahlenreihe (vgl. S. 22). Sie ist als gesichert anzusehen.

Krystall 9 (Taf. 3 Fig. 9). Wasserhell, von Siorarsuit. Dimensionen: 1.5 : 1 : 1.3^{mm}. Ähnlich Krystall 8. Das kleinere, hier nach vorn gezeichnete Krystallpaar ist von dem grösseren fast ganz umschlossen.

Combination:

P	M	ζ	f	$\overset{*}{K}$	T	l	z	n	y	p	o	γ
0	0∞	$\infty 5$	$\infty 3$	$\infty\frac{5}{3}$	∞	$\infty\bar{\infty}$	$\infty\bar{3}$	$0\bar{2}$	$\bar{2}0$	$\bar{1}1$	$\bar{1}$	$\frac{\bar{1}}{2}\frac{1}{2}$

Der Krystall zeigt wieder die bereits an Krystall 1 und 2 gefundene neue Form $K = \infty\frac{5}{3}$. Die Prismenflächen sind wieder abgelenkt z. B. T um $+24'$, $-40'$; $+2'$, $-2'$. M ist in zwei Facetten geteilt.

Krystall 10 von Narsarsuk (Taf. 4 Fig. 10) ist eine interessante Verwachsung von Albit mit Orthoklas. Auf einem grossen Karlsbader Zwilling von grauweissem, trübem, nicht ganz frischem Orthoklas (30 : 30 : 40^{mm}) sitzen zwei grosse Albitkrystalle. Einer auf jedem der beiden Orthoklas Individuen. Der Albit ist klar und frisch von blass-rosa-violetter Farbe. Die Figur gibt ein etwas schematisches Bild der Anordnung und relativen Grössen.

Der linke Albitkrystall ist ein Zwilling (20 : 9 : 18^{mm}) nach dem Albitgesetz, der rechte ein Vielling nach dem gleichen Gesetz (18 : 9 : 12^{mm}). Beide Albite sind nach dem Karlsbader Gesetz gegeneinander gestellt, verdanken jedoch diese Stellung nicht sich selbst, sondern dem Orthoklas, auf dem sie orientiert sitzen. Fortsetzungen des linken Krystalls überwachsen die Prismenflächen und das Pinakoid *M* des Orthoklas.

Der linke Krystall zeigt die Kombination: $P\ M\ \zeta\ \ddot{Z}\ T\ l\ z\ n\ x\ \delta\ o\ \ddot{\eta}$
- rechte — - - — $P\ M\ \zeta\ f\ T\ l\ z\ \cdot\ x\ p\ o.$

Krystall 11 (Taf. 4 Fig. 11). Rötlichvioletter durchsichtiger Vielling nach dem Albitgesetz von Narsarsuk. Von gleichem Typus wie Krystall 10. Dimensionen: 3 : 1.8 : 3^{mm}.

Combination:

P	M	ζ	f	T	l	$\ddot{a}$	z	$\ddot{L}$	x	y	p	γ	g	$\overset{*}{\Gamma}$	δ	u	$\ddot{\eta}$
0	0∞	$\infty 5$	$\infty 3$	∞	$\infty\bar{\infty}$	$\infty\bar{2}$	$\infty\bar{3}$	$\infty\bar{5}$	$\bar{1}0$	$\bar{2}0$	$\bar{1}1$	$\frac{\bar{1}}{2}\frac{1}{2}$	$\bar{2}2$	$\frac{\bar{1}}{3}\frac{1}{3}$	$\frac{\bar{1}}{2}$	$\bar{2}$	$\overline{13}$

An ihm zeigten sich 6 nach dem Albitgesetz verwachsene Scheiben in der ungefähren relativen Grösse der Figur. Diese Lamellen schwanken in ihrer gegenseitigen Orientierung um etwa $^1/_2{}^\circ$. Die Ursache der Schwankung bei diesem sehr gut ausgebildeten Krystall dürfte in dem Einfluss des Orthoklas zu suchen sein, auf dem der Albit aufsass und dem er sich bei seinen etwas verschiedenen Elementen nicht genau parallel richten kann.

Die Terminalflächen geben durchweg gute Reflexe, die Prismen zeigen die üblichen Ablenkungen. Interessant an dem Krystall ist die neue Form Γ.

$\Gamma = \frac{\bar{1}1}{33}$ $(\bar{1}13)$ ist vertreten durch eine verhältnismässig grosse ebene Fläche mit sehr gutem Reflex. Messung und Rechnung stimmen gut (vgl. S. 25). Die Form bildet eine hübsche Ergänzung der harmonisch entwickelten Zone: $0 \cdot \frac{\bar{1}1}{33} \cdot \frac{\bar{1}1}{22} \cdot \bar{1}1 \cdot \frac{\bar{4}4}{33} \cdot \bar{2}2 \cdot \bar{\infty}\infty$ (vgl. S. 20).

$u = \bar{2}\,(\overline{22}1)$ ist eine für den Albit seltene Form. Sie zeigte sich bereits oben an Kryst. 6 und noch einmal an unserem Krystall 15.

$\alpha = \infty\bar{2}\,(1\bar{2}0)$, $L = \infty\bar{5}\,(1\bar{5}0)$ und $\eta = \overline{13}\,(\overline{131})$ haben sich auch hier gefunden.

Krystall 12 (Taf. 4 Fig. 12). Wasserheller Vielling nach dem Albitgesetz von Kangerdluarsuk. Dimensionen: 1.2 : 0.6 : 0.5^{mm}. Der Krystall besteht aus zwei ziemlich gleich grossen Individuen in Zwillingsstellung, zwischen denen zwei starke Zwillingslamellen eingeschoben sind. Er ist vom Typus des Krystalls 7.

Combination:

P	M	f	T	l	z	n	o	$\ddot{\eta}$
0	0∞	$\infty 3$	∞	$\infty\bar{\infty}$	$\infty\bar{3}$	$0\bar{2}$	$\bar{1}$	$\overline{13}$

Krystall 13 (Taf. 4 Fig. 13). Wasserhelles Bruchstück von Kangerdluarsuk. Dimensionen: 0.8 : 0.5 : 0.8^{mm}.

Combination:

P	M	$\ddot{h}$	f	T	l	$\ddot{\alpha}$	z	y	p
0	0∞	$\infty 0$	$\infty 3$	∞	$\infty\bar{\infty}$	$\infty\bar{2}$	$\infty\bar{3}$	$\bar{2}0$	$\bar{1}1$

Die Terminalflächen gaben vorzügliche Reflexe. Das Pinakoid M zeigte trotz ausgezeichneten Reflexes eine Ablenkung von $-20'$ und $-40'$ von dem durch die Zonen PP' und pp' angezeigten Ort.

$h = \infty 0\,(100)$ und $\alpha = \infty\bar{2}\,(1\bar{2}0)$ erscheinen als feine Streifen.

Krystall 14 (Taf. 4 Fig. 14). Durchscheinender weisser Krystall von Siorarsuit. Dimensionen: 3 : 1.5 : 2.5mm. Zwilling nach dem Albitgesetz mit zwei eingeschlossenen Zwillingslamellen.

Combination:

P	M	$\ddot{h}$	ζ	f	T	l	z	$\ddot{L}$	y	p	$\overset{*}{\varLambda}$	g	o
0	0∞	$\infty 0$	$\infty 5$	$\infty 3$	∞	$\infty\bar{\infty}$	$\infty\bar{3}$	$\infty\bar{5}$	$\bar{2}0$	$\bar{1}1$	$\frac{\bar{3}}{2}\frac{3}{2}$	$\bar{2}2$	$\bar{1}$

Die **neue Form** $\varLambda = \frac{\bar{3}}{2}\frac{3}{2}$ **(3̄32)** passt gut in die harmonische Reihe der Zone $\bar{p}p$ (vgl. S. 20). Sie wurde nur an diesem Krystall gefunden, ist aber ziemlich breit, eben und gut spiegelnd. Messung und Rechnung stimmen gut (vgl. S. 25).

Krystall 15 (Taf. 4 Fig. 15). Weisser, trüber Krystall oder richtiger Krystallgruppe von Siorarsuit. Dimensionen: 7 : 3.5 : 9mm. Besteht aus vielen Lamellen nach dem Albitgesetz, von denen nur ein Teil in der Figur wiedergegeben ist. Die einzelnen Individuen sind ungleich hoch und nicht ganz eng aneinander geschlossen. Der Reichtum an Formen ist hier sehr gross.

Combination:

P	M	$\ddot{h}$	ζ	f	$\ddot{Z}$	$\overset{*}{K}$	T	l	z	$\ddot{L}$	n	$\overset{*?}{\varXi}$	$\ddot{W}$	p	δ	o	u	$\ddot{\eta}$	$\ddot{\chi}$
0	0∞	$\infty 0$	$\infty 5$	$\infty 3$	$\infty 2$	$\infty\frac{5}{3}$	∞	$\infty\bar{\infty}$	$\infty\bar{3}$	$\infty\bar{5}$	$0\bar{2}$	$0\bar{5}$	1	$\bar{1}1$	$\frac{\bar{1}}{2}$	$\bar{1}$	$\bar{2}$	$\overline{13}$	$\overline{24}$

?$\varXi$ = **0$\bar{5}$ (0$\bar{5}$1)** erschien an 4 Lamellen. Messung und Rechnung stimmen gut, doch war der Reflex verwischt und, da die Zahl in der Reihe etwas compliciert erscheint, wurde die Form als der Bestätigung bedürftig angesehen.

$\ddot{h} = \infty 0\,(100)$; erscheint schmal; $z = \infty 2\,(120)$ tritt mit 3 schmalen aber guten Flächen auf.

$K = \infty\frac{\bar{5}}{3}\,(3\bar{5}0)$ mit 2 schmalen aber gut reflektierenden Flächen; $L = \infty\bar{5}\,(1\bar{5}0)$ mit 2 kleinen sehr gut spiegelnden Flächen.

$W = 1\,(111)$ fand sich mit einer sehr kleinen aber gut bestimmbaren Fläche.

$\chi = \overline{24}\,(\overline{24}1)$ fand sich nur an diesem Krystall als sehr gute kleine Fläche mit gutem Reflex.

Krystall 16 (Taf. 5 Fig. 16) von Siorarsuit. Wasserhell. Dimensionen: 2.5 : 1.5 : 3^{mm}. Es ist ein Zwilling mit eingeschobenen Lamellen. Die Terminalflächen von ganz vortrefflicher Ausbildung; die Prismen, obwohl mit guten Reflexen, mit den üblichen Abweichungen behaftet: M um — 14′ und — 12′; l um — 6′; T um + 5′.

Combination:

P	M	$\ddot{h}$	T	l	$\ddot{a}$	z	$\ddot{L}$	n	γ	p	δ	o	$\ddot{\eta}$
0	0∞	$\infty 0$	∞	$\infty\bar{\infty}$	$\infty\bar{2}$	$\infty\bar{3}$	$\infty\bar{5}$	$0\bar{2}$	$\frac{\bar{1}}{\bar{2}}\frac{1}{\bar{2}}$	$\bar{1}1$	$\frac{\bar{1}}{\bar{2}}$	$\bar{1}$	$\overline{13}$

Krystall 17 (Taf. 5 Fig. 17). Eine interessante Überwachsung von Orthoklas mit Albit von Narsarsuk. Ein einfacher Orthoklas. Krystall ist rundum von einer glasig-wasserhellen, mehrere Millimeter dicken Hülle von Albit umgeschlosseu, so dass der Eindruck eines einheitlichen, grossen Albitkrytsalls entsteht. Dimensionen: 22 : 12 : 20^{mm}. Der Albit gliedert sich oberflächlich in viele parallele Endigungen von Zwillingen nach dem Albitgesetz mit den Terminalflächen $Ppo\eta nxy$. Der umhüllte Orthoklas ist in der Figur durch blaue Farbe angedeutet.

Krystall 18 (Taf. 5 Fig. 18). Von Narsarsuk. Karlsbader Zwilling von Orthoklas; rundum eingehüllt von einem glasig-durchsichtigen Mantel von Albit. Dimensionen: 40 : 20 : 30^{mm}. Der Albit, wieder am Ende in Zwillinge nach dem Albitgesetz aufgelöst, zeigt die Terminalflächen: $Ppo\eta n$. Der eingeschlossene Orthoklas ist in der Figur durch blaue Farbe angedeutet.

Krystall 19 (Taf. 5 Fig. 19). Von Narsarsuk. Ein grosser Manebacher Zwilling von Orthoklas mit orientiertem Albit. Dieser hat sich fast ausschliesslich auf den Prismen aufgesetzt. Dort bildet er aneinandergelegte Tafeln von ungleicher Länge und Dicke in sehr grosser Zahl. Jede Tafel ein Albitzwilling mit eingeschobenen Lamellen. Die Figur giebt diese Tafeln nur im Gröbsten wieder, zeigt aber ihre Anordnung. Auf M hat sich nur eine minimale, vielfach unterbrochene Schicht von Albit abgesetzt, auf P fast gar nichts. In der Figur ist der Orthoklas durch blaue Farbe ausgezeichnet. Dimensionen: 25 : 20 : 23^{mm}.

Krystall 20. Von Nunasarnausak (Taf. 5 Fig. 20). Farblos, wasserhell. Vielling nach dem Albitgesetz. Dimensionen: 1 : 0.4 : 1.2^{mm}.

Combination:

M	ζ	f	$\overset{*}{K}$	T	l	$\ddot{a}$	z	$\ddot{L}$	γ	p	δ	o	$\ddot{\eta}$
0∞	$\infty 5$	$\infty 3$	$\infty\frac{5}{3}$	∞	$\infty\bar{\infty}$	$\infty\bar{2}$	$\infty\bar{3}$	$\infty\bar{5}$	$\frac{\bar{1}}{2}\frac{1}{2}$	$\bar{1}1$	$\frac{\bar{1}}{2}$	$\bar{1}$	$\overline{13}$

Tafelförmig durch starkes Vorherschen von M. Bemerkenswerth ist das Fehlen von P in allen Lamellen. Ausbildung nicht sehr vollkommen, sodass die Messungen zur Elementbestimmung nicht herangezogen werden konnten. Interessant ist das Auftreten der neuen Form K und der seltenen $a L$ sowie das für unsere Grönländer Albite charakteristischen η. Auch an diesem Krystall ist η die am besten ausgebildete, nach M ist sie die grösste Fläche.

Projectionsbilder. Taf. 1 Fig. 21 giebt ein gnomonisches Gesammtbild der gesicherten Formen des Albit. Sie bilden ein einfaches übersichtliches System von pseudo-hexagonaler Anlage. Die 5 an unseren Grönländer Albiten nicht beobachteten Formen $r \lambda \sigma \tau Y$ sind durch leere Ringel kenntlich gemacht.

Taf. 2 Fig. 22 gibt ein gnomonisches Gesammtbild der Formen eines Zwillings nach dem Albitgesetz. An Stelle fast jedes Punktes des einfachen Bildes Fig. 21 ist hier ein Pärchen benachbarter Punkte getreten. So tritt P zu P'; n' zu e u. s. w. Die Abstände in solchen Paaren sind bei den Terminalflächen nicht klein. Sie sind dagegen sehr klein bei den Prismen. Dies dürfte die Ursache der Ablenkungen und Störungen gerade in der Prismenzone sein und es möge die Figur hierzu als Illustration dienen.

Merkwürdig ist in dem Formensystem des Albit die einseitige Entwicklung der Formen nach links und hinten. Die Einseitigkeit wird theilweise compensirt durch die Zwillingsbildung.

Statistik. Die folgende Tabelle S. 58 zeigt die Combinationen der 17 gemessenen Krystalle und gibt dadurch ein Bild von der relativen Häufigkeit der einzelnen Formen. Die den Buchstaben angehängten Ziffern geben die Zahl der Einzelflächen.

Zusammenfassung. Der Resultat der vorliegenden Untersuchung ist etwa folgendes.

1. Das Albit-Vorkommen von Grönland, speziell von den Fundorten Siorarsuit und Kangerdluarsuk hat sich als das formenreichste und vielleicht das best ausgebildete unter den untersuchten Albiten gezeigt. Es hat 32 verschiedene, gut gesicherte Flächenarten geliefert, darunter 8 neue; 7 von früheren Beobachtern angegebene, aber der Bestätigung bedürftige Formen, wurden definitiv gesichert.

Das Formenverzeichnis des Albit umfasst jetzt 37 sichere Formen (darunter 32 von Grönland) und 6 unsichere (darunter 2 von Grönland).

2. Die für den Albit angegebenen Formen wurden einer kritischen Sichtung unterzogen, wobei die Discussion der Zahlenreihen gute Dienste leistete. Neben den unrichtigen und vicinalen wurden auch die unsichern oder der Bestätigung

Combinationen.

Kryst. No.	P	M	$\ddot{h}$	ζ	f	$\ddot{Z}$	$\overset{*}{K}$	T	l	$\ddot{a}$	z	$\ddot{L}$	e	n	$\overset{*}{\vartheta}$	$\overset{*?}{\Xi}$	x	y	$\ddot{W}$	$\overset{*}{\Gamma}$	γ	p	$\overset{*}{\Lambda}$	g	δ	o	u	$\ddot{\eta}$	$\overset{*}{\xi}$	$\overset{*}{\varphi}$	$\overset{..?}{X}$	$\ddot{\chi}$	$\overset{*}{\omega}$	$\overset{*}{Q}$
1	P_2	M_2	..	ζ_1	f_2	..	K_2	T_2	l_2	..	z_2	..	..	n_2	..	..	..	y_2	..	..	γ_2	p_2	..	..	..	o_2	..	η_2	..	..	..	..	..	..
2	P_4	M_2	..	ζ_2	f_2	..	K_2	T_2	l_2	a_2	z_2	..	..	n_1	..	..	..	..	..	..	..	p_1	..	..	..	o_2	..	..	..	..	..	..	..	..
3	P_1	M_3	..	ζ_2	f_3	..	..	T_2	l_3	a_1	z_2	L_2	..	n_1	..	..	..	..	W_1	..	..	p_2	..	..	..	o_1	..	η_1	..	..	..	..	..	..
4	P_4	M_2	h_2	..	f_2	..	..	T_2	l_2	..	z_2	L_2	e_1	n_1	ϑ_1	..	..	y_2	..	..	..	p_4	..	..	..	..	..	η_2	..	..	..	..	..	..
5	P_4	M_4	..	..	f_4	..	..	..	l_4	..	z_4	..	..	n_2	..	..	x_2	..	..	..	γ_1	p_2	..	..	δ_2	..	..	η_2	..	..	..	..	..	..
6	P_2	M_2	h_1	ζ_2	f_1	Z_1	..	T_3	l_3	a_2	z_2	L_2	e_1	n_2	..	..	x_2	y_2	..	..	γ_2	p_4	..	g_2	δ_2	o_4	u_1	η_2	ξ_1	φ_2	X_2	..	ω_2	..
7	P_2	M_2	..	ζ_2	f_2	..	..	..	l_2	..	z_2	..	..	n_2	..	..	..	..	..	..	..	..	..	..	..	o_2	..	..	..	..	..	..	..	..
8	P_3	M_4	..	..	f_4	..	..	T_2	l_2	..	z_2	L_2	..	n_2	..	..	..	..	..	..	γ_2	p_2	..	..	δ_2	..	..	..	..	..	..	..	..	Q_1
9	P_4	M_4	..	ζ_2	f_2	..	K_1	T_5	l_4	..	z_4	..	..	n_2	..	..	..	y_1	..	..	γ_1	p_2	..	..	..	o_2	..	..	..	..	..	..	..	..
10	P_8	M_4	..	ζ_3	f_3	Z_1	..	T_7	l_7	a_1	z_3	L_1	..	n_1	..	..	x_4	..	..	..	..	p_4	..	..	δ_1	o_4	..	η_1	..	..	..	..	..	..
11	P_6	M_3	..	ζ_2	f_3	..	..	T_5	l_4	a_1	z_3	L_2	..	..	..	..	x_2	y_2	..	Γ_1	γ_2	p_3	..	g_1	δ_4	..	u_1	η_3	..	..	..	..	..	..
12	P_4	M_2	..	..	f_2	..	..	T_4	l_3	..	z_2	..	..	n_2	..	..	..	..	..	..	..	p_1	..	..	..	o_2	..	η_2	..	..	..	..	..	..
13	P_2	M_2	h_1	..	f_2	..	..	T_3	l_2	..	z_2	..	..	..	..	..	..	y_2	..	..	..	p_2	..	..	..	..	..	..	..	..	..	..	..	..
14	P_4	M_2	h_1	ζ_1	f_2	..	..	T_4	l_3	..	z_2	L_2	..	..	..	..	..	y_4	..	..	..	p_2	Λ_1	g_2	..	o_2	..	..	..	..	..	..	..	..
15	P_6	M_2	h_1	ζ_2	f_3	Z_4	K_2	T_4	l_4	..	z_4	L_2		n_2	..	Ξ_2	..	..	W_1	..	..	p_4	..	..	δ_2	o_2	u_2	η_2	..	..	..	χ_1	..	..
16	P_4	M_2	h_1	..	..	..	..	T_4	l_5	a_2	z_2	L_2	..	n_2	..	..	..	..	..	..	γ_2	p_2	..	..	δ_2	o_2	..	η_2	..	..	..	..	..	..
20	..	M_2	..	ζ_1	f_2	..	K_1	T_3	l_2	a_1	z_4	L_1	..	..	..	..	..	..	..	..	γ_2	p_2	..	..	δ_4	o_2	..	η_2	..	..	..	..	..	..
Zahl d. Kryst.	16	17	6	10	16	3	5	15	17	7	17	10	2	13	1	1	4	7	2	1	8	16	1	3	8	12	3	12	1	1	1	1	1	1
Einzelflächen	60	44	7	19	39	6	8	52	54	10	44	18	2	22	1	2	10	15	2	1	14	39	1	5	19	27	4	23	1	2	2	1	2	1

* bedeutet: neu ·· bedeutet: bestätigt. Die dem Buchstaben angehängte Ziffer bezeichnet die Zahl der Einzelflächen.

bedürftigen ausgeschieden und so das Formenverzeichnis abgeklärt. Sollte dabei die eine oder andere richtige Form geopfert sein, so wird sie sich durch spätere Beobachtung wieder einstellen. Eine Abklärung aber war nötig. Das nun Festgehaltene dürfte sicher sein.

Eine Zusammenstellung der Combinationen liess ein Bild von der relativen Häufigkeit der verschiedenen Formen gewinnen und kann bei Untersuchungen über deren Rangordnung verwendet werden.

3. Die von Chr. Winther ausgeführte, uns zur Publikation überlassene Analyse hat gezeigt, dass das Material ein sehr reiner Albit ist. Auf einen solchen beziehen sich also unsere Elemente.

4. Die Elemente des Albit wurden neu berechnet unter Heranziehung aller besten Messungen der 16 ersten gemessenen Krystalle. Dabei wurde die von Borgström und Goldschmidt veröffentlichte Methode der Krystallberechnung für das trikline System verwendet und den vorliegenden Verhältnissen angepasst. Das ausführliche Beispiel der Ausrechnung dürfte manchem willkommen sein.

Die so gefundenen Elemente dürften als die für Albit best gesicherten gelten können. Sie weichen nur um ein Geringes von den von Brezina nach Raths Messungen berechneten Elementen ab, dagegen stark von den nach Schusters Messungen von Goldschmidt berechneten Elementen. Letztere können daher nicht mehr festgehalten werden.

5. Mit den neuen Elementen wurde eine Winkeltabelle neu berechnet. Dies geschah trotz der geringen Differenz wegen der vielen neuen Formen, sowie mit Rücksicht auf die sonstige Abklärung des Formenverzeichnisses.

6. Zur Berechnung der Elemente konnten nur die Terminalflächen verwendet werden. Die Flächen der Prismenzone zeigten auch bei den schärfst ausgebildeten Kry-

stallen starke Ablenkungen. Das Studium dieser Ablenkungen und ihrer Beziehung zur Zwillings- und Viellingsbildung ist genetisch von grossem Interesse. Speziell die Tatsache ist wichtig, das gerade die stärkste Zone am meisten gestört ist, ohne Störung des Krystallbaues und ohne Ablenkung der Terminalflächen. So sind die Flächen der Parallelzonen $0q$, $\bar{1}q$, $\bar{2}q$ schön an ihrem Ort, während das zu allen diesen Zonen gehörige $M = 0\infty$ jedesmal, meist stark, abgelenkt ist.

Correcturen.

Seite 5 Zeile 10 u. 4 v. u.

lies:	0.6367 : 1 : 0.5593	94°15′	116°37′	87°41′
statt:	0.6373 : 1 : 0.5599	94°18′	116°41′	87°37′

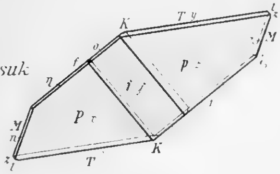
Seite	5	Zeile	2	v. u.	lies:	16′	statt:	20′
-	32	-	7	v. o.	lies:	878 476	statt:	978 476
-	-	-	15	-	-	981 151	-	988 151
-	-	-	2	v. u.	-	$\bar{0}.6311$	-	0.6311

Heidelberg, Dezember 1906.

Albit.

Kangerdluarsuk

Fig. 1a



Kangerdluarsuk

Fig. 2a

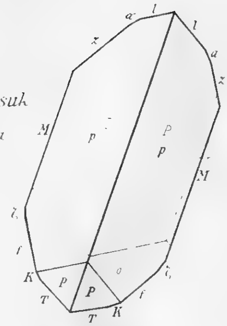


Fig. 1b

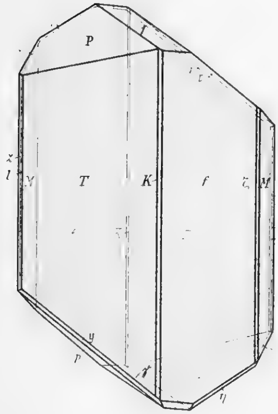


Fig. 2b

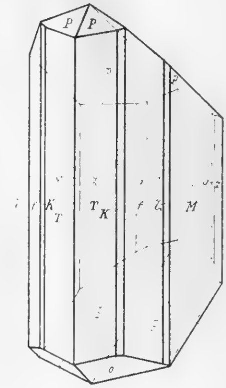
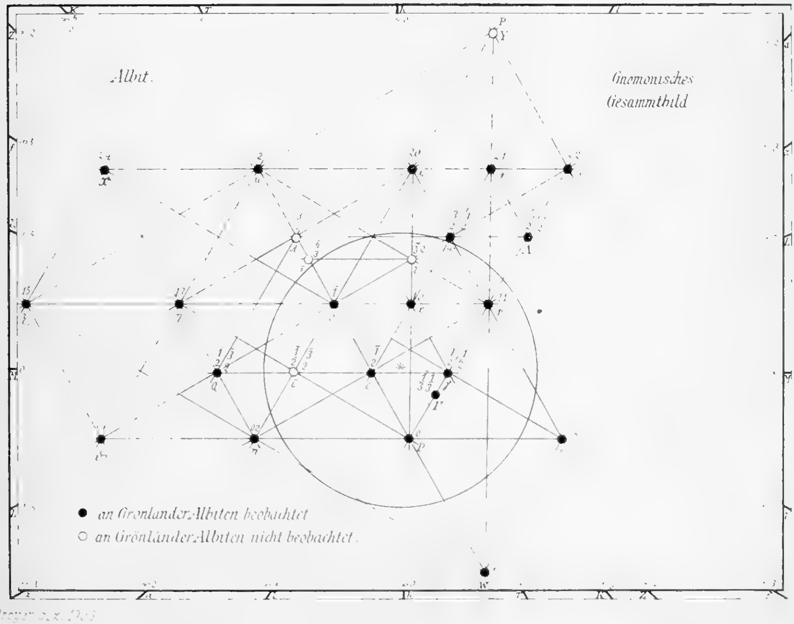


Fig. 21

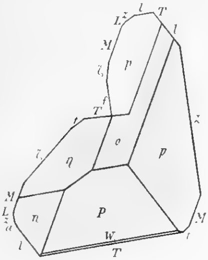


Lith. v. Gerstenlauer & Reisacher, Stuttgart

Albit.

Siorarsuit

Fig. 3a



Narsarsuk

Fig. 4a

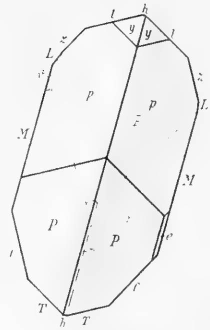


Fig. 3b

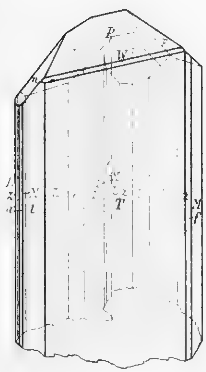


Fig. 4b

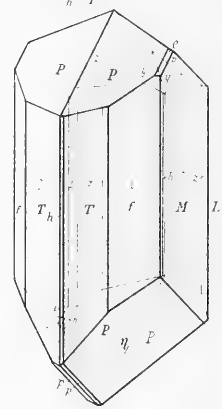
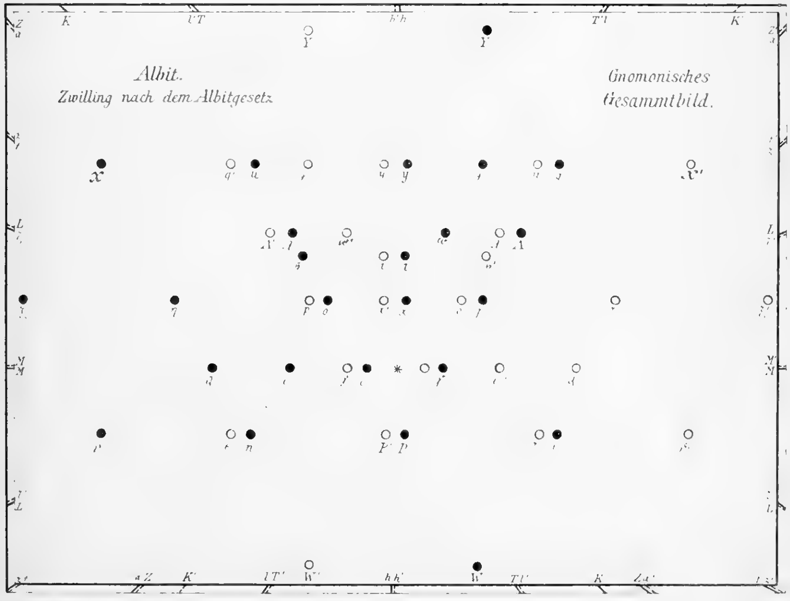


Fig. 22



Albit.

Siorarsuit

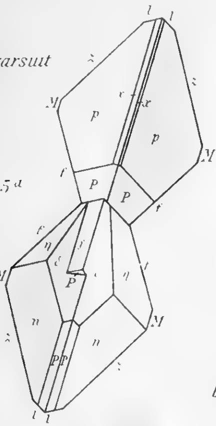


Fig. 5a

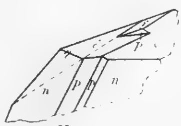


Fig. 5c

Theil von 5b vergröss

Siorarsuit

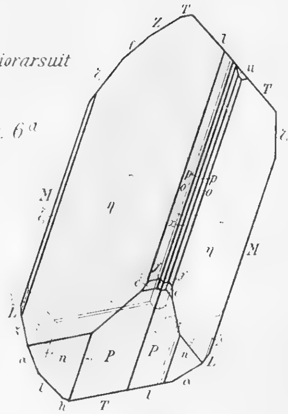


Fig. 6a

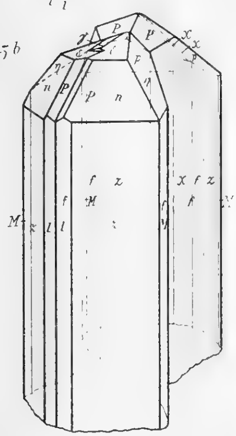


Fig. 5b

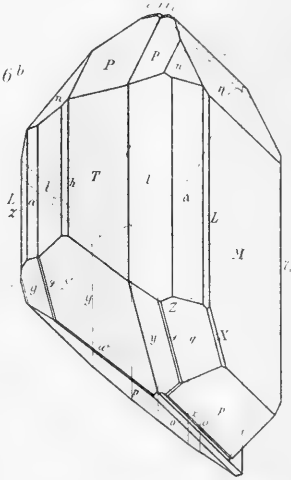
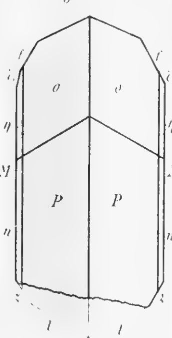


Fig. 6b

Kangerdluarsuk

Fig 7



Siorarsuit

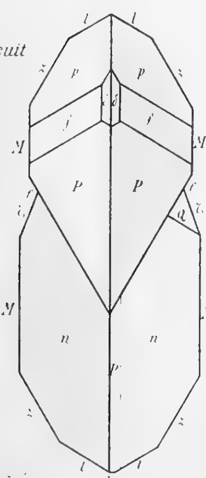


Fig 8

Siorarsuit

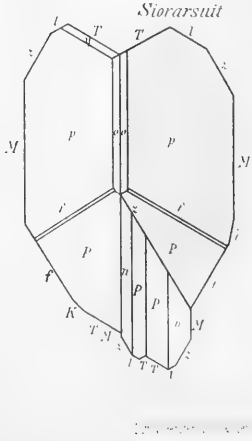
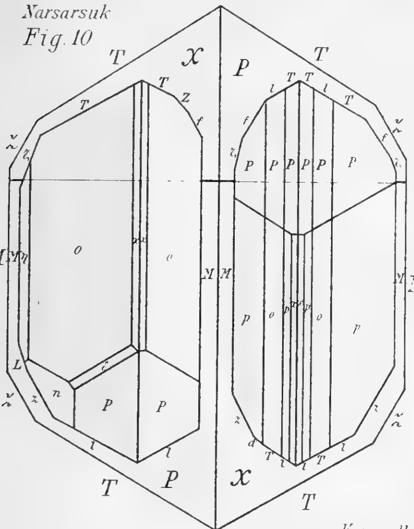


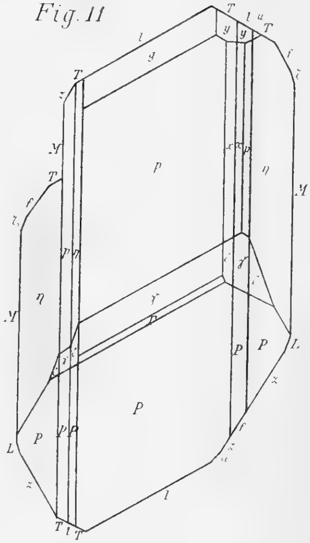
Fig 9

Albit.

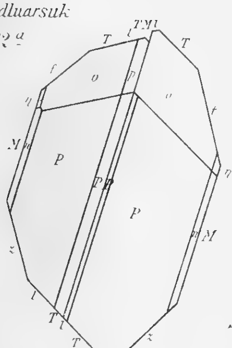
Narsarsuk
Fig. 10



Narsarsuk
Fig. 11



Kangerdluarsuk
Fig. 12ᵃ



Kangerdluarsuk
Fig. 13

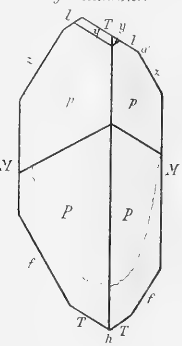
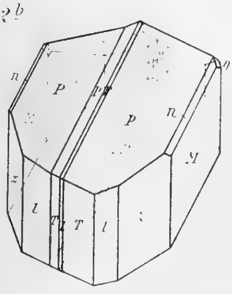


Fig. 12ᵇ



Siorarsuit
Fig. 14

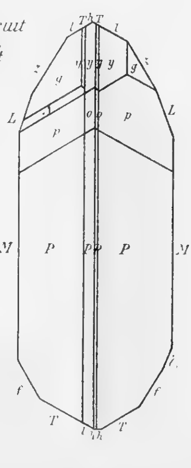
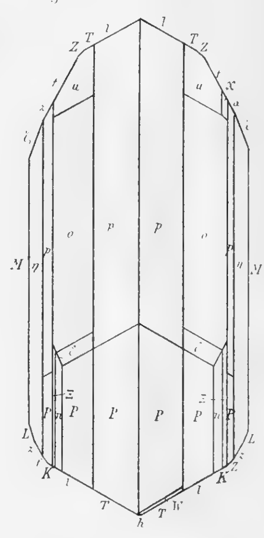


Fig. 15 Siorarsuit



Albit.

Siorarsuit

Fig. 16a

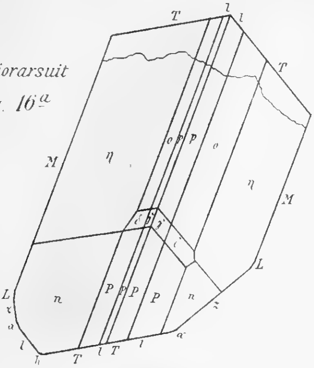
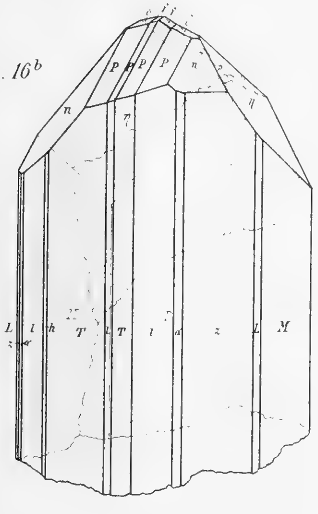
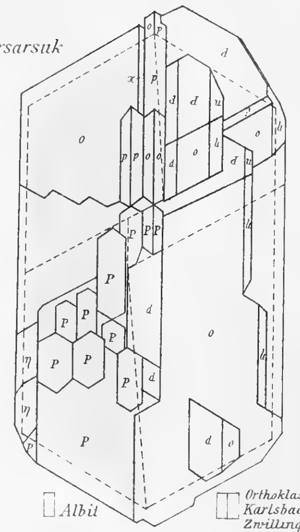


Fig. 16b



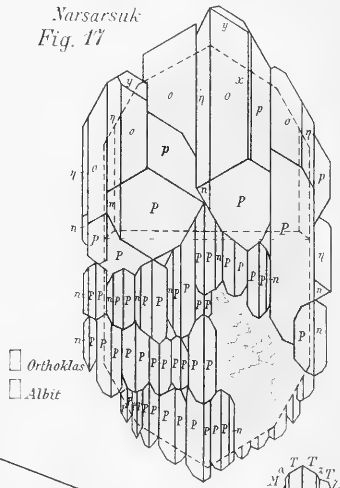
Narsarsuk

Fig. 18



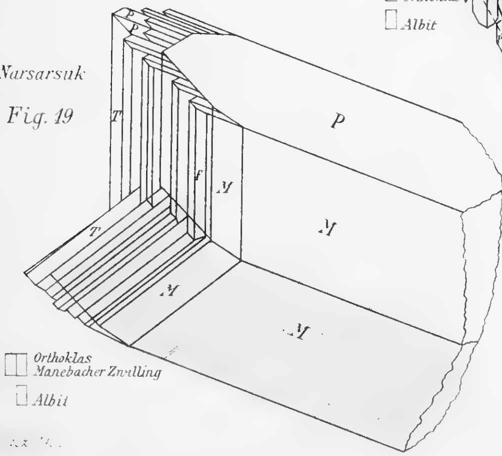
Narsarsuk

Fig. 17



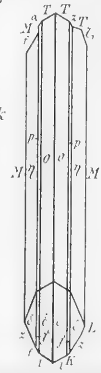
Narsarsuk

Fig. 19



Niunasar nausak

Fig. 20



II.

On the occurrence of *Fredericella sultana* Blumenb. and *Paludicella Ehrenbergii* van Bened. in Greenland.

By

C. Wesenberg-Lund.

1907.

Denmark has hitherto been the most northerly country from which fairly detailed reports of the fresh-water Bryozoa have appeared. From Dalyells' (1848 p. 87) and Allmans' researches (1856 p. 78) we know that *Cristatella mucedo* and *Plumatella fungosa* occur in Scotland, and that *P. repens* has probably a wide distribution in that country. As regards Norway Kraepelin only reports (1887 p. 99) that he has taken *Paludicella* in the neighbourhood of Kongsberg and *Plumatella fruticosa* (1887 p. 120) near Drammen. To my knowledge we have hardly any reports at all from Sweden whereas a good many from Finland. From Nurmijärwisö ca. 6 miles to the north of Helsingfors *Paludicella*, *Fredericella*, *Plumatella princeps*, var. *fruticosa*, *P. polymorpha* var. *repens* and *cæspitosa* besides *Cristatella* have been reported by Stenroos (1898 p. 50). As far as I am aware no growing Bryozoa have been found farther north. From the existing evidence as to the boundaries of the fresh-water Bryozoa it would seem that they do not extend very far to the north; their geografical distribution would seem to justify our considering them as organisms requiring a considerably high summer temperature to enable them to thrive. Yet several circumstances make it questionable whether this opinion will hold good.

In the first place it has been proved that fresh-water Bryozoa occur at considerable depths where the annual temperature is but low. Du Plessis thus pointed out a species of *Fredericella*, by Forel termed *F. Du Plessisi* (1901 p. 113). It is common in the upper part of the abyssal region at ca. 45 m. where Forel obtained ca. 150 specimens at a single dredging.

At this depth they live and thrive at a temperature varying between 4—9° C. Zschokke recently (1906 p. 2) states that the Vierwaldstätter See down to its greatest depths is covered with "*Rasen und Wäldern*" *of Fredericella Du Plessisi*, in other words that even at depths of 214 m. (Halbfass 1903 p. 712) with a constant annual temperature of ca. 4—5° C. (Amberg 1904 p. 91—93) the fresh-water Bryozoa still occur[1]).

These curious deepwater Fredericella which I have also dredged in Lake Geneva are not as is the case with Bryozoa in general attached to other bodies, but like the Pennatulides they stick loosely in the mud of the lake bottom. According to Forel they have the power of moving and when kept in glass vessels are said to be able to rise out of the mud at the bottom and at will to fasten themselves in the same. Davenport mentions (1904 p. 213) that *Paludicella Ehrenbergii* and *Fredericella sultana* have been determined in catches from Lake Michigan at depths of 23—36 m. For my own part I have often during several years taken shells of mussels at 11—15 m. with fixed statoblasts of *Plumatella* attached to them and besides at one dredging in Furesø, estimated at 20 m., I got a colony of *Cristatella.*

Further, it has been established that fresh-water Bryozoa inhabit lakes almost verging on the snow region. The species which according to Zschokke (1900 p. 115) occur in mountain lakes are *Fredericella sultana*, *Plumatella repens* and *Cristalla mucedo*, of which *Cristatella* has been found at the greatest height (2293 m.). From lakes in the Engadin valley at 1825 m. above sea level Zschokke reports *Fredericella* as occuring abundantly even below the icecover of the lakes.

Besides these examples furnished by the fauna of our own day we may also point to the Bryozoa of past epochs for evidence which unmistakably shows that these organisms

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[1]) The same species has quite recently also been found in the abyssal region of lake d'Annecy (*Marc le Roux* 1907 p. 267).

must be quite able to exist at a much lower temperature than our present knowledge of their geographical distribution would seem to warrant. In samples of chitin and silicious fragments from Scandinavian peat bogs kindly sent me some years ago by Gunnar Anderson I was able (1896 p. 51) to determine *Cristatella* statoblasts so early as in the Dryas-layers; *Plumatella* did not occur until the pine period. Since then *Cristatella* as well as *Plumatella* statoblasts have been reported by several observers as well as by myself in the quartär layers of Denmark, Sweden, Norway, Finland and North Germany. As I thought it unnecessary to mention here the numerous places of discovry, I applied to the intimate connoisseur of the fauna and flora of the Danish peat-bogs, N. Hartz, for some general information as to the occurrence of Bryozoa statoblasts in our peat-layers. According to Hartz the statoblasts of the above-mentioned Bryozoa are found throughout all the several layers, the *Cristatella* occurring most commonly, whereas in the Dryas-layers the *Plumatella* are more rare.

Consequently it cannot be denied that, whether we consider the occurrence of the fresh-water *Bryozoa* of the present time or call to mind their vertical distribution during past ages, in both cases it seems extraordinary that now-a-days the Bryozoa should cease at so great a distance from the polar circle as has hitherto been supposed to be the case. If these organisms have been able to exist under the natural-conditions of the Dryas-period and if still able to liwe at the low temperatures prevailing at the bottom of the Vierwaldstättersee as also in Alpine lakes situated near the snow-region, we should be justified in supposing that, although the natural conditions obtaining in countris beyond the arctic circle at the present day do not admit of a direct comparison with the conditions prevailing at the period where the Dryas layers were deposited in our own latitudes, that the northern limit of these forms at present would extend farther to the north.

Mr. Ad. Jensen of the Zoological Museum of Copenhagen on his return from Greenland in the autumn of 1906 informed me that he had found freshwater Bryozoa in the vicinity of the colony of Jacobshavn near the Disko-Bay (69° 13′ N.). Being conversant with the above facts this message was of course full of interest to me and I owe Mr. Ad. Jensen my best thanks for the readiness with which he handed over the samples to me for closer inspection. As to the locality Ad. Jensen reports. "To the north-east of the colony of Jacobshavn a plain extends for a couple of English miles along the base of the mountains. The plain is watered by a small rivulet, which discharges itself into the harbour. On its way to the harbour it passes through several small lakes or tarns. The Bryozoa were found on the 28^{et} of August 1906 in the bed of the stream at the place where it leaves the uppermost and largest of the small lakes; the height above sea level was ca. 30 m. In this place the river is quite shallow, the bed is covered with stones and partly "moss-grown". Numerous Sticklebacks (*Gasterosteus aculeatus*) were swarming about besides the brood of the arctic Char (*Salmo alpinus*). Numerous curiously formed chitinous sheaths housing the pupa of *Simulium* adhered to the lower sides of the stones. On handling them I observed a colony of Bryozoa fixed on to the lower side of a stone; on turning round hundreds of stones I at length succeeded in finding one more with a colony attached to the lower side of the stone. Unhappily the stones were both too large to go into any of my glasses so that I had no option but to detach the branches of the Bryozoa from them with a knife. The stream in this place was scarcely more than $^{1}/_{3}$ m. deep. I further looked for Bryozoa on stones in the littoral zone of the lake but without success. However a dredging across one of the small inlets of the lake fetched up numerous Bryozoan branches with statoblasts. The lake itself is a "cold" one being comparatively deep; it is fed by the melting snow of the mountains and has an outlet. In contradistinction to such lakes I call the smaller lakes or ponds that have neither affluents nor outlets "warm" lakes; the temperature of these shallow, stagnant waters is in summer often comparatively high. I measured 15° C. in one of these very shallow ponds; in the latter the ice melts early in summer; they were free from ice when we arrived at the "South eastern" bay on the 20th of June, whereas the colder lakes were still covered with ice which did not melt until the last days of June. With regard to the animal life of these lakes a characteristie difference was noticeable, the shallow, warm lakes producing an abundant fauna; on hauling a plankton net through the water small animals such as *Branchinecta paludosa*, *Copepoda*, *Cladocera*, *Rotifera* etc. appear in great numbers in the net. Notwithstanding several hauls in a couple of cold lakes I obtained no micro-organisms visible to the naked eye. In the lake near Jacobshavn, at the bottom of which the Bryozoa occured I likewise fished in vain with my plankton net; the only live animals observed were a small arctic Char and a good many larve of a gnat (*Chironomus*) about an inch long, which enclosed in their tubes of mud came up from the bottom along with a tangled mass of Bryozoa, Characea and moss.

It may further be remarked that according to Rink's (I p. 39) twelve years of observation the mean temperature at Jacobshavn is in Jan. — 14·2, Feb. — 15·2, March — 11·6, Ap. — 6·7, May — 0·1, June + 3·7, July + 5·9, Aug. + 4·3, Sep. + 1·0, Okt. — 2·5, Nov. — 9·1, Dec. — 12·2."

The Bryozoa proved to be *Fredericella sultana* Blumenb. The form of the colony was the usual one with spreading branches well apart from each other and much resembling those I had seen from the abyssal region of Lake Geneva and figured by Forel (1901 p. 114); the tubes contained the well known brown kidney shaped statoblasts without annulus. The colour of the tubes was a pale yellow, in the youngest parts almost white; they lack the Diatom-coating so characteristic of the Danish *Fredericella* (W.-L. 1896 p. 262) whereas grains of sand were observed here and there in the fragil and soft tubes, in order to make them firmer. In the sample handed over to me from the above mentioned lake the *Fredericella* were entangled in a mass chiefly of Characea interspersed with *Fontinalis*. Evidently the feeble, pliant colony clung to the Characea along the stems of which they possibly branched and twined for support. The length of the tubes at any rate measured 4—5 cm., possibly considerably more.

A further inspection of the sample from the rivulet revealed some few specimens af another Bryozoa: *Paludicella Ehrenbergii* v. Benned. attached to the branches of *Fredericella*. In our native lakes it is by no means a rare sight to see *Paludicella* coating the branches of *Fredericella*. It must now be considered as a matter of fact that the fresh-waters of the arctic zone are inhabited by at least two fresh-water Bryozoa: *Fredericella sultana* and *Paludicella Ehrenbergii*.

A closer perusal of the literature consequent on the present find showed that although no Bryozoa colonies had as yet been recorded from the polar zone their statoblasts had been noted. B. statoblasts are reported from Spitzbergen by Richard (1897 p. 1); *P. fruticosa* from the Murman coast (1901 p. 23) and *P. repens* by Levander from Russian Karelien (1905 p. 33).

Whilst the presence of statoblasts in one of our home-localities may probably always be considered as a sure sign that the species to which the statoblasts belong will also occur in the locality, the case may be different when the statoblasts occur at so great a distance from the limits of the domain the growing Bryozoan colonies have hitherto been known to occupy, the dispersing powers of the statoblasts being as is well known, very great.

In order more definitely to ascertain the northernmost locality from which living fresh-water Bryozoa colonies have been reported I applied for better information on this head to

Scotland, Norway, Sweden and Finland. Mr. James Murray advised me, that outside the reports af Dalyell and Allmann no knowledge had been gained as to their distribution in Scotland. Prof. G. O. Sars informed me that in the vicinity of Christiania he had met with *Plumatella repens* (fairly common) *Cristatella* (only in one locality) and probably also with *Fredericella*; otherwise nothing was known at to their distribution in Norway excepting from Kräpelins reports. Ekman writes me that Bryozoa are not known to occur in Swedish Lapmark; at the same time he reports *Cristatella*, *Plumatella repens* (?), *Plumatella fungosa*, and *Paludicella* as having been found in Sweden, however their utmost boundary lay just to the north of the great Swedish lakes. Levander reports that hitherto *Paludicella*, *Fredericella*, *Cristalla*, *Plumatella repens*, *fruticosa*, *fungosa* and *punctata* have been found in Finland. With the exception of *P. repens* which is said to be generally distributed throughout the southern and central parts of Finland, the other forms have only been found in some few localities in the southern part of the country[1].

As the above shows Ad. Jensen's find is of no small interest, it extends the northern limits of the Bryozoa from 60° N. to 70° N. and is the means of bringing about an agreement in the distribution of the Bryozoa towards the north and their occurence in Alpine lakes, in the abyssal region of lakes in low countries as also their distribution in prehistoric times.

It is worth while to notice that the form, which according to the common evidence of present observers in more temperate latitudes seems to thrive best at the lowest temperatures: *Fredericella sultana* (Zschokke a. o., see above) so far likewise proves to be the dominant form towards the north. Knowing

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[1] I beg to express my best thanks to each of the above mentioned scientists for their kindness in thus having placed their knowledge at my disposal.

as we now do that the artic zone houses fresh-water Bryozoa, and that probably other species than those here mentioned may be expected to occur, our researches must aim at a better understanding af their mode of reproduction.

It is a well known fact, that by far the greater part of the investigations regarding the reproduction of the lower fresh-water organisms have until a few years ago taken place exclusively in Central Europe. Owing to studies pursued in this from a geographical point of view very limited area our knowledge on this head has been based. It seems to have been tacitly understood that the results arrived at from this territory must hold good in any other locality where the lower fresh-water fauna happened to occur, i. e. almost all over the surface of the earth. During later years a series of publications have appeared on this fresh-water fauna, resting on investigations carried on in artic and North European as well as in the high alpine lakes of Switzerland, in Italy and North Africa. In Central Europe these studies have further been carried on with some regard to the conditions to which the organisms occurring in this territory are subjected. Of this extensive literature we shall here only mention the general results that have been gained, which further researches will more fully substantiate. In all the lower fresh-water groups of animals with various modes of reproduction — digonic or monogonic (parthenogenesis, gemmation, division) or producing two types of eggs (resting eggs with thick shells and summereggs with thin shells) the two modes of reproduction are not employed indiscriminately under all climatic conditions nor in every locality; nor are the two types of eggs everywhere utilised to the same degree. This is the case with the Copepoda, Cladocera, Ostracoda, Rotifera, Bryozoa, Planaria, Dinoflagellata and will in the future probably likewise prove to hold good with regard to the Phyllopoda. In certain latitudes and under certain conditions the monogenic propagation prevails, in others the digonic. The circumstance that organisms endowed with various modes of reproduction employ these differently under differing external conditions I regard as an indisputable fact, which in my opinion has hardly been appreciated by zoologists, whilst to botanists, whose knowledge of the life-conditions and vital requirements of plants exceeds by far that of zoologists with regard to animals it has long been an acknowledged fact. In botanical literature it has often been emphasized, that sexual reproduction is abandoned in high latitudes, and that plants living under arctic conditions increase either chiefly or exclusively vegetatively. To mention an example Nathorst (1883 p. 64) reports that a great many of the Spitzbergen plants produce no fruit at all; the phenomenon is even observable in the Færoe Islands (Ostenfeld 1901 p. 106 and 1906 p. 41 where further literature is cited). In botany it is so pronounced, that plants which in a given locality do not produce ripe seeds are considered by some botanists as relicts, a view which however can hardly be supported (Warming 1904 p. 74). With regard to plants fertilized by the aid of insects it is of course often the absence of the proper insects which forms a hindrance in this respect. Ostenfeld further remarks, that with regard to wind fertilized plants the explanation of the above feature must be sought for in climatic conditions, more especially the low summer temperature — the same interpretation as has been propounded in recent zoological literature on the various modes of propagation of the lower fresh-water organisms in high northern latitudes.

I shall not here enter upon this now pretty extensive literature, comprising numbers of greatly differing organisms, but only restrict myself to a few remarks respecting the Bryozoa.

Already in 1896 (p. 350) I was of opinion, that the sexual reproduction of the Bryozoa decreases towards the north. Notwithstanding regular fortnightly investigations made upon colonies of *P. fruticosa*, *Fredericella* and *Lophopus* in their habitual places of growth, I was never able to find either larvæ, eggs or spermatozoa. This is in all essentials in accordance with the results arrived at by Kraepelin with respect to North Germany (see W.-L. 1897 p. 344—349) and further corresponds with Zschokkes reports on his researches respecting Bryozoa in high Alpine lakes. Zschokke states, that he has never seen any sexual elements in the *Plumatella* colonies of lakes investigated by him, and that these Alpine Bryozoa possibly — he does not wish to express himself positively — may prove to form an interesting parallel to the colonies of the northern regions (1900 p. 119). Thanks to Kraepelins investigations we now know that in North Germany *Paludicella* produces eggs as well as spermatozoa, a feature which will probably also hold good with us. The larves have only once been found in the vicinity of Breslau (Bräem 1896 p. 54). Since then I have continually been in search of them in and on the large *Paludicella* colonies in Fure- and Lyngby-Sø but as yet without success. Whilst neither Kraepelin nor I have ever seen the *Fredericella* larva, Chirica (1904 p. 2) reports, that in the Rumanian lakes the *Fredericella* throw off their larves in the latter end of July; these larva haves further been observed by Bräem as far as I know near Breslau (1895 p. 503).

In our latitudes the production of eggs and sperms along with a copious produce of larvæ can only be regarded as a common feature in *Plumatella repens*, *fungosa* and in *Cristatella*. Further researches must now decide, whether not only the forms, that already with us seem to have abandoned more or less the sexual mode of reproduction (*Fredericella, Plumatella fruticosa* and possibly also *Paludicella Ehrenbergii*) but likewise all the rest of the *Plumatella* species as well as *Cristatella*, both of which will in time presumably be found in the arctic region, and which in our latitudes all produce larvæ abundantly, only propagate asexually in the far north. This would seem the more probable, as the arctic conditions unquestionably shorten the growth period of the Bryozoa. From his researches in Tilisuna- and Lüner-See ca. 2000 m. above sea level Zschokke (1900 p. 117) remarks, that the period of active growth in Alpine lakes can only be estimated at 8—10 weeks, whereas in low countries at 20—22 weeks. The production of the statoblasts does not take place until ca. 9—10° C., i. e. in the latter part of July, and already in Oct. the colonies are dead. During the period Oct.—July only the germs winter in the statoblasts. According to Rink's statement as to the mean temperature of Jacobshavn it appears, that the above mentioned lake has hardly been free from ice for more than three months. "Generally speaking the ice begins to form at the end of Sept., and in the course of Oct. the lakes are quite frozen over; the ice does not wholly vanish until the beginning of July or even later" (Rink I, p. 76). The period of the year when the temperature exceeds ca. 9—10° C. is undoubtedly very short. Notwithstanding the severity of the climate the colony might in all probability survive the winter in the case of a favorable locality; in 1899 p. 45 Lampert mentions the *Fredericella* as being the only Bryozoa positively known to be able to live beneath the ice.

A few years ago (1904 p. 337) Zykoff was able to report *Estheridæ* as having been found on Kolgujew-Island at ca. 70° N. with an isotherm of ca. 7—8° C. in July. This discovery at one stroke extended the limits of distribution of these organisms from regions bordering on the Mediterranean, from the Hungarian steppes and from the Mongolian as far north as to the arctic zone. The discovery of the Esteridæ along with that of the fresh-water Bryozoa treated of in this paper in the first place goes to show how very little we at present know as to the arctic fresh-water fauna. It has of late become customary, from a knowledge of the lowest July temperature at which a given organism at the present time is supposed to be able to live, to draw conclusions as to the temperature at which those strata in which the fossil specimens of the species now occur. For several reasons I consider these conclusions as being of small worth; more especially on account of our want of knowledge as to the northernmost limits of the lower fresh-water fauna.

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III.

Medfødte Misdannelser m. m. hos den grønlandske Befolkning.

Ved

Gustav Meldorf.

1907.

I det efterfølgende har jeg samlet, hvad jeg selv har set, samt hvad jeg i Literaturen og i Distriktslægernes Indberetninger fra Grønland har kunnet finde angaaende medfødte Misdannelsers Forekomst hos Befolkningen i Grønland. — Skjøndt Materialet til Belysning af dette Forhold ikke er stort, synes det dog tilstrækkeligt til at vise, at de fleste af de fra andre Nationer bekendte almindeligste Misdannelser ogsaa træffes hos Grønlænderne, og jeg skulde næsten tro, at de endda er forholdsvis hyppige hos den grønlandske Befolkning.

Man vil i det efterfølgende finde Exempler paa: ufuldstændig Lukning af føtale Spalter i Ansigtet, ufuldstændig Lukning af Cerebrospinalaxens Hulheder, Cyklopi, Hermafroditisme, fejlagtig Dannelse af anus, fejlagtig eller mangelfuld Dannelse af Extremiteter m. m. — Om Dobbeltmisfostre og hjærteløse Misfostre (Acardiaci) foreligger ingen Oplysninger.

En Mola hydatidosa, der fremkaldte stærke Blødninger og paafølgende Abort i 3die—4de Maaned, saa jeg hos en 31 Aar gl., gift Grønlænderinde ved Julianehaab d. 7/8 1897. — I 1896 behandlede Fritz Jørgensen, ligeledes ved Julianehaab, en «Metrorrhagia gravissima, Mola hydatidosa» (manuel Fjernelse af Mola).

Et Exempel paa ufuldstændig Lukning af føtale Spalter i Ansigtet saa jeg hos en ca. 18-aarig, ugift, forældreløs Kvinde fra Grønlands Østkyst, der i Eftersommeren 1900 indvandrede til den sydlige Del af Vestkysten tilligemed 37 andre Beboere af Østkystens sydlige Del for at bosætte sig paa Vestkysten. Jeg traf og vaccinerede disse Østgrønlændere ved Udstedet Pamiagdluk d. 27/9—28/9 1900 og har nærmere beskrevet mit Sammentræf med dem i en lille Afhandling i «Meddelelser om Grønland» XXV Hæfte, Kbhvn. 1902, betitlet: «Fra en Vaccinationsrejse i Egnen omkring Kap Farvel i Efteraaret 1900». Hos den ovennævnte Østgrønlænderinde saas en medfødt mangelfuld Tillukning af den føtale Spalte imellem den af første Visceralbue dannede Over- og Underkæbelap paa begge Sider.

Paa venstre Side var denne Spalte forbleven helt aabenstaaende paa et længere Stykke, saaledes at Mundspalten strakte sig i transversel Retning lige hen til, hvor de ægte Kindtænder begyndte (Fissura buccalis transversalis, Macrostoma). Længere bagtil havde Tillukningen af denne føtale Spalte paa venstre Side for største Delen fundet Sted; dog saas endnu ca. 1 Tomme nedenfor og foran venstre Øregang en lille, spalteformet Kanal, i hvis Lumen, der var saa stort og saaledes formet, at en Hulsonde kunde trænge derind, den normale Hudbeklædning strakte sig ned, saa langt man kunde se. Lige bagved denne spalteformede Aabning i Huden saas en lille nogenlunde øreformet Hudlap, der i Forening med Kanalen foran dannede ligesom et Miniaturøre med den tilhørende Øregang noget nedenfor og foran det normale Øre.

Paa Ansigtets højre Side var Mundspalten ikke forlænget udover det normale, men her saas to lignende Kanaler (spalteformede Aabninger) i Huden som den ovenfor beskrevne enkelte paa venstre Side. Paa Kinden omtrent midt imellem højre Mundvig og højre Øregang saas den ene af de nævnte to smaa, spalteformede Aabninger og bagved denne en ærtestor, lidt oval, fibromlignende Lap. Endvidere saas en noget større Hudlap foran Lobulus af højre Øre, og foran og lidt opadtil for denne saas den anden spalteformede Aabning at strække sig ned i Huden.

Misdannelser af Hovedet o. a. Legemsdele i højere

Grad synes at have været tilstede i et Par af Paul Egede («Continuation af Relationerne» etc., 1734—1740, Kbhvn. 1741) beskrevne Tilfælde af medfødte Misdannelser, nemlig:

«Den 28de» (Marts 1738) «blev ved Isefjorden fød et Monstrum, hvilket havde Øjnene paa Siden af Næsen, Munden var som en spids Hunde-Snud; havde ingen Ørn. Og i Stedet for Hænder og Fødder havde det ikkun Laller og store tykke Laar. Over Panden var det begroet med Rens-Diurs Haar. Paa Siden af det var det at se til som et Stykke Hvidfiskeskind. Et andet Barn, sagde de, var fød der i Nærværelsen og havde lugtet af Orme. Aarsagen til slige Vanskabninger, foregive Angekut, at være, at Moderen har ladet sig bruge af de Døde».

«Den 9de» (Maj 1739) «blev født et Monstrum 2 Mile herfra uden Hoved, med fire Ben, store Negler, Mund paa Brystet og Klør paa Ryggen. Slige og andre Vanskabninger fødes tit her i Bugten».

Under mit 6-aarige Ophold ved Julianehaab fik jeg Lejlighed til at se to Tilfælde af medfødt Spaltning af Spinalkanalen (Rachischisis, Hydrorhachis ext., Spina bifida lumbosacralis) hos Grønlænderbørn.

I det første af disse Tilfælde var Patienten et 2 Aar gl. Pigebarn ved Udstedet Sydprøven med Coxitis og «Tabes meseraica» tillige, hvem jeg kaldtes til d. 7/9 1898. Det spinale Meningocele havde en bred Basis og var blødt og vandpudeagtigt at føle paa; opadtil og bagtil løb det ud i en Spids, hvortil yderligere var fæstet et lille mørkerødt, ved Tilhæftningen til Meningocelet indsnøret, kødet Appendix. Tumor var medfødt og var vistnok voxet noget siden Fødslen. Intumescensens Længdeaxe var fra Basis og til den fri Spids af det omtalte lille Appendix 5 1/2 Centimeter; heraf udgjorde det sidste 3/4 Centimeter. En aragtig Indtrækning saas i Huden nedenfor Meningocelet. Indenfor Basis af Tumor føltes tydelig Defekten i Hvirvelbuerne (manglende processus spinosi osv.). Den dækkende Hud af naturligt Udseende. — Barnet, hvis Forældre var meget fattige, var i elendig Ernæringstilstand og overmaade slet soigneret; det døde senere ($^{4}/_{2}$ 1899).

Den anden Patient, et $1^{1}/_{2}$ Maaned gl. Barn (Dreng) fra Udstedet Narssak (Nordprøven), blev indlagt paa Sygehuset ved Julianehaab d. $^{27}/_{8}$ 1899. Meningocelets Basis var her 5 Centimeter i Diameter; den dækkende Hud var rødviolet, stærkt udspilet, slimhindeagtig i Midtpartiet, blank og spejlende. Konsistensen spændt og fluktuerende. Svulsten punkteredes ved Dieulafoi's Aspirationsapparat, og der udtømtes en ret betydelig Mængde aldeles vandklar Vædske, hvorefter Sækken faldt sammen, og Defekten i Hvirvelbuerne kunde nu overordentlig tydelig føles herigennem. Men Vædsken reproduceredes trods Trykforbinding meget snart, og Sækken blev atter udspilet heraf. Barnet befandt sig vel under og efter Punkturen. Forældrene vilde ikke indlade sig paa, at større Indgreb blev foretaget og havde bestemt at rejse fra Kolonien allerede d. $^{30}/_{8}$ med Barnet. Dette, der altsaa kun opholdt sig 4 Dage ved Kolonien, døde d. $^{14}/_{11}$ ved Bristning af Sækken, hvilken Bristning Barnet overlevede i 2 Dage.

Et Tilfælde af Cyklopi omtales af Distriktslæge Pfaff, Nord-Grønland, i hans Indberetning for Aaret 1867: Ved Jakobshavn fødtes i Stutningen af Juni Maaned «et dødfødt Misfoster. Øjnene vare sammensmeltede ved Næseroden. Næsebenene manglede, men ned over det sammensmeltede Øje hang fasthæftet til Næserodens Hudbedækning en kødet, af en Aabning perforeret Klump. Paa venstre Fod fandtes 6 Tæer, iøvrigt var Barnet fuldbaaarent og velskabt».

Under mit Ophold i Grønland blev det mig fortalt (1899), at 3 Tilfælde af Kryptophthalmus? skal være sete ved Nanortalik for en Del Aar siden, idet en gift Grønlænderinde, der først havde født et Par sunde Børn, derefter fødte tre Børn, det ene efter det andet, hvor Øjelaagsspalten (rima) helt eller delvist manglede paa begge Sider. — Hos det første Barn skal Tillukningen have været saa fuldstændig, at man aldeles intet kunde se af Bulbi, hos de to andre Børn saas derimod et lille Parti af Cornea («saa meget som et Spurveøje») at skinne frem i Midten af de iøvrigt tillukkede Øjelaagsspalter. — Alle tre Børn skal have haft Lyssands (drejede Hovedet efter Lyset); de døde alle i en ret spæd Alder, og Moderen fødte senere atter sunde Børn.

Af Hermafroditisme saa Distriktslæge Otto Jessen ved Julianehaab et Tilfælde, der omtales i hans Medicinalberetning for September 1872—September 1873: «Som Mærkværdighed vil jeg kun tilføje til min Indberetning, at der i den tyske Menighed er bleven født et Barn med saa hermaphroditisk misdannede Genitalia, at der var Strid, om det skulde døbes Carl eller Marie, men Missionæren døbte det som Dreng. Da jeg paa min Rejse undersøgte det, var han 3 Maaneder gl.; Clitoris var udviklet til en ca. 1/2 Tomme lang Penis, næsten uden paaviselig Præputium, men forholdsvis stor Glans med fin, næsten hypospadiær Urethralaabning, derunder en Aabning, saa stor, at man kunde stikke en ikke meget fin Sonde 3/4 Tomme i Dybet; begge Testes føltes med Funiculi i Labia majora».

Muligvis kan der have været Tale om Hermafroditisme i større eller mindre Grad i et Par af Paul og Niels Egede omtalte Tilfælde. Ialfald som Kuriosum synes jeg, at de fortjener at anføres her:

Paul Egede fortæller i «Continuation af Relationerne» om en Kone, der d. 23de Marts 1738 sagde til ham: «Jeg fødte dette Barn i Sommer og var en Dreng, det første han kom ud, men han revnede og blev til en Pige; uden Tvivl er Luften bleven vred for noget, jeg maa have forset mig udi». — — — «I hvor meget jeg end søgte at igendrive hende, stod hun dog paa sit, og sagde: Det var en Dreng, men revnet». —

I «Tredie Continuation af Relationerne» etc. 1739—1743, Kbhvn. 1744, skriver Niels Egede for d. 7de December 1741: «Iblandt andet sagde en Kone, at den lille Pige, som hun nu havde, var en Dreng, da hun blev født, som de alle saa, men da Jorde-Moderen havde forset sig i noget, idet hun ikke havde taget alle Angekokkens Regler iagt, sprak han itu og blev til en Pige, som du ser[1])». Niels Egede var da rejst Nord paa til Isefjorden, hvor dette foregik.

I December 1739 omtaler Niels Egede en Brud, der Brudenatten blev forvandlet til en ung Karl.

Bataillonschirurg Rudolf, Nord-Grønland, angiver i Aaret 1/7 1845—30/6 1846 at have behandlet et Tilfælde af Atresia urethræ; om medfødt eller erhvervet angives ikke.

Et Tilfælde af Atresia ani omtales i Distriktslæge F. Block's Medicinalberetning for Godthaab Lægedistrikt for 1/7 1840—30/6 1841: Anus imperforatus, medfødt: «en tynd Hinde tilsluttede Aabningen, men ved en stærk Nisus depressonus anden Dagen efter Fødslen sprang denne Hinde itu paa to Steder. Anus blev dog herved ualmindelig lille og maatte i 5-Aars-Alderen dilateres blodigt. Barnet sagdes da ikke at have haft Aabning i 5 Uger!, og der udtømtes efter Operationen (uden Clysma eller andre Afføringsmidler) Masser af Fæces». Barnet var en Dreng. Hudstrimmelen gennemskares med Fistelkniv.

Exempler paa fejlagtig eller mangelfuld Dannelse af Extremiteter er allerede nævnte i det foregaaende (under Omtalen af Misdannelser paa Hovedet og Cyklopi). I det efterfølgende skal anføres flere andre Exempler herpaa:

Distriktslæge Pfaff, Nord-Grønland, fortæller i sin Medicinalberetning for Aaret 1872 om en Fodfødsel, hvor Moderen døde 3 Timer efter Fødslen, da Jordemoderen ikke var i Stand til at

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[1]) Om en lignende formodet Forvandling fra Dreng til Pige (allerede i Foetallivet) paa Grønlands Østkyst meddeler Kommandør G. Holm i «Ethnologisk Skizze af Angmagsalikerne» (Den østgrønl. Expedition 1883—85, Side 134, Meddel. om Grønland, X Hæfte, Kbhvn. 1888): En Angekok havde forudsagt en Kone, at hun vilde føde en Søn. Barnet blev imidlertid en Pige. Senere fandt Angekok'en ud af, at Spaadommen vilde være gaaet i Opfyldelse, hvis Konen ikke ved Uforsigtighed engang var falden, hvorved der var gaaet en Revne i Fosteret».

faa Efterbyrden frem. (Pfaff formoder, at der har været udbredte Adhærencedannelser tilstede). «Bemeldte Barselkone havde født flere Børn, og ikke faa af dem have haft Abnormiteter saaledes Fingrene forenede ved Svømmehud eller aldeles manglende; det nyfødte Barn manglede saaledes Tommelfingeren paa højre Haand».

Knud Poulsen anfører i «Contributions to the anthropology and nosology of the East-Greenlanders» (Meddelelser om Grønland XXVIII Hæfte. Kbhvn. 1905): «More considerable deformities are certainly very rare, children with such being as a rule undoubtedly killed shortly after having been born. The only one I saw was a young man, whose left hand was somewhat deformed, being first nearly 4 Ctm. shorter than the right one; the outermost points of the three middlemost fingers were besides stiff, and between these, being very delicate, a web was distended reaching nearly the outermost point». —

I «Ethnologisk Skizze af Angmagsalikerne» skriver Kommandør G. Holm om Østgrønlænderne: «Det er vistnok ingen Sjeldenhed, at der fødes vanskabte Børn. Disse tilligemed syge Børn, som antages ikke at kunne leve, ligesom ogsaa Børn, hvis Moder dør under Fødslen, og hvem ingen anden kan give Die, blive kastede udenfor paa Jorden eller i Havet for at omkomme». — —

Hos en nogle og fyrretyve-aarig, gift Grønlænder, Fanger fra Bopladsen Kangermiutsiait i Nærheden af Kolonien Julianehaab, som kom til Lægebehandling for en anden Lidelse d. $^{2}/_{6}$ 1902, saa jeg et Exempel paa Syndaktyli, idet 4de og 5te Taa paa venstre Fod var fuldstændig sammenvoxede i hele Berøringsfladernes Udstrækning. Sammensmeltningen, der var medfødt, indbefattede Huden, ikke Muskler, Sener eller Knogler. De sammensmeltede Tæer saa ud som en enkelt meget bred Taa med 2 Negle. Paa 4de Taa var Neglen veludviklet; paa 5te Taa var den uregelmæssig kort og bred, rudimentær.

Polydaktyli saa jeg d. $^{20}/_{4}$ 1902 hos en ca. 5 Aar gl.

Grønlænderdreng fra Bopladsen Niakornak, Nord for Kolonien Julianehaab. Barnet havde to Tommelfingre paa venstre Haand, hvoraf den ene (den yderste) dog kun var ca. $^1/_3$ saa stor som den anden (den egentlige Tommelfinger). De var begge indleddede (ved Ledforbindelse) paa første Mellemhaandsben. Den lille overflødige Tommel havde (ligesom den større) 2 Phalanx-Knogler, og der var Bevægelighed i alle Led (ogsaa Metacarpophalangeal-Leddet). Yderste Phalanx var dog skudt ned paa Ulnarsiden af 1ste Phalanx, saa at den lille Tommels yderste Led vendte imod den større Tommelfinger. Patienten kunde selv bevæge i alle Led. Begge Fingre bar vel udviklede Negle; paa den lille Tommelfinger var Neglen lang og smal.

Niels Egede («Tredie Continuation af Relationerne») skriver i August 1739: «Sidst i denne Maaned kom en Grønlænder langt Sønden fra, som var vanskabt, hans Mave ragte lige fra hans Hals, og kunde jeg ikke føle til noget Brystben paa ham, Albuen var nærved Skulderbladet, Laarene vare omtrent en fjerdedel Alen, og hans Højde i sig selv var som et ordinært Menneske. Han talede uforstaaeligt, hans Kammerat sagde, at han kunde spise 5 Sælhunde op i et Maaltid, de indbildte sig og, at han havde en Spaadoms-Aand og kunde sige tilkommende Ting. Hans Moder fortalte mig, at da hun engang var paa Jagt og af Mathed lagde sig ned ved en stor Sten for at faa Hvile, drømte hun, at en Trold laa hos hende, og da hun af Alteration vaagnede, var hun ganske mat og merkte ved sig selv, at hun var besvangret».

»Hun bad mig, at jeg vilde tale til Gud for hende, at den vanskabte Søn maatte enten blive som andre eller og maatte dø, thi han fortærte al hendes Ejendom og kyste Livet af hans andre Søskende».

Kommandør G. Holm nævner i »Den østgrønlandske Expedition», Side 87, en Østgrønlænder ved Imarsivik, «som var Dværg». — Hans Datter roede i Kajak og fangede godt.

En gift Grønlænder ved Kolonien Julianehaab, født i Aaret

1874, lider af dobbeltsidig pes equinus samt genu valgum, medfødt eller da i alt Fald udviklet i den tidlige Barnealder.

Af mindre væsentlige medfødte Anomalier skal jeg nævne: en for vidt gaaende Tilhæftning af Tungen til Bunden af Mundhulen (Ankyloglosson), en for vidt gaaende Tilhæftning af Overlæben til Overkæbens Gingiva samt to Tilfælde af Molluscum fibrosum pendulens faciei, det ene hos et dansk, det andet hos et grønlandsk Barn ved Kolonien Julianehaab. De to sidstnævnte Tilfælde stod vistnok i Forhold til den føtale Spalte imellem Over- og Underkæbelappen; der var dog intet Tegn til Makrostomi hos noget af disse to Børn.

Ankyloglosson saa jeg hos et 14 Maaneder gl. Barn, Datter af Enke, ved Udstedet Narssak (Nordprøven) d. $^{17}/_{7}$ 1900. Barnets Tungebaand (Frenulum linguæ) var tilhæftet meget langt fortil paa Undersiden af Tungen, næsten helt hen til Tungespidsen, saa at Tungen kun kunde løftes ganske lidt op fra Mundhulens Bund og ikke rækkes frem af Munden.

Hos et andet Grønlænderbarn, 8 Maaneder gl., Søn af Kolonist ved Julianehaab, som jeg d. $^{11}/_{3}$ 1901 fik under Behandling, var Tungens Bevægelser ligeledes stærkt indskrænkede paa Grund af Tungebaandets Tilhæftning altfor langt fortil paa Tungens Underside.

Hos begge Børn foretoges «Løsning af Tungen» ved Indklipning med Sax i Tungebaandet. Efter den lille Operation blev Tungens Bevægelighed betydelig mere fri. — Hos begge Børn saas tillige en hvidlig Plet (Stomatitis aphthosa), der hos det først omtalte Barn var 10-Øre stor og havde sit Sæde paa Tungespidsen; hos det sidstnævnte Barn var Pletten godt ærtestor og havde sit Sæde lige foran Tungebaandets øverste og forreste Tilhæftning (halvt paa Tungebaandet og halvt paa Tungens Underside); Moderen havde bemærket denne Plet siden d. $^{27}/_{1}$ 1901. Under flittig Pensling af Pletten med Tinct. myrrhæ & gallæ āā tabte den sig mere og mere og var næsten helt forsvunden i Slutningen af Marts.

Det synes næsten, som om saadanne strammende Baand i Mundhulen, der ikke hæves ved artificiel Behandling, er særlig udsatte for at angribes og — ialtfald delvis — destrueres ved at blive Sædet for Betændelsesprocesser (Aphthæ o. lgn.), hvorved der indtræder en Slags Naturhelbredelse af Anomalien. Jeg har set det i flere Tilfælde, ogsaa naar Frenulum imellem Overlæben og Gingiva har strakt sig helt ned til Fortænderne. Formodentlig finder dette Forhold sin Forklaring ved, at en saadan fri Rand stadig er udsat for Stramning og Irritation under Tungens og Overlæbens Bevægelser.

Fibroma (Molluscum fibrosum), medfødt, saa jeg hos et Grenlænderbarn ved Julianehaab, født d. 9/6 1901, Søn af Fanger. Tæt foran højre Øre (i Højde med Crus helicis, altsaa lidt ovenfor Øregangsaabningen) saas en rundagtig, lidt mere end hampefrøstor, stilket Tumor, bestaaende af normal Hud med Lanugohaar (Cutis pendula). Stilken var tyndest lidt ovenfor den øvrige Huds Niveau.

Hos et dansk Pigebarn ved Julianehaab, der fødtes i April s. A., altsaa et Par Maaneder i Forvejen, saas et lignende medfødt Molluscum fibrosum foran venstre Øre. Umiddelbart foran Tragus (paa Overgangen mellem denne og Tindinge-Egnen) fandtes et 4 Millimeter langt Appendix af blød Konsistens, bestaaende af normal Hud. Det havde Cylinderform, og Cylindrens Diameter var 2 Millimeter. Cylindren var indsnævret lidt ovenfor Huden.

Begge disse smaa Tumores fjernedes let ved Afklipning med Sax (henholdsvis d. 2/1 1902 og d. 29/10 1901), og i Løbet af faa Dage var Snitfladen lægt og dækket af Epidermis.

Phimosis er yderlig almindelig hos Drengebørn og voxne Grønlændere.

Af Hydrocele congenita har jeg set et enkelt Tilfælde hos en Grønlænderdreng.

Skjøndt det efterfølgende egentlig ikke kan komme ind under Betegnelsen: medfødte Anomalier, vil jeg dog tillade mig i Tilslutning til Omtalen af disse at anføre et Par Iagttagelser over Forhold hos Grønlænderbørn, der ligger lidt udenfor det helt almindelige og dagligdags.

Da jeg d. $^{12}/_{5}$ 1901 opholdt mig paa Embedsrejse ved Anlæget Nanortalik i Julianehaab Distrikt, fremstillede en ugift Grønlænderinde sin 9-aarige Datter for mig for at faa fjernet en frembrydende Tand, der generede Barnet en Del under Tygningen m. m., idet den var kommen frem paa den haarde Gane en Centimeter bagved Mellemrummet imellem de to mediale Fortænder i Overkæben, altsaa i Legemets Midtlinie (Sagittalplanet).

Foruden denne Tand havde Barnet 12 Tænder i Overkæben (2 Fortænder, 1 Hjørnetand og 3 Kindtænder i hver Kæbehalvdel). I Undermunden saas de tilsvarende 12 Tænder, og desuden var 2den Molar i stærkt Frembrud i venstre Side. De to Hjørnetænder i Underkæben var ved at blive erstattede af to frembrydende, blivende Hjørnetænder. Disse var komne godt frem over Tandkødet paa den ydre Side af Mælketænderne (lidt udenfor dem), saa at Barnet da havde 4 Hjørnetænder i Underkæben. De to Hjørne-Mælketænder kunde kun rokkes forholdsvis lidt.

Den lille, hvide, frembrydende Tandkrone, der saas i Midtlinien af den haarde Gane, havde nærmest Form som en Fortand (mejseldannet med en Køl paa den bagtil vendende Flade). Dens Størrelse var lidt mindre end Fortændernes. Efter Udtrækningen med Tandtang viste den sig at være 9 Millimeter lang, heraf udgjorde Kronen 6 Millimeter. Kronens Bredde var 4—5 Millim.; forfra—bagtil var den 3—4 Millim. Roden var afrundet af Form. Tanden kunde før Udtrækningen rokkes lidt.

«Hexemælk» træffes undertiden hos de smaa Grønlænderbørn. Hos en lille Pige, født d. $^{1}/_{1}$ 1903, Datter af Fanger ved Julianehaab, kunde der saaledes, da jeg i Dagene omkring d. $^{16}/_{1}$—$^{18}/_{1}$ s. A. undersøgte Barnet, fra begge Papillæ mammæ let udtrykkes nogle Draaber tynd, halvklar, hvidlig, mælkeagtig Vædske.

IV.

On Gyrolite from Greenland.

By

O. B. Bøggild.

1908.

So far as can be ascertained, gyrolite was first observed by K. L. GIESECKE in the year 1811. He gives the following description of a mineral from Niakornat in the district of Umanak, Greenland, which evidently refers to this species[1]:

«Ist aber Mandelstein ein Gemengtheil dieses Conglomerats, so sieht man in demselben Quarz, Chalcedon, faserigen Mesotyp in Nieren von verschiedener Grösse. Der letztere geht oft ins krummblätterige über, ist schiefrig, hat einen starken Perlenmutter-, oft beinahe metallischen (Silber-) Glanz, und braust etwas mit Salpetersäure. Seine Krystallisation scheint die sechsseitige Tafel zu sein.»

Gyrolite seems to be again indicated by GIESECKE in 1814, when, in describing the minerals of Disko, he writes[2]:

«The Apophyllite also occurs in a radiated form similar to stilbite, but with a more brilliant lustre, and presenting on the surface a crystallisation similar to the cock's-comb barytes.»

In this passage the relationship with apophyllite is clearly recognized; but later writers confounded the mineral with mesole (thomsonite) and even with the radiated zeolites. Thus Haidinger writing in 1827[3] describes eight specimens of "Mesole" from ALLAN's collection (now in the British Museum, London), and remarks that "these varieties show a very great

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[1]) GIESECKE, Mineralogiske Rejse i Grønland, Copenhagen, 1878, p. 245.

[2]) GIESECKE, On the minerals of Disko Island, Trans. Roy. Soc. Edin., IX, 1816, p. 271.

[3]) Edinbourgh Journal of Science, VII, p. 19.

resemblance to certain kinds of Apophyllite, so much so, that Sir Charles Giesecke, who discovered them in the island of Disco, in Greenland, was induced to consider them as a particular subspecies of it, the micaceous apophyllite". The first five specimens described in this paper by Haidinger are mesole (or faröelite, i. e. lamellar radiated thomsonite) from Nolsö in Færöe, while No. 6, "discovered by Sir Charles Giesecke at Nia Kornak in the island of Disco, Greenland"[1]) had a specific gravity of 2·382, and is said to have occurred in reniform groups, the individuals being "similar to those of var. 4, but larger": it was most probably therefore mesole. But the two last specimens described by Haidinger are, there can hardly be any doubt, gyrolite, as was pointed out by M. F. Heddle[2]). They are thus characterized by Haidinger:

«7. The size of the plates is here between a quarter of an inch and half an inch. They have a bright pearly lustre on their cleavage planes, and the whole aggregate resembles in no small degree the crystallized spermaceti. The colour of this variety is white, slightly yellowish. It forms part of the inside of a geode detached from one of the vesicular cavities of basalt. It is from Karartut, near Godhavn, in the island of Disco.

8. Large individuals aggregated and coarsely forming reniform shapes. The surface is dark yellowish-grey, the colour on the cleavage planes almost straw-yellow; the whole apparently decomposed. Cleavage is very easily obtained, and the laminæ show some elasticity when we attempt to separate them. This specimen is a native of Nia Kornak in the Omenaksfiord, like the preceding in the island of Disco.»

It is no doubt also gyrolite which is referred to by Lévy[3])

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[1]) More properly Niakornat. This locality is not on Disko but on the peninsula Nugsuak, Umanak-Fjord.

[2]) The Mineralogy of Scotland, 2, 1901, p. 79.

[3]) Description d'une collection de minéraux formée par M. Henri Heuland et appartenant à M. Ch. Hampden Turner, 1828, 2, pp. 272 and 274.

a year later, under the description "apophyllite globuliforme", with mesolite and apophyllite, "Waygat, île de Disco, Groenland"; and apophyllite laminaire .... blanc et nacré, globuliforme radié; Niarkornak, Groenland".

In the year 1851 the mineral species gyrolite was named and described by Anderson[1]; the locality was Storr in the island of Skye, one of the Hebrides.

The occurrence of gyrolite in Greenland was for the first time expressly stated by Greg and Lettsom[2], who concerning that mineral write: "specimens of it (arranged in Mr. Allan's collection as mesole by Haidinger) without doubt occur at Karartut, near Godhavn in Disco Island, Greenland; also at Niakomak, Omensnaksfiord, Disco".

With greater certainty gyrolite was proved to be a Greenland mineral by Heddle (see above) and by J. Currie[3] who points out some localities in Greenland, where Giesecke may have found the mineral. Of these Niakornat has been named above; from Tarajungitsok Giesecke[4] mentions: "kugelichten Glimmerzeolith in feinen, fast zerreiblichen Blättern", and by this description gyrolite without doubt must be meant, so much the more as this mineral in reality has been collected by Giesecke at this place (see later on). From Tupausarsuit (= Tuapagsuit) Giesecke[5] mentions "der mehrmals berührte glimmerige Zeolith — blätterig und in Kuben"; here it is also almost quite certain that he has meant gyrolite. Finally Currie names the locality of Akiarut from which Giesecke[6] mentions "massive apophyllite" and "pearl white radiated mesole"; of these the former, in my opinion, may be apophyllite, the latter thomsonite.

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[1]) Phil. mag. I, p. 111.

[2]) Manual of the Mineralogy of Great Britain and Ireland. 1858, p. 217.

[3]) Min. Mag. 14, 1905, p. 95.

[4]) l. c. p. 329.

[5]) l. c. p. 254.

[6]) A descriptive Catalogue of a new Collection of Minerals in the Museum of the Royal Dublin Society. Dublin, 1832, pp. 54, 55.

When I wrote the "Mineralogia Groenlandica", in 1905[1], I had never seen gyrolite and of the above cited works of Haidinger and Heddle I knew nothing; I thought then, that the occurrence of gyrolite in Greenland could not be considered as certain, so much the more as there did not exist any analysis of the Greenland mineral. Subsequently Mr. Currie made me acquainted with the above cited works and drew my attention to Lévy's description. He also sent me specimens of gyrolite from different localities, by comparison with which I soon found the mineral in specimens from several localities in the Greenland collections of the Museum of Copenhagen. On a closer examination of these I found that the mineral from Niakornat showed such highly interesting crystallographical and physical development, and in most respects differed so much not only from every formerly known gyrolite but also from almost all other zeolites, that it deserved a special description.

In the following, then, I shall first describe the mineral from Niakornat, and afterwards that from the other Greenland localities.

In conclusion I have to pay my best thanks to Mr. J. Currie for his kind assistance to me without which I should never have come to make the following examinations.

I. Gyrolite from Niakornat.

Occurrence. About the occurrence we only know what Giesecke, who alone of all has collected the mineral at this place, states[2]. The rock is a basaltic breccia (tufa) in which the size of the fragments varies from that of a pea to the weight of several hundred pounds; they consist of basalt or "Wacke" or amygdaloid, the last of which contains quarz chalcedony and the "faseriger Mesotyp". Upon the specimens

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[1]) Medd. om Grønl. 32.

[2]) l. c. p. 245.

in the Museum of Copenhagen we can see that the cavities which contain the gyrolite must have been of a considerable size, at least 1—2 dm in diameter.

The minerals which accompany the gyrolite are mesolite and apophyllite, and the succession of these is very distinctly the following: mesolite, gyrolite, apophyllite. The mesolite is developed in spherical radiated aggregations of a diameter of c. 1 cm which cover the walls of the cavities and from which free needles protrude into the gyrolite but only attain the length of about 1 mm. The gyrolite forms a stratum on the inner side of the mesolite and the thickness of that stratum varies from 1 to at least 5 cm; from that some folia protrude into the apophyllite, which mineral is only found in one specimen and which consists of one very large individual (about 5 cm in diameter) without distinct crystalline faces; it seems that its form has been partly influenced through contact with other individuals of the same mineral which no longer exist.

The gyrolite is, as is otherwise the case, crystallized in radiated, foliated groups; the common size of the folia varies from 0·5 to 2 cm, the arrangement of the folia is however not so regular as commonly, for distinct spherical aggregates are not to be found, and the folia are often seen to intersect each other and in some places to form quite a complicated network.

Here and there freely developed folia are seen to protrude into small cavities and these have given me the material for crystallographical examination.

Crystalline form. The crystals have the habit of very thin hexagonal tables, the edge of which is mostly, by alteration as I think, quite uneven and without distinct faces; in some cavities it is possible to find better developed crystals with rather plane and shining marginal faces, which have allowed the following measurements to be made.

What is so far known of the crystalline form of gyrolite is very little. Giesecke describes the form as hexagonal tables;

HEDDLE[1]) obtained from the Treshinish Islands six-sided plates with the plane angles c. 128° 50′ and 115°; I cannot understand how he has got these angles, which harmonize so little with the fact that the mineral is uniaxial. Heddle describes, too, one or two bewelling faces on the edges, which he mentions as very brilliant and smooth; unfortunately he has not measured the position of these faces.

For the gyrolite from Niakornat I have found the following:

Crystalline form rhombohedral tetartohedral (rhombohedral class of GROTH); the tetartohedrism is only to be seen by the etching figures.

$$\text{Axis } c = 1{\cdot}9360.$$

The following forms have been found: $c\{0001\}$, $r\{10\bar{1}1\}$, $u\{10\bar{1}2\}$, determined by the measurements:

	Average value	Variations	Number of measurements	Calculated value
$r:c = (10\bar{1}1):(0001) =$	65° 54′	64° 19′-67° 23′	5	
$u:c = (10\bar{1}2):(0001) =$	48° 3′	47° 25′-48° 42′	3	48° 11′
$r:r = (10\bar{1}1):(01\bar{1}\bar{1}) =$	75° 58′		1	75° 32′

As will be seen the values are divergent to a rather high degree, so that they cannot be considered as very exact. This arises from the fact that the faces are not well adapted for measurements; the faces of $c\{0001\}$ are large and shining but mostly curved in different directions so that they give a number of signals in the goniometer. The rhombohedral faces are sometimes shining enough, but they are always very small and furthermore somewhat curved; the reflections, which they give, are of course mostly very indistinct. There cannot, however, exist any doubt about the correctness

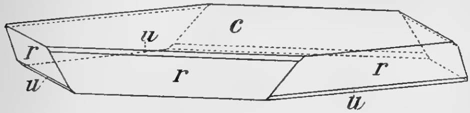

Fig. 1. *Gyrolite,* Niakornat.

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[1]) Min. Mag. 8, 1889, p. 272.

of the two determined rhombohedra, allthough the form $\{10\bar{1}2\}$ is in other cases one of the rarest of all.

The complete form of the crystals is given in figure 1.

On some crystals there can be seen small, very indistinct negative rhombohedra but these give no reflections.

No twins were observed.

Etching figures are readily produced with the aid of cold hydrofluoric acid or hot diluted hydrochloric acid, in both cases the effect lasts at the most only a few seconds. The

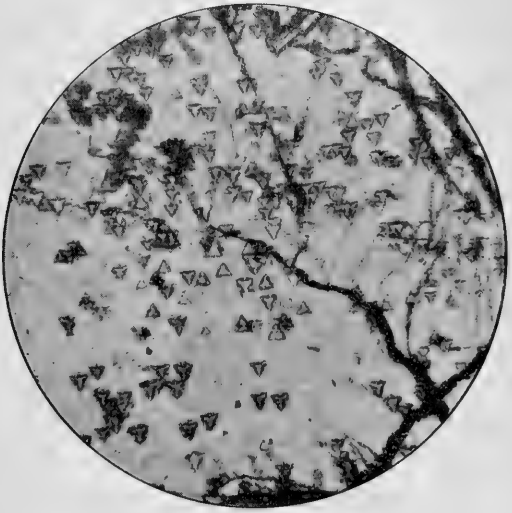

Fig. 2. *Gyrolite,* Niakornat. The etching figures on the upper and lower basis are directed opposite to each other; the former ones have the point of the triangle turned downwards. — The enlargment 1:45.

figures are of a sharp triangular form, most commonly with concave edges as will be seen on figures 2 and 3. On the first of these we see that the etching figures on the lower and upper basis are directed opposite to each other. When etching figures are made upon a crystal with rhombohedral faces we see that the sides of the triangle produced by etching are not quite parallel to the edges between $c\{0001\}$ and $u\{10\bar{1}2\}$ but are turned about 10° from that direction, to the right or to the left on the two opposite faces of $c\{0001\}$. This turning is distinctly shown on Fig. 3 where the directions of the edges $(0001):(10\bar{1}2)$ are clearly represented by the rays of the percussion figure. From this phenomenon it may be seen that this gyrolite belongs to a tetartohedral class, either the trapezohedral or the rhombohedral, and from the above named fact that the figures on the two basal planes are orientated in absolutely opposite directions one may conclude that the mineral belongs to the latter of these classes.

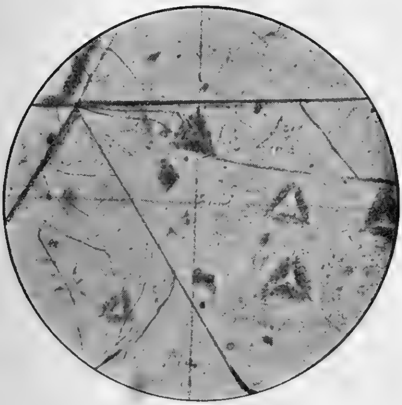

Fig. 3. *Gyrolite,* Niakornat. Etching figures; the sides of the triangles are turned about 10° from the directions of the rays of the percussion figure. — The enlargment 1:120.

Physical properties. The cleavage along $c\{0001\}$ is very strong so that gyrolite in that respect takes a place between gypsum and mica; the cleavage folia are almost perfectly inelastic and break very easily into pieces of quite irregular form; in that respect there is a small difference between the mineral from Niakornat and other forms of gyrolite which are, as a rule, somewhat flexible. A fine percussion figure can readily be made with the apparatus described by K. J. V. Steenstrup[1]) and consists of a six-rayed star, a part of which is seen on figure 3. The lustre of $c\{0001\}$ is strong pearly, of the other faces vitreous. The colour is on the fresh crystals grayish or silvery white, on the somewhat altered crystals yellowish white. The purest crystals are perfectly transparent, but mostly they are somewhat dull and, seen under the microscope, traversed by numerous stripes which are curved and pass in all directions

[1]) Geol. Fören. Förh., Stockholm, 10, 1888, p. 113.

quite irregularly; so far as can be seen because of their smallness, they consist of fluid inclusions. The specific gravity has been determined by Thoulets solution; for the purest pieces it is 2·578, while it decreases gradually with the increasing quantity of the above named inclusions; for one of the more impure pieces it has been determined at 2·463.

Gyrolite is, as stated by DESCLOIZEAUX[1]) optically negative. I have succeeded in determining the indices of refraction by the total reflectometer, using a very even face of $c\{0001\}$; the boundary lines were quite sharp and distinct; I have found:

$$\omega = 1{\cdot}5645.$$
$$\varepsilon = 1{\cdot}5590.$$

For the analysis I have selected cleavage pieces of the most perfect transparency; as the mineral is always overgrown with wery small crystals of calcite I have washed it with dilute acetic acid. The analysis was made by cand. polyt. CHR. CHRISTENSEN with the following result:

		Quotients.	Theor. I.	Theor. II.
SiO_2	54·83	0·914	56·42	55·28
Al_2O_3	4·58	0·045		4·56
CaO	31·15	0·556	35·11	31·06
Na_2O	1·74	0·028		
H_2O	8·14	0·452	8·47	9·10
Total	100·44.			

Of the water 2·45 pCt. goes away by heating to 100°; no trace of fluorine is found.

As will be seen the quantities of the different constituents do not stand in any simple relation to each other. The common formula for gyrolite, $3\,H_2O$, $2\,CaO$, $3\,SiO_2$, cannot be adopted here, as the quantity of water is but half so large as required. What part the alumina plays is not easy to see; it cannot, I think, belong to any foreign mineral e. g. feldspar as

[1]) N. R. 13, 1867.

no trace of any such impurity is to be seen on a microscopical examination of the analysed substance, possibly a small amount of kaolin or bauxite could conceal itself amongst the gyrolite, though I do not think it very probable; I have, however calculated the theoretical value (see above No. II) for a mixture of 11·55 pCt. kaolin and 88·45 pCt. gyrolite of the composition $3\,SiO_2$, $2\,CaO$, $1^1/_2\,H_2O$. On the other side, when the Al_2O_3 is added to the CaO and Na_2O, the ratio between the bases and the silica will be a little greater than 2:3; I have, also, calculated the theoretical value (see No. I) for the composition $3\,SiO_2$, $2\,CaO$, $1^1/_2\,H_2O$; we see that these values agree tolerably well with those found, and the last named formula thus most probably represents the composition of the mineral.

As one third of the water goes away at 100° it must be assumed to be water of crystallization and we thus have the following formula for this gyrolite:

$$H_2\,Ca_2\,(SiO_3)_3 + {}^1/_2\,H_2O$$

with a small part of the Ca replaced by Na or Al.

Before the blowpipe the gyrolite from Niakornat exfoliates and fuses rather easily (fusibility $3^1/_2$) to a white enamel. The same I have found to be the case with the mineral from all other localities including the original from Storr so that the statement commonly found in all handbooks that the mineral fuses with difficulty is, according to my experience, not quite exact.

The consideration of the relation between gyrolite and other minerals I shall defer until I have mentioned the mineral from other localities.

II. Gyrolite from other Greenland localities.

1. Iglorsuit on Ubekendt Ø (Unknown Island), district of Umanak. Here the gyrolite was collected by K. J. V. Steenstrup and is found in cavities with saponite

and apophyllite; the saponite is the first formed mineral but is only found in some places as small spots on the walls of the cavity; the gyrolite forms a stratum, whose thickness varies from 1/2 to 2 cm, and upon that stratum the apophyllite is found as rather large (1—2 cm) cubelike crystals, which quite fill up all the spaces between the gyrolite so that freely developed crystals of that mineral are not to be found. The gyrolite, itself, is as usual crystallized in foliated masses arranged rather irregularly; the surfaces of the cleavage folia are rather strongly curved in all directions. I have not succeeded in producing percussion or etching figures upon them; the specific gravity of the purest material is 2·446.

2. Nusak, on the southside of the peninsula of Nugsuak, the district of Ritenbenk. The specimens are collected by Rink and the rock seems to be a breccia with numerous cavities in which are found: (1) a radiated columnar mineral probably scolecite in the form of globular masses of a diameter up to 2 cm, (2) gyrolite forming a stratum of 1 to 3 cm thickness and (3) small grains of quartz of quite irregular form implanted upon the gyrolite and probably younger than this mineral; the gyrolite is crystallized in radiating foliated aggregations and it is possible to cleave out quite regular and even folia of a diameter up to 1 cm; crystalline faces are not found. Percussion figures cannot be made and the etching figures, produced by hydrofluoric acid, are quite marked but of a rounded, almost circular, form. The specific gravity is 2·412.

3. Niakornarsuk, near the foregoing place. From here we have a small specimen collected by Steenstrup with a single cavity (6 cm) the walls of which are covered with a thin (1—2 mm) stratum of thomsonite arranged in globular masses as is commonly the case; upon that mineral saponite or gyrolite is found, where they are found together the gyrolite is the younger of the two. Upon all the three other minerals are implanted flat crystals of apophyllite (see the figure 101 in

Mineralogia Groenlandica) which, however, do not cover them altogether. The gyrolite has the ordinary shape of small (1—3 mm) radiating tables which are partly freely protruding in the cavity; the cleavage folia which can be formed are very uneven and small and I have not tried to produce percussion or etching figures; on a microscopical examination it will be seen that their interior is very impure. Under the circumstances the specific gravity can have no very exact value; for one of the purest pieces I have found 2·383.

4. Iganek, on the northside of Disco, district of Ritenbenk. Here Steenstrup has found some small cavities (8 to 10 cm in diameter) the walls of which are covered with a thin (c. 1 mm) layer of thomsonite, on which is a quite uninterrupted layer (3 mm) of gyrolite; this mineral is in it turn, partly covered with cubelike crystals of apophylite; in a single place, too, there are found small botryoideal masses with exceedingly small crystals of calcite. A part of the gyrolite freely protrudes in the cavities as small crystal tables which are so much altered that they have no distinct crystalline faces. The cleavage folia of the gyrolite are rather irregular and curved and it is not possible to produce percussion and etching figures upon them. The specific gravity of the purest variety is 2·387.

5. The district of Ritenbenk without more exact indication of the locality (collected by Rink). The gyrolite is in cavities of a diameter up to 5 cm, without surrounding rock. Outermost in the cavities there is mostly a thin layer of saponite whereafter follows another thin layer (c. 1 mm) of a mineral which has much resemblance to gyrolite; as it is, however optically biaxial, it is more probably thomsonite. Next follows a layer (c. 5 mm) of a fine-grained or somewhat fibrous snow-white substance which I cannot more exactly determine, and thereafter a layer, of almost the same thickness, of gyrolite; later formed zeolites are not found here but the gyrolite is covered with some very small calcite crystals without distinct

form. The gyrolite is partly protruding in the innermost cavity as small crystal tables without determinable faces. The cleavage folia of the gyrolite are rather even and etching figures can be formed upon them of a quite rounded shape; the substance is rather impure and the specific gravity is 2·383.

6. Ivnarsuit (Skarvefjeld) and Karartut on the south side of Disco, district of Godhavn. Here have at very different times, been collected some specimens of the mineral, which show so much resemblance to each other that they must be considered as having come from the same place, the two localities being, in fact, very close together. The gyrolite is found in cavities in dolerite, the diameter of the cavities is up to 1 dm. The first formed mineral is natrolite, formed as very regular radiating masses from which fine needles protrude through the other minerals. Upon the natrolite the gyrolite is formed, covering directly the walls of the cavities where the natrolite is wanting. Innermost there are large (2—3 cm) crystals of apophyllite implanted on the two first formed minerals. The gyrolite has the form of fine spherical masses (c. 1 cm in diameter) sometimes traversed by natrolite needles but mostly very pure; crystalline faces are found on the outside but they are too small to be determined. The cleavage folia are somewhat curved and it is not possible to produce regular percussion figures upon them; etching figures of a quite circular form can be produced with hydrofluoric acid. The specific gravity, which, owing to the purity of the mineral, can be determined very exactly, is 2·418. Optically this gyrolite is sometimes feebly biaxial, the axial angle, 2 E, going up to c. 10°.

7. Karusuit in Disco-Fjord, district of Godhavn. The gyrolite from here, collected by Rink, is one of the finest and best developed examples of the mineral. The first formed mineral is in some places radiating fibrous masses, perhaps mesolite, in other places a rather hard, white, quite homogeneous,

almost opal-like substance; in general the gyrolite itself covers the walls of the cavities. The inner space of the cavities is sometimes filled up by apophyllite in large-grained masses, sometimes the gyrolite is covered by a very thin (c. 0·1 mm.) layer of an opaque yellow substance, and when this is removed crystalline faces can be seen. The gyrolite itself has the common structure of foliated masses, the single folia reaching the diameter of 1 cm, it seems to be very pure and has a fine pearly lustre. The terminal faces are very small and curved; in the goniometer they can however be determined as the fundamental rhombohedron $r\{10\bar{1}1\}$. The faces are very imperfectly developed; the base is bright and shining but highly curved so that it gives no single signal in the goniometer; the faces of $r\{10\bar{1}1\}$ are more even but very small and their reflexions of course very weak; for the angles I have got the following values:

	Average value	Variations	Number of measurements	Calculated value
$r:c = (10\bar{1}1):(0001) =$	65° 55′	64° 06′-67° 03′	4	65° 57′

The average value and the variations agree very well with those of the mineral from Niakornat; no trace of the rhombohedron $u\{10\bar{1}2\}$ is found. The physical properties are the same as from the foregoing locality, the gyrolite here being also, in many cases, optically biaxial. The specific gravity is 2·417.

8. Another gyrolite from Disco-Fjord without more specific locality shows a very great similarity to the preceding and may, perhaps, originate from the same place.

III. General remarks.

As will be seen from the foregoing most of the Greenland gyrolites show, in almost all respects, very small variations, and the same is according to what I have seen in the literature and for a great part confirmed by my own observations, the case with the gyrolite from all other countries. The only exception is the mineral from Niakornat, wich possesses so many particular properties that it may, perhaps, be somewhat doubtful if it in reality belongs to gyrolite. In the following remarks I shall point out the resemblances and the differences between the gyrolite from Niakornat and other gyrolites.

The occurrence is very uniform and characteristic. The mineral is always found in cavities in basalt or basaltic tufa; the first formed minerals associated with it in these cavities is for the Greenland localities one of the zeolites natrolite, mesolite, scolecite or thomsonite and in some cases saponite alone or together with one of the named zeolites; the last formed mineral ist mostly apophyllite and in a few cases calcite or quarz.

For the Scottish gyrolites Currie has given me the following scheme where is collected all what is known about the mineral associations[1]):

1. Faroelite-Scolecite-Gyrolite (Treshnish Islands).
2. Mesolite-Gyrolite (— —).
3. Mesolite-Gyrolite-Apophyllite (— —).
4. Faroelite-Gyrolite (— —).
5. Mesolite-Gyrolite-Apophyllite (Rudha na h'Airde Glaise, Portree, Skye).
6. Mesolite-Gyrolite (— — —).
7. Faroelite-Gyrolite (— — —).
8. Gyrolite-Apophyllite (Quiraing, Storr, Skye).
9. Faroelite-Gyrolite (— — —).
10. Faroelite-Mesolite-Gyrolite (— — —).
11. Scolecite (?)-Gyrolite (Rudha nan Clach, Skye).
12. Mesolite (?)-Gyrolite (Sanday, Canna).
13. Mesolite (?)-Analcime-Gyrolite (Sgeir Dearg, Mull).
14. Gyrolite-Xonotlite (Gribun, Mull).

[1]) 1—4, Heddle: Min. Mag. 8, p. 130; 5—6, Heddle: Trans. Geol. Soc. Edinb. 7, 1899, p. 331; 7—13, Currie (private information); 14, Heddle: Min. Mag. 5, 1882, p. 4.

From other places in the world very little is recorded about gyrolite; at Sundelaget in the Færöes, it is found[1]) with apophyllite superimposed and the same is the case with the gyrolite from New Almaden, California[2]), while it in Nova Scotia[3]) is stated to be younger than the apophyllite.

As a rule, however, we find that the succession of minerals is the following.

1. One of the zeolites: natrolite, mesolite, scolecite or thomsonite.
2. Gyrolite.
3. Apophyllite.

This association seems very difficult, if not impossible, to explain; it is highly surprising that the zeolites of the group 1 which contain the most alumina of all zeolites are found together with the gyrolite and the apophyllite which contain little or no alumina while all the other zeolites very rarely occur with them, further, the order of formation is very obvious when we take into consideration the amount of lime in the three groups; it is for the first group 0—14 pCt., for the gyrolite 30—33 and for the apophyllite c. 25 pCt. For the sake of comparison I give the composition of the three groups in the following scheme:

	1.	2.	3.
SiO_2	36—49	51—55	51—53
Al_2O_3	25—32	1—5	0—1
CaO	0—14	30—33	24—26
Na_2O	0—16	0—2	0—1
K_2O	0—1	0—2	4—6
H_2O	9—15	8—15	16—17
F	0	0—1	0—2.

The only constituents wich seem to be able to produce that succession are the alumina wich is decreasing and the

[1]) Currie: l. c. p. 94.
[2]) Clarke: Am. Journ. Sci. 38, 1898, p 128.
[3]) How.: Am. Journ. Sci. 32, 1861, p. 13.

potash and fluorine which are increasing as we go from the first to the last formed minerals.

The crystalline form is only known for the gyrolite from Niakornat and Karusuit; it is in both cases the same, with the one exception that the crystals from Niakornat sometimes have the rhombohedron $u\{10\bar{1}2\}$ which is entirely wanting on the crystals from the other locality. The form of the aggregations and the common habit of the mineral is also almost the same in all known gyrolites.

On the other side there are in the following respects very marked differences between the gyrolite from Niakornat and that from other localities:

1. The etching and percussion figures can be made very easily upon the gyrolite from Niakornat while both are very imperfect on all other gyrolites or are not formed at all.

2. The specific gravity is for the pure gyrolite from Niakornat 2·578; in other gyrolites it varies from 2·383 to 2·446.

3. The composition. As I have no analyses of the Greenland gyrolites with the exception of that from Niakornat I shall for a comparison use the older analyses of the mineral from Skye[1]), Nova Scotia[2]), New Almaden[3]), Fort Point[4]) in California and Brazil[5]).

Analyses of gyrolite:

	Niakornat	Skye	N. Scotia	N. Almaden	Fort Point	Brazil
SiO_2	54·83	50·70	51·90	52·54	53·47	52·77
Al_2O_3	4·58	1·48	1·27	0·71	0·22	0.73
CaO	31·15	33·24	29·95	29·97	32·00	33·04
MgO	—	0·18	0·08	—	—	—
K_2O	—	—	1·60	1·56	—	0·41
Na_2O	1·74	—	—	0·27	1·25	0·35
H_2O	8·14	14·18	15·05	14·60	13·21	12·58
F	—	—	—	0·65	—	—

1) Andersen: Phil. Mag. 1, 1851, p. 111.
2) How: l. c.
3) Clarke: l. c.
4) Schaller: Bull. U. S. Geol. Surv. 262, 1905, p. 124.
5) Hussak: Centralbl. f. Min. 1906, p. 330.

As will be seen the greatest difference consists in the amount of water which is much smaller in the gyrolite from Niakornat than in the others; accordingly the amount of the other constituents must, in general, be somewhat larger; another difference, which however cannot be considered as very essential, is that comparatively much of the CaO is replaced by Al_2O_3 and Na_2O. The formulæ of the minerals can, quite exactly, be expressed as follows:

Gyrolite from Niakornat $3\,SiO_2,\ 2\,CaO,\ 1^1/_2\,H_2O$,

Gyrolite from Skye, N. Scotia, N. Almaden $3\,SiO_2,\ 2\,CaO,\ 2^1/_2$—$3\,H_2O$[1]),

Gyrolite from Brazil and Fort Point $3\,SiO_2,\ 2\,CaO,\ 2^1/_4\,H_2O$.

As long as we have not found transitions between the different forms it is not possible exactly to decide if they are in reality the same mineral; I find it very probable that the gyrolite from Niakornat represents the fresh state of the mineral and that all the other gyrolites are altered by assorption of water, by that alteration the specific gravity must, of course, be lowered; the crystalline structure has been so much deformed that the etching and percussion figures cannot be made in the altered mineral, while the optical properties seem to be almost the same in both varieties, all forms of gyrolite being optically negative and either perfectly uniaxial or occasionally weakly biaxial. It is true that no similar alteration in other minerals seems to be known; but the great similarity between the different varieties of gyrolite in respect of occurrence and crystalline form seems to show that they belong to the same mineral species.

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[1]) In the case of the mineral from Skye, Andersen observed already in 1857 that onethird of the water goes off at 100°. The formula therefore for the Skye mineral — and presumably for other gyrolites with the same proportion of H_2O — should empirically be written $H_4Ca_2Si_3O_{10} + H_2O$.

Relations to zeophyllite[1]) and other minerals.

The only mineral to which gyrolite is somewhat closely related is, as far as I can see, the zeophyllite from Grosz-Priesen[2]) and Alter Berg[3]) in Bohemia. I shall in the following give a short account of the properties of that mineral, as far as they can contribute to clear up the relation between it and gyrolite.

The succession of minerals is very different in the two zeophyllite localities; at Grosz-Priesen it overlies natrolite and at Alter Berg it overlies calcite or hyalite and apophyllite and is overlaid by hyalite; we thus see, that the occurrence of zeophyllite is not quite similar to that of gyrolite, but as the last named mineral varies somewhat in that respect it is not possible to regard that fact as conclusive.

The crystalline form is by Pelikan described as rhombohedral with the base, a prism and a rhombohedron forming an angle of almost 78° with the base; Cornu has not more closely examined the mineral in that respect, upon a specimen from Alter Berg in the Museum of Copenhagen I have, however, found quite the same form. As the base is very badly developed I have measured the angle between the prism (of second order) and the rhombohedron and determined it to 31° 45′ as a mean of 6 values varying from 31° 15′ to 32° 05′; from this the angle between the rhombohedron and the base is calculated to be 79° 05′, and if we assume that the rhombohedron is $s\{02\bar{2}1\}$ we get the axial ratio for the zeophyllite:

$$c = 2{\cdot}2451$$

while for the gyrolite:

$$c = 1{\cdot}9360.$$

As the measurement of the angles are for neither of the

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1) This relation is mentioned by Cornu: Centralbl. f. Min. 1906, p. 80.
2) Pelikan: Sitzb. d. k. Akad. d. Wiss. Wien, 111, 1902, p. 336.
3) Cornu: Tschermaks Min. und Petr. Mitt. 24, 1905, p. 127.

minerals very exact they can perhaps be considered as isomorphous.

The common combination of the zeophyllite, viz $c\{0001\}$, $a\{11\bar{2}0\}$ and $s\{02\bar{2}1\}$ is represented on figure 4.

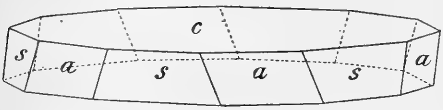

Fig. 4. *Zeophyllite;* Alter Berg, Bohemia.

The etching figures are described by Pelikan and show that the zeophyllite is tetartohedral; I think it most probable that it belongs to the same class as gyrolite, viz. the rhombohedral.

The aggregations, the cleavage and the common habit of the two minerals are quite similar; the optical properties are almost the same too, the zeophyllite being negative but exhibiting more optical anomalies than the gyrolite; the index of refraction is for the zeophyllite somewhat smaller the ω being determined by Cornu at 1·545.

The specific gravity is for the pure zeophyllite 2·748—2·765 while it for the gyrolite from Niakornat is 2·578.

The composition is given by Pelikan for the zeophyllite:

$$Si_3 O_{11} Ca_4 H_4 F_2$$

for the gyrolite from Niakornat it is:

$$Si_6 O_{19} Ca_4 H_6$$

so that we find in that respect a great difference between the two minerals.

Although there are many similarities between the zeophyllite and the gyrolite they must be considered, as two well defined minerals which are, most probably, isomorphous and form a very interesting group of the calcium zeolites; unfortunately these are, with the exception of apophyllite, very imperfectly known and consequently it is difficult if not quite impossible to point out the relations between them. Some of them come very near to gyrolite in composition and are, perhaps, only a very fine grained form of that mineral. The most interesting of these minerals seems to be the centrallassite[1]) which in physical properties viz. laminar structure and strong pearly lustre, seems to be identical with the gyrolite and in respect to specific gravity (= 2·45—2·46) and chemical composition directly to form a transition between the two forms of gyrolite. Most of the analyses, to the sure, contain more SiO_2 than the gyrolite, but one of them has only 54·72 p. ct. SiO_2 and perhaps the other may be impure from some free silica as is assumed to be the case with the variety of centrallassite named cyanolite; in other respects (Al_2O_3 1—2 p. ct. and H_2O c. 11·5 p. ct.) the mineral will be seen to take a position between the gyrolite from Niakornat and the other gyrolites.

Another mineral which is very nearly related to gyrolite is tobermorite[2]); in physical respects it is so fine grained an aggregate that cleavage etc. cannot be observed; the specific gravity is 2·423. The analyses show that the amount of SiO_2 (46·51—46·62 p. ct.) is smaller than in gyrolite, but in respect to CaO, Al_2O_3 and H_2O it closely resembles centrallassite.

Okenite does not stand very far from gyrolite in composition, but here the physical properties show that the two minerals cannot be very nearly related to each other.

The rest of the calcium zeolites, viz. the chalcomorphite, the plombierite, the louisite and the zonotlite, differ in composition very much from gyrolite; chalcomorphite[3]) is found as very small hexagonal crystals with the axis $c = 1{\cdot}9091$ (it is almost the same as in gyrolite); as the mineral is, however, holohedric and the cleavage parallel to the base is only described as "distinct" it is most probable that the similarity of the axial ratios must be considered as quite accidental.

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[1]) How: Ed. n. phil. Journ. 10, 1859, p. 84 and Phil. Mag. 1, 1876, p. 128.
[2]) Heddle: Min. Mag. 4, 1890, p. 119.
[3]) C. v. Rath: Pogg. Ann. 1873: Erg.-Bd. 6, p. 376.

Appendix.

After the above paper was written I received from CORNU[1]) a very interesting treatise upon gyrolite and related minerals. According to this the mineral from Niakornat is a new mineral species and it is named *reyerite* and besides the differences between it and gyrolite, which I had already found, there is also stated to be a small difference in respect to the index of refraction, the ω of the gyrolite being determined at 1·54—1·55 while for the reyerite it is 1·5645. The reyerite is, stated to originate from Disco as well as from Niakornat; it may, however, be the same locality as Niakornat was formerly described as a locality upon Disco, as we have seen above. As the paper by CORNU is stated to be a preliminary one a more exact description of the specimens will, perhaps, clear up this point.

As Greenland localities for gyrolite there are named:

1. Korosoak (= Kororsuak near Godhavn): from that place I have found no gyrolite; CORNU describes three different varieties all occurring together with apophyllite partly older and partly younger than that mineral.

2. Karatut near Godhavn (= Karartut, see above p. 105) here the gyrolite is described as implanted upon apophyllite, while, on the specimen examined by me it is distinctly older than that mineral; the form described as small spheres, also shows that the specimens are quite different from each other.

3. Niakornak. From that locality I have found no gyrolite besides the above named which by CORNU has been termed reyerite.

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[1]) Tschermaks min. u. petr. Mitth. 25, 1907, Heft 6.

V.

Geologiske og antikvariske Iagttagelser

i Julianehaab Distrikt.

Af

K. J. V. Steenstrup.

1909.

Paa forskellige Rejser, i Aarene 1874, 76, 77, 88 og 99, har jeg haft Lejlighed til at undersøge Fjordene Tunugdliarfik, Kangerdluarsuk og Igaliko ved Julianehaab. Hensigten med disse Rejser var dels en Indsamling af de sjeldne Mineralier, der dér forekomme, dels at skaffe en almindelig Oversigt over de geologiske Forhold. Fra Rejsen i 1876 foreligger en til Professor Johnstrup indgiven foreløbig Beretning, der blev trykt uden hans og mit Viden, da den, som Bilag var indsendt til Rigsdagen[1]; og i 2det Hefte af «Meddelelser om Grønland» findes et geologisk Kort over denne Egn med Forklaring. I 1877 besøgte jeg under et kortere Ophold igen denne Egn; og, da alle Bjergartsprøverne og den største, om end ikke just den væsentligste Del af de i Aarene 1876 og 77 indsamlede Mineraler vare gaaede til Grunde ved Christianborgs Brand i 1884, besluttedes det i 1888 at jeg igen skulde rejse derop for at forsøge paa at erstatte det tabte. Paa den Tid var Spørgsmaalet om Gasglødelyset stærkt fremme og Opmærksomheden derved henvendt paa Eudialyten paa Grund af dens Indhold af Zirkonsyre. Kryolith-Mine- og Handels-Selskabet søgte saa Indenrigsministeriet om Tilladelse til at lade indsamle og bryde et større Parti Eudialyt for dermed at anstille Forsøg. Da jeg den Gang, paa Grund af mine tidligere Undersøgelser, vel omtrent var den eneste der vidste nogen Besked om den Maade, hvorpaa Eudialyten forekom, henvendte Kryolithselskabet sig til

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[1]) Tillæg B til Rigsdagstidenden for 1877—78.

Professor Johnstrup, der dengang var Formand i Kommissionen for Grønlands geologiske Undersøgelse, og bad om jeg maatte lede den Expedition det agtede at udsende. — Dette gik han med Glæde ind paa, da Kommissionens Opgave jo ikke alene var videnskabelig at undersøge Grønland men ogsaa at fremdrage de Naturprodukter, der kunne have teknisk Betydning, og derved mulig blive en Indtægtskilde for Landet, som Kryolithen. — Vel vidste jeg nok hvor Eudialyten skulde søges, men jeg havde dog ingen Anelse om i hvor stor en Mængde, selv en overfladisk og løselig Indsamling kunde skaffe tilveje, hvorfor jeg, da Selskabet spurgte mig om hvormeget jeg troede en halv Snes Arbejdere i en halv Snes Dage kunde indsamle, ikke turde love mere end nogle faa Tusinde Kilo. Resultatet var imidlertid, at denne første Indsamling indbragte c. 15000 Kilo, hvoraf omtrent Halvdelen kunde anses for ren Eudialyt.

Uagtet det hed sig, at Eudialyten var usælgelig og at Selskabet laa inde med hele Lageret, saaledes fortalte Professor Thomsen mig, at de vel havde solgt et Parti, men faaet det tilbage, da vedkommende Fabrik ikke vilde anerkende at det indeholdt den Zirkonsyremængde der var forudsat; — saa besluttede Kryolithselskabet dog igen i 1899, atter efter indhentet Tilladelse, at lade foretage en lignende men noget større Indsamling af Eudialyt, og henvendte sig saa igen til mig om at lede Expeditionen. Uagtet jeg havde besluttet ikke oftere at rejse til Grønland, da jeg paa min sidste Rejse i 1898 til Nord-Grønland havde følt at jeg ikke længere kunde taale de idelige Bjergbestigninger der vare forbundne dermed, saa kunde jeg dog ikke modstaa Professor Jul. Thomsens elskværdige Opfordring, hvorved jeg jo ogsaa endnu en Gang vilde faa Lejlighed til at færdes i denne, saavel i geologisk som i antikvarisk Retning lige interessante Egn. — Resultatet var, at der denne Gang hjemførtes c. 44000 Kilo uren Eudialyt. Dette Minerals Forekomst vil senere i denne Beretning blive omtalt, hvorimod selve den Maade, hvorpaa Eudialyten efter min Anvisning indsamledes og brødes ikke her omtales paa Grund af et udtrykkeligt udtalt Ønske af Kryolithselskabets nuværende ledende Direktør Dr. phil. H. Topsøe.

For Oversigtens Skyld ere mine Iagttagelser fra de forskellige Rejser samlede i følgende 3 Afsnit:

1) De geologiske, særlig den gamle røde Sandsten. 2) Mineralogiske Iagttagelser og Indsamlinger, og 3) Antikvariske Iagttagelser.

1. Den røde Sandsten.

Allerede Hans Egede blev paa sin Rejse i 1723 for at finde Østerbygden, af Grønlænderne gjort opmærksom paa, at der inde i Fjorden Tunugdliarfik fandtes «en slags brunrød Farve, desligeste røde Stene med hvide Spætter udi»[1]; først Peder Olsen Walløe paa sin Rejse til Østkysten i 1751, stiftede nærmere Bekendtskab med den røde Sandsten, da han den 12te September s. A. kom til Sidlisit: «her blev mig anvist 2 Bjerge nær hos hinanden, som havde god Forraad af bruunrød Farve; men i Udkanten af den ene var en Vinkel som bestod af kolørede Stene, røde med hvide Pletter og derfor kunde lade sig udkløve i store og smaa Fliser, saa meget man lystede». Hertil føjer Otto Fabricius: Jeg besidder en Prøve af disse Stene som til Nød kunne bruges som Hvedsestene, og deraf har vel Stedet sit Navn: Sidlisit, betyder paa grønlandsk Hvæssesten[2]). Ogsaa Arctander, paa sin Rejse i 1777 besøgte efter Grønlændernes Anvisning dette Sted, ligesom han ogsaa efter deres Anvisning besøgte Stedet ved Ipiutak, hvor de mange Kvartskrystaller findes[3]).

Giesecke omtaler paa sine Rejser i 1806 og 1809 flere Steder, hvor den røde Sandsten forekommer i denne Egn, og

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1) Omst. og udførl. Relation ang. den grønl. Mission. Kbhvn. 1738. S. 115.
2) Ugebladet Samleren. I. 1787. S. 172.
3) Ugebladet Samleren VI 1793. S. 1125; cfr. M. o. G. II. S. 37 og XXXII. S. 72 og Tillæg B til Rigsdagstidende for 1877—78. S. 7.

fremhæver navnlig den inderlige Forbindelse der er mellem Sandstenen og de den gennemkrydsende Gangmasser, der, f. Ex. ved Igaliko, have et fuldstændigt lavalignende Udseende. Dog gaar han vel vidt, naar han tilføjer: die Oberfläche des Gebirges selbst hat durchaus ein verbranntes Aussehen[1]. I sin Afhandling: «Greenland» i Brewsters «The Edinburgh Encyclopædie» kalder han Sandstenen Old red Sandstone[2].

Dr. C. Pingel besøgte i 1828 Igaliko og har i Vidensk. Selsk. Skrifter[3] givet en Beskrivelse af Sandstenen og de den gennembrydende Porphyrganges Optræden. Paa Grund af dette Forhold mellem den røde Sandsten og Porphyrgangene henfører han den første til Tyskernes: Rothes Todtes Liegende, altsaa til den Permiske Formation. Da hans Undersøgelser kun strakte sig til Igalikos allernærmeste Omegn og kun til en ringe Højde over Vandfladen, c. 200 m. have hans Inddelinger af Sandstenlagene og Porphyrgangene ikke den almindelige Betydning, som man efter hans Fremstilling skulde tro.

Paa Holms og mit Kort fra 1876[4]) har jeg angivet den røde Sandstens Grænse, saavidt jeg efter dette ene Aars Undersøgelser kunde overse Forholdene, og mine senere Undersøgelser have ikke i nogen væsentlig Grad forandret noget deri, saa jeg har ikke anset det for nødvendigt at tegne et nyt Kort; og saalænge ikke et mere detailleret Kort foreligger, tror jeg heller ikke at det behøves. Grænserne mod Fjordene ere jo angivne med den Nøjagtighed, hvormed disse ere aflagte og Grænserne paa Land er det umuligt at angive med nogen Nøjagtighed, saalænge Terrainforholdene dér kun ere saa løst skitserede, som det for Øjeblikket er Tilfældet.

Som det ses af Kortet er det i det Indre af Halvøen,

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1) Dagbog 18/8 1806.
2) Optrykt af Johnstrup sammen med Gieseckes Dagbog S. 343.
3) Om den af Porphyrgange gennembrudte røde Sandsten i det sydlige Grønland i X. Del (S. 299—317). (Naturv. math. Skrifter.)
4) M. o. G. II. Tav. I.

mellem Sermilik og Tunugdliarfik, at den røde Sandsten har sin største Udbredelse, medens den de andre Steder hvor den forekommer, som ved Igaliko og i Bunden af Kangerdluarsuk kun optræder som mindre Partier, der paa Grund af særlig Fasthed eller paa Grund af Terrainforholdene ere blevne delvist skaanede for Iserosionen. Alle Isfurerne paa Klipperne vise hen til, at Isbevægelsen er kommen fra Indlandet, fra NØ., og Isfurerne paa Toppen af Nunasarnausak (755 M.) og paa Toppen af Nulupĸaĸak (812 m.) vise, at Isens Mægtighed maa have været saa stor, at selv saadanne Fjeldtoppe ikke have formaaet at paavirke Isstrømmens Retning; den er gaaet hen over dem, som om det var uvæsentlige Hindringer. I 1877 besteg daværende Løjtnant J. A. D. Jensen og jeg en af Ilimausaks højeste Toppe (1376 m.), hvor der dog, vistnok paa Grund af Bjergartens sprængte Beskaffenhed, ingen Isfurer saas, men derimod fandtes der indtil en Højde af c. 1200 m., en Mængde afrundede Sten af forskellige Bjergarter. Selve Toppen er Diabas[1]).

Det maa altsaa have været en mægtig Isstrøm, der i sin Tid har gaaet hen over Narssak og Julianehaabs Halvøerne; hvor kun enkelte Fjeldtoppe som Ilimausaks og Redekammens[2]) ragende op derover. Det er derfor naturligt, at den røde Standsten, med de underordnede Lag af Diabas, flere Steder ere næsten fuldstændig borteroderede, som i Lavningerne mellem Sermilik og Tunugdliarfik og paa Overbærestedet ved Igaliko. Gaar man saaledes fra Kagsiarsuk over til Tassiusak i Sermilik,

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[1]) Som et Bidrag til Kendskabet til den varme SØ.-Vind, Føhnen, der saa ofte omtales i Grønland, kan anføres, at det blæste en stormende varm SØ. ved Udstedet Narssak, den Dag, den 18. September, vi besteg den ovennævnte Fjeldtop paa Ilimausak. Kl 8 Fm. var det ved Udstedet 16°,0 C., medens det paa Toppen af Fjeldet, Kl. 3 Em., var 10°,5 C.; men en kold Vind med Snebyger gjorde Opholdet der meget ubehageligt. — Ved Udstedet var det trykkende varmt hele Dagen. Barometret steg her i Dagens Løb fra 767,0 m til 767,4 m.

[2]) Tillæg B til Rigsdagstidenden for 1877—78. S. 9.

støder man, i det her forholdsvis stærkt bevoxede Terrain, snart paa Sandsten, snart paa Diabas og snart paa Granit, uden at det er muligt at angive Grænserne mellem dem. Er det saaledes kun muligt meget omtrentlig at kunne angive Grænserne for den røde Sandsten, saa er det endnu vanskeligere at angive dens oprindelige Mægtighed før Isdenudationen. Vel kan man vistnok sige, at man ingen Steder faar Indtrykket af, at den gaar synderligt ned under Vandfladen, saa man maa antage, at den er synlig i hele sin nuværende Mægtighed; men paa den anden Side faar man et ligesaa bestemt Indtryk af, at der maa være eroderet saa meget bort af de øverste Lag, at det er umuligt at danne sig et Begreb om hvor stor Mægtigheden har været før Isen begyndte sin Erosion. Der findes jo heller ikke Spor af, at Sandstenen har været overlejret med yngre Dannelser, saa heller ikke herfra kan der hentes Bidrag til Forstaaelsen af hvorledes denne Sandstensformations øverste Lag have været beskafne.

Det højeste Punkt jeg har maalt, hvor Sandstenen, eller Kvarsiten, som den her nærmest maa kaldes, er blottet, er i Partiet indenfor Musartût, hvor den naar op til en Højde af c. 800 m.; og da Graniten træder frem ved Kysten nær Vandlinien, kan man altsaa sige at Formationen her er synlig i hele sin nuværende Mægtighed. Lejringen er sjelden ganske horizontal, der er som oftest et Fald paa 5—10° og da særlig i sydvestlig Retning; men deraf at ville udlede en Korrektion til den ovenfor angivne Højde, vil ingen Betydning have. Et andet Forhold, der er af langt større Betydning for Bedømmelsen af Sandstenens Mægtighed, ere de mere eller mindre mægtige Diabaslag der altid optræde mellem Sandstenlagene. Kornerups Tegninger paa Tavle II i Hefte II af M. o. G. kunne give et Begreb om det Indtryk, man faar af disse Bjergarters indbyrdes Forhold paa et Par af de mest karakteristiske Steder: Nunasarnausak i Kangerdluarsuk og Nordkysten af Tunugdliarfik fra Nunasarnak til Sidlisit. Ogsaa Tavle VII, i dette Hefte, der viser Nunasarnak set fra Odden ved Ipintak, kan tjene til at anskueliggøre dette Forhold. At udpege hvilke af de paa dette Billede synlige Lag der ere Diabas eller Sandsten, er ikke muligt, da et nærmere Eftersyn paa selve Stedet viser, at det snart er Sandstenen, snart Diabasen, der alt efter Strukturen danne de stejlt affaldende Lag.

Sandstenens direkte Paalejring paa Graniten ses enkelte Steder, som i Nunasarnausak, hvor Granitens øverste Del da er opløst til en Arkose. Nederste Billede paa Tavle XII viser Graniten paa en lille Odde mellem Sidlisit og Nugarsuk, altsaa paa Grænsen mod Sandstenen, hvor Graniten er opløst til Grus; men om dette Forhold skyldes det Tilfælde at man her, efter Sandstenens Bortfjernelse, har den gamle forvittrede Overflade, eller det skyldes Bjergartens Beskaffenhed saa den paa dette Sted let henfalder til Grus, kunde jeg ikke se. Graniten her og i Omegnen er i Reglen graafarvet af Feldspathen. Denne forvittrer, kaoliniserer paa Overfladen, saa f. Ex. isskurede Flader faa et hvidt Udseende, hvorfor saadanne Næs paa grønlandsk kaldes kakortok; f. Ex. Hvide Næs ved Julianehaab.

Dr. C. Pingel skelnede i sin Tid mellem forskellige Sandstenlag ved Igaliko; men i det store og hele har det ikke været mig muligt at paavise væsentlige Forskelligheder mellem de Lag, der dér ligge umiddelbart paa Graniten og de Lag, der ligge øverst, hvor Sandstenen, inklusive Diabaslagene naa en Mægtighed af c. 800 m.

Som Navnet udsiger, er Sandstenen i Reglen rød, rødbrun eller gulrød til graa; men mange Steder er den ogsaa hvid, grøn, violet eller svag rosarød, og visse Lag ere fuldstændig klare som Glas, saa de enkelte Sandkorn næppe eller endog slet ikke kunne skelnes. Andre Steder ere hele Kvarsitlag kulsorte, og atter andre Steder er Sandstenen flammet af grønne, røde, hvide og violette Striber; ikke at tale om at den er overfyldt med gule Pletter, saaledes som den nederste Figur paa Tavle XIV viser det.

Sandstenen maa vistnok, som Helhed betragtet, betegnes som en Kvarsitsandsten, og med Hensyn til Kornstørrelsen som grovkornet, idet de enkelte Sandkorn i Almindelighed have en Størrelse af fra 1 til 3 mm. Bindemidlet er i Reglen kiselholdig, saa Fastheden som oftest er stor. Hertil maa dog bemærkes, at paa Grund af den stærke Isdenudation, er det kun sjeldent, at andre end de fasteste Partier ere blevne levnede. Urent Jærnilte danner Bindemidlet i de løsere Partier, ligesom det ogsaa findes udskilt i tynde Lag. Som ovenfor nævnt tiltrak disse Lag sig derfor Opmærksomheden i ældre Tid, da de kunde anvendes til Farve. Ogsaa tynde Lag af en haard Rødjærnsten findes; og det er interessant at se, hvor spejlblanke dens isskurede Flader endnu ere paa Stedet; hjembragte i Museet blive de efter et Par Aars Forløb matte og hensmuldre tilsidst. I Sandstenen findes flere Steder hele Lag af nævestore, sjeldent hovedstore Rullesten, hvis stærkt afrundede og ofte noget flade Form, karakterisere dem som Strandsten. Disse Lag naa dog sjeldent en Mægtighed af mere end et Par Meter, og de synes hurtigt at kile ud, saa de tilsidst kun bestaa af et enkelt Lag Rullesten. Disse bestaa som oftest af Sten, der synes identiske med Sandstenen selv, dog findes ogsaa Rullesten af Granit, Diabas, Agat og Jaspis. Disse Rullesten bære ofte Mærker af det uhyre Tryk, der maa have været udøvet paa dem, idet de ofte ere sprængte og Brudstykkerne forskudte. Disse Brudstykker ere saa igen sammenkittede med Kvarts. Andre af disse Rullesten bære Mærker af Indtryk af Naborullestenene.

Hvad Sandstenens Struktur angaar, da kan denne være meget forskellig, ligefra tyndskifret som i Slibestensfjeldet, (se øverste Figur paa Tavle XIII og nederste Figur paa Tavle XIV) til en saa kompakt Masse, at Lagdelingen kun fremtræder som en Bænkning, saaledes som denne kan vise sig hos Graniten. Mærkelig nok kan der, som paa de smaa Bratninger ved Vandet ved Igaliko (der ses midt paa Billedet paa Tavle VI) i en saadan haard kompakt isskuret Kvarsitsandsten, ved en god Belysning ses svage Linier, der kun kunne tydes som om Sandstenen bestod af en skarpkantet Breccie[1].

Hvor Sandstenen bliver tyndskifret og finkornet, søger man uvilkaarlig efter Forsteninger; men uagtet jeg har anvendt en ikke ringe Tid paa at søge efter saadanne, lykkedes det mig dog aldrig at finde nogen. Ved Musartût er der ejendommelige runde Kugler af Sandsten i Sandstenen, c. 3 cm. i Tværsnit; men de ere uden Struktur og sidde i Reglen saa fast, at det kun lykkedes at faa enkelte løse.

Uregelmæssige Partier af hvid storkrystallinsk Kalkspath findes flere Steder i Sandstenen uden at det er klart hvorledes de ere dannede.

Paa Spalter i Sandstenen findes flere Steder Kvartskrystaller, oftest ejendommelig flade og skæve, ofte tillige overtrukne med Jærnglimmer, som ved Ipiutak[2]), Iganek og Nunasarnausak. Af Grønlænderne ved Igaliko modtog jeg i 1899 et haandstort Stykke Tungspath, der skal være fundet i Sandstenen ved Musartût.

Bølgeslagslinier findes overalt i Sandstenen, det være sig saa enten denne er tyndskifret eller saa fast og kompakt, at ethvert Spor af Lagdeling er udvisket. Hvor store Flader ere blottede, er det interessant at se, at Vindretningen, der har sat Vandet og dermed Sandet i Bevægelse, under Tiden har været den samme medens flere Lag ere blevne afsatte; saaledes saas det paa Højderne Ø. for Overbærestedet ved Igaliko, at Nordostvinden maa have været fremherskende der paa Stedet gennem lange Tidsrum.

Som Dr. C. Pingel fremhævede, er den røde Sandsten saa inderlig forbunden med Gange og Lag af Diabas og Por-

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[1]) En saadan saas ogsaa og langt tydeligere ved Musartût. Se ogsaa Pingel l. c. S. 11.

[2]) M. o. G. II, S. 37 og XXXII, S. 72. Tillæg B til Rigsdagstidenden 1877—78. S. 7.

phyr, at han derfor mente at maatte henføre den samlede Dannelse til den nederste Afdeling af den permiske Formation. En Anskuelse jeg efter mine Undersøgelser i 1876 mente at maatte tiltræde[1]. Efter nyere Undersøgelser synes det derimod at denne Sandsten maa henføres til endnu ældre Dannelser; hvorvel Spørgsmaalet næppe kan afgøres, før et heldigt Træf bringer Forsteninger for Dagen.

Petrografisk ere Diabaslagene og Porphyrgangene ikke undersøgte, saa der for Øjeblikket ikke kan siges noget om deres mineralogiske Sammensætning og Samhørighed. Kun skal jeg bemærke, at de horizontale mere eller mindre mægtige Lag i Reglen have Diabasstruktur; medens Gangene i Almindelighed have Porphyrstruktur. Gangene gaa i Reglen lodret gennem baade Sandsten og Diabaslagene, som om de stode dem begge lige fjernt; dog ses det enkelte Steder, som f. Ex. ved Igaliko, hvor en ejendommelig rødbrun Slaggemasse, som en 13 m. bred lodret Gang, til begge Sider udsender 3 m. brede horizontale Gange ind mellem Sandstenlagene, saa det ser ud, som om disse Gange vare underordnede Lag i Sandstenen. I det Hele tror jeg ikke, at Diabasen maa opfattes som optrædende i Lag, det der synes saa, er vistnok kun horizontale Gange, intrusive Lag; saaledes som jeg ogsaa i sin Tid søgte at hævde det, for de Basaltlags Vedkommende, som Rink og Nordenskiöld omtalte at der fandtes i de kulførende Dannelser i N.-Grønland[2]. At Diabasen er yngre end Sandstenen, og som smeltede Masser er brudt frem gennem den, er der ofte Bevis for, se saaledes Tavle XV øverste Billede, der viser en lavalignende Strøm, der er afsondret i smukke Søjler, og hvis Overflade har et fuldstændig slaggeagtigt Udseende, Fig. 1. Derimod har jeg ikke et eneste Sted set, at et Sandstenlag, der hviler paa Diabas, i sin nederste Del er dannet af vejrsmuldret Diabas, saaledes som det ses, hvor Sandstenen hviler paa Granit. Baade kemisk

[1]) Tillæg B til Rigsdagstidenden for 1877—78, S. 7.
[2]) M. o. G. IV, S. 188.

og dynamisk have derimod baade Sandstenen og Diabasen paavirket hinanden. Saaledes kan Sandstenen baade blive skifret og affarvet paa Grænsen mod Gangene; medens Sandstenen igen kan have paavirket Gangmassen, saa denne i Reglen er tæt mod Sidestenen, og først i Midten bliver storkrystallinsk og porphyritisk. Rent mekanisk har Diabasgennembruddene undertiden stærk paavirket Sandstenlagene, idet disse kunne være bøjede til hele Buer, som i Tunugdliarfik, V. for Overbærestedet, se nederste Figur paa Tavle XIII, eller som ved Igaliko, hvor det ses, at Diabasgennembruddet har været for-

Fig. 1. Diabasens slaggeagtige Overflade Musartût. (1/2).

bundet med betydelige Spring og Forskydninger i Sandstenlagene. Se venstre Side af Billedet paa Tavle VI; det samme ses paa nederste Billede af Tavle X, der viser Fjeldet Iganek lige over for Igaliko. Atter andre Steder ser man Sandstenlagene ligesom tværede ud i hinanden.

I Sandstenlagene har jeg aldrig fundet kulholdige Skifere; men at der ikke desto mindre maa have fundet organiske Aflejringer Sted den Gang, det bevise ikke alene de sorte Kvarsitlag, der findes f. Ex. paa Nunasarnausak, men ogsaa et ejendommeligt grafitholdigt Lag, der forekommer i et stærkt forandret Diabaslag i Iganek paa Østsiden af Fjorden ved Igaliko.

Paa Grund af den stærke Isdenudation, der har borttaget alle de løsere Partier af Sandstenen og Diabasen og afrundet de fastere Partier, saa disse kun træde lidet frem, og endelig paa Grund af den for Grønland forholdsvis frodige Vegetation, er det vanskeligt at faa et almindeligt Overblik over disse Bjergarters indbyrdes Optræden. Jeg skal derfor til Slutning nøjes med at anføre, hvad jeg paa forskellige Steder har noteret mig om Sandsten og Diabaslagenes indbyrdes Forhold.

1. Nunasarnausak. Ved at gaa fra Siorarssuit i Tunugdliarfik op ad Nunarsarnausaks Nordside iagttoges følgende: I selve Stranden er Syeniten fremherskende, men lidt Vest derfor gaar den over i grøn Hornsten, en næsten jaspisagtig Masse, der igen gaar over i en hvidgrøn Kvarsit. Skraaningen op efter er bedækket af forvittret Syenit, der ved et leragtigt Bindemiddel er hærdnet til en grov løs sandstenagtig Masse. I en Højde af 380 m. træder Sandstenen frem som afvexlende hvide og sorte Lag, der dog ogsaa gaa over i hinanden. De hvide Lag vare de tykkeste, c. 3 dm., de sorte noget tyndere, c. 2 dm. I en Højde af 392 M. saas et Conglomeratlag i Sandstenen med indtil 2—3 Cubikdecimeter store Sten, der som oftest vare knuste. Blandt dem fandtes nogle der havde et fuldstændigt agatlignende Udseende. Dette Conglomeratlag stod med en skarp lodret Grænse mod et tæt blegrød Kvarsit. Fra 529—560 m. saas et Kvarsitlag, der dækkede et Diabaslag, der igen syntes at dække over en skifret graa Kvarcit. I en Højde af 584 m. fandtes igen et 2,5 m. mægtigt Conglomeratlag, hvori Stenene syntes at være af samme Beskaffenhed som den omgivende Sandsten. Ved 605 m. saas et Diabaslag der gennembrødes af en 1,5 m. mægtig Porphyrgang. Lagene falde her c. 10° i NNØ. Det øverste Parti af Nunasarnausak, der naar op til en Højde af 750 m., er Diabas med flere Porphyrgange, hvoraf én, der var 8 m. mægtig, udmærkede sig ved at være meget storkrystallinsk. Ved imidlertid at gaa op paa Nunasarnausak, paa andre Steder, har jeg fundet at Lagfølgen og

Mægtigheden af Lagene var endel forskellig fra hvad her er angivet.

2. Putdlisek, saaledes synes paa Tunugdliarfiks Sydside, henimod Overbærestedet, et Sted at kaldes, der tiltrækker sig Opmærksomheden ved at Sandstenslagene ere meget stærkt bøjede, saa de danne hele Buer; se nederste Billede paa Tavle XIII. Foruden i de store Buer er Sandstenen knust og udtværet til en Breccie med Kvarts til Bindemiddel. Denne stærke Paavirkning synes fremkaldt af et Diabasgennembrud. Lidt vestligere i Stranden bliver Sandstenen tyndskifret og hælder under store Vinkler, saa man faar Indtrykket af, at det hele kun er en Skal, der dækker det bagved liggende Grundfjeld.

3. Igaliko. Selve Underlaget af Sletten ved Igaliko er, som Dr. C. Pingel i sin Afhandling anfører, Sandsten gennembrudt af Porphyrgange, dog er der langt flere af disse, end man efter hans Fremstilling skulde tro. Tavle VI viser Igalikosletten set fra Skæret med Ruinen. Over Husene, der ses i Midten af Billedet over den stejle Sandstenskrænt ved Vandet, hæve Sandstenlagene sig i Afsatser, hvis Beskaffenhed bedst undersøges i de mange Kløfter, der gaa lodret paa Skraaningen. Disse Kløfter staa ofte i Forbindelse med Porphyrgangene og Diabaslagene, og betydelige Spring og Forskydninger ses at staa i Forbindelse med disses Gennembrud. Det er denne Fjeldskraaning, der strækker sig over den største Del af Billedet paa Tavle VI, og som naar en Højde af c. 200 m., Dr. C. Pingel i sin Tid beskrev, og som han delte i 3 Afdelinger efter Sandstenlagenes Beskaffenhed. Det gaar imidlertid her, som ovenfor omtalt ved Nunasarnausak, at man kommer til forskellige Resultater, hvad Bjergarternes Mægtighed og Beskaffenhed angaar, efter som man gaar op i den ene eller den anden Kløft.

I en af disse, omtrent lige over Husene, var Sandstenen i en Højde af 150 m. skifret og dækket af et mægtigt Tuflag, der fuldstændig lignede en vulkansk Tuf, tildels med Slaggestruktur og indeholdende Rullesten af Sandsten og Gnejs. I en Højde af 200 m. var Sandstenen stærk jærnholdig og fuld af rullede Sten, hvoraf de fleste vare Sandsten men ogsaa mange af Diabas. I en Højde af 230 m. blev Sandstenen grovere og indeholdt Rullesten af Sandsten og Kvarsit. Herunder laa et mere eller mindre sandholdigt rødjærnstenholdigt Lag, der havde en Mægtighed af indtil 2 m. Ved at gaa op ad en anden Kløft, Kurusuk kaldet, og som ses længst til venstre paa Tavle VI, saas følgende: Det nederste Diabaslag laa i en Højde af 52 m. og havde en Mægtighed af 6—7 m. Sandstenens Grænse mod den overliggende Diabas var ligesom angreben og gennemtrængt af porøs Jærnilte. Diabasen var mod denne Grænse stærk skifret. Lagene paa begge Sider af Kløften viste, at der her var sket en vertikal Forskydning af c. 8 m. Flere Porphyrgange gik lodret gennem Diabasen og Sandstenen. I en Højde af 98 m. saas i Sandstenen et c. 7 dm. mægtigt Conglomeratlag, hvis Sten væsentlig bestode af en hvid og blaalig Kvarsit, rød, brun, violet og blegrød Sandsten og endvidere en rød Granit. Stenene vare ofte pressede og havde Indtryk af hinanden, eller knuste, saa Brudstykkerne vare forskudte. I den næste Kløft mod N. lige ved Ujarartarfik ligger Overfladen af den røde slaggeagtige Diabas i en Højde af 64 m.; ogsaa her findes et Conglomeratlag. Lige over Ujarartarfik ser det ud som om den røde slaggeagtige Diabas var flydt ud over et c. 1 m. mægtigt Lag af Rullesten. I en Højde af 149 m. findes i en slaggeagtig Diabas Blokke af rød Sandsten, dels skarpkantede, dels helt afrundede. I en Højde af 236 m. saas et Diabaslag, der var opfyldt af smaa runde Concretioner. Laget var spaltet i smukke 6sidede Søjler, og gjorde Indtrykket af at være hærdet Tuf. I en Højde af 336 m. saas igen i Sandstenen et Diabaslag. Paa Nullupkakak naar Sandstenen op til en Højde af c. 520 m.

4. Iganek. Dette 560 m. høje Fjeld, der ligger lige over for Igaliko, paa den anden Side af Fjorden, ses nederst paa

Tavle X. Det er af lignende Beskaffenhed som Fjeldet over Igaliko, men med endnu mere udprægede Spring og Forskydninger, hvilket ogsaa Billedet antyder. Foden af Fjeldet er Syenit, og saavel gennem denne som gennem Sandstenen, der her gennemgaaende er graa kvarsitagtig, gaa en Mængde røde Porphyrgange. Flere Diabaslag ses, og c. 50 m. under Toppen findes en ejendommelig Kontaktdannelse, hvori Graphit og Apatitkrystaller danne en karakteristisk Bestanddel.

5. Nunasarnak. Tavle VII viser dette karakteristiske Fjeld set fra Ipiutak. Det bestaar af afvexlende Lag af Sandsten og Diabas. Selv har jeg ikke undersøgt det, men daværende stud. polyt. Alb. Theilgaard, der ledsagede mig i 1899, har meddelt mig følgende Højder fundne ved Barometeraflæsninger under Bestigningen af Fjeldet:

Toppen af Fjeldet ..	=	634 m.
Varden	=	567 m.
Rød Sandsten......	=	471 m.
Hvid Kvarsit.......	=	457 m.
Diabas	=	377 m.
Hvid Kvarsit.......	=	330 m.
Rød Sandsten......	=	191 m.
Diabas	=	122 m.

Før jeg gaar nærmere ind paa de mineralogiske Iagttagelser, turde her være Stedet at omtale et Par Iagttagelser angaaende Isen.

Bræen ved Kiagtût. I 1876 besøgte jeg denne Bræ første Gang og i 1899 anden Gang og fandt, ved Hjælp af Fotografier fra 1876, at denne Bræ havde forandret sig en Del i de forløbne 23 Aar; men naturligvis véd jeg ikke, om denne Forandring har været jævnt fordelt over disse Aar, eller om Bræen mulig har skudt sig frem og trukken sig tilbage flere Gange. Foran Bræen ligger en lille Sø, og medens Bræen i 1876 gik ud i denne med en stærk foroverbøjet Rand, saa den kalvede og dannede smaa Isfjelde, saa var Bræenden i 1899 sunken sammen og saa bedækket med Ler og Grus, at den knap kunde skelnes fra Moræenen. I det lerede Vand foran Enden af Bræen steg den under denne løbende Elv tilvejrs som en stærk kogende Kilde. Selve Bræens Tilbagegang var ikke særlig stor; men kan ikke bestemmes nøjere. Ved at tage mine Fotografier med, vil Forandringen næste Gang bedre kunne bestemmes, da et Par af dem ere tagne fra en Varde, der næppe vil være vanskelig at genfinde.

Som Bidrag til Kendskabet til Isens tidligere Udbredelse, kan henvises til det øverste Billede paa Tavle XII, der viser Isfjeldbarieren udenfor Mundingen af Isfjorden Korok. Vandet skal efter Grønlændernes Sigende være lavt paa denne tidligere Endemoræne; men paa Grund af Grønlændernes Ulyst til at ligge stille mellem de mange og ofte kalvende Isfjelde lykkedes det mig ikke at faa oploddet en Linie tversover, uagtet jeg havde alt parat dertil.

Medens Isfjelde med skarpe fantastiske Former saa ofte ere afbildede og fotograferede, viser det øverste Billede paa Tavle IX et stort Isfjeld af et mere sjeldent Udseende. Det bestaar af en Breccie af Isstykker og maa være dannet om Vinteren, da Bræen stadig kalver, men de derved dannede Brudstykker kunne, paa Grund af Fjordisen ikke flyde bort, saa de ophobes foran Bræenden, saa de tilsidst naa dennes Højde. Om Foraaret naar Fjordisen gaa bort udskydes saa disse Breccieisfjelde sammen med de der kun bestaa af et enkelt Stykke Is. Dette Isfjeld er fotograferet i Tunugdliarfik ud for Udstedet Narssak, men stammer rimeligvis fra Isfjorden Sermilik.

Det nederste Billede paa Tavle IX viser Bræisens ejendommelige kornede Struktur, med de karakteristiske Fingeraftryk lignende Figurer.

2. Mineralogiske Iagttagelser og Indsamlinger.

1. Eudialyt. Det eneste af de mange sjeldne Mineralier, der findes i denne Egn, og som mulig kan faa teknisk Betydning,

er Eudialyten, paa Grund af dens Indhold af Zirkonsyre. Dette Mineral findes næsten overalt i Sodalithsyeniten, dels som enkelte Krystaller, dels som større eller mindre elliptiske[1]) Masser og dels udfyldende Spalter i Bjergarten, sammen med Arfvedsonit og Feldspath.

Det Sted, hvor Eudialyten hidtil er funden i saa store Mængder, at der kunde være Tale om at vinde den teknisk, er i Bunden af Fjorden Kangerdluarsuk.

Kortskitsen Figur 2 viser dette Sted. Dybdekurverne ere dragne efter Kaptajn C. F. Olsens Lodninger i 1888. Midt i Fjorden, ud for Halvøen Niakonarsok og Øen Kekertak, begge ved Foden af Fjeldet Nunasarnausak, er der en dyb Rende med 50—70 Favne Vand; Bunden er Mudder. Herfra er Grunden jævnt opgaaende med Sten, kun ud for Elvene, navnlig Laxelven, er der større Sandflader med indtil 5 Favne Vand. I 1888 laa «Fox», under Arbejdet med Indsamlingen af Eudialyten, for Anker c. 100 Favne N. for Øen; i 1899 laa den derimod helt inde i Bunden af Fjorden, saa nær ved Land, det for Lavvande var muligt.[2])

Sodalithsyeniten danner paa Grund af sin stærke Forvittring vistnok den ødeste Egn i Grønland; thi næppe stort andet end Lavarter forekomme paa de ikke helt til Grus henfaldne Partier, og kun langs Vandløbene findes enkelte højere Planter. Fotografierne paa Tavlerne XIX kunne maaske give et Begreb om denne Egns Goldhed. Her i denne, over store Strækninger til dybe Gruslag forandrede Bjergart, findes Eudialyten, dels udfyldende Spalter i de haardere Partier, dels liggende løse, som oftest i flade eller elliptiske Partier, der kunne naa en Vægt af over 50 Kilo og som for en Del ere Rester af Pegmatitgangene.

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[1]) I Mineralogisk Museums Forhal findes en udmærket Prøve paa et saadant elliptisk Lag.

[2]) «Fox» kastede her en Del af sin Ballast over Bord, hvilket bemærkes for at forebygge Misforstaaelse; thi denne Ballast bestod for en væsentlig Del af Kryolith og de sammen med denne forekommende Mineralier.

Forgrunden i det øverste Billede paa Tavle XX viser et saadant Parti, hvor Overfladen af den faststaaende Sodalithsyenit næsten er skjult af Forvittringsmaterialet, i og paa hvilket sidste der er fundet løse Eudialytstykker til en samlet Vægt af mange hundrede Kilo. Paa Kortskitsen Fig. 2 ere Eudialytlagene betegnede ved en tyk sort Streg, medens de Strækninger, hvor de løse Eudialytstykker ere samlede, ere betegnede ved Kors. En af de største og rigeste Pegmatitgange fandtes paa Østsiden af den lille Ø. Gangen er 80 cm. bred, hvoraf de nederste 20 cm. væsentlig er Eudialyt, medens den øverste Del bestaar af Arfvedsonit, Feldspath og Ægirin. Gangen gaar skraat ned under Vandfladen og er ved Højvande næsten dækket; medens den ved Lavvande er blottet i en Længde af c. 12 m. I nederste Billede paa Tavle XX, ses det øverste af denne Gang, hvor den forøvrigt næsten er svunden ind til en Ubetydelighed.[1]) Denne Gang har ydet flere Tusinde Kilo Eudialyt. Circa 5000 Kilo ydede fremdeles et Lag i Bunden af Fjorden, der laa i en Afstand af ca. 900 m. og i en Højde af 200 m. over Vandfladen. Ydede end disse og et Par andre, men mindre Gange og Lag en betydelig Mængde Eudialyt, saa vandtes dog den langt overvejende Del af de hidtil hjembragte ca. 55000 Kilo ved paa Rouserne at indsamle løse Stykker. Mange af disse sidste bestode naturligvis langt fra af rent Mineral; men Regelen var, at intet Stykke maatte medtages, hvori Eudialyten udgjorde mindre end Halvdelen, efter at de vedhængende Mineralier vare fjernede ved Hammeren. Arbejdet er jo i egentligste Forstand Rovdrift; thi der toges alt hvad der fandtes, og da de enkelte Pegmatitgange i Reglen snart kile ud, kan et planlagt Minearbejde ikke anlægges paa et bestemt Sted.

Da Kryolith-Selskabet i 1888 overdrog mig Ledelsen af Indsamlingen af Eudialyt og i den Anledning spurgte mig om, hvormeget jeg mente at der kunde skaffes til Veje, turde jeg

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[1]) Dette Billede, der er taget i 1899, viser ogsaa en Del af Tang- og Balanranden. Se Medd. om Grønl. XXXIII.

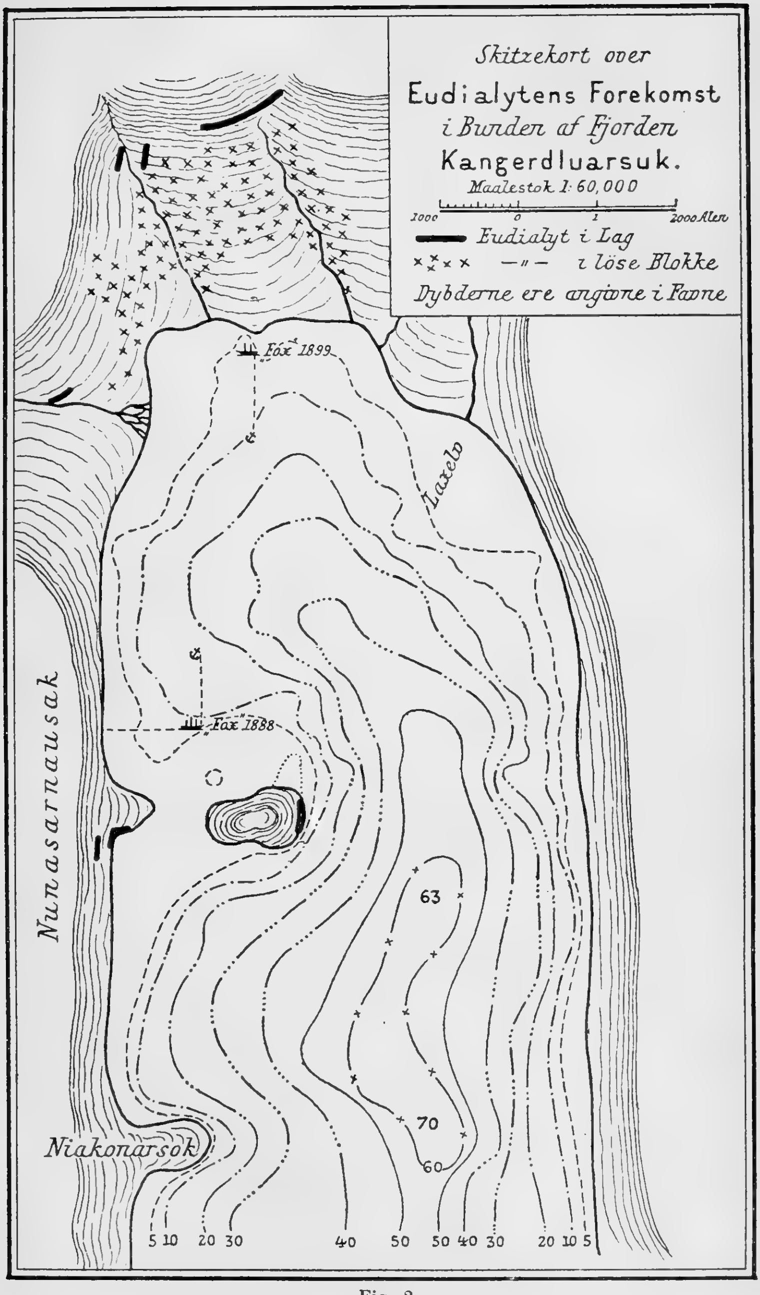
Skitzekort over
Eudialytens Forekomst
i Bunden af Fjorden
Kangerdluarsuk.
Maalestok 1: 60,000
1000 0 1 2000 Alen
Eudialyt i Lag
—"— i löse Blokke
Dybderne ere angivne i Favne
„Fox" 1899
Laxelv
„Fox" 1888
Nunasarnausak
Niakonarsok
63
70
60
5 10 20 30 40 50 50 40 30 20 10 5

Fig. 2.

kun stille nogle faa Tusinde Kilo i Udsigt, og jeg tvivlede meget om, at vi skulde kunne naa de 5000 Kilo, som Selskabet mente var det mindste, der kunde være Tale om at gjøre Forsøg med. I Løbet af en Uge naaede vi imidlertid at faa samlet ca. 15000 Kilo. Vi toge alt, hvad vi saa, saa theoretisk skulde der ikke være stort tilbage, og dog naaede vi, som nævnt, i 1899 endnu at faa indsamlet ca. 44000 Kilo. Uagtet vi ogsaa da toge alt, hvad vi saa, saa tvivler jeg dog ikke om, at der jo nok endnu vil kunne samles adskillige Tusinde Kilo; men, det er jo klart, at saaledes kan det ikke blive ved, engang maa Endialytmængden ved en saadan overfladisk Indvinding høre op, eller i det mindste kun forekomme i en saa ringe Mængde, at det ikke kan betale de ikke ubetydelige Omkostninger, der ere forbundne dermed. Jeg skal ikke her komme ind paa Spørgsmaalet, om ikke Indvindingen af Eudialyt kunde foretages paa en billigere Maade end den hidtil anvendte.

Skulde det vise sig, hvad der jo destoværre ikke for Øjeblikket skal være Udsigt til, at Eudialyten har en Fremtid for sig i teknisk Henseende, bliver Spørgsmaalet: findes der ikke andre Steder i Sodalithsyeniten, hvor Eudialyten optræder i lignende Mængde som i Kangerdluarsuk; thi som enkelte Krystaller eller som nævestore Partier findes det, snart sagt, overalt.

Flere Steder kan der uden Tvivl ved nøjere Undersøgelse findes en Del; men det eneste Sted, jeg har set, der saavel i Eudialytmængde som i let Tilgængelighed kommer Bunden af Kangerdluarsuk nær, er Tupersiatsiap ved Naujakasik i Tunugdliarfik. Her synes tilmed, ligesom i Kangerdluarsuk, at være den Fordel, at et Skib som «Fox» maa kunne ligge dækket mod de fleste Vinde, ligesom ogsaa for Isfjælde og Kalvis fra Sermilik og Koruk. Hosstaaende Kortskitse Fig. 3, der dog kun er baseret paa faa Pejlinger, kan tjene til at give et Begreb om Forholdene paa dette Sted. Fotografiet øverst paa Tavle XXI viser SV. — Siden af denne Bugt med Teltpladsen Tupersiatsiap yderst til højre. Paa Kortskitsen betegner Streger og Kors de Steder, hvor Eudialyten findes i større Mængder. Fra Teltpladsen og vestefter, henad Najakasik, findes indsprængt og temmelig jævnt fordelt gjennem hele Bjergarten ikke ubetydelige Mængder af Eudialyt; men hvis der skulde være Tale om at indvinde den her, maatte dette Minerals Værdi stige i en overordentlig Grad. Øst for Teltpladsen og langs Bugtens hele Sydside forekommer Eudialyten derimod under fuldstændig lignende Forhold som i Kangerdluarsuk ɔ: dels som større og mindre løstliggende Blokke og dels paa Spalter og i Lag. Saaledes findes der ved

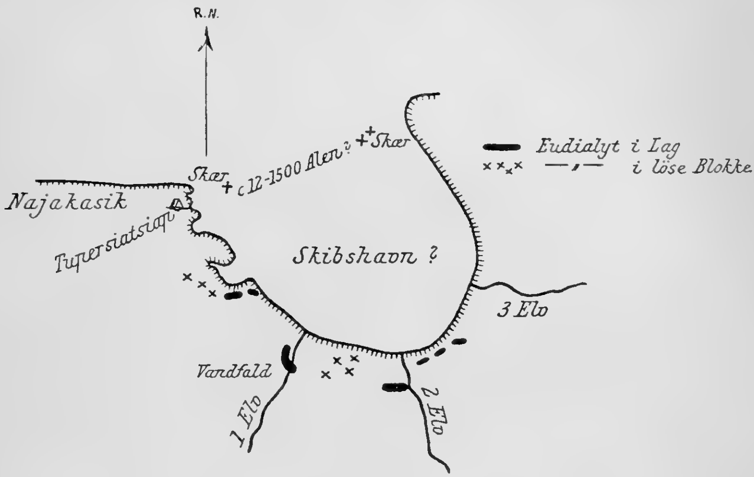

Fig. 3.

den vestligste af de smaa Elve i Bunden af Bugten, og som er let kjendelig derved, at den danner et smukt lille Vandfald, et ca. 30 cm. mægtigt Lag af meget rent Eudialyt, der, saavidt det paa den stejle, af løst Materiale dækkede Skrænt kunde ses, havde en betydelig Udstrækning. Det nederste Fotografi paa Tavle XXI er et Billede af denne stejle Fjældvæg, der danner en Del af Sydsiden af Elvlejet. Det viser Sodalithsyenitens «bænkede» Struktur, og endvidere hvorledes den er gjennemtrængt af mere og mindre lodrette Sletter og Gange. Eudialytlaget findes enten ved den nederste eller maaske snarere ved den næstnederste af de paa Billedet synlige horizontale Klovninger. I Elvlejet laa flere, ja endog meget store Blokke af næsten ren Eudialyt. Paa Vestsiden af den næste Elv, den anden, fandtes ligeledes et Eudialytlag, der ikke alene havde en Mægtighed som det foregaaende Lag, men som endog var afdækket paa en større Flade, saa der uden Tvivl den Gang med Lethed kunde have været taget flere tusinde Kilo. Desuden fandtes paa Skraaningerne ved begge Elve en Mængde løse Blokke.

2. Kvartskrystaller fra Narsasuk. Da jeg i 1888 var ved Igaliko, tilbød Grønlænderne mig en Mængde afbrudte og ufuldstændige Ægirinkrystaller, der kun gjorde sig bemærket ved deres store Mængde. I Begyndelsen tillagde jeg ikke disse Krystaller nogen Betydning; men efterhaanden tiltrak deres store Mængde sig min Opmærksomhed, og paa mit Spørgsmaal om, hvorfra de stammede, nævnede de Narsasuk og pegte henimod Kistefjeldet. Da jeg bad dem vise mig Stedet, førte de mig hen til et af de sædvanlig grusede Steder, som jeg kendte saa godt fra mine Bestigninger af Kistefjeldet. Deri saa jeg intet paafaldende, og da de fortalte mig, at Krystallerne fandtes ved at gennemsøge Gruset, og jeg efter en kort Afsøgning ingen fandt, forlod jeg Stedet, da jeg mente, at Fundet af disse Krystaller, der ganske vist havde et noget forskelligt Udseende fra Ægirinkrystallerne i Kangerdluarsuk, ikke havde nogen særlig videnskabelig Betydning. Da jeg senere kom til Julianehaab, viste Kolonibestyrer Lytzen mig en Del store og smukt udviklede Ægirinkrystaller, som han tilbød Museet. Om de nye Mineralier, som Neptunit o. s. v., som han maaske allerede da, eller i al Fald snart efter sendte til svenske Mineraloger, nævnede han dengang eller senere ikke et Ord. I 1897 undersøgte den svenske Mineralog Gustaf Flink, hvem de lytzenske Samlinger vare komne i Hænde, paa Kommissionens Bekostning Narsasuk og fandt derved mange nye Mineralier, som han har beskrevet i M. o. G. XIV og XXIV. I 1899 besøgte ogsaa jeg igen Stedet.

I Mineralogia Groenlandica er Materialet fra denne Indsamling medtaget, og jeg skal derfor her kun omtale nogle Kvartskrystaller, der straks tiltrak sig min Opmærksomhed paa Grund af, at de utvetydigt viste den basiske Flade, der jo hører til en af de største krystallografiske Sjeldenheder. Tavle XI, Fig. 1 viser en saadan Krystaldruse, der yderst bestaar af 6 symmetrisk sammenvoxede Krystaller, i hvis Indre flere mindre ses og hvoraf de fleste ere forsynede med Basis; der hos dem alle spejle paa én Gang. Ses de under Lupen, iagttager man, at disse Flader ere svagt krummede, saa at de paa Goniometret ikke spejle som én Flade, saa deres Vinkel med Pyramidefladerne ikke kan maales med Nøjagtighed. Endvidere ses det, at disse Basisflader alle have et drueformet chalcedonagtigt Ydre (Fig. 2). Kvartsen i disse Krystaller er i Reglen glasklar, næsten hyalitagtig og spejler med en vandklar Friskhed, der gør, at de se ud, som om de ere slikkede. Ikke alene paa de enkelte, skarpt udprægede Krystaller findes disse ejendommelige Flader; men de findes ogsaa i hele Samlinger paa de uformelige Krystaldruser, som Dr. Flink[1]) har omtalt som den mest almindelige Form: «namely in individuals that have been so strongly attacked by solvents that one can no longer see whether they were originally idiomorphic crystals or massive lumps. The quartz crystals from Narsarsuk show all the stages of etching, from its appearance as a mere trace to the total obliteration of the original form.» Figurerne 3—5 paa Tavle XI vise de forskellige Sider paa en saadan «massiv lump», der findes i Dr. Flinks Samling, og som efter hans Formening er fremkommen ved Opløsning, men hvori jeg kun kan se en meget svagt individueliseret Kvartskrystal, der er sammensat af en Mængde Individer paa en noget lignende, men langt mere kompliceret Maade, end som det ses i Fig. 1, Tavle XI. Fig. 4 paa denne Tavle viser nemlig Prismet med sin horizontale Stribning. Fig. 3 viser en Pyramideflade med sine karakteristiske Figurer

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[1]) M. o. Gr. XXIV, S. 21.

og endelig viser Fig. 5 en paa Basis's Plads værende Overflade, der er sammensat af mange smaa Endeflader (de karakteristiske med Vorterne) i Forbindelse med Tilløb til Pyramideflader. Fotografierne vise vel skarpt nok de forskellige Flader; men kun, naar man kan tage disse usædvanlige Krystaller i Haanden og bese dem fra alle Sider, faar man det rette Indtryk af dem.

Uagtet Basis er meget almindelig hos hexagonale Krystaller, saa er der jo den Mærkelighed ved Kvartsen, at denne Flade kun yderst sjeldent optræder hos dette Mineral, og dertil kan vel kun Grunden være den, at Kvartsens Sammensætning eller Struktur ikke i Almindelighed er gunstig for denne Flades Fremkomst, og fremkommer den saa som her en enkelt Gang[1]), forekommer det mig, at det er karakteristiskt at se, hvor ufuldkommen den er, idet den jo minder om Kvartsens mindre fuldkomne Form: Chalcedonen. Det kan bemærkes, at disse Kvartskrystaller ere usædvanlig rige paa smukke, skarpt udprægede hule Krystaller, der næsten alle synes at have en ubevægelig Libelle.

3. Kvarts-Pseudomorphoser fra Ivinguit ved Narsak. I 1876 samlede jeg paa dette Sted paa Spalter i en tufagtig Diabasis en stor Mængde Krystaller, der bestode af Kvarts, men som tydelig viste sig at være Pseudomorphoser efter et eller andet Mineral, hvilket, har det ligesaalidt strax som senere været muligt at bestemme, og det lykkes vel ogsaa kun, naar der engang findes Rester af det oprindelige Mineral i dem. Alle de indsamlede Krystaller gik imidlertid til Grunde ved Christiansborgs Brand; men i 1899, da jeg igen besøgte Stedet, lykkedes det mig at skaffe en ny Samling, dog langt fra saa stor som den første.

Professor Ussing har undersøgt disse Krystaller og givet følgende Beskrivelse af dem: «Kvartsseudomorphoserne fra Ivinguit ved Narsak har et Udseende som gengivet paa hosstaaende

[1]) Det bemærkes, at det her ikke drejer sig om en enkelt Krystal, men at Fænomenet er gennemgaaende hos en stor Del af de fundne Krystaller.

Fig. 4. I Størrelse naar de som oftest c. 2 cm, enkelte af Krystallerne endog indtil 6 cm. De optræder ofte som hele Krystalblokke af tilnærmelsesvis parallelt stillede Individer (se Fotografiet); ved denne Anordning i Forbindelse med Krystallernes Habitus fremkommer ofte en overfladisk Lighed med de i alle Samlinger udbredte Pragtstykker af krystallinsk Svovl fra Sicilien.

Fig. 4. Kvartspseudomorphose fra Ivinguit.

Efter de maalte Vinkler har jeg ikke kunnet identificere disse Pseudomorphoser med nogen i Mineralverdenen almindelig forekommende Krystalform, og da Fladernes Beskaffenhed ikke tillader nøjagtige Maalinger, og saaledes heller ikke Sammenligninger med sjældnere Former, har Forsøget paa, gennem Formen at udfinde det oprindelige Mineral maattet opgives. Her skal derfor kun anføres en ganske kort Beskrivelse:

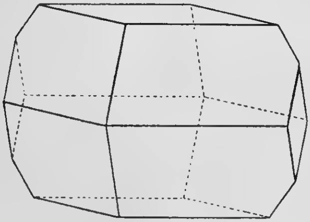

Fig. 5.

Pseudomorphosernes Habitus er rhombisk. Vinklerne maaltes med Anlægsgoniometret og lod sig bestemme med en Nøjagtighed paa 1 à 2°; der kunde ikke konstateres nogen Afvigelse fra den rhombiske Symmetri, men paa Grund af den nævnte Usikkerhed i Maalingerne maa man regne med den Mulighed, at Krystallerne i Virkeligheden tilhører det monokline eller trikline System. Naar Formen betragtes som rhombisk og opstilles som Figur 5 viser, bliver de tilstedeværende Former at betegne som rhombisk Dobbeltpyramide, Basis og andet Endefladepar eller

(111) . (001) . (010).

Den sidste Form var dog kun tilstede paa en Del af Krystallerne. De fundne Vinkelværdier er:

$$111 : 11\bar{1} = \text{c. } 46^\circ$$
$$111 : \bar{1}11 = \text{c. } 91^\circ$$
$$111 : 1\bar{1}1 = \text{c. } 72^\circ$$

Af de to førstnævnte Vinkler faas Akseforholdet:

$$a : b : c = 0{,}82 : 1 : 1{,}49.$$

3. Iagttagelser i Kryolithbruddet ved Ivigtut.

Iblandt de Mineralier, der oftest er nævnet i Forbindelse med Spørgsmaalet om Kryolithens Dannelse, hører Topasen; men uagtet jeg ofte, under mine Besøg ved Ivigtut, har tænkt paa, om dog ikke dette Mineral skulde findes der, saa har jeg dog aldrig fundet noget, der kunde minde derom. Ved Gennemsyn i Fjor af nogle Mineralprøver, jeg i 1899 havde haft med fra Ivigtut, men som vare blevne henstaaende ubestemte[1]), var ogsaa et større Stykke Kryolith, der var gennemtrængt af en flere Centimeter bred Zone af sammenklumpede smaa straaletkrystallinske Korn, som jeg, da jeg tog det, tænkte maatte være enten en Kvarts- eller Feldspathmasse. Ved nu at tage det frem til nærmere Undersøgelse fandtes det let, at det ikke var nogen af Delene. Det var mathvidt, med et svagt gulligt Skær, og haardt, saa det ridsede Kvarts. Vægtfylden var, efter at Kryolithen var fjernet ved Kogning med Kloralluminium, 3,51. Ved svag Glødning blev det rosenrødt. Efter Hr. Cand. polyt. Chr. Christensens Analyse er Sammensætningen følgende:

$$
\begin{array}{lr}
SiO_2 & = 30{,}02 \\
Al_2O_3 & = 58{,}51 \\
F & = 18{,}53 \\
\hline
 & 107{,}06 \\
\text{Ilt} \div & = 7{,}80 \\
\hline
 & 99{,}26
\end{array}
$$

[1]) Iblandt de Prøver af Kryolithmineralier, jeg i 1899 havde hjem med fra Ivigtut, har Docent Bøggild fundet et mindre Stykke Kryolitionit, som

Mineralet er altsaa Topas, hvad hverken Lysbrydningen eller Dobbeltbrydningen modsiger.

Da Direktør Jarl paa «Øresund» saa Stykket, bemærkede han, at dette Mineral kendte de godt paa Fabrikken. De Stykker, der modtoges derfra, havde dog et noget andet Udseende, omendskønt dets Forekomst i Kryolithen var overensstemmende med Topasens. Det var blødt, Haardhed ca. 2; det var endvidere graalig gult og blev sort ved Glødning. Ved 100° mistede det 0,3 % Vand og ved svag Glødning endvidere 3 %. Vægtfylden var 2,83. Hr. Chr. Christensens Analyse gav følgende Resultat:

SiO_2	=	47,9
$Al_2O_3(Fe_2O_3)$	=	37,0
Ka	=	9,9
MgO	=	1,6
Tab ved Glødning..	=	3,3
		99,7

Altsaa maa det betragtes som en speudomorphoseagtig Forandring af Topasen[1].

Tavle VIII viser Vestenden af Kryolithbruddet, saaledes som den saa ud i 1899. Hvad der særlig tiltrækker sig Opmærksomheden derved, er det mørke rektangulære Parti, der findes nederst i Midten af Billedet. Det er en Del af det ejendommelige Parti af mørk «sort» Kryolith[2]) der paa skraat gaar

jeg havde medtaget, da jeg syntes, det lignede hverken Kryolith eller Flusspath.

[1]) I Hintzes Mineralogie staar omtalt en i kemisk Henseende ganske lignende Forandring af Topasen fra Stoneham. (Bd. II, S. 127.)

[2]) Ogsaa under andre Forhold optræder en sort Kryolith; det er i Vestenden af Bruddet, i det ejendommelige Kvarts-Feldspathparti, der dækker Kryolithen mod Vest. Her optræder denne sorte Kryolith som Spalteudfyldninger i Feldspathen; ja saa fuldstændig gennemtrænger den denne, at Feldspathen pletvis ganske faar et skriftgranitagtigt Udseende. Her er det aabenbart Feldspathen, der bestemmer «Bogstavernes» Fremkomst, og ved at se dette spørger man uvilkaarlig sig selv: Skulde det samme ikke ogsaa kunne være Tilfældet ved den almindelige Skriftgranit?

gennem den hvide Kryolith. Det er som bekendt i denne «sorte» Kryolith, at de ejendommelige store Flusspath Krystaller findes, som Prof. Jul. Thomsen har undersøgt og fundet, at de indeholdt Helium[1]). Disse Flusspathkrystaller gaa i Almindelighed under Navn af den røde eller rødbrune Flusspath, og Navnet er for saa vidt rigtigt nok, som de næsten altid ere rødbrune af udskilt Jærnglimmer eller Jærnilte. Det forekommer mig imidlertid, at naar den har dette Udseende, maa den være stærkt forandret, da den er fuld af Sprækker, og disse Sprækker er fulde af smaa Jærnglimmerkrystaller. Lykkes det derimod at faa en Krystal frem, der er uden Sprækker og Jærnglimmer, er Farven graa eller brungrøn. De store Krystaller vise en smuk zonal Struktur, og er Forvitringen skredet stærkt frem, udviskes ogsaa denne tilligemed de smukke brunlige Farvetoner, og Krystallerne bliver graa og faar en straalet Struktur. Om denne Forandring staar i Forbindelse med Afgivelsen af Helium er endnu ikke undersøgt. Kryolithen er som bekendt ikke ganske lidt opløselig i Vand; Johnstrup[2]) angiver at 1 Del deraf opløses ved 12° C. i 2730 Dele Vand, og det er derfor mærkeligt, at Bruddet, der ligger ganske nær Kysten, og hvis Bund nu ligger omtrent 130 Fod[3]) under Havfladen, er ganske tør, kun noget Overfladevand maa daglig oppumpes. Saa meget mærkeligere er det, som Kryolithen er fuld af haarfine Revner, der paa Krys og Tvers gennemskærer den; men da der aldrig er paavist den ringeste Forskydning langs disse Revner, tyder det jo paa, at der siden Massen stivnede, ikke kan være sket nogen væsentlig Forandring. Det at Bruddet, uagtet Kryolithens Opløselighed og de mange haarfine Revner, stadig vedbliver at være tørt, kan vel kun opfattes som et Bevis for, at Kryolithen ikke direkte berøres af Havvandet, men at det maa være beskyttet af et Gnejsdække. Forholdet

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[1]) Kgl. D. Vidensk. Selsk. Forhl. 1898, S. 69 og 1904, S. 53.

[2]) Förhl. v. d. Skand. Naturforsk. 12te Møde. Stockholm 1880. S. 250.

[3]) Ussing: Geografisk Tidskrift XIX, S. 195.

var et andet, da Isen og senere Vandet gik over Kryolithen. Da dannedes der dybe Kløfter langs Revnerne, der nu ere fyldte med Moræenemasse: Sand, Ler og store afrundede Sten. En saadan Kløft ses i Midten af Billedet, til Højre for den midterste af Stigerne; og den Linie, der fra denne Kløft ses i Siksak at fortsætte sig hen under Enden af Rebstigen til Højre, er en tynd Spalte i Kløftens Forlængelse. Spalten er i Virkeligheden lige, det er kun paa den buede Væg at den tegner sig i Siksak. Selv har jeg kun set denne ene morænefyldte Kløft; men den daværende Bestyrer, Hr. Edwards sagde at de havde truffet flere; de ere ikke vandførende.

Jeg skal ikke her komme ind paa Kryolithens Aflejringsmaade; men kun henvise til det nederste Billede paa Tavle XV, der er taget i Bunden af det Hul, der er brudt i Kryolithen paa Grænsen mod Graniten, og som ses øverst paa Tavle VIII, og hvor Kryolithen paa denne Grænse viser den ejendommelige pladeformede Struktur, der er karakteristisk for flydende Masser, der ere stivnede ved Afkøling mod Sidestenen, og som saa ofte ses ved plutoniske Gange, men som ikke forekommer hos Masser der ere afsatte af Vandet.

Til Slutning maa det være tilladt at henlede Opmærksomheden paa nogle farvede Pletter, jeg i 1899 fandt paa den Kryolith, der ved Ivigtût stod stablet til Udskibning. Det var smaa rosarøde til rødviolette Pletter, der kun fandtes paa Kryolithen paa de Steder, hvor denne var knust ved Slag med Hammeren. Et Sted saas dog en saadan Plet paa Siden af et Borehul. Det er ikke noget Farvestof der er paafør[1], det er kun, ligesom at et rødviolet Farveskær udgaar fra Stenen. Da Kryolithen altid er knust paa det Sted, hvorpaa Farven findes, lader der sig ikke slibe et Præparat deraf, og undersøges Pulveret under Mikroskopet, ses absolut intet. Farven er bestandig i Lyset; thi jeg har haft et Stykke liggende i et Vindue mod Syd i flere Aar,

[1] De kunne heller ikke forvexles med de rødviolette Pletter, Fuglene afsætte paa den Tid af Aaret, de særlig leve af Bær.

uden at den har forandret sig det mindste; ligesaa er den upaavirkelig af svage Syrer, Vinaand og Æther. Disse farvede Pletter ere lette at finde, naar man først er bleven opmærksom paa dem; saaledes skrev jeg for nogle Aar siden til Bestyreren af Bruddet og bad ham om at sende mig nogle Kryolithstykker med disse Pletter paa, og pr. Omgaaende fik jeg en hel Del af dem. Ogsaa Professor Ussing bragte fra sin Rejse i 1908 Prøver med deraf. Farven minder meget om den rødviolette Farve, flere Mineralier, som Sodalith, Nephelin og ogsaa andre Mineralier fra Sodalithsyeniten i Kangerdluarsuk ses at have, i det Øjeblik de ved Kløvning blottes; men som næsten øjeblikkelig forsvinder i Dagslyset.

4. Antikvariske Iagttagelser.

Skjøndt det aldrig har været min Opgave paa mine Rejser særlig at undersøge de gamle Nordboruiner, saa har jeg dog altid med den største Interesse iagttaget dem jeg traf paa.

A. E. Nordenskiöld har fremhævet, at medens man i Norge og Sverige ikke kender en eneste Husruin fra Slutningen af Hedenskabet, saa findes saadanne i Grønland i Hundredevis[1]). Burde det end maaske for Grønlands Vedkommende snarere hedde: fra de første Aarhundreder efter Kristendommens Indførelse, saa forringer dette ikke Betydningen af det Faktum, at Grønland virkelig er i Besiddelse af en Mængde Ruiner af Huse, der ere opførte i Aarene c. 1000 til c. 1400, og som saa, vistnok forholdsvis hurtigt ere blevne overladte til sig selv, for derefter, uden synderlig Indgriben fra den efterfølgende Befolknings Side, at staa uforandret indtil vore Dage[2]).

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[1]) Den andra Dicksonska expeditionen till Grönland. S. 367.

[2]) Selvfølgelig have Eskimoerne, strax efter Nordboernes Uddøen, plyndret Husene for alt, Metal osv., som de kunde bruge, ligesom de naturligvis ogsaa have borttaget Træværket. Spor til at saadant Træværk har været anvendt i grønlandske Huse eller Grave, vides dog mærkelig nok, aldrig at være paavist. Ligeledes er det mærkeligt, at der aldrig er fundet Spor af ædle Metaller, thi disse kunne jo ikke helt forsvinde, selv om Eski-

Blandt de Grunde, der kunne anføres mod den Opfattelse, at de gamle Nordboere skulde være gaaet op i Eskimoerne, forekommer disse Ruiners Tilstand mig at være en af de væsentligste; thi allerede da Egede kom til Landet, stod Eskimoerne fuldstændig fremmede over for dem. Aldrig have de direkte benyttet dem; de have kun behandlet dem som andre naturlige Stensamlinger, der kunne benyttes til at indrette Grave eller Ildsteder i.

Nordboruinerne kunne passende deles i 3 Grupper; først Kakortokkirken ved Julianehaab, der ved sin Arkitektur adskiller sig saa fuldstændig fra alle de andre Nordboruiner, at Tanken uvilkaarlig anviser den Plads som opført i den allerseneste Tid, hvori Kolonierne have bestaaet, saaledes som jo ogsaa allerede Graah har antydet det. Den er vistnok langt yngre end den Tid, vi kende fra de grønlandske Sagaer, og stammer vel fra den sidste Tid, hvorom vi kun vide, at der sendtes Bisper til Landet for mulig at redde Religionen og derigennem Befolkningen. En saadan Biskop, der var fuldstændig fremmed for Landet og Traditionen i Landet, kan meget vel tænkes at have bygget en ny Kirke paa et saadant Sted, der ligger centralt for hele Østerbygden, men som er uden Forbindelse med de gamle Centrer: Garðar og Brattahlið. Havde Befolkningen selv skullet bygge en ny moderne Kirke, vilde de naturligvis, Traditionen tro, have bygget den paa et af de to sidstnævnte Steder. Et Udtryk for den Følelse af forholdsvis Nyhed som flere Rejsende have faaet, er ogsaa det, at de have fremsat den Formodning, at Kirken aldrig er bleven færdig. Sans comparaison spiller altsaa denne Kirkeruin samme Rolle som Kirkeböruinen paa Færøerne; men medens det i 1899 lykkedes at faa opklaret naar

moerne have benyttet dem; og hvorfor er der i Grønland aldrig fundet hengemte Skatte?, der var dog, under de idelige Fejder og senere under Kampene saavel med Eskimoerne som Sørøverne, Grund nok til at hengemme Værdigenstande.

[1]) Privatboligen paa Island. S. 168.

denne Ruin er bygget, saa er Udsigten til at faa opklaret, naar Kakortokruinen blev bygget jo desto værre vel omtrent lig Nul.

Efter Valtyr Gudmundsen omtales Vinduer med Glas, — og man kan vel nok forudsætte, at der har været Glasvinduer i Kakortokkirken, — paa Island først ved Aaret 1195, og ser man hen til Forholdet mellem Island og Grønland den Gang, kan man vel nok gaa ud fra, at Glasvinduer ere komne betydelig senere til Grønland end til Island.

Endnu et Forhold tyder paa, at Kakortokkirken er af sen Oprindelse, og det er det, at det er den eneste Nordboruin, hvorom Eskimoerne have et Sagn om dens Opførelse.

Saaledes siger Giesecke[1]), og det samme siger Vahl[2]), at Grønlænderne havde et Sagn om, at Stenene til Kakortokkirken vare tagne paa Ujarartarfik Øerne ud for Lichtenau-Fjord.

Uagtet Giesecke til en Slags Bestyrkelse af dette Sagn anfører: «Zum wenigstens sind die dortigen Bausteine, welche ich sah, theils Glimmer — theils Hornblendeschiefer, welche sich am Redekammen nicht so tauglich finden», saa er der dog næppe nogen Tvivl om, at Stenene til Kirken, der forøvrigt slet ikke er bygget af Glimmer eller Hornblendeskifer, ere tagne ved Foden af det nærliggende Kirkefjeld. Derimod turde der maaske ligge noget andet til Grund for Sagnet, nemlig det at de gamle Nordboere mulig kunne have taget Kalksten paa Ujarartarfik Øerne til Mørtel til Kirken. Mørtel findes der nemlig, om end nu meget sparsomt i denne Ruin[3]), og det er ogsaa den eneste hvori saadant er paavist, og paa Ujarartarfik Øerne findes utvivlsomt en Kalksten; thi dels omtalte den nu afdøde Peter Eberlin, at der fandtes Kalksten dér, og dels

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[1]) Dagbog under 17de Juli 1809.

[2]) Ms. Dagbog i Botanisk Haves Bibliothek.

[3]) Ligesom Graah fandt ogsaa jeg nogle Stykker sandblandet Kalk mellem Stenene i Kirkeruinen, og ligesom hans Stykker gik tabt, før de bleve undersøgte, gik ogsaa mine Stykker tabt ved Christiansborgs Brand.

fik jeg i 1876 i Julianehaab flere Stykker Kalksten der angaves at hidrøre derfra. — Angaaende Kirkeruinens Arkitektur har Hr. Dr. phil. M. Mackeprang velvilligst meddelt følgende:

«Af selve Kirkeruinen[1] er det vanskeligt at drage nogen Slutning om dens Opførelsestid, da Formerne ere saa yderlig simple. Hvad Grundplanen angaar, er det den fra Island laante Form, hvor Skib og Kor danner et eneste ligehøjt Rum. Den optræder meget tidlig i Moderlandet Norge, men holder sig til Gengæld længe, helt ind i Gothiken. Det store fladbuede Vindue paa Østvæggen kunde i og for sig tyde paa en sen Tid, men der maa dog gøres opmærksom paa, at i norsk Arkitektur træffes Fladbuen baade i 12te og 13de Aarhundrede; og de andre Aabningers Konstruktion med den flade Overligger peger afgjort i denne Retning. Snarest skulde jeg derfor tro, at Kirken var opført i 12te, maaske 13de Aarhundrede. Jeg maa dog tilføje, at norsk kirkelig Stenarkitektur fra Middelalderens sidste Aarhundreder endnu er et meget lidt opdyrket Felt.»

Næst den enestaaende Kirkeruin ved Kakortok, er det særlig Ruinerne med de cyclopiske Mure, der tiltrække sig Opmærksomheden. Dog kan det ikke siges, at Maalet med at sammenføje disse mægtige Sten, har noget Sted været at tilvejebringe en hel cyclopisk Bygning; thi i Reglen er det kun den ene Side eller den ene Ende af Bygningen der er bygget af saa overordentlig store Sten, at man undres over at de har kunnet magte dem; den anden Side eller Ende af Huset er da i Reglen opført af somme Tider endog ret smaa Sten, saa disse Partier nu som oftest ere nedfaldne. Exempler herpaa ere den bekendte store Ruin ved Stranden ved Igaliko, der i sin Tid gik under Navnet Brattahlið, og Ruinen paa Øen ud fra Igaliko. Nederste Billede paa Tavle XVI viser denne sidstnævnte Ruin, hvor det, ved Sammenligning med Figuren ses, hvilke store

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[1] Angaaende Afbildninger af denne, da kan henvises til Tavlerne III—V i Graahs Rejse til Grønlands Østkyst; Pl. I i Amerikanist Congressens 5te Møde i København 1883 og Tavlerne XVII—XX i M. o. G. VI.

Sten der her i denne, Østenden; er anvendt; medens de to Rum i Ruinens Vestende, ere opførte af mindre Sten, hvorfor store Partier af denne forlængst ere faldne sammen.

Man faar Indtrykket af, at de gamle Nordboere have benyttet de Sten, der fandtes paa det Sted, hvor de ønskede at bygge, og at de saa først have stillet de største Sten sammen, eller endog bygget op ad den største af dem, som om det var en fast Klippe, og saa siden opført Murene af mindre og mindre Sten, eftersom de større slap op, eller det blev for langt at hente flere. Jo mindre Stenene bleve, jo mere synes Græstørvene at have været anvendte. Derved at der er benyttet en stor Sten som fast Udgangspunkt, kan der ofte fremkomme ejendommelige nisheformede Fordybninger i Murene, uden at saadanne have været tilsigtede. Saaledes f. Ex. den Nishe, der i M. o. G. VI, Tavle XII er vist i Fig. V a. At der er tyet til Stensamlingerne for at have Materialet til Husbygningen ved Haanden er naturligt, hvorfor Ruinerne hyppigt findes i Nærheden af de fra Klipperne nedskredne eller de af Elvene sammenskyllede Sten. Men selv om Gletscherelvene senere kan have forstyrret en eller anden Ruin, saa gaar Giesecke dog for vidt, naar han tilskriver saadanne Forstyrrelser, helt eller delvis, de gamle Kolonisters Tilintetgørelse[1]).

At der ogsaa kan være bygget huslignende Bygninger af

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[1]) Giesecke: Transactions of the Royal Irish Academy Vol. XIV. 1825. Antiquities. S. 50: All the ruins of Norwegian houses, and there were more than fifty which I examined, were surrounded by immense masses of rocks, probably precipitated from the summits of the adjacent mountains, and heaped together in the most fantastic groups, the places of fracture being sometimes so fresh, that the points from which they are broken are distinctly observable. Places of desolation of this kind are frequently met with in the mountains, connected with the sea by waterfalls, which are precipitated, with tremendous noise and destructive velocity headlong from the rocks, covered with glaciers. I have no doubt but that such a revolution, caused by bursting glaciers and following innundations, has affected this dreadful chaos; and that perhaps the Norwegian settlers perished, and were buried with their cattle in the ruins».

ikke anden Grund end den, at et udmærket Materiale fandtes paa Stedet, i Forbindelse med, at Stedet ved sin Beliggenhed indbød til at bygge et «Lysthus», forekommer det mig, at «Udkigsruinen» ved Umiausat i Tunugdliarfik er et Exempel paa[1]. Det er en c. 30 Meter bred Porphyrgang, der her gaar gennem Graniten, og hvis blottede Partier ere sprængte i rektangulære Stykker, der ligefrem indbyde til at «bygge Hus» af. Uden som et Slags Lysthus for de nærboende Folk, kan denne Ruin nemlig næppe have haft nogen som helst Betydning, hverken som Pakhus eller «Fæstning». Udsigten herfra er fortrinlig, baade ud og ind ad Fjorden. Naar der tidligere er brugt Udtrykket «Udkigshus» om lignende fritliggende og paa fremspringende Punkter liggende Ruiner, som ved Kagsiarsuk i Igaliko-Fjord og paa Toppen af Kistefjeldet ved Igaliko[2], da troer jeg ikke herved bør tænkes paa noget som helst krigerisk; men kun paa, at det er naturligt, at der bygges skærmende Mure mod Vinden paa Steder, hvorfra der haves god Udsigt.

Hvad endelig Bygningsmaaden angaar, da er det interessant at se, hvorledes den oftomtalte Ruin paa Skæret ved Igaliko er opført. De to nederste Billeder paa Tavle X vise denne Ruin, dels som den ligger paa dette Skær, der ved Højvande er næsten helt overfyldt, saa det ser ud som om den flød paa Vandet[3], og dels Sydmuren af selve Ruinen. Den østlige Halvdel er nemlig opbygget af skarpkantede Sandstenblokke, der ere brudte paa selve Skæret, der bestaar af Sandsten; medens den vestlige Halvdel er opført af løse afrundede Blokke mest af Grundfjeldet[4]. Da det er utænkeligt, at der er slæbt store Rullesten

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[1]) M. o. G. VI. Tavle VII og Compte Rendu du Congrès internat. des Américanistes. 5te Session. Copenhague 1883. S. 110.

[2]) M. o. G. XVI S. 353.

[3]) M. o. G. II S. 40. Da jeg i 1899 besøgte dette Skær, 23 Aar efter at jeg først betraadte det, fandt jeg Forholdene fuldstændig uforandrede. Tangranden strakte sig ind under Ruinens nederste Sten; men ikke én Tangplante kunde jeg finde paa disse.

[4]) En Del af den vestlige Halvdel af Ruinen ses til venstre paa Billedet.

ud paa dette Skær, for at bygge Hus af dem, kan man vel kun tænke sig, at Skæret oprindelig var belagt med en Morænerest af store Sten. Disse ere saa alle, paa en eneste nær, der ses paa Billedet, benyttede til Opførelsen af Husets Vestende. Enten kan man nu tænke sig, at Ruinen oprindelig ikke har været større end den Halvdel der er opført af de løse afrundede Sten, og at den saa senere er bleven udvidet, ved at der skaffedes Materiale fra et Brud i Sandstenen; eller, man kan maaske ogsaa tænke sig, at Bygningen er opført samtidig af to Partier, et der benyttede de løse Sten, der fandtes paa Skæret, og et der først maatte bryde Stenene. Da det vel er utænkeligt, at der senere kan være ført Sten bort fra Skæret, kan man altsaa ogsaa være sikker paa, at Huset ikke kan have været højere end Ruinen nu er[1]. Hvad Meningen kan have været med at bygge et Hus paa dette Skær[2], skal jeg ikke udtale mig om, men henpege paa, at et lignende Forhold findes paa et andet Sted, men rigtignok under noget andre Forhold. Det er den Ruin der ses paa det øverste Fotografi paa Tavle X og som findes i en lille Sø, noget til Fjelds ved Ivsormiut i Tunugdliarfik[3]. Paa Grund af at Terrainet om Søen er saa fladt, falder Øen paa Fotografiet tildels sammen med Landet. Om denne Ruin, der kun er tilgængelig ved Svømning, hvis man da ikke vil lade

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[1]) Arktander fandt 1751 (Samleren VI. S. 1216) at Højden var «3 Alen, endel Steder lidt derover»; og jeg har maalt, paa det Højeste, 6 Fod 9 Tommer. I 1899 saa jeg ved Hjælp af mine Fotografier fra 1876, at Ruinens Nordside, der er opført af mindre Rullesten, var bleven noget forstyrret i de mellemliggende 23 Aar.

[2]) Ogsaa ved den ovenfor omtalte Ruin, der findes paa Øen ved Siden af, er Forholdet det, at Højvandet gaar til Ruinen. Tangranden ligger 2,5 Meter under den Helle hvorpaa Ruinens sydlige Hjørne hviler. Endvidere kan bemærkes, at paa den store Sten (ikke Sandsten) der ligger Vest for Øen, naar Tang og Balanranden op til c. 6dm fra Toppen. Naar Dr. C. Pingel (2det skandinaviske Naturforskermøde 1840. S. 354) anfører et Sagn om, at Skæret skal have været større og været landfast, da vise Dybdeforholdene, at der ikke kan have ligget noget positivt til Grund derfor.

[3]) Se Kapt. Bruun i M. o. G. XVI. S. 278.

Kajakker bære derop, beretter Cand. Theilgaard, at Vandet om Øen er dybt; Ruinen er 10 Skridt lang og 6 Skridt bred, udvendig maalt. Der er en Døraabning paa den søndre Langside, nærmest den østre Ende. Ruinen staar tvers over Øen, og begge Ender af den beskylles af Vandet. Østenden er fortrinlig bygget af godt tilpassede firkantede Granitkvadre. Vestenden er derimod stærkt sammenfalden. Hvorfor der her, saa højt til Fjelds, er opført en saa solid Bygning i en lille Sø, er mærkeligt; thi vel er den vel nok over Halvdelen af Aaret tilgængelig paa Isen, men en stor Del af Aaret maatte der Baad til for at komme ud til den, hvis man da ikke, som Cand. Theilgaard, vilde svømme derud. At der i Tidens Løb skulde have dannet sig en Sø om Ruinen, som ikke havde været der, da den opførtes, er der Intet der tyder paa.

Oprindelig har vel alle disse Bygninger været opførte med Græstørv mellem Stenene, ligesom der ogsaa kan paavises Mure, der helt ere opførte af Græstørv, hvilende paa et Underlag af Sten. En saadan ses nederst paa Tavle XVII. Det er Muren i den Ruin Kaptain D. Bruun udgravede i 1894, og som han har afbildet S. 219 i M. o. G. XVI. I de 5 Aar der vare forløbne mellem Bruuns Udgravninger og mit Besøg i 1899, er denne Græstørvmurs indre Struktur kommen frem, og Siksaklinierne paa Fotografiet vise tydeligt, at Græstørvene i sin Tid bleve sammenstillede paa lignende Maade paa Grønland, som de endnu opstilles paa Island[1]).

Hvor Forholdene have været anderledes, har Murkonstruktionen ogsaa været en anden. Saaledes paa den c. 26 m. høje Havstok N. for Kordlortok i Nordenden af Tunugdliarfik. Her har Materialet kun været mindre Sten og Grus, hvorfor Siderne af Murene have været opførte af de største af Stenene, medens den Indre har været udfyldt af Grus, saavidt man da kan dømme

[1]) Se D. Bruun: Gammel Bygningsskik paa de islandske Gaarde. Aarsberetning for Foreningen til norske Fortidsmindesmærkers Bevaring. 1907. S. 8.

efter de ringe Grundvolde der findes. Der er ogsaa det ejendommelige ved flere af disse Ruiner, at de ikke ligge parallel med Havstokkens Retning, men lodret derpaa, saa den ene Ende af Huset synes at have maattet ligge betydeligt lavere end den anden.

Paa denne Havstok findes ogsaa nogle ejendommelige elliptiske Stenlægninger; se øverste Billede paa Tavle XVI, der bringer Tanken hen paa, at de mulig kunne være Begravelser. Den her afbildede er dannet af skarptkantede Sten og meget uregelmæssig, hvorimod jeg paa en anden Havstok ved Hvæssestensfjeld, har fundet dem fuldstændig regelmæssig dannet, som langstrakte Ellipser. De vare dannede af større Sten end dem, der var almindelige paa Havstokken, saa de traadte skarpt frem. Stenene i 3 af dem bleve fjernede, og der blev søgt indtil $1^1/_2$ m. ned i de underliggende Strandsten, men intet fandtes [1].

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[1]) I 1879 stødte jeg ved Cap Cranstown paa Svartenhuk-Halvø i Nord-Grønland paa lignende elliptiske Stensætninger, M. o. G. V. S. 21.

15—10—1909.

Tavle VI.

Tavle VI.

Igaliko-Sletten set fra Skæret med Ruinen.

Over den midterste Sandstenshelle i Stranden skimtes, paa Sletten inden derfor, Nordboruinerne og Grønlænderhusene. Paa begge Sider af disse ses hævede Havstokke. Navnlig til Venstre, ved Foden af Nulupkakak, ses de karakteristiske Kløfter, der gaa lodret paa Kysten og som give god Anledning til at studere Sandstenens og Diabasens indbyrdes Lejringsforhold.

Fototypi: Pacht & Crone.

Igaliko-Sletten set fra Skæret med Ruinen.

Tavle VII.

Tavle VII.

Fjeldet Nunasarnak set fra Odden ved Ipiutak
Tunugdliarfik.

Fototypi. Pacht & Crone.

Nunasarnak set fra Odden ved Ipiutak.

Tavle VIII.

Tavle VIII.

Vestenden af Kryolithbruddet, Ivigtût. 1899.

Det mørke, rektangulære Parti i Midten nær Grubens Bund antyder omtrent den Maade, hvorpaa den sorte Kryolith strækker sig gjennem den hvide.

Den smalle Kløft, der i Midten af Billedet ses til Højre for den lange Stige, er en Kløft, der er fyldt med Moræne-masse og maa være dannet, da Isen gik hen derover. Den siksakformede Stribe, der fra denne Kløft strækker sig hen under Rebstigen, er en smallere Fortsættelse af denne Kløft og er i Virkeligheden retlinet; men paa Grund af Væggens Krumninger tager den sig anderledes ud. Kløften øverst til Højre for den korte Stige er et kunstigt Brud.

Fototypi. Pacht & Crone.

Vestenden af Kryolihtbruddet Ivigtut.

Tavle IX.

Tavle IX.

Øverste Billede: Et større Isfjeld, der er sammensat af lutter kantede, paa Overfladen afrundede Isstykker. Saadanne Isfjelde dannes om Vinteren, naar Kalvisen ikke kan flyde bort paa Grund af, at Fjorden er frossen, og som derfor maa ophobes foran Bræenden.

Nederste Billede viser Bræisens kornede Struktur, saaledes som denne under Smeltningen viser sig i gjennemgaaende Lys. Karakteristisk ere de ejendommelige Fingerendeaftryk lignende Figurer.

Et Breccie-Isfjeld.

Bræisens kornede Struktur.

Fototypi. Pacht & Crone

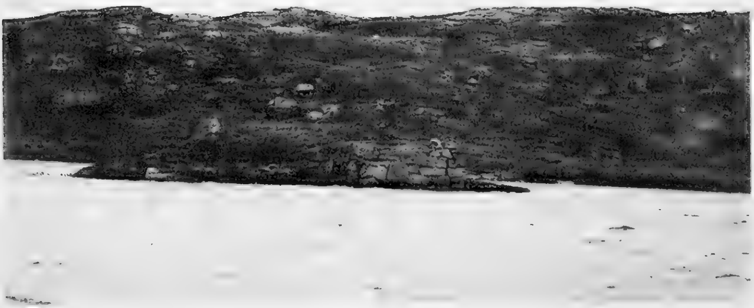
Tavle X.

Tavle X.

Øverste Billede: Nordboruin paa et Skær i en lille Indsø oppe paa Fjeldene ved Ivsormiut i Tunugdliarfik.

Nederste Billede: Nordboruin paa Skæret ved Igaliko. I Baggrunden ses Fjeldet Igańek. Det bagved liggende Kistefjeld er skjult af Taagen.

Det mellemste Billede viser den østlige Ende af sidstnævnte Ruin. Denne Ende af Ruinen er opbygget af skarpkantede Kvarsitblokke, der ere brudte paa Skæret, medens Vestenden af Ruinen, hvoraf der ses en Del, er opført af de løse, afrundede Morænesten, der fandtes paa Skæret.



Ruin paa et Skær i en Indsø. Ivsormiut.

Ruin paa Skæret ved Igaliko.

Skæret med Ruinen ved Igaliko.

Fototypi. Pacht & Crone.

Tavle XI.

Tavle XI.

Tegninger og Fotografier af Kvartskrystaller fra Narsarsuk ved Igaliko, der formentlig vise den sjeldne Basisflade.

Fig. 1 er en Tegning af en 6-sidig Kvartsdruse, hvor svagt buede Flader ses paa Basis' Plads.

Fig. 2 viser en saadan Flade forstørret c. 10 Gange. Karakteristisk er det chalcedonagtige Udseende.

Fig. 3—5 ere Fotografier af en større Krystal.

Fig. 3 viser en Pyramideflade.

Fig. 4 Prismefladen, og

Fig. 5 viser en ujævn Flade, der sidder paa Basis' Plads, og som formentlig er sammensat af en Mængde Basisflader, dem med de smaa Forhøjninger, og endvidere Tilløb til Pyramideflader. (Tegningerne ere af Hr. stud. mag. V. W. Petersson).

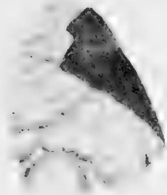


Fig. 2. $^{10}/_{1}$

Fig. 1. $^{2}/_{1}$

Fig. 3. Pyramide. $^{3}/_{1}$

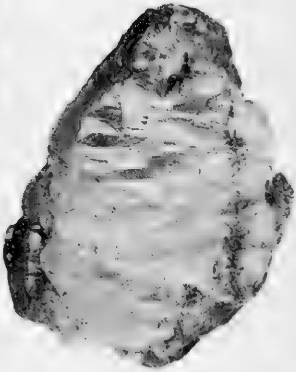


Fig. 4. Prisme. $^{3}/_{2}$

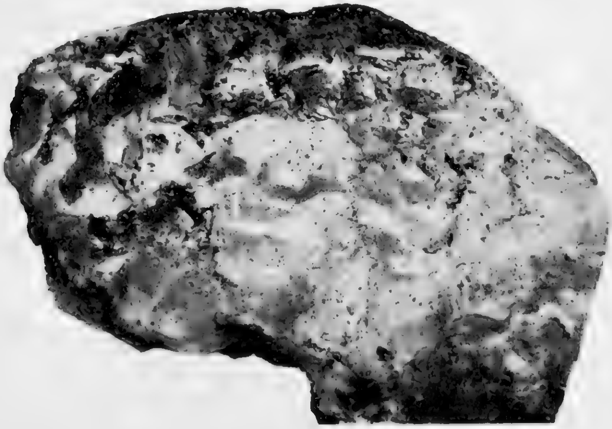


Fig. 5. Basis. $^{3}/_{1}$

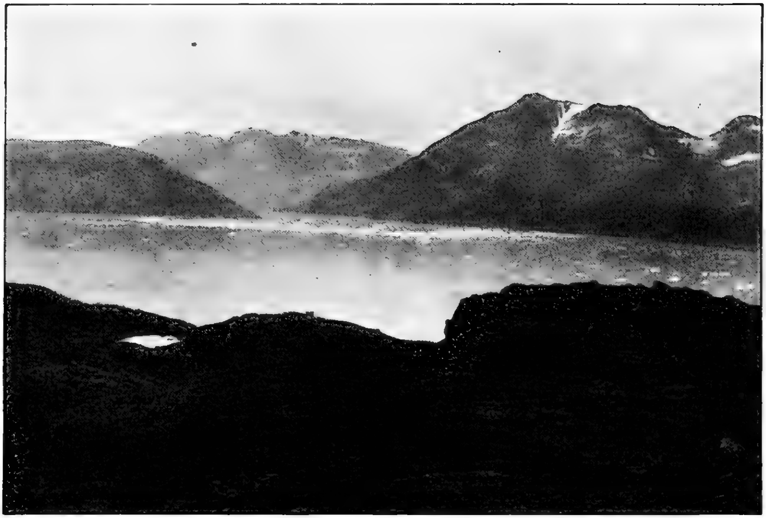
Fototypi: Pacht & Crone.

Tavle XII.

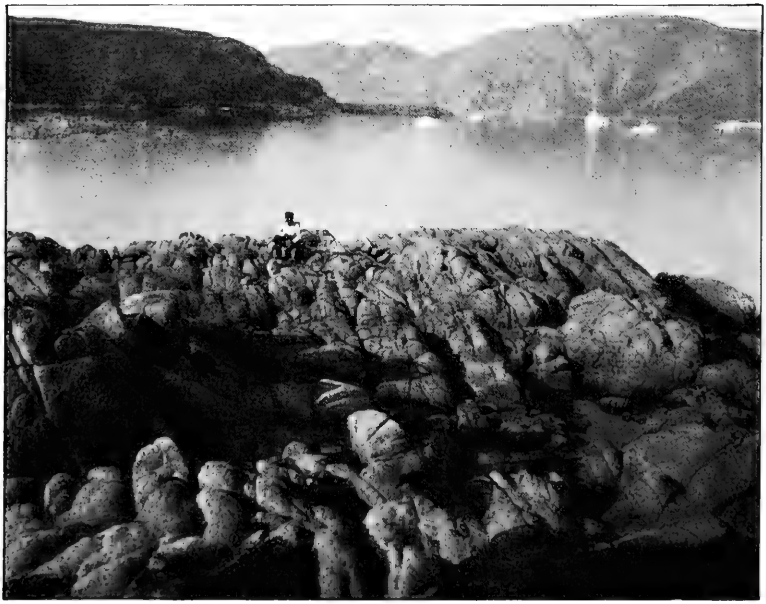
Tavle XII.

Øverste Billede: Isbarrieren udenfor Mundingen af den lille Isfjord Korok i Tunugdliarfik. Den dannes af Isfjelde, der ere strandede paa en formentlig Endemoræne.

Nederste Billede: En stærkt forvittrende Granit, der danner en Odde mellem Nugarsuk og Sidlisit i Tunugdliarfik.



Isbariæren ved Koroks Isfjord.



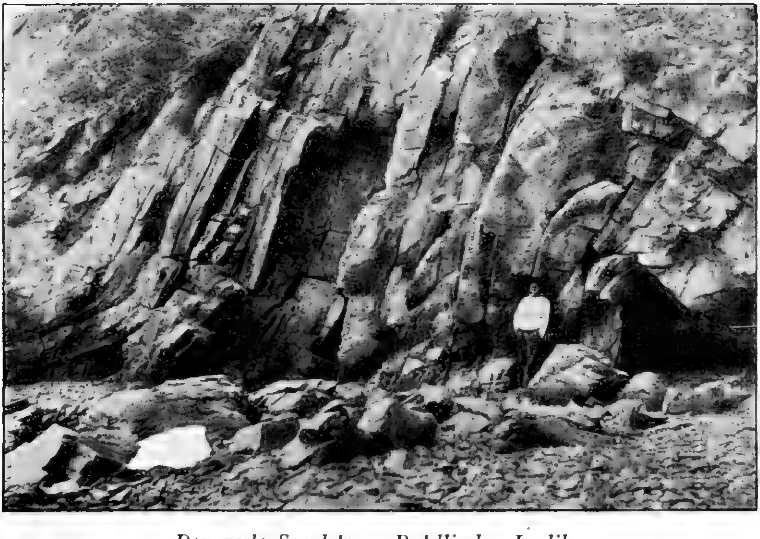
Forvittrende Granit. Nær Sidlisit.

Tavle XIII.

Tavle XIII.

Begge Billeder vise den røde Sandsten; det øverste, saaledes som denne viser sig i sin tyndskifrede Form og uforstyrret Lejring i Slibestensfjeld, Sidlisit; og det nederste, saaledes som Sandstenen undertiden kan være stærkt bøjet, sandsynligvis paavirket af den gjennembrydende Diabas. Pudtlisek ved Igaliko.

Den røde Sandsten. Sidlisit.



Den røde Sandsten. Putdlisek. Igaliko.

Tavle XIV.

Tavle XIV.

Den røde Sandsten.

Det øverste Billede viser det Landskab, der fremkommer, hvor denne Sandsten i horizontal Lejring findes over større Strækninger. Ipiutak i Tunugdliarfik.

Det nederste Billede viser Sandstenens Struktur og giver en Forestilling om det ejendommelige Udseende, den har, hvor den røde Farve pletvis er afbrudt af gule Pletter. Sidlisit i Tunugdliarfik.

Den røde Sandsten. Ipiutak.

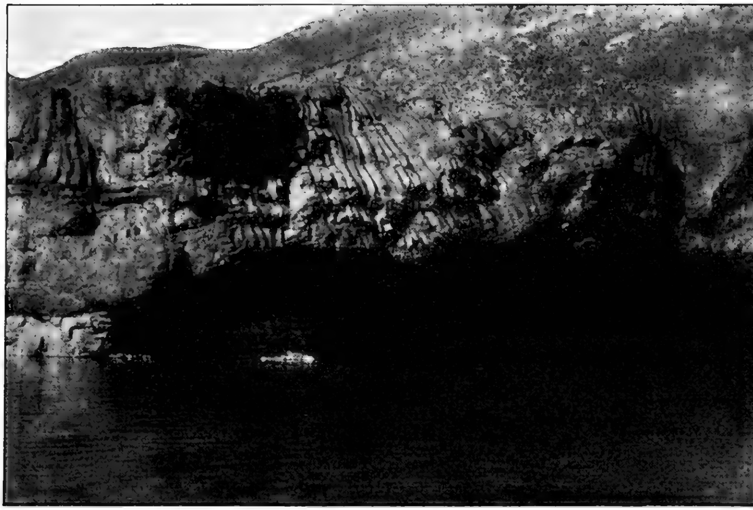
Den røde Sandsten. Sidlisit.

Tavle XV.

Tavle XV.

Øverste Billede: Søjleformet Afsondring i Diabasen; rimeligvis en Del af en intrusiv Gang. Musartût i Tunugdliarfik.

Nederste Billede: Kryolithens pladeformede Struktur mod den overliggende Granit; formentlig fremkommen ved den smeltede Masses Afkøling mod Sidestenen. Kryolithbruddet. Ivigtût (1899).



Søjleformet Struktur. Diabas. Musartût.

Kryolithens lagdelte Struktur mod Graniten. Ivigtut. 1899.

Tavle XVI.

Tavle XVI.

Øverste Billede: En af de ejendommelige elliptiske Stenbelægninger, der af og til findes paa Havstokkene ved Kysterne af Tunugdliarfik. Den her fremstillede er fra Kagsiarsuk og er uregelmæssig sammensat af kantede Sten. Andre som ved Slibestensfjeld, ere regelmæssig elliptiske og sammensat af større afrundede Sten, der fremtræde skarpt mod Havstokkens mindre Sten.

Nederste Billede: Østenden af den lange Ruin paa Øen (ikke Skæret) ved Igaliko.

Elliptisk Stensætning. Kagsiarsuk.

Østenden af Ruinen paa Øen. Igaliko.

Tavle XVII.

Tavle XVII.

Øverste Billede: Et sjeldent stort Exemplar af en krybende Birk paa Hellerne ved Kagsiarsuk i Tunugdliarfik. Stammen var 8 m lang og nær Roden 29 cm i Omkreds.

Nederste Billede: Strukturen i en gammel Jordmur, der viser, hvorledes denne har været opført af i Siksak stillede Græstørv. Tingimiut i Sermilik.

Krybende Birketræ. Kagsiarsuk.

Husmur af Græstørv. Tingimiut.

Tavle XVIII.

Tavle XVIII.

De gamle nordiske Ruiner i Grønland, navnlig dem der direkte have tjent til Beboelse, ere i Reglen saa stærkt sammenfaldne og bevoxede med Krat, at et Fotografi sjeldent kan vise noget. Navnlig ere nogle af de mest karakteristiske Bygninger, Staldene med Stenplader som Skillerum, aldrig i en saadan Stand at de kunne fotograferes med Udbytte. For at give et Begreb om, hvorledes en saadan Stald og et tarveligt af Stenplader opbygget Hus med Stengærde omkring, kunne se ud, hidsættes her to Billeder af saadanne Bygninger fra Højfjeldet ved Røros i Norge.

Hus ved Røros. Norge.

Stald ved Røros. Norge.

Tavle XIX.

Tavle XIX.

Øverste Billede viser Højlandet mellem Fjordene Kangerdluarsuk og Tunugdliarfik og kan tjene til at give et Billede af det øde Udseende, Landskabet her har paa Grund af Sodalithsyenitens stærke Forvittring.

Nederste Billede viser Østsiden af Bunden af Kangerdluarsuk. Fjeldet i Baggrunden er det nordligste af Iviangusat-Fjeldene, der naar en Højde af c. 800 m. Ogsaa dette Parti bestaar af Sodalithsyenit, der er næsten fuldstændig uden Vegetation. De ejendommelige bølgede Linier vise en Afvexling i Lagene af mørke og lyse Mineralier, fremkomne under Afkølingen af de engang smeltede Masser.

Fjeldparti mellem Kangerdluarsuk og Tunugdliarfik.

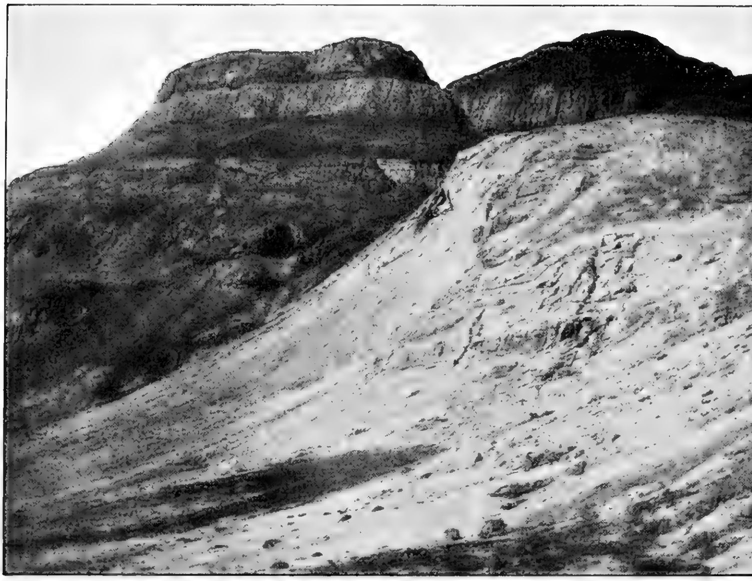
Fjeldside i Kangerdluarsuk.

Tavle XX.

Tavle XX.

Øverste Billede: I Baggrunden ses Fjeldet Nunasarnausak i Kangerdluarsuk, hvis nederste Del bestaar af Granit, medens den øverste Del bestaar af afvexlende Sandsten og Diabas. Det lyse Parti i Forgrunden til højre er den stærkt forvittrende Sodalithsyenit.

Nederste Billede: Parti af den lille Ø, der ligger ved Foden af Nunasarnausak, der danner Baggrunden. I Midten ses den øverste udkilende Del af en Gang, der fortsætter sig skraat ned under Vandfladen og som for en stor Del er udfyldt med Eudialyt. For neden ses noget af Tang- og Balanranden. (1899).



Nunasarnausak i Kangerdluarsuk

Fra Øen i Kangerdluarsuk.

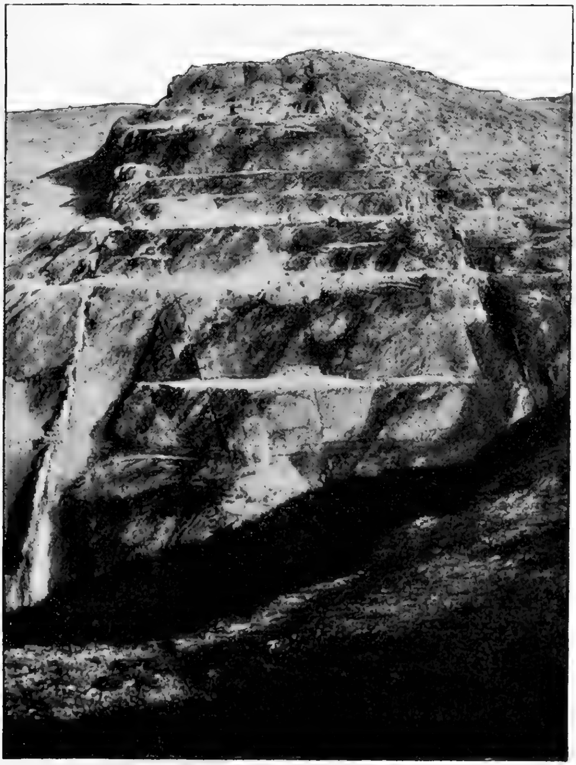
Tavle XXI.

Tavle XXI.

Øverste Billede viser Vestsiden af Bugten ved Naujakasik i Tunugdliarfik.

Nederste Billede viser Sodalithsyenitens bænkede Struktur, saaledes som denne er blottet i en næsten lodret Væg ved Naujakasik i Tunugdliarfik.

Naujakasik i Tunugdliarfik.



Fra Naujakasik. Tunugdliarfik.

VI.

Beretning

om

Undersøgelserne af Jakobshavns-Isfjord og dens Omgivelser

fra Foraaret 1903 til Efteraaret 1904.

Af

M. C. Engell.

1909.

Hensigten med Ekspeditionen var i Hovedsagen at fortsætte de Undersøgelser, jeg havde paabegyndt i Sommeren 1902, og om hvilke der er berettet her i Meddelelserne samt for et enkelt Punkts Vedkommende tillige i Geographische Mitteilungen 1903.

Det var oprindelig bestemt, at jeg skulde rejse med Barkskibet «Ceres». Men da dette allerede skulde afgaa fra København den 9de Maj, opnaaede jeg ved Hr. Direktør Rybergs Velvilje at faa Tilladelse til at rejse med Direktoratets Dampskib «Godthaab». Afrejsen fandt først Sted den 5te Juni fra Grønlandske Handels Plads. Uagtet jeg altsaa kom til at rejse en Maaned senere fra Danmark, viste det sig, at jeg dog naaede Egedesminde Dagen, før «Ceres» passerede dette Sted.

Efter en i alle Henseender behagelig Rejse kom vi paa Højde med Kap Farvel den 18de Juni. Her laa Storisen et langt Stykke til Søs, c. 18 Sømil (33—34 km). Julianehaab-Bugt helt op til Nunarssuit var ligeledes fyldt med Is, saa langt man kunde se fra Udkigstønden. Kaptajn Bang forsøgte desuagtet at komme gennem Isen for at kunne følge Løbene langs Land. Forsøget maatte dog opgives, efter et Etmaals Forløb, hovedsagelig paa Grund af Taage. For mig, der aldrig tidligere havde set Storisen paa nærmere Hold, var denne Tur gennem Isen meget interessant. For det meste var de enkelte Stykker flade, med en ringe Højde over Havfladen (1/2 Meter eller mindre); Arealet varierede meget, men gennemgaaende var der ingen Stykker over 100 m. Nu og da saa man en sort Plet paa Isflagerne; Pletten viste sig at være Sælhunde, der styrtede sig i Vandet, naar Skibet nærmede sig. Forøvrigt er den store Hastighed, hvormed en Isflage kan skyde sig ud i de aabne Partier mellem Isen og saaledes spærre Vejen for Skibet, forbløffende. Den viser, at der maa være stærke Strømninger i Vandet, hvorved der skabes Pres. Med Undtagelse af Sæler bemærkedes ellers intet Dyreliv i Storisen.

Det første Sted, vi betraadte i Grønland, var Kolonien Godthaab, hvortil vi kom den 21de Juni, altsaa efter en Rejse paa kun 16 Dage. Da Direktøren skulde inspicere Kolonien blev Skibet liggende et Par Dage. For at udnytte Tiden foretog jeg Dagen efter en Ekskursion til Lille Malene, en Gnejsknold, der ligger tæt ved Godthaab, for at se lidt paa Vegetationen.

Vinteren havde i hele Grønland været meget stræng. Sent paa Foraaret var der tillige faldet meget Sne. Overalt omkring Godthaab og endog paa de smaa lave Øer udenfor laa der endnu store Snedriver i Kløfter og paa Afsatser, og Nordskraaningerne var næsten helt sneklædte. Paa Sydskraaningerne var Sneen derimod ved at smelte bort, og Smeltevandet sivede overalt nedover og gennem Vegetationsdækket. Som Følge af disse Forhold var Plantevæksten endnu meget langt tilbage. Kun faa Arter og Eksemplarer havde naaet at udvikle og udfolde Knopper og Blomster og det endda kun paa de gunstigste Lokaliteter — nemlig enkelte Sydskraaninger. Den Plante, der var længst fremme, var selvfølgelig *Empetrum nigrum*; den var nu næsten helt afblomstret; kun ganske enkelte Eksemplarer stod endnu med støvfyldte Knapper. *Vaccinium uliginosum* og *Salix groenlandica* stod med modne Støvknapper, ligeledes *Salix herbacea*. Paderokken, *Equisetum vulgare*, havde modne Sporer. *Loisleuria procumbens* og *Diapensia lapponica* stod med Blomsterknopper færdige til at springe ud. *Betula nana* stod i Knop; kun faa havde udfoldet Knopperne og stod med modne Rakler. *Salix glauca* stod derimod næsten allevegne kun i Knop. *Ledum palustre* og *Phyllodoce coerulea* var ikke engang udstyrede med synlige Blomsterstande. Sammenligner jeg dette med mine Iagttagelser fra Jakobshavn den 22de Juni 1902, var der en meget betydelig Forskel i Plantevækstens Udvikling — i Godthaabs Disfavør — uagtet Jakobshavn ligger paa c. 69° n. Br., medens Godthaab ligger paa 63° n. Br. Ved Jakobshavn var paa samme Tid i 1902 alle de ovenfor nævnte Planter meget længere fremme.

Den 23de om Eftermiddagen lettede «Godthaab» og satte Kursen mod den næste Koloni nord for Godthaab, Sukkertoppen, hvortil vi ankom Dagen efter, den 24de, tidlig om Morgenen. I Sukkertoppens umiddelbare Omegn var der næsten ingen Sne, og Vegetationen var længere fremme end det 1° sydligere liggende Godthaab. Dette beror hovedsagelig paa, at Sukkertoppen ligger særdeles lunt, beskyttet mod kolde Vinde af høje Fjelde; men Havstrømningerne udenfor spiller sikkert ogsaa en Rolle.

Om Aftenen samme Dag, som vi var kommet, afgik Skibet til de næste Kolonier: Holstensborg og Egedesminde; et vedholdende Regnvejr forhindrede i Holstensborg en nærmere Besigtigelse af Vegetationen. Sne var her meget mindre af end i Godthaab. Efter at vi den 27de om Eftermiddagen var kommet til Egedesminde gik jeg fra Borde. «Godthaab» skulde nemlig videre nord paa til Upernivik for at hente Besætningen fra et af Isen ituskruet Hvalfangerskib — forøvrigt det fra Nordenskiölds Færd saa berømte «Vega». — Først paa Tilbagevejen vilde «Godthaab» anløbe Jakobshavn.

Da jeg altsaa blev sat af her i Egedesminde — ganske vist uformodet — besluttede jeg mig nu, da der maaske var Lejlighed til at komme ind i Aulatsivik-Fjord. De indre Dele af denne Fjord er kun delvis kortlagt; Jensen og Kornerup har passeret dens sydlige Gren. I den nordlige har Nordenskiöld været med «Sophie». Det var særlig til denne Del af Fjorden, jeg gerne vilde frem. Dels havde det sin Interesse at se, om Gletscheren havde forandret sin Beliggenhed siden Nordenskiölds Tid, dels vilde jeg forsøge at kortlægge Grænsen mellem Indlandsisen og Landet, hvorved jeg fik Forbindelse mellem det i 1902 undersøgte Orpigssôk. Endelig vilde jeg forsøge at faa afgjort om det flade Land mellem Aulatsivik-Fjord og Disko-Bugt havde en lignende Oprindelse som det flade Land syd for Klavshavn.

I Anledning af Direktørens Ankomst kom der adskillige Konebaade til Kolonien fra Bopladserne i Omegnen; for saa vidt var det ikke vanskeligt at faa fat i en Konebaad. En af de Grønlændere, der var kommet til Kolonien med Konebaad og som hørte hjemme i Kangarssuatsiak, Boplads mellem Egedesminde og Aulatsivik-Fjord, sagde han kendte Fjorden rigtig godt og tilbød at være Styrer. Som vi senere skal se var enten hans Kendskab ikke stor eller ogsaa havde han — diplomatisk — ikke udtalt sig nærmere om Fjorden; den var nemlig, som jeg senere erfarede, paa denne Tid altid stuvende fuld af Is.

Den 29de rejste vi syd paa gennem Egedesminde Skærgaard og overnattede paa en mindre Ø, Inugsutusut. Vejret var ægte Strædevejr, raakoldt og taaget, meget forskelligt fra det Vejr, jeg var vant til ved Jakobshavns-Isfjord. Sne var der her i Egedesminde-Distriktet kun lidt tilbage af, hovedsagelig kun paa Nordskraaninger og i Kløfter, hvor der var føget særligt meget sammen. Vegetationen var ogsaa her betydeligt længere fremme end ved Godthaab; det maa dog samtidig erindres, at Tiden var rykket en Uge frem. *Salix glauca* stod med helt udfoldede Knopper og med modne Rakler, *Betula nana* ligeledes. *Silene acaulis* blomstrede.

Fra Inugsutusut sejlede vi videre syd paa til Aulatsivik-Fjord, men allerede et Stykke indenfor Mundingen, var den endnu saa fuldpakket af Kalvis og Vinteris, at Konebaadsstyreren havde Ret i, at det vilde være umuligt nu at komme frem. For yderligere at overbevise os om det triste i Situationen spildte vi — Konebaadsstyreren og jeg — næsten en hel Dag med at komme op paa nogle høje Bjergtoppe, fra hvilke vi havde en god Udsigt over den ydre Del af Fjorden: desværre Is overalt i Fjorden i saadan Mængde, at en Konebaad ikke vilde kunde klare sig. Forøvrigt plejede Fjorden ikke at være nogenlunde isfri før i den sidste Del af Juli, bedst er den at befare i August og til Dels i September — saaledes fortalte man mig i Niakornak, en Boplads i Fjordens Munding. I den Henseende forholder altsaa Aulatsivik-Fjord sig som andre Fjorde, i hvilke der gaar Isstrømme ned f. Eks. Torsukatak-Fjord. Under disse Forhold maatte jeg atter vende tilbage til Egedesminde, hvorfra jeg sejlede videre med Konebaad til Klavshavn, hvortil jeg kom den 6te Juli. Jeg søgte at bevæge Konebaadsføreren til at lægge Vejen over Kitsigsunguit, af Danskerne kaldet «de grønne Øer» efter den i Grønland usædvanlig tætte Græsvækst, fremkaldt af den utallige Mængde Terner, der ruger der; men Konebaadsføreren frygtede det brede Farvand, vi skulde over og foreslog, at vi hellere maatte tage over den lille Ø Upernivik ɔ: Foraarsstedet, fordi Grønlænderne i Forsommeren pleje at staa i Telt her paa Fangst. Uagtet der ingen Grønlændere stod i Telt, da jeg var paa Øen, var det let at se, at Øen var en yndet Teltplads: *Alopecurus alpinus*, der er Bopladsernes ufravigelige Ledsager, dannede et tæt og meget smukt Grønsvær; de mange Grønlændergrave beviste ogsaa, at Øen var et søgt Fangststed.

I Klavshavn var ved vor Ankomst Atak-Fangsten i fuld Gang. Det kneb derfor meget med at skaffe Besætning og Baad til den paatænkte Tur ind i Tasiussak. I Fangsttiden, hvor der er rigeligt med Mad, holde de unge Knøse, der alligevel intet fanger, mere af at gaa og drive end at bestille noget, et Forhold de ældre Grønlændere ikke er blinde for. Omsider fik jeg dog samlet en Besætning sammen, og med denne tog jeg saa ind til Tasiussak; men den for Forbindelsen vigtige Autdlarisap-Tasia var endnu islagt. Desværre var Isen for mør til, at man kunde gaa paa den. Naar man satte Foden haardt i, opløstes Isen i henved decimeterlange Stængler. Denne stænglede Struktur af Is kan man som bekendt ogsaa iagttage herhjemme. Konebaaden maatte altsaa bæres helt syd om Søen og uden om Kiagusuk-Fjeld. Denne Ombæring er lang og besværlig og tager megen Tid. Medens Mandskabet bar Baaden over, saa jeg lidt paa Vegetationen. Det var iøjnefaldende, at Foraaret ogsaa her var kommet meget sent. Sneen var ganske vist helt forsvunden, naar undtages visse Steder, hvor der var føget Driver sammen. En Plante *Pyrola grandiflora*, der 1902 stod i Blomst den 22de Juni, var endnu ikke udsprunget den 7de Juli; selv *Dryas integrifolia* var først sprungen ud for nylig; kun faa Eksemplarer stod i Blomstring. Ellers var de andre Hedeplanter nu i fuld Blomstring: *Rhododendron lapponicum*, *Silene acaulis* o. a.; *Vaccinium uliginosum* var endog næsten afblomstret.

Først Dagen efter var Konebaad og Bagage naaet helt ned til Tasiussak. Denne var paa dette Tidspunkt ganske fri for Vinteris; Isfod var der intet at se af. Nu gik Roturen ind gennem Tasiussak til Kekertarsunguit-Tupersua — naturligvis med de nødvendige Ophold —. Her slog jeg Telt og begav mig om Eftermiddagen paa en Fodtur til Teltpladsknuden, idet jeg og mine Ledsagere gik over et Pas i Kekartarsunguit-Kulâ. Uagtet det var temmelig sent om Eftermiddagen vi begav os af Sted, var Myggene meget ubehagelige; for hvert Skridt man tog, for der en Sværm op af Lyngen. Overhovedet var Myggene denne Sommer næsten uudholdelige; Aarsagen til den store Myggerigdom, som jeg slet ikke bemærkede i 1902, maa vist søges i det sene Foraar og rigelige Nedslag om Vinteren; alle Huller var i Aar fulde af Vand. Om Natten — for saa vidt man kan tale om Nat i den lyse Tid, er Myggene temmelig fredelige, hvorfor man staar sig ved at arbejde om Natten og sove om Dagen; ganske vist har Myggene en fænomenal Evne i Retning af at finde et Hul, hvorigennem de kan komme ind i Teltet.

Fra Teltpladsknuden har man en udmærket Udsigt over Jakobshavns-Isfjord og Enden af Jakobshavns-Gletscher. Selve Isfjorden frembød det sædvanlige Skue: aldeles tætpakket af større og mindre Kalvisstykker, mange af sædvanlige Isfjeldes Dimensioner; alt er hvidt. Et eneste Isfjeld af samme Type som de i min Beretning af 1902 omtalte fandtes. Det stod med lodrette Sider og en takket ujævn Overflade af en mere graalig Tone — hidrørende fra Støv, der fra Land er blæst ud paa Gletscheren, medens Isfjeldet var en Bestanddel af denne. Da det har stor Interesse at faa Højden af saadanne Isfjelde i oprindelig Stilling sammenlignet med Højderne af Gletscheren, foretog jeg — foruden Nivellement med Haandniveau — et trigonometrisk Nivellement, idet jeg udmaalte en Basis og fra Endepunkterne foretog de nødvendige Vinkelmaalinger. Resultatet gav, at Isfjeldet var 9 m lavere end det Parti af Isstrømmen paa det Sted, hvor Isfjeldet paa det nærmeste maatte antages at have løsnet sig. Denne Forskel betyder dog ikke noget absolut, idet Fikspunktet paa saavel Isfjeldet som Isstrømmen maa tages nogenlunde tilfældigt som en markeret Spids og udsiger altsaa intet nøjagtigt om den gennemsnitlige Højde af saavel Isfjeld som Gletscher; men som vi senere skal komme tilbage til, kan der ikke være Tvivl om, at disse Isfjelde i oprindelig Stilling løsner sig fra Gletscheren ved en Revne, og da ligge de nøjagtigt i samme Niveau som Gletscheren. Der kan altsaa ikke være Tvivl om, at den yderste Ende af Gletscheren flyder paa Vand efter de hydrostatiske Love. Kalvningen af disse Isfjelde i oprindelig Stilling kan altsaa ikke foregaa hverken ved Nedstyrtning eller Opdrift; men maa foregaa derved, at der, under Isens uensartede Bevægelse fra Randen af Fjorden og ud mod Midten, opstaar Spændingsforskelle, der resulterer i Brud, og da de foran Isstrømmen liggende Ismasser ikke formaar at udøve et tilstrækkeligt Tryk mod det frasprængte Isstykke, vil dette ikke ved Regelation atter fryse sammen med Gletscheren. Overhovedet spiller maaske en Isfjords Pakning af Kalvis en betydelig Rolle med Hensyn til den Maade paa hvilken Isstrømmen kalver. I den Henseende er netop Jakobshavns-Isfjord ualmindeligt stærkt pakket, idet der ved Mundingen af den ligger den bekendte Isfjeldsbanke, der næsten ganske stopper for Kalvisens Udførelse af Fjorden. Hvis der nemlig ikke er noget Modtryk af Kalvismassen mod Isstrømmens forreste Rand, kan man vanskelig tænke sig, at Isstrømmen skulde kunne skyde sig saa langt ud, at den kan flyde paa Fjorden; paa Grund af de ovenfor omtalte Spændinger maatte Enden af Isstrømmen snart springe itu, og da der intet er, der presser imod, vilde Regelationen udeblive: Enden af Isstrømmen altsaa henfalde til mindre Stykker, netop den Slags man ser i mindre tætpakkede Isfjorde f. Ex. Torsukatak. Saa vidt jeg ved, har ingen tidligere bemærket disse Isfjelde i oprindelig Stilling i Nord-Grønland, og efter al Rimelighed forekommer de her kun i Jakobshavns-Isfjord, som den mest ispakkede Fjord. Noget nævneværdigt Udbytte af at studere Kalvningsfænomenerne i Jakobshavns-Isfjord som Forbillede for Kalvningerne i andre Fjorde har man altsaa ikke, fordi Forholdene der er saa afvigende fra andre Isfjorde.

Til en skarp Bestemmelse af Gletscherrandens Beliggenhed egner Teltpladsknuden sig ikke mere, da Gletscherranden nu har trukket sig længere mod Øst, hvorved man i altfor høj en Grad kommer til at se Randen *en face*. Jeg tog dog et Fotografi af Situationen, og fra Endepunkterne af en Basis tog jeg med Teodolit Sigter til et Punkt i Gletscherranden omtrent midtvejs mellem Midten af Gletscherranden og Fjordens Side. En Udregning gav, at dette Punkt skulde ligge c. 350 m længere fremme end Gletscherranden gjorde det foregaaende Aar. Det maa dog bemærkes, at den benyttede Trekant havde en meget lille Basis i Forhold til Sidernes Længde, tilmed var den meget skævvinklet. Forøvrigt maa man erindre, at 350 m ikke betyder saa meget her, hvor alle Dimensioner er saa store, og hvor Isens Hastighed er saa stor; blot der løsner sig et Par større Isbjerge er tilstrækkeligt til, at Gletscherranden paa det nærmeste kommer til at ligge, hvor den laa det foregaaende Aar. Randpartiet af Gletscheren havde nedenfor Teltpladsknuden løsnet sig; 1902 havde den her dannet ligesom en Bræmme. Dette kan sikkert tydes som en Tilbagegang af Gletscheren, idet vi nemlig maa erindre, at Randpartierne af Gletscheren bevæge sig paa selve Bunden af Fjorden og saaledes ikke er underkastet de samme Svinger som Midterpartierne af Gletscheren, der flyder paa Vandet.

For at faa en nøjagtigere Bestemmelse af Beliggenheden af Gletscherenden forsøgte jeg at komme over til Nunataken. Den Elv, der løber mellem de to Søer var stærkt opsvulmet, saaledes at det var umuligt at vade over. Af det Ler og Slam, som var afsat paa Stenene, kunde man se, at den for nylig havde staaet endnu højere; i Løbet af en fjorten Dages Tid vilde den være sunket saa meget, at man kunde komme over. Selve Søerne var endnu delvis islagte, men Isen var fuldstændig mør.

Da jeg altsaa alligevel ikke kunde naa over til Nunataken, vendte jeg tilbage til Teltpladsen, Kekertarssunguit-Tupersua. Herfra sejlede jeg med Konebaaden til Alangordlek-Gletscher, for nærmere at undersøge om denne Gletscher muligen ogsaa trak sig tilbage og for muligen at blive klar over dens Maade at kalve paa.

Nogen Forandring i Beliggenheden af Gletscherens Ende kunde jeg ganske vist ikke paapege. Men at Gletscheren er enten stationær eller snarere i Tilbagegang, synes mig at fremgaa deraf, at der langs Gletscheren findes en frisk, aldeles ubevokset Morænevold, en Endemoræne. Højden af Gletscherenden over Havet overstiger næppe noget Sted 25 m. Hastigheden er ringe, da der næsten ingen Kalvis dannes. Overalt luder Gletscherenden frem over. Nogen Kalvning fandt ikke Sted;

heller ikke hørte jeg under mit Ophold den kanonadeagtige Støj, der altid følger med Kalvningerne. De ganske smaa og spredte Stykker Kalvis dannes vistnok simpelthen af Nedstyrtninger.

Besætningen vilde nu tilbage til Klavshavn, hvilket jeg maatte give Lov til; paa Tilbagevejen slog jeg atter Telt ved Kekartarssunguit-Tupersua, hvorpaa jeg foretog en ny Ekskursion til Teltpladsknuden; men nye Resultater fremkom ikke. Gletscherenden havde ikke forandret sig kendeligt i den Uges Tid, jeg havde været ved Alangordlek; kun var der flere Steder styrtet betydelige Partier af Gletscherenden ned. Det ovenfor omtalte Isfjeld var rykket lidt længere ud i Fjorden. Nunatap-Tasia var endnu delvis islagt.

Da Grønlænderne stadig klagede over, at deres Kamiker var saa daarlige — et almindeligt brugt Paaskud, naar Grønlænderne ikke vil være ude mere — maatte jeg opfylde deres Ønske om at komme tilbage til Klavshavn.

Som allerede berørt i min Beretning om Rejsen 1902 er Klavshavns Befolkning ikke behagelig at have med paa en længere Tur. Det er en noget lad Befolkning. Man ser altid i Klavshavn kraftige unge Mennesker, som slet intet bestiller ud over at ryge Tobak og glane ud over Havet. Der er ved Klavshavn en god Fangst og efter grønlandsk Skik og Brug falder der altid lidt af til dem, der intet har fanget; det er derfor ikke nødvendigt at slide for Føden. Naboskabet til de to Kolonier Jakobshavn og Kristianshaab har vel heller ikke gavnet.

Meget behageligere at have med at gøre er Grønlænderne i Torsukatak og i Sydost-Bugt.

Da meget afhænger af den Besætning, man har med sig, foretrak jeg at gaa videre mod Nord for der at skaffe en flink Besætning. Desuden skulde jeg alligevel helst ind i Torsukatak-Fjord, for at undersøge om Gletscherne der var i Tilbage- eller i Fremgang.

Fra Klavshavn gik altsaa Rejsen over Jakobshavn, hvor jeg hentede Proviant, til Rodebay, en mindre Boplads, hvis Navn stammer fra den hollandske Hvalfangsttid. Hvorfor den har faaet Navnet Rodebay ɔ: røde Bugt er usikkert. Fjeldene deromkring er ikke rødere end andre Steder. Paa grønlandsk hedder den Okaitut (Skarvene); Navnet stammer fra, at der i sin Tid i de stejle Fjelde bag den nuværende Boplads rugede Skarve. Efter hvad en Grønlænder meddelte, var disse nu udryddet her. Bopladsen ligger ved en temmelig fladvandet Bugt med god Ankergrund — formodentlig Aarsagen til, at de hollandske Hvalfangere holdt til her —. Befolkningen er behageligere at have med at gøre end Klavshavnerne og Jakobshavnerne.

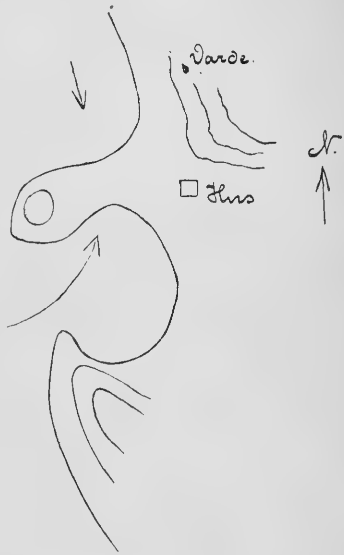


Fig. 1.

Fra Rodebay gik Rejsen videre til Klokkerhuk. Konebaadene plejer, naar Vejret er godt, at gaa over det tre Mil brede Farvand mellem Kangârssuk og Sarkâta, den sydligste lavere Del af Arveprinsens-Ø (paa grønlandsk Agdlutok). Vejret var lidt ustadigt denne Gang, og derfor gik Konebaadsstyreren helt op til Niakornak, før han satte over. Da vi kom omkring Øens Sydspids begyndte det at friske op, saaledes at vi maatte slaa os ned ved Klokkerhuk, hvor vi paa Grund af daarligt Vejr maatte blive to Dage. Selve Klokkerhuk er en lille knoldformet Halvø forbundet med Hovedlandet ved en flad Strækning (Fig. 1). Denne Landtange er dannet ved, at de skiftende nordlige og sydlige Vinde har kastet Grus og Sten op i en Vold. For Øjeblikket bryder Havet ned, hvad det tidligere har opbygget, formodentlig fordi Landet sænker sig. Tidligere var

Klokkerhuk en vigtig Boplads, fra hvilken der blev drevet en ret betydelig Hvalfangst; et Minde om dens fordums Betydning har man i de mange Eskimograve i en ældre Strandvold. Nu er Klokkerhuk ganske ubeboet, kun nu og da ligger der en Baad fra Ritenbenk paa Fangst her. For at rejsende om Vinteren kan søge Ly her, findes der opført et Hus, forøvrigt ganske forfaldent og molesteret af Grønlænderne. Til nogen større Nytte er det næppe; de fleste Slæderejser gaar i Reglen øst om Øen, da Disko-Bugt i de senere Aar sjælden lægger til.

Omsider bedagede Vejret sig, og vi kunde atter fortsætte Rejsen til Ritenbenk. Allerede naar man kommer uden for Klokkerhuk kan man se det høje Forbjerg Kangek, lige syd for Ritenbenk. Man tror man er nær ved, og dog er der 3—4 Timers Rotur fra Klokkerhuk til Kangek. Vestkysten af Arveprinsens-Ø, eller som den i ældre Tid kaldtes Arveprinsens-Ejland er meget ensformet uden Pynter, Skær og Bugter. Lagene helder ind ad og har Strygning parallel med Kysten, saaledes at der ikke bliver noget videre at bearbejde. Tilmed findes der kun faa Revner og Spring. Kangek er netop opstaaet ved et saadant mægtigt Spring.

Ritenbenk, skal efter hvad Dr. Steenstrup har oplyst, være dannet ved Omsætning af Bogstaverne i Berkentin og har altsaa ikke noget med Ride, den tretaaede Maage, og bank, Fuglefjeld at gøre. Paa grønlandsk hedder Bopladsen Agpat efter et Fuglefjeld tæt ved, hvor der ruger et Utal af Tejste af Danskerne kaldet Alke; den egentlige Alk, Klubalken ruger ogsaa paa Fuglefjeldet, men er langt sjældnere. Alkefjeldet her ved Ritenbenk er dog efter Beskrivelsen at dømme meget mindre end Alkefjeldet ved Upernivik.

Fra Kangek og nordpaa er Arveprinsens-Ø meget indskaaret, som Følge af den meget uregelmæssige Lejring af Gnejsen; Sejladsen fra Ritenbenk nord paa er derfor meget afvekslende. Efter en lille Dags Rotur naaede vi Kekertak

(«Øen») en lille Ø, der ligger inde i en Sidebugt til Torsukatak, og hvor der findes en lille Boplads og et «Udliggersted». Paa de Fremspring, der danner Bugten, ligger to Bopladser Nugak og Ekogfat. I den ydre Del af Torsukatak saa vel som her i Kekertak-Bugt, laa der kun lidt Drivis. Sejladsen ind gennem Fjorden gik derfor godt til at begynde med, men i den mellemste Del nord for Kekertakasik (eller som den her med Provinsudtale kaldes Kekertakasak) var der dog saa megen Drivis, at vi maatte gaa syd om denne Ø for at naa ind til Anâ («dens — formodentlig Isens — Exkrement»), et Navn der ogsaa forekommer i Upernivik-Distrikt paa en lignende Halvø, der skyder sig ud fra Indlandsisen. Formodentlig sigtes der ved Navnet til, at Halvøen rager frem fra den hvidlige Indlandsis som en mørk Masse. Paa den nordvestlige Spids af Halvøen ligger der en Boplads af samme Navn som Halvøen. For Øjeblikket fandtes der kun to Huse; for et Par Aar tilbage var der 3 Huse, men den ene Familie flyttede til Arsivik, hvorfra der er lettere Forbindelse med Handelspladsen Atâ. Ved vor Ankomst var begge Familier draget paa Fangst; kun et Spand Hunde var tilbage. Det var forøvrigt min Hensigt at naa tværs over Fjorden til et Forbjærg, Nuk, tæt ved den nordlige Gletscher, hvor Dr. Steenstrup har foretaget Hastighedsmaalinger af Gletscheren samt fotograferet den. Det var imidlertid ganske umuligt at komme igennem. Det er forøvrigt værd at bemærke, at der om Natten selv i den varmeste Maaned danner sig Tyndis inde i Isfjordene. For at faa Overblik over Gletscherforholdene besteg jeg et Fjeld tæt bag Bopladsen. Fjeldet hed Sagdliarusek, og man har derfra en udmærket Udsigt over Isen og Fjorden. Paa Toppen fandtes en Varde, helt mosgroet og altsaa af gammel Dato; maaske er den stablet af Hammer 1883.

Nogen Forandring i Beliggenheden af de to Gletschere kunde jeg ikke paavise ved at sammenligne Gletschernes nuværende Stilling med Fotografier tagne af Dr. Steenstrup. Dog maa den langs Siderne liggende Endemoræne, hvis lysegraa Farve stikker saa stærkt af mod de mørke, likenbevoksede Klippevægge, tydes som et Tegn paa, at Gletscheren i Øjeblikket er i Aftagende. Hele det indre af Torsukatak var fuldstændig opfyldt af Kalvis, op af hvilken der her og der ragede enkelte Isfjelde. Isfjelde i oprindelig Stilling, saaledes som jeg har omtalt det for Jakobshavns-Isfjords Vedkommende, var der intet at se af. Gletscherne skrider ned mod Havet med et meget stærkere Fald end i Jakobshavns-Isfjord. Kalvningen er derfor sandsynligvis helt forskellig de to Steder. Medens vi opholdt os paa Fjeldet, maa der have fundet Kalvninger Sted, da vi hørte den med Kalvningerne forbundne Støj; men hvorledes Kalvningen foregik, fik vi ikke Lejlighed til at iagttage.

Da jeg altsaa paa Grund af Ishindringen i Torsukatak ikke kunde naa over til Nuk, sejlede jeg videre syd paa og vilde have været i Land ved de to sydlige Gletschere Sermia avanarlermata og Sermia kujadlermata; men Konebaadsstyreren, der var fra Ritenbenk, havde aldrig været i Nærheden af Indlandsisen og turde ikke komme den nær. Antagelig vidste han, at der ved Kalvningerne opstaar stærk Bølgegang; denne har han saa anset for at være farlig for Konebaaden, hvilket han ikke behøvede, da det slet ikke var min Agt at komme Gletscherne saa nær med Konebaad. Maaske har han ogsaa næret nogen overtroisk Frygt for Indlandsisen, hvilket ikke er ualmindeligt hos de Grønlændere, der bor fjernt fra den. Vi maatte derfor nøjes med at gaa i Land paa Igdloluarssuit («de store Huse»), en Ø, der ikke er mere end 400 m høj; men hvorfra man har en udmærket Udsigt over de to nævnte Gletschere. Syd for den sydligste ligger der langs med Landet, Nuna-Kigdlinga, i en Afstand af c. 2 km en (5—6 km) lang Morænevold paa Indlandsisen. Denne Bundmoræne maa opstaa ved, at Isen paa Grund af Terrainets Form skyder sig op efter. Hammer omtaler ikke denne ellers meget iøjnefaldende Moræneνold og heller ikke Steenstrup. Maaske er det et Fænomen, der først i den senere Tid er fremkommet, i Lighed med Nunatakerne ved Jakobshavns-Gletscher; hvis det er Tilfældet, synes Morænens Fremkomst at tyde paa, at Isen nu staar lavere end tidligere.

Fra vor Teltplads ved en lille Bugt, Omare, paa Øens Vestside vendte vi tilbage til Kekertak. Farvandet mellem Igdloluarssuit og Kekertakasik er fuldt af lave Øer, og Farvandet er vistnok ikke ret dybt; i hvert Fald er der en meget stærk Strøm her. Det samme syntes mig ogsaa at være Tilfældet mellem Anâ og Kekertakasik samt i Farvandet mellem denne Ø og Arsivik-Land. Da Indlandsisen havde en større Mægtighed end nu, har de to Gletschere inden for Igdloluarssuit sikkert skudt sig ud gennem Atâ-Sund, fordi Torsukatak-Fjord har været helt udfyldt af Torsukatak-Gletscher. Farvandet syd for Kekertakasik har derfor ligget i Læ og er ikke blevet eroderet. Men forøvrigt er det vanskeligt helt at komme paa det rene med disse Forhold, saa længe Isfjordene ikke er oploddede.

Efter at være naaet tilbage til Kekertak foretog jeg en Ekskursion til Sarkak-Gletscher.

Sarkak-Gletscher skyder ned fra det høje sneklædte Land, der ligger syd for de store Søer. Dens Fald er meget betydeligt. Foran Gletscherne var der aflejret en betydelig, ganske ubevokset, Morænevold. I Forhold til denne syntes det, som Gletscheren har trukket sig noget tilbage. Snegrænsen synes her at ligge ganske paa samme Højde som paa Plateauet indenfor Kekertak-Bugt.

Selve Bopladsen Sarkak, der ligger lidt længere mod Vest, gør et meget tiltalende Indtryk. Den ligger ved en lille Bugt, hvis Indløb beskyttes af en lille Ø. I visse Henseender minder den lidt om et dansk Fiskerleje; det er vel ogsaa den mest velstillede Boplads ved Disko-Bugt. De mægtige Isfjelde, der driver ned gennem Vaigat, hidlokker Sælerne og skaffer derved god Fangst.

Fra Sarkak vendte jeg tilbage til Ritenbenk, hvor jeg skaffede mig en Besætning, der lovede at følge mig inde i Tasiussak hele Sommeren. Begyndelsen var ganske lovende. Turen fra Ritenbenk til Jakobshavn, 11 Mil, blev tilbagelagt paa en Dag, hvorpaa jeg drog ind i Sarkardlek-Fjord. De Lodninger, jeg foretog her, gav til Resultat, at denne Arm af Tasiussak ikke er videre dyb, c. 90 m. Ved at bestemme Højden af Gletscheren kom jeg til det Resultat, at de midterste Dele af Gletscherenden havde en Højde af 30 m over Havspejlet, enkelte Toppe hævede sig til 35 m. Man kan vel antage, at den kompakte Ismasse ikke hæver sig over 30 m over Havet. Hvis nu Drygalskis Teori om, at Gletscherne kalver der, hvor de begynder at miste Fodfæstet, er rigtig, saa skulde Dybden af Fjorden ved Gletscherenden beløbe sig til c. 225 m, idet vi antager, at den Del, der er under Vand, er $7^1/_2$ Gange saa stor som den Del, der rager op over Vandet. Lodskuddene viser imidlertid, at saa dybt er der langtfra i Fjorden. Drygalskis Teori om Kalvningen skulde altsaa herefter ikke være gældende. Dog bør det ikke lades ude af Betragtning, at der kan tænkes den Mulighed, at Gletscheren ligger saaledes som det er anskueliggjort paa hosstaaende Tegning (Fig. 2). Meget taler dog mod dette. Navnlig maatte da den Del af Gletscherenden, der beskyttet af Havets opløsende Virksomhed af den foran aflejrede Moræne, springer stærkt frem under Vandet, paa Grund af Opdriften sprænges fra og skyde op med en betydelig Hastighed. Saadanne opskydende Ismasser har jeg aldrig iagttaget, og efter Beskrivelserne har heller ikke andre iagttaget saadanne. Naar man har angivet, at Isfjelde har raget op over Gletscheren og atter sunket tilbage, saa behøver dette blot at have været Flager, der efter Løsningen fra Gletscherenden under deres Bestræbelse for at finde Ligevægtsstillingen med en Spids har raget op over Gletscherens Overflade. At Isfjelde med en

Top kan rage op over Gletscherens Overflade er forøvrigt allerede omtalt i Meddelelser om Grønland 26 Bd. Efter at jeg har foretaget nævnte Lodninger, mener jeg altsaa, at man maa forlade Drygalskis Hypotese.

Som jeg senere hen kommer tilbage til, tyder Forholdene ved Kiakusuk paa, at en Gletscher kan staa meget lavere med sin Underflade end den foranliggende Havbund. Men dermed være ingenlunde sagt, at Forholdene er saadan som anskueliggjort paa Figuren.

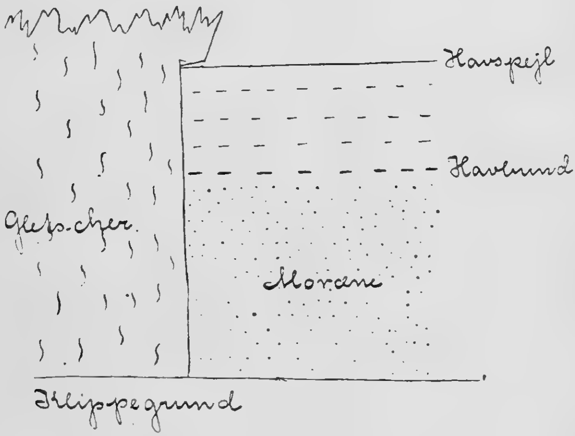


Fig. 2.

Under Opholdet ved Sarkardlek var min Opmærksomhed naturligvis i høj Grad henvendt paa Spørgsmaalet om, hvorledes Gletscheren kalvede.

Man kan ikke undgaa at lægge Mærke til, at Gletscherenden stadig stiller sig med fremadheldende Flade, og at den Del, der ligger i Vandet, er meget afgnavet; dette ses tydeligst, naar det er Lavvande (se forøvrigt hosstaaende Skema Fig. 3). Naar Heldningen har naaet en vis Størrelse, omkring 10°, og der er gnavet tilstrækkeligt meget bort af Vandet, kommer der et Øjeblik, hvor Sammenhængskraften ikke længer formaar at gøre sig gældende; men der skér en Bristning, og den flade Knold falder ned i Vandet. Dette har jeg flere Gange haft Lejlighed til at iagttage. Naar den Skive, der løsnes, ikke gaar i Stykker, hvilket hyppigst sker, falder den om paa Siden. Efter Kalvningen staar Gletscherenden for det meste med lodrette Endeflader, ofte endda heldende en Smule bag over.

Vedbliver man at iagttage et saadant Parti, hvor der er sket en Nedstyrtning, lægger man Mærke til, at Gletscherenden fra at være tilbageheldende bliver lodret og derefter fremadheldende; samtidig ser man Vandet opløse mere og mere af Isen i Vand-

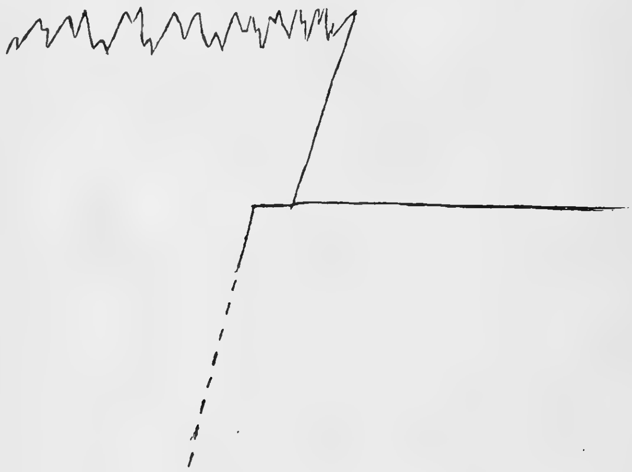


Fig. 3.

skorpen. Naar saa Heldningen er blevet tilstrækkelig stor, og Vandet har gnavet af Isen, sker der en ny Nedstyrtning, en Kalvning; Tidspunktet afhænger af flere Ting, saaledes Revnernes Dybde og Kalvninger i Nærheden. Hvis nemlig Revnerne er særlig dybe, og der finder Kalvninger Sted i Nærheden, kan der indtræde en Nedstyrtning, før der egentlig skulde.

Nogen Opskydning af Isfjelde har jeg ikke iagttaget; heller ikke har jeg kunnet paavise noget Sammenhæng mellem Kalvning og Tidevande. Kalvning indtraadte saavel, naar det var Højvande, Lavvande, Slaptid og Springtid. Hvis Kalvningerne hidrører fra Opdriftens Virkning, skulde man vente de fleste

Kalvninger, naar det var Højvande og da navnlig Springtid; men noget saadant har jeg ikke kunnet paavise. Derimod var det meget almindeligt, at en ringe Nedstyrtning var Signalet til betydelige Nedstyrtninger i Nabolaget, hvilket ogsaa er forklarligt nok, da Spaltedannelsen fremmes ved den opstaaede Rystelse. At Kalvningerne til Tider kan være meget heftig i Isfjordene, har ogsaa andre bemærket.

For Sarkardlek-Gletscher er der næppe noget, der taler for anden Maade at kalve paa end ved Nedstyrtning.

Den Kalvis, der dannes, er meget ubetydelig og forsvinder — naar undtages nogle enkelte Knolde — i Løbet af faa Dage.

Paa Gletscherens Overflade nogle faa Meter fra Land iagttager man de af Nordenskiöld først omtalte Kryokonit-

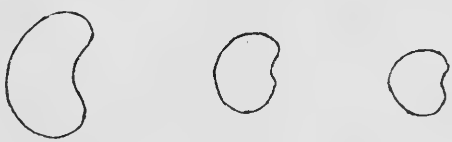


Fig. 4.

huller. Foruden disse lodrette Kryokonithuller havde jeg Lejlighed til at iagttage, hvad de tyske Glacialgeologer kalder Sonnenlöcher (Solhuller), om hvis Forekomst i Grønland der vist ikke foreligger nogen Beskrivelse. For det meste var disse Huller temmelig store (henved 1 dm) og aldrig kredsrunde, men altid mere eller mindre nyredannede. Jo mindre i Tværmaal des mere nærmede de sig til at være kredsrunde — omtrent som Figuren viser. Samtidig med, at de nærme sig til at være kredsrunde, gaa de over til at blive lodrette. (Fig. 4).

De nyredannede Huller var altid orienterede paa en bestemt Maade, nemlig saaledes, at et lodret Plan gennem Aksen faldt sammen med Meridianplanet; denne bestemte Orientering holdt altid Stik. Selve Aksen, der peger mod Syd, danner en Vinkel paa c. 50° med Lodlinjen. (Fig. 5).

I Bunden af disse skraatstillede Huller fandtes, saa vidt jeg kunde skønne, nøjagtig det samme Slam som i de smalle, lodrette Huller. Der kan derfor næppe være Tvivl om, at de maa have samme Oprindelse som de Nordenskiöld-ske Kryokonithuller. Med Hensyn til den skraa Stilling af Hullerne er at bemærke, at denne ikke hidrører fra Bevægelsen af Gletscheren, i saa Fald maatte man kunne paavise en Overensstemmelse i Orienteringen og Hovedretningen af Bevægelsen i Gletscheren. Den skraa Retning kan heller ikke fremkomme ved Forskellen i Bevægelseshastighed i de forskellige Lag af Gletscheren. Da Hullerne ikke er mere end 1 à 2 dm dybe, vil der ikke der kunne være nogen væsentlig Forskel i Bevægelseshastighed. Da Hullerne altid er orienterede mod Syd, maa den skraa Stilling sikkert hidrøre fra Solstraalerne. Hvorledes disse store Kryokonithuller opstaar, er usikkert; maaske opstaar de ved, at flere smaa og tætliggende Kryokonithuller smelter sammen. Som bekendt opstaar Kryokonithullerne ved, at Støv, der er blæst ud fra Land, opsuger Varmestraaler og derved smelter sig Fordybninger i Isen. For at forklare, hvorledes det gaar til, at Hullerne bliver skraa, maa man antage, at det Støv, der ligger ved den sydlige Kant, ligger i Skygge og derfor ikke smelter sig ned; derimod vil det Støv, der ligger i den nordlige Del af Hullet træffes af forholdsvis mange Solstraaler og derfor smelte sig ned i Isen. Hullernes Nyreform staar sikkert i Forbindelse med Solens daglige Bevægelse. Om Eftermiddagen, f. Eks., vil det Støv, der ligger ved den sydvestlige Kant af Hullet, være i Skygge.

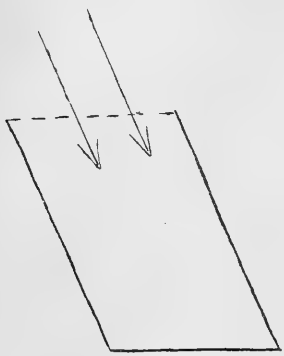


Fig. 5.

De store Kryokonithuller har jeg kun fundet i Nærheden af Land, formodentlig fordi der i Nærheden af Land aflejres saa meget Støv.

Sarkardlek-Gletscher er temmelig bred, men Mægtigheden er næppe stor. Midt i Gletscheren (se Kortet) ligger der en ret stor Nunatak, fra denne gaar der en Morænestribe ud til Gletscherenden. Den Mængde Materiale, denne Morænestribe indeholder, er dog ikke meget betydeligt. Foruden denne fra Nunataken kommende Morænestribe, findes der en Moræne til; den kommer fra en lille af Gletscheren overdækket Fjeldknold. Denne Morænestribe er noget rigere paa Materiale end den før omtalte.

Gletscherenden danner en lige Linje fra Sydsiden til Nunataken, herfra og til Kavdlunap-Nuna danner den en Bue og er tillige ganske lav. Øst for den omtalte Morænestribe hæver Gletscheren sig op i en lav Kuppel og er paa dette Sted meget sønderreven. Forøvrigt er Overfladen i det hele meget ujævn. Hovedretningen af Spalterne i Gletscherne gaar vinkelret paa Bevægelsesretningen af Gletscheren; men foruden disse Hovedspalter er der ogsaa andre mindre fremtrædende Spalter, der hidrøre fra Ujævnheder i Undergrunden.

Saavel langs Gletscherens nordlige som dens sydlige Rand flyder der en Smeltevandselv. Den paa den sydlige Side er langt den største.

Under mit Ophold her inde i Fjorden foretog jeg nogle meteorologiske Iagttagelser; selv om de ikke er systematisk gennemførte, meddeler jeg dem dog:

	7. Aug.		8. Aug.			9. Aug.			10. Aug.
	Kl. 2	Kl. 9	Kl. 8	Kl. 2	Kl. 9	Kl. 8	Kl. 2	Kl. 9	Kl. 8
Tørt Term.	10.6	5.4	9.5	10.6	5.4	7.4	10.2	4.2	7.7
Vaadt Term. ...	7.6	4.0	6.5	7.6	4.4	..	9.0	2.7	6.2
Max. Term.	...	12.2	..	...	12.6	..	...	10.7	..
Min. Term.	...	...	2.6	...	...	..	...	...	—0.8

Vi ser altsaa, at selv helt inde ved Indlandsisen kan Temperaturen om Dagen den første Del af Aug. stige til 12.6; men om Natten kan Temperaturen naa 0 og derunder (— 0.8).

Foruden de oven for omtalte Undersøgelser benyttede jeg Lejligheden til i saa stor Udstrækning, som jeg kunde, ved Hjælp af Haandniveau og Barometer at indlægge Højdekurver i det af Hammer ved hans Opmaalinger skaffede Grundlag.

Derimod foretog jeg ingen Hastighedsbestemmelse af Gletscheren, da jeg ikke kunde skaffe en Basis, der laa højt nok til, at jeg kunde faa gode Sigter ud over Gletscheren.

For at faa udført nogle Lodskud i Nunatap-Tasia lod jeg Konebaaden bære over fra Kekertarssunguit-Ilua til den lille Ferskvandssø Amitukujok og derfra atter over til Nunatap-Tasia.

Amitukujok er forholdsvis flad — det dybeste Lodskud var kun 14 m. Den Dal, Søen ligger i, er en Bruddal, udforet af Morænemateriale, idet nemlig Dalens Retning gaar vinkelret paa den Retning, Isen maa have haft, da den skød sig ud over Yderlandet. Paa lignende Maade forholder det sig temmelig sikkert ogsaa med Kunguak-Dal, der jo er parallel med Amitukujok.

Nunatap-Tasia var derimod meget dybere. I den østlige Del, hvor den aabenbart er dybest, beløb Maximumsdybden sig til 127 m.

Søens Dannelse skyldes vistnok i første Instans Forvitring, paa lignende Maade som jeg senere kommer til at omtale det for Itivdlek's Vedkommende. Men Forkastninger har sikkert ogsaa haft deres Andel i Dannelsen; paa Hammers Teltpladsknude lige vest for Søen er der et Par Steder Dale, der maa opfattes som Bruddale, og som ligger temmelig nøje i Retning af Nunatap-Tasias Hovedretning, ligesom man kan forfølge en Forkastning her fra Nunatap-Tasia helt hen til Tasiussak (Kajuta sugdlua). Det er netop denne Forkastning, der danner den Randkæde der — afbrudt af Forkastninger i Nord-Syd — løber langs den sydlige Side af Jakobshavns-Isfjord, og hvoraf Nunataken er en Del. Naar den østlige Del er dybest, skyldes det maaske den Omstændighed, at to Forkastningslinjer her skærer hinanden, nemlig Forkastningslinjer i Øst-Vest og den Forkastningslinje, der har dannet Amitukujok-Dal.

Under den højere Stand af Indlandsisen, gik denne ind gennem Nunatap-Tasia og har yderligere eroderet den.

Fra Vestenden af Nunataken ved Varden var det let at konstatere, at Gletscheren nu laa længere øst paa end i Juli. Medens Gletscherenden af Sarkardlek for det meste stiller sig med fremadheldende Endeflade, saa staar Enden af Jakobs-

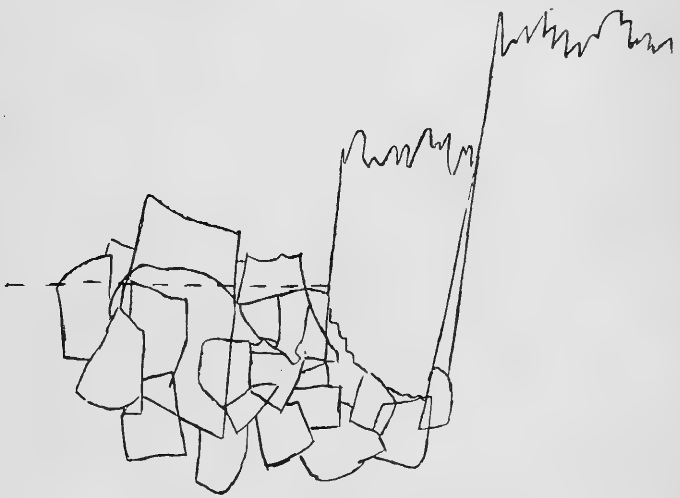


Fig. 6.

havns-Gletscher altid med lodret Væg eller maaske snarere med Væggen lidt tilbageheldende. Undertiden blev det nedstyrtede staaende paa Halvvejen, hvilket jeg ogsaa lagde Mærke til 1902. Dette beror sagtens paa, at saadanne større Stykker kommer til at hvile paa mægtige Masser af sammenstuvet Kalvis, der bærer dem oppe. Muligvis hidrører Fænomenet ogsaa fra, at den Del af Stykket, der rager ned i Vandet, af dette bliver delvis opløst, saaledes at Opdriften bliver mindre. Hosstaaende (Fig. 6) søger at anskueliggøre dette Forhold.

ndre Kalvninger end saadanne Nedstyrtninger fik jeg ikke

Lejlighed til at iagttage. Derimod bemærkede jeg paa selve Gletscheren inden for Enden ruinagtige Partier ɔ: Omraader hvor Spidserne tilsyneladende var faldet ned. Saadanne Partier var ved deres hvide Farve afstikkende i Forhold til den graa Farve, der ellers er herskende paa Gletschernes Overflade.

Paa Østenden af Nunataken var der god Lejlighed til at paavise, at Isen havde trukket sig tilbage. Isranden laa nu 35 m lavere, end den har gjort tidligere, idet dens tidligere Stand jo markeres af en Moræne, endnu kun sparsomt bevok-

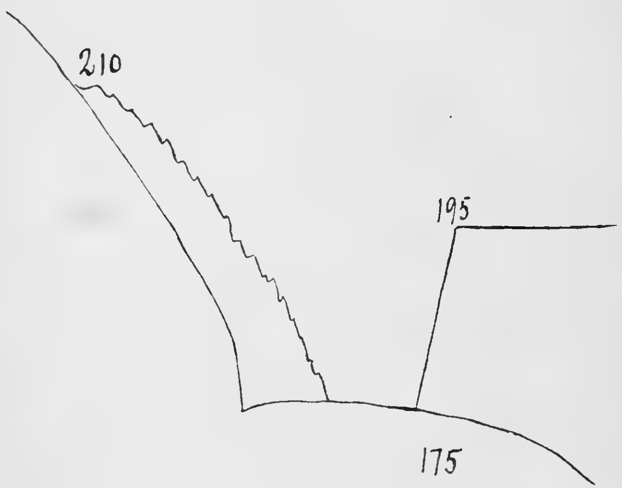


Fig. 7.

set med Planter. Isens øverste Rand laa i en Højde af 195 m, dens Fod i en Højde af 175. Gletschervæggen var altsaa 20 m høj. Mellem den øverste Moræne og den nuværende Isrand, der iøvrigt ikke er ledsaget af nogen Morænevold, iagttog jeg flere mere eller mindre udprægede Morænevolde: Beviser for, at Isen ikke kan have trukket sig jævnt tilbage, men i længere eller kortere Tid har været stationær, hvor nu Morænevoldene ligger.

Mellem den østlige Ende af Kekertarssunguit og Nunatanguak skyder der sig en Gletscher ned. Den er ganske jævn oven paa, og nogen videre Bevægelse kan der næppe være i den. Formodentlig ligger den i Læ af Nunatakens Fortsættelse under Isen mod Øst. Ogsaa denne Gletscher er i Tilbagegang, hvilket de temmelig friske Moræner, der ligger langs dens Rand, tyder paa.

Ved Enden af Gletscheren er der et Delta, som forener sig med en Gletscherelv, der løber mellem Nunatanguak og Fastlandet, og som kommer fra en bred Gletscher, der skyder sig ned mellem Nunatanguit og Ekaluit-Nunatâ; ogsaa her har Isen trukket sig meget stærkt tilbage. Temperaturen i Elven Kl. 2 de sidste Dage i August var nøjagtig 1°; om Natten danner der sig Tyndis paa den Del af Nunatap-Tasia, hvor den munder ud. Mængden af Slam den fører, er ikke stor. En Bestemmelse gav kun 6 gr pr. Liter.

Her, hvor Deltaet løber tæt under Gletscherenden, vasker den de nederste Dele bort, og det ovenoverliggende styrter da ned. Gletscherenden kommer derfor til at staa med lodrette Vægge ganske som de Gletschere, der gaa ud til Vandet i Fjordene. Det synes mig, som dette Forhold giver et Fingerpeg til Forstaaelsen af Kalvningen i hvert Fald for Gletschere, hvis Hastighed ikke er stor.

Paa Hammers Kort kaldes den Landstrækning, der ligger inden for den store Gletscher og hen imod Ekaluit-Nunatâ, for Tivsarigsok (tipe = Lugt, sak og gigpok). Oprindelig betegnede Helland hermed Strækningen ved Kangerdlukasik. Hammer flyttede det længere mod Øst. Grønlændere, som jeg spurgte ud om Stedbetegnelsen paa Landstrækningen her, kendte ikke dette Navn. Overhovedet har de ikke nogen Betegnelse netop for dette Omraade. Der maa formodentlig have indsneget sig en Misforstaaelse, hvilket forøvrigt meget let kan ske med grønlandske Stednavne, idet disse jo i Modsætning til Stednavnene i ældre Kulturstater har en Betydning, der forstaas umiddelbart, og forskellige Grønlændere ofte betegner et og samme Sted forskelligt, efter hvad hver af dem synes, er det mest karakteristiske for det.

Paa den vestlige Del af Nunataken opholdt jeg mig meget for at faa Lejlighed til at iagttage Kalvninger af Gletscheren. Smaa Kalvninger, Løsning af Flager og Nedstyrtninger var hyppige nok, men større Kalvninger, der kunde give nogen nærmere Oplysning om, hvorledes de store Isfjelde dannes, fandt ikke Sted, medens jeg var til Stede.

Der stod endnu tilbage, inden Vinteren kom, at foretage en kort Ekskusion til Alangordlek-Gletscher — Sermia alangordlia, — som Grønlænderne kalder den. Efter de Lodninger, som jeg foretog, — se Kortet — er Dybden i Midten kun c. 50 m, langsomt aftagende ind mod Bredden. Højden af Gletscheren fandt jeg at være 25 m eller i kompakt Masse 20 m. Hvis Gletscheren skulde svømme i Vandet med sin Ende, — eller i hvert Fald være lige ved det — maatte Fjorddybden beløbe sig til c. 150 m. Man kan naturligvis antage, som jeg ogsaa gjorde det for Sarkardlek, at en ret betydelig Endemoræne befinder sig ved Enden af Gletscheren. En Endemoræne paa 100 m er jo ret betydelig; men Forholdene ved Keakusuk synes mig at tale noget til Gunst for en saadan Opfattelse.

Bunden baade her og i Sarkardlek-Fjord bestaar af et meget fint Ler; kun i Nærheden af Gletscheren viste Bundprøverne sig mere sandede. Dette forklares ved, at den betydelige Strøm af Smeltevand fører Leret bort, og lader Sandet ligge. Forøvrigt gaar Hovedmassen af Smeltevandsstrømmen op langs Gletscherenden og driver derefter langs Overfladen af Fjorden ud efter. Ved at skovle i Overfladen kan man jævnlig faa det blaa, næsten klare Fjordvand at se.

Kalvningerne i Alangordlek frembyder ingen Forskel fra Kalvningerne i Sarkardlek; men Gletscheren er endnu mindre produktiv end Sarkardlek-Gletscher.

Paa begge Sider af Gletscherne laa der ret betydelige Endemoræner; men forøvrigt var der intet, der tydede paa, at denne Gletscher var i nogen stærk Aftagen. Paa Endemorænerne var *Papaver nudicaule*, *Stellaria alpina* og enkelte andre indvandrede.

Fra det høje Land nord for Alangordlek-Gletscher, har man en fortrinlig Udsigt over Gletscherne. Navnlig kan man meget tydeligt forfølge Spalterne i Gletscherne. I det hele gaar de paa tværs af Bevægelsesretningen. Afvigelserne beror paa Ujævnheder i Undergrunden. Er der en Bakke under Isen, hemmes Isens Bevægelse paa det Sted, og Spalterne kommer derfor til at løbe skraat tilbage.

Fra Alangordlek-Fjord hæver Landet nord for sig meget brat. Naar man først naar op, er det meget jævnt, idet, saa vidt man kan skønne, de oprindelige Dale er blevet udfyldt af Morænemateriale. Op over Plateauet hæver der sig mod Nordost et kegledannet Fjeld, Omerslusat.

Fra Alangordlek roede vi til Ekaluit (Laksene), en i Laksetiden besøgt Teltplads ved den Elv, der løber ud fra Ekaluit-Tasia (Laksesøen). De mange primitive Røgestilladser er et Vidne om Virksomheden. Forøvrigt er Laksene smaa og heller ikke velsmagende. Umiaken blev baaret langs den nordre Bred til Søen og sat i Vandet her. Om Efteraaret staar Vandet næsten en Meter lavere end om Foraaret. Da Søen modtager Tilløb fra Smeltevandsfloder, der kommer fra Indlandsisen, er Vandet uklart ligesom i Nunatap-Tasia, og ligesom der er Bredden fuld af skarpkantede Sten, som gør det besværligt at sætte en Konebaad i Vandet. Paa en gammel Morænevold paa den nordøstlige Side af Søen slog vi Telt.

Desværre fik jeg ikke udført nogen Lodning, da jeg ved et Uheld havde mistet Lodlinen i Alangordlek. Formodentlig er Søen temmelig flad i Modsætning til Nunatap-Tasia. Medens Nunatap-Tasia i en forholdsvis sen Tid har været udfyldt af en Ismasse, der banede sig Vej syd om Nunataken, saa har Ekaluit-Tasia ikke været udfyldt af Is, siden denne havde en langt betydeligere Udbredelse end nu.

Ved den østlige Ende af Søen løber der en Gletscherelv ind. Bækken har skaaret sig ned i et tidligere Delta. Dette maa altsaa være dannet under en højere Stand af Søen. Sarkardlek- og Alangordlek-Gletscherne har formodentlig i sin Tid skudt sig frem, saaledes at de helt har stemmet Ekaluit-Tasia op. Rudimenter af det tidligere Gletscherdelta staar tilbage som Kamme og Rygge. Elvedalen er flad og fuld af Rullesten.

Øst for Søen oppe paa et Plateau hæver det før omtalte Omerslusat-Fjeld sig; det ligger tæt ude ved Indlandsisen, og man har derfra en udmærket Udsigt i alle Retninger. Desværre sneede det, saaledes at Landskabet blev indhyllet i Sne; det blev derfor vanskeligt at erkende Grænsen mellem Land og Indlandsis, altsaa at paavise, om Isen overhovedet havde trukket sig tilbage. Paa nogle enkelte Steder kunde jeg dog paavise, at der laa store nye Morænevolde; det maa vel derfor være berettiget at antage, at ogsaa Isen her er i Aftagen. Langs Isranden laa der opstemt mange Smaasøer; i adskellige af disse ender Isen med lodrette Vægge.

Paa Isen laa der ret betydelige Moræner.

Egnen indenfor Ekaluit-Tasia er øde og besøges yderst sjældent af Grønlænderne og kun om Vinteren ved Hjælp af Hundeslæde, naar de vil paa Rensdyrjagt. Man kører ind ad Tasiussak til Kangerdlukasik og over Tangen ind paa Ekaluit-Tasia. Derpaa følger man den før omtalte Gletscherelv mod Nord og kommer saa ind paa Ekaluit-Nunatap-Tasia (ikke at forveksle med Kekertarssunguit Nunatap-Tasia). Rensdyrene er dog meget sjældne. Ganske vist har jeg flere Gange i Egnene syd for Isfjorden set Rensdyrspor, men kun en eneste Gang i Sommeren 1902, set et ungt Dyr. Forøvrigt er ogsaa andre Dyr sjældne herude, saaledes baade Hare og Rype.

Nordøst for Søen strækker der sig en temmelig høj Bjergkæde, fra hvis højeste Top man har en udmærket Udsigt. Man ser over Jakobshavns-Gletscher til Nunatarssuak og dennes Østspids; man kan ligeledes se Dele af Ekaluit-Nunatap-Tasia og Ekaluit-Nunatâ. Disse topografiske Enkeltheder er blevet indført paa Kortet.

Øst for Søen findes et lille Omraade af Fjeldskraaninger, der ikke er bevokset med Lav, og som derfor er lysegraat. Rimeligvis har Isen for nylig med en Tunge hængt ned herover. Stedet synes ogsaa at være antydet paa Hammers Kort.

Da Søen ligger saa aaben, er Vegetationen meget sparsom, selv paa Nordsiden, der dog beskyttes af de ovenfor omtalte Fjelde. Nogle enkelte Steder er dog Birkebuskene ret godt udviklede, og i en Fure, som en lille Elv havde skaaret i en Endemoræne, der strakte sig langs den nordlige Del af Søen, voksede *Salix glauca* oprejst og naaede en Højde af 1.3 m. En Skare Rødirisker holdt til i dens Grene. Vegetationen paa Moraenen var, saaledes som det altid er Tilfældet, meget sparsom. Mest fremtrædende var den sorte traadede Liken, dernæst enkelte Græsser og Halvgræsser, hist og her en *Dryas*, *Saxifraga tricuspidata*, *Silene acaulis* og endnu sjældnere nogle Eksemplarer af *Salix glauca* og *Betula nana*.

Efter et have faaet et foreløbigt Overblik over Egnen omkring Ekaluit vendte vi tilbage til Ekaluit-Tupersua. Næste Morgen var Alangordlek saa langt, som vi kunde se, tillagt med Tyndis. Grønlænderne blev naturligvis noget bekymrede ved Situationen og ønskede at komme af Sted, saa snart ske kunde. Med Aarerne slog vi Isen itu og kom omsider ud i aabent Vand i Tasiussak. Her viste Vandet en Temperatur af 1.2°. Det kolde Smeltevand i det indre af Isfjorden fremmer selvfølgelig i høj Grad Islæget. Om Aftenen naaede vi Kekertarssunguit-Tuperssua, hvor vi slog Telt. Den følgende Dag gik jeg over Kekertarssunguit-Kulâ til Teltpladsknuden for at iagttage Forandringer i Isfjorden. Der var forøvrigt ikke noget interessant at opdage; det tidligere omtalte Isfjeld i oprindelig Stilling var forsvundet.

Derefter fortsatte vi Rejsen ud af Tasiussak, idet vi dog anløb Upernivik ved Tasiussaks Udmunding i Isfjorden. Her gik jeg op paa Fjeldene for at se, om det eftersøgte Isfjeld skulde være at se. Det var der ikke og maa altsaa være gaaet i Stykker; ud af Fjorden kan det i hvert Fald ikke være kommet.

Da nogle meteorologiske Observationer fra Egne, der ligger nær Indlandsisen maaske kan have sin Interesse, meddeles her nogle Fragmenter.

	Nunatap-Tasia									
	25. Aug.	26. Aug.		27. Aug.			29. Aug.			30. Aug.
	9 Aft.	8 Mg.	8 Aft.	8 Mg.	2 Md.	8 Aft.	8 Mg.	2 Md.	8 Aft.	8 Mg.
Term.	3.5	3.9	0.6	1.3	3.7	0.8	0.9	5.2	÷0.2	0.0
Vaadt Term.	..	2.6	..	0.7	3.6	0.2	÷0.1	4.1	÷1.8	...
Max.	..	..	7.5	...	..	3.8	...	..	6.2	...
Min.	..	..	..	÷3.0	..	..	÷0.8	..	...	÷5.9

	Kekertarssunguit		Alangordlek						
	30. Aug.	31. Aug.	31. Aug.		1. Sept.		2. Sept.		
	8 Aft.	8 Mg.	2 Md.	8 Aft.	8 Mg.	8 Aft.	8 Mg.	2 Md.	8 Aft.
Term.	÷1.5	÷2.4	3.8	÷0.6	1.7	0.5	3.0	4.1	÷1.2
Vaadt Term.	...	...	..	...	...	..	1.2	..	...
Max.	...	...	..	4.0	...	6.2	...	..	4.5
Min.	...	÷8.0	..	...	÷3.0	..	÷7	..	...

	Alangordlek									
	3. Sept.		4. Sept.			5. Sept.			6. Sept.	
	8 Mg.	8 Aft.	8 Mg.	2 Md.	8 Aft.	8 Mg.	2 Md.	8 Aft.	8 Mg.	8 Aft.
Term.	1.7	1.1	1.3	3.3	0.1	0.1	4.1	2.2	2.5	1.8
Vaadt Term.	÷0.7	÷1.3	÷1.2	1.2	÷1.2	÷1.1	2.0	1.0	1.0	0.3
Max.	...	4.7	...	..	3.2	÷4.9	..	4.0	...	6.2
Min.	÷4.9	...	÷3.9	..	...	...	..	..	÷2.0	..

	Ekaluit-Tasia											
	7. Sept.			8. Sept.			9. Sept.			10. Sept.		
	8 Mg.	2 Md.	8 Aft.	8 Mg.	2 Md.	8 Aft.	8 Mg.	2 Md.	8 Aft.	8 Mg.	2 Md.	8 Aft.
Term.	3.1	7.4	2.7	4.0	5.1	2.8	3.1	5.1	2.1	2.3	5.1	0.4
Vaadt Term.	0.6	4.1	0.6	2.1	3.3	..	..	3.0	..	0.3	3.3	..
Max.	..	..	9.0	...	..	5.3	..	..	7.3	...	..	6.9
Min.	1.0	..	..	÷1.9	..	..	0.8	..	..	÷0.4	..	..

	Ekaluit-Tasia												
	11. Sept.			12. Sept.			13. Sept.			14. Sept.			15. Sept.
	8 Mg.	2 Md.	8 Aft.	8 Mg.	2 Md.	8 Aft.	8 Mg.	2 Md.	8 Aft.	8 Mg.	2 Md.	8 Aft.	8 Mg.
Term.	0.7	5.8	÷0.5	2.4	6.7	3.5	3.6	7.2	3.0	3.4	4.2	2.8	2
Vaadt Term.	÷0.3	3.3	...	1.5	5.4	2.9	..	..	..	..	..	..	..
Max.	...	..	+6.3	...	..	7.0	..	..	7.0	..	..	4.5	..
Min.	÷6.3	..	...	÷3.7	..	..	0.7	..	..	1.0	..	..	0.0

Vejret, der i den sidste Tid havde været koldt og vinterligt, blev netop nu, da vi var ved at forlade Tasiussak, næsten sommerligt — i hvert Fald om Dagen. — Jeg besluttede derfor at gøre en Ekskursion til Pakitok-Fjord for om mulig at faa Lejlighed til at undersøge, om Indlandsisen ogsaa her er i Tilbagegang. Som omtalt af Hammer er Indsejlingen meget snæver og kan kun foretages i Nærheden af Middelvandstand og endda kun med Forsigtighed. Selve Udløbet har skaaret sig igennem en Moræneaflejring, der, da den er flad ovenpaa, synes at være afsat under Vand. Konebaadsstyreren var forøvrigt ukendt her, og da vi søgte at naa frem ad den sydlige Arm, løb Baaden paa Grund, hvorover Styreren blev meget betænkelig. Vi vendte og slog Telt paa Akuliarusek, hvorfra man har en ganske god Udsigt over de Gletschere, der skyder sig ned. Flere Forhold tyder paa, at Isen var i Aftagende.

Paa Grund af det snævre Indløb beløber Forskellen mellem Flod og Ebbe sig kun til en halv Meter i Pakitok-Ilua.

Da Vejret vedblev at være godt, og Konebaadsstyreren ikke var bange for at slaa Telt i rimelig Nærhed af Isen, sejlede vi ind gennem Atâ-Sund og slog os ned i Bassinet syd for Torsukatak ved Kugssuak, en Gletscherelv, der kommer fra en Gletscher mellem Nunap-Kigdliga og Manitok. Gletscheren styrter fra en Højde af 350 m meget stejlt ned mod Kugssuak-Dal. Paa denne Tid førte Elven ikke ret meget Vand og var desuden delt i flere Arme, saaledes at man uden større Besvær kunde komme over den. Nunap-Kigdliga bestaar af Glimmerskifer, der er stærkt forvitret. En gammel Moræne fortæller, at Isen har staaet mere fremrykket end nu. Men ellers kan man ikke sige, at Isen nu for Tiden har trukket sig synderligt tilbage; hvis man overhovedet med Sikkerhed kan tale om Tilbagegang her.

Paa Plateauet vest for Kugssuak ligger der adskillige Søer, hvorfra Elvene styrter ned som brusende Vandfald.

Ved Teltpladsen laa en subfossilførende Lermasse. Mellem Gneisøen og Fastlandet har den bevaret sig mod Denudationen; Bølgeslaget har dog gnavet den stærkt. Paa Klippesiderne ser man smukke Gletscherskrammer. Disse er hyppigt krydsende. Selv om man nødvendigvis maa antage, at Ismassen i umiddelbar Nærhed af Gletscherskrammen maa have samme Retning som Skrammen, og at altsaa Ismasserne ved Bunden ved krydsende Skrammer maa have haft en forskellig Retning, saa er det dog ikke vist, at hele Ismassen helt op til Overfladen har haft forskellige Bevægelsesretninger. En større Mægtighed af Isen er vistnok tilstrækkelig til at kunne fremkalde en forskelligartet Bevægelse af Ismasserne ved Bunden.

Paa Gletscheren stod Vandet frosset i Fordybningerne og faldt ved sin asurblaa Farve stærkt i Øjnene. Langs Gletscheren, men dog fjernet nogle Meter derfra, laa en ældre Moræne, sparsomt dækket af den Vegetation, man sædvanlig træffer paa gamle Moræner. Umiddelbart langs Gletscheren laa der en anden ganske frisk Moræne.

Den Del af Nunap-Kigdliga, der støder op til Gletscheren, frembyder en smuk Lagrække. Nederst iagttager man en typisk Gnejs tæt gennemsat af Pegmatitgange. Derefter kommer der et Lag Hornblende og endelig øverst et Glimmerskiferlag; dette sidste er stærkt forvitret. Lagene falder mod Øst.

Fra vor Teltplads her ved Niakornanguak formaaede jeg Styreren til at sejle os til Nunataken. Denne har ganske samme Lagfølge som Nunap-Kigdliga; dog er der ved et Brud, der gaar tværs over Nunataken i øst-vestlig Retning, betydelig Forskel paa den nordlige og sydlige Del af Nunataken. Den nordlige Del er meget højere end den sydlige Del, og da Lagene falder mod Øst, er den ved Forvitring delt i Trappetrin, der løber i Nord-Syd, og som gør Marchen meget besværlig. Uagtet Nunataken i og for sig ikke er videre stor, tog det en uforholdsmæssig lang Tid at naa op paa det højeste Punkt. Herfra har man en udmærket Udsigt til alle Sider. Her tæt ved Toppen fandt jeg et stort Rensdyrgevir. Det var meget forvitret og stammede sandsynligvis fra den Tid, da Rensdyrene fandtes i disse Egne. Nu er Rensdyrene udryddede paa Strækningen mellem Torsukatak og Jakobshavns-Isfjord. Landstrækningerne her er jo ogsaa kun smaa, og Kysten er tæt befolket — efter grønlandske Forhold naturligvis. Men allerede umiddelbart syd for Jakobshavns-Isfjord og nord for Torsukatak findes der Rensdyr, paa det sidste Sted er de endog ret hyppige. Da Dagene nu allerede var korte, kom vi først hjem sent om Aftenen. Heldigvis var det Maaneskin, ellers havde vi været nødt til at tilbringe en ret kølig Efteraarsnat paa Klipperne; nu kunde vi med lidt Forsigtighed langsomt bevæge os ned ad.

Den sydlige Del af Nunataken bestaar i sin øverste Del af en stærkt forvitret Glimmerskifer ganske som paa Nunap-Kigdliga, og ligesom paa denne var Overfladen temmelig jævn og fuld af Forvitringsprodukter. Sermia-Kujadlek-Dal,' saa vel som Brudlinjen mellem den nordlige og sydlige Del af Nunataken samt Sermia-Avanardlek-Dal hører formodentlig alle til samme System af Forkløftninger. De to Gletcherdale er stærkt eroderede, derimod staar Bruddalen paa Nunataken med skarpe Former og er fuld af Forvitringsprodukter — nedfaldne og skarpkantede Sten og lignende. Lagfølgen er meget regelmæssig: nederst Gnejs, saa Hornblende, saa Glimmerskifer; kun paa den nordlige Del af Nunataken har et øverste modstandsdygtigt Lag holdt sig; derfor er ogsaa dette Parti det højeste.

I Dalen mellem den nordlige og sydlige Del af Nunataken løber der baade en lille Elv, der kommer fra Plateauet, og en Gletscherelv, der kommer fra en lille Gletschersø, af Grønlænderne betegnet Tasek-Ilulialik (tasek = Sø, iluliak = Isfjeld, lik = forsynet med), fordi der dannes smaa Isfjelde i den — formodentlig paa sædvanlig Maade ved Nedstyrtning. Isen er her i Vinklen mellem de to Dele af Nunataken meget jævn ganske som ovenfor Nunap-Kigdliga.

Under Opholdet her inde i Bassinet syd for Torsukatak, havde vi i Forhold til Aarstiden et ualmindeligt mildt Vejr. Dette beroede paa, at Vinden stadig var østlig-sydøstlig, saaledes at Vinden var en Føhnvind, til Tider endog udpræget med høj Varme og stærke Vindstød. Men nu gik Vinden om til syd og samtidig faldt Temperaturen. Vi forlod Nunataken for at sætte over til Anâ-Land, for at jeg kunde faa Lejlighed til at studere Sermia-Avanardlek; vi passerede flere lave Øer, Satut, (de tynde ɔ: de flade); den nordligste af dem, Kekertak-Avanardlek, bestaar af to Gnejshøje, forbundne ved en Moræne. Vi slog Telt ved Niakornak (niakok = Hovede). Med Omslaget i Vejret kom Taage, og om Natten faldt der megen Sne; nu var det pludselig blevet Vinter. Vi blev derfor enige om, at nu var det bedst at bryde op og naa ud til Kysten, inden Tyndisen kom og spærrede for os. Paa Vejen tilbage passerede vi syd for Kekertakasak en lille Ø, Pokitokujôk (pokitok, lav); den var langstrakt og bestod ligesom den nylig omtalte Kekertak-Avanardlek af to Gnejshøje, forbundne ved Morænemateriale. Denne Ø ligger saa lavt, at Vandet ved Springflod gaar over Forbindelsespartiet. Hvis Landet sænker sig saa hurtigt som formodet, maa denne Ø, ved at Tangen bliver overskyllet, snart blive delt i to.

Da vi kom til Torsukatak, laa der vidt og bredt Tyndis. Vandet er jo i Forvejen afkølet til Frysepunktet; falder der saa Frostsne, fryser Kalvisstykkerne let sammen. Vi var imidlertid forberedt paa disse Vanskeligheder og havde taget tynde Brædder med. Disse blev fastbundne paa Umiaken i Vandlinjen, saaledes at Isen skar paa Brædderne, medens Skindet blev beskyttet. Vi naaede derfor uden større Besvær Kekertak.

Medens vi sejlede gennem Torsukatak, sprang en tidligere Strandlinje meget tydeligt frem navnlig paa den sydlige Side. Paa min tidligere Rejse gennem Torsukatak havde jeg ikke faaet Øje paa den; men Sneen bevirkede nu, at den traadte tydeligt frem. Paa Slæderejserne den kommende Vinter kunde jeg næsten allevegne i Torsukatak paavise Strandlinjen. Paa den nordlige Side af Fjorden var den dog kun tydelig med bestemt Belysning. Saa vidt jeg ved, er Dr. Steenstrup den eneste, der tidligere har paavist, at man ogsaa andre Steder i Grønland kan paavise saadanne Strandlinjer, der i Norge er ret almindelige.

I Kekertak købte jeg Hunde, og med disse sejlede vi den følgende Dag (d. 6. Okt.) til Ritenbenk, hvor jeg blev boende til den 31. Januar. Da vi var kommet til Ritenbenk, brød der en heftig Sydvest-Storm løs, ledsaget af et stærkt Snefald. Men efter en Uges Forløb var Vejret atter smukt, og Sneen forsvandt næsten ganske igen. Iøvrigt var Efteraaret ikke koldt. Gennemgaaende havde vi en Temperatur af ÷ 8° fra midt i Oktober næsten til Udgangen af December. En Omstændighed, der forøvrigt havde den kedelige Virkning, at jeg ikke kunde komme af Stedet, eftersom Islæget udeblev.

Da Ritenbenk ligger paa omtrent samme Bredde som Anâ, havde jeg efterladt nogle Termometre hos en Fanger dér, for at han i Efteraarsmaanederne skulde foretage Temperaturaflæsninger. Det vilde jo være af Interesse at sammenligne Temperaturerne ved Indlandsisen og ude ved Havet. For at der ikke skulde ske nogen Misforstaaelse, havde jeg anmodet en grønlandskkyndig Mand om at forklare Fangeren Fremgangsmaaden. Da jeg senere kom til Anâ, viste det sig, at Manden nok havde opskrevet nogle Tal, men disse var uden Værdi.

Da Forstaaelsen af Grønlændernes Betegnelse for Vindretningerne kan være af Betydning for Rejsende, meddeles her nogle Oplysninger, som sikkert yderligere kan suppleres og maaske modificeres.

Vindretningerne i Grønland bliver stedse af Grønlænderne angivet ved den Retning, hvorfra de komme. Da Grønlænderne jo ikke har noget andet Middel end et Jugement af Solen til at bestemme Verdenshjørnerne, bliver Retningerne naturligvis altid helt retvisende. Efter at Kompasset har fundet Indgang blandt Grønlænderne, angives nu ogsaa Vindretningerne misvisende. Mange Steder benyttes naturligvis lokale Navne for de fremherskende Vinde.

Som Følge af Insolationen om Dagen og den stærke Udstraaling om Natten er Land- og Søvinde meget almindelige i Grønland. Landvinden — altsaa i Reglen den østlige Vind — bliver kaldt Asarnek (af en mig ubekendt Rod) og de sædvanlige Søvinde (Vestvinde) Imarsarnek (af Imak = Hav).

Af de Vinde, der opstaar ved større barometriske Minima, er Norden- og Søndenvinden de vigtigste. Nordenvinden hedder Avagnak, men Retningen er egentlig nærmest nordvest (retvisende). Den rigtig kolde Nordenvind betegnes Avanakasik (Avanak = Norden og kasik = ussel, forbandet). Misvisende bliver Avanakasik altsaa nordost, Avanak derimod nord. Sydlig Vind betegnes Kigangak (misvisende altsaa sydvest); i Syd-Grønland betegnes denne Vind Nigek. Kujasik er en sydlig Vind, der stryger langs Kystens Hovedretning, altsaa en sydøstlig Vind (misvisende Syd). De varme Føhnvinde, blev saa vidt jeg forstod, kaldt Kiangnak (af Kiak = Varme) eller Isangiak, naar man særlig vilde betegne Føhnvinden. Danskerne i Grønland kalder Føhnvinden Sydost (misvisende).

En lokal Vind, der blæser gennem Vaigat kalder Grønlænderne Isersarnek, de Danske Vaigatsnorden. Det er en svag Vind, der bringer smukt Vejr; den samme Vindretning kaldes Avanak-utokak, naar det blæser stærkere, og Vejret er enten taaget eller nedbørbringende. Begge Vindretninger er altsaa nordvestlige, men medens den første vistnok oprindelig er en Nordvind, er Avanak-utokak vistnok en vest sydvestlig Vind, der stryger rundt om Disko ned gennem Vaigat og derved faar Udseende af at være en nordvestlig Vind. Det er blevet mig meddelt, at denne vestlige Vind andre Steder kaldes Avangnak-kananek. Kananek betyder egentlig en sydvestlig Vind. Nordenvinden, der stryger ned gennem Ata-Sund (paa Grønlandsk Ikarasak), kaldes af Beboerne der omkring Ikarsarnek. En nordlig Vind, der stryger ned over Godhavn, gaar der under Navnet Pito,rak. Forøvrigt har Vindene de forskellige Steder vistnok oftere Navne efter Fjelde eller Dale, som de stryger hen over; ved Kristianshaab kaldes Føhnvinden Sarkarsnek efter de høje Fjelde mod Syd (Sarkak = Sydside).

I den mig af Commissionen for Grønlands geologiske og geografiske Undersøgelser givne Instruks blev min Opmærksomhed henledet paa Dannelsen af Isfoden og dennes Indflydelse paa Tangranden. Under mit Ophold i Ritenbenk havde jeg netop god Lejlighed til at iagttage, hvorledes Isfoden anlægges.

Isfod betegner den Del af Isdækket paa Havet, der er fastfrosset til Kysten. Om Vinteren danner den en Bræmme paa en, to eller flere Meters Bredde, alt efter Kystens Form; jo fladere Kysten er, des bredere er Bræmmen. Den fremkommer ved, at Isdækket under Flod og Ebbe hæver sig op og ned; kun en Isrand langs Land ligger fast. Det bevægelige Isdække er skilt fra denne Rand ved Spalter. Ved Lavvande særlig under Springtid kan Isdækket ligge saa lavt, at det er meget besværligt at komme i Land; man maa ligefrem med Tok'en hugge Trappetrin i Isfodens Kant; med Hundeslæde er det endnu besværligere. I Begyndelsen af Vinteren ved stejle Strandbredder kan der mellem Isfoden og Isdækket ved Lavvande og navnlig under Springtid ligefrem være en aaben Rende af Vand (se Fig. 8c). Saaledes maatte vi i Februar en Aften vente i flere Timer paa en Klippeside, inden vi kunde slippe ned paa Isen, ellers vilde vi let i Mørket være faldet ned i Renden.

Isfodens Anlæg finder Sted endnu før der har dannet sig Islæg — fra Isfjordene ses der her bort. — Den begynder som et tyndt Glassurovertræk paa Bredden, naar det er Ebbe og naar fra Højvandets øverste Stand til omtrent laveste Ebbe. Naar Vandet igen stiger, bliver den nederste Del af Overtrækket igen opløst, hvilket jeg overbeviste mig om ved at føle efter, dog finder denne Opløsning ikke Sted straks, men noget efter, at Vandet er steget. Paa de øverste Dele maa der aabenbart ogsaa opløses noget — men ikke saa meget som i den nederste Del, fordi Vandets Indvirkning er meget kortere. Naar Vandet atter falder, fryser der en ny Skorpe fast, og — hvilket der vistnok er det væsentligste — Skorpen bliver stærkt afkølet saaledes, at naar Vandet stiger, vil en Mængde Vanddele fryse fast. I den nederste Del vil dog Vandet kunne faa Tid til at tilføre saa megen Varme, at en Del atter opløses. Den øverste Del af Isfoden vokser derfor stærkere end den nederste. Derfor danner Isfoden ikke en Figur som (b) men snarere som (c). (Fig. 8).

Naar Isen om Foraaret forsvinder, driver bort, ligger Isfoden tilbage som en Bræmme med næsten stejle Rande. Men dette varer kun kort, thi Vandet, der nu, da Isdækket er borte, kan komme i Bølgebevægelse, vil snart gnave sig ind, saaledes at Isfoden kommer til at se ud som (e) og senere som (f). Jeg har aldrig iagttaget, at Isfoden er brækket løs fra Klippen; derimod har jeg iagttaget, at dens yderste Spids kan brække af (den punkterede Linje paa Fig. f), naar det er Ebbe, og naar den underste Del af Isfoden er gnavet bort. Ved Kristianshaab havde jeg Lejlighed til at iagttage, hvorledes en *Fucus*, der sad indfrossen i Isfoden, blev fuldstændig fri, uden at den mistede saa meget som en Flig. Dens mørke Legeme absorberer Varmestraaler saaledes, at der omkring den dannes Vand. Selv om der skulde ske et Brud, vil den derfor knapt nok en Gang blive beskadiget. Naar en stor veludviklet Alge ikke ødelægges af Isfoden, saa finder dette endnu mindre Sted med smaa Alger,

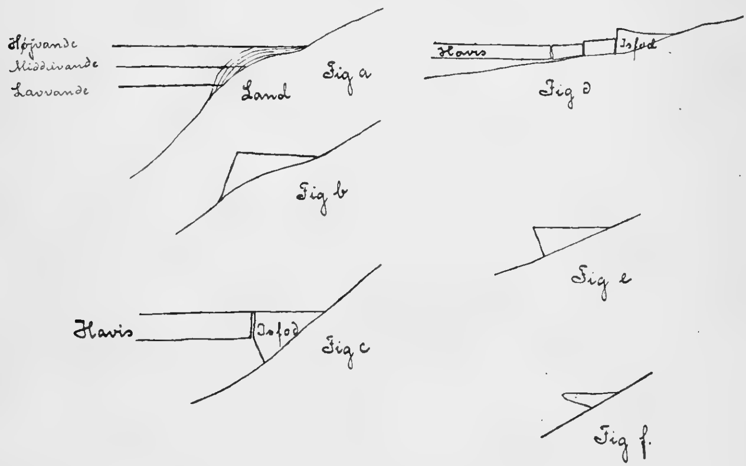


Fig. 8.

hvilket mine Iagttagelser ved Øerne ved Kristianshaab synes at bekræfte. Isfoden har altsaa næppe nogen ødelæggende Virkning paa Algevegetationen, og forsaavidt er der altsaa ikke noget til Hinder for at bruge Tangranden til Bestemmelse af, om Landet hæver eller sænker sig, saaledes som af Dr. Steenstrup foreslaaet.

Foruden Iagttagelser over Isfodens Dannelse studerede jeg de grønlandske Stednavnes Etymologi samt foretog meteorologiske Observationer samt Lysmaalinger ved Hjælp af Steenstrups Lysmaaler. Resultaterne findes meddelt her.

Dato		8	2	8	Dato	8	2	8
Oktbr.	Term.	1.5	2.9	1.0	Oktbr.	÷2.0	..	1.2
	Max.	..	..	3.0		..	..	2.2
	Min.	..	..	..		÷3.5	..	..
9.	Vindstyrke	..	..	..	16.	0	3	5
	Vindretning	S	S	S		SØ	SØ	SØ
	Skydække	10	10	8		0	0	2[2]
	Belysning	..	..	..		..	38	..
	Term.	2.0	3.0	2.0		0	0.1	÷3.2
	Max.	..	..	4.7		..	..	0.1
	Min.	0.1	..	..		÷2.0	..	..
10.	Vindstyrke	..	..	..	17.	7	6	2
	Vindretning	..	..	..		S	SV	S
	Skydække	..	..	..		10	10	2[3]
	Belysning	..	..	..		..	34	..
	Term	0.9	1.6	÷1.2		÷4.0	÷0.5	÷0.1
	Max.	..	..	1.7		..	..	..
	Min.	0.0	..	..		÷6.6	..	..
11.	Vindstyrke	3	3	3	18.	5	5	4
	Vindretning	ØSØ	ØSØ	ØSØ		NØ	NØ	Ø
	Skydække	3	2	1		2	1	0
	Belysning	..	38	..		..	38	..
	Term.	÷3.1	..	÷3.0		2.9	5.6	6.9[4]
	Max.	..	..	..		..	..	7.2
	Min.	÷4.8	..	..		..	..	..
12.	Vindstyrke	2	..	4	19.	5	7	9
	Vindretning	Ø	..	NØ		SØ	SØ	SØ
	Skydække	2	2	2		2	7	10[5]
	Belysning	..	38	..		..	32	..[6]
	Term.	÷4.8	÷4.0	÷5.8		3.5	4.4	2.7
	Max.	..	..	÷3.3		..	..	4.4
	Min.	÷5.8	..	..		2.2	..	..
13.	Vindstyrke	2	3	3	20.	0	1	1
	Vindretning	Ø	Ø	NØ		Ø	NØ	NØ
	Skydække	3	0	1		..	..	..
	Belysning	..	42	..		..	27	..
	Term.	÷6.2	÷3.8	÷4.7		÷1.0	÷0.5	÷3.0
	Max.	..	..	÷3.8		..	..	÷0.1
	Min.	÷7.0	..	..		÷1.5	..	..
14.	Vindstyrke	2	1	1	21.	1	1	1
	Vindretning	Ø	SØ	Ø		NØ	NØ	NØ
	Skydække	1	8	0[1]		1	0	0
	Belysning	..	36	..		..	42	..
	Term.	0.2	2.0	0.4		÷2.1	÷1	÷2.0
	Max.	..	..	2.2		..	..	÷0.9
	Min.	÷5.5	..	..		÷4.2	..	..
15.	Vindstyrke	3	4	3	22.	4	6	5
	Vindretning	S	SØS	SØS		NØ	NØ	NØ
	Skydække	1	1	1		2	1	0[7]
	Belysning	..	43	..		..	40	..

[1]) Nordlys. [2]) Diset. [3]) Snevejr. [4]) Det fugtige Term. viste Kl. 2 + 1.8. [5]) Regn. [6]) Föhnklatter. [7]) Sydostklatter om Morgenen.

Dato		8	2	8	Dato	8	2	8
Oktbr.	Term.	÷4.1	÷2.5	÷5.5	Oktbr.	÷3.2	÷2.0	1.0
	Max.	..	..	÷2.2		..	..	1.0
	Min.	÷6.1	..	..		÷5.1	..	..
23.	Vindstyrke	2	2	2	30.	3	3	3
	Vindretning	SØ	SØ	SØ		N	N	N
	Skydække	2	0	0 [1]		2	5	10
	Belysning	..	46	..		..	34	..
	Term.	÷6.5	÷5.5	÷6.9		÷3.0	..	÷0.4
	Max.	..	..	÷4.0		..	..	÷0.4
	Min.	÷7.3	..	..		÷4	..	..
24.	Vindstyrke	0	1	0	31.	3	3	3
	Vindretning	..	..	..		N	N	N
	Skydække	1	0	0		5	6	5
	Belysning	..	46	..		..	27	..
	Term.	÷7.7	÷4.1	÷3.5	Novbr.	÷1.8	÷1.1	..
	Max.	..	..	÷3.0		..	..	÷1.0
	Min.	÷9.0	..	..		÷3.5	..	..
25.	Vindstyrke	0	1	3	1.	1	1	1
	Vindretning	NØ	NØ	NØ		N	NØ	NØ
	Skydække	0	0	0		2	0	0
	Belysning	..	41	..		..	36	..
	Term.	÷4.0	÷3.4	÷5.0		÷4.5	÷3.5	÷4.0
	Max.	..	..	÷3.4		..	..	÷1.0
	Min.	÷8.5	..	..		÷5.1	..	..
26.	Vindstyrke	0	0	0	2.	0	0	0
	Vindretning	NØ	NØ	NØ		NØ	NØ	NØ
	Skydække	1	2	1		9	8	10
	Belysning	..	38	..		..	29	..
	Term.	÷5.6	÷3.4	÷5.3		÷5.0	÷5.1	÷4.0
	Max.	..	..	÷3.0			..	..
	Min.	÷7.1	..	..		÷5.6	..	÷5.6
27.	Vindstyrke	0	2	0	3.	0	1	0
	Vindretning	Ø	Ø	Ø		..	NØ	..
	Skydække	8	9	0		2	2	2
	Belysning	..	32	..		..	32	..
	Term.	÷4.5	÷3.4	÷3.5		+4.1	2.5	..
	Max.	..	..	÷2.1		..	..	+4
	Min.	÷8.0	.	..		÷6.5	..	..
28.	Vindstyrke	5	0	2	4.	3	8	9 [3]
	Vindretning	NØ	NØ	NØ		SØ	SØ	SV
	Skydække	1	0	2		2	4	10
	Belysning	..	37	..		..	30	..
	Term.	÷2.1	÷1.1	÷1.0		÷1.0	÷5.4	..
	Max.	..	..	÷0.6		..	÷0.8	..
	Min.	÷5.5	..	..		÷1.9	..	..
29.	Vindstyrke	2	2	2	5.	6	2	4
	Vindretning	SØ	SØ	SØ		SV	NV	NV
	Skydække	2	0	1 [2]		9	4	2
	Belysning	..	38	..		..	28	..

[1]) Føhnklatter. [2]) Føhnklatter. [3]) Føhnklatter Kl. 8 Morgen, Sne 8 Aften.

Dato		8	2	8	Dato	8	2	8
Novbr.	Term.	÷8.3	÷6.3	÷7.0	Novbr.	÷8.9	÷10.5	÷11.1
	Max.	..	..	÷6.1		..	..	÷8.7
	Min.	÷8.8	..	..		÷9.8	.	..
6.	Vindstyrke	0	3	2	13.	2	2	2
	Vindretning	Ø	Ø	Ø		NØ	NØ	NØ
	Skydække	2	1	1		2	3	0
	Belysning	..	33	..		..	28	..
	Term.	÷6.5	÷5.5	÷6.0		÷10.0	÷8.0	÷8.7
	Max.	..	..	÷5.5		..	..	÷6.2
	Min.	÷9.0	..	..		÷12.1	..	..
7.	Vindstyrke	3	0	2	14.	1	1	1
	Vindretning	SØ	Ø	NØ		NØ	NØ	NØ
	Skydække	10	10	10[1])		8	6	2
	Belysning	..	25	..		..	24	..
	Term.	÷5.8	÷6.8	÷9.1		÷6.1	÷5.0	÷6.0
	Max.	..	..	÷5.6		..	..	÷5.0
	Min.	÷6.9	..	..		÷12.2	..	..
8.	Vindstyrke	1	2	0	15.	2	1	0
	Vindretning	SØ	S	..		SØ	SØ	..
	Skydække	10	10	2		10	10	10[4])
	Belysning	..	28	..		..	22	..
	Term.	÷7.4	÷9.0	÷8.6		÷6.5	÷7.1	÷6.8
	Max.	..	..	÷7.0		..	..	÷5.5
	Min.	÷10.2	..	..		÷7.0	..	..
9.	Vindstyrke	3	1	0	16.	1	4	5
	Vindretning	NØ	NØ	..		NØ	N	NØ
	Skydække	2	2	0		5	2	0[5])
	Belysning	..	30	..		..	30	..
	Term	÷7.7	÷4.0	÷3.0		÷5.5	÷6.1	÷6.0
	Max.	..	..	÷3.0		..	..	÷5.3
	Min.	÷10.0	..	..		÷10.0	..	..
10.	Vindstyrke	0	0	2	17.	2	2	3
	Vindretning	..	..	NØ		Ø	NØ	N
	Skydække	10	10	5		8	5	7
	Belysning	..	27	..		..	20	..
	Term.	÷4.5	÷3.4	÷2.7		÷6.5	÷7.5	÷8.5
	Max.	..	..	÷2.7		..	..	÷5.3
	Min.	÷7.0	..	..		÷7.2	..	..
11.	Vindstyrke	0	0	3	18.	2	2	1
	Vindretning	..	..	SV		S	S	SØ
	Skydække	2	10	10[2])		10	10	3[6])
	Belysning	..	24	..		..	20	..
	Term.	÷5.0	÷6.2	÷6.1		÷11.5	÷10.5	÷10.0
	Max.	..	..	÷5.0		..	..	÷9.5
	Min.	÷5.6	..	..		÷12.0	..	..
12.	Vindstyrke	3	1	0	19.	2	2	2
	Vindretning	N	N	..		Ø	SØ	Ø
	Skydække	8	10	10[3])		2	2	4[7])
	Belysning	..	23	..		..	23	..

[1]) Svagt Snefald. [2]) Diset om Morgenen, Snefald om Eftm. [3]) Diset om Morgenen. [4]) Snevejr. [5]) Diset om Morgenen. [6]) Snevejr. [7]) Diset om Aftenen.

Dato		8	2	8	Dato	8	2	8
Novbr.	Term.	÷11.5	÷10.5	÷8.5	Novbr.	÷7.5	÷7.1	÷7.5
	Max.	..	..	÷7.0		..	..	÷6.1
	Min.	÷12.5	..	..		÷9.2	..	..
20.	Vindstyrke	2	2	2	27.	1	1	1
	Vindretning	Ø	NØ	NØ		Ø	Ø	Ø
	Skydække	4	3	8		7	8	10
	Belysning	..	22	..		..	17	..
	Term.	÷7.0	÷6.6	÷7.8		÷7.0	÷6.7	÷7.9
	Max.	..	..	÷6.6		..	..	÷6.7
	Min.	÷12.7	..	..		÷8.7	..	..
21.	Vindstyrke	1	1	3	28.	1	1	2
	Vindretning	N	N	NØ		Ø	Ø	Ø
	Skydække	10	10	5 [1]		10	10	10
	Belysning	..	19	..		..	..	..
	Term.	÷10.7	÷12.6	..		÷11.1	÷10.6	÷8.0
	Max.	..	..	÷10.5		..	..	..
	Min.	÷11.5	..	..		÷12.4	..	..
22.	Vindstyrke	3	2	..	29.	3	3	4
	Vindretning	Ø	NØ	..		Ø	Ø	Ø
	Skydække	8	3	..		0	3	7
	Belysning	..	21	..		..	17	..
	Term.	÷14.5	÷15.0	÷14.0		÷0.5	0.0	÷0.2
	Max.	..	..	÷14.0		..	..	..
	Min.	÷15.9	..	..		÷12.4	..	..
23.	Vindstyrke	2	2	3	30.	5	6	2
	Vindretning	Ø	Ø	NØ		ØSØ	S	ØNØ
	Skydække	4	4	5		10	10	10 [3]
	Belysning	..	20	..		..	9	..
	Term.	÷14.4	÷14.5	÷15	Decbr.	0.6	÷0.6	÷1.5
	Max.	..	..	÷13.5		..	..	+1.8
	Min.	÷15.9	..	..		÷1.9	..	..
24.	Vindstyrke	1	2	2	1.	3	1	1
	Vindretning	NØ	NØ	NØ		SØ	N	NØ
	Skydække	3	2	3		4	4	2
	Belysning	..	20	..		..	16	..
	Term.	÷13.6	÷7.8	÷13.2		÷1.5	÷2.8	÷4.2
	Max.	..	..	÷7.0		..	..	÷1.5
	Min.	÷15.8	..	..		÷4.0	..	..
25.	Vindstyrke	2	1	3	2.	1	1	1
	Vindretning	NØ	Ø	0		S	SØ	Ø
	Skydække	2	2	0		10	10	10
	Belysning	..	19	..		..	..	..
	Term.	÷14.5	÷13.0	÷6.9		÷5.0	÷5.2	÷5.2
	Max.	..	..	÷6.1		..	..	..
	Min.	÷15.0	..	..		÷5.8	..	..
26.	Vindstyrke	9	7	5	3.	2	2	3
	Vindretning	NØ	NØ	NØ		..	..	..
	Skydække	5	4	4 [2]		10	10	10
	Belysning	..	18	..		..	10	..

[1]) Snevejr. [2]) Diset. [3]) Snevejr.

Dato		8	2	8	Dato	8	2	8
Decbr.	Term.	÷6.5	÷8.5	÷10	Decbr.	÷9.5	÷10.4	÷10.5
	Max.	. .	. .	÷7.1		. .	. .	. .
	Min.	÷7.1	. .	. .		÷10.5	. .	. .
4.	Vindstyrke . .	. .	. .	. .	11.	2	3	2
	Vindretning .	NV	N	N		NNØ	NØ	Ø
	Skydække . . .	10	10	9[1]		0	4	4
	Belysning . . .	. .	8	. .		. .	12	. .
	Term.	÷10.5	÷10.9	÷13.0		÷7.0	÷2.5	÷2.0
	Max.	. .	. .	÷10.1		÷5.8	. .	. .
	Min.	÷11.2	. .	. .		÷11.2	. .	. .
5.	Vindstyrke . .	5	2	1	12.	3	3	9
	Vindretning .	NV	Ø	Ø		Ø	ØSØ	ØSØ
	Skydække . . .	7	8	2		4	10	6
	Belysning . . .	. .	11	. .		. .	10	. .
	Term.	÷14.0	÷13.5	÷14.0		÷2.2	÷2.9	÷1.4
	Max.	. .	. .	÷11.5		÷1.0	. .	. .
	Min.	÷14.9	. .	. .		÷7.2	. .	. .
6.	Vindstyrke . .	2	3	1	13.	5	4	5
	Vindretning .	Ø	NNØ	Ø		Ø	SSØ	ØSØ
	Skydække . . .	4	4	2		4	4	2
	Belysning . . .	. .	12	. .		. .	11	. .
	Term.	÷12.5	÷11.5	÷11.8		+1.3	+0.6	÷0.4
	Max.	. .	. .	. .		+1.0	. .	. .
	Min.	÷14.7	. .	. .		÷4.0	. .	. .
7.	Vindstyrke . .	1	2	1	14.	9	7	4
	Vindretning .	ØNØ	N	N		Ø	Ø	ØNØ
	Skydække . . .	4	2	0		10	6	2
	Belysning . . .	. .	11	. .		. .	9	. .
	Term.	÷10.5	÷9.0	÷6.8		÷0.3	÷0.5	+0.5
	Max.	. .	. .	÷6.8		+1.0	. .	. .
	Min.	. .	. .	. .		÷1.9	. .	. .
8.	Vindstyrke . .	2	2	3	15.	3	1	7
	Vindretning .	NØ	NØ	ØSØ		Ø	S	SØ
	Skydække . . .	2	6	4		2	4	2
	Belysning . . .	. .	12	. .		. .	9	. .
	Term.	÷7.5	÷8.0	÷8.1		÷2.0	÷3.0	÷3.5
	Max.	. .	. .	÷6.9		+1.0	. .	. .
	Min.	÷11.7	. .	. .		÷2.5	. .	. .
9.	Vindstyrke . .	3	1	5	16.	5	2	3
	Vindretning .	NØ	ØNØ	NNØ		ØSØ	Ø	Ø
	Skydække . . .	6	6	2		2	2	2
	Belysning . . .	. .	. .	. .		. .	10	. .
	Term.	÷9.4	÷8.2	÷7.6		÷3.3	÷3.8	÷4.4
	Max.	. .	. .	÷5.8		÷2.6	. .	. .
	Min.	÷12.1	. .	. .		÷6.7	. .	. .
10.	Vindstyrke . .	1	1	1	17.	2	4	4
	Vindretning .	Ø	SØ	NØ		Ø	Ø	ØNØ
	Skydække . . .	4	10	2		2	4	0
	Belysning . . .	. .	10	. .		. .	9	. .

[1] Snevejr.

Dato		8	2	8	Dato	8	2	8
Decbr.	Term.	÷5.8	÷0.2	÷1.8	Decbr.	+0.5	÷0.5	÷2.2
	Max.	÷3.0	..	..		+0.9	..	..
	Min.	÷7.0	..	..		÷4.9	..	..
18.	Vindstyrke	2	7	8	25.	9	2	2
	Vindretning	Ø	ØSØ	ØSØ		SØ	ØSØ	Ø
	Skydække	2	8	2		1	1	1[3])
	Belysning	..	8	..		..	9	..
	Term.	÷2.2	÷4.0	÷5.8		÷5.6	÷5.5	÷7.5
	Max.	÷0.3	..	..		..	..	..
	Min.	÷6.0	..	..		..	..	..
19.	Vindstyrke	4	3	2	26.	2	2	1
	Vindretning	..	..	..		NØ	NØ	NØ
	Skydække	4	2	0		1	2	0
	Belysning	..	8	..		..	8	..
	Term.	÷8.0	÷10.0	÷11.0		÷7.8	÷6.6	÷5.4
	Max.	÷2.1	..	..		÷4.4	..	..
	Min.	÷9.0	..	..		÷9.9	..	..
20.	Vindstyrke	2	2	1	27.	2	1	1
	Vindretning	Ø	ØNØ	Ø		NØ	Ø	Ø
	Skydække	0	0	0		0	2	3
	Belysning	..	8	..		..	9	..
	Term.	÷8.8	÷8.8	÷9.9		+2.0	+0.7	÷4.2
	Max.	÷7.5	..	..		+2.6	..	..
	Min.	÷11.2	..	..		÷8.9	..	..
21.	Vindstyrke	2	3	1	28.	..	0	0
	Vindretning	Ø	Ø	Ø		ØSØ	..	..
	Skydække	4	4	0		8	8	8
	Belysning	..	9	..		..	8	..
	Term.	÷8.5	÷5.1	÷2.3		÷5.7	÷8.0	÷6.0
	Max.	÷0.1	..	..		+1.7	..	..
	Min.	÷8.1	..	..		÷7.5	..	..
22.	Vindstyrke	2	4	2	29.	1	1	1
	Vindretning	NØ	ØNØ	Ø		Ø	Ø	SØ
	Skydække	2	4	6		8	7	10
	Belysning	..	8	..		..	11	..
	Term.	÷0.1	÷1.0	÷2.5		÷7.7	÷7.5	÷8.6
	Max.	+0.6	..	..		÷5.4	..	..
	Min.	÷9.0	..	..		÷9.0	..	..
23.	Vindstyrke	5	7	6	30.	6	2	1
	Vindretning	..	..	..		Ø	S	SØ
	Skydække	6	6	2[1])		2	10	4[4])
	Belysning	..	7	..		..	7	..
	Term.	÷4.2	÷3.0	÷1.0		÷8.0	÷9.5	..
	Max.	+0.1	..	..		÷7.0	..	..
	Min.	÷6.4	..	..		÷9.5	..	..
24.	Vindstyrke	..	..	..	31.	2	3	..
	Vindretning	ØNØ	NØ	ØNØ		NØ	N	..
	Skydække	1	2	2[2])		10	10[5])	..
	Belysning	..	10	..		..	8	..

1) Sne om Morgenen, senere Føhnklatter. 2) Føhnklatter. 3) Føhnklatter. 4) Snevejr. 5) Snevejr.

Dato		8	2	8	Dato	8	2	8
Januar	Term.	÷10.6	÷11.2	÷11.0	Januar	÷9.4	÷9.5	÷10.0
	Max.	÷7.6	..	..		÷7.8	..	..
	Min.	÷12.2	..	..		÷10.4	..	..
1.	Vindstyrke . .	2	3	1	8.	6	7	8
	Vindretning .	Ø	Ø	Ø		S	SV	SV
	Skydække . . .	7	2	2		10	10	5
	Belysning . . .	..	10	..		..	9	..
	Term.	÷12.0	÷12.5	÷11.7		÷11.5	÷12.0	÷12.8
	Max.	÷10.3	..	..		÷8.9	..	..
	Min.	÷13.0	..	..		÷12.0	..	..
2.	Vindstyrke . .	2	2	2	9.	2	2	1
	Vindretning .	Ø	Ø	Ø		NØ	NØ	NØ
	Skydække . . .	0	0	0		8	8	5
	Belysning . . .	..	10	..		..	11	..
	Term.	÷11.0	÷10.0	÷9.4		÷13.2	÷12.2	÷13.5
	Max.	÷10.7	..	..		÷11.7	..	..
	Min.	÷14.3	..	..		÷13.9	..	..
3.	Vindstyrke . .	2	3	1	10.	1	1	4
	Vindretning .	Ø	Ø	Ø		ØNØ	SØ	S
	Skydække . . .	3	8	10		10	10	10
	Belysning . . .	..	9	..		...	12	...
	Term.	÷9.4	÷7.5	÷8.2		÷15.2	÷16.5	÷17.0
	Max.	÷8.7	..	..		÷12.2	..	..
	Min.	÷10.5	..	..		÷15.7	..	..
4.	Vindstyrke . .	1	6	2	11.	2	2	3
	Vindretning .	ØNØ	NV	NNV		Ø	Ø	Ø
	Skydække . . .	10	10	8		5	5	4
	Belysning . . .	..	7	..		..	15	..
	Term.	÷7.8	÷8.0	÷7.8		÷16.6	÷16.5	÷17.8
	Max	÷6.9	..	...		÷15.0	..	..
	Min.	÷10.4	..	..		÷17.7	..	.
5.	Vindstyrke . .	2	1	2	12.	6	8	2
	Vindretning .	NNV	NNV	NNV		Ø	SØ	Ø
	Skydække . . .	10	7	8		8	5	3
	Belysning . . .	..	10	..		.	14	..
	Term	÷7.6	÷7.5	÷8.0		÷17.0	÷15.2	÷14.2
	Max.	÷6.9	..	..		÷16.3	..	..
	Min	÷9.5	..	..		÷18.7	..	..
6.	Vindstyrke . .	1	5	2	13.	2	2	1
	Vindretning .	NNV	NNV	Ø		Ø	Ø	Ø
	Skydække . . .	10	10	10 [1]		8	8	5 [2]
	Belysning . . .	..	9	..		..	..	..
	Term.	÷8.4	÷8.0	÷9.5		÷11.0	÷7.0	÷9.0
	Max.	÷7.2	..	..			..	..
	Min.	÷9.4	..	..		÷17.3	..	..
7.	Vindstyrke . .	2	2	1	14.	1	3	9
	Vindretning .	SØ	SV	SØ		Ø	S	V
	Skydække . . .	10	10	10		10	10	10
	Belysning . . .	..	..	..		..	13	..

[1]) Snevejr. [2]) Svagt Snefald.

Dato		8	2	8	Dato	8	2	8
Januar	Term.	÷11.0	÷10.5	÷11.3	Januar	÷25.1	÷25.4	÷25.5
	Max.	÷6.7	..	..		÷22.0	..	..
	Min.	÷12.1	..	..		÷25.2	..	..
15.	Vindstyrke	6	4	1	22.	2	1	1
	Vindretning	SSØ	OSØ	Ø		Ø	Ø	Ø[6]
	Skydække	7	2	3		2	2	2
	Belysning	..	15	..		..	18	..
	Term.	÷8.8	÷9.5	÷10.1		÷23.0	÷22.8	÷23.0
	Max.	÷8.4	..	..		÷22.2	..	..
	Min.	÷12.0	..	..		÷25.3	..	..
16.	Vindstyrke	2	2	2	23.	2	0	0
	Vindretning	NV	NV	NV		Ø	Ø	Ø
	Skydække	10	10	10[1]		10	10	10[7]
	Belysning	..	15	..		..	16	..
	Term.	÷12.6	÷14.5	÷16.0		÷26.5	÷26.7	÷27.7
	Max.	÷8.4	..	..		÷25.0	..	..
	Min.	÷13.0	..	..		÷29.0	..	..
17.	Vindstyrke	9	9	7	24.	2	2	1
	Vindretning	NV	NV	NV		Ø	Ø	Ø
	Skydække	10	10	10[2]		10	5	0
	Belysning	..	13	..		..	19	..
	Term.	÷19.0	÷20.4	÷21.4		÷28.5	÷28.4	÷25.3
	Max.	÷12.3	..	..		÷24.0	..	..
	Min.	÷19.0	..	..		÷25.9	..	..
18.	Vindstyrke	6	6	4	25.	2	1	4
	Vindretning	SV	S	SØ		NØ	NØ	NØ
	Skydække	10	10	10[3]		0	0	0
	Belysning	..	12	..		..	22	..
	Term.	÷21.5	÷21.5	÷23.1		÷25.5	÷24.4	÷23.7
	Max.	÷19.0	..	..		..	..	..
	Min.	÷21.9	..	..		..	..	..
19.	Vindstyrke	4	7	7	26.	1	1	1
	Vindretning	SØ	SSV	Ø		NØ	NØ	NØ
	Skydække	10	10	10		2	0	7
	Belysning	..	16	..		..	22	..
	Term.	÷17.7	÷14.0	÷15.1		÷24.4	÷24.5	÷25.0
	Max.	÷17.2	..	..		÷22.3	..	..
	Min.	÷23.9	..	..		÷25.0	..	..
20.	Vindstyrke	6	3	3	27.	1	1	1
	Vindretning	SØ	SV	SV		NØ	NØ	NØ
	Skydække	10	10	10[4]		3	0	0[8]
	Belysning	..	16	..		..	22	..
	Term.	÷22.0	÷22.5	÷23.0		÷25.0	÷24.4	÷23.5
	Max.	÷13.3	..	..		÷23.0	..	..
	Min.	÷22.0	..	..		÷25.9	..	..
21.	Vindstyrke	0	1	1	28.	1	1	1
	Vindretning	Ø	SØ	Ø		NØ	NØ	NØ
	Skydække	2	4	2[5]		1	5	4[9]
	Belysning	..	18	..		..	24	..

[1]) Svagt Snefald. [2]) Snefog. [3]) Snevejr. [4]) Snevejr. [5]) Langs Disko Vaigaitsnorden. [6]) Vaigaitsnorden langs Disko. [7]) Svagt Snefald. [8]) Vaigaitsnorden langs Disko. [9]) Vaigaitsnorden langs Disko.

Dato		8	2	8	Dato	8	2	8
Januar 29.	Term.	÷27.0	÷27.6	÷28.4	Febr. 4.	÷0.5	÷1.0	÷0.5
	Max.	÷23.0	..	..		÷0.3	..	..
	Min.	÷27.0	..	..		÷5.2	..	..
	Vindstyrke	0	1	0		6	6	3
	Vindretning	..	Ø	..		SØ	SØ	SØ
	Skydække	0	0	0		8	8	10
	Belysning	..	25	..		..	24	..
30.	Term.	÷28.9	÷28.6	÷26.5	5.	÷0.5	÷0.5	÷1.4
	Max.	÷26.2	..	..		÷0.2	..	..
	Min.	÷28.2	..	..		÷2.0	..	..
	Vindstyrke	1	2	0		2	6	2
	Vindretning	Ø	NØ	..		SØ	SØ	SØ
	Skydække	4	4	0[1]		8	4	0[4]
	Belysning	..	25	..		..	28	..
31.	Term.	÷28.0	÷28.0	÷27.0	6.	÷4.1	÷3.5	÷5.2
	Max.	÷26.0	..	..		÷0.2	..	..
	Min.	÷28.3	..	..		÷6.0	..	..
	Vindstyrke	2	1	1		1	3	2
	Vindretning	NØ	NØ	Ø		Ø	Ø	Ø
	Skydække	3	3	0[2]		0	0	0
	Belysning	..	23	..		..	28	..
Febr. 1.	Term.	÷28.6	÷27.0	÷23.0	7.	÷9.0	÷9.0	÷10.0
	Max.	÷26.9	..	..		÷3.4	..	..
	Min.	÷28.8	..	..		÷9.9	..	..
	Vindstyrke	1	2	1		1	1	2
	Vindretning	Ø	Ø	Ø		Ø	Ø	Ø
	Skydække	0	8	0[3]		1	0	0
	Belysning	..	25	..		..	28	..
2.	Term.	÷12.5	÷11.9	÷7.0	8.	÷14.5	÷14.5	÷15.0
	Max.	÷12.8	..	..		÷8.8	..	..
	Min.	÷28.2	..	..		÷15.8	..	..
	Vindstyrke	4	4	6		10	10	3
	Vindretning	NØ	Ø	SØ		NØ	NØ	NØ
	Skydække	4	6	8		0	0	0
	Belysning	..	24	..		..	29	..
3.	Term.	÷3.7	÷3.9	÷3.5				
	Max.	÷3.4	..	..				
	Min.	÷14.0	..	..				
	Vindstyrke	5	8	8				
	Vindretning	SØ	SØ	SØ				
	Skydække	8	8	8				
	Belysning	..	26	..				

[1]) Diset. [2]) Diset. [3]) Nordlys. [4]) Nordlys.

Dato	Belysningsgrad	Vejret
Oktbr.		
11	38	Let skyet.
12	38	Let skyet.
13	42	Klart.
14	36	Overtrukket.
15	43	Klart.
16	38	Klart.
17	34	Overtrukket, Snevejr.
18	38	Klart.
19	32	Overtrukket.
20	27	Overtrukket.
21	42	Klart.
22	40	Klart (Sydost Klatter).
23	46	Klart (Sydost Klatter).
24	46	Klart.
25	41	Svagt skyet.
26	38	Svagt skyet.
27	32	Overtrukket.
28	37	Klart (svagt skyet).
29	38	Klart (svagt skyet).
30	34	Svagt skyet.
Novbr.		
1	36	Klart.
2	29	Overtrukket.
3	32	Svagt skyet.
4	30	Let skyet.
5	28	Lidt overtrukket.
6	33	Klart.
7	25	Overtrukket (lidt Snefald).
8	28	Skyet.
9	30	Klart.
10	27	Skyet.
11	24	Overtrukket.
12	23	Overtrukket.
13	28	Klart.
14	24	Overtrukket.
15	22	Overtrukket (Snevejr).
16	30	Klart.
17	20	Skyet.
18	20	Overtrukket (Snevejr).
19	23	Klart.

Dato	Belysningsgrad	Vejret
Novbr.		
20	22	Klart.
21	19	Overtrukket (Snevejr).
22	21	Klart.
23	20	Klart.
24	20	Klart.
25	19	Klart.
26	18	Lidt diset.
27	17	Skyet.
28	16	Skyet.
29	17	Ingen Skyer (diset).
30	9	Overtrukket (Snevejr).
Decbr.		
1	16	Skyet.
2	10	Skyet.
3	10	Skyet.
4	8	Skyet (Snevejr).
5	11	Skyet.
6	12	Svagt overtrukket.
7	11	Svagt skyet.
8	12	Skyet.
9	12	Noget skyet.
10	10	Skyet.
11	12	Skyet.
12	10	Stærkt skyet.
13	11	Lidt skyet.
14	9	Lidt skyet.
15	9	Skyet.
16	10	Lidt Skyet.
17	9	Skyet.
18	8	Skyet.
19	8	Skyet.
20	9	Svagt skyet.
21	9	Skyet.
22	8	Lidt overtrukket.
23	7	Lidt overtrukket.
24	9.5	Klart (Sydost Klatter).
25	9	Klart (Sydost Klatter).
26	8	Klart (Skybanke i Syd).
27	9	Lidt skyet.
28	7.5	Skyet.
29	11	Lidt skyet.

Dato	Belysningsgrad	Vejret	Dato	Belysningsgrad	Vejret
Decbr.			Januar		
30	7	Overtrukket (Snevejr).	20	16	Lidt overtrukket.
31	8	Overtrukket (svagt Snefald).	21	18	Klart.
Januar			22	18 / viol. 3	Klart.
1	10	Svagt skyet.	23	16 / 0	Overtrukket.
2	10	Klart.	24	19	Klart.
3	9	Lidt skyet.	25	22	Klart.
4	7	Meget tæt.	26	22	Klart.
5	10	Klart, lidt Skyer.	27	22	Klart.
6	9	Overtrukket, Snevejr.	28	24	Klart.
7	9	Overtrukket, Snevejr.	29	25	Klart.
8	9	Overtrukket.	30	25	Klart.
9	11	Noget overtrukket.	31	23	Diset.
10	12	Noget overtrukket.			
11	15	Klart.			
12	14	Klart.	**Febr.**		
13	13	Overtrukket, svagt Snefald.	1	25	Klart.
			2	23	Diset.
14	13	Overtrukket, Snefald.	3	26	Klart.
15	15	Klart, svagt skyet.	4	24	Noget skyet.
16	15	Overtrukket.	5	28	Klart.
17	12	Overtrukket, Snefog.	6	28	Klart.
18	12	Overtrukket, Snefald.	7	28	Klart.
19	16	Lidt overtrukket.	8	29	Klart.

Ved Siden af disse Lysmaalinger foretog jeg ogsaa nogle Lysmaalinger, hvor der over Skalaen var lagt et Gelatinestykke, uigennemtrængeligt for de violette Lysstraaler.

Resultaterne var følgende:

Dato	Belysningsgrad		Dato	Belysningsgrad	
	uden absorberende Gelatine	med absorberende Gelatine		uden absorberende Gelatine	med absorberende Gelatine
Jan.			**Febr.**		
23	18	3	1	25	14
24	16	0	2	23	11
25	22	7	3	26	9
26	22	8	4	24	8
27	22	10	5	28	18
28	24	9	6	28	18
29	25	10	7	28	18
30	25	11	8	29	18
31	23	11			

Som omtalt var Efteraaret, hvilket ogsaa ses af vedføjede Skema forholdsvis mildt. Først i Begyndelsen af Januar sank Temperaturen saa meget, at Disko-Bugt i Vige og Bugter blev islagt; men dette Islæg var dog meget usikkert. Endelig den sidste Uge af Januar blev Islæget saa sammenhængende, at man kunde befare det med Hundeslæde.

Den 31. Januar brød jeg op med Torsukatak som Maal. Vejen lagdes over Kekertak. Herfra kørte jeg ind i det indre af Torsukatak, hvor jeg slog mig ned hos en Grønlænder, Vitus Petersen, i Anâ. Jeg havde her god Lejlighed til paa nærmere Hold at studere Grønlændernes daglige Liv om Vinteren.

Her ved Anâ boede kun to Familier. Min Vært var en udmærket Fanger, som ikke blot ernærede sin egen Familie, men tillige underholdt den anden; til Gengæld maatte denne gaa ham til Haande. Hans Kue (Spækhus) var altid stoppet med Kød og Spæk. Da jeg ankom, fodrede han mine Hunde med Sælkød. Med en ikke uberettiget Stolthed kunde han sige: «Se, det kan jeg tillade mig; havde det været i Kolonien, saa var Grønlænderne kommet paa alle fire for at spise med». Overhovedet kan man vel vanskelig undgaa at lægge Mærke til, at jo længere man kommer bort fra Civilisationen, repræsenteret af Butik og Præster, desto dygtigere er Grønlænderne. I det indre af Fjorden er der forøvrigt en usædvanlig god Fangst paa Fjordsælen; men der er langt til nærmeste Handelsplads. Foruden Fjordsælen er den spættede Sæl ret hyppig i Torsukatak; den kommer derind i Juli Maaned for at kaste Unger. Som Vitus Petersen fortalte, holder den til ved Nunataken og ikke ved Kekertakasik, der findes altsaa nu «Kasigisat ernivisat» og ikke længer ved Kekertakasik, hvor den i Steenstrups Tid plejede at yngle.

Det Hus, jeg boede i, var af Middelstørrelse med følgende Dimensioner. Højden var 2 m Dybden var 4.3 m, Længden 2.9 m. Gangen var over 4 m lang — alt indvendigt

Maal. — Huset var som andre ægte Grønlænderhuse opført af Græs- og Lyngtørv indvendigt beklædt med Brædder. Briksen fandtes langs Nordvæggen, Vinduet mod Syd (Fig. 9). Langs Øst- og Vestvæg fandtes Bænke, og i en Krog stod en Kogekakkelovn. Som her fremstillet er de fleste Grønlænderhuse byggede; der kan selvfølgelig være betydelig Forskel saavel i Udstyrelse som i Indretning. Er Husejeren fattig, mangler Gulvbrædderne, den bare Jord tjener da til Gulv; hyppig er Væggene heller ikke beklædte med Brædder, saaledes at man ser den nøgne Tørvevæg. Kniber det haardt, findes der i Loftet ikke flere end de aller nødvendigste Brædder, for at Tørvene, der danner Taget, kan bæres. Er Husejeren meget fattig, mangler der naturligvis ogsaa Glas i Vinduet. I Stedet for Glas anvendes en tynd Hud, og om Vinteren tilstopper man helt Vinduet.

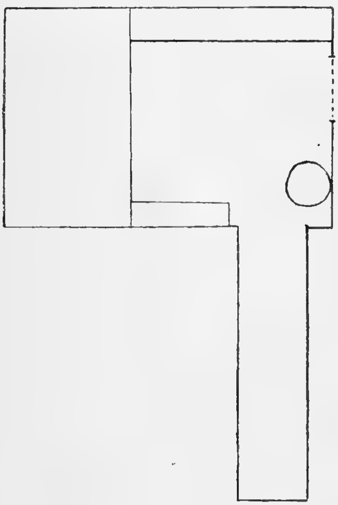


Fig. 9.

Ogsaa i Indretningen af Vinduer og Husgang kan der, som berørt, være en Del Forskelligheder i det enkelte. Men det er en fast Regel, at Vinduet vender mod Syd — naturligt nok. — Husgangen er ikke afhængig af nogen bestemt Verdens Retning, men det synes, som dens Beliggenhed er afhængig af Landingsstedet. I de fleste Tilfælde gaar Husgangen mod Kysten eller parallel med den. Døren sidder snart paa Siden af Husgangen, snart for Enden; men ved mindre Bopladser vender den altid ud til Landingsstedet. Om Husgangen løber mod Landingsstedet eller parallel med Kysten afhænger vistnok af Terrainforholdene. I Kolonierne og paa større Bopladser holder denne Regel ikke Stik. Husene ligger her ofte langt borte fra Kysten, og andre Betingelser gør sig gældende.

For en Europæer synes Husene at være smaa og ubekvemme; i Virkeligheden er de udmærket tilpassede til den grønlandske Natur. Husets Opgave er her som alle Vegne at beskytte Beboerne mod Vejrligets ubehagelige Sider. Kulden er i Grønland den ubehageligste og mest paagaaende Faktor. Midlet derimod, Brændsel, er ikke til Stede i Rigdom, tvært imod. Kun paa enkelte Steder findes Kul. Ellers maa Grønlænderen se sig om efter andet Brændsel. Spæk er ganske vist et godt Brændsel, men det er dyrt og i sløje Fangsttider — f. Eks. den første Del af Vinteren — næsten ukendt. I Upernivik-Distrikt, hvor det flere Steder er vanskeligt at faa Brænde, maa man ty til Spæklampen. I den mellemste Del af Grønland bruger man Hedekvas og Tørv, i den sydligste Del, hvor der paa gunstigere Lokaliteter findes lidt vantreven Birkeskov, træder rigtigt Brænde til. I det hele og store er Brændselen sparsom og Kulden stærk; det gælder derfor om at gøre det Rum, der skal opvarmes saa lille som muligt og tillige saa lunt som muligt. Om Natten kan der forøvrigt i en saadan Grønlænderhytte, naar dens Beboere optager næsten hver Tomme, blive saa lummervarmt, at det næsten er uudholdeligt; for Ventilationen sørges der ved et Hul i Loftet, der ellers er tilstoppet af en Græstot. Mod Regn er Grønlænderhuset daarligere tilpasset. Imidlertid er Regnen jo forholdsvis sparsom og falder kun om Sommeren, paa en Tid hvor Husene ofte er forladte, og Grønlænderne bor i Telt paa Sommerfangstpladserne. Naar det om Sommeren falder ind med en længere Regnperiode eller med voldsommere Regnskyl, gaar Vandet gennem de flade Tage. Ved at lave Tagene skraa vilde Grønlænderne undgaa denne Ubehagelighed, men til Gengæld blev der højere til Loftet, hvorved der udkrævedes mere Brændsel. Af to Onder foretrækker Grønlænderne det mindste. Storm og Sne kan ikke gøre de lave, tætte Huse nogen Fortræd; Sneen bidrager forøvrigt yderligere til at isolere Huset.

Efter de Erfaringer, jeg havde gjort i Tasiussak, mente jeg, at en Lodline paa 500 m vilde være tilstrækkelig til at maale Dybderne i Torsukatak. Det viste sig imidlertid, at det ikke var tilstrækkeligt, naar jeg kom ud til de midterste Partier af Fjorden. Fra Kekertak fik jeg en ny Line. Resultatet af Lodskuddene findes aflagt paa Kortet. Som man vil se, har jeg ikke kunnet meddele Lodskud for den inderste Del af Fjorden nærmest Indlandsisen. Isen var her saa fuld af Kalvis og saa sammenskruet, at det næsten var umuligt at komme frem. Tillige var det en ret farlig Sag at komme her, fordi Isflager som Følge af Isstrømmens Bevægelse ofte skrues lodret i Vejret.

Uagtet vi endnu kun var i den første Uge af Februar, kunde man dog godt staa op allerede Kl. 6; inden man fik alting klaret, var der allerede saa megen Lysning, at man kunde se at færdes paa Fjorden. Ofte maatte man tilbagelægge et godt Stykke Vej, inden man naaede Arbejdspladsen. Vejret var forøvrigt meget smukt; en Føhn havde afsmeltet det meste Sne, saaledes at det ganske saa ud som Foraar — sordlo upernak — som en af Grønlænderne sagde.

Den nordlige Gletscherarm ligger ugunstigt, naar det gælder om at komme paa det rene med Kalvningen, fordi man ikke fra Panekarajok kan komme til at iagttage Gletscherenden en profil; men for enkelte Partiers Vedkommende kan der ikke være Tvivl om, at de stiller sig med fremadheldende Rande. Nogen Kalvning havde jeg ikke Lejlighed til at iagttage.

Saavel Helland som Steenstrup har foretaget Hastighedsmaalinger fra Panekarajok. De af dem benyttede Basispunkter kunde jeg ikke finde, være sig enten fordi de Varder, de har opstillet i Endepunkterne af Basis, er faldet ned, eller fordi de overhovedet ikke har ofret nogen Tid paa Opførelse af Varder. Paa Tilbagevejen over Panekarajok traf vi en

Flok Rensdyr paa 6 Stykker; efter Grønlændernes Udsagn begynder forøvrigt Rensdyrene ogsaa at blive sjældne i disse Egne. Det lykkedes Grønlænderne at nedlægge et Dyr, men det tog ganske vist saa megen Tid, at det var fuldstændig mørkt, inden vi naaede Strandbredden; yderligere maatte vi vente to Timer, førend vi kunde komme ned paa Isen, da det netop var Ebbe, da vi naaede Strandbredden.

Den sydlige Arm af Gletscheren frembyder forsaavidt bedre Vilkaar for Iagttagelse af Kalvning, som man her fra en Klippe-ryg har udmærket Udsigt over Gletscherenden, i hvert Fald et større Parti af den. Her staar Gletscheren med fuldstændig lodrette Vægge, maaske snarere en lille Smule tilbageheldende paa enkelte Steder. Desværre fandt der ingen større Kalvning Sted under mit Ophold ved Gletscheren; kun rutchede der paa et Sted et Parti ned; efter denne Kalvning stod Randen meget stærkt tilbagelænet. De Steder, hvor, som omtalt, Randen staar lidt tilbagelænet, er formodentlig Steder, hvor der fornylig har fundet Kalvninger Sted. Nogle Dage senere opholdt jeg mig atter ved Gletscheren; der fandt en Kalvning Sted noget heftigere end den foregaaende Gang. Kalvningen bestod ogsaa denne Gang i en Nedstyrtning. Umiddelbart efter begyndte der en voldsom og vedholdende Kalvning af den nordligere Gletscher.

Hvor stærk Isskruningen kan være her inde i den indre Del af Fjorden, fik jeg Lejlighed til at iagttage paa Tilbagevejen. Vi fulgte naturligvis vort første Spor, men paa en Strækning af over 30 m forsvandt Sporet aldeles; paa en lodretstillet Isflage saa jeg nogle af dem. Hele Bredden var paa et Sted, hvor den skraanede jævnt ned mod Havet, fuldstændig barikaderet med Isblokke og Flager, der var skruet ind over Bredden. Efter Grønlændernes Udsagn kan der hen paa Foraaret paa den Maade dannes en Vold paa c. 10 m's Højde eller mere.

Baade paa den nordlige og sydlige Side af Fjorden findes der Husruiner i det indre af Fjorden. Disse Omstændigheder foranledigede min grønlandske Ledsager til at fortælle, at i tidligere Tid havde Forholdene været helt anderledes; man havde endog sejlet om Anâ. Intet tyder paa, at dette er rigtigt. Husresterne herinde stammer fra den mere oprindelige Tid, da Grønlænderne boede mere spredt og ikke blev tiltrukket af de danske Handelspladser; thi Forbindelsen med Omverdenen er naturligvis meget vanskelig en stor Del af Aaret; bedst er den om Vinteren.

Som Kortet viser, er det ret betydelige Dybder, der træffes i det indre af Fjorden, 720 m. Der kan næppe være Tvivl om, at den store Dybde er tilvejebragt af Gletscheren, der i sin Tid skød sig ud gennem Fjorden. Alle Sidegrene til Fjorden: Kangerdluk og Ikarasak er ikke videre dybe — efter de faa Lodskud at dømme. Der har ingen eroderende Virksomhed været, snarere er der blevet aflejret Morænemateriale. Forøvrigt er det kun et beskedent Antal Lodskud, der staar til Raadighed, vedrørende de grønlandske Fjordes Dybder. Dr. Steenstrup har foretaget nogle Lodninger ved Umanak, hvor Dybderne viser sig at være ringere end i Torsukatak. Hammer har foretaget nogle Lodninger i Jakobshavns-Isfjord syd for Kingigtok, men for nær Land og i for ringe Antal til at de kan give nogen Oplysning om Dybdeforholdene i Jakobshavns-Isfjord. Jensen har foretaget Profillodninger i sydgrønlandske Fjorde. Det havde været min Hensigt at foretage nogle Lodninger i Ikarasak og derefter i det store Basin syd for Anâ og Kekertakasik. Rimeligvis er den nordlige Del temmelig lavvandet, fordi den er opfyldt af Materiale fra Torsukatak-Gletscher. Derimod vil det formodentlig nok vise sig, at der i den sydlige Del kan paavises en Rende, der er dannet af Gletscherne, der har skudt sig videre frem gennem Atâ-Sund. Ikarasak kunde imidlertid ikke befares. Isen er her paa Grund af den stærke Strøm — der jo netop tyder paa, at Strædet er lavvandet — usikker og stedvis fuld af Vaager. De faa Lodskud i Begyndelsen af Ikarasak tyder ogsaa paa, at Farvandet ikke er dybt.

Efter at have fremskaffet en Del Oplysninger om Dybdeforholdene i det Indre af Torsukatak flyttede jeg sidst i Februar længere ud og slog mig ned i Nugak; ogsaa her boede jeg hos en Grønlænder, der var Stedets Skolelærer, hvorved jeg fik et godt Indblik i den Undervisning, som den opvoksende Slægt i Grønland faar.

Med Hensyn til Lodningerne er der at bemærke, at jeg udførte dem med en temmelig tynd Line, 3-løbet Bindegarn. Dette havde den Fordel, at jeg kunde anvende et temmeligt lille Lod, mellem 3—5 kg. Trods den ringe Tyngde kunde man dog med Lethed mærke, naar Loddet stødte mod Bund. Uagtet Snoren var tynd og Loddet let, var det dog ret besværligt at trække Loddet op. Jeg forsøgte først at benytte en Valse, men Linen frøs sammen, og at afvikle den var derved umuligt. Valsen var forøvrigt den samme, som den Dr. Steenstrup benyttede 1879. At trække Loddet op med Hænderne fra en Dybde af 700 m var baade langsomt og trættende. Derimod gik det meget nemt, naar man benyttede Hundeslæde. Naar Loddet skulde hives op, blev Linen bundet til Hundeslæden, hvorpaa man tog Retning mod det næste Lodsted. Paa den Maade gik Ophivningen baade hurtigt og let. For at Snoren ikke skulde skære sig ind i Isen, blev Skaftet af Tôken lagt over Hullet. Trods det lille Lod brast Linen dog ret jævnlig under Ophivningen paa Grund af Friktionen med Vandet. Naar Loddet kom op, tog Grønlænderen dette og vandrede hen til næste Lodsted. Medens Grønlænderen huggede Hul i Isen, bestemte jeg Stedet ved Hjælp af et Pejlkompas. Paa den Maade var man i Stand til at udføre et i Forhold til Dybderne ret anseligt Antal Maalinger.

Da Linen var temmelig tynd, var det nødvendigt ved Eftermaaling at korrigere for Strækning. Denne Eftermaaling blev udført med et Staalmaalebaand. Der er altsaa næppe større Fejl paa Lodskuddene; men forøvrigt spiller det ikke nogen nævneværdig Rolle, om der paa en Dybde af 700 m virkelig skulde være en Fejl paa 2—3 Meter. Linen var inddelt i Længder paa 25 m. Det første Mærke var 1 Knude, det næste 2 o. s. v. Hundrederne var ligeledes mærket med tilheftede Knuder. Det var derfor let at foretage Aflæsningen.

Til Bestemmelse af Lodstedets Beliggenhed benyttede jeg Tilbageskæring. Først benyttede jeg et Universalinstrument, men da det var sent at manøvrere med, og da man i 30° Kulde ikke kan holde ud ret længe at staa med bare Hænder og stille

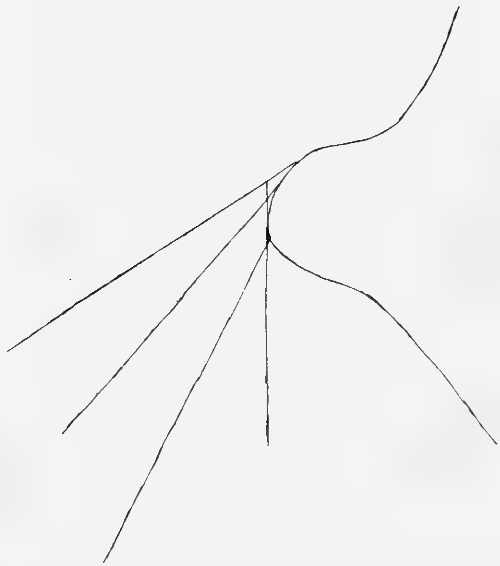


Fig. 10.

paa Stilleskruer, foretrak jeg et Pejlkompas, der var hurtigere at arbejde med. Til Sigtepunkter ved Tilbageskæring anvendte jeg Toppe og Pynter. Toppe giver en nøjagtigere Bestemmelse end Pynter (se Fig. 10).

Resultatet af Maalingerne i de ydre Dele af Torsukatak var, at Dybderne var omtrent som i de indre Dele. Kun længst ude syd for Ekogfat blev Dybderne mindre; man kommer uvilkaarlig til at tænke paa en Isfjeldsbanke som ved Jakobshavns-Isfjord, hvor der er mindre dybt end inde i Fjorden.

Det maa der nemlig være; thi Isfjældene driver uhindret ud gennem Fjorden, men tager Grund ved Mundingen. Banken er vel opstaaet som en Endemoræne, da Jakobshavns-Gletscher naaede helt ud til Mundingen; paa samme Maade er det rimeligt, at der uden for Torsukatak-Fjord maa ligge en lignende Endemoræne, over hvilken Vandet er mindre dybt end inde i Fjorden. Forholdene minder altsaa meget om Bankerne langs Syd-Grønland, hvor der ligeledes findes dybere Vand indenfor. Bankerne er vel derfor i det store, hvad Jakobshavns Banke og Banken uden for Torsukatak er i det smaa. Ligesom Jakobshavns og Torsukataks Banke er opstaaet, da Isen havde en videre Udstrækning end nu og naaede helt ud til Mundingen af Fjorden, saaledes er formodentlig de store Banker opstaaet, da Indlandsisen som en sammenhængende Kappe skød sig ud over Grønland. Disko-Bugt har den Gang været helt udfyldt af Is paa samme Maade som de danske Farvande. Over Dybdeforholdene i Disko-Bugt har vi næsten ingen Oplysninger. I den midterste Del er der kun to Lodskud, der giver Dybder paa 400 m, altsaa meget beskedne Dybder i Forhold til Dybderne inde i Fjordene. Uden for Disko-Bugt er der et større Antal Lodskud. Efter disse ser det ud, som om Isen er gaaet ud over «Rotten» i sydvestlig Retning. Nogen Is er vel ogsaa gaaet ud gennem Vaigat; i dettes Munding findes der et Lodskud paa 365 m, medens Dybderne uden for er mere beskedne, 90 m eller saa. Desværre findes der ikke noget Lodskud i den mellemste og sydlige Del af Vaigat og heller ikke i de tilgrænsende Dele af Disko-Bugt. Ellers vilde man maaske kunne udlede, hvilken Vej Torsukatak-Gletscher har taget.

Vi var nu naaet til Midten af Marts, og Islæget var vel nu paa det bedste. Jeg besluttede derfor at bryde op og køre syd paa for at naa over Jakobshavns-Isfjord, der som bekendt, som Følge af den stærke Strøm fremkaldt af Tidevandet, ofte er fuld af Vaager og Strømsteder i Mundingen. Paa Vejen syd paa gjorde jeg holdt i Atâ ɔ: det Land, der ligger under; et Navn, der er meget træffende, fordi Atâ netop er et lavtliggende Forland, ovenover hvilket selve Agdlutok hæver sig til 400 m. Denne Forskel paa Atâ og Hovedlandet skyldes sikkert en Forkastning, der løber i nordøstlig Retning, markeret af Søen Taserssuak og Bugten Kangerdluatsiak ved Torsukatak.

Selve Bopladsen Atâ er lille; der findes ialt kun fire Huse. Beliggenheden er ogsaa daarlig, man vil næsten — med grønlandske Erhvervsforhold for Øje — sige naturstridig, idet den nemlig ligger i en Bugt. Fangsten er kun ringe; om Foraaret er der dog nogen Utôk-Fangst. Aarsagen til, at Bopladsen der er kommet til at ligge der, maa vel søges i, at Forbindelsen med Omgivelserne er forholdsvis let, saaledes over Taserssuak til Arsivik og videre over Torsukatak til Nugak og over Agdlutok til Ritenbenk. Medens jeg var ved Atâ, benyttede jeg Lejligheden til at foretage nogle Lodninger i Atâ-Sund (Ikarasak).

Med Torsukatak in mente kunde man vente, at man ogsaa i Atâ-Sund vilde træffe store Dybder, dels er det jo temmelig bredt, dels er det omgivet af højt Land, der falder brat ned. Saaledes var det dog ikke; Atâ-Sund er i sin nordligere Del ikke dybere end 300 m. Denne Dybde finder man temmelig almindelig.

Ogsaa paa Søen bag Atâ, Taserssuak, foretog jeg en Lodning. Det var dog meget besværligt, da Isen var godt og vel en Meter tyk; Dybden af Søen var næsten 100 m, en ret betydelig Dybde i en Ferskvandssø. I første Række skyldes Dybden vel Forkastningen; men Isen har sikkert ogsaa været medvirkende, idet Gletscheren, da Isens Mægtighed var større, er stemmet op af Agdlutok høje Land og har bevæget sig ned langs dette og videre ud gennem Atâ-Sund. Da det tog en uforholdsmæssig lang Tid at faa hugget Hul i Isen, foretog jeg kun denne ene Maaling i Taserssuak.

Derefter kørte vi videre syd paa gennem Atâ-Sund og over den smalle Tange ved Kitsermiut til Pakitok, hvor vi boede i et lille Hus, opført til Brug for de postrejsende. Fra Niakornak kom der Grønlændere paa Besøg. De oplyste os om, at Trafiken over Jakobshavns Isfjord havde været meget vanskelig i Aar; kun ganske faa Slæder var sluppet over. For Øjeblikket var den ganske ufarbar. Jeg besluttede mig derfor til at blive ved Pakitok en Uges Tid eller saa.

For at komme ind i det indre af Fjorden (Pakitup Illua) maa man over en smal Landtunge, fordi der i den snævre Munding er en meget stærk Strøm, der forhindrer Islæget. Illua er, som alle Søer i det lave Land, dækket af store Mængder Sne, som gør Kørselen meget besværlig, fordi Slæden skærer sig helt ned i Sneen. Denne Fjord bliver kun forholdsvis sjældent besøgt og har derfor ogsaa kun faa Stednavne. Kun nogle Øer og Forbjerge har Navn. Min grønlandske Ledsager var dog godt kendt her; han var født i Pakitok og havde boet der en længere Række Aar, men var for faa Aar tilbage flyttet til Atâ. Pakitok ligger ikke godt for at være en god Fangstplads; den ligger nemlig paa en Maade i en Bugt. Ganske vist ligger der et større Farvand, Illua, bag ved. For saa vidt kunde man tro, at Beliggenheden ikke var saa daarlig. En Beliggenhed ved et Overgangssted mellem to Havarme er netop en ikke ualmindelig Beliggenhed af Bopladser i Grønland. Men Illua har ikke ret meget at byde paa; ganske vist findes der mange Ænder; men disse er de sidste Aar aftaget stærkt i Mængde. Det store Antal Edderfugle beror paa, at Illua, — som vi skal se, — er temmelig flad. I tidligere Aar var ogsaa den spraglede Sæl almindelig i Yngletiden. Saalænge Illua altsaa havde noget at byde paa, var det naturligt nok, at der her ved Pakitok blev lagt en Boplads. Stedet laa paa en Maade centralt, man kunde let komme mod Øst, der bød paa Edderfugle og spraglede Sæler, og mod Vest til Ikarasak (Atâ-Sund) og Disko-Bugt, hvor Fjordsælen holdt til. Desuden er der umiddelbart ved Bopladsen et udmærket Torskefiskeri; — paa en god Time fangede min Ledsager 56 Torsk. Da nu Edderfuglen blev mere og mere sjælden, og den spraglede Sæl ligeledes, har Fangsten mod Øst ingen Betydning mere, og Stedet kommer derfor erhvervsmæssig set til at ligge inde i en Bugt. Derfor er Beboerne rykket mod Vest ud til Niakornak, nogle er draget til Atâ; der findes nemlig en Butik; men ellers er Atâs Beliggenhed jo ikke gunstig. Selve Bopladsen ved Niakornak hedder forøvrigt Kilersiut (Haartoppen), fordi man aabenbart har sammenlignet Halvøen med en Haartop, som er indsnøret paa Midten. Over denne Indsnøring gaar Slædevejen til Jakobshavn. Bopladsen er forøvrigt kun beskeden, idet der kun findes fire smaa Huse. Der kommer for faa Isfjælde herop, til at der kan være mange Sælhunde. Der fanges Hajer, lidt Kaleralik og Torsk. Omkring Niakornak er der paa Grund af Tidevandet temmelig stærk Strøm, og det synes, som om Torsken gerne holder til, hvor der er Strøm. Det er vel derfor, at der netop ved Pakitok findes saa mange Torsk.

Pakitok afgiver et godt Eksempel paa, hvorledes en Boplads' Beliggenhed afhænger af Oplandet ɔ: dens Næringsgebet. Saa vidt muligt søger en Boplads ikke blot i Grønland, men ogsaa alle andre Steder, at lægge sig saa centralt som muligt i Næringsgebetet, og det gælder aabenbart lige saa godt om store som om smaa Bopladser; kun bliver Forholdene for de større Bopladser mere indviklede. Naar de østjyske Købstæder ligger helt inde i Bugterne, spiller sikkert denne Beliggenhed en bestemt Rolle lige overfor Byernes Opland; netop ved at ligge inde i det Inderste af Fjorden opnaar de at faa det størst mulige Opland i Forbindelse med Adgang til Havet. Ser man paa et Kort over Grønland i en nogenlunde stor Maalestok, f. Eks. de fortrinlige Kort, der udgives af Søkortarkivet, kan man ikke undgaa at lægge Mærke til, at de grønlandske Bopladser, større og mindre, fortrinsvis ligger paa Spidsen af

Halvøer og Øer, ikke just saaledes at forstaa, at Bopladsen ligger paa den geometriske Spids, det gør den i mange Tilfælde ikke — af Grunde, som vi senere skal omtale — men dog i umiddelbar Nærhed deraf. En Beliggenhed paa Spidsen af en Halvø eller Ø frembyder de bedste Betingelser for Fangsten. Fangerens Domicil skydes jo paa den Maade ligesom ud i Fangstomraadet. Boede han nede paa Siden af en Halvø, havde han kun en Halvcirkel at jage i, nu derimod faar han det meste af en Cirkel. Kan han ikke sætte Kajaken i Vandet paa Grund af Bølgeslag fra den ene Side af Halvøen, saa kan han uden stor Ulejlighed gøre det fra den anden. Overhovedet har Fangeren Mulighed for at kunne vende sig til to Sider, alt efter Forholdene. Ved at bo paa en lige Kyst maa han altid vende sig til en og samme Side. Som berørt spiller Landingsforholdene — Havneforholdene for de større Bopladser, Byer — en vigtig Rolle, netop fordi Eskimoen i saa høj en Grad er henvist til at søge sit Erhverv paa Søen. Af den Grund kommer Bopladserne ikke netop til at ligge paa selve Spidsen; denne er maaske stejl, et Stykke derfra er der maaske en bedre Landingsplads, følgelig kommer Bopladsen til at ligge der og ikke paa den geometriske Spids. Paa et Kort i middelstor Maalestok f. Eks. Søkortene projiceres dog Bopladsen som liggende paa Spidsen — man kunde næsten kalde det den geografiske Spids — Maalestokken tillader ikke nogen Afvigelse. Selvfølgelig gives der Undtagelser — endda mange Undtagelser fra denne Regel. Disse vil vel meget ofte vise sig at ligge i, at der paa Spidsen og dens nærmeste Omegn er daarlige Landingssteder, maaske mangler ogsaa Drikkevand. Inde i Bugter er det i hvert Fald ikke almindeligt at træffe Bopladser, med mindre der er et nemt Overgangssted til et andet og godt Jagtomraade. I Fjorde, i hvilke der gaar Gletschere ned, og hvor der dannes rigeligt med Isfjælde, kan man dog træffe Bopladser, saaledes inde i T o r s u k a t a k. Men ogsaa her er der en Tilbøjelighed til at lægge Bopladsen paa en Pynt; A n â og

Nugak er Eksempler herpaa, ligeledes Husruinerne paa den nordlige og sydlige Side af Torsukatak.

For de Bopladsers Vedkommende, der ikke ligger paa Pynter eller i umiddelbar Nærhed deraf, maa man ikke lade sig forlede til at tro, at de har en tilfældig eller endog unaturlig Beliggenhed. Som Eksempel kan jeg nævne Klavshavn; man skulde tro, at Eke, naar man blot ser paa Kortet, har en naturligere ɔ. bedre Beliggenhed, og dog findes der kun tre Huse, medens Klavshavn jo er en efter grønlandske Forhold stor Boplads. Tilsyneladende er Eke beliggende paa en Spids. Det er dog ikke ganske rigtigt, naar man tager andre Forhold med end de rent kartografiske. For det første er Isfjorden for det meste saa pakket med Is, at den er ganske ufarbar, og dernæst ligger der en mægtig Isfjældsbanke uden for Mundingen. Erhvervsmæssigt set ligger Eke snarere i en Bugt end paa en Pynt.

Karakteristisk nok betyder Eke netop Vig, Bugt. I Virkeligheden ligger Klavshavn gunstigere, herfra kan Fangerne dels nyde godt af Isfjældenes Nærhed, dels har de Tasiussak i Ryggen. Tasiussak spiller for Klavshavn en vigtig Rolle: om Sommeren er der et rigt Fugleliv og noget Laksefiskeri, om Vinteren er der godt Kaleralikfiskeri og lidt Sælhundefangst. Paa samme Maade vil man formodentlig ogsaa for de andre Bopladser, der ikke ligger paa Pynter, kunne gøre Rede for Aarsagen til, at de ligger netop paa det Sted. Saaledes er det let at klarlægge Forholdet mellem Kingigtok og Jakobshavn, der i alt væsentligt forholder sig som Eke og Klavshavn. Hvad den sidste har i Tasiussak, har Jakobshavn i sin Havn, der har gjort Bopladsen til en Koloni med de deraf flydende Fordele. Overhovedet indtager Kolonier og Handelspladser en særlig Stilling; her er det saa at sige udelukkende Havneforholdene, der er det afgørende, medens Fangstforholdene ikke ved Valget har den afgørende Betydning. Som Følge deraf ligger et stort Antal Kolonier og Handelspladser slet ikke paa Pynter, hvor der jo sjælden vil være gode Havne. Men Handelen med Danmark er jo ikke nogen oprindelig eskimoisk Erhvervsgren, selv om den i vore Dage øver stor Indflydelse.

Som hos alle primitive Folk, der lever af Jagt og Fiskeri, er Opholdsstedet ikke af stor Varighed. Naar Fangsten af en eller anden Grund ikke mere giver tilstrækkeligt af sig et Sted, vandre Beboerne til andre og, som de haaber, bedre Fangstpladser. I tidligere Tid har saadanne Vandringer ret ofte fundet Sted (sé Holms Konebaadsekspedition). Man finder i det indre af Fjordene Ruiner næsten alle Vegne, hvor Forholdene har været egnede til Boplads. Opførelsen af Husene danner ingen større Vanskeligheder eller Udgifter; den Smule Tømmer, der fandtes i det forladte Hus, kan jo føres med og benyttes paa ny. Nu er Beboerne vistnok mere stavnsbundne, og helst vil de bo et Sted, hvor der ikke er for langt til Butiken. Da Handelspladserne ligger ved Kysten, har Grønlænderne mere og mere klumpet sig sammen der, hvilket er naturstridigt. Et Jagt- og Fiskerfolk skal ligesom Rovdyr bo saa spredt som muligt, derved bliver der det størst mulige Jagtomraade til hvert Individ.

Foruden i det nævnte Hus ved Pakitok boede jeg i Telt inde ved Indlandsisen og ude ved Atâ-Sund. Indretningen af et Vintertelt er ganske simpel. Af to almindelige Sommertelte, saaledes som de bruges paa de af Kommissionen udsendte Ekspeditioner, havde jeg gjort det ene en Smule mindre. Paa de Teltstænger, der bar det ydre Telt, havde jeg anbragt to Klodser, paa hvilke den Rygstang hvilede, der bar det indre Telt. Ved Snore var der sørget for, at det indre Telt holdtes i en Afstand af omtrent et Kvarter fra det ydre. Naar Primusapparatet var tændt, kunde der blive saa varmt, at man kunde sidde uden Overtøj; oppe under Teltryggen var der helt varmt, hvilket var godt til Tørring af Kamiker. Om Natten kneb det mere; da gik Primusapparatet ud af Mangel paa Pumpning.

Havde man haft et lille Dowlastelt, der kunde have hvilet paa en Snor, udspændt mellem Teltstængerne, saaledes at man altsaa havde lavet sig et tredobbelt Telt, havde det sikkert været behageligere. Hvad et saadant Dobbelttelt vejede ved jeg ikke. Men foruden Teltet kunde jeg have to tætpakkede Kasser paa Slæden, i hvert Fald paa Isen, paa Land, navnlig i couperet Terrain, kunde Hundene vanskelig trække saa meget.

I Avanardlek-Dal fandt jeg omtrent midt i Dalen to Gletscherskrammer, som krydsedes. Den ene løb i Dalretningen, NØ-SV, den anden i Øst-Vest. Hvilken af de to Skrammer, der var ældst, kunde ikke ved blot og bar Iagttagelse afgøres, saa ens var de. Men man maa vel antage, at Skrammen, der havde Retningen Øst-Vest, var den ældste, dannet i den Tid, da Indlandsisens Mægtighed var saa stor, at den upaavirket af det underliggende Terrain bevægede sig ud over Yderlandet i vestlig Retning. Den anden Skramme i Nordøst-Sydvest henpeger paa den Tid, da Indlandsisen vel havde en større Mægtighed end nu, men dog i Hovedsagen maatte følge Ujævnhederne i Terrainet. Tidsrummet, som ligger mellem Frembringelsen af disse to Skrammer, maa være ret betydelig, og Ismassen, som har bevæget sig over Stedet i Mellemtiden, maa have været stor. Og dog har disse Ismængder ikke formaaet at erodere saa meget i den faste Klippe, at den ældste Skramme er bleven slebet bort. Dette viser, hvor ubetydelig selve Isens eroderende Virkning er, naar den skal bearbejde en fuldstændig kompakt Klippe.

Gletscheren, som skubber sig ned mod Avanardlek, har trukket sig kendeligt tilbage. Paa en Strækning af en km kunde man paavise, at Klipperne i Nærheden af Gletscheren kun var sparsomt eller endog slet ikke bevoksede med Likener. Langs Siderne laa en stor Endemoræne; for Enden af Gletscheren manglede en saadan. Smeltevandet havde dannet en mægtig, ganske flad Flodseng. I denne Dal fandt jeg de fra arktiske Lande kendte Høje, der opstaar, ved at Grundvandet, der ikke kan synke i Jorden, presser Isskorpen op næsten som et Krater. Nogle af disse Høje var store, 3 m eller mere i Diameter. Fra det høje Land nord for Gletscheren har man en vid Udsigt mod Nord og Vest. I en Lavning ved det høje Fjeldparti, hvor Indlandsisen sender en Tunge ind, rislede Vandet frem under Gletscheren for dog straks efter at fryse. Lufttemperaturen var ÷ 26°.

Ogsaa den sydlige Gletscher havde trukket sig tilbage. Dog var det vanskeligt nøjagtigt at bestemme, hvormeget Isen havde trukket sig tilbage, da nyfalden Sne udviskede Grænserne. Saa vidt jeg kunde skønne, har vistnok Isen trukket sig omtrent 200 m tilbage. At Gletscheren maa være noget i Aftagen fremgaar ogsaa deraf, at en stejl Klippe rager frem midt i Gletscheren, og denne Klippe er lysgraalig og ikke sortegraa, saaledes som lichenbevoksede Klipper ellers er. Naar den ikke er lichenbevokset, kan det vel kun skyldes den Omstændighed, at den tidligere har været dækket af Isen, men nu er bleven fri.

I Gletscherens Sidepartier havde jeg Lejlighed til at iagttage Gletscherkornene uden at behøve i Forvejen at farve med Methylenblaat; slamholdigt Vand var i Sommerens Løb sivet ind mellem Kornene og dannede nu et fint spindelvævsagtigt Næt. Man kunde derfor meget let se Kornenes Form og Størrelse. Kornene var alle smaa, omkring 2 cm. Overhovedet har alle de Gletscherkorn, jeg har haft Lejlighed til at iagttage paa de forskellige Steder, altid været temmelig smaa. Fra Bjergene syd for Kujadlek har man en god Udsigt endogsaa helt ind i Tasiussak, naar det var klart Vejr.

Paa Illua foretog jeg nogle Dybdemaalinger. Mærkelig nok viste Lodskuddene over en større Strækning i den centrale Del samme Dybde, nemlig 325 m, en Dybde, der ganske vist i Forhold til Dybderne i Torsukatak er beskeden, men naar man tager Hensyn til, at Illua er et lukket Farvand, der ikke en Gang naas af Gletscherne mere, er det dog en anselig

Dybde. Lodningerne var sene at udføre, da Isen var 0,8 m tyk. Indad mod de to Sidefjorde tager Dybden af; den sydlige af disse er endog saa flad, at man ikke kan befare den med Konebaad. Illua er fuld af Smaaøer; om det er selve Klippegrunden, eller det er Gletschermateriale, aflejret, da Gletscheren skød sig ud gennem Illua, fik jeg ikke undersøgt.

Efter selv at have været i Jakobshavn for at forhøre mig om Mulighed for at slippe over Jakobshavns-Isfjord, foretog jeg nogle Lodninger i den ydre Fjord, hvor Dybderne er omtrent som i den indre Fjord, dog gennemgaaende noget mindre. Vejret var stadigt meget uroligt, snart Taage, snart Storm. Temperaturen var i nogle Dage relativ høj, ÷ 12°.

Da det viste sig at være umuligt at slippe over Jakobshavns-Isfjord, vendte jeg mig atter mod Nord, idet jeg først slog Telt ved Kitsermiut for at foretage nogle Lodninger i den ydre Del af Atâ-Sund; Dybden mellem Nugdluk og Kitsermiut var næsten 500 m (495 m). Ejendommeligt er det forøvrigt, at Dybderne over forholdsvis store Strækninger er saa ens. Ikke mindre end 5 Lodskud gav samme Resultat nemlig 495 m. Inde i Pakitup-Illua gav 3 Lodskud, der dog laa et godt Stykke fra hinanden, samme Resultat, nemlig 325 m. I Atâ-Sund uden for Kaerssorssuak viste 3 Lodskud samme Dybde, 415 m. I Farvandet nord for Okaitunguit er Dybden over en stor Strækning 375 m. Noget lignende viste sig i Torsukatak. Man kan vanskelig antage, at Gletscherne skulde kunne erodere Klippegrunden saa mærkværdig jævn. Man føres snarere til den Antagelse, at den eroderede Klippebund atter, da Isen trak sig tilbage, er blevet udforet med Gletschermateriale; hvis dette er aflejret under Vand, er det let forklarligt, at Smeltevandet vil brede det jævnt ud.

Fra Kitsermiut drog jeg til Kaersorssuak, hvor jeg døjede en Del af Kulden, trods vi nu var midt i April, og derfra til Atâ efter først at have taget nogle Lodskud i Atâ-

Sund og været inde i Kangerdluarsuk og oppe paa Kaersorssuak Plateauet. Der ligger her flere store Søer paa Plateauerne. Den sidste Uge af April begyndte Vejret at blive mildere, og de sidste Dage i April saa jeg den første Flok Snespurve; Foraaret var altsaa ved at indfinde sig.

Paa en Udflugt til Natdluarssuk saa jeg Sporene af en Isbjørn; den havde aabenbart gjort en heldig Fangst; thi et Stykke derfra saa vi ved en Vaage Baglallen af en Sælhund. Da vi senere steg op ad Nuna-Kigdliga, saa vi Sporene af en voksen Isbjørn og af en Unge. Om Natten havde den aflagt Besøg ved Teltet, men om Morgenen var den borte; Sporene tabte sig i en Vaage. En Uges Tid senere blev der i Tasiussak set to Isbjørne, men da Fangerne i Klavshavn ikke er Isbjørnejægere, drog hele Flokken ud, hvorved Bjørnene naturligvis blev yderst forskrækkede og forsvandt. Det er forøvrigt meget sjældent, at Isbjørnen forvilder sig ind i Disko-Bugt.

Da Afsmeltningen jo om Vinteren hører op, og Ablationen udelukkende bestaar i Fordampning, breder Gletscheren sig. Figur 11 forestiller et Tværsnit af Kanten af Ekip-Sermia. Gletscheren hænger som en Flage ud over Morænevoldens Ryg. Paa Undersiden af Flagen sad der fastfrosset Bundmoræne af store Sten og alle Grader nedefter i Størrelse. Om Sommeren smelter der saa meget af, at Gletscheren staar lavere.

Den forholdsvis høje Temperatur de sidste Dage havde bevirket, at Isen var mindre sikker. Ved alle Pynter traf man Strømsteder, hvor der enten var aabent Vand eller tynd Is. Det var derfor nødvendigt at sætte over Torsukatak en af de første Dage.

Den 30. April brød jeg op fra Atâ og kørte over Atâ Taserssuâ mod Nord, derpaa over en lille Tange, saa et Stykke over Kangerdlukasik og endelig over Land til Ulugsat. Sundet mellem Kekertakasik og Ulugsat var nu ganske aabent. Maager, Edderfugle (baade *mollis* og *specta-*

bilis) og Skarven tumlede sig i Vandet. Paa Land var Sneen mange Steder forsvundet; Transporten var derfor meget besværlig, navnlig i Kororssuak (den store Dal), hvor Vejen gaar meget stejlt op. Ved Ulugsat overnattede vi. Den næste Dag satte vi over Torsukatak, hvor Isen mange Steder var saa mør, at man kunde stikke Token lige igennem, og kom velbeholden til Itivdliarsuk, en ganske lav Tange mellem Torsukatak og Kekertap-Illua. Ved Itivdliarsuk findes

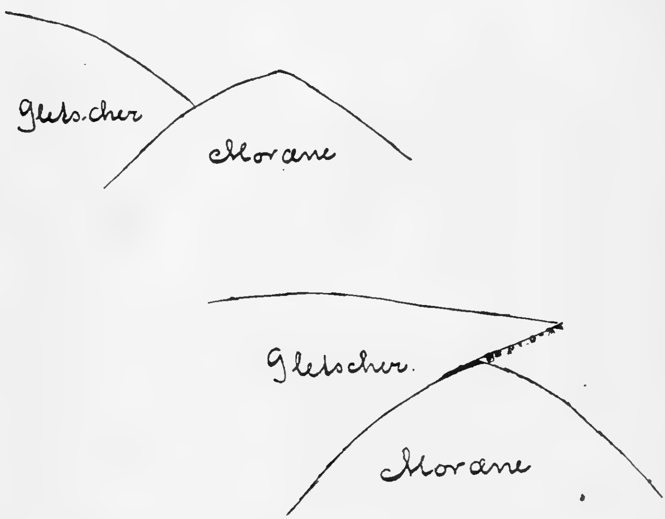


Fig. 11.

kun eet Hus. Grønlænderen, der er en Storfanger, har tillige et Hus ved Ekogfat. Om Vinteren bor han ved Itivdliarssuk, hvor han driver Utok- og Garnfangst inde i Fjorden. Han var nu i Færd med at bryde op og drage til Ekogfat for at drive Fangst fra Kajak; ved Ekogfat var Vandet mod Vest allerede aabent. Vi slog Telt ved Kugsarnek. Kugsarnek-Dal løber næsten lige mod Nord. Langs denne kørte vi op, indtil vi kom til en lille Sø, Amalortok; derpaa drejede vi mod Øst og naaede ned til Taserssuak-Isortok, der er en meget lang Sø, der strækker sig helt fra «Majorvejen» til Kangerdluk inde ved Gletscheren. Her slog vi Telt (et lille Rejsetelt). Derefter kørte vi et Stykke op ad «Boyes Vej»; men vendte forøvrigt snart om, da Vejret, der hidtil havde været mildt og smukt, antog en stormfuld Karakter. Som omtalt tidligere lægger der sig paa Søer, der er beskyttede af Fjelde, store Mængder Sne. Om Dagen, naar Solen skinner, tør det øverste Lag op, og Slæden skærer derfor igennem, ligesom man ogsaa selv synker ned til midt paa Livet. Det er derfor bedre at færdes om Natten; da fryser der atter en Skorpe paa Isen, saaledes at man kan køre og gaa uden stadig at synke i. Derfor kørte vi om Natten. Selv Kl. 12 var det nu saa lyst, at man ret tydeligt kunde skimte Fjældtoppene, der laa omkring os, og dog var vi først lige i Begyndelsen af Maj. Det har ogsaa sin Fordel at hvile om Dagen, saa kan man bedre udholde Kulden i Teltet. Fra Boyes Vej kørte vi videre mod Øst et Stykke paa en Elv, hvor Elven danner Afløbet for Isortok og derpaa til Niakornak, hvor vi slog Telt. Herfra kørte vi om ad Amalortokujok og tilbage. Naar Torsukatak om Foraaret ikke længere kan befares paa Grund af Strømsteder, anvender Grønlænderne fra Kekertak og Nugak Vejen over Isortok ind til Kangerdluk for at naa ind til det indre af Torsukatak, hvor der er rig Utokfangst. Helland, som besøgte Torsukatak 1875, gik ogsaa denne Vej.

I Kugsarnek-Dal fandtes der usædvanlig mange Ryper. Nu i Begyndelsen af Maj var det deres Parringstid.

Da Vejret slog om til et efter Aarstiden stærkt Tøvejr, maatte jeg bryde op og køre til Kekertak for ikke at blive afskaaret. Imidlertid blev det atter Frostvejr, og jeg tog saa med en Grønlænder til Nugssuak-Halvø for om muligt at faa et Overblik over Forholdene i det indre af Halvøen. Vi kørte den sædvanlige Vej ad «Majorvejen» op til Majorkarsuatsiak, hvilket Fjæld af de Danske kaldes Majoren — efter de to første Stavelser; heraf har man saa atter dannet

Navnet paa Vejen, der fører lige forbi Fjeldet. Fra Majorkarsuatsiak drejede vi om til Tasek-Ujordlek, hvor vi forøvrigt traf en lille Skare Rensdyr. Sarkrap-Tasersua synes at være en meget flad Sø. — Lodninger fik jeg ikke foretaget, da jeg ikke havde medtaget de nødvendige Dele; — overalt ser man flade Øer og Banker, der, saa vidt jeg paa Grund af den frosne Jord kunde afgøre, bestaar af Grus, Sand og Ler. Maaske har det oprindelig været en dyb Sø, der i Tidens Løb er blevet udfyldt af Gletschermateriale. Rundt om skyder der sig Gletschere ned mod Søen. Fra Ujordlek kørte vi over dennes Sydspids tilbage til Majorvejen.

De to store Søer, Isortok og Ujordlek er vel at betragte som Kløftdale. I det hele synes Nugssuak's Tektonik at bero paa Kløvningssystemer, der løber i Nordvest-Sydøst. Den tidligere omtalte Sø, Taserssuak, ligger netop ogsaa i samme Retning. Nugssuak er vel en Horst, hvis Randpartier er sunkne.

Ved Ujordlek er Forvitringen meget stærk; store Klipper ligger her nedstyrtede under de lodrette Klippevægge. Lagene (Skifringen) synes her at ligge næsten lodret.

Paa Tilbagevejen var Isen paa Kekertap-Illua saa tynd, at man kun med stor Forsigtighed kunde befare den. Jeg tog derefter med Bagagen til Ekogfat, 19. Maj, og den følgende Dag sejlede jeg med Konebaad til Ritenbenk forbi Jakobshavns og derfra til Klavshavn, paa hvilken Rejse jeg havde rig Lejlighed til at iagttage Isfodens Opløsningsproces. Isdækket laa endnu paa Tasiussak; desværre var Isen saa mør, at man ikke kunde køre paa den. Det var derfor umuligt at komme ind til Jakobshavns Isstrøm. Derimod gjorde jeg nogle Ekskursioner til Isfjorden; navnlig interesserede det mig, om der skulde kunne findes Isfjælde i oprindelig Stilling; det fandtes der imidlertid ikke. Overhovedet havde Isfjorden sit sædvanlige Udseende: tætpakket med Kalvis. Ved Indløbet til Tasiussak var Farvandet aabent. Den stærke Strøm, der fremkommer her som Følge af Tidevandet, skærer op i Isen.

De sidste Dage i Maj kunde man sige, at Sommeren var i Anmarch. Den 29. Maj fandt jeg den første blomstrende *Empetrum*. Ogsaa *Saxifraga oppositifolia* stod med helt udsprungne Blomster.

Salix glauca var i Knopbrud. *Elymus* havde grønne Blade ved Grunden.

Midt i Juni stod *Loisleuria*, *Diapensia*, *Vaccinium uliginosum* i Blomst paa gunstige Steder. Paa Nordsiden blomstrede *Empetrum* endnu ikke; paa enkelte gunstige Lokaliteter blomstrede *Dryas*, *Cassiope*, *Papaver*, *Rhododendron*.

Under mit Ophold i Jakobshavn havde jeg Lejlighed til at iagttage en «Kanel» i Havnen: «Kanel» er et Udtryk, som de danske Funktionærer bruger om en voldsom Bølgebevægelse i Havnen, der opstaar pludseligt, men som ogsaa forsvinder lige saa hurtigt igen. Bølgegangen er ledsaget af en stærk Brusen i det inderste af Havnen. Denne Brusen er ikke andet end Vandets Udstrømning fra en smal Kløft, naar Bølgen trækker sig tilbage. Denne voldsomme Udstrømning har, som Hammer meddeler, foranlediget Grønlænderne til at tro, at Havnen er forbundet med det indre af Jakobshavns-Isfjord ved en underjordisk Gang. Det er dog ikke Tilfældet; den omtalte Kløft, som Danskerne kalder Zimmers Kløft, er en Fortsættelse af Havnen. Havnen ved Jakobshavn er vel at opfatte som et Brud, yderligere eroderet af Indlandsisen, da den bredte sig over Landet; dette Brud fortsættes altsaa af Zimmers Kløft. Ad den kører Slæderne om Vinteren til Natdluarsuk.

Til Forklaring af Fænomenet siger Hammer (Meddel. om Grønland IV, p. 22): «Disse Fænomeners Forklaring er maaske nærmest den, at Bølgerne, som ved Kalvningen bliver dannet i Fjorden, bliver brudt mod Isbanken i Mundingen og kastet tilbage mod Land, hvorved Vandbølgen bliver opstemmet i den snævre og lidet dybe Havn og foraarsager en pludselig Stigning i Vandstanden og en frem- og tilbagegaaende Bølgebevægelse. Denne Vandbevægelse kan dog ogsaa undertiden være svag og er da maaske foraarsaget ved en Kalvning af et Isfjæld i Fjorden eller paa Banken. Man kan da ved hine stærke Bevægelser i Vandet komme til Kendskab om, hvor hyppig Kalvningen af Gletscheren finder Sted». Som vi ser tilskriver altsaa Hammer Aarsagen til «Kanelen» Kalvninger enten af Gletscheren eller af Isfjælde i Fjorden eller paa Banken. At selv en beskeden Kalvning af et Isfjæld paa aaben Kyst kan fremkalde Bølger paa 2—3 m Højde, har jeg haft Lejlighed til at iagttage paa Agdlutoks Vestside. I Torsukatak-Isfjord har jeg ligeledes set en Kalvning, der frembragte meget store Bølger. Naar et af de store Isfjælde, som staar paa Grund ved Mundingen af Jakobshavns-Isfjord, kalver eller endog fuldstændig brækker i Stykker, maa denne Proces fremkalde et enormt Oprør i Vandet. Mange af de store «Kaneler» i Jakobshavn og tillige de største har sikkert sit Udspring fra Isbjærgenes Forstyrrelser ved Fjordmundingen og ikke fra Gletscherens Kalvning. Dels ligger denne c. 30 km fra Jakobshavn, og tilmed er Dannelsen af de store Isfjælde, dem i naturlig Stilling, næppe videre voldsom; her sker jo hverken nogen Nedstyrtning eller Kæntring og for Resten heller ikke nogen Opskyden, tværtimod foregaar Dannelsen meget langsomt. Den største Bølgebevægelse jeg har set, hidrørte fra et Isfjæld, som kalvede og derpaa kæntrede. Nedstyrtninger og Kæntringer finder selvfølgelig ofte Sted inde ved Gletscheren, men deres Virkning, en hæftig Bølgebevægelse, vil blive meget svækket, inden den naar Jakobshavn, dels paa Grund af Afstanden, dels paa Grund af den tætpakkede Ismasse, hvorved megen Energi forbruges til at overvinde Gnidningen mellem Isstykkerne. Jeg er derfor tilbøjelig til at antage, at «Kanelen» hidrører fra Kalvninger af Isfjælde, der ligger nær Jakobshavn, altsaa paa Isfjældsbanken eller i umiddelbar Nærhed af denne. Det hænder selvfølgelig ikke saa sjeldent, at der ligger Isfjælde uden for Mundingen af Havnen. Naar et saadant Isfjæld kalver, vil der selvfølgelig opstaa en heftig Bølgebevægelse i Havnen, altsaa en «Kanel». Til Belysning af, hvor hyppig Gletscheren kalver, kan man ikke bruge «Kanelen», eftersom den opstaar uafhængig af Gletscherens Kalvninger.

Ved Klavshavn er Lagbygningen meget regelmæssig, idet de der stryge næsten vinkelret paa denne med et Fald mod Nord paa 30°. Parallel med Kysten løber der et System af Diaklaser. Kysten er altsaa en Brudkyst, opstaaet ved en Sænkning af Disko-Bugt Omraadet. Et Blik paa Kortet viser, at Kysten i store Hovedtræk løber omtrent i en lige Linje og danner en Vinkel paa 10° med Meredianen. De mindre Afvigelser er vel opstaaet ved, at løsere og fastere Lag veksle, og at de løsere er blevet eroderet af Isen. Andre Spaltesystemer spiller vel ogsaa en Rolle, f. Eks. netop ved Jakobshavn, hvor Lagene stryge parallel med Kysten, medens den saakaldte Leverbugt, der ligger paa tvers af Havnen, altsaa i Strygningens Retning, snarere er opstaaet ved Forvitring af løsere Lag. I hvilken Grad Afvekslingen mellem blødere og haardere Lag spiller en Rolle for Udformningen af Detaljerne i Terrainet, ser man tydeligt ved Itivdlek, Overbæringsstedet til Tasiussak. Naar Vestkysten paa Agdlutok (Arveprinsens-Ø) har et saa regelmæssigt Forløb, skyldes dette vistnok for en meget væsentlig Del den Omstændighed, at Lagene stryge parallelt med Kysten og med Fald mod denne. De Revner, der findes, har Isen ikke kunnet udnytte, da Kysten her laa i Læsiden, den Gang Iskappen i sin Tid skød sig ud over Yderlandet.

For ikke i længere Tid at ligge uvirksom rejste jeg den 27. Maj mod Syd. Det var min Hensigt at naa ind i Sydost-Bugt til de Strækninger, der paa Hammers Kort er betegnet ved Ler, altsaa Strækningerne mellem Tasiussarssuak og Havet. Jeg haabede tillige at kunne komme ind i Orpigsok-

Fjord. Jeg kom ikke meget længere end til Akugdlet; thi i den inderste Del af Sydøst-Bugt laa der endnu Is. Jeg maatte derfor vende tilbage.

Da jeg var kommen tilbage til Klavshavn den 5. Juni, fortalte Fangerne, at nu var Isen brudt op i Tasiussak. Næste Dag brød jeg op for at naa ind i Tasiussak. Den for Transporten saa vigtige Audtlarissa-Tasia var dog endnu tilfrossen, eller rettere belagt med Is; denne var saa mør, at man ikke kunde gaa paa den. Slog man paa den, gik den i Stykker og faldt hen i de bekendte Isprismer. Konebaaden maatte derfor bæres syd om Søen og syd om Keakusuk. Dette er imidlertid meget besværligere end den sædvanlige Transport, hvor man kan sejle over Autdlarissa-Tasia. Overbæringen tog derfor to Dage. Den Landtange, der ligger mellem Enden af Tasiussak og Havet, er ganske flad og bevokset med Hedeplanter; forøvrigt fuldt af smaa Vandpytter. Den bestaar paa Overfladen af Sand og Grus, Havbredden af ganske fint Sand, sammenbundet af lidt Ler. Mod Tasiussak var Materialet i det hele noget grovere. Landtangens Højde ligger mellem 30—40 m; saavel mod Tasiussak som mod Havet ender den med stejle Brinker. Mod Tasiussak, hvor Materialet er mere gruset, mangler Forsteninger ganske eller næsten ganske. Saaledes har jeg i Klinten her kun fundet et Fragment af en Balanskal. Grusmasserne er dog svagt lagdelt og maa altsaa være afsat i Vand. I Skrænterne ud mod Havet er Masserne ogsaa lagdelt og indeholder en Mængde subfossile Muslinger. Denne Forskel i Materialets Beskaffenhed ved Tasiussak og ved Havet kunde tyde paa, at det er afsat i strømmende Vand, der har bevæget sig i Retningen fra Tasiussak mod Havet. Kaster man et Tilbageblik paa Dybdeforholdene i Tasiussak, kan man vel kun finde den Forklaring, at der en Gang har staaet en Gletscher i Tasiussak, og at Landet den Gang laa 30—40 m lavere end nu. Antager man dette, er de forhaandenværende Kendsgerninger ganske godt forstaalige. Man kan vel altsaa bedst opfatte disse flade Strækninger som et Gletscherdelta, afsat i Havet; Smeltevandet har planeret og sorteret Materialet; de større Partikler findes ved Tasiussak, de finere er ført længere bort. Mod Tasiussak, hvor Vandet var fersk, findes ingen Forsteninger, mod Havet, hvor Vandet var salt, er der rigeligt med Forsteninger.

Gletscheren maa have staaet i lang Tid paa samme Sted for at danne en saa stor Aflejring; men naar alpine Gletschere mod Podalen har kunnet danne Moræner paa 600 m, er en Aflejring som den ved Keasuk ikke saa imponerende. Tæt ved Tasiussak træffer man en Morænevold med usorteret Materiale, blandt andet større Sten. Denne Vold maa have været det sidste Stadium i Dannelsen. Sandsynligvis er Landet da hævet saa højt, at det ikke mere laa under Havet. Volden er da at betragte som en usorteret Endemoræne.

Vegetationen paa disse flade Strækninger er fortrinsvis Lichener, navnlig sorte Skorpelicher — sort er den fremherskende Farve — eller, hvor Vegetationen er kraftigere, den sorte Busklichen blandet med andre Lichener. Man kan altsaa nærmest kalde den en Lichenhede. Af Phanerogamer var *Saxifraga*, *Luzula*, *Poa*, *Artemisia*, *Silene*, *Stellaria*, *Papaver*, *Rumex* paa sine Steder ret hyppige. Paa saadanne Steder faar vi altsaa en Fjeldmarkvegetation. Hedeplanter er derimod sjældne. Her og der finder man en *Salix*, *Empetrum* og, hvor der er lidt fugtigere, *Vaccinium uliginosum*.

Lignende flade Strækninger traf jeg mod Syd ved Orpigsok med en lignende Højde. Sandsynligvis har de en lignende Dannelsesmaade, idet Gletscheren i sin Tid har strakt sig frem gennem Søerne. Uden at have været paa Stedet er det rimeligt at antage, at de af Hammer omtalte flade Strækninger fra Tasiussarssuak og til Havet (Sydøst-Bugt) forholder sig paa samme Maade. Forøvrigt vil sikkert en grundig Undersøgelse af disse skalførende Aflejringer ikke blot her i Orpigsôk, men ogsaa de andre nævnte Steder være af Interesse, idet de maaske kan give Oplysning om Forhold, der vil være af Vigtighed for Forstaaelsen af Dannelsesmaaden af disse Aflejringer. Paa medfølgende Kort er de skalførende Dannelser i Orpigsôk aflagt.

Efter at være kommet til Tasiussak naaede vi i et smukt Sommervejr Teltpladsen ved Kunguak. Denne Teltplads har

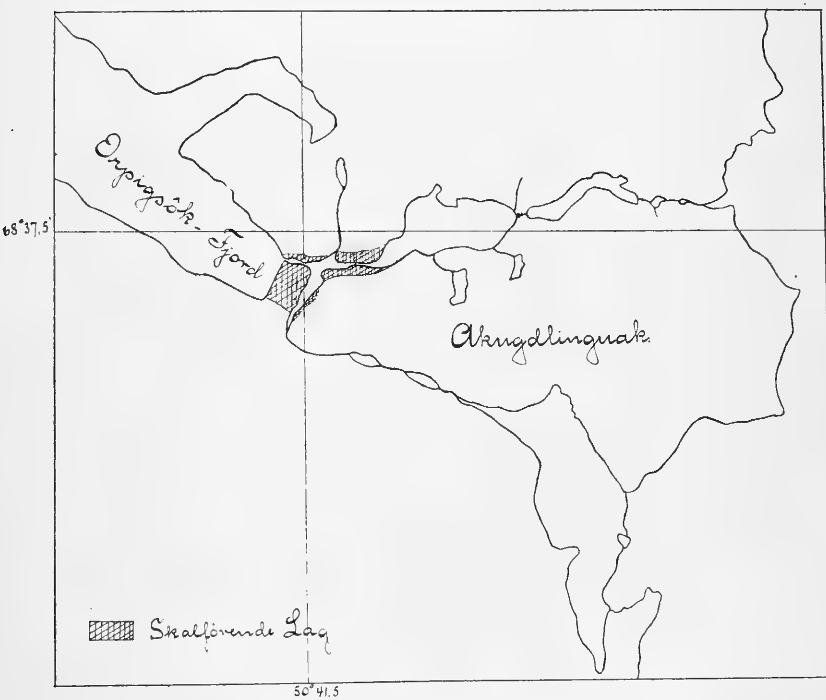


Fig. 12.

en usædvanlig smuk Beliggenhed paa Vejen til Alangordlek, men benyttes ikke videre af Grønlænderne. Kunguak-Dal er udfyldt af en leragtig Moræne. Som saa ofte paa lerholdige Moræner er Vegetationen meget aaben, idet den har et maskeagtigt Udseende. Denne nætformede Fordeling af Vegetationen synes at være et Resultat af Lerets Tilbøjelighed til at slaa Revner, naar der om Sommeren indtræder Tørke; i disse

Revner har Frø og Spirer lettere ved at komme op end i de midterste Partier i Masken, hvor Leret er haardt som et Gulv. Om Foraaret under Snesmeltningen forholder det øverste Lag af Leret sig ganske som en halvflydende Masse. Træder man paa Leret, synker man i til Foden standser ved det frosne Lag. Paa Skraaninger kan man iagttage, at Leret bevæger sig som en sejgtflydende Masse.

I Søen ovenfor Teltpladsen er den smukke, lille *Phalaropus* (Odinshøne) meget almindelig.

Fra Kunguak roede vi den næste Dag til Kekertarssunguit-Tupersuâ. Herfra foretog jeg den følgende Dag en Ekskursion til Teltpladsknuden for at se, hvorledes det forholdt sig med Gletscheren og Tilstanden i Fjorden i det hele taget. I Fjorden laa der 3 Isfjælde i oprindelig Stilling; det ene af dem laa temmeligt langt ude i Fjorden, de andre to nærmere ved Gletscheren, det ene vel omtrent i Midten af Fjorden, det andet noget nærmere Kekertarssunguit. I alle andre Henseender saa Fjorden ud som sædvanligt. Gletscherens Ende laa i det hele paa samme Sted som det foregaaende Aar, nogle Partier havde en mere østlig, andre en mere vestlig Beliggenhed end Aaret forud. Hvad der forsaavidt er vigtigere, naar det gælder om at afgøre, om Gletscheren trækker sig tilbage eller ikke, er, at den Del af Randpartiet, der glider paa Bunden langs Teltpladsknuden, havde trukket sig noget tilbage; paa det allernærmeste laa den 40 m østligere end Aaret før. Det forekommer mig, at man i denne Omstændighed har et Bevis for, at Gletscheren fremdeles er i Aftagen. Det kunde jo nemlig tænkes, at Gletscheren allerede havde naaet sit Minimum og nu atter var ved at skyde frem.

Derefter vendte jeg tilbage til Fjorden, hvor jeg foretog nogle Lodninger. I det hele er Tasiussak ikke nær saa dyb som Torsukatak, hvilket vel heller ikke var at vente, men den er heller ikke saa dyb som Farvandene syd for Torsukatak, hvilke i flere Henseender kan sammenlignes med

Tasiussak. Den største Dybde, jeg har fundet i Tasiussak, er 251 m, omtrent ud for Kunguak; men da Lodskuddet ikke ligger midt i Fjorden, er det muligt, at der kan findes lidt større Dybder. I Farvandet syd for Torsukatak var Dybderne 375 m. Forøvrigt er Dybdeforholdene i Tasiussak i det hele temmelig ensformige. Ligesom i Torsukataks Omraade finder man ogsaa her trugformede Fordybninger; en saadan ligger netop uden for Kunguak. Bundens Art er her som overalt i Fjorden en fin Ler; kun enkelte Gange har jeg faaet et Gruskorn eller en lille Sten med op. Nogen videre Vægt paa en systematisk Undersøgelse af Bundprøverne lagde jeg for Resten ikke.

Efter at jeg havde foretaget Lodningerne, gjorde jeg atter en Udflugt til Isfjorden. De to Isfjælde, der laa nærmest Gletscheren, var nu skubbet længere mod Vest og laa næsten uden for Kakapalak. Det tredje Isfjæld kunde jeg ikke finde, rimeligvis var det gaaet itu og omdannet til de sædvanlige Isfjælde. Ved Gletscheren maa der have fundet omfattende Kalvninger Sted; Gletscherenden havde trukket sig noget tilbage.

Som omtalt i Beretningen for 1902 kan man meget tydeligt i det tørlagte Areal ved Nunatap-Tasia adskille to Zoner. I den ene er der allerede en ret betydelig Plantevækst, i den anden og laveste er Plantevæksten endnu sparsom. I den øverste Zone finder man Rester af udgaaede Planter netop af det Udseende de faar, naar de er gaaet ud, ved at Stedet er blevet oversvømmet. Jeg fandt saaledes ganske godt bevarede, men udgaaede Mosser; Grene af Salix blev fundet. Alt tyder paa, at den oprindelige Vegetation er bleven kvalt, ved at Vandet er steget; siden er Vandet atter sunket, og en ny Vegetation er da indvandret. Disse Svingninger i Vandstanden staar naturligvis paa det nøjeste i Forbindelse med Gletscherendens Svingninger. Det er værd at lægge Mærke til, at der altsaa maa have været en Periode, der aabenbart maa ligge forud for

Hammers Undersøgelser, hvor der har været en lavere Vandstand, altsaa en ringere Mægtighed af Isen.

Endnu stod tilbage at foretage en Undersøgelse af Sikuijuitok-Fjorden. 1902 gik jeg dertil fra Jakobshavn; men det er en lang Vej. Denne Gang roede jeg til Rodebay, hvorfra Vejen knapt er saa lang, og hvor man oven i Købet kan ro paa nogle Indsøer. I Kajak roede vi om Eftermiddagen fra Rodebay til Kangersunek-Kingua og bar saa Kajaken langs Perserajoitok-Kugssua til Kangersunek-Tasersua, hvor vi atter kunde ro et Stykke. Endnu to Gange maatte vi bære over Land og naaede omsider det inderste af Dalstrøget. Paa en Skraaning mod Nordvest traf jeg paa en lille Plet den smukke gulblomstrede *Ranunculus*. Gennem en Dal steg vi langsomt tilvejrs og naaede omsider om Morgenen Kamhøjden.

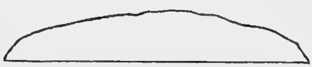


Fig. 13.

Fra denne til Gletscheren var der endnu et godt Stykke. Først ved Middagstid naaede vi frem til selve Gletscheren. Ved at betragte Kalvismasserne ser man snart, at Isstykkerne er meget afgnavede, alle Kanter og Spidser er forsvundne. Et typisk Stykke Is fra Sikuijuitok har omtrent Form som afbildet i Fig. 13. Højden kan være større eller mindre; man kan undertiden se ganske flade Stykker, ganske lig Vinteris. Kalvisen i Sikuijuitok er heller ikke hvid, saaledes som Kalvis plejer at være. Den gulgraalige Nuance, Isen i denne Fjord har, adskiller den meget fra Kalvisen i andre Fjorde. Denne snavset hvide Farve hidrører fra Støv, som navnlig om Efteraaret blæser ud paa Isen. Kun i umiddelbar Nærhed af Gletscheren bemærker man et smalt, hvidt Bælte af mere uregelmæssig formet Kalvis. At Bæltet er smalt, tyder paa, at Gletscherens Kalvning kun er ubetydelig. Ispakningen i Fjorden kan altsaa ikke direkte hidrøre fra Sikuijuitok-Gletscher; men maa hidrøre fra andre Aarsager. Som omtalt i Beretningen af 1902 maa sikkert Jakobshavns-Isfjord være den egentlige Aarsag. Den gulgraa Kalvismasse, som udfylder den inderste Del af Sikuijuitok, strækker sig ogsaa langs Vestsiden af Nunatarssuak. Nærmer man sig til Jakobshavns-Isfjord, lægger man Mærke til, at Kalvisen efterhaanden faar sit sædvanlige Udseende, hvid. Navnlig bemærker man, at et Bælte sniger sig tæt omkring Natdluarsuk-Halvø og strækker sig henimod Natdluarsuk-Bugt. Man kan vist forklare dette paa den Maade, at Tidevandet, som strømmer stærkest om Natdluarsuk-Halvø, tager den Kalvis, som findes i Jakobshavns-Isfjord ud for Sikuijuitok-Fjord med sig ind i denne Fjord. Naar det atter bliver Ebbe, kan Isen ikke komme ud, da Jakobshavns-Isfjord er stærkest pakket med Is. Man kan vist ikke antage, at Kalvismassen direkte bliver presset ind i Sikuijuitok, ellers maatte der ogsaa under Nunatarssuak findes hvid Kalvis, med mindre der fra dennes sydvestlige Hjørne skulde udgaa en Revle, men det er der forøvrigt intet, der tyder paa. Forholdene er sikkert de samme som i de sydlige Bifjorde, Kangerdlukasik og Tasiussak. Ogsaa her driver Kalvismasserne ind, naar det er Flodtid; i begge Bugter er Mundingen smal; i Kangerdlukasik er Mundingen delvis lukket af en Ø. I begge Fjorde kommer der derfor ikke saa megen Drivis ind som i Sikuijuitok, der har en vid Munding. For Tasiussaks Vedkommende kommer der hertil, at dens Overflade er saa stor, at Afsmeltningen af Isbjergene langt overgaar Tilførselen.

Sikuijuitok-Gletscher er lav; paa den sydlige Side er Højden c. 20 m, paa Nordsiden mindre; et lille Parti nærmer sig dog stærkt til at være 20 m.

For at faa en nøjagtig Angivelse af Snegrænsen, der bedst kan bestemmes paa denne Aarstid, sejlede jeg til, efter at være vendt tilbage til Rodebay, til Kekertak og derfra til Asâsat for at bestige Asâsat-Ka. Asâsat selv er et forvitret jærnholdigt Parti. Opstigningen sker i en Kløft, som er opstaaet ved Forvitring, og som med sin rislende Bæk og frodige Vegetation danner et smukt Parti. Paa den Væg af Kløften, der vender mod Havet, ruger mange Maager. I det lille Delta, som Bækken danner, var *Stenhammaria* ikke sjælden. Opstigningen er ikke vanskelig; i Løbet af en Time naaede vi Plateauet. *Betula* forsvandt i en Højde af 360 m, og noget højere forsvandt *Salix glauca* (475 m). *Vaccinium uliginosum* forsvandt i en Højde af 560 m. De andre Hedeplanter holdt sig endnu: jeg saa *Diapensia*, *Loiseleuria*, *Dryas*, *Silene acaulis*, *Luzula* samt mange Mos- og Lavplanter. Efterhaanden bliver Hedeplanterne sjældnere. *Cassiope* er nu den almindeligste Plante. Paa Partier med mere Bundfugtighed fandtes den lille sirlige *Cassiope hypnoides*. *Salix* og Syre fandtes endnu. Den sidste *Cassiope* saa jeg ved 780 m. Allerede før denne Højde fandtes spredte Snepletter; nogle af disse var dog meget tynde og forsvinder maaske i gunstige Somre. De tykkere maa dog anses for at være vedvarende. Den lokale Snegrænse kan sættes til 700 m. I en Højde af 690 m traf jeg temmelig store Snepletter (7 m lange og 3 m brede). De laa bag ved en lav Klipperand med sydlig Eksponering. Paa den gamle Sneskorpe var aflejret et tyndt Lag nyfalden Sne — vi var sidst i Juli. — Denne lave Snegrænse skyldes formodentlig den Omstændighed, at under Snefog fra Nord lægger Sneen sig her i mægtige Driver. Til Gengæld ligger Stedet rigtignok lige mod Syd. Den egentlige Firn, som bedækker Toppen, begynder først ved 850 m. Højden af den tvedelte Top er 895 m for den sydlige og 910 for den nordligste. Fra den nordlige Top mod sydøst er Faldet meget stærkt, saaledes at Firnranden her ligger ved 700 m. Randen af Firnen er her ledsaget af en Morænevold; paa sine Steder var denne Morænevold fjernet 20—30 m fra den nuværende Isrand, en Antydning af Isens Tilbagetrækning. Firnens Overflade er ganske jævn og om Natten haard, saaledes at den er let at gaa paa.

Nogle Dage senere besteg jeg Nakarajok, en isoleret Top paa Nugssuak Vejens Vestside. Paa det flade Land tæt ved Strandbredden ligger der en lille Vold, Arfiussak (af arfek Hval og ussak lignende). Den blev ikke nærmere undersøgt og er vel sagtens en Strandvold og ikke nogen Endemoræne, hvilket ikke passer godt med Beliggenheden. Opstigningen er ogsaa her ret let. Planterne forsvinder næsten i samme Orden og i samme Højde som ved Asåsat-Kulå. Snegrænsen ligger dog her noget højere, idet kun et lille Parti af Toppen var bedækket med Sne. Firngrænsen laa ved 885 m; mod Nordøst laa dog Firnen noget lavere, fordi den her var i Bevægelse. Snegrænsen laa altsaa paa Nakarajok i det hele lidt højere end paa Asåsat-Kå. Maaske beror dette paa, at Sneen paa en lille isoleret Top lettere blæser bort end paa et større Plateau.

Jeg havde haft til Hensigt endnu en Gang at gøre en Ekskursion til Gletscherne i Torsukatak, men uheldigvis var Fjorden paa Grund af sydvestlig Vind saa fyldt med Kalvis, at det var umuligt at komme frem med Konebaad. Efter forgæves at have ventet paa Lejlighed til at komme ind i Torsukatak, brød jeg op for at vende tilbage til Jakobshavns-Isfjord; jeg blev ledsaget af Udliggeren i Kekertak, der fortalte, at endnu 1885 laa der en lille Firn paa Niakornak-Ø; tidligere havde den været endnu større, hvilket Udsagn blev bekræftet af Grønlænderne; men da Niakornak næppe er mere end 400 m, er der ingen Grund til foreløbig at tillægge dette Udsagn nogen Betydning. Mere rimeligt er det, at Gletscheren ved Kingussak tidligere har haft en større Udbredelse end nu.

Ved Ankomsten til Jakobshavns-Gletscher iagttog jeg, at denne havde slaaet en stor Revne nord for den vestlige Basisvarde. En smallere Revne gik i nordøstlig Retning omtrent fra Nunatakens Vestspids til den sydlige Ende af omtalte store Revne. Det var ikke muligt at iagttage nogen

Højdeforskel paa de to Sider af Kløften. Heller ikke da Kløften var blevet noget bredere, var det muligt at paavise nogen Forskel i Højde af Isfjæld — thi det er man berettiget til at kalde den Del af Gletscheren, der laa vest for Kløften — og selve Gletscheren. Derefter maa den af mig allerede tidligere paa Iagttagelser grundede Teori, om at Jakobshavns-Gletscher flyder paa Vandet med sin yderste Ende, og at Kalvningen her finder Sted, ved at der fraskilles Stykker af samme Mægtighed som Gletscheren selv, bestyrkes. Kalvning ved Opdrift eller Nedstyrtning finder kun Sted for mindre Isfjældes Vedkommende. De store Isfjælde gaa dog altid itu, inden de naar Banken. De paa denne faststaaende Isfjælde er derfor Brudstykker uden den for Isfjældene i oprindelig Stilling karakteristiske Overflade. Spørgsmaalet, om hvorledes Jakobshavns-Gletscher kalver, maa derfor anses for at være opklaret.

Endnu laa den smalle, sorte Rand tværs over Nunatap-Tasias Munding. Om nogle Aar vil denne Bariere rimeligvis forsvinde, og Nunatap-Tasia vil da for en Tid være en Bugt til Jakobshavns-Isfjord.

De tidligere omtalte Isfjælde i oprindelig Stilling var nu presset mod Vest og stod omtrent uden for Tasiussaks Munding.

For at faa en Forestilling om, hvor dybt Jorden tør op, lod jeg foretage en Gravning i det løse Materiale ved Keakusuk. Resultatet var 1,7 m. Paa et andet og mere fugtigt Sted fandt jeg, at Dybden fra Jordens Overflade til den frosne Jord var 1,5 m. Forsøget blev anstillet midt i August, altsaa paa en Tid, hvor Varmen maa have naaet sit Maximum i Retning af at naa ned.

Paa en Ekskursion til Eke lagde jeg Mærke til, at der nu mellem Isfjorden og Klavshavn findes 3 Bopladser, nemlig Narsarmiut med 6 Huse, Kaersormiut med 2 og Eke med 3. Paa Hammers Tid var der kun en Boplads, Igdlormiut; i det mindste angives kun denne paa Hammers Kort.

Narsarmiut betyder dem, der bor ved Sletten. Der findes nemlig Nord for Klavshavn mellem Fjeldene og Havet en smal Slette, der i meget minder om Sletten ved Keakusuk, og som maaske staar i Forbindelse med Jakobshavns-Gletscher, da denne skød sig helt ud gennem Fjorden. Minder om den Tid har man ogsaa i Rudimenter af Endemoræner, der findes paa den nordlige Side af Fjorden. Forøvrigt har jeg ogsaa ved Torsukatak fundet saadanne Rester af en Endemoræne paa Halvøen ved Nugak. Om disse Endemoræner er samtidige og samtidige med de store Aflejringer ved Enden af Tasiussak, Orpigssok og Overgangen mellem Sydost-Bugt og Tasiussarssuak lader sig endnu ikke afgøre; men hvis de gør det, henpeger de paa en af de mindre Istider, der har fulgt efter den store Istid, da hele Grønland var overiset. Om Isfjældsbanken er at opfatte som den daværende Jakobshavns Gletschers Endemoræne, er vel tvivlsomt.

20—12—1909.

Appendix.

List of Vascular Plants

collected by **Dr. M. C. Engell**

in the Vicinity of the Great Glacier of Jakobshavn, about 69° lat. n.

Determinated by **Morten P. Porsild.**

During his journey to Greenland 1902 for geographical and geological studies, Dr. Engell brought together a small collection of plants, principally gathered in the neighbourhood of Jakobshavn. At his request, I have determinated them and as this part of Greenland, visited by Dr. Engell, has not been much investigated botanically, it seems to be of some interest to give a list of all the plants collected. The localities, where the plants were found, may be found on the map of M. C. Engell (Meddelelser om Grønland XXXIV, tab. II) with exception of one, viz. Orpigssuit or Orpigssôk («the place with numerous thickets») lying at 68° 35′ (Medd. om Grønl. XXVI, tab. III). For the physical conditions of the soil, habit of the vegetation etc. we may refer to a paper of the collector in Medd. om Grønl. XXVI.

After the MS. 1906 of the following list was written, Dr. Engell has looked over it and added some species and localities to it. Those statements, of which I have not seen the plants, are set in «—».

«**Equisetum arvense** L.
Tasiussak, common».

«**Cystopteris fragilis** (L.) Bernh.
Tasiussak, common».

Woodsia ilvensis (L.) B. Br.
α **rufidula** (Mich.) Koch.
Kunguak, Nunatak.

Lycopodium annotinum L.
var. **pungens** Desv.
Kunguak, fruiting specimen.

Juniperus communis L.
var. **nana** (Willd.).

Orpigssuit, about 68° 35′ lat. n. 50° 40′ long. w., the northern limit in Greenland. The northernmost localities for this species were hitherto S. Kangerdluarsuk near Holstensborg, about 67° 0′ lat. n. 53° 30′ long. w. (Warming & Holm) and Sofiehamn, 68° 21′ lat. n. 51° 6′ long. w. (Berlin). Hence its northern limit on inland stations lies about 1½ degrees farther northward, than near the open coast. The same is the case with another plant of southerly distribution, found at Orpigssuit viz. *Gentiana tenella* (Cfr. Hartz Medd. om Grønl. XV, p. 40).

«**Alopecurus alpinus** Sm.
Tasiussak, common on dwelling places».

Hierochloa alpina (Liljebl.) R. & S.
Kunguak (several collection-numbers), Nunatap Tasia.

Phippsia algida (Sol.) R. Br.
Nunatap Tasia.

Calamogrostis arundinacea (L.) Roth.
var. **purpurascens** (R. Br.) Gel.
Kunguak.

Agrostis borealis Hartm. (*A. rubra* Wg.).

Nunatap Tasia, two specimens, the one small with somewhat contracted spike-like panicle, the other 15—20 cm high with spreading panicle.

Trisetum subspicatum (L.) Beauv.

Nunatap Tasia.

Poa pratensis.

Kunguak.

Poa cenisia All.

Kunguak, Nunatap Tasia; several numbers collected, the most of which with narrow leaves and with pyramidal spreading panicles and deep purplish spikelets.

Poa glauca M. Vahl.

Kunguak, Nunatap Tasia; various numbers collected, some of which are small with narrow contracted panicles, somewhat resembling *P. abbreviata* R. Br.

Glyceria maritima (Huds.) Wg.

var. **vilfoidea** (Anderss.) Gel.

Kekertarssunguit Ilua.

Glyceria distans (L.) Wg.

Tasiussak.

Festuca ovina L.

Kunguak, Nunatap Tasia; deep purplish and green specimens.

Festuca rubra L.

Kunguak.

Elymus arenarius L.

var. **villosus** (E. Mey.).

Kunguak, Tasiussak.

Eriophorum polystachyum L.
Nunatap Tasia.

Carex lagopina Wg.
Kunguak.

Carex rigida Good.
Kunguak, Nunatap Tasia (several specimens).

Carex rupestris All.
Kunguak.

Carex capillaris L.
Kunguak.

Juncus arcticus Willd.
Nunatap Tasia.

Juncus castaneus Sm.
Kunguak, Nunatap Tasia; from the latter locality the collection contains numerous numbers, being without very common and characteristic for that place. From Orpigssuit and from Aulatsivik-Fjord Hartz and Berggren have mentioned *Juncus castaneus* and *J. arcticus* as plants characterizing the vegetation of moist clayey soil.

Juncus triglumis L.
Nunatap Tasia, on heath.

Luzula arcuata (Wg.) Sw.
* **confusa** Lindeb.
Kunguak.

Tofieldia palustris Huds.
Kunguak.

Salix groenlandica (And.) Lundstr.
Kunguak; *f. latifolia* And. and *angustifolia* And. occur in the collection.

Salix glauca L.
Kunguak.

Salix herbacea L.
Near the Ice-Fjord.

Betula nana L.
Kunguak.

«**Oxyria digyna** (L.) Campd.
Nunatap Tasia, common».

«**Rumex Acetosella.**
Itivdlek»; a rare plant in North-Greenland.

Polygonum viviparum L.
Kunguak, Nunatap Tasia; some of the specimens are infested with *Ustilago Bistortarum.*

Koenigia islandica L.
Nunatap Tasia.

Sagina nivalis (Lindbl.) Fries.
Kunguak.

Alsine verna Bartl.
var. **hirta** (Wormskj.) Lge.
Kunguak, Nunatap Tasia.

Ammodenia peploides (L.) Rupr.
var. **diffusa** Horn.
Kunguak, several numbers.

Stellaria humifusa Rottb.
Kekertarssunguit Ilua.

Stellaria longipes Goldie.
Kunguak.

Cerastium alpinum L.
Kunguak, Nunatap Tasîa; the collected specimens are low and densely hairy: var. **lanatum** Lindbl.

Silene acaulis L.

Kunguak.

Viscaria alpina (L.) Fenzl.

Kunguak, a form with two longstalked two-flowered cymes beneath the raceme-like inflorescence.

Melandrium involucratum (Ch. & Schl.).

var. **affine** (J. Vahl.) Rohrbach.

Kunguak, Nunatap Tasia.

Melandrium triflorum (B. Br.) J. Vahl.

Kunguak; many numbers were collected, generally the specimens are tall and densely glandular-hairy.

Ranunculus hyperboreus Rottb.

Kunguak, Nunatap Tasia.

Ranunculus lapponicus L.

Nunatap Tasia.

Papaver radicatum Rottb.

Kunguak.

Cardamine bellidifolia L.

Kunguak.

Draba hirta L.

Kunguak, Nunatap Tasia.

Draba arctica J. Vahl.

Kunguak.

Sedum villosum L.

From Kunguak several numbers were collected; on Disco it is a rare plant.

Rhodiola rosea L.

Akugdlek.

Saxifraga nivalis L.

Nunatap Tasia.

Saxifraga stellaris L.
var. **comosa** Poir.
Nunatap Tasia.

Saxifraga cernua L.
Nunatap Tasia.

Saxifraga rivularis L.
Nunatap Tasia, several numbers; one of which is a etiolated shadow-form.

Saxifraga groenlandica L.
Kunguak, Nunatap Tasia; small specimens.

Saxifraga tricuspidata Rottb.
Nunatak, Itivdlek.

Saxifraga aizoides L.
Nunatap Tasia.

Saxifraga aizoon L.
Nunatap Tasia.

Saxifraga oppositifolia L.
Nunatap Tasia.

Dryas integrifolia M. Vahl.
Kunguak.

Potentilla nivea L.
Tasiussak.

Potentilla tridentata Sol.
Tasiussak; a very rare plant in North Greenland.

«**Empetrum nigrum** L.»

«**Hippuris vulgaris**»; without doubt.
var. **maritima** Hartm.
«Tasiussak».

Chamaenerium latifolium (L.) Spach.
Kunguak.

Pirola grandiflora Radius.

Kunguak, Itivdlek.

Cassiope tetragona (L.) Don.

Nunatak, Kunguak, on mountains near the great glacier; Taserssuak, «Tasiussak».

Phyllodoce coerulea (L.) Gr. & God.

Taserssuak near Claushavn, Kunguak.

Loiseleuria procumbens (L.) Desv.

Taserssuak near Claushavn.

Rhododendron lapponicum (L.) Wg.

Kunguak, Taserssuak near Claushavn.

Ledum palustre L.

var. **decumbens** Ait.

Kunguak.

Vaccinium uliginosum L.

* **microphyllum** Lge.

Kunguak, several numbers; Orpigssuit, infested with *Exobasidium Vaccinii.*

Vaccinium Vitis Idaea L.

var. **pumilum** Horn.

Orpigssuit, «Nunatap Tasia, Sarkardlek»; rare in North Greenland.

Diapensia lapponica L.

Itivdlek near Claushavn, Kunguak.

Armeria sibirica Turcz.

Nunatap Tasia, Kunguak.

«**Mertensia maritima** (L.) S. F. Gray.

Kekertap Ilua (70° lat. n.) Itivdlek».

Euphrasia latifolia Pursh.

Dr. Engell has noticed: «Euphrasia officinalis, Tasiussak». This species is very rare in North-Greenland.

Pedicularis lapponica L.
Kunguak.

Pedicularis flammea L.
Kunguak.

Plantago maritima L.
Kunguak.

Plantago borealis L.
Kunguak.

Campanula rotundifola L.
var. **arctica** Lge.
Kunguak, Nunatak.

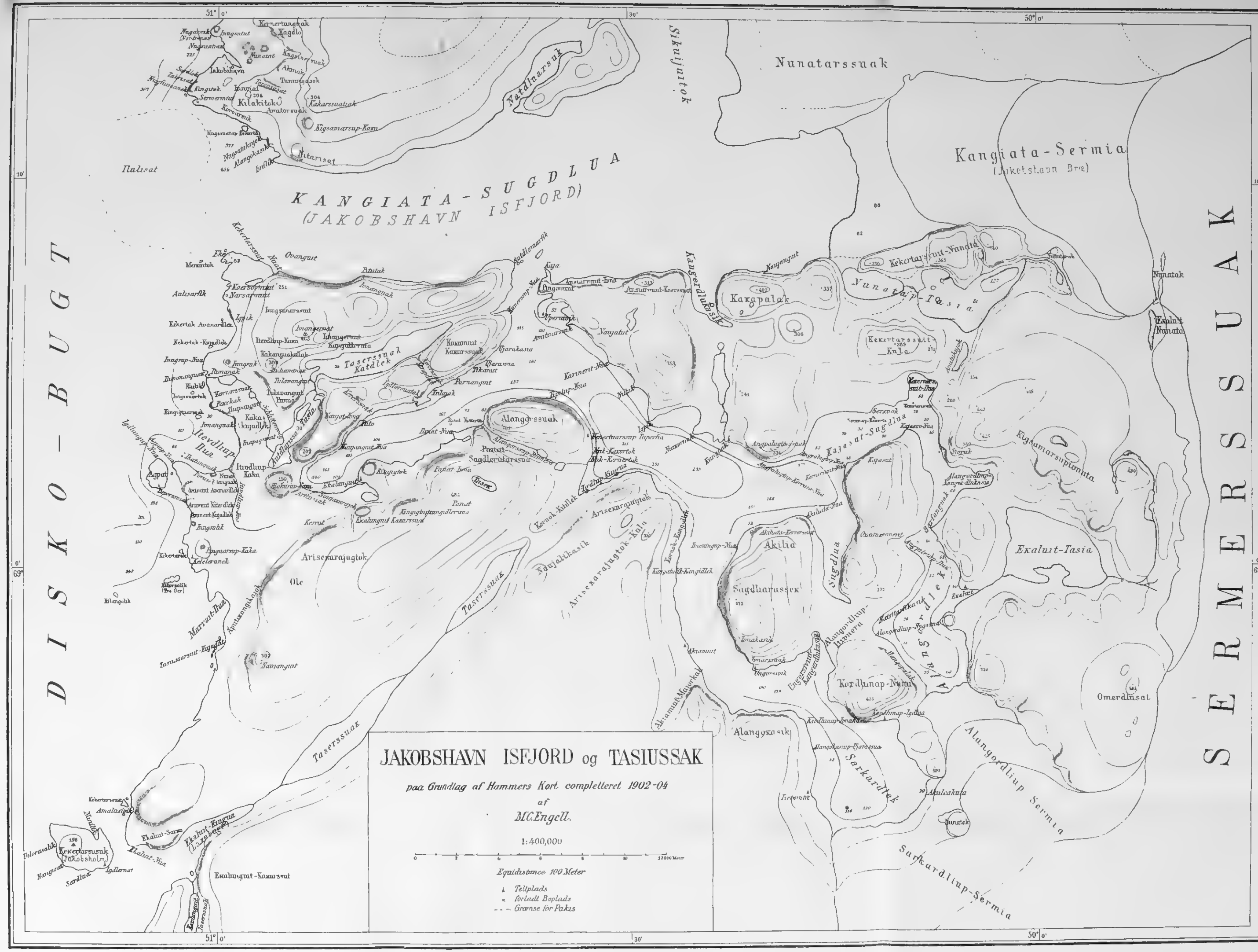
Antennaria alpina Gärtn.
Kunguak.

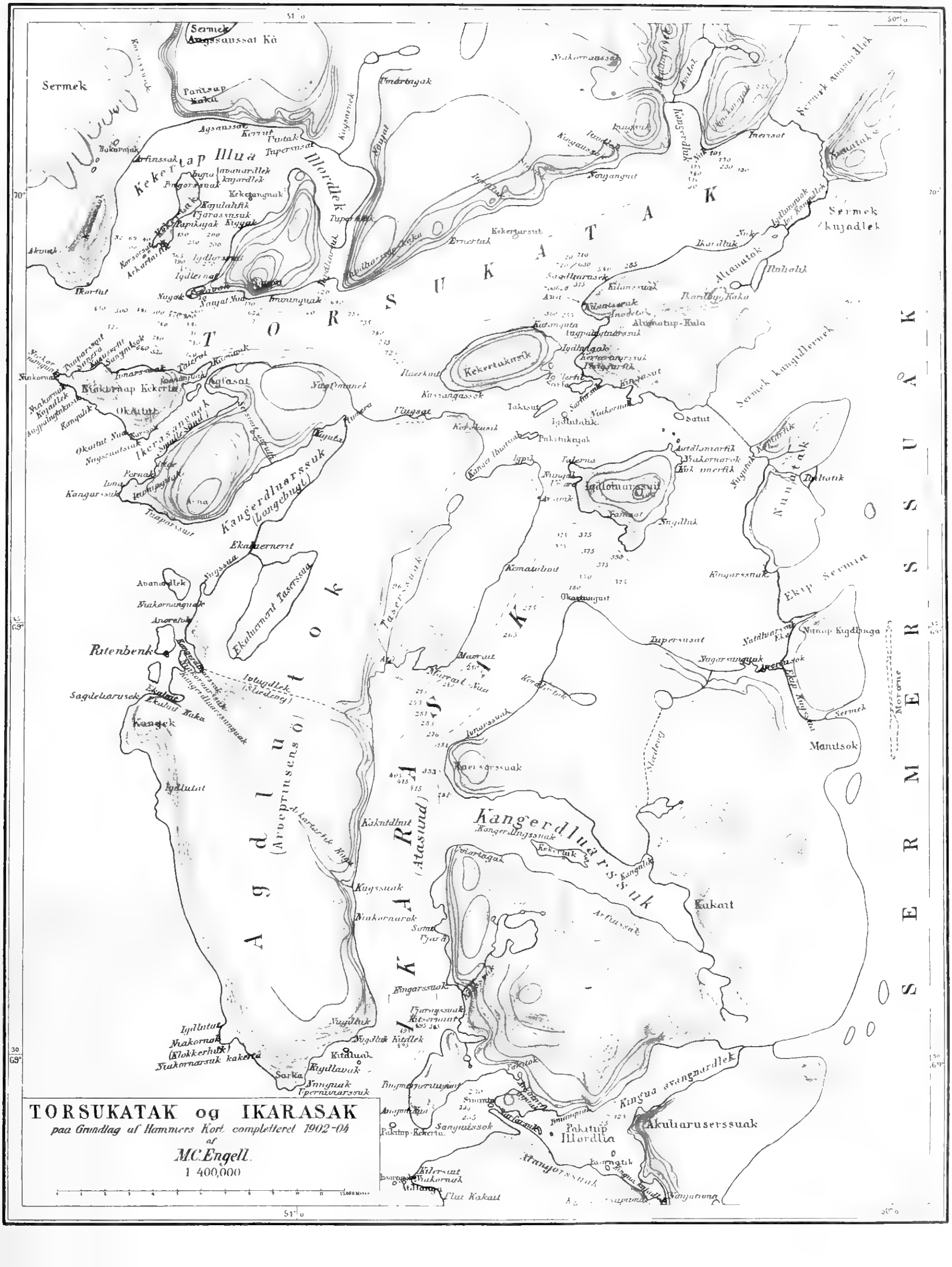
Arnica alpina Murr.
Kunguak, Itivdlek.

Artemisia borealis Pall.
Kunguak, a rather great number of different specimens was collected; otherwise this species seems to be rare in North-Greenland.

Taraxacum croceum Dahlst.
Dr. Engell has noticed: «Taraxacum officinale, Tasiussak, Torsukatak»; I think this statement is referable to the above named, the commonest of the Greenland species at the given latitude.

20—12—1909.


JAKOBSHAVN ISFJORD og TASIUSSAK
paa Grundlag af Hammers Kort completteret 1902-04
af
M.C.Engell.
1:400,000
Equidistance 100 Meter
Tellplads
forladt Boplads
Grænse for Pakis
DISKO - BUGT
SERMERSSUAK
KANGIATA-SUGDLUA
(JAKOBSHAVN ISFJORD)
Kangiata-Sermia
(Jakobshavn Bræ)
Nunatarssuak
Sikuijuitok
Natdlarsuak
Jakobshavn
Ilulisat
Alangorssuak
Karapalak
Akilia
Sagdlarassek
Ekaluit-Tasia
Omerdlusat
Kordlunap-Nuna
Sarkardlek
Alangordliup Sermia
Sarkardliup-Sermia
Tasersuak
Ole
Kekertarssuak
(Jakobsholm)
Itevdliup-Ilua
Kajasat-Sugdlua
Kigsauarsupionnta
Alangorsuak
51° 0'
30'
50° 0'
69°



TORSUKATAK og IKARASAK
paa Grundlag af Hammers Kort completteret 1902-04
af
M.C.Engell.
1:400,000

VII.

Contributions

to the

Ethnology and Anthropogeography of the Polar Eskimos.

By

H. P. Steensby.

1910.

I.

The Eskimo tribe, which is called here the Polar Eskimos, lives on the north-west coast of Greenland, between 76° and 79° N. L., and is the most northern people on the globe. From the West Greenlanders they are separated by the uninhabited ice-shores of Melville Bay and from the natives of Ponds Inlet on the northern part of Baffin Land by the likewise uninhabited large islands of Ellesmere Land and North Devon.

The title "neighbours of the North Pole", which E. Astrup gives them, is theirs with right, not only because their land is so near to the pole, but also on account of the great and important help they have given in recent times to the Polar expeditions. For a long time they were known under the name "the arctic Highlanders", a title given them by John Ross, by which he intended to convey the impression both of remarkable stature and also of the northerly and mountainous nature of their land. Later, Bessels with small reason introduced the name Itaner or Etah'er from the most northerly, large settlement of the tribe, Ita or Etah. More frequently the tribe has been named after their most southerly settlement the Cape York Eskimos. The title Polar Eskimos has come into use mainly since L. Mylius-Erichsen's Danish Expedition of 1902—1904.

Although there is full reason to regard the tribe as an ethnographic unit, owing to the apartness of its region from that of all other Eskimos and owing to the special characteristics of its culture, yet its numbers are extremely few. According to a census taken by Peary in the summer of 1895 the tribe then numbered 253 individuals in all, of which 140 were of the male sex and 113 female. Already two years later the number had sunk to 234. And in 1906, when Peary again made a census of all the natives, he found there only 207, of which 119 were men, 85 women and 3 small children, of whose sex Peary could obtain no information. These numbers, which also agree with the observations of the Danish Expeditions, are certainly correct. On the other hand, the estimates given by Kane in 1854, of about 150, and by Hayes in 1861, of about 100, and by Bessels in 1873;, of 112, were certainly incomplete.

It was so long ago as 1616, that William Baffin in his small ship "Discovery" sailed along this part of the Greenland coast, past Capes York, Atholl and Parry, and on the 5th of July reached his furthest point, within sight of Cape Alexander. Baffin narrates, that he was forced by the ice "to stand backe some eight leagues to an island we called Hakluit's Ile — it lyeth betweene two great Sounds, the one Whale Sound, and the other Sir Thomas Smith's Sound; this last runneth to the north of 78° ..."[1].

We must pass over two hundred years, however, before we learn anything of the inhabitants of this land. They were first discovered in 1818 by John Ross. On the 9th of August, while the two ships of John Ross were lying in the neighbourhood of Cape York, 18 natives visited them, approaching over the ice. They had sledges and dogs, lances and knives, concerning which Ross says, that they were made of meteoric iron, said to occur in abundance in the neighbourhood of Bushnan Island. Ross adds, further, that they apparently had no idea of other people living to the south[2].

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[1] The voyages of W. Baffin of 1612—22, ed. by C. R. Markham. Hakluyt Society. London 1881, p 145.

[2] John Ross: A voyage of discovery etc. London 1819.

John Ross' voyage and in still higher degree W. E. Parry's in 1819, during which Lancaster Sound was navigated, led to the English and Scottish whalers pushing further north than they previously had done. Baffin's voyage in 1616 had been the precursor of the whale-fishing in the Davis Strait, which was begun already in 1619 by the Dutch, followed by the English a few years later; but for 200 years the whalers had kept to the southern parts of the Greenland coast.

After Ross and Parry better knowledge was obtained of the movements of the whale in these waters, and the whalers were not long in making use of this knowledge. In March the large whales, with which we are here concerned, are met with off the ice-edge at Cumberland Sound and Frobisher Bay. In the beginning of May they go over to the Greenland coast, where they are found in June south of Disko. From here they return towards the north along the ice-edge in Melville Bay and into the so-called "North Water" of the whalers, south of Smith Sound between Greenland in the east and Ellesmere Land in the west. Late in July and in the beginning of August some are met with in Jones Sound and in Lancaster Sound, but the main portion are found off the mouth of Ponds Inlet, where the whale-fishing takes place. In September and October the whales turn to the south between the coast of Baffins Land and the western edge of the "middle pack"[1].

The movements of the whalers correspond with the migrations of the whale. They arrive at the North Water late in June or in the beginning of July, and often come into connection, as a rule off Cape York, with the Polar Eskimos, who come out to the ships on the coastal ice which is still firm at this time of year. During the past century the whalers have thus traded occasionally with the Polar Eskimos, who in return for their fox and bear skins received wood and iron implements.

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[1] A. P. Low: Report on the Dominion Government Expedition to Hudson Bay and the arctic islands, 1903—04. Ottawa 1906.

On the other hand, the stay of the whalers in the North Water has always been so short, that they have never come into such close contact with the Polar Eskimos as, for example, with the Eskimo tribe at Ponds Inlet, who to some extent have taken part in the whale-fishing.

Fortunately, the English and Scottish whalers have never adopted the methods employed by the American whalers in Hudson Strait and in Hudson Bay. These latter, namely, employ the Eskimos to man their whaling-boats and for this purpose carry away whole, small tribes to the fishing-grounds, to exploit their powers and cleverness throughout the summer. On the other hand, the English and Scotch depend wholly upon their own white crew to man their boats.

The introduction of steam-power on the whaling vessels, in the fifties or sixties, gave a fresh impetus to the whale-fishery and for the Polar Eskimos this meant a closer connection with civilisation. Almost at the same time the whole of the fishery in Baffin Bay passed over into the hands of the Scotch alone, who came from a single port, namely Dundee. From there about half a score of vessels went yearly in the seventies to Baffin Bay, but in 1903 and 1904 only 4 vessels went out and in 1909, it is said that only a single vessel visited Baffins Bay.

The Polar Eskimos had no connection with the scientific expeditions for a long period of years after their discovery. It was only during the expeditions in search of Franklin that they became better known. The ship "North Star" under the ship-master Saunders, which was sent out in 1849 with provisions for James C. Ross' Search Expedition in Barrow Strait, was prevented by ice from entering Lancaster Sound and had to pass the winter of 1849—50 in the small North Star Bay on the south side of Wolstenholm Sound.

In the middle of August 1850 the two large English expeditions under H. Austin and William Penny both came into connection with the Polar Eskimos at Cape York. The last-named had the Dane Carl Petersen on board as interpreter. From Cape York Austin's expedition took a young Polar Eskimo to England, where he was baptised and became known under the name of Erasmus York; he died however in the year 1856 at Newfoundland, where he was being educated to be a missionary among the Labrador Eskimos.

Regarding the Polar Eskimos at Cape York Lieutenant Sherard Osborn[1], who was in charge of one of Austin's ships, narrates that they arrived in dog-sledges, which "were entirely constructed of bone, and were small, neat looking vehicles; no sledge had more than five dogs; some had only three ... They are said, ... to have believed themselves to be the only people in the world". Carl Petersen[2] says, with regard to one of these sledges, that it was bound together by thongs of all kinds. The runners consisted of old whale-bone, and there was but little wood in it.

In the years immediately following, the English expeditions again came into connection with the Polar Eskimos. The only one of importance in this regard is the expedition under E. A. Inglefield, which discovered Inglefield Gulf and for the first time sailed through Smith Sound. On August 22nd 1852 Inglefield[3] met Eskimos in the neighbourhood of the Petowik Glacier, where they were bird-hunting among the cliffs by the coast; "Nothing of European ware was found with these natives, nor were kyacks seen". Thereafter he visited the Eskimo settlement Umanark, which was uninhabited at the time, as also a likewise uninhabited winter-settlement (probably Netschilivik) on Barden Bay, in the neighbourhood of which, however, Eskimos were dwelling in tents; at this settlement several examples of European steel implements were found.

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1 Sh. Osborn: Stray leaves from an arctic Journal. London 1852, p. 250.
2 Carl Petersen: Erindringer fra Polarlandene. København 1857, p. 29.
3 E. A. Inglefield: A summer search for Franklin. London 1853, p. 46 *et seq.*

Inglefield's discoveries were continued by the American Expedition under E. K. Kane. From the autumn of 1853 to late in May 1855, when the members of the expedition left their ship to try and reach Upernivik by boat, they had their fixed quarters in Rensselaer Harbour (78°37′ N. L., 71° W. L.), and as time went on came into close touch with the Polar Eskimos. A part of the expedition, including Carl Petersen and I. I. Hayes, which had made a futile attempt to reach Upernivik by boat in August 1854 and had been obliged to live for some time in a stone-hut on the coast between Booth Sound and Granville Bay, would certainly have perished from hunger, if the Polar Eskimos had not come to their assistance, and thus enabled them to get back to their ship in December[1].

Kane[2] was the first to give a detailed account of the Polar Eskimos. From his description we obtain a vivid picture of their poverty in wood and iron. The shafts of the harpoons were composed of several pieces of wood bound together. The sledge-runners were made of pieces of bone fitted and bound together. Pieces of barrel-hoops were used for knives. It appeared further, that the Polar Eskimos did not at that time hunt the herds of reindeer, which collected round about on the coastal hills, nor did they know anything of the bow and arrow. The salmon in the lakes and rivers were not fished and they were unacquainted with the usual Eskimo methods of fishing, with a three-pronged fork. Further, they did not use the kayak, concerning which Kane says, that it "exists among them only as a legendary word"[3].

Kane's interpreter, the Danish West Greenlander, Hans Hendrik[4], left the expedition during the return voyage and

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[1] Isaac I. Hayes: An Arctic Boat Journey. Boston 1860, p. 139 et seq.

[2] E. K. Kane: Arctic Explorations in the years 1853, 54, 55. Philadelphia 1856. Vols. I—II. Carl Petersen, l. c.

[3] l. c. Vol. II, pp. 208—210.

[4] Memoirs of Hans Hendrik, the arctic traveller, serving under Kane, Hayes, Hall and Nares, 1853—1876. Edited by George Stephens. London 1878.

joined the Polar Eskimos, among whom he married and remained until I. I. Hayes' expedition found him at Cape York on August 25th 1860 and took him onboard with his wife and child, to serve as interpreter. The winter of 1860—61 was passed by the expedition in Foulke Fjord at Etah and they thus came into close contact with the Polar Eskimos. Regarding these, Hayes like Kane narrates, that they did not hunt the reindeer, as the bow and arrow were unknown to them[1].

A few years after Hayes' stay among them, however, the Polar Eskimos must have learnt not only reindeer-hunting and the use of the bow and arrow, but also salmon fishing and the building of kayaks, as well as the methods of hunting from the kayaks; this learning they received from a tribe of immigrants from the American side of Smith Sound. About half a century later Knud Rasmussen[2] obtained the story of this immigration from two Polar Eskimos, namely, from Merkrusârk, who was born on the American side, and from Panigpak, whose father Itsukusuk was son of Kridlarssuark (i. e. the great Kridlak), who was leader of the immigrants.

These seem to have numbered in all ca. 14 persons; but after some years — Merkrusârk said 6 — the old Kridlarssuark had the desire to return to his own country and again left the Polar Eskimos along with his relatives, with exception of his own son Itsukusuk and his family. During the journey, however, most of the party succumbed to hunger; some of them committed cannibalism and only a few survived, to return 5 years later to the Polar Eskimos; amongst these was Merkrusârk.

For various reasons I am able to say, that this immigration took place in the beginning or the middle of the sixties. When C. F. Hall's expedition "Polaris" lay at Life-Boat Cove in the neighbourhood of Etah during the winter of 1872—73, Captain Budington happened to notice a tattooed woman and

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[1] Isaac I. Hayes: The Open Polar Sea. London 1867, p. 272.
[2] Knud Rasmussen: Nye Mennesker. København 1905, pp. 21—35.

learnt on further conversation, that she and her family belonged to a party of western Eskimos, who had come over Smith Sound "4 or 5 years before, and these were the only survivors. They had introduced the use of the bow and arrow"[1].

The husband of this woman was indeed Itsukusuk (pronounced Itukusuk), as Knud Rasmussen, using the Danish-West Greenland mode of writing, calls him — the American authors write the name E-took'-a-jeu — and her little son then was Panigpak (Pun'-e-pa).

The "4 or 5 years before", given as the time for the last immigration, must certainly not be taken literally. There are other inaccuracies also in Budington's information; thus, he states, that they passed over Smith Sound in a woman's boat and 5 kayaks, whereas Merkrusârk narrates, what is certainly correct, that they came over the frozen Strait, thus on dog-sledges, bringing their kayaks on these. Merkrusârk's report gives one the impression of being correct on the main points.

The narrative of the expedition shows, however, that the departure under the leadership of the old Kridlarssuark must have taken place before 1872, since Itsukusuk with his family alone remained. We may likewise conclude, that Merkrusârk and the few others, who were saved on the eventful return-journey, had not yet come back again to the Polar Eskimos. If we now calculate, that they could have returned at the earliest shortly after the departure of the "Polaris" Expedition from the Life-Boat Cove in June 1873, and make use of Merkrusârk's statement of the 5 years as given above, the departure on the return-journey to the American side must have occurred at the earliest in 1868 and at the latest on the spring-ice of 1872. The time for the first immigration must therefore lie between 1862 and 1866; but I believe that the first year mentioned is nearest the mark.

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[1] C. H. Davis: Narrative of the North Polar Expedition U. S. Ship "Polaris", Captain C. F. Hall commanding. Washington 1876, pp. 450—451.

I base this view chiefly on the interesting fact, that Mc Clintock's Franklin-Expedition obtained information regarding Kridlarssuark and his little tribe, whilst these were on their way from their home-country to the coasts of Smith Sound. After a fleeting connection with the Polar Eskimos at Cape York on June 26th 1858, Mc Clintock on his Franklin Search Expedition with the "Fox" sailed westwards and later southwards from Jones Sound along the east coast of North Devon; here, at Cape Horsburgh, the most easterly point of North Devon or more correctly of Philpots Island, he met Kridlarssuark on July 11th 1858.

Mc Clintock[1] is himself more brief in his report of this meeting than his interpreter, the above-mentioned Dane Carl Petersen[2], for which reason I keep mostly to the account of the latter, which agrees in all points with Mc Clintock's. Whilst the "Fox" was passing a good distance off the edge of the fixed ice, Mc Clintock heard some voices calling from the ice through the still weather, and shortly after caught sight of some figures. After anchoring to the fixed ice, 3 men, 3 women and 2 children came on board, whilst 4 persons remained behind on the shore. Carl Petersen then narrates that "they were all clothed in reindeer skin and quite resembled our Greenlanders, and their language had also a considerable resemblance to that of the latter Eskimos". Their coat was however somewhat longer than the Polar Eskimos'; the faces of the women were tattooed. They asked Mc Clintock to wait, as their sledges were on the way with narwhal and walrus teeth, which they wanted to sell. They had come from Ponds Inlet, where they had often been on board the English whaling-vessels. Two years previously they had come over Lancaster

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[1] Mc Clintock: A Narrative of the Discovery of the fate of Sir John Franklin. London 1857, pp. 143—144.

[2] Carl Petersen: Den sidste Franklin-Expedition. København 1860, pp. 92—93.

Sound on their dog-sledges, and they knew absolutely nothing of the land to the west or north. "The oldest man among them was very bald, which is a rarety, and was called Kre'tlak (Mc Clintock: Kal-lek)".

This Kre'tlak cannot be any other than Kridlarssuark, who has grown to be a great figure in the folk-lore of the Polar Eskimos. All doubt of his identity disappears when we learn what Panigpak told Knud Rasmussen regarding his great grandfather. "His hair was thin like the white men's. His large forehead was not covered by hair". A more certain proof of identity, when it shows an extremely rare characteristic among Eskimos, we could not desire.

When we think of the length of time such a journey would take under a constant struggle for existence, it seems very probable, that 6—7 years passed during which the little group of emigrating, Ponds Inlet Eskimos wandered along the east coasts of North Devon and Ellesmere Land, before they reached their distant, uncertain goal, the Northern Eskimos, of whom they had heard from the whalers. I believe myself fairly near the truth, in saying, that it was most probably the year 1862 or 1863. when the culture of the Polar Eskimos received the many new impulses from their immigrant kinsmen.

The English Expedition of 1875—76 under G. Nares did not touch the land-region of the Polar Eskimos on the voyage up to Floeberg Beach on the coast of the Polar Ocean itself; on the return voyage the ship of the Expedition entered Bardin Bay on September 12th 1876 and saw there an Eskimo land-settlement, but as the wind went round it was obliged to hasten out to sea, without coming into connection with the Eskimos, who were already streaming to the beach[1].

The American Expedition of 1881—1884 under A. W. Greely[2] has most interest in this conneetion, as it discovered Lake

[1] A. H. Markham: The Great Frozen Sea. London 1880, p. 359.
[2] A. W. Greely: Three years of arctic service. London 1886. Vols. I—II.

Hazen, which lies inland in the centre of the northernmost part of Ellesmere Land, in a district rich in musk-ox. At this lake, namely, the remains of Eskimos winter-houses were found, a most astonishing find, which showed, that an Eskimo tribe must have lived here in the extreme north; not only this, but also that they must have lived inland during the winter, whereas the rule is that the Eskimos must remain on the sea-coast, in order to obtain subsistence by seal-hunting on the ice. These important discoveries regarding the earlier places of settlement and lines of migration of the Eskimos over the most northerly Polar islands, especially on the west coast of Ellesmere Land and North Devon, were continued by the Norwegian Expedition of 1898—1902 under the leadership of O. Sverdrup.

In 1891 Robert Peary began his long series of expeditions and lengthy sojourns among the Polar Eskimos. In this way the culture of the Polar Eskimos was once again enriched, which has contributed undeniably to lighten their struggle for existence. Thus, in exchange for fox and bear skins they obtain weapons of the finest and best American manufacture, and Peary by his frequent expeditions could keep them fairly regularly provided with ammunition. They had never had much advantage out of the few weapons, they had previously been able to acquire in exchange from the whalers, as it was only very occasionally that they could procure powder and shot.

Peary's first expedition passed the winter of 1891—92 at Mc Cormick Bay and the second of 1893—95 at Bowdoin Bay, which lies a little more to the east on the north side of Inglefield Gulf. The expeditions of 1896 and 1897 were only summer voyages, to fetch the large blocks of iron, which Ross had heard about as occurring in the neighbourhood of Cape York. On his fifth expedition in 1898—1902 Peary began to make his way right up to the northern end of the Smith Sound Passage with his ship, and at the same time he began to follow the example of the American whalers in Hudson Bay, taking with him a number of Polar Eskimos on board the ship, in order to make use of their powers and cleverness in hunting and managing the sledges.

He employed the same procedure in 1905—06 and 1908—09. On the first of these expeditions ca. 70 Polar Eskimos or one-third of the whole tribe were taken on board. On the return-journey late in August 1906, 8 of the Eskimo families became discontented over a slight, compulsory reduction in the day's rations and left the ship in Lady Franklin Bay. These families passed the winter in the region by Lake Hazen west of the Robeson Channel. In the following spring, they journeyed over the sea-ice down to the Etah country, where Knud Rasmussen shortly after found them in the best of condition and health after the long journey, which owing to the lack of dogs had for a great part to be made on foot[1].

In August 1907 the American Whitney's hunting expedition, with Frederick A. Cook on board, came to the district about Smith Sound. Cook passed the winter in Anoatök north of Etah and started from there on his journey. His main interest for us here, however, is that he showed the Polar Eskimos the way to the musk-ox hunting grounds on the west coast of Ellesmere Land discovered by Sverdrup. In May 1909 he again left the Polar Eskimos and journeyed southwards over Melville Bay.

From April 1903 to late in January 1904 the Danish, so-called "Literary-Expedition" under L. Mylius-Erichsen, Grev Harald Moltke and Knud Rasmussen lived among the Polar Eskimos, for the most of the time on Saunders Island. In recognition of the support received by the Expedition from the natives, the Danish Government sent them valuable presents of guns, ammunition, tools etc., which were brought to the Polar Eskimos in the beginning of August 1905 by Captain H. Schouby,

[1] R. Peary: Nearest the Pole. London 1907, p. 253. — Knud Rasmussen: Berlingske Tidende, Nr. 181. København 1908.

on board the old ship of Mc Clintock, the "Fox", which is now a coast steamer in Greenland.

From April 1907 till the end of May 1908 Knud Rasmussen was again with the Polar Eskimos, living "as Eskimo among the Eskimos". In the summer of 1909 a Danish Missionary Society commissioned Knud Rasmussen and H. Schouby to found a permanent Mission Station at North Star Bay. The expedition on board the S/S "Godthaab" also called in at Cape York, both on its outward journey in July and on its return in August.

Some scientists who were sojourning in West Greenland at that time, namely, Chr. Refsaas, ethnologist in music, Th. Thomsen, Eskimo archæologist, and the author, also accompanied the Expedition on the "Godthaab". The main object of the first-named was to make a collection of the primitive melodies of the Eskimos, which might serve as a valuable supplement to the collections of folk-lore and ethnological materials, made by Knud Rasmussen among the Polar Eskimos. For the Danish National Museum, Th. Thomsen bought up a collection of clothing and implements, an account of which will probably be published by him. My own studies were directed more to the manners and customs of the Polar Eskimos, and the results of my observations are discussed in the following pages.

To supplement my own observations and for the purpose especially of giving a more complete picture of the life of the Polar Eskimos throughout the year, I have made use of the literature available, among which may be specially mentioned the works of R. Peary, L. Mylius Erichsen and Knud Rasmussen. From the last I have also received various items of information by word of mouth.

II.

The region of the Polar Eskimos, in its more restricted sense, is the west side of the broad peninsula, sometimes called Hayes Peninsula, which from North-West Greenland extends towards the west between the Kane Basin in the north and Melville Bay in the south. This western coast, which extends over about 3 degrees of latitude from Cape Olsen to Cape York and which is washed by the "north water" of the whalers as also by the 50 km. broad Smith Sound, is a characteristic transverse coast with deep and branching bays. The two main fjords are Wolstenholm Sound and Inglefield Gulf. Numerous glaciers project out from the inland ice, so that the narrow, ice-free foreland is split up into small parts.

The direction of this coast as a whole is from NW. to SE., whilst the opposite coast of Ellesmere Land has a direction from NE. to SW. Together the two coasts form the funnel-shaped outlet of the long, narrow passage, which connects the Polar Sea with Baffins Bay. With regard to the currents the conditions in Smith Sound are quite the same as in Bering Strait or in the northernmost part of the Atlantic between Greenland and Norway; a cold polar current carrying masses of ice goes southwards along the west side of the Sound, whilst a warmer aud ice-free current coming from the south tries to force its way in along the east side. This condition of the currents is directly connected with the revolving of the globe, which induces the deflection of the water-masses just as of the air-currents.

From Melville Bay and the east coast of North Devon towards the south and as far as a line from Cape Russell to Buchanan Bay towards the north, both coasts of Smith Sound Passage consists of primitive kinds of rocks, whilst the northern continuation from Kane Basin to Robeson Channel is bounded by coasts which are built up of formations chiefly originating from the Cambrian, Silurian and Trias periods.

In agreement with the American geologists, who distinguish between an older, Laurentian and a younger, Huronian group among the primitive rocks, the southern part mentioned may be said to consist of both groups. The older, harder, Laurentian gneiss and granite form the coast on the Greenland side from Melville Bay to Cape Atholl and from Foulke Fjord to Cape Russell, while they constitute the whole of the opposite coast of Ellesmere Land and North Devon with exception of a part ca. 40 km long immediately south of Cape Isabella.

The Laurentian coast is of a uniform height and shows few indentations, whilst the Huronic coast, which includes the small stretch at Cape Isabella as also the Greenland coast round Inglefield Gulf and Wolstenholm Sound, is more indented as well as more diversified and changeable as regards height and steepness. "A series of bedded rocks consisting of several thousand feet of sandstones, limestones and other sediments, occupies the coast and islands of the east side of Smith Sound, from Cape Atholl northward to Foulke Fjord. These bedded rocks are associated with dark coloured traps and diabase, which are present in the form of sills between the bedding; as dikes cutting the bedding rocks and as large intrusive masses."[1]

On the Huronic coast also, more frequently than on the Laurentian, we find a low beach which is specially suited to

[1] A. P. Low: Report on the Dominion Government Expedition to Hudson Bay and the Arctic Islands on Board the D. G. S. Neptune 1903—1904. Ottawa 1906, p. 207.

the building of the winter-houses of the Eskimos, as also for landing, both with the kayak in summer and with the dog-sledges from the sea-ice in winter. This is one of the reasons why the buildings of the Eskimos are mainly found at Inglefield Gulf and Wolstenholm Sound, and it is also one of the conditions which make the Greenland coast more inhabitable in contrast to the coast of Ellesmere Land.

A further advantage which the Greenland coast has in biogeographical regards may also be mentioned here, namely, that many of the high, in part precipitous, in part strongly sloping coast-hills between Cape York and Cape Alexander on Smith Sound are directed towards the south and south-west. This has the result amongst others, that these coasts are specially selected by the birds, and in summer we find this coast teeming with bird life. Chief among these are the Auk and the considerably smaller Little Auk (Mergulus alle L.); less numerous are the eider ducks, gulls, terns, fulmars and loons (Colymbus).

Auk grounds occur at some few places where the slope of the coast is steep; the largest and the one most frequented by the Eskimos lies on the south-west coast of Saunder's Island, and the Eskimo name for the island, "Agpat", is an indication of the quantities of auk there. A second auk ground, also called "Agpat", is found further to the south on the coast right opposite Conical Rock. The Little Auk occurs on the less steep coastal cliffs, where it breeds amongst the stones. The whole coast from Cape York Bay to Cape Atholl, the south coast of Northumberland Island as also the stretch of coast from the settlement Krâna on the north side of Inglefield Gulf westwards right round to Kane Basin, might also be considered a continuous row of Little Auk grounds. If we row along such a place on a summer's day the air is full of flocks of birds and noisy with the half chirping, half crackling sounds they make; the sea also is covered with thousands of the swimming black birds. It is only the sea-birds which are of economical importance to the Eskimos; the ptarmigan is only hunted and eaten in times of want; the raven, on the other hand, which also occurs here, plays the part of a mystic messenger in their tradition and folk-lore.

As a consequence of this bird-life, the soil on the southern slopes is naturally, owing to the good manuring, very fertile, and we thus find at these places a comparatively luxuriant vegetation, consisting mainly of grass. And when we find a specially abundant vegetation in these regions, we may be sure in most cases, that it has developed just at one of these bird-grounds with southerly exposure or round an old settlement where the soil has been manured by blubber and offal.

The vegetation leads to a considerable wealth of polar hares, and the reindeer also finds here a good part of its food in summer when it comes down from the inner hilly regions. Further, the presence of the birds and hares means a livelihood for a large number of foxes, especially of the blue arctic fox. It seems to be a rule, that most of the blue foxes are met with east of Smith Sound, whilst the white fox is more common on Ellesmere Land. It is quite possible, that this stands in connection with the difference in the food conditions, the Greenland side having large quantities of birds, whereas on Ellesmere Land the principal food of the fox is of quite a different kind. Naturally the hares, reindeer and foxes are not exclusively restricted to the districts frequented by the birds, but occur everywhere on the narrow strips of ice-free land between the coast and the inland ice; they may even penetrate in on the Nunataks. A specially rich district for the packs of reindeer is the inner parts round Olriks Fjord, where the most extensive stretches of lichen vegetation are found.

These connected conditions have the result, that the coast mentioned has a better vegetation and a richer animal-life than any other place in the same latitudes on the globe. This also leads to better conditions for human life and also helps to explain why it is that human beings have here pushed farthest up towards the pole.

The chief conditions for Eskimo life have to be sought, however, not on land but on the sea, and they concern the marine mammals and the ice. The large whales, which still visit the "North Water" now and then, though in earlier days they must have been present in much greater numbers, have never been of any great importance for the Polar Eskimos. The latter have seized upon the carcases driven on land and revelled in the rich quantities of flesh and blubber, but they have never known how to carry on the systematic hunting of the large animals. The narwhal and the white whale are common and are hunted from the ice and from kayaks; but both of these important animals go down in winter to more southerly latitudes. The chief source of food for the Eskimos is however the walrus, which is met with the whole year round. In the summer time it can be seen lying in the sun on the ice-floes right inside the fjords and at the islands; in the autumn when the fjords are frozen it is met with outside the ice-margin, and through the winter it keeps in the always partially open water in the middle of the North Water due south of Smith Sound and Cape Alexander.

The commonest of the seals is however the fjord seal (Phoca foetida, esk. netchik), which occurs throughout the whole year. Phoca barbata (esk. ugsuk) is also found here but in much smaller numbers. It is the first-named, the fjord seal, which comes into the fjords in winter under the even winter-ice and gives rise to the important "Maupok" hunting at the breathing holes, which this seal constantly makes in the ice. As the Polar Eskimos also hunt the walrus from the ice-margin in the winter, the Maupok hunting is however not of such importance here as is the case amongst some of the arctic Eskimo tribes on the coast of the American continent, e. g. the Netchillick Eskimos on the Boothia Isthmus, the Ugjulik Eskimos on King Williams Land and the tribes on Coronation Gulf.

All hunting on the ice requires however an even surface of ice, so that dog-sledges can be used. Irregular pack-ice frozen in summer, such as is met with along the Ellesmere coast and up through the narrow waters north of Smith Sound, is a hindrance to hunting and sledging, and prevents any permanent settlement of the Eskimos.

The first to point out the vital importance of the winter ice, formed in the course of the winter, for the Eskimo culture was the celebrated American ethnographer Franz Boas of New York[1]. He demonstrated, that it is the nature of the ice which determines the distribution of the Eskimos throughout the greater part of the year, and he showed how the extension of the winter ice depends chiefly on the configuration of the coast, as also on the currents and tides, since a strong current can prevent the formation of fixed ice. This is the case for example, as already mentioned, in the middle of the North Water, where the current flows out and in through Smith Sound.

It is only inside the islands lying in the mouths of the two large indentations that an even winter ice is formed, which has the chance to lie unbroken throughout the greater part of the year. As a rule this is formed in October and lies to the beginning of July, in other words ca. 9 months in the year. In 1903 Knud Rasmussen journeyed with dog-sledges from the east side of Saunders Island to the mainland even so late as July 17th.

If it should happen any autumn that the seas is unusually late in becoming frozen over, the hunting suffers, and

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[1] Franz Boas: The Central Eskimo. 6th Annual Report of the Bureau of Ethnology. Washington 1888, p. 417.

famine may ensue. Here and there the even surface of the winter ice may be broken by an iceberg or an ice-pack which is firmly fixed in the ice and surrounded by a snow-drive. It happens frequently also that the changing wind may carry a swimming ice-block forwards and backwards and thus a stretch of open water is maintained, from the margins of which the Eskimos can carry on their hunting.

Along the coasts a fixed ice-base is formed which is frozen solidly to the land; its surface corresponds with the high-water mark. Outside this ice-base the ice rises and falls with high and low water, and the boundary is formed by a break and sometimes also by washed-up ice-masses. Just above the ice-base, on the fixed land, where the coast is low and has a supply of stones for building material, the Eskimos set up their winter-houses with the low passage and skin windows towards the sea. It sometimes happens that this ice-base remains throughout the summer; thus Kane found an ice-base several years old which was 10 m thick and 40 m broad in Smith Sound[1].

Several things would indicate that the lands round Smith Sound are subject to a regular and slow sinking, in contrast to the rising which is believed to have been noticed along the north coast of North America from Coronation Gulf westwards[2]. This sinking was already noticed by Kane and was strongly maintained later by Peary. As evidence of the sinking Astrup states, that he has seen remains of houses now under the surface of the water on the south-western side of Saunders Island[3]. Knud Rasmussen narrates that it is the Eskimos' own view that the land has sunk and that the sea is spreading. At the settle-

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[1] cited from G. Hartmann: Der Einfluss des Treibeisses auf die Bodengestalt des Polargebiets. Leipzig 1891.

[2] H. H. Howorth: Recent Elevations of the Earth's Surface in the Northern Circumpolar Region. Journ. Roy. Geog. Soc. Vol. XLIII. London 1873.

[3] E. Astrup: Blandt Nordpolens Naboer. Christiania 1895, p. 318. R. Peary: Northward over the Great Ice. Vol. II, p. 173.

ment Umanark on the south side of Wolstenholm Sound, I have myself seen how the sea is eating away the low, grass-covered coastal land; houses can be seen there which have been dwelt in within the memory of those now living, but there foundations have now been half carried away by the waves. Whether the ground has sunk before the foundations were carried away, I cannot definitely determine, though it seems most probable.

It is not my intention to give here a complete description of the geology of the region dealt with, its climate, animal and plant life. I need only mention the conditions which are of importante for the Eskimo culture, that is, of anthropogeographical interest. Most of these conditions have already been mentioned and only a few additional remarks need be made.

In earlier times the Polar Eskimos obtained materials from the ground for their stone-knives and stone-axes and even on Peary's and Astrup's first visit these had not quite disappeared. Slate has at any rate been used for such women's knives (Ulo), which were employed for scraping the blubber on the inner side of seal-skin. As mentioned earlier, Ross narrates that when he met the Polar Eskimos at Cape York in 1818, he found in their possession rude knives and harpoon points with cutting edges of meteoric iron. So far as he conld understand from the explanations of the Eskimos, this iron came from an "iron-mountain" on Melville Bay, north of Bushnan Island. The place was found in the spring of 1894 by Peary by the help of an Eskimo, who knew both the place where it occurred and also the use of this natural iron, which is really of meteoric origin in contrast to the Disko iron, which was originally deposited in the basalt. Peary thus describes how the Eskimo found the place: "Kicking aside the snow, he exposed more pieces, saying this was a pile of the stones used in pounding fragments from the "iron-mountain". He then indicated a spot four or five feet distant as the location of the long-sought object". The large block of iron was cleared of snow and the Eskimo told Peary, "that the Innuits call the meteorite a woman in a sitting position, and he says it used to be much larger and higher than it is now, but that his people have gradually worn it down, and that years ago natives from Peterahwik (on the coast north of Inglefield Gulf) broke off the head and carried it away. He also voluntarily told how the ancient knives of his people used to be made, namely, by inserting small flattened pieces of the metal in a bone or ivory back, and then with a piece of trap lying near, showed me how the flakes of iron were detached". In 1895 Peary procured a woman's knive, which was found in an old winter house at Netschilivik, as also a man's knive from the old settlement Kangerdlugsuark (Kangerdlooksoah), far in on the south side of Inglefield Gulf, and both instruments were provided with an edge of the natural iron[1]. This use of the natural iron can scarcely have arisen at the place itself, but is certainly due to some influence from outside. Possibly it came from the more southerly west coast of Greenland over Melville Bay, or it may have been learnt from the use which the Central Eskimos on the North American continent make of the natural copper occurring on the islands and coasts at Coronation Gulf. The question cannot be further discussed here; for its solution we require typological studies on archaeological material which is still wanting.

Of minerals which are of cultural importance for the Polar Eskimos we also find sulphur pyrites, used for making fire, and soapstone, from which lamps and cooking utensils are made. The principal locality for sulphur pyrites is the so-called "Ignerite" hill (fire-stone hill) at Fitz Clarence Rock in Booth Sound. One of the principal soapstone quarries lies on the coast some kilometers west of the Petowik Glacier.

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[1] R. Peary: Norhward etc. Vol. II, pp. 145—147, 612—614 (fig. of the two knives).

The lack of trees has been of vital importance for human life on Smith Sound, and in earlier times this lack was even one of the main reasons why they could not build boats. The conditions are different here from those in South Greenland, from Egedesminde and southwards, where the coast received plenty of drift-wood. Extremely little of this occurs so far to the north, even though small quantities certainly drift in fairly regularly. Hall[1] found a piece of drift-wood which was about 1 m long as far north as Kennedy Channel, and another somewhat shorter piece; and Greely[2] gives a list of the drift-wood collected on his expedition, consisting almost entirely of willow, pine and cedar.

Attention has only been paid hitherto to the more restricted region of the Polar Eskimos from Cape York to Smith Sound; this is the district where they have their fixed winter dwellings and where they pass all the dark periods, as well as the times of leisure and scarcity of food. The place is well-marked off from nature's side. Smith Sound is a little over 50 km broad at its narrowest part and in the winter is covered by a solid layer of ice; according to the Eskimos it can be crossed at this time not only by the polar bears, foxes, reindeer and hares, but also by the musk-ox and the polar wolves. In spite of this, the two last-mentioned animals do not occur at Inglefield Gulf and Wolstenholm Sound. The musk-ox is said never to have been seen south of Cape Alexander; but the Polar Eskimos have been from early times accustomed to cross over Smith Sound and hunt them on the east coast of Ellesmere Land about Bache Peninsula. A few polar wolves are sometimes met with at intervals of some years, probably roving animals which have lost their way south of Cape Alexander.

The different occurrence of the two kinds of foxes on the

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[1] E. Bessels: Die amerikanische Nordpol-Expedition. Leipzig 1879, p. 296.

[2] A. W. Greely: Report on the Proceedings of the U. S. Expedition to Lady Bay, Grinnell Land. Washington 1888. Vol. 1, pp. 313 and 534.

two sides of the Sound has already been mentioned. And it is also peculiar that the races of reindeer differ in an almost exactly parallel manner. On the east side we find the common Greenland reindeer, which is closely related in all its structure and appearance to the caribou of the North American Barren Ground. On Ellesmere Land, on the other hand, we find a smaller race (*Rangifer pearyi* Allen), which is also said to differ in colour, form of the horns and anatomical features[1].

The polar bear has quite a special importance for the Polar Eskimos. It is their most dangerous enemy while hunting and it has been in great degree their trainer in hardihood and ingenuity. Further, there is no Eskimo tribe which requires and uses the skin of the bear for clothing to such an extent, as the Polar Eskimo's district falls within the region of distribution of the polar bear; but it only occurs in small numbers at the fjords. It is most abundant, on the other hand, up in the Kane Basin at the Humboldt Glacier, as also in Melville Bay off its many ice-streams, and the Polar Eskimos sometimes sledge up to these localities to hunt for the bear and provide themselves with its indispensable skin.

The areas visited by the Eskimos thus extend from the Humboldt Glacier right down into Melville Bay. Sometimes they have come so far down that the West Greenland bear hunters have found the traces of their sledges; but, at any rate during the period of the Danish colonisation in the district of Upernivik, there was no connection with the more southern Greenlanders before 1904. According to Knud Rasmussen the Polar Eskimos tell of a bloody conflict they have had with the latter, after which they no longer ventured to go so far to the south. And there is scarcely any doubt that there has been an occasional connection once upon a time, which for some reason was broken off some generations ago, perhaps in the

[1] Bull. Amer. Mus. Nat. Hist. Vol. XVI. New York 1902, p. 409; and Vol. XXIV, New York 1908, p. 487.

first half of the 18^{th} century. R. Stein[1], who made a special investigation of the extent of the original geographical knowledge of the tribe, came to the result, that it extended so far to the south as even to include Upernivik, whereas to the north it only went a little beyond the more restricted home-district of the race (a little beyond 79° N. L.).

It is, in fact, an enormous extent of land and sea which this handful of people, counting little more than 200 individuals, must toil over in order to procure for themselves what is necessary for the maintenance and security of life. It is a tract of 6—800 km. Towards the land its extension is of course limited by the inland ice, which for the Eskimo is surrounded by superstitious dread and mystery. Journeys over the glaciers are however by no means unknown. It happens, that open water off a projecting promontory must be avoided by driving over the glacier-covered land with the dog-sledges. And two sledge-routes pass over the marginal zone of the inland ice in going to the principal reindeer district in Olriks Fjord. The one goes from the settlement at Netschilivik up towards the most northerly of the glaciers, which open on to Barden Bay, and further in an easterly direction on the inland ice. The other leads from North Star Bay up the valley, which is the eastern continuation of the bay in towards the land, and up on the inland ice; thereafter the route bends in a northerly direction and leads towards the inner part of Olriks Fjord. Both of these glacier-routes are used in the autumn, before the long, river-like Olriks Fjord with its strong current is frozen over, and even before the ice-free foreland is suitable for sledging, so that the baggage must be carried up to the margin of the glacier.

All the wanderings and journeys of the Eskimos are made by sledge, as the period of open water is so short; and it is

[1] R. Stein: Geographische Nomenclatur bei den Eskimos des Smith-Sundes. Petermanns Mitteilungen 1902.

only within recent years that they have begun to construct skin-boats, and even then only kayaks, not the larger women's boats or umiaks. A group of islands like the Carey Islands seems never or seldom visited by the Eskimos either by sledge or by boat, though the islands can be seen from the coast of the mainland.

On Ellesmere Land the Polar Eskimos had earlier never passed over the relatively narrow tract of land which extends between the indentations on the east coast to Bay Fjord on the west side of Ellesmere Land. Along the east coast they have not gone very far north or south of the indentations on Bache Peninsula. Nowadays, however, this has been altered as the result of the influence of expeditions and the information gained therefrom, and some Polars Eskimos have already on their own initiative extended their horizon as far as Jones Sound and the west side of Ellesmere Land.

III.

The state of culture of a tribe can express its primitiveness and lack of development mainly in two ways. There is in the first place the division of labour; the more undeveloped, the less the division. Every individual of a tribe in the state of low culture does the same kind of work as every other. The most primitive condition of all is, that the individual seeks his food alone for himself without cooperation with others and without giving others help; it is the individualistic mode of life, which however one scarcely finds realised in all its purity in any single case. The second direction in which primitiveness can display itself in a decisive manner is in the lack of special apparatus and the lack of acquired, skilled methods in obtaining a livelihood.

The expression "collectors" has been employed to denote those tribes, which stand in the lowest stage of development both as regards the individualism as also in the other direction mentioned. At the present day true "collectors" hardly exist, as the industrial culture of all known tribes is based on special acquirements or trained methods in using special apparatus. This applies especially to the male sex, whereas the direct participation of the female sex in obtaining the means of sustenance consists as a rule merely in the collecting of everything possible that might be eatable, as fruits, roots, eggs, larvae etc., thus, things which can all be obtained without the use of other apparatus than a pointed stick for digging up roots. We might say, therefore, that among the hunting peoples the woman still remains at the "collector" stage, whilst the man has developed a special and higher form of culture.

Amongst the hunting peoples we may therefore with a certain amount of right distinguish between two modes of livelihood, namely, hunting, which is pursued by the men with special weapons manipulated in a special, trained manner with sport-like character, and secondly collecting, which is carried on by women, children and old people or all those who do not possess the strength or skill to take part in the hunting. In the culture stage of the pure hunters, therefore, hunting and collecting correspond partly to man's and woman's work; it is on this basis at any rate, for a very great part, that the often sharp division between the work of man and woman as also between their customs has been founded.

It is self-evident, that it would be wrong in a scientific consideration of cultures to distinguish fishing from hunting as a special or separate mode of livelihood. Fishing has to be regarded as "hunting", if it requires special apparatus in conjunction with special methods of capture or great strength, and in these cases it belongs to the activity of the men. On the other hand, it is merely "collecting", when a wealth of fish is so easily obtainable that women and children can help in its capture.

Applying now these considerations to the culture of the Polar Eskimos, we find that this, like that of the remaining Eskimos, stands no higher in the direction of division of labour in the making of their living that most of the other hunting cultures throughout the world. Every man must be a hunter, even the priests or angakoks, and there are no special leaders or organisers in the tribe. On the other hand, their industrial culture stands even very high as regards its wealth of apparatus for various uses and as regards the acquired skill and sportman's craft and daring with which they are used, even though the apparatus is only for the use of one person, not of many together, i. e. individualism is predominant.

We can readily see that the Polar Eskimos have raised themselves high above the level of the "collectors". Further, we also find that the sport-like hunting plays a more prominent part than the simple collection of the means of life; the natural conditions indeed do not give much opportunity for the latter. Berried fruits and eatable insects hardly occur and the beach is practically bare of edible shell-fish. Nevertheless this essentially woman's mode of livelihood does occur. It appears typically in the case of the few, fresh plant-materials which may be eaten, namely, some sweet-tasting flower-buds and some sourish leaves, which are eaten either raw or after boiling with a little water, and it is as a rule the women and children who enjoy this kind of food. To balance matters the men are able to obtain another kind of plant-food, as they eat the contents found in the stomachs of reindeer; this is a very favourite food and as only the men have access to the reindeer meat stored in the depots, it is specially a man's dish. Again, the women take part in the catching of the Little Auk, which takes place on the readily accessible, sloping cliffs by means of a large net attached to a 2—3 meter long pole, the hunter lying down among the stones and stretching up the net to catch the birds as they sweep in thousands over his head. On the other hand, the hunting of the Great Auk and the collecting of its eggs on the steep sides of the cliffs, where the hunter is let down from above by a rope, is purely man's work. Similarly it is for the man to fetch the eggs of the eider duck from some small islands, e. g. from Dalrymple Rock. In connection with these conditions we can also note a tendency on the man's part to make the eggs his own particular property and to forbid the women touching this delicacy, which is enjoyed even though the development of the embryo is far advanced[1].

[1] cf. Josephine Diebitsch-Peary: My Arctic Journal. London 1894, pp. 163—164.

The Polar Eskimos as well as the Eskimos in general are distinctly nature people, in the sense that their direct dependence on and adaptation to the natural conditions under which they live, is distinctly apparent everywhere in the life of the tribe. The varied hunting equipment and the highly developed cleverness in hunting, however, place the Eskimos not among the lowest but among the most developed hunting peoples the world knows. If we divide the hunters into the two cultural categories, lower and higher, we often find the Eskimos placed in the lower class along with the bushmen, the dwarf negroes, the Australian negroes and the Botocudos; but this is by no means right. The Eskimos' culture-apparatus for the maintenance and security of life is even specially well-developed and entitles us to place them among the higher hunter peoples.

The Polar Eskimos belong to the group of Eskimos for whom the summer and the winter bring very distinctly different modes of livelihood, corresponding to the great changes in the natural conditions. In winter the surface of the water is solid ice and snow, in summer it is over the greater part a rolling sea. We might indeed speak of a summer culture and a winter culture. The summer culture is characterized by the kayak, the kayak hunting and the summer tent, whilst the winter culture is characterized by the dog-sledge, hunting on the ice and the winter-house.

For the Polar Eskimos the summer activity is of very brief duration, that of the winter long. As we go southwards along the west coast of Greenland, the summer mode of life becomes more prolonged and the winter mode more restricted. When we come right down to South Greenland, south of the Polar Circle, the dog-sledges and the hunting on the ice quite disappear and during the whole year the product of the hunting must be sought for in kayaks on the open sea. Quite a parallel transition is met with along the west coast of Alaska, where the Point Barrow Eskimos mainly pursue the ice-hunting, whilst down towards the Aleutians the sea is open the whole year round and we find a very higly developed kayak-hunting, just as in South Greenland. There can be no doubt that the many points of agreement between the Eskimo culture in South Greenland and that in South Alaska have arisen from this adaptation to the same kind of natural conditions. At both these places the Eskimo culture has become subarctic, whilst in the intermediate, more northerly regions from Point Barrow to Baffin Bay it assumes more distinctly arctic forms[1]. The Polar Eskimos are thus preeminently arctic people, but in cultural regards not appreciably more so than the continental Eskimo tribes from Coronation Gulf to Melville Peninsula.

In addition to the division of the year into a period of 3 months with open water and another of 9 months with ice and sledging, we find here also, owing to the situation so far north of the Polar Circle, a dark period and a light period with two intermediate periods when the sun comes up and goes down. The dark period or the true winter time lasts from about the 1st of November to the 11th of February, or ca. 102 days, in the regions about Cape York or more correctly 76° N. L. Then comes a kind of spring-time with day and night, which lasts till about the 29th of April, after which the sun no longer goes down until the 15th of August, i. e. for about 109 days. Then follows the autumn period from the middle of August to the beginning of November. The further north we go the more do the real dark and light periods increase in duration at the expense of the intermediate, arctic spring and autumn; in Inglefield Gulf, for example, these periods are each fully ten days longer than at Cape York.

These four polar seasons, which are each approximately one-fourth of the year, determine the yearly changes in the Eskimo life and the yearly hunting journeys, but the part they

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[1] cf. H. P. Steensby: Om Eskimokulturens Oprindelse. København 1905, pp. 12 and 142 *et seq.*

play is more indirect, in affecting the occurrence of the animals hunted.

The winter-houses, which stand empty through the summer and are almost always partially unroofed, are made ready in the course of September for dwelling in and begin to be used as a rule in the latter half of September, after which — excluding journeys — they are dwelt in until May. In setting the house in order both men and women must take part. A family has however no right of possession to a house, longer than they are just resident there, unless it is expressly stated to the other members of the tribe, that they will occupy the same house next winter. Otherwise it can be taken by any one that likes. The fact is, indeed, that the winter is not passed at the same place each year. The family, which one winter has lived at Cape York is perhaps met with next winter at one of the most northern settlements of the tribe. Quite new winter houses are however only built exceptionally, as it is more convenient to repair one already existing, and such deserted dwellings are to be found at various localities along the whole coast right from Bushnan Island to near the Humboldt Glacier.

The most southerly houses which are used during the winter lie on the east side of Cape York (75°51′ N. L.) between the point of the promontory and the nearest glacier. A number of winter-houses are collected here, built into the sloping incline at the foot of the high, steep cliffs; the place is called Ivnaganerk by the Eskimos. The northernmost place used has long been Etah or Ita, which lies at Port Foulke at 78°15′ N. L. At the time of Kane's expedition and again within recent times they have gone right round to Kane Basin to Anoatok or Anoritork, which has become known through being the starting-point for Fr. A. Cook's expedition.

The other places most used between these two outermost points are as follows, beginning from the north: Nerkré or as the English and American authors (especially Peary) write it, as a rule, Nerkey, which lies west of Robertson Bay; further, Krâna (Engl. Karnah), which is situated on the north side of Inglefield Gulf between Mc Cormick Bay and Bowdoin Bay; Narsark (Engl. Narksami), which lies on the south side of Inglefield Gulf a little to the east of the mouth of Olriks Fjord and which owing to its position is like a centre for the dwellers on the Gulf; Itivdlerk (Engl. Ittiblu) on the south side of the mouth of Olriks Fjord; Netschilivik (Engl. Netchiolumy) on Barden Bay; Kiatark (Engl. Keaté or Kieti) on the south coast of Northumberland Island; Umanark (Engl. North Omenak or Oomunui), which receives its name from a neighbouring, table-shaped mountain on the north side of North Star Bay and has a similar importance for Wolstenholm Sound as Narsark for Inglefield Gulf; Agpat (Engl. Akpan) on the south-west side of Saunders Island; as also the small settlement Igfissork (Engl. Ipsuischo, Ipsueshow), which lies on the small Parker Snow Bay about halfway between Cape Atholl and Cape York. It was at Umanark that the new Danish Mission Station was set up in 1909.

The snow-houses are not actually used at any definite period of the year, but only as lodges whilst hunting or on journeys during the winter. These snow-houses, which require suitable, hard, frozen snow, are built by the Eskimos in the course of a very short time, the men with their long snow-knives cutting blocks of snow from the drifts and placing them in a spiral-line above one another, until the whole becomes an arched dome. Towards May, when the snow is less suited for building purposes and the summer tent is already in order, a combination of snow-house and tent is set up on the journeys, a low snow-wall being first built and the tent in a folded condition is then laid on the top to serve as roof. Sometimes also, a mere wall is built for shelter or even this is quite omitted and the Eskimos simply lie down and sleep on the snow. Further, natural caves or overarching shelters in the cliffs, several of which occur along the coast, are used both on the sledge and kayak journeys, when the night has to be

Fig. 1.
A snow-house seen from the side (drawn by the Eskimo woman Alakrasina). Note how the rows lie obliquely, being arranged in a spiral which ends at the top, where the smoke-hole is. On the right of the house-passage stand two individuals, one of which is a woman with a child in the "amaut".

passed in the open or shelter sought for owing to bad weather. A well-known cave, where some of the expeditions have sought shelter on their journeys by sledge or boat, lies just to the north of the Petowik Glacier about halfway between the settlements in Wolstenholm Sound and at Cape York[1]. During the autumn hunting out in Olriks Fjord, when the Eskimos have come down with their sledges over the inland ice, a shelter is built of stones and outstretched skins in which the women and children can live, while the men are out for days on the hunting grounds[2]. Much sought after also, whilst on journeys or hunting, are the ruins of winter-houses.

Fig. 2.
Diagram of the interior of a snow-house (drawn by the same person). A blubber-lamp is represented as standing on each of the side-platforms inside the house.

This collection of winter and summer dwellings, hunting lodges and improvised shelters on journeys, which the Eskimos know how to construct, already shows to what a high degree and in what a practical manner they adapt themselves to the prevailing conditions.

[1] Peary: Northward etc. Vol. II, p. 139.
[2] Knud Rasmussen: Nye Mennesker. København 1905, p. 90.

This appears just as clearly also in their methods of hunting and journeying at the different seasons of the year. It is only possible naturally to sketch and describe the main features of these, as there can be some differences from the ordinary routine depending both on geographical conditions as well as on personal conditions and pleasure.

The Eskimos are most bound to a definite spot during the summer or more correctly in the months of July, August and September, as they have open water then and their complete lack of large boats for journeys (umiaks) prevents moving. The earlier mentioned, American Eskimos, who immigrated to these parts in the sixties, certainly knew the travelling or women's boat, and they seem also exceptionally to have used it. Thus Knud Rasmussen[1] narrates that the Polar Eskimos tell of a group of men, who were isolated during a bad hunting period on Cape Melville in Melville Bay, and that, when the summer came, they made a women's boat from their tent-skins and rowed away to better hunting places. However this report may be judged from a purely historical standpoint, it bears witness that the Eskimos have not been wholly unacquainted with the idea of large skin-boats. At the present time, when the Eskimos have had access to wood for some years, it is probably and mostly for practical reasons that they do not build such boats. A umiak, namely, cannot be taken on the sledge, so that in order to have any advantage from it, a family must end its ice and winter life exactly at the same place where, 9 months previously when the sea became frozen over, it began; such a women's boat is however not so useful during the short summer life, that the Polar Eskimos would willingly bind themselves in such a way. We find therefore that the few boats, which the Eskimos have in the course of time come into possession of from expeditions, have been permitted to lie without being put to any appreciable use for the tribe.

[1] l. c., p. 28.

In the old days, before kayaks were obtained, the summer had to be passed on one of the grounds frequented by birds, where life could be maintained at any rate until the ice-hunting began again. The Eskimos are not now so firmly bound to such localities; what they now seek for are the places where the sea-mammals occur and where at the same time the sea is calm in the shelter behind land and ice-fields. These conditions are found inside in Cape York Bay, as also inside the groups of islands at the mouths of Wolstenholm Sound and Inglefield Gulf. At Cape York the white whale (Beluga), narwhal and seals (bearded seal and fjord seal) are almost the only forms in the summer hunting, whilst at the two other places as also at a third place right up at Etah, the walrus is also present, as it has its summer haunts there at a certain depth of water, where it lives upon the shell-fish of the bottom.

It is not the case here as in South Greenland, that the settlements at the open sea are placed on the outer side of the fringe of islands, where the open water is always near and where the hunter can approach nearer the seals when the water is rough than when it is smooth. Nor is the kayak of the Polar Eskimos like the light, elegant boat of the South Greenlander; it is clumsy, heavy and open, the hunter sitting in an open space, whereas in South Greenland he becomes one with his boat by means of a closely fitting fur-skin. The kayak, which has become the main apparatus of the subarctic Eskimos, is of quite subordinate importance among the Polar Eskimos, whose main apparatus is the dog-sledge.

The places now preferred by the Polar Eskimos for the months of July, August and September are in the main the same as the winter dwelling-places at Cape York and Etah and those which lie in the mouths of the two large indentations. Some of the principal conditions for a summer settlement are in fact the same as the conditions for setting up their winter dwellings. In both cases they require calm and sheltered water — in the one case for their kayaks, in the other for the even surface of ice. Lastly, the conditions for landing from the water with the kayak and from the ice with the dog-sledge are very much the same, as they both require an even, sloping beach.

The summer hunting from the kayak however is on the whole not so very important. When the spoil has been killed, it is towed on land, where the sealer himself skins it and places it in the depot, when it is not at once divided up on the spot for distribution at the settlement or among the participators in the hunt and towing. The distribution takes place according to fixed rules. The first harpooner or the one who first struck the animal has the first right to take certain, specially good pieces; then come the second and third harpooners and then the others taking part. The animal on being cut up is divided into definite portions, the principal of which, according to a drawing of a walrus accompanied by an explanation which I received from Napsanguark, are the two breast-pieces, the lateral halves of the back, the neck, head, the front flippers, the two lateral halves of the body, the hind limbs, the two rib-pieces, the two stomach-pieces, the two lumbar portions, the tail with its root and the liver. The Eskimos have an excellent knowledge of the anatomy of the animals and divide up a walrus with surprising skill and speed.

That it is the man among the Polar Eskimos who skins the animals, whereas this is distinctly woman's work among all the other Greenland Eskimos, finds its simple explanation in this, that the usual spoils for the Polar Eskimos are much larger animals, which cannot be brought home whole to the settlement with the kayak or on the sledge, as is the case with the smaller seals in South Greenland. This appears very distinctly when we consider the Polar Eskimos' ice-hunting of the walrus, as will be described below.

Towards autumn, when the reindeer are fat and come together in herds on the lichen-covered plateaus at Olriks Fjord, a number of families move up there along the routes already mentioned. Whilst the men are hunting the deer, the women and children catch salmon in some few (certainly only 2 or 3) lakes which occur there. These lakes are already covered by ice and the fishing is therefore carried on through holes in the ice by means of an ice-fork. This is one of the instruments which the American immigrants at that time taught the Polar Eskimos. The above mentioned old man, Merkrusârk, who himself belonged to the immigrants, gave Mylius Erichsen[1] the following account of their methods of salmon fishing. "On a strong line we fix small pieces of narwhal's teeth or walrus' teeth, then drop it into the water and pull it up and down until we catch the salmon, which we land with a two-pronged fork". The method is well-known at several other Eskimo localities. The fish is eaten either boiled or frozen and is kept in the frozen condition through the winter.

After satisfying its lust for hunting and its desire for reindeer flesh and fish, and after storing the excess of food-stuff in the depots, from which they are only fetched when the dark period is over, the family journeys back again to the coast, where the even winter-ice has already as a rule begun to form. Apart from variations in the time for the appearance of the ice-cover, the sledging on the fjord-ice generally begins in October. The intermediate periods between open water and solid ice, which may last a long time during storms, are actually barren periods, when the hunter is compelled to lead an idle life in the winter-houses until the ice becomes solid; often they are periods of famine when the depots are reduced.

Then begins the real arctic form of life with hunting on the ice as the main activity. The walrus, white whale and narwhal go out to the ice-free waters and the hunters at the

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[1] l. c., pp. 307—308.

different settlements are accustomed, in the autumn or by moonlight, to go out on sledges to the margin of the ice at the groups of islands in the mouths of the fjords and hunt the walrus on the newly formed ice. Inside the fjords there are only the fjord-seals. These are first hunted when the winter has set in, one of two methods being employed according as the ice is smooth and bare or covered by a layer of snow.

When the ice is smooth, the hunting is carried on in the manner known already from Umanaks Fjord in West Greenland, as described by Rink[1]. In this method the hunter covers his feet with hairy skin and can thus walk noiselessly on the smooth ice, which he cannot do on a rough or snow-covered surface that crackles as he goes along. If the hunter possesses acute hearing, which can distinguish the sound and direction of the breathing seal, and a sharp eye to detect the breathing hole in the ice, he can silently run up and strike the harpoon into the seal, just at the moment when it has sunk its head and is about to leave the hole. In striking at this moment he manages to do so in the neck or in the soft parts behind the head, and not in the harder, more resisting part of the latter, so that the harpoon penetrates deep and remains fast; the seal is thus attached to the line which the hunter holds fast. After some time the seal must come up again to breathe, but is met by the lance and is in the end hauled up on the ice; during the struggle the hole must as a rule be made somewhat larger. This smooth-ice hunting can give a considerable yield in the beginning of winter, especially when a large number of hunters take part so that a watch can be set at all the breathing-holes over a large area. Peary[2] describes it in the first days of November 1894. "The natives are making the most of the new ice in the Sound (i. e. the waters between

[1] H. Rink: Grönland, geografisk og statistisk beskrevet. København 1852—57, Vol. I.

[2] Northward etc., Vol. II, pp. 402—403; cf. Knud Rasmussen, l. c., p. 242.

Herbert Island and the mainland) before snow comes to cover it and bring the harvest to an end. Every man and boy that can raise a "pussymut" (seal-spear) is living on the ice night and day, clad in his heaviest furs, his feet muffled with noiseless bearskin pads, and with his little three-legged stool, on which at a pinch he sits for hours, waiting for the unsuspecting seal to come to its breathing-hole, and receive the murderous spear-thrust. In the afternoon Panikpak returns and tells me he has killed sixteen seals off the Castle Cliffs, and Koolootingwah an equal number. Over a hundred seals had already been killed by the natives of Karnah and Koinisuni, and if the snow holds off a few days longer, it is likely that, in addition to their store of walrus and narwhal meat, there will be two seals apiece for each man, woman and child at these settlements."

In general the stool mentioned is not used during the smooth-ice hunting; but it is most probable that in Peary's case every single breathing-hole has been watched over by a hunter; otherwise the stool is used when the ice is covered by snow, in the true "Maupok" or "waiting" method. This is carried on over snow-covered ice, when the hunter dare not move from fear of disturbing the seal; he must stand or sit still at the breathing-hole and wait till the seal comes up to breathe. A further difficulty with this method lies in finding the situation of the breathing-holes under the snow-cover. From the Central Eskimo tribes we have the report that they employ a specially trained dog, led on a line, to scent out the holes, and it is probable that the Polar Eskimos know the same mode of procedure[1]. In this Maupok hunting, however, a three-legged stool is used, whose "weak and thin legs composed of many, small pieces of wood are elegantly stiffened by means of thin, diagonally wound thongs". This is the description

[1] cf. L. Mylius Erichsen and Harald Moltke: Grønland. København 1906, p. 524.

given by Astrup[1] of the Maupok stool of the Eskimos. Those I have seen in 1909 quite agree with this, except that the legs now consist of whole pieces of wood or sticks.

Fig. 3.
Strangers arrive at the winter settlement (drawing by the Eskimo Samik). Above, a snow-house and below this a winter-house, which is only partially drawn. The smoke-hole is seen on both houses. In front of the snow-house a woman is sitting with a child in the "amaut"; in front of the winter-house there are also two persons, whilst a third is sitting on a sledge; the upright back at the hind-end of this is supposed to have a hunting-line wound round it. The dogs of the settlement are fastened together in a clump to a stone, but are trying to make towards the people in front of the houses, as they imagine they are about to be fed; but it does not occur to them to make towards the new-comers; Greenland dogs do not watch over the house, but only the sledge when they are harnessed to it. The long, horizontal line in the picture represents the boundary between the land and the sea-ice. The strangers have come half over this line and stopped. One dog does a necessity on the ice; some others seek to settle their personal disputes and cannot be distinguished from one another. The Eskimo man is standing behind the back of the sledge with the whip in his hand, whilst the woman is sitting on the sledge and points towards the fighting dogs.

Some time after the sun no longer rises above the horizon, it is still light enough to be able to hunt on the ice, but it gradually becomes darker and this puts an end to the

[1] l. c., p. 84.

hunting. In the course of the 3 months' winter-darkness there is moonlight three times, and these occasions are used in paying visits to other settlements, or sledge-journeys are made to bring in food from the scattered depots; in cases of necessity the Maupok hunting is also carried on at the breathing-holes. Sometimes a wandering polar bear, scenting supplies of food, may rove into the settlement, and in such a case torches are lit and all join in hunting it. But, for the rest, the dark period is a time of feasting, when the Polar Eskimos come together, sing folk-songs and tell one another expansive hunting stories and the latest news. In January 1895 Peary[1] on a visit to the settlement Krâna had the opportunity of participating in such a visiting and feasting period. "In the evening the village was a scene of feasting. A fetid seal-feed was in progress in Kardah's igloo; in Akpalisoaho's a little-auk spread was laid out; and in Ingeropahdoo's another feasting crowd was gathered about a large walrus-ham, which took up nearly all the floor. Ootoomish and Tellikotinah, and their wives, visitors from the south shore of the Sound, now on a round of social visits, were making calls from igloo to igloo, sampling all the feasts and gathering all the gossip."

From the beginning of February, when the day-light again appears, families from all the settlements between Cape York to Inglefield Gulf start off on the journey up to the coast at Cape Chalon and Cape Alexander, where the open water in the middle of the North Water lies near the land and a hunting lager is set up at places which may vary in different years. In front of the ice-base along the land and just under the bluffs the Eskimo families build their snow-houses with the entrance and gut-skin windows towards the sea-ice. In the latter half of March 1894 Peary[2] visited the hunting grounds at Cape Chalon (Peterahwik) and found there over 40 snow-

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[1] Northward etc. Vol. II, pp. 389—390.
[2] ibid. p. 419 *et seq.*

houses, which held more than $^2/_3$rds of the whole tribe. The open North Water lay about 20 to 50 km, west or south-west of the settlement, "and its edge shifts like the fringe of a waving curtain. Two or three days of heavy wind will eat into the ice and bring the water several miles nearer the shore. Then during the following calm, the fierce temperatures of February and March, the lowest of the year, bind the motionless water with a zone of young ice, which in twenty-four hours will support a sledge and team of dogs. Then is the hunter's time; leaving the village at earliest daybreak he drives out to the edge of the old ice where the dogs are fastened, and then on foot with his harpoon, line and lance, he starts out upon the black mirror of the new ice".

It is important for the hunter to be able to reckon where the walrus will rise to breathe. Usually he waits for it at a hole already formed in the ice, but sometimes the animal comes up at a new place, breaking through the ice. The hunter then hastens quickly to the spot with the harpoon in the right hand and the ca. 40 meter long line of seal-skin in the left. The harpoon is not thrown, owing to the thickness of the walrus hide, but is thrust in, and the pole hastily withdrawn. The spike — formerly of bone, now usually of iron — which is at the end of the pole and has served as base for the loose point of the harpoon, is now planted in the ice, the line is given a turn as far down as possible and the knee and shoulder are brought strongly to bear as counterpoise. When the line again slackens, it is fastened as quickly as possible through two holes in the ice, and the animal as it reappears is met with the lance of the hunter and his comrades, who have hastened to his help. When the animal is dead, it is lifted right up by a kind of tackle, formed by lines of seal's skin passed through two holes in the ice and a couple of holes cut in the skin, and as the heavy animal, which may weigh up to 1000 kg, is gradually lifted up over the water, pieces are cut off and the whole booty finally driven in the dog-sledges to the coast.

At the same time as the walrus hunting is going on, foxes and hares are caught in amongst the coastal hills. The skin of these animals is good and fit for use at this time of year, and it is specially for the sake of the skin that they are hunted. The foxes are nowadays taken in the modern American fox-traps, but we still find everywhere the remains of the old stone-traps. These consist of a small stone-box built of flat stones on the surface of the ground; this is closed at one end and just so long and so high that a fox can crawl into it, attracted by a piece of blubber. This blubber is, however, connected by means of a thong with a large, flat stone, which falls down and closes the trap, as soon as the fox seizes hold of the blubber. The hares are caught in running nooses, the arrangement and make-up of which will be described later.

Towards the middle of April breaks occur in the ice at several places nearer to the land, and the walrus are scattered along the coast. The Eskimos again disperse, going as a rule to various settlements in the outer parts of the fjords; at the same time they keep to the bird-grounds, which are taken possession of by the birds about the middle of May. One group, for example, goes to Agpat or Saunders Island and remains there hunting the walrus, seals and narwhal, and later bird-catching, until the end of June; then just before the ice breaks up they move in on the mainland to the settlement Umanark at North Star Bay, where they pass the summer. Others set up their snow-huts in the neighbourhood of Kiatark and go later to one of the mainland settlements in the mouth of the Inglefield Gulf; others pass the spring on the north side of Inglefield Gulf.

During the spring hunting two characteristic methods of hunting the seal are used. The one depends on the fact, that the mother-seal, when calving, digs a hole in under the snow, as a rule in a snow-drift close by an ice-field. From the hole a large opening leads down through the ice, through which the mother passes up and down, and there is a smaller opening up through the snow-drift for the passage of air. A sharp eye can detect these "seal-igloos" from outside; the Eskimo walks softly up to it, and puts his ear close to the snow and listens. If he hears any sign of life he jumps on the mound as hard as he can, until it caves in, and then, with a kick in the head, he dispatches the young one. If the mother is present, he seeks first of all to plant the harpoon into her; if she is away, he patiently awaits her reappearance up through the hole in the ice, and then she meets the harpoon.

The second method is the likewise well-known Utok hunting, or the hunting of the seals when they lie and sun themselves on the surface of the ice. The Eskimo approaches his watchful prey crawling on his stomach; at the present day he uses fire-arms, but unlike the Eskimos in the more southern parts of Greenland he does not have a small sledge with outstretched, white linen sail, behind which the hunter is able to conceal himself. In earlier days it was necessary to approach his unsuspecting prey so closely that he was able to stick a harpoon into it. The method then was, to crawl up against the wind and as far as possible imitate the movements of the seal, lifting the head in the same manner, flapping the arms just like the seal with its flippers and moving the legs as the seal does the tail-end of its body. It is quite an art, which the older Eskimos have all practised and can still practise, but it is dying out in the younger generation.

In the latter half of this period, as a rule from the first half of May, the Eskimos dwell in tents, as the snow-houses become damp and wet. The sun is now above the horizon during the whole twenty-fours hours. The Auks and Little Auks have come and taken possession of the sides of the cliffs. There is now abundance of food and it is a time of enjoyment for the Eskimos. During this period "there is no regular sleep in an Eskimo camp; day and night are spent abroad when the weather is good. A constantly burning fire summons the people together at the public feeding-places of the camp, and the constant interchange of men going to the hunt and others returning maintains life and interest round about the fire at all times of the day and night"[1].

The bird-hunting is carried on late in May and in the course of June, and stores of birds are laid in, which entire and with the feathers on are laid in blubber in a seal-skin, also eggs, which are kept under small stone-heaps. In the old days the whole summer had to be passed on one or other of the birds-grounds, and these localities are still places of resort for one or other poor and incapable family or for women, who for some reason have lost their providers.

In this systematic review of the changes which take place with the seasons in the industrial culture of the Polar Eskimos, some interesting and important features of their hunting-life have not yet been described, for the reason that they are not of regular occurrence each year for all the hunters. These are especially the hunting of the polar bear and musk-ox.

The places frequented for the polar bear hunting are Melville Bay and Kane Basin at the Humboldt Glacier. The great extent of these hunting journeys to the southwards has already been mentioned. The season at which they are undertaken is the polar spring. Any one who intends to go bear hunting must make his preparations already in the previous year, in so far as he must obtain several dogs and train them specially to face the bears. The hunting itself requires the dog-sledges, the track of a bear being followed until the bear is sighted; the dogs are then let loose and surround the fleeing bear, keeping it back until the hunter can come up with it.

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[1] Knud Rasmussen, l. c. p. 46.

Fig. 4.

Bear hunting, drawn by the Polar Eskimo Miterk. 6 dogs have surrounded and stopped the bear. According to the explanation of the artist the person sitting has been bitten by the bear. From the right side approaches help in the form of 2 sledges. Behind the upper the artist has drawn a very large figure, which is supposed to represent a Dane. The lower sledge is supposed to be further away and approaching at full speed.

At the present time the rifle is the weapon used, but previously it was the lance. Bow and arrow could not possibly be used, as the arrows cannot wound the animal sufficiently, owing to its thick hide and fur. The hunting thus developed into a fight at close quarters with the bear, in which the hunter not rarely received some hard knocks. Some of the Eskimos I saw, especially Masaitsiak and Samik, bore frightful scars on their bodies as the result of wounds from the claws of the bears.

The hunting of the musk-ox on the east coast of Ellesmere Land is even more occasional. How this hunting was carried on before the advent of the rifle, has not been clearly explained. But it was even more impossible than in the bear-hunting to employ the bow and arrow against the dense covering of thick, wooly hair of the musk-ox. We are not aware whether the Polar Eskimos knew or employed the lassoo or not, but it would seem practically impossible to catch a musk-ox in this manner, owing to the shape of the fore-part of the body, with the head sloping forwards from the neck and its thick horns likewise projecting downwards and forwards. There can hardly be talk of any other weapon but the lance, and presumably the method of hunting has been almost the same as that employed by Cook and his two Eskimos whilst wintering at Cape Sparbo in 1908—09, when they enclosed or drove the musk-ox on to ground covered by nothing but stones. On such a ground two legs are better than four and the hunter can approach quite near to the awkward musk-ox and easily evade its fury; in hunting these, dogs are also probably used.

Both the bear and the musk-ox hunting are old among the Polar Eskimos. This does not hold good, however, for the reindeer hunting, which was first introduced by the immigrants from the American side. A contributory reason, why they had not previously troubled themselves about the profitable autumn hunting of the reindeer in Olriks Fjord, may have been that they always passed the summer on the bird-grounds, and thus lived far from just those settlements, such as Umanark, Netschilivik, Itivdlerk and Narsark, from which there is access to these hunting grounds over the inland ice. Until the time when Peary began his expeditions, the bow and arrow were the main weapons in hunting the reindeer. The Polar Eskimos became all at once keen deer-hunters and they seem to have rapidly become just as expert and untiring in the hunt

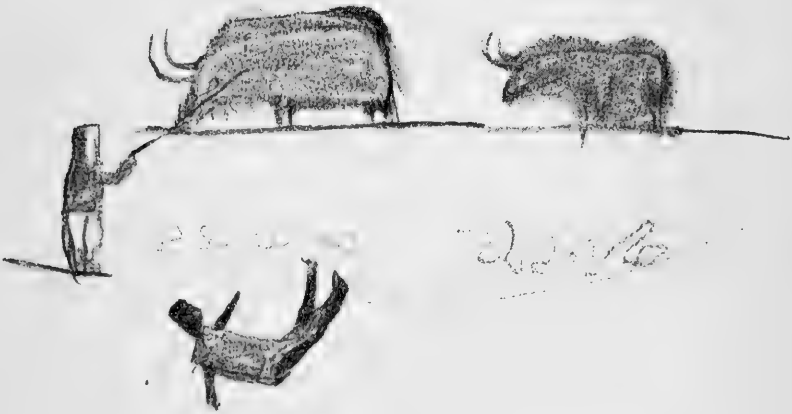

Fig. 5.
Musk-ox hunting, drawn by the Eskimo Samik. According to his own explanation the one individual has "fallen on the stones". The other hunter (supposed to be Samik himself) attacks the first musk-ox, seeking to wound the animal in the heart with the lance (or gun?).

as other Eskimo tribes. The long, converging rows of stakes, between which the herds of deer are driven into an ambush and which are so common among the other Eskimos, do not seem to have been used by the Polar Eskimos. One of their hunting methods and the most primitive meant simply finding a trail and following it at a steady run, until the animal was approached so near that it could be struck by an arrow. With regard to other methods, the Eskimo Imerarsuk told the following to Knud Rasmussen, and I obtained a similar description from the old angakok Masaitsiak. "The deer at that time followed certain passes between the hills. We can still see up there (i. e. on the hills at Olriks Fjord) the many hard-trodden paths. The hunters knew, therefore, which paths the animals would follow, both in going down to the coast in the spring and in returning to the hills in winter. They stretched long lines of seal-hide across the deer paths, fixing the lines at short intervals to small piles of stones which they built. When a herd of deer came along and ran their heads against the line, they never tried to jump over it but simply followed it along to one of the ends. Here an archer was posted at both sides, sitting within a sheltering wall of stone, so that the deer should not suspect anything, and in this way the spoil was led to the hunter. The custom was also for many to join in the hunt and confuse the herds by cries, so that the deer were driven from the one shooting-box to the other. But for this method to succeed, the ground had not to be too broad"[1].

Fishing is of little importance for the Polar Eskimos. The sea is not so rich in fish as further south. The salmon-fishing of recent years has already been mentioned. Further, I have seen sea-scorpions (Cottus) taken by a boy from his fathers kayak with hook and line, and also a special kind of fishing-apparatus, consisting of a ca. 8 cm long two-pronged fork, with teeth on the inner side of the prongs, which was cut out of a piece of narwhal or walrus bone and attached to a pole quite 1 m long. This apparatus was said to be used in fishing for a small fish, probably a gadoid.

The considerable booty, the Polar Eskimo obtains as a rule on his hunting tours, cannot possibly be taken along with him to the settlement on his sledge, and still less in his kayak. What he does, therefore, is to hide the surplus in a depot, from which it can be fetched later. The natural conditions during the greater part of the year make this method of preserving easy, as the meat freezes, and if the seal or walrus

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[1] Knud Rasmussen, l. c., p. 97.

flesh does become somewhat putrid, this does not matter so much, as the Eskimos rather prefer the flesh when it is "high". Seals are even laid out in the spring so that they should become high, and are eaten later as a delicacy. On freezing at the low temperature the meat gradually undergoes a change, so that it becomes soft; when it is then warmed up to one or two degrees below freezing-point it forms quite a nice dish. Pemmican is not prepared as among the North American Indians, but it is a general thing to place birds and the skin of the white whale and narwhal in blubber.

The many scattered depots lighten the long journeys for the Eskimos to a considerable extent, the depots being regarded as a kind of common feeding-places. This is one of the reasons why they are able to make their sledge-journeys of many miles in length with extremely little baggage and almost without provisions. But the depots also have other obvious advantages; for example, in keeping their riches out of sight. If the whole of the booty were brought to the settlement, the less fortunate and the less capable hunters with their families would share in the eating, so long as the food lasted, instead of going out themselves to hunt. Further, the depots far from the settlements mean several good places for the fox-traps, as the foxes always gather round the depots.

IV.

The small North Star Bay on the south side of Wolstenholm Sound is separated from the main fjord by a small peninsula, lying chiefly in the direction from east to west. Furthest west this peninsula ends in a characteristic hill, which has the form of a broken cone with evenly sloping sides and a horizontal level on the top of no small extent. This hill, which is quite 200 m high, is called by the Eskimos Umanark (Umanak), a name which is commonly used all over Greenland for such isolated, projecting mountains; the word is derived from umat, heart, and would thus mean heart-shaped.

To the north-east of Umanark, but on the north-west side of the small peninsula towards Wolstenholm Sound, lies the settlement Umanark. It consists of some groups of winter-houses, which lie scattered along the coast at intervals of some few hundred meters. The most southerly group, which is composed of 5 houses, seems to be the one most used at the present time. In the summer time all the houses lay more or less open, the skins were entirely or partially out of the windows in all and in most the roof had been partially pulled down. Further there were empty houses which had not been used in recent years and also others which were so old, broken down and overgrown with grass, that it was only from the circular elevation with the depression in the middle, that one could conclude, a winter-hut had formerly been there. It was evident that stones had been removed from these old places to be used in building the new houses.

A peculiar thing was, that some of the oldest ruins were considerably larger than the houses now used, and had a more square-shaped ground-plan. How far these large houses belong to a definite period in the earlier history of the Polar Eskimos, or whether they have perhaps been built by quite a different tribe of Eskimos, which has lived there previous to the present tribe, it is difficult to determine. I thought of something intermediate, that they were perhaps meeting-houses (kashims) of a similar character to those met with among the Central Eskimos on the mainland and among the Western Eskimos, and the Polar Eskimos are certainly not unacquainted with the custom, for those of a certain age to meet together in a common house. Thus, we sometimes find at their settlements a special meeting-house for the young people. For this purpose, however, one of the ordinary winter-houses is used, a special house of a larger type is not built. This would also be practically impossible, as the Polar Eskimos, with their present materials of nothing but stones and grass-turf and with their modest technical appliances, have probably reached the approximate limit for the size of their houses. On the other hand, there is no doubt, that if the materials permitted it, they would sometimes built larger houses than they now do.

These considerations lead us therefore on to a different line with regard to the question of the large ruins. On Baffin Land the natives at Ponds Inlet build fairly large houses, in which the roof is not a stone-arch, but is formed from wood or from whale-ribs, which those taking part in the Scottish whale-fishing still have the opportunity to obtain. Some few centuries ago, when the large whales occurred in great numbers, it must have been easy for the Polar Eskimos to procure such bones for building materials, from the whales that were stranded or driven on land, and thus to make their houses somewhat larger than they can build them now. For the rest, well-preserved ruins of such houses with cross-beams of whale-ribs still occur at long-deserted settlements[1]; but unfortunately we have no information regarding the size of these ruins.

For the sake of completeness it may be added, with regard to these large ruins at Umanark, that the Polar Eskimos have taken note of them and that they believe, they belong to an ancient period of adventure, when "people might wish themselves somewhere else". If there is anything in this of importance for the solution of the question, it is of a purely negative character, namely, that the Polar Eskimos do not ascribe these ruins to any other tribe. Nor is it in opposition to my supposition, that they were merely the forerunners of the present-day houses, built of material more adaptable to larger houses, which has now been used up.

Fig. 6.
Part of a hare-barrier, consisting of 3 stone-heaps. Between the two left portions the nooses are represented, between the two right a row of small stones.

One of the modern houses at Umanark lay quite uninhabited with tumbled-down roof. The reason was, that it contained a corpse. When any one dies in a house, winter-house or tent, it is forsaken, and a long time passes before such a deserted house is again taken into use. Up from the settlements about a couple of hundred meters from the shore there were several old and more recent graves at a place with numerous stone-boulders, but all had been disturbed, most probably by foxes — if not by dogs — as also by the earlier expeditions. At one of these lay the remains of implements; it was the grave of a man, to judge from the remains of a kayak. Even the skeletons and skulls had almost all been removed from the graves. These consisted of stone-work above

[1] Knud Rasmussen, l. c., p. 85. — cf. R. Peary, Northward etc., p. 380.

the ground or between the boulders on the cliff with a rectangular ground-plan, which was just so long and broad, that the body could lie in a bent-up position, with the knees up against the breast. The grave-implements lay, not in the grave itself, but at the side, and from a distance the grave looked like an ordinary heap of stones.

Round about among the cliffs along the coast we here and there find piles of stones in an opening in the cliffs or between a pair of large stone-boulders; these somewhat resemble graves but are in reality food-depots. The principle with these is, that the stones must be so large and heavy that the foxes and dogs cannot push them aside. When we therefore find a cleft or hollow in a cliff, which might readily be covered over, we will also regularly find that it has been used as food-depot and not for a grave. Among the Polar Eskimos the interests of the living are placed before those of the dead. Practically speaking it is certainly impossible to make the depots secure against the bears, so that it is fortunate that these animals are not numerous in the more restricted hunting grounds of the Polar Eskimos. Scattered round about the neighbourhood of the settlement and at the depots along the coast we found almost everywhere more or less well-preserved, stone fox-traps.

Down on the coastal plains around the old and more recent groups of houses at Umanark we find a very luxuriant grass-vegetation in the summer-time, which has apparently a very alluring influence on the hares in the winter and spring. About half a kilometer from the coast the last outposts of these grass-oases form some swampy, low-lying places with less vegetation, which lie in the direction from west to east and are bounded on the north and south sides by irregular, stony ground, whilst on the east they change over into more gravelly ground. On the east side of these depressions are constructed one or in a single case two concentric half-circles of small stone-heaps or oblong stones raised on end.

One of these semicircles of hare-barriers was quite 45 m long, another 80 m long and the longest I saw had a length of ca. 160 m. The single stones or stone-heaps are placed at a distance of $2^1/_2$—5 m from one another and their height is in general 30—45 cm. Sometimes, but by no means always,

Fig. 7.
View from the settlement Umanark. On the left a depot-pillar. On the right of this a winter-house, seen from the side; on the right of the picture a second house, seen straight in front with the opening to the passage below and the opening of the window above. The beach is immediately to the left of the depot-pillar.

rows of small stones, the meaning of which is not quite clear, are placed between these large stones. Horizontal strings of seal's hide can be stretched between the stone-heaps with rows of running nooses hanging down from them. When a hare comes down from the hills and seeks its way to the grass-covered hollow or is returning from this to the hills, it runs up against these strings and nooses and begins to play with them or to investigate them somewhat closely. The result in many cases is, that it gets its head or a paw into a noose and cannot free itself. As a rule these hare-traps are looked after by the old men and the larger boys. It is in the polar winter by moonlight and in the polar spring, while the hare-skin is still usable, that this hunting is carried on. A trap for hares, consisting of two converging rows of stones, was seen by me 3—4 km east of the settlement up in the hills; it was constructed in front of a greenish transverse hollow on a small ridge.

About two km east of the settlement Umanark, on the north side of the small peninsula, where this joins on to the mainland, projects a small, low point out into the bay. On this is situated a fairly well-preserved ruin of a house, and in front of this there is a couple of half-fallen stone-pillars, which have been used as a place of deposit for food. Two similar depot-pillars occur at Umanark, where they also lie in front of the houses, so that they can be seen from the passage and window of the house. They are circular, massive and built up of fairly large stones, which are laid above one another without any cementing material; the old blubber dropping down from above helps however to bind the stones together. The pillar has steep sides and a flat or slightly concave upper surface, where the meat is laid. The height is judged, so that the dogs should not be able to reach up to the food. The one depot-pillar (to the left in figure 7) is 1,6 m high and ca. 1,2 m in diameter of cross-section. The other is of about the same height but a trifle broader.

The winter-house of the Polar Eskimo is an extremely interesting production of the small tribe and requires very special attention. Seen from the outside it is an arched elevation on the ground; a very excellent comparison of its form has been made with that of a large turtle, with its head and neck projecting forwards. The house itself has something of the characteristic arching of the turtle-shell, and the low entrance-passage might well be compared with the neck. Figs. 8, 9 and 10 show respectively the ground-plan, longitudinal section and cross-section of a typical Polar Eskimo house.

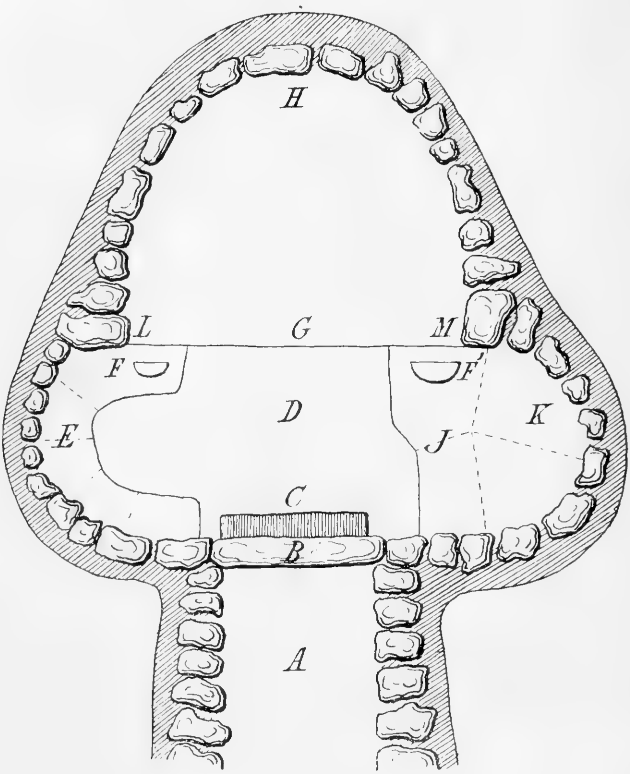

Fig. 8.
Ground-plan of a winter-house. Only the inner part of the entrance-passage is shown at A.

The ground-plan gives the front-part of the house, the passage, and the circumference of the house itself. The passage *A* is closed above at B, which represents the oblong, flat slab of slate which lies right across the entrance and separates this from the window, forming at the same time the lower border of the latter. The passage is thus continued under this slab and opens into the room of the house between *B* and *C* through an oblong, approximately rectangular opening, which is shaded in the figure (on the longitudinal section, fig. 9, it lies between *c* and *d*). *D* indicates the floor-place of the house, which is surrounded on the 3 sides by platforms. The principal platform *GLHM* takes up the whole of the circular space at the back, while the side-platforms *E* and *JK* occupy the two smaller, round spaces at the sides. On the side-platforms are placed the two blubber-lamps *F* and *F'* with the less convex side towards the main platform, where the house-mothers, who have to look after the lamps, have their seats at *L* and *M*. Each house is occupied by at most two families. The principal platform is the living-room of the family during the day and the sleeping-place at night, whilst the side-platforms are kept for the lamps and other articles of the house, as also food, and are only exceptionally used as sleeping-place for the children. Above the blubber lamp hangs the cooking-pot, which is suspended by strings from a horizontal drying-board which again hangs on lines fastened to the roof.

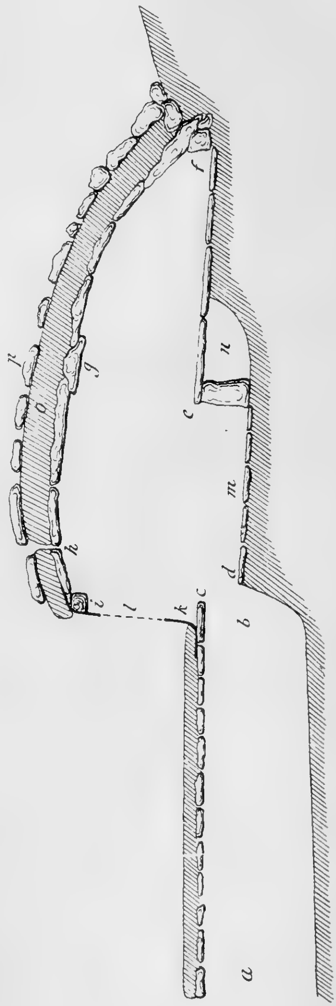

Fig. 9.
Longitudinal section of winter house. *ab* passage; *cd* entrance-opening; *m* floor; *n* open space under the main platform *ef*.'

The reason why the two recesses for the side-platforms E and JK appear so prominent in the interior of the house, is that the walls of the house at L and M are specially heavy and built somewhat inwards, in order to bear the upper structure and the roof. For the Polar Eskimos have had the most difficult task in forming a support for the heavy roof of stone and earth, as they have had no wood at their disposal and no longer, at least in recent centuries, have access to the large whale-bones, which elsewhere form such an excellent building-material. With regard to the manner in which they have solved this problem, Peary, who was an engineer originally, remarks that

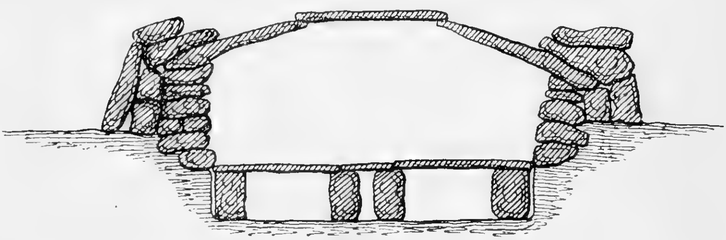

Fig. 10.
Cross-section of winter-house.

it corresponds to the modern cantilever-system in engineering, which has been used chiefly in the building of bridges.

This original building-method of the Polar Eskimos is illustrated in fig. 10, which represents a cross-section through the house at LM (fig. 8), i. e. through the thickest parts of the wall and across the front part of the main platform. The figure shows, how a long stone on each side is fixed at its base in the wall by means of other stones which act as counterpoise, and how the free, inner ends of these projecting stones support a long and flat, central stone. I have seen several of these top-stones of slate, which were about 1 m long, over $^1/_2$ m broad and some few cm thick. A third projecting stone is placed further back in the middle line of the house (at f in fig. 9), and there may also be a couple of these, as a rule smaller, intermediate between the three mentioned, as also a further pair at each of the side-platforms.

The position of all these projecting stones is schematically represented on fig. 11. They enable us to understand the developmental history of the house, as their situation in pairs would indicate, that they must have arisen from a method of building in which there were entire cross-beams going right across the house. We can therefore imagine one of two things. Either small houses were built originally, so that a single stone could reach across, or other materials besides stone have been at the disposal of the builders. Of these two alternatives we can certainly exclude the first; houses of this kind would be extremely small, and we have no evidence from anywhere that they have existed. On the other hand, as already mentioned, it is permissible to believe, that the Polar Eskimos have had other building-materials, for example, whale-bones. And it therefore seems reasonable to set up the hypothesis, that at the places in the Polar Eskimos house, where we now find the projecting stones, there have originally been whale-ribs for the support of the roof. The house of whale-bone has thus not only preceded in time the present stone-house, but it has also been its technical precursor.

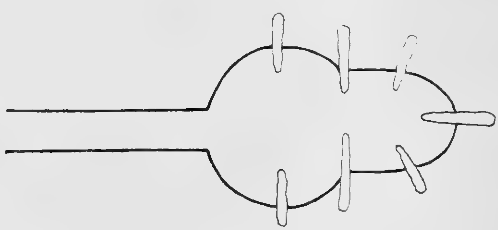

Fig. 11.
Diagram showing the position of the projecting stones in a winter-house.

The longitudinal section fig. 9 shows on the left the house-passage, which is formed of two vertical stone-walls with flat flag-stones above, and furthest to the right the continuation of the natural slope of the ground, out of which the house is to some extent dug. The passage is so low that one must crawl on going through it, or like the Eskimos bend the body at right angles to the legs; it slopes evenly outwards from *b* to *a*. In winter it is sometimes further prolonged by means of an arch of snow with the entrance on the one side, or a snow wall is simply raised to serve as a screen against the wind. The normal length of the passage is ca. 3 m; its height inside is 60—75 cm and its breadth 60—70 cm. At the inner end of the passage a sloping entrance between *c* and *d* leads up into the house-room. The opening here is so small, that a well-developed Eskimo must have the greatest difficulty in crawling up through it. It is fairly rectangular and measures in a longitudinal direction, transversely to the house, $^1/_2$—$^3/_4$ m, whilst its breadth (from *c* to *d*) is only about 35—40 cm.

This entrance-opening stands as a rule unclosed; but sometimes a stone is placed over it to prevent the dogs from coming into the house, or if the wind is very strong and is blowing right in. The Eskimo creeps through the entrance into the house and is then on the floor of the room itself (*m* in fig. 9), which is laid with flat flag-stones. The window with its pane of gut-skin looks out on the roof of the passage; its opening is completed above and below by long, narrow pieces of slate, and at the sides by walls of heaped-up stones. The square pane of gut-skin, which is represented on fig. 9 by the dotted line at *l*, is sewed tightly by means of tendons on to a skin, in the centre of which a square opening of the size of the gut-skin has been cut; this skin is indicated on the figure by the thickened line at *k* and *i*. The mode of fixing is, to place the lower part of the skin at *k* outwards on the top-stones of the entrance, securing it there by laying over it a layer of earth and grass-turf. At the sides of the window the skin is likewise made fast out under the covering of earth, whilst at the top it is bent back over the top-stone of the window and in under the earth and stone-covering of the roof. In this way quite an air-tight and solid window-frame of skin is obtained. The opening of the window is ca. 80 cm high and

70 cm. broad. Only a dull light comes through the gut-skin; to be able to see out from the house there is a small peep-hole in the centre.

The floor-place itself is not large. Its extent depends partly on the size of the house, partly on the amount of space occupied by the side-platforms. In one house, for example,

Fig. 12.
Photograph of a winter-house seen directly in front. Uppermost the remains of the window opening and just under this the entrance from the passage. The two openings to the right and left of this lead merely into store-rooms, which are built at the side of the passage. In front of the house the ground is covered with refuse. The beach is just in front.

the distance from the entrance to the main platform was 170 cm and across from the one side-platform to the other likewise 170 cm; each of the latter was here only ca. 35 cm broad. The whole breadth of the house in front, including these recesses, was thus 240 cm. In another house the corresponding dimensions of the floor were 130 and 175 cm; here the platform to the left was 75 cm broad and that to the right as much as 140 cm broad, the measurements being taken along the middle line of the side-platforms (*EK* on fig. 8). The whole breadth of the house was thus 3·9 m. The principal platform in this house was as much as 205 cm long (from *e* to *f*) and had in front a breadth of 210 cm; its height above the floor was 30—35 cm in front (at *e* in fig. 9). The principal platform always slopes evenly down towards the back and the height of the side-platforms is normally the same as that of the main platform in front. Both the main and the side-platforms are formed of flat stones, which rest on stones set up on end. In the back part of the main platform, however, the stones lie directly on the ground.

Among the piled-up stones of the house-walls we not rarely find, forming part and parcel of the walls, the vertebrae and smaller bones of the large, now extinct or rare whales. The skulls of walrus are also used for this purpose. Some of the stones are so large that one can hardly understand, how it was possible to move them. Pieces of pine or bone are fixed in among the stones of the roof and between these strings are hung, on which small articles of clothing and other objects can be suspended.

In the front part of the roof there is a small and narrow opening (at *h*) which can be closed above by a clod of grass; this is called "nose" of the house by the Eskimos, and in the still winter-frost the hot air can be seen streaming out like white steam. At one place in Umanark two houses had been built together, so that they had a common wall but were otherwise quite like two houses. On fig. 9 we can also see the top-stone *g* between the two central projecting stones; this helps to supports the flag-stones of the roof. Over these lies the layer of earth and grass-clods *o*, and this is again covered by a layer of stones (*p*).

The height of the house internally is not very considerable. I have measured one house (the last of the two above-mentioned), in which the greatest height above the floor was 145 cm (at *m*); possibly, however, the roof had sunk a little

Fig. 13.
Photograph of the interior of a winter-house, from which the front part of the roof has been removed, so that the light falls on the main platform. The photograph was taken from the window-sill (to the right of *B* in fig. 8) and includes nearly the section *G L H* on fig. 8. Below is seen the platform, composed of a thin slab supported by blocks of stones. The projecting oblique stone seen on the left above is not very large in this case, but to make up for it the thin slab, which forms the middle part of the roof, over the platform, is very large. On the back wall of the house hang two coils of leather rope, made from walrus skin; a similar coil lies on the platform.

in the summer, so that the height might really have been a little greater, but it can hardly have exceeded 160 cm in any case, so that a man of average height will not be able to stand upright in it. In all the other houses the front part of the roof just over the threshold had been removed for the sake of ventilation. In this house the greatest height at the front part of the platform was 95 cm, usually it will be about 1 m in the centre and a little lower at the sides.

In the typical house of the Polar Eskimos the whole roof is built up of stone-flags, and this is always the case with the part which arches over the main platform. On the other hand, it is not rare for the front part of the roof, just over the floor, to be covered simply by skin, which is spread out over cross-poles and covered outside by earth and stones. At Cape York I saw a couple of houses of this kind, where the remains of the covering skin still lay on the top of the house-wall.

In winter the interior walls and roof of the house are covered with seal-skin, the hairy side being turned towards the wall and the light-coloured inside out towards the room. The flat, stony floor of the main platform is covered with a layer of dry grass and above this are laid the skins of reindeer or bear. Each member of the house has a definite place for sitting and lying on the platform, counting from the front to the back. He either sits, as a rule with crossed legs, in front on the platform, or lies on this with the head always towards the open room, so that the head is always highest. The place of the wife is outermost at the wall of the house close to the side-platform, the lamp on which she must constantly be looking after. Usually, in addition to the two large lamps on the side-platforms, there is also quite a small, third lamp on the one platform; so far as I could gather, its flame is nourished by the blubber which drips down from the large lamp and is collected in a special holder below this. The blubber-lamps, in addition to warming up the house, give a very pleasant and clear light.

One problem in the polar house-building, which the Polar

Eskimos have in common with practically all other Eskimos, is to protect the dwelling-room against the wind and draughts, or to obtain, without at the same time interfering with the renewal of the air, a constant supply of the latter which can be evenly and regularly warmed. This is attained in the first place by the long, narrow passage, which stops the spread of the air-pressure and causes it to become an even and quiet stream of air, when it passes into the house, secondly, by the low-lying position of the entrance to the passage and lastly, by placing the lamps on a raised stand and not on the floor itself. As the result of the two last-mentioned conditions, the cold air is able to spread quietly along the floor. It is only when it comes to the level of the platform that it is evenly warmed up by the lamps and gradually rises, so that there is always a warmer layer of air lying above. The products of combustion can escape outwards, partly through the "nose" of the house, partly through the peep-hole in the pane of gut-skin.

The arrangement of the long, low passage, which opens into the house so low down, is thus in reality a kind of equivalent for the door and porch or lobby, by the help of which the Europeans in cold lands keep the cold air from penetrating directly into their dwelling-rooms. In the eskimo house it is in reality the raised platform, which corresponds to the true dwelling-room. And so cleverly therefore is this house built, that the fresh air has the most unhindered entrance and yet one is in the midst of an even warmth.

The Danish painter, Grev Harald Moltke[1], who passed a great part of the winter of 1903—04 in a winter-house of the Polar Eskimos, has expressed his opinion on it as follows: "Two things are surprising in this small, primitive hole — the temperature and the good air. The cold air streams through the passage, the entrance-hole and out over the floor, where

[1] Mylius Erichsen og Moltke: Grønland, p. 589.

the temperature in winter is always below freezing-point, as a rule from —10° to —20° C., so that the blocks of snow intended for drinking-water can lie there without melting. The lamps draw the air upwards, which is thus warmed and streams out over the raised platform, where the temperature as a rule is so high, that one cannot stand having clothes on and quickly follows the example of the Eskimos and takes them all off. Under the roof the air is, to put it plainly, very hot. If we sit on the edge of the platform with the feet resting on the floor, they will be surrounded by air at ca. —10°, whilst the head reaches up into a tropical temperature. Only the stomach is in a suitable and pleasant warmth, which explains why no other position can be maintained for a long time in here except lying down on the raised platform. However warm it may become here, the air is nevertheless always pure and good, and — in contrast to the atmosphere in many Danish-Greenland houses — without smell. This is quite simply explained by the fact, that the fresh air always has unhindered access to the house through the entrance-hole, where there is no door". In contrast to which we now find a door in the Danish-Eskimo houses, which as a rule closes the passage inwards.

Figs. 14 and 15 are two drawings by the eskimo woman Alakrasina. The first represents the interior of the ordinary winter-house with a main platform and two side-platforms, as also the passage to the house and the outside structures in front. On each of the side-platforms stands a large blubber-lamp and at the side of this to the left a small lamp; a couple of basins also stand on each of the side-platforms.

Fig. 15 is of very great interest. Among a number of winter-houses, which Alakrasina drew of her own accord in my drawing-book, were two of this type, though I found no representative of them, either at Umanark or at Cape York. We see here two winter-houses built together, so that they have a common floor-place and common passage; further, the two adjacent side-platforms have likewise been joined to form a

Fig. 14.

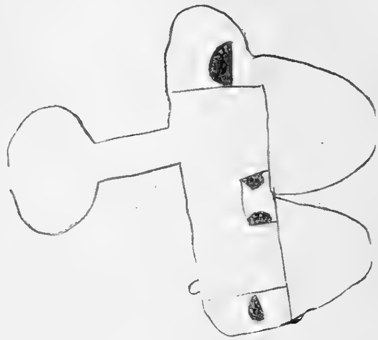

Fig. 15

small, median platform, which stands out from the dividing wall between the main platforms. This dividing wall, which

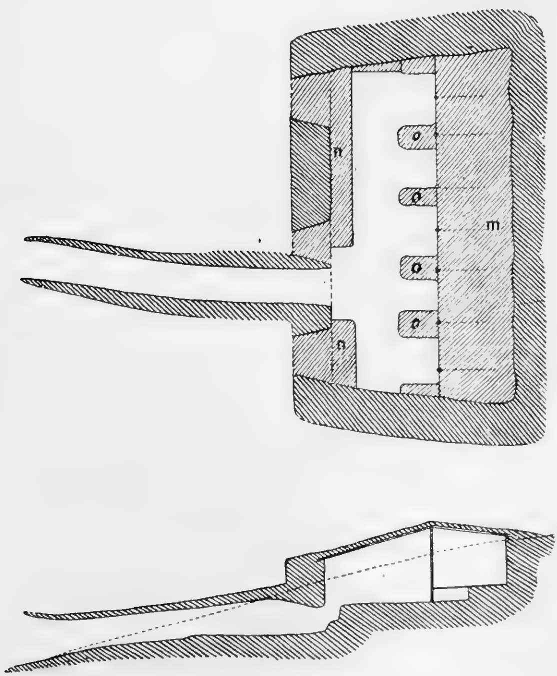

Fig. 16.

Ground-plan and cross-section of a long Eskimo house from Angmagsalik (after Gustav Holm). *m* — main platform divided into family compartments at the dotted lines; *n* — smaller platforms along front-wall; *o* — side-tables with lamps.

seems very narrow and to end in a point, must in reality be comparatively broad, as a considerable part of the roof's weight must rest on it, both over the floor-space and the main platforms.

The important thing about this house-type is, that it shows us in quite a convincing manner, how the long winter-house has arisen, which was used in West Greenland before the Danish colonisation and which G. Holm[1] in 1884 still found in use at Angmagsalik. The long, common-house in Greenland is in fact nothing else than this house-type, built with beams of drift-wood to support the roof instead of stones or whale ribs. The fixed dividing wall becomes of no use and disappears, as soon as a more convenient mode of supporting the roof, by means of beams resting on the side-walls, is found (cf. fig. 16); but the small, middle platforms remain in the form of a raised part or table, on which the lamps stand in front of the main platform in the long house (*o* in fig. 16).

A house-type such as shown on fig. 15, which is intended for 2 families, each having a separate, main platform and considerably more space than if they shared a simple, single house, has arisen as the expression of the Eskimo tendency to crowd together, a tendency which is binding both in sociological and psychological regards. As soon as the Eskimos can obtain the drift-wood, they have been able to satisfy this tendency and thus, on the basis of the known house-type, build the long house with a single, long, main platform, on which each family has its "berth" or division, separated at the sides only by a hanging skin.

In July—August 1909 there were 5 tents to the east of the winter-houses at the settlement Umanark; these were occupied by 6 families of in all 29 members. The tents lay scattered on the sides of a small valley-like depression and

[1] Gustav Holm: Etnologisk Skizze af Angmagsalikerne. Meddelelser om Grønland X.

were most of them farther from the shore than the winter-houses. The openings of the tents were not in any particular direction, but so that the in-dwellers could in each single case look out directly on the sea. The tents were placed on grassy ground and not on a naked, rounded rock-surface, as we so often find in the more southern parts of Greenland. The grass is warmer and it is not filled with gnat-larvae, as may be the case in the south. Outside the tents the dogs were leashed 4—5 together to one or other large stone boulder, whilst the half-grown puppies were allowed to play about.

Of these 29 Eskimos 6 were married men, 6 married women, one widow, a half-grown girl and boy and the rest children[1]. The widow Krulé, an old, decrepit woman tottering about with a stick made of two pieces of wood, did not live in any of the 5 tents, though her married daughter occupied one of them and could have housed her without difficulty. She had no idea how old she was and the other Eskimos still less; by their way of it, she had always existed so long as they could remember. She herself answered the question as to her age with such inconsequent remarks as, she was now no longer of any use, or even, that she was so old that her lice no longer had a good taste; she was probably about 60—65 years old. According to information from Knud Rasmussen her tribesmen, who were tired of carrying such a useless object about, had left her on one of the bird-grounds two years previously, to look after herself or go under. Knud Rasmussen happened by chance to pass that way and took her with him on his sledge. Now she was eking out her existence here at Umanark, going round about the tents and picking up odds and ends of the food going. Her dwelling was made up of some old skins laid over a couple of poles, in the form of a

[1] During the stay of the "Godthaab" at North Star Bay, two other families and one unmarried, young man — in all 7 persons — were there; they had been brought from Cape York and were taken back there again.

very small tent, the height of which outside was 1·3 m, length 1·7 m and the breadth 1·1 m. Inside the space was so restricted that she had just room to sit up on the ground in front. Of platform or lamp there was no sign; her bed was a skin laid over a layer of grass. The diminutive tent opened towards the large tents, so that Krulé could keep an eye on what was going on.

The summer-tent of the Polar Eskimos, which I have had the opportunity to see at Cape York and at Umanark, is in its present form not nearly so interesting as the winter-house, as the occurrence of wood in later years has had more effect on the construction of the tent than on that of the winter-house. The best hunters may have a tent-platform of wood, but we still also see the older tent-platform, consisting of stones placed together in a mosaic.

As example of a Polar Eskimo tent I may describe the largest and best tent at Umanark. It was occupied by two families (Uvdloriark and Itsukusuk) and was fairly new. The first time I visited this tent, a sunny day in July, only the inner covering was on, while the outer covering lay in a heap in front of the tent. The inner covering consisted partly of skins of the bearded seal without hairs, partly of the same kind of skins with the hairy side inwards. On the front part of the tent and even a little along the sides, this inner covering was quite clear and slightly transparent, so that the sunshine filled the tent with a peculiar, clear, yet soft and pleasant light. The tent was turned towards the north, so that even at midnight the sun shone into the quite pleasing room. This clear

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Fig. 17 shows Uvdloriark's summer tent, seen from the side. In the back-ground to the right, the view extends in towards the eastern end of Wolstenholm Sound with the inland-ice behind.

Fig. 18 shows the old Krulé and her little tent. The view in the background extends right across Wolstenholm Sound to the mountains on the north side of this fjord.

Fig. 17.

Fig. 18.

skin is the "meat-side" of the bearded seal's skin, the hairy side being carefully peeled off with an "ulo"; this is said to be a very difficult task.

As it became colder a few days later, the outer covering was put on. This has the hairy side outermost and is not subjected to any special treatment in front. Both the inner and outer coverings each form a single piece sewed together; on the front, more upright part of the tent the coverings are however not sewed together in the middle line, from the ground up towards the top of the tent. The upper part of this slit is laced together with seal thongs, and the lower part forms the entrance to the tent. This is closed by flaps folding together over one another. When no one is at home, heavy stones are laid on the edges of the flaps, so that the dogs cannot break in. Uvdloriark's tent could further be closed by means of a thick strap of seal's skin, which at half the height of the entrance was fastened round the tent; behind, this strap was attached on each side to another strap, which went over the tent and was fastened at the ends by stones laid on it.

The framework of the tent consisted in front of a frame or gallows of 3 poles, of which the one was borne horizontally by the two others and supported the broad front-part of the tent, which was about 1 m broad. The two upright poles were not on the ground but stood on a stone, the first of a continuous circle of stones, which went round the inner side of the tent, with exception of the part at the entrance. The sloping poles, 9 in all, the principal of which were bound fast to the cross-beam of the top, rested at the other end on the highest stones in the inner row mentioned. The framework of the tent was thus quite loose, but the tent was moored by bringing the lower edge of the covering out a little on the ground and weighting it there with stones (cf. fig. 20).

The height of the inside of the tent from the ground to the cross-beam of the top was 240 cm, but in the other tents this and the other measurements were somewhat smaller. The greatest length internally from the entrance to the back was 420 cm, whilst the greatest breadth just in front of the main platform was 360 cm. The main platform itself, which in this tent consisted of wooden beams laid transversely on the rows of stones at the sides, was in the centre 195 cm from front to back. The side-platform, which consisted partly of wood, partly of stone, was 120 cm. broad on Uvdloriark's side and projected 110 cm from the main platform, whilst that on Itsukusuk's side was only 70 cm and projected 90 cm; but Itsukusuk was not so clever a hunter as Uvdloriark, being also younger and still without children. In front of the side-platforms each of the two men had a box or small, locked case of the kind generally used in Danish Greenland, in which they kept their tools, cartridges and smaller instruments.

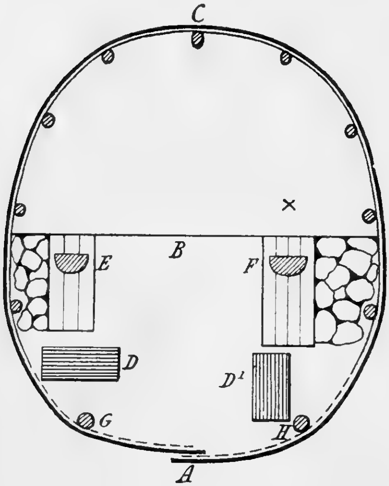

Fig. 19.
Diagrammatic ground-plan of a tent for 2 families (as the tent shown in fig. 17). The two skin-layers are indicated by a thicker and a thinner line; the dotted part of the latter in front indicates the clear portion. *G* and *H* are the two front uprights, which support the horizontal top-pole. Between *B* and *C* the main platform, here considered to be of wood. At *E* and *F* the side-platforms with the lamps; these platforms are partly of wood, partly stone. *D* and *D'* are the tool-boxes. The cross (X) indicates the spot, where the mother in photograph fig. 23 sits.

The boards of the main platform were covered with a layer of dry grass and above this skins of the reindeer. Just as described for the arrangement of the winter-houses, here also the women had their place outermost at the sides of the tent, where they sat by the side-platform and the lamp standing on it. Here sat Kagssâluk, whom the photograph given on fig. 23 shows in home-dress, managing to look after her small children, whilst at the same time working with skins and attending to the flame of the blubber-lamp.

The lamp stood on the boards of the side-platform, supported by 3 stones (cf. fig. 21). Soapstone is still used for the lamps, but cooking utensils of soapstone are disappearing and those of tin and iron are taking their place. In the bend on the most convex side of the lamp lie as a rule shining lumps of white, unmelted blubber, while the bottom of the lamp is

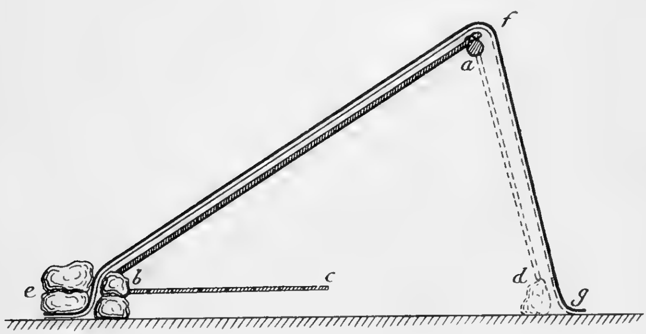

Fig. 20.

Diagrammatic longitudinal section of the same tent (i.e. through *ABC* in fig. 19). *ab* is the sloping pole which in fig. 19 is most nearly indicated by *C*; it rests on a stone at *b* and is attached to the top-pole at *a*. *ad* is the upright *H* (fig. 19), indicated here by dots, as it lies outside the middle plane. The two coverings of the tent are represented as in fig. 19, and the clear part of the inner covering is also indicated by a dotted line. The manner in which the coverings are anchored by stone-ballast is shown between *b* and *e*. *bc* is meant to represent the divided main platform, only the wooden floor being shown.

covered by the melted, floating blubber. The flame is placed within the bend on the less convex side of the lamp, which is turned towards the main platform. If the lamp has to be lighted and there is no melted blubber in it, the women have to melt the blubber by chewing and then spit it out into the lamp or directly on to a prepared wick of moss. The latter must be rolled, namely, between the hands before it can be used, until it makes a fine dust. Some of the moss is strewn along the edge of the lamp where the flame is to be, whilst the rest is sometimes laid as a reserve in one of the pointed corners of the lamp, from which it is taken later between the thumb and forefinger and strewn over the places, where the flame requires brightening. With the lamp-stick, which as a rule is an unprepared piece of bone or wood, the lamp-moss soaked with the blubber is arranged in a series of pointed tufts. Then these or at least some of them are lighted at the top and allowed to burn for a while; the lamp-stick is now used to bring them all into connection, and the tufts still not lit are added, so that a long flame is obtained which burns at the back of a low wall of moss (a cross-section of this with the flame is shown to the left in the lamp on fig. 21). The magnitude of the flame thus depends on how long the moss-wall is made

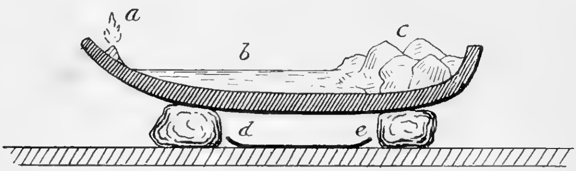

Fig. 21.
Diagrammatic longitudinal section through a blubber-lamp, standing on the stones of a side-platform. *a* is the flame above the moss-wall (wick); *b* the melted blubber; *c* unmelted blubber; *de* is the leather-bowl to catch the dripping blubber.

and further, on whether much heat is required for cooking or warming or whether the room has simply to be lighted up somewhat. In the former case, the flame may extend over at least ³/₄ths of the one side of the lamp, whereas in the latter case it only requires to be a few cm. The size of the lamp itself is extremely variable; the breadth of a cooking-lamp between its two pointed corners may be normally from 30 to 70 cm. While the lamp is burning, it must be constantly attended to; with the stick the woman works along the moss-wall smoothing and making it regular, so that the flame should burn clear and evenly without smoking. This apparently so simple treatment is in reality very difficult and requires so much skill, experience and care, that none but an Eskimo woman can exercise it. Just at the moment of lighting, the flame may smoke somewhat, giving off a bluish smoke and jumping a little, but as the heat rises it becomes quieter and burns with a yellowish colour.

To make fire matches are now used, if they are to be had; otherwise fire is made with an apparatus which consists of a piece of sulphur pyrites and a piece of quartz, or even of old steel. Further, a tuft of moss is used somewhat larger than a closed hand and in a small hole on the top of this a small clump of the woolly seed of the polar willow is placed. When fire is to be made, the moss with the seed is placed in front on the platform or on the knees and the sulphur is held about 3 cm over the seed, into which the sparks fall when the sulphur is struck. When the seed-wool has obtained a spark that catches, it is blown upon until it spreads out in the wool over a space of quite half a square cm. A small piece of moss is now torn off, steeped in the melted or chewed blubber and used as a lighter. In this manner the Polar Eskimos can produce fire in less than a minute.

Over Kagssâluk's lamp and about 90 cm from it hung the horizontal, wooden grating for drying clothes, which was 96 cm long and 50 cm broad. It was suspended in strings from the frame of the tent. A skin-strap, which passed up round a couple of stakes in the board and could be moved along these, suspended a cooking vessel consisting of an old metal pot. The other house-utensils on the side-platform, which to a certain extent plays the part of kitchen, also spoke distinctly of intercourse with Europeans and Americans. Thus, at a certain, typical moment there stood on Kagssâluk's side-platform, in addition to the lamp, a large metal pot, a metal basin, a coffee pot, a pot with seals' intestines, an "ulo", as also a large piece of narwhal meat. Until quite recently, however, the water-jars used were made of skin sewed together and made water-tight at the seams by the blubber-mixed substance, which is scraped from the "kamikker" on cleaning them.

In addition to the care of the children, sewing and preparing the skins, attending to the lamp and drying of the wet clothes and kamikker, the woman has further the housewife's task of preparing the food. This task is however not so great, as the man cuts up the booty and brings the pieces of meat into the tent or winter-house. She has thus only to keep the pot boiling, and the art of cooking among the Polar Eskimos is not very developed. Frequently the meat is taken from the pot and eaten before it is quite cooked. Quite raw meat is also eaten in large quantities; the fondness for frozen and rotten meat has already been mentioned. The skin of the white whale and narwhal, the so-called Mattak, is eaten in large amount and is a much-liked and quite pleasant dish. Freshwater is always used for cooking by the Polar Eskimos. For about 9 months of the year all the drinking-water must be obtained by melting freshwater ice over the blubber-lamp; the ice is fairly easily obtained from the ice-bergs and ice-clumps, which lie scattered about frozen in amongst the sea-ice.

Fig. 22. Photograph of the tent described, seen from in front. The outer tent-covering is pushed aside on both sides; the inner one only on the left. In front of the tent stand Itsukusuk and Kagssâluk, both in house-costume (except Itsukusuk's Kamikker). It is clearly seen, that Kagssâluk's left breast is somewhat atrophied; this is probably connected with the fact, that her place is always on the left side of the main platform (at the cross on fig. 19), and that she has her children on her right, in towards the middle of the tent, so that as a rule only the right breast is used in giving milk (cf. fig. 23).

Fig. 23 shows Kagssâluk and her two children, sitting in house-costume inside the tent at the place marked in fig. 19. The child feeding is her and Uvdloriark's daughter Natû (one year old); the other is their son Inuterk. In the left hand she is holding an ulo. In the back-ground the skin and poles of the tent. On the platform is seen the skin-layer or cover and under this the layer of dried grass, which is spread on the wood underneath. The side-platform is to the right in the picture.

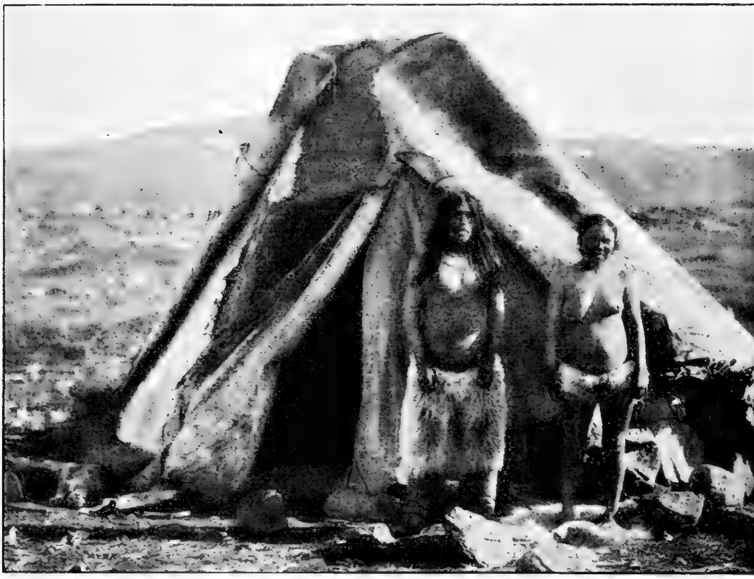

Fig. 22.

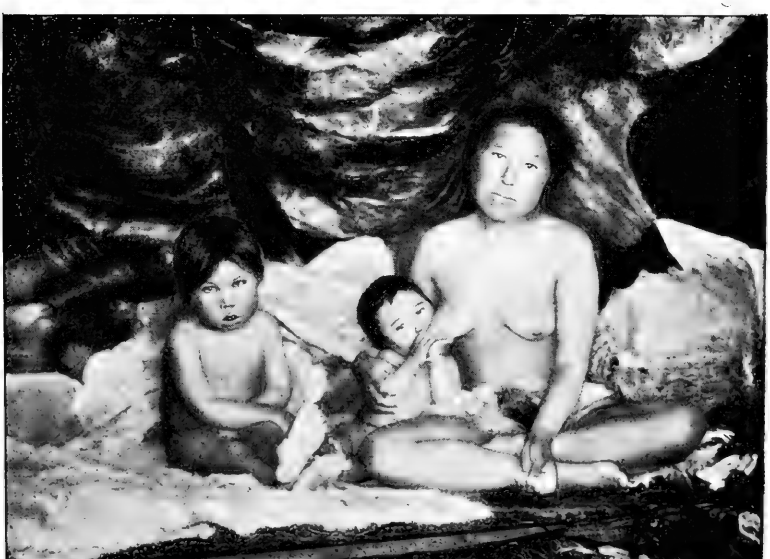

Fig. 23.

V.

The practical sense, which is so apparent in the structure of the Polar Eskimo house, reveals itself also in the skin-clothing; and various features, which at first sight produce a comic or incomplete impression, on closer acquaintance are found to rest on practical adaptation to the climate or the necessities of the material.

The separate parts of the clothing are: kamikker (boots), skin-stockings, trousers, under furcoat, over furcoat and mittens.

When the Polar Eskimos come into a winter-house or a tent, where the lamps are lit and the room warm, all the clothes are taken off with exception of the trousers. The women must always keep the trousers on, but it is quite common for the men to lie on the platform with nothing but paradisiac costume.

The trousers of the women, which are of blue foxes' skin, are but some few — about 10 — cm long and just come up to the seat and the uppermost part of the thighs. As a rule two skins of the blue fox are required for a pair of woman's trousers. The men's trousers on the other hand are of bear's skin and of considerably greater length, extending from the knees to the upper part of the thighs, where the band is pulled together with a string which thus comes to rest on the *trochanter major* of the thigh-bone on each side. For a European it would be very difficult to keep up the trousers in this manner; but for the Eskimos it is customary and natural. And it is also very practical, in agreement with the material and the conditions. If, namely, the band of the trousers, as with us, came above the hips, with the thick, stiff skin it would seriously interfere with the suppleness and bending the joint between the thigh and the hip-joint. The position in the kayak with the legs stretched out in front, the lateral position on the sledge, the sitting positions on the platform in the house, the bent attitude on cutting up the booty — all cases require the clothing to respect the natural jointing of the body, which is at the hips and not in the middle-line. The warm bearskins are quite indispensable for trousers in the cold climate; the only kind of skin in polar regions, which is just as warm, is that of the musk-ox, which the Polar Eskimos have also occasionally used for trousers. But this skin has practical disadvantages; thus, where dirt, blubber and blood can readily slip off from the hairy covering of the bearskin, the musk-ox has such a woolly covering, the hair is so dense, that the dirt rather gets glued on to it and sticks fast.

Fig. 24.
A boy with kamikker and bearskin trousers; he is holding up his arms, so as to show how the trousers are supported

Practical arrangement also characterises their other clothing. But it cannot be said that the clothing for the feet and legs, which the women have, is very practical or suited to movement. As their trousers do not come far down over the thighs, the kamikker and stockings must come far enough up to do so. For this reason the women wear stout and long kamikker, which come far up above the knee and make it appear as if they had the legs of an elephant. The kamikker of the men, on the other hand, only reach to just below the knee, where the upper edge is fastened by a string round the skin-stockings. The kamikker may also be drawn tight at the ankles by a leather thong, which is passed through two leather loops fixed on the side of the foot above the middle part.

The kamikker of both the men and the women are of seal's skin, which is treated in warm water and then scraped, so as to remove the hairs and the dark outer layer. Their colour is thus light. On the other hand, it does not appear that the Polar Eskimos, like the more southerly Greenlanders, use urine for the tanning of the skins. On the feet of the kamikker an extra sole of specially strong skin is sewed. This sole-skin is first scraped on the upper side, i. e. the inner side of the skin, by means of a curved blade of an "ulo", so that it should not be too thick and unbendable. After it is then well-chewed once more, it is sewed along the edge which is turned up a little. During the sewing the women constantly use their teeth on the edge of the sole, to make it more pliable and easier to pierce with the needle. The method of sewing on the sole is quite the same as in attaching a patch on a hole in the skin-boat. The stitches are not passed in and out through the skin and foot of the kamik, but along both skins, so that no stitch goes right through either of the skins. On the outside the skin of the sole has a fine wrinkling, produced without the use of any special instrument.

The Polar Eskimos do not have any over-shoes, such as were worn by the Eskimos in Southern Greenland up to the 18th century and which are mentioned by Roald Amundsen as still occurring among the Netchillik Eskimos.

Under the kamikker are worn the skin stockings, which have the same length as the men's and women's kamikker respectively. They are of hare-skin, which is white the whole year round in the polar regions. For this use the hare-skins are said to far excel those of the fox and dog; they are softer and more pliable, do not cause sweating of the feet so readily, are more easily dried and never become so stiff and uncom-

Fig. 25.

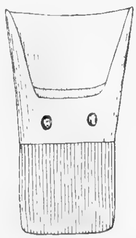

Fig. 26.
Bone-scraper with wooden handle. 7,5 cm long; 3,7—3,9 cm broad.

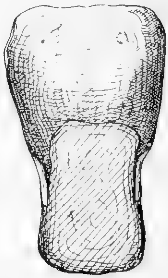

Fig. 27.
A "softening scraper" with wooden handle and a piece of tin-plate from a preserving tin. 10,5 cm long, 4,2—5,9 cm broad.

fortable. Dried grass is used as stopping between the kamikker and hare-skin stockings, especially under the sole of the foot. To keep their extremely high foot-ware stiff, the women further use a piece of stiff seal's skin of the form shown in fig. 25. This is inserted in the kamik between this and the hare-skin stocking and in front of the shin-bone, so that it goes from the instep to the knee. Its length is ca. 35 cm and its breadth 16—18 cm.

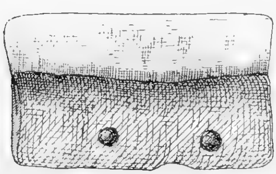

Fig. 28.
Skin-scraper with bone-handle and iron plate. 10.5 cm long, 6.2 cm broad, the iron plate occupying 2.8 cm. On the bone handle a couple of holes can be seen, one of which goes right through.

It is only possible to go some few days with such skin foot-ware before it becomes sodden with the wet. The stockings and grass must then be taken out of the kamikker and dried, and these must likewise be cleaned, dried and made soft again by rubbing (kamjute). In South Greenland it is common first of all to wash the dirt from the kamikker, bût up here, where water is a more costly commodity, they are scraped clean with a bone instrument (fig. 26). After this a scraper with a blade of iron and a short handle is used for the "kamjuting" (fig. 27). In scraping the hollow edge of the blade is held forward.

These two instruments, the kamik cleaner and the softening scraper, must not be confused with the true skin-scraper, which is also quite different from the "ulo" or woman's knive, of which again there is a couple of forms. The blubber on the inner side of the fresh skin is cut away by means of the ulo. Then the skin is treated in warm water and afterwards the hairy layer is scraped off with a skin-scraper with an iron edge (fig. 28). Of the forms of ulo (cf. figs. 53, 58, 61) the one with the strong curved edge is used in cutting the skin and as the usual instrument during sewing, in short it plays the part of scissors. The women now and then sharpen this against a stone or by using the sewing-needle as a "steel".

On the upper part of the body, as mentioned, the men and women wear innermost a pelt which is made of the skins of the Auk or Little Auk, sewed together with the feather side inmost towards the body. This bird-skin shirt is soft and warm, but it has the disadvantage, that it is impossible to keep it free from lice. A linen shirt was therefore the most highly esteemed article of clothing one could offer a Polar Eskimo, for the reason, so they said, that they could see the lice in it It is not to be assumed, however, that they have quite given up the fight against their small plagues in the bird-skin pelt, as they have constructed a practical lice-catcher, consisting of a stick 35—40 cm long, on the end of which a piece of bear-skin is fastened; in this the insects get trapped when the instrument is rubbed in under the feathers. Naturally, the "catch" is eaten by the Polar Eskimos, as by most other nature-folk. There is further a special skin-scratcher, consisting of a wooden shaft with a head of bone.

To make a bird-skin shirt means very considerable work. The skins are pulled off the birds whole, so that the feathers come to be inside, and hung up for preserving and drying on a thong, which is passed through a hole made with a bone needle. When the skins are again taken down for treatment, they are subjected to a very careful process of chewing; the women place the skin in their mouths and chew it, turning it round and round in the mouth, until every little bit of the skin has been chewed. The skin is thus softened and made smooth, and the fat sucked out. After drying it is then cut up.

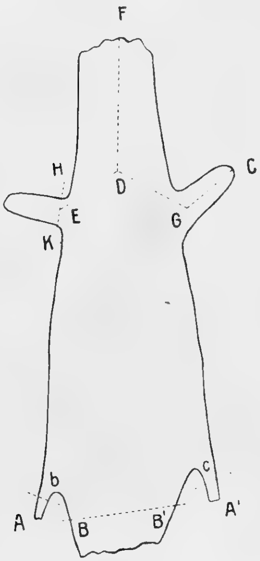

Fig. 29.

The process of cutting up is shown on fig. 29, which represents a Little Auk skin turned inside out, on which I have endeavoured by means of letters and dots to show the lines along which the skin is cut up with the ulo. First the tail is cut off along the dotted line *BB'*, and then the ends of the two skin-stumps of the legs *A* and *A'* along the dotted lines at *b* and *c*. The third and fourth sections are made along the profile of the figure from *B* to *b* and from *B'* to *c*, so that the hind end of the skin, instead of 3 small, comes to have one large opening. Then the skin of the one wing is cut off along the line *HK*. The next cut begins in the middle of the skin of the other wing at *G*, is carried from there up to *D* and further to *E*. Thereafter the skin is cut along profile line from *K* to *A* and then the middle line *DF* of the neck-skin. As a rule the line *GC*, the uncut wing, is not cut until the last. The skin is now folded out like a plate and can be sewed together with others, for which purpose, however, it is somewhat clipped along the edges. About 100 skins of the Little Auk is used for one of these inner pelts, whilst of the Auk not a fourth part of this number is required; but the pelt of the Little Auk is said to be the softest and warmest.

The person from whom I had most opportunity to obtain this information was a young, pregnant woman Inadtliak, who was busy preparing for future use an "amaut", or a pelt in which to carry the child on her back. She had made a shield-shaped piece of tanned sealskin for her new Little Auk pelt, to be placed outside at the back, so that the pelt came to stand out at the back and form a space for the expected

Fig. 30.
Inadtliak and her litte son. She is sitting in the open on some skins and, the sun being warm, has for a moment taken off both her kamikker and bird-skin pelt for mending purposes.

child, which would be lodged between her bare back and the bird-skin. For the time being, she stopped up the space with the hood of the skin-pelt, so that her back should not freeze.

Whilst the inner pelt has the feather side innermost, the outer pelt, which is made of the skins of seals, foxes or reindeer, always has the hairy side outermost. The sealskin pelt is used in summer, whilst the others belong to the winter, though the old Krulé went about in a fox-skin pelt during the summer. On very sunny and warm days many persons only wear the inner pelt. The pelt is provided with a hood, to be pulled over the head, so that only the face is bare surrounded by a skin border. The women, who are carrying a child in the "amaut", have however a loose, helmet-shaped skin hat, which is fastened under the chin by a band; they use further

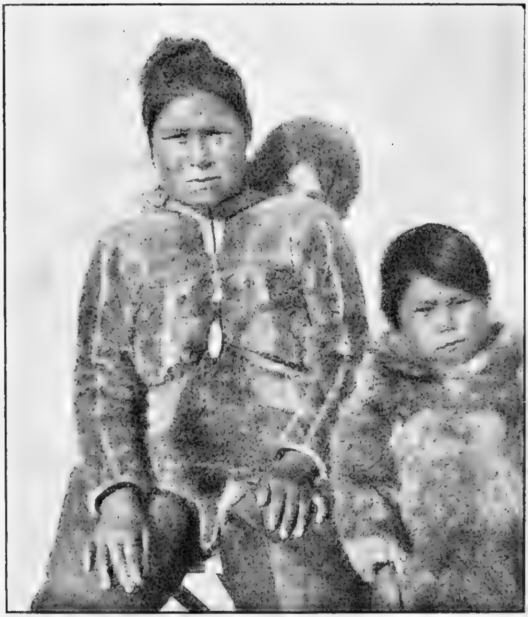

Fig. 31.
Kagssâluk with her two children, the girl Natû with the hood of the foxskin pelt over her head sitting in the amaut of sealskin pelt and the boy Inuterk, who like Natû is clad in a foxskin pelt.

a narrow, skin strap which is fastened at the one end in the middle line of the pelt between the breasts; from here it is carried round the back under the bag or pouch, to prevent the child from sinking down, and is then brought right round the other side and buttoned, the free end having a short cross-piece of bone which is twisted under the fixed end on the breast.

After their intercourse with the Danish Literary Expedition of 1903—04, the men have found it practical to imitate the Europeans and have a pocket on the front of the pelt. They use it chiefly to hold their pipe and tobacco; sometimes it is ornamented with a pearl-button. The upper parts of the pelt over the shoulders and breast are sewn and cut according to

Fig. 32.
the same as fig 31.

a traditional custom, which will not be further considered here, but a close comparison with materials from other tribes would certainly give very interesting information regarding the developmental history of the dress. The same applies also to the flaps or lappets, which end the pelt below, in front and behind; they are a little larger behind than in front and somewhat larger for the women than the men. With regard to these lappets, however, I cannot refrain from one remark.

It is a well-known fact that their distribution agrees fairly exactly with that of the Eskimos, whereas all other arctic peoples have a quite rounded, straight-cut edge to their-coats, even though this, as is most usual, reaches a good piece down on the legs, sometimes even almost to the ankles. If we look now at the skin-coats of the Eivillik and Kinipetu Eskimos on the west side of Hudson Bay and Barren Grounds, which have only become known within recent years through the figures of Canadian travellers, especially A. P. Low, we are most struck by the extent of these lappets, their breadth and length. The lower edge of the pelt reaches at the sides only to the hips, but from here the coat slopes down in front and at the back, so that the side-edges meet at the level of the knees, or even a little lower down, as they form a wide sweep below. In such cases we might as well talk of notches at the sides of the pelt as of lappets in the middle. And my idea is, that the Eskimos have originally worn a fairly long, loose pelt, but that this has proved to be unpractical in the narrow kayak, when the Eskimos changed from the kneeling position in the birch canoes to the sitting position in the kayak. In adapting themselves to the narrower space for sitting in, the men have then got the coats made with the opening at the sides, whilst the front and back parts have remained as large flaps, as there was room for these in the kayak. Gradually, however, these flaps, which were only useless rudiments, have decreased in size to the small lappets, which we find among the Polar Eskimos and which should thus be the last apparent reminders of the long pelt. That the women's coat has also passed through the same developmental process does not contradict the theory, as it would be a common correlation phenomenon, that the flaps should also be the same in the woman's coat. And the fact, that the lappets among the Eskimos are always greatest on the woman's coat, just indicates that the development may have proceeded along the lines described.

The Polar Eskimo coat and especially that of the men is thus constructed on the articulated principle with bare skin at the joints so as not to hinder the movements. For the sake of warmth an edging of the long-haired bear-skin is often used at the joints, for example, round the upper edge of the women's stockings and round the wrists; on the man's pelt, probably for similar reasons, there is a small bear-skin flap, which sticks out under the chin.

Fig. 33.
A boy in bearskin trousers and sealskin pelt.

When it gets very cold, the joints are bound round with fox-tails, and it is also said that a fox's tail is hung over the nose from the forehead. Short skin mittens with one finger are worn on the hands; they are filled with dry grass. Even in summer there were some among both the men and the women who went about with mittens on; thus the old Masaitsiak wore them even on mild, sunny days. When the women are sitting down and their hands are freezing, they stick them down in the long kamikker inside the hare-skin stockings.

The skins, which are to be used as pelts and thus have the hair kept on, must also undergo a long treatment. First as much blubber as possible is cut and scraped off with the ulo; then the skin is stretched out on the ground to dry, being held down by numerous pieces of bone — 50 or more — which are stuck into the ground through holes in the edges of the skin. The skin is thus tightly stretched out with the inner side uppermost.

When it is quite dry, the women take the skin and chew it thoroughly on its inner side, in order to get as much fat out as possible and make it soft. Then it is dried once again and scraped with the blunt-edged skin-scraper, so that it becomes soft and flexible. There can be no doubt that the chewing of these large skins is exceedingly hard work. A woman is said to be able to chew two reindeer skins in a day, but she cannot keep at it from day to day.

The cutting-up of the skins into pieces of clothing is done by the women, quite freely with the curved ulo, without using any measurer or model. The model they follow must be so fixed by tradition and so much a matter of practice, that it is used almost reflexly and unconsciously. The Eskimo works with such ease at a skin-coat, that one gets the impression, she does not use much brain-work on it. In sewing she sits on the platform with the legs crossed, in the fashion of the Turks. The skin is held with the feet, for example, by fixing it between the big toe and the second toe on the right foot, by holding it between the big toe of the right foot and the left leg or by placing it between the left knee and the right foot. The needle, which now is of European make, is carried from the right to the left. With thicker skins a thimble is used on the forefinger. The thread is unravelled as it is used from a bundle of sinews, which is softened in the mouth. This is constantly being used during the work, as the skin edges to be sewn together are softened by chewing, and the finished seam is treated in the same manner. A pin-cushion is sometimes used for keeping the needles in, made of a small skin-bag containing some moss, and all the sewing requisites are kept in a small skin-bag.

True ornaments or other colours than those naturally possessed by the skins are not used to any extent on the dress, nor on the implements. This comes partly from the lack of ornamental materials, partly from the fact, that the practical struggle for life — at any rate in earlier years — engaged all their powers and interest, so that no energy was left unused which could be converted into such uneconomical things as ornaments. Among the Polar Eskimos all things are judged by a purely practical standard; but as the struggle for life has now been made easier for them in several ways, it will be interesting to follow their future development and, for example, observe how a desire for ornamentation with the use of European buttons, pearls, bands etc., will also certainly develop amongst them. A beginning of this kind was indeed already to be noticed. Thus, one of the women (Fig. 30) was wearing a narrow skin-ring round the neck and for $^{2}/_{5}$ths of its extent the front edge of the ring was beset alternately with small, black and white beads; further, three small fringes on the front edge of the ring each ended in a large, glass bead and the middle fringe was ornamented by a large, white button. I saw a more indigenous case of ornamentation on the kamikker of a young woman (Fig. 86). In the middle line above and in front these had a 3—4 cm broad piece of black skin, which composed more than $^{1}/_{3}$rd of the length of the kamikker in front of the leg and looked quite pretty. In answer to my question, I received the explanation, that she had not had sufficient of the light-coloured skin for the kamikker and had to eke it out with the black; she had thought it best therefore to make both kamikker in the same way. Nevertheless she had also understood how to make them so as to look best. It is also possible, that the Polar Eskimos will in future simply take over the West Greenland ornamentation, adapting it somewhat to their special conditions.

As will appear from the photographs given here of the Polar Eskimos, the men wear their hair long and usually hanging loose down from the head, so that they are obliged every moment to give a small toss with the head or take their hands to clear their eyes. Sometimes, however, they use a thin string of skin as hair-band, bringing it from the upper part of the forehead round the temples to the back of the neck. The women almost always have their hair bound up in a string of skin like a chignon or a small top. Only one little girl had obtained a red band for the hair, and there did not appear to be any great desire to possess coloured bands.

The little older children were clothed in quite the same way as the adults. The boys had the bearskin trousers, reaching down to the knees, whilst the girls have the long kamikker and the small, short foxskin trousers. The smallest children seem however to wear generally a loose hood; I saw two children with amulets round the neck, consisting of the head and claws of a raven. The very small children unable to walk are constantly carried in the "amaut", where they are "cradled and rocked". It is only when the child has to have milk that it is taken out of the back-pouch; this is done by the mother leaning forward and carefully shaking the young one out over the one shoulder. The youngest children are suckled for a very long time; I have seen a 5 years' old boy regularly taking milk at his mother's breast, but even older children are said to do the same.

Water is for the greater part of the year too costly a commodity to find any other use than drinking, so that neither the children nor the older people have known what it is to be washed. I have however seen a mother dry her child's dirty fingers on a white gull's skin. Such is also sometimes used by the grown-up people in the tent, to clean their fingers after they had eaten; possibly, however, this use is of more recent origin.

In the previous pages of this chapter I have just touched upon the question of the woman's work and place among the Polar Eskimos. In contrast to most other hunting-peoples in milder parts of the globe, where the chief occupation of the woman is the collection of easily obtained objects of food, here in the Polar North her duties with the preparing of skins and making of clothes mean work of a mechanical kind and lead to a special development in various directions. If we enquire what special kind of mechanical work it is that lays most claim on the time and physical powers of the woman, we find that it is such a primitive form of activity as the chewing of skins, and next the scraping of skins. Then come cutting and sewing with sharp instruments such as tke knive and needle.

The only division of labour practised among the Polar Eskimos is that between man and wife. Each man and each woman, to be considered as a fully qualified member of the tribe, must be able to do and carry out all that may fall to the lot of his or her sex. And this is by no means little. There is perhaps no nature-people, where the requirements in the way of mechanical production are greater than among the Polar Eskimos. This is connected partly with the difficult conditions of life in Polar lands, partly with the great variations in the seasons, which require not only different kinds of dwellings and clothing, but also different apparatus for the different seasons of the year.

Making of the apparatus falls to the man. The material he chiefly works in is bone and wood, and now also metals, which in earlier days were replaced by stone and by the natural iron occurring in the region of Cape York. If we enquire, in the same manner as for the women, what is the special, mechanical hand craft exercised by the men, we find similarly that the sharp instruments for cutting and hewing play in the Polar Eskimo's occupations, compared with European hand-worker's, a less important part than such instruments as are used for filing, sawing, scraping and boring. Even the teeth also play a considerable role with the man, for example, to soften the skin-thongs or straps, loosening of knots and as a fixed holding-apparatus on numerous occasions.

The fact seems to be that the Polar Eskimos have not adapted themselves to the European methods to the same extent as they have to the European apparatus. These have just been taken over into the methods of the stone-age and naturally have altered and modified this, but the underlying traditions of the stone-age are constantly to be noticed. The transition from the stone-age to the use of European iron apparatus had already had a good preliminary before 1818 in the use of the meteoric iron, and the transition proceeded slowly in the course of a couple of generations, materials being introduced little by little by intercourse with the whalers and expeditions as also by wreckage and the forsaken ships of expeditions.

When Peary began his expeditions in 1891, the true stone-age was already past, and the era he introduced, by providing the Polar Eskimos with the most modern guns and other apparatus for hunting, is best described by saying, that he brought in among the Eskimos the keen production of modern European-American civilisation. In this way a danger has arisen for them, as it is conceivable that they will now be able to destroy or at any rate greatly decimate the stock of the bears and foxes especially. And without the skins of these animals for clothing, their cold land will become almost uninhabitable.

It must not be believed, that any and every kind of European implement found a welcome in the eyes of the Polar Eskimos. They have had a remarkably good understanding of how to choose out the kinds and forms, which were best suited for their requirements. The most useful European instrument a Polar Eskimo can obtain is still a file. By means of steel-files pieces of whalrus and narwhal teeth are worked up into harpoon points, as foreshafts of the harpoons, as protectors under the sledge-runners and for several other purposes. For sawing is used a ship's saw, quite 30 cm in length, of the best American manufacture; the back-edge of the saw is ground sharp and used for hewing and chopping. The steel-knife is used for cutting up the animals taken in the hunt and plays the part of both a cutting and scraping instrument in the making of apparatus. For boring, on the other hand, there is still used the Eskimo drill with a bone mouth-piece, the bow being usually formed of a seal's rib and a skin thong, and the point is now always of metal.

It is in fact a point of no little cultural interest from the historical side to make clear, what European apparatus can be absorbed by a strange culture. We see very clearly among the Polar Eskimos, that they have chosen the apparatus, which for them meant a reduction of labour in their old modes of procedure. But they have still held fast to their old methods and the old forms, in so far as they were not obliged to modify them in using the new apparatus.

The Polar Eskimos are thus to a certain extent still people of the stone-age, who are employing the help yielded by the modern mechanical methods, without adopting the mental accompaniments. For them iron is a material of similar kind to bone, and they deal with bone and metal in quite the same manner, with the file.

I found an interesting example of this in a harpoon-point (fig. 34) of the Polar Eskimo Manigssok; every part of it had been filed out of a massive piece of iron. As a rule only the point is of iron, whilst the head-piece is of filed bone (cf. fig. 35, which likewise shows the second of the two forms of harpoon-points common among the Polar Eskimos; it is used for the white whale and narwhal, whilst fig. 34 is for the walrus and seal). The iron point, fig. 34, is in all details an exact copy of the commonly used form. It is likewise a witness of the surprising, technical skill of the Polar-Eskimos, as without any other assistance whatsoever, with the file in the right hand and the object in the left, they are able to make such a uniform and faultless implement. During the work they support the left hand on the knee or the thigh, but there is no talk of making measurements or of copying from something already completed. They produce so to speak by "heart" the forms of apparatus they are accustomed to.

One cannot help being impressed by the ease, rapidity and practical sense with which they work, in spite of the lack of all the many means of assistance, which the European workshop affords our workers. I was present, for example, when Samik sawed through a piece of an antler of a reindeer, longways with a ship's saw. First of all he chopped off the round tines on two diametrically opposite sides by means of the sharp back-edge of the saw, so that he was freed from cutting

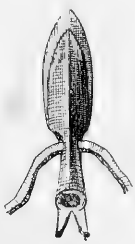

Fig. 34.
Harpoon point; a piece of leather thong passes through the cross-hole. 7,6 cm long, up to 1,6 cm broad, 1,5 cm thick.

Fig. 35.
Harpoon point of bone with a small iron tip, fixed by a nail. 13,8 cm long, up to 3,7 cm broad, 2 cm thick.

through these parts. A hand-worker would do exactly the same. Then he began to saw the antler, holding it in the left hand, lightly supported on the left leg. Later also, he sawed off some small pieces in the same manner. It looked most dangerous but was carried out with steadiness and accuracy.

They all seem to be able to use their hands with the same cleverness and certainty. I can remember, for example, how Uvdloriark sat outside his tent and with the back-edge of his ship's saw cut into shape a walrus-rib, which was to be used as the frame of a drum. He held the bone enclosed in his left hand, with the back of the hand resting on the legging of the kamik of the left leg, and cut right down towards the index finger which lay along the bone. He could bring the cutting edge of the saw with force right in under the index finger without cutting himself, and the accurately cut pieces being chipped off the bone quickly acquired the desired form. Later, the bone thus cut down was bent by alternately working with the hands and dipping it in hot water.

After hunting the Polar Eskimos take the greatest interest in hand-work. We cannot help noticing the attention and intelligence, with which they take hold of and consider an apparatus, they get into their hands, the use of which they know. Nor would it be possible for them to sit and work at their apparatus with the care and accuracy they employ, if a certain amount of pleasure in working with the hands was not present.

"Hand culture" stands very high among the Polar Eskimos and it has scarcely at any time been higher than it is now. On this point as on others there can be no talk of any "demoralisation" among them. On the contrary, their acquisition of the European aids has opened up the possibility of further development of skill and ingenuity in overcomiug technical difficulties, which in the old days of the stone-inplements could only be overcome by the employment of an enormous amount of time and patience.

The child is taught partly by play and imitation, partly by the direct instruction of the father. Toys for the smaller children are made by the father from bone, in the shape of figures representing animals and human beings. It is not impossible, however, that some of the figures do duty as a kind of pedagogic means of instruction. The larger boys make for themselves toy-harpoons, toy-sledges, toy-stools for Maupok-hunting etc., and these are true copies of the apparatus of the older Eskimos'.

Before the Polar Eskimos obtained guns, and before the Ponds Inlet Eskimos taught them the use of the kayak and the bow and arrow, about 1862—63, the dog-sledge, the harpoon and the lance were their principal means of making a livelihood, and they are still that. It has already been mentioned, how the first expeditions found these apparatus composed of small pieces of bone and wood bound together.

At the present day the lack of wood is not so great; but we can still see sledges on which the runners do not consist of a single piece of wood, but of several pieces bound together with thongs. For example, Ajorsalik had a sledge, in which the one runner had 7, the other 5 pieces of wood, which were exactly fitted to each other and securely lashed together. Each of these sledge runners was 2,5 m long and 17,5 cm high; of this however 1,5—2,8 cm went to the shoes of the runners, which in front were thinner than behind. The breadth of the shoe is ca. 2—2,5 cm. In front the runners curve evenly upwards, and a little before the front end begin the cross-trees, which in Ajorsalik's sledge numbered 12 in all. The two uprights behind rise 75 cm above the sledge and are connected with one another by a cross-piece and a couple of intercrossing straps. The breadth of the sledge from runner to runner was only ca. 55 cm, whilst the cross-trees were 60 cm long and thus extended a little beyond the runners. This long, narrow form is characteristic for the Polar Eskimo's sledge and distinguishes it for example from the shorter and broader sledges used in West Greenland.

Instead of shoes of filed pieces of walrus and narwhal teeth the Eskimos now also use iron-shoes. There are even a few of the specially expert hunters who now keep two sledges, one with ivory shoes and the other with iron shoes. The former, namely, are said to be best on the wet ice in the autumn and spring, whilst the iron shoes are best on the ice during the rest of the winter and on land. The method of giving the runners ice-shoes is also known, melting snow being rubbed on them; it is chiefly used in the autumn. Early in

March 1892 Peary whilst on a sledge-journey observed a some different procedure, which he describes as follows. "The bottoms of the runners (are first covered) with a continuous strip of thick walrus hide, 2½ inches wide, with the hair on. This was fastened on by rawhide lashings passed through slits cut in the edges. When this was frozen hard, a coating of snow dipped in warm urine was applied and shaped and pressed with the hands, until the entire length of the runner was covered three-fourths of an inch to an inch thick. This, in turn, was allowed to freeze solid, and then chipped and smoothed with a knife, and finally rubbed down with the hand dipped in water"[1].

Whilst the first expeditions usually met with small packs of dogs it is now common for good hunters to have a considerable number. A man like Samik has a score of dogs. A single team may now consist of up to 12 dogs, though 6—8 is about the usual number. If a man has two teams, one of them is often driven by a boy, a son or relative, who may have almost the position of a servant. The method of driving is highly developed and of the same kind as in West Greenland. The team is directed with the long whip and with shouts of definite meaning for stopping, turning to the one side and the other, swifter movement, danger, bear and so on. These signals are not common for all, but different for every one. Each driver himself trains his dogs and teaches them his own signals, so that it is very difficult for others to drive them.

The Polar Eskimo dogs belong to a specially large, fine and strong race, which however stands near to the sledge-dog of West Greenland. In West Greenland the dogs are always allowed to go loose about the settlement; among the Polar Eskimos they are always tied up, and they are better and more systematically fed than in the south. The natives are simply

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[1] Northward etc. Vol. I, p. 228.

obliged to do this up there, where the dogs cannot themselves go and seek for food on the beach, as they would then rob the food-depots or break into the houses. Just as in the more southerly West Greenland, the dogs are sometimes placed out on the small islands in the summer, where they are permitted to run about loose, but even here they are fed with a certain amount of regularity, which however does not always mean daily. Such a "dog-island" lies off the coast at the settlement Umanark. In order that the dogs when fastened in the leashes should not be able to free themselves by chewing through the leather, it is said to be common for the dogs, when still puppies, to have their molars crushed by means of a stone[1]. Dog-flesh is only eaten in cases of want.

The two common forms of harpoon-points and their different use have already been described above. It would be of considerable interest to obtain an account of the different forms of harpoons. I shall not attempt to give such an account here, however, *inter alia* because I was unable during my short stay to get the matter fully cleared up. I shall therefore content myself with some few preparatory notes. A throwing board is not used for any kind of harpoon. Instead, the shaft of the harpoon, somewhat below the middle, has a small, firmly lashed bone button, which serves as support for the hand in throwing or striking, the button being held between the third and fourth finger.

Quite provisionally for the sake of description and to give a basis for future investigations, I may divide the harpoons into heavy and light. The heavy harpoons have a shaft which the hand can scarcely reach round; its length is usually about 1,5 m, and to this has to be added a foreshaft of bone, the length of which may vary somewhat greatly (ca. 20—40 cm). Of the heavy harpoons again I have seen two kinds, namely,

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[1] Mylius-Erichsen og Moltke, l. c., p. 232.

one with detachable foreshaft and another with a foreshaft which is firmly lashed to the end of the harpoon. Of the light harpoons I have only seen one kind with firmly lashed foreshaft and at the same time a little less in length than the foregoing (in all about 1,5 m).

The heavy harpoon with detachable foreshaft is used from the kayak; the line passes from the point up along the shaft of the harpoon and is fastened by a bone-ring to a small button — now as a rule a nail without head — which is fixed into the shaft a little beyond the bone-button serving as support for the hand. As the foreshaft is broken by the struggles of the wounded animal in the water, the point of the harpoon is set free and also the line from the shaft, and the latter floats up on the water. The various harpoons with fixed foreshaft seem on the other hand always to have another arrangement to let the point and line free. Along the shaft lies a fairly tight thong, about 75 cm long, which is firmly attached to the shaft at the ends and at one spot in between; a coil of the harpoon line is now placed in under the thong and round the middle fixed point in such a way, that it runs out at the moment there is a pull upon the harpoon line. This mode of attachment is specially practical in the case of harpoons, which are not thrown but thrust into the animal and the shaft withdrawn.

A heavy harpoon with fixed foreshaft is used in the walrus-hunting on the ice in the spring. A light form of harpoon with fixed foreshaft is used in the Utok hunting of the spring, or the hunting of the seals which have crawled up on the ice. Which forms of harpoons are employed in the other methods of hunting, as for example on the smooth ice and in the Maupok hunting, has not been cleared up with certainty. It will be of importance especially to ascertain, whether a harpoon with fixed or detachable foreshaft is used in the Maupok method. An interesting question is also, whether the Polar Eskimos, before they learnt the use of the kayak, perhaps did not use harpoons with detachable foreshaft at all. These questions may have significance for the solution of the whole problem regarding the origin of the Eskimo culture.

Of the lances I have only seen the kayak lance; this has a detachable foreshaft with firmly attached point. Its length is a little less than that of the kayak harpoon, but it is thick and heavy like the latter. The foreshaft is sometimes a long piece of bone with an inserted, short and flat iron point, sometimes quite a short piece of bone with a long iron point inserted on it; the latter is filed out of a piece of iron bar. As this lance is also used as a throwing implement from the kayak, a small bladder may be fastened at the upper end of the shaft of the lance, so that the lance floats on the water, when it breaks loose from the animal struck. On fig. 36 this small bladder is shown lying at the back of the kayak just in front of the large hunting-bladder.

With regard to the bow and arrow and the kayak, the Polar Eskimos use them just as the Central Eskimos and especially the Baffin Landers do, as it was from Ponds Inlet, as I have shown above, that they have learnt the use of these implements. The bow is what F. v. Luschan has called a "composite and strengthened" bow to distinguish it from the true "compound" bow, which has its finest representative in the Asiatic, so-called Turkish bow. The Polar Eskimo bow consists of 3 pieces of reindeer antler, the two meeting-places of which are covered by an upper and under plate of the same material and bound round by leather thongs; on the back of the bow there is also a number of longitudinal leather thongs or, in very fine examples, strings formed from plaited tendons of the narwhal.

The bow has now been displaced by the gun, but most of the men have used the bow and arrow in the reindeer hunts in their younger days, and they can still both manage and make these things. In shooting the arrow is held between the

Fig. 36.

forefinger and middle finger of the right hand. The shaft of the arrow is of wood with or without two laterally placed steering-feathers, and to the fore-end of this shaft is lashed a tine from the antlers of a deer, with or without an iron point and also with or without barbs.

During our stay at North Star Bay in 1909 a small number of bows with corresponding arrows were made at request by the old Masaitsiak, who was probably one of the few who had never hunted reindeer with any other weapon. As I observed that the length of these bows, which were made by the same man, was different, becoming gradually shorter, I made an attempt to get information regarding the more or less purposeful, established custom for the size of the bow; it seemed to me namely that there must be some principle or rule. Unfortunately this as well as various other investigations were difficult to carry through, owing to the fact that my interpreter from West Greenland was not specially fit for the task.

It appeared however, in the first place, that Masaitsiak was quite aware, that these bows and arrows were not made really for reindeer hunting, but only to satisfy the odd whims of the strangers, so that they did not require to be exactly right, and owing to the scarcity of material he was free to reduce their length. It appeared, further, that the regulation length of the bow was taken from the distance between the outstretched finger-tips of the left hand and a little way beyond the middle line of the breast; its length would be 79—80 cm in Masaitsiak's case. The length of the arrow — excluding the bone fore-part with the iron-point, which did not seem to have any definite regulation length — was indicated by him by bending the left arm at a right angle and stretching the fore-arm and fingers straight out; the length of the arrow shaft would thus be from the inner side of the elbow-joint to the tips of the fingers. One of the arrows he made for me had the right length (42 cm plus 12 cm for the bone fore-part and iron

Fig. 37.

point), but a second was too short, because — so he said — he had not sufficient wood.

We have here a problem, the solution of which would be of the greatest ethnographic interest. How many pieces do the ethnographic collections not contain, which would prove to be quite valueless types if we knew exactly their previous history? Every one believes himself capable of making an ethnographic collection, in reality it is a highly developed and difficult task, if it is to be done satisfactorily.

Fig. 36 is a drawing after a photograph of the author's showing a Polar Eskimo in his kayak; it will be seen that the man sits in an open space, bounded in front by a rounded piece of wood, on which the central part of the paddle rests in rowing. In this figure the paddle is seen from the side, but in fig. 37 it is seen from the surface. On both sides of the middle piece of the paddle are the thinner parts for the hands, about 8 cm long, while the middle piece is ca 48 cm. Further out a leather-strap is bound round both blades, so as to prevent the water which runs down the blade from reaching the hand; the length of the blade itself is ca. 77 cm and the breadth up to 8 cm. The whole length of the paddle is about 260 cm and no part of it is made of bone.

Fig. 36 shows the harpoon lying in front of the kayak, with the foreshaft turned towards the man; leather thongs hold it down to the kayak. Under the harpoon are the coils of the line, which passes from there to the right of the man and back to the large bladder, which is seen lying behind on the kayak immediately behind the already mentioned small bladder.

The large bladder is made from a skin of the fjord seal and the shrivelled up front-flippers of the seal are seen to be still attached to the bladder. Under the hind part of the large bladder lies a square wooden frame, the bottom of which is covered by a skin; this frame is thrown into the water and is dragged along 3—4 m behind the bladder by means of a string, which is attached to the bladder at the same place as the harpoon line. The speed of the attached animal through the water is further hindered by this contrivance. On the figure can be seen some of the 8 strings which are fastened to the frame; above the centre of this the strings are fastened together on one line which passes to the front end of the large bladder. Behind the frame and the bladders is seen the lance, which is held fast under a pair of thongs on the left side of the deck of the kayak.

Fig. 38 is a diagrammatic sketch of a Polar Eskimo kayak seen from above; so far as the lengths and breadths are concerned the measurements are in the correct proportions ($AB = 5{,}3$ m). The lashings which keep the harpoon and lance in their place are represented at C, D (2 straps bound together at the middle), E and F; *abcd* is the opening of the kayak. K is the rounded wooden piece on which the paddle rests during rowing. G and H are a couple of pieces of bone or wood, on which the harpoon is placed when approaching the prey,

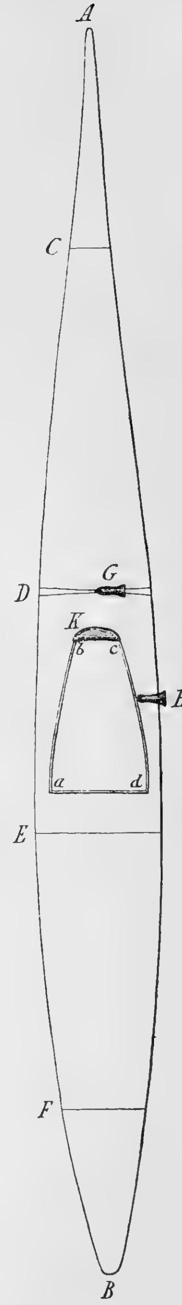

Fig. 38

for convenience in seizing and slinging it out. In the kayak itself or on the front deck a gun may nowadays also be carried, sometimes lashed to the kayak by a thong so that it should not be lost if it fell overboard. The Polar Eskimos are very careless in their ways of keeping and looking after their weapons. The well known Eskimo bird-dart is not at all used.

As mentioned previously, this form of kayak is only in small degree suited for use on the sea. And the Polar Eskimos for this reason took great interest in the West Greenland kayaks, which the Expedition had brought with it, and a West Greenland kayak which Knud Rasmussen had taken up on an earlier occasion had even already produced an effect, which could be traced in some of the kayaks at Umanark.

The open kayak of the Polar Eskimos or rather of the Ponds Inlet Eskimos is more suited for use on rivers than on the sea. The square, open frame is certainly also a relict of the birch-bark canoe, which was only covered over in front and behind. Models of the Canadian birch-bark canoes are to be found in the "Museum für Völkerkunde" in Berlin and in these the upper deck extends over $^2/_3$rds of the length of the canoe, so that the middle third is open[1]. That the well of the kayak has become narrower in front, is possibly connected with the fixing of the wooden board mentioned as support for the paddle, by which means the rowing is made easier.

The Polar Eskimo kayak described seems to agree well with the figure Low gives of a kayak from Cape Haven south of Cumberland Sound; on the other hand, it differs from some figures gives by Boas[2] of the kayaks of the Central Eskimos from the southern Baffin Land and Repulse Bay, as these have round wells. In several respects it seems to differ from the

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[1] cf. A. Byham, Die Polarvölker. Leipzig 1909. Pl. X, fig. 2.

[2] The Central Eskimo. 6th Annual Report of the Bureau of Ethnology. Washington 1888, p. 486 *et seq.*

river-kayak covered with deerskin, which is used by the Kinipetu Eskimos, an inland tribe on the Barren Grounds, whom A. P. Low describes as follows[1]: "The Kinipetu kayak is extraordinary in shape. It is long and narrow and quite deep, so that the midship section is almost semicircular. The ends terminate in long narrow points, of which the bow end slopes downward towards the water and the stern end is inclined upwards. This kayak is so narrow that the combing of the well sometimes projects beyond the sides. Being narrow and cranky, a good deal of skill is required to handle these craft with safety, and accidents caused by upsetting are not uncommon. These kayaks are covered with parchment deerskin, and are the only ones painted [in contrast to the kayaks used by the coast Eskimos on Hudson Bay, in Labrador etc.], various colours being obtained from oxide of iron found in the interior". This kayak is only used for inland hunting.

Low explains that the kayak form of these inland Eskimos is peculiar to them, whereas the natives on the west coast of Hudson Bay, especially the Eivillik Eskimos at Repulse Bay and neighbourhood, have quite a different form of kayak, which is more closely related to the kayaks of Labrador and Baffin Land. This information is not without importance. Further, it seems from Low's description of the Kinipetu kayak, though somewhat general statements only are made, that this kayak form possibly again stands somewhat nearer the small birch-bark canoe; I am thinking here, namely, of the statements regarding its narrowness and its semicircular section.

This information does not quite agree, however, with that given by F. Boas[2], according to which there seems to be greater agreement between the Kinipetu implements and those used by the Eivillik Eskimos. On the other hand, it quite agrees with

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[1] l. c., p. 154 *et seq.*

[2] The Eskimo on Baffin Land and Hudson Bay. Bulletin of the American Museum of Natural History. Vol. XV. New York 1901.

James Anderson's observations made on his journey in 1855[1]. He also found that the kayaks were covered by deerskin, and the Eskimos he met with were clothed partly in deerskin and partly in musk-ox skin.

Partly from these and partly from other reports[2] it appears with certainty, however, that there really still lives a tribe of inland Eskimos on the Barren Grounds, which carries on the hunting of the reindeer and musk-ox. The question is thus only, whether these inland Eskimos have once dwelt by the coast and have migrated from the coast into the interior, or whether they have never been in closer touch with the sea, but have always lived in the interior. In the latter case, they are then to be regarded simply as the remains of the original Eskimos before these changed over to the life on the sea coast. Or more correctly, they are in such a case an intermediate stage between the supposed, oldest stage, when they lived as hunters in the birch and pine woods, and the present mode of life on the sea-coasts of the Arctic. They have taken the step from the woods out on to the tree-less tundras and have thus, among other adaptations, been obliged to replace the birch-bark covering of the boat with deerskin.

I shall not enter further into these interesting, but still somewhat uncertain problems regarding the early history of the Eskimo culture. I have already dealt with this question in a work[3], in which I have come to the result, that the Eskimo culture must have developed on a sea-coast of the Arctic, and I have shown, that the point of origin must probably be sought for on the stretch between Hudson Bay and Coronation Golf.

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[1] Journ. Roy. Geogr. Soc. Vols. 26 and 27. London 1856—57.

[2] cf. H. P. Steensby, Om Eskimokulturens Oprindelse. København 1905, pp. 87—88.

[3] l. c.

VI.

In the foregoing pages I have endeavoured among other things to show, how the industrial culture of the Polar Eskimos, solely on the basis of adaptation to the natural geographical conditions, has attained a considerable height, which is expressed partly in their apparatus partly in the "culture of the hands".

With regard to the sociology and psychology of the tribe, to the understanding of which the myths, folk-lore and fables collecled and in part published by Knud Rasmussen[1] will give an essential contribution, I shall express myself here quite briefly.

The high development of individual skill in hunting and hand-craft has led to a corresponding development of intelligence in practical regards. So long as a situation merely requires jugdment of the natural conditions or of those conditions which lie within their practical experience, we can scarcely find more intelligent people than the Polar Eskimos or people with greater ingenuity and powers to get themselves out of a difficult position. This combined with their hardihood makes them incomparable helpers in the polar expeditions.

As an example of the Polar Eskimo's ability to pursue a line of reasoning, I may cite here an answer which Mylius Erichsen received from the angakok Sorkrark to his question: why not a single bear had yet appeared in the neighbourhood

[1] Nye Mennesker. København 1905. The people of the Polar North London 1908.

of Agpat late in the year. "No bears have come because there is no ice, and there is no ice because there is too much wind, and there is too much wind because we mortals have offended the powers". When Sorkrark's practical experience fails, he thus concludes with an anthropomorphism, and he imagined further, that by means of his gut-skin drum and a Shamanistic seance, he would be able to find out, why the "powers" felt themselves offended, but owing to weakness he was obliged to give up.

This example illustrates, if I may say so, the animistic limits of the real comprehension of the Polar Eskimo; they are wider than is the case with many other nature-peoples. On the other hand, their horizon is greatly limited in sociological regards, corresponding to the so primitive nature of their social organisation. Thus I may mention how extremely little connected their notions are with regard to the idea of property. What a man has made for himself is his own property, and the idea that this right of possession can be transferred to another has not developed. In their dealings with Europeans they have, it is true, adapted themselves to a practice in this direction; but cases are constantly arising which show their true feelings in the matter. For example, it is impossible for a European to buy an apparatus of a Polar Eskimo and then hand it over to another Eskimo; the first will never be able to get rid of the idea that it is his property, and he will believe himself entitled to take the apparatus back, as soon as he does not wish the other to have the "loan" of it any longer.

Further, I have hitherto mostly laid emphasis on the purely individualistic traits, which one constantly runs up against among the Polar Eskimos, and which are so much the more striking, as one is not accustomed among the more southerly nature-peoples to meet with such a high individual development in conjunction with so slight a social development. Naturally the life of the Polar Eskimos is not wanting in social features, but everything has contributed to retard the development of the "society", so that the tendency to work and live together, which the Polar Eskimos are certainly also in possession of, has never had the chance to develop.

Practically the only sort of cooperation or subordinate kind of sociological formation we can talk of in the case of the Polar Eskimos, is the settlement; but as this is constantly on the move, sometimes scattering, sometimes concentrating

Fig. 39.
Scene from a summer settlement (drawn by the Eskimo woman Tukuminguark). To the left of the tent are seen two persons in conversation; at least one of them is a woman. To the right a Dane is approaching with his hands in his pockets and behind him an Eskimo. 5 dogs fastened to a stone are welcoming the new-comers, and a 6th dog is trying to get up on a depot-pillar with meat on its top. To the left a sledge and on this, Tukuminguark said, her little son sits playing.

more or less, this unit is not very constant either. The basis for this periodic meeting together at a settlement is in part relationship, in part the comradeship of the hunt. On the other hand, there is no such thing as true alliances or grouping according to age, probably on account of the small numbers and scattered nature of the tribe; nor are any ceremonies or forms known on the attainment of maturity.

The feeling of relationship is not small. It expresses itself, for example, in greater gentleness towards relatives, in contrast to the absence of sympathy and the sharp criticism, which the joke-loving Eskimos display towards everything and everybody not belonging to their own family. The hard struggle for existence has not permitted the Polar Eskimo to become other than a confirmed egoist, who knows nothing of disinterestedness. Towards his enemies he is crafty and deceitful; he does not attack them openly, but indulges in back-biting; he will not meet his deadly enemy face to face, but will shoot or harpoon him from behind. It is very necessary to remember that these Polar Eskimos, who are so smilingly gentle and friendly, even tactful, on meeting, are by no means ideal.

It is only during the hunt that a common interest and a common danger engenders a deeper feeling of comradeship, and this may lead to a few of the hunters of about the same age agreeing to hunt together, journey together and remain at the same settlement, perhaps even if possible live together in the same house. If the natural conditions and the dangerous struggle for existence have prevented the development of a more solid social organisation, they have led on the other hand to a kind of comradeship between the unattached and independent individuals of the male sex. How serious this necessity for comradeship may be, is shown hy an event of recent years. The angakok Kajorapaluk (Peary's Kyoahpadu or Kyo) was a bad character and a bad comrade, who was always offending the other members of the tribe in various ways; but what was specially fatal was, that he was constantly lying and deceiving them with regard to the hunting. Sometimes he amused himself by warning them of bad hunting and consequent famine, in order to frighten them, sometimes he told them that he had seen here or there, for example, the white whale or walrus; but it was always falsehood. At last it became too much for them; it gradually became the common feeling of the tribe, that it would be best to get rid of such a troublesome individual. He was killed by Uvdloriark and Masaitsiak, two of the best men of the tribe, and the latter married the dead man's wife, whom he lives with till this day.

The "public opinion" has very great weight among the Eskimos, and the individual is obliged to give way before it. It maintains the unwritten laws or regulations, which form the basis of the training and attitude towards others of every Polar Eskimo. These fundamental laws are in the main the same as rule among other Arctic Eskimo tribes. As regards West Greenland these laws have been discussed by H. Rink, and in a similar manner as he has done we can formulate some of the principal rules governing the social life of the Polar Eskimos.

(1) The requirement that no man except in case of natural weakness can evade making his own living, and he is still less permitted to interfere with others or prevent them from making their living.

(2) The rule that no one can establish himself in a settlement without the permission of those already settled there.

(3) The practice that the spoils of the hunt, when they are not small, for example not less than a fjord seal among the Polar Eskimos, are divided partly between those taking part in the hunt, partly between the natives at the settlement, and according to definite rules. In times of want the division of the spoils and of the depots is made even more equal, but at such times any person who is disliked runs the risk of being excluded from receiving help.

The man that cannot completely make his own living, owing to either bodily or mental shortcomings, cannot obtain a wife and thus is unable to reproduce his kind. Similarly a hunter who has lost his strength in one way or another, will also as a rule loose his wife, as she will leave him and seek for a better provider, if any such will have her. There is no doubt that this natural selection plays a specially great part in a small hunting community like the Polar Eskimos' and it is very probable, that one of the reasons why the Polar Eskimos are so few in numbers is this, that their hunting life demands so much strength and intelligence and requires such a high grade of constant training, that only the very best can persist in the struggle for life. A related reason for the small numbers however is also the comparatively great difficulty of obtaining objects of food, which might serve as "reserve" in times of want; thus in the earlier days especially the Polar Eskimos to a very great extent lived on the verge of starvation, and their

Fig. 40.
Drawing by the Eskimo woman Arnaruniark, representing the interior of a house, with 4 persons sitting on the main platform; the two outermost are sitting close to the side-platform on which the lamps are indicated. The window is drawn in front, in the plane of the paper. To the right of the house is a kneeling person busy stealing meat from a depot, whilst his comrade is standing and keeping watch, so that no one should come and surprise them in the act of thieving.

lore and stories bear witness, that families or groups were not so seldom in want of food or died from the frost. On such occasions cases of cannibalism have arisen, probably affecting in the first instance the old and the feeble.

Marriage is regarded purely as a condition of property, and chief weight is laid on the woman being able to work as also to bear children. In cases of infertility the marriage bond is very loose and will in many cases be dissolved by discarding the woman. Special weight is laid on the woman being able to bear the male children or the future hunters; but the scarcity of women at the present time has led to their having a more protected position than before. It has further led to the woman being married at a much earlier age than previously, even so early as 12—13 years, though she is said not to develop appreciably earlier than the European woman. On the other hand, the men do not marry before they are fully developed hunters, that is, about twenty years of age or more. At present there is said to be only one man in the tribe who has 2 wives. The well-known Eskimo system of exchanging wives is carried out under festive ceremonies and is also a custom of practical importance; for example, if a man wishes to undertake a journey and his wife for one reason or another is unable to accompany him, the matter can be arranged by making an interim exchange with another man whose wife has no such hindrances. Nevertheless, the Polar Eskimos are to be reckoned among the nature-peoples of good morals; a woman is judged very strictly if she gives herself away to any other but her own husband, unless he commands her to do so, and in their relations to strangers it is exceptional that a man offers his wife in order to gain something by it.

When the Polar Eskimos are face to face with cases in which the settled "public opinion" cannot at once decide the matter, or where a difficult case of sickness or want arises, the "angakok" is called in to clear up the problem by exorcism. In religious matters the Polar Eskimos relies exclusively on the "angakok", who by his art and genius and his conjurations is supposed to make himself master over the powers which rule over life and death, sickness and strength, weather and the animals of the hunt. Knud Rasmussen[1] once obtained a characteristic answer from a Polar Eskimo: "We do not believe in any God as you do. We do not all understand the things that are hid, but those who say, that they understand, them we believe in. We believe in our "angakut" (plural of

[1] Nye Mennesker. pp. 136—137.

angakok), in our conjurers, and we believe in them because we wish to live long, and because we do not wish to run the risk of famine. We believe for the sake of our lives and for the sake of our food. If we did not believe in our priests, the animals we hunt would not be apparent to us; if we did not follow their advice we should become sick and die".

Whilst in secular matters a chieftainship or a differentiated social organism has never developed, the Polar Eskimos in religious regards come under a leadership of developed Shamanism and are thus in so far a step further advanced in religious than in sociological matters. This is certainly connected with the fact, that they have to struggle almost exclusively against nature and the misfortunes arising from the forces of nature, whereas they have not known what it is to be obliged to fight for themselves and their hunting-districts against hostile tribes.

The considerable communication which has existed between the last generations and expeditions has not failed to influence the Polar Eskimos in regard to their views of the world and the hidden powers. They now know that there are many and densely populated lands in addition to their own. And they no longer believe so directly in all the spirits, "tornarssuit", they ascribe to all the localities — house-floor, space behind the skin-walls, the lamp, house-entrance, refuse-heap in front of the entrance, the fells, the sea — from which they have special opportunities of receiving impressions and moods, or in other words, to nearly everything for which they have names. In earlier days they were afraid of these spirits and believed that they had no good-will towards men. Now they are somewhat more superior in these matters, though the belief in spirits is by no means extinct[1].

I am so fortunate as to be able to give an actual illustration of the more open mind with regard to these matters

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[1] cf. Knud Rasmussen: Nye Mennesker, p. 148.

at the present day. Fig. 41 is reproduced from a drawing due to the collaboration of Arnaruniark and her husband Samik. Arnaruniark first drew a fully loaded sledge, with 6 dogs harnessed to it, meaning that it was her husband who was returning home from a successful hunt. Then Samik himself drew a "tornarssuk" in between the traces of the dogs, meaning in jest that it was harnessed to the heavy sledge. Samik himself is seen standing with the whip in his outstretched right hand ready to strike at the "tornarssuk", but Arnaruniark standing

Fig. 41.
The "tornarssuk" fastened to the sledge (drawn by Samik).

behind with the child in the amaut takes hold of his arm to keep him back. After obtaining this explanation from Samik I asked him, if he had seen a "tornarssuk". He replied no, he had never seen him, but he had often heard him among the fells.

It may be remarked expressly, that both this and the other figures reproduced, with hardly any exception, were not drawn by request; the subjects were chosen quite freely by the Polar Eskimos. After I had got one person to make a drawing, there were many willing to do so, and I only required to give the one or the other a drawing-book and a pencil for a day, and then have it returned with a couple of drawings of their own making. Some of them could sit for hours and draw with a seriousness, which showed that the work interested and occupied them. Others I saw asking the opinion of the surrounding Eskimos, whether this or that position was quite correct, whether the arm was held so far back on swinging the whip and so on. Most of the drawings reproduced here have been reduced. The explanatory text is based on information, which I sought in every case to obtain as fully as possible by means of the interpreter.

In the foregoing I have mentioned the feeling of kinship, the comradeship in the hunt, the public opinion and institution of the angakok as the most important, active forces in the primitive Polar Eskimo community. Lastly, a couple of practical statutes were mentioned. But there are others factors, however, which contribute to form the ideas and proceedings of the Polar Eskimos. These are the stories and fables of the tribe, which it has in common with other Eskimo tribes, but in well-marked characteristic variations to an extent which has not yet been sufficiently investigated. Some of these stories and fables are purely descriptive and give an answer to one or other question, for example, the creation of the world; but others contain a rule of life or sketch supernaturally capable hunters or great angakoks, who may stand as examples or types worthy of imitation.

Lastly, there is a number of traditional customs and forms, which have a regulating and determining influence in many conditions of life. There are somewhat complicated customs with regard to confinement and burial, and there are occasions which require the prohibition of definite kinds of food and certain actions. On the other hand, there are no special ceremonies with regard to marriage. Further, amulets and conjuring formulae are used in certain situations. In regard to these things the Polar Eskimos do not exact the precise, well-founded understanding as in the case of the actions which have to do with earning their livelihood. They are carried out simply because they have been prescribed in this way in the old traditions, the origin of which is lost in the dim past.

We touch here on an interesting point, namely, the relation between their absolute, social freedom on the one side and their dependence on tradition on the other. The Polar Eskimo is his own master in everything he does, and he permits no interference from others. He will only take up something new when it has been shown to him in such a manner, that his desire to imitate has been roused. On the other hand, if he is accustomed to do anything, he continues to do it owing to man's natural inertia, even after the reasoning has been forgotten. Even after such a tradition has lost its practical significance, indeed after it has come into conflict with practical interests, it may still be retained as a survival or remnant.

The cultural history of the Polar Eskimos has in fact shown examples of such survivals, which stand in direct conflict with the interests of the tribe. I may recall here firstly, how they had earlier failed to hunt the reindeer, though their neighbourhood was sometimes teeming with these animals, which for most other Eskimos constitute such an important part of the hunt. Further, how they did not fish for the salmon, though they had the opportunity of observing every year, at least in one lake at Etah, the great abundance of this fish, which is also of importance for most other Eskimos. The same thing applies to their ignorance of the kayak. There can be no doubt that these cultural shortcomings must be regarded as survivals of traditions from the time that the Polar Eskimos lived under conditions, when the hunting of the reindeer and the fishing for salmon had to be given up for natural reasons.

How the folk-lore of the Polar Eskimos, their fables, forms, customs, amulets, stand in relation to corresponding phenomena among other Eskimo tribes, and how far their origin can be traced back to other cultures and races of people, need not be further discussed here. I may simply mention, that in various cases we can still detect sometimes a natural instance of adaptation, sometimes a simple analogy, under the influence of which the custom has been formed. Reasoning by analogy seems especially to play a great part, a superficial point of resemblance becoming determinative of the whole matter; for example, when the women make up the soot scraped from the bottom of the cooking-pot into an amulet sewed into their neck-band (Fig. 30), following the reasoning, that lamp-soot is stronger than the fire itself, as the fire has not been able to destroy the soot, and consequently that the lamp-soot is the strongest stuff in the world and able to give protection.

Fig. 42.
Two women in conversation and a dog; scene from the settlement (drawn by the Eskimo woman Alakrasina). The woman to the left has the hood of the outer pelt drawn up over the head; the woman to the right has a child in the "amaut" and the loose, helmet-shaped hood on the head.

The method of reasoning of the Eskimos gives us the impression of being very superficial, because they are not accustomed to retain what we call a definite line of reasoning or a single, isolated subject for any length of time; their thoughts, namely, do not rise to abstractions, or logical formulae, but keep to pictures, of observation or situations, which change according to laws we find it difficult to follow. Their ability to draw is evidence of the nature of this mode of thinking, as also their power of their own accord to choose subjects for reproduction, in spite of the fact, that they never draw, either on their implements or on natural objects. The choice of subject does not seem to offer them the least difficulty; it seemed to be natural, that as soon as they set the pencil to paper, some one or other favourite mental picture, which was extraordinarily clear to them, should begin to appear. In agreement with this also, it was chiefly the women who drew house-apparatus and scenes from the settlement, whilst the men chose to represent animals and scenes of the hunt. One motive which both sexes have shown a predilection for, is a woman with a child in the "amaut". Samik has even drawn in one figure (fig. 43) a pregnant woman, who at the same time carries a child in the amaut. For Samik this situation represents the acme of desirable fertility.

Fig. 43.
Pregnant woman with child in the "amaut" (drawn by Samik).

These drawings of the Polar Eskimos, among whom drawing is not a traditional exercise, but is the occasional unfolding of a latent talent, the presence of which is connected partly with the special mode of thinking, partly with the "culture of the hands", may be compared with drawings of nature-peoples, where drawing has been practised for generations, so that the art has already come under the influence of tradition. As example the bushmen may be cited. We then see that there is no difference in the power to conceive and reproduce, which the Polar Eskimos display with regard to animals and to people. These are reproduced in a manner which bears witness to an almost equally sharp power of observation in both cases. This seems to show, that the well-known tendency among other hunting-peoples, accustomed to draw, to reproduce animals better than men, is not due to the lack of observation of men, but rather on the contrary to the fact, that the man's figure being easiest to recognize is the more readily subject to simplification. Just as with the Polar Eskimos, the nature-peoples do not draw in order to attain any high artistic level; they are satisfied when it can be seen what their intention is.

With regard to the animals, the Polar Eskimos seem to share the view prevailing among nature-peoples, that there is no great line of division between the life and intelligence of men and animals. As Karl v. d. Steinen expresses it, man is rather to be regarded as *primus inter pares* than as an existence which is elevated high above or beyond ordinary living things. The most intelligent of all the animals is the bear, and the soul of the slain bear is also the most dangerous to men; certain rules of precaution must therefore be taken, to prevent the bear from returning to take revenge. These hunting customs are most developed and most comprehensive in regard to the bear, but corresponding ideas exist to less extent in the case of other animals.

The views and feeling of the Polar Eskimos with regard to life are not refined by any kind of poetry or artistic tendencies. If the translations of their folk-lore and tales into a European language seem to give an impression of poetry, it is we who read this into them. For the Polar Eskimos life is deadly real and sober, a constant striving for food and warmth, which is borne with good humour and all dispensations are accepted as natural consequences, about which it is of no use to reason or complain. Death also is accepted with the greatest fortitude and occupies their daily thoughts to an extremely small extent.

As already mentioned, the struggle for existence has been made easier for the Polar Eskimos in our days owing to the improved apparatus, even though it may still happen, as for example in February 1903, that a considerable number of individuals may perish — in the case referred to, half a score perished on a journey over a glacier at Nerkrè. The tribe now has almost a flourishing appearance, and we now find, certainly in consequence of this greater prosperity, that the useless old people and cripples are maintained by the tribe year in year out. In another matter, however, the conditions have not permitted them to display humanity; this is in the case of small children whose mother has died. They are killed by the father, as he finds it impossible to obtain nourishment for them, unless quite exceptionally there may happen to be a woman able to foster them in the settlement.

The Polar Eskimos have very little notion of time. No one knows his own age. Even the age of the children can only be given by the parents after they have sat down and calculated how many winters have passed since the child was born. Except for the light period, the year is divided according to the moons, each of which has its own peculiar name. During the light period it seems to be chiefly the migration of the birds which gives definite points for the determination of time. The days passed, e. g. on a journey, can only approximately be given according to the number of times they have slept. Shorter periods may be indicated, for example, by showing how great a distance the sun will travel across the sky or, if the sun is not to be seen, would travel in the time thought of. But we must remember here, that these statements are chiefly made in conversation with Europeans and in answer to their questions; for the Polar Eskimos themselves, the reckoning of time has not the slightest importance.

Another matter is, that the change of the seasons seems to have a fairly considerable influence on their temperament and moods. A peculiar form of hysteria, more frequent among women than men, is said to be strikingly common late in the autumn, when the winter darkness is just coming on. Such attacks, which last for some few minutes to about half an hour, may however also appear at other times of the year, caused by a sudden fright or other unusual mental shock. In July 1909 I was witness of such an attack in the woman Inadtliak (fig. 30). It lasted 25 minutes. She sat on the ground with the legs stretched out, swaying her body to and fro, sometimes rapidly sometimes more slowly, from side to side and tortuously, whilst she kept her hands comparatively still and only now and then moved her elbows in to her sides. She stared out in front of her quite regardless of the surroundings, and sang or screamed, occasionally changing the tone, iah-iah-iaha-ha . . .; now and then she interjected a sentence, e. g. that now the Danish had at last come to them, and again the great happiness this gave her now in the glad summer-time and so on. Her two small children sat and played about her, whilst the members of the tribe scarcely looked at her during the attack; they seemed to be very well acquainted with such things. She recovered quite suddenly and only some hectic, red spots on her cheeks indicated anything unusual. Without so much as looking about her or betraying a sign of anything unusual she began, literally in the same moment, to give her youngest child milk and then went quietly on to chew a skin. According to Knud Rasmussen's experience this attack was comparatively mild; in other cases the sick person may have a lust for destruction, and men frequently become very dangerous to their surroundings.

The songs of the Polar Eskimos strike one as being very monotonous especially in the beginning, but they improve on closer knowledge, and according to Chr. Léden[1] they are of very considerable musical interest from the historical side. The rule is, that every man or woman who has the ability to sing — for there are also unmusical Polar Eskimos, just as there were a few who said that they had no notion how to draw — themselves make up the melodies or "songs without words", which they sing. It is the exception for any one to sing the melodies of others. I shall not express any opinion here as to the difference between the songs of the men and the women;

[1] On p. 267, line 12, Chr. Refsaas should also be Chr. Léden.

both are without words, but now and then a phrase may be woven into them. In regard to voices, there is a great difference between the roaring, open-air voices of the men and the thin, somewhat soft speech and tones of the women, which speak of adaptation to the business of the house and marriage subjection.

The principal time when they sing is during the dark period, and the real singers are the angakoks, who sing to the accompaniment of the beating of a small stick on the frame of the gut-skin drum, which is of the same kind but on the whole smaller than among other Eskimo tribes. In the beginning of August 1909 I was present at an actual musical entertainment at Umanark given by two angakoks, Masaitsiak and Ajorsalik. At midnight the sun had already begun to go down behind the mountains on the north side of Wolstenholm Sound, so that there was a couple of hours twilight. On a night of this kind Napsanguark had invited his kinsmen to a feast consisting of a rotten seal, which had been caught on the spring-ice and had since then lain in the depot to become rotten in the course of the summer.

In front of Napsanguark's tent a sledge was set up on end, resting on the uprights, and a skin was hung between the tent and the sledge, so as to give some shelter against the coolish wind from the west. The seal was laid on the ground right in the corner between this skin and the front of the tent. It had just been cut open and the blubber had been removed and placed on one side. The flesh lay swimming in the blood on the skin and in the opened abdomen. The men stood or sat round about, and now and then they reached forward to the food and cut themselves a lump of the rotten flesh and stuffed it into their mouths. The women and children, who kept mostly inside the tent, also came forward now and then to obtain their share, and the children especially looked quite wild as they ran about with their faces all covered with blood.

The smell of the rotten flesh was soon very unpleasant, but one quickly became accustomed to it. Laughter and cheerfulness prevailed.

After the feast was over, Knud Rasmussen was successful in persuading Masaitsiak and Ajorsalik to sing. They placed themselves inside the densely packed tent, opposite one another on the floor in front of the opening, and began their preparations. But these took up some time, as they were both obviously nervous. Like European virtuosi they complained that there were various things which prevented their doing themselves justice. It was too light and there were too few people, said Masaitsiak. According to European taste there were already far too many in the small space; but the Eskimos like best of all to pack themselves so close together on the platform and the floor in front, that one can hardly move.

At last Masaitsiak began to sing, beating the drum at the same time: "... iah-iah-iah-ah-iah-ah-aha ...", all still without a word, and now and then the whole company joined in with some tones as chorus. He kept his eyes closed the whole time, and Ajorsalik later did the same thing. The expression of the face gradually altered to the mood of the song, and the face appeared to be turned more and more upwards. At the same time he began to dance. This means, that the soles of the feet remained firmly planted at the same spot, but the knees bent and the body swung and turned on the hips. The different movements were neither strong nor violent, and they were combined, with constant changing of the manner, almost like the few tones of the song. The drum was used at the same time, being held in the left hand and beaten with more and more force. So long as Masaitsiak sang and danced, he gave himself up to it entirely and his whole body and all his movements expressed the feeling of the song and dance. Ajorsalik stood the whole time in front of him with a small stick ca. 15 cm long in the hand. At the moment when Masaitsiak was about to end his first song, Ajorsalik held up the stick between the thumbs and forefingers of both hands, perpendicularly in front of his face, and shook it rapidly from side to side with the upper (right) hand, as if there were something that should be shaken loose. As if waking up, with a gasp for breath and quick nod of the head, Masaitsiak returned from his transport to ordinary life, both he and Ajorsalik crying: "... waeih-waeih-eh-eh ...". This performance was repeated at the end of every song by one of the singers.

Masaitsiak sang again 3 or 4 times before Ajorsalik began and his condition of ecstasy increased each time. The song became stronger and the movements more violent and more rapid; one quite forgot that it was the old, simple man whom I had so often seen sitting and dozing over some hand-work or another. Ajorsalik's songs were feebler and his dancing and beating of the drum much less imposing. He also sang 4—5 times, and then Masaitsiak began again, and in this way they relieved one another several times, until — not the singers, for they can keep it up for nights, once they have come into the spirit of the thing — but the listeners, especially the Europeans, became tired and got them to break off.

Fig. 44—52. Different figures of animals, of which figs. 44—48 and 50—51 were drawn by Miterk, fig. 49 by Samik and fig. 52 by the Eskimo woman Kagssâluk. Fig. 44 represents the bearded seal, 45 the fjord seal, 46 the walrus, 47 the hare, 48 the narwhal, 49 and 52 the dog, 50 the white whale (Beluga) and 51 the polar bear.

Figs. 53—65. Different apparatus; figs. 53, 58, 60, 62, 63 and 64 were drawn by the Eskimo woman Tukuminguark, figs. 54, 56 57, 59 and 61 by the Eskimo girl Arnanguak, fig. 65 by Samik. Fig. 55 was the only one of the figures given, which was drawn at my direct request and from an available model; the figure represents Kagssâluk's blubber-lamp, and she drew it while sitting at her place on the platform with the lamp standing on the side-platform, the least curved side being turned towards herself; but she drew the reflection of the lamp with the strongest curved side downmost. Fig. 53 is a ulo of a form which is said to be most used in eating to cut off the meat in front of the lips, fig. 54 is a blubber-lamp, 56 a cooking-vessel, 57 two tents seen from the side, 58 and 61 ulos for working with skins, 59 a skin-scraper, 60 a snow-knife, 62 poker for the lamp, 63 meat-tray, 64 drying-frame, 65 an inspanned sledge, on which some individuals and children are sitting resting, and on the uprights of which is coiled a line of seal's hide.

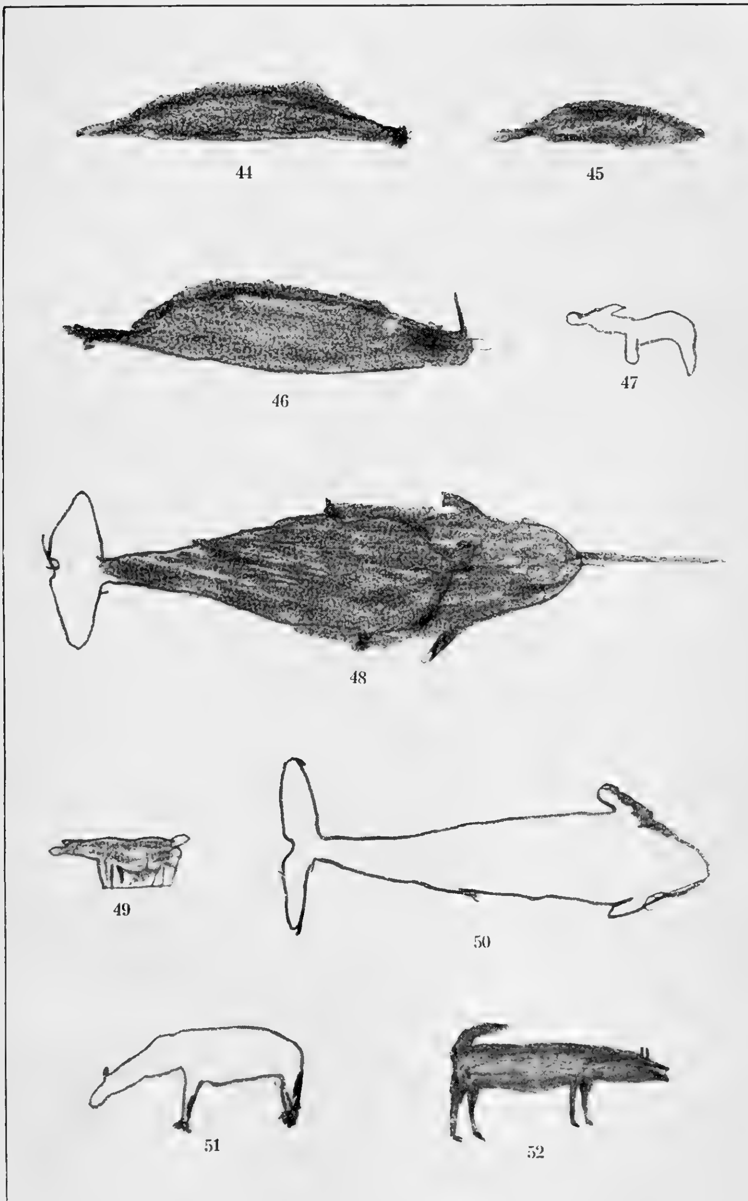

Fig. 44—52.


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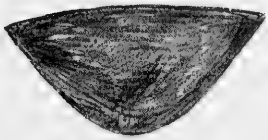
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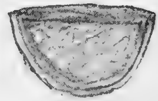
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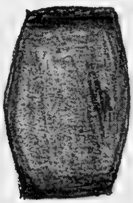
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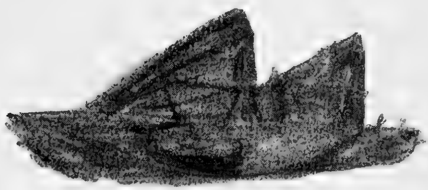
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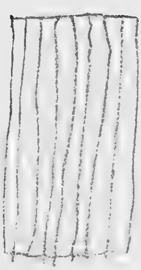
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Fig. 53–65.

VII.

During our stay at North Star Bay I also made some anthropological observations and measurements, in which I followed the methods taught by Professor F. v. Luschan of Berlin.

As I only met with a small portion of the tribe, however, — partly because so many of them were with Peary in the Polar Sea — I shall not enter here upon a general account of the anthropology of the Polar Eskimos, but restrict myself to some of the main points in the observations along with the photographs taken by me. At this moment also, there is less reason for going too deeply into the subject, as the extensive work on the anthropology of Greenland prepared by C. M. Fürst and F. C. C. Hansen is just about to be published.

When we get over the first impression of distaste towards their dirtiness and less pleasant smell, the Polar Eskimos have in reality a pleasing exterior and are specially remarkable for their well-proportioned structure and fine, small hands and feet. Those I met were on the whole small, but there are not a few men in the tribe who are above the average height. It is said that those who are descended from the Ponds Inlet Eskimos belong to the tallest in the tribe. The men especially are very muscular, but as both the men and the women must be considered as well-covered, their musculature is not very pronounced or marked. The health seemed to be extremely good.

From the racial standpoint the first impression one obtains of the tribe, when one comes from the more southerly West

Greenland, is almost one of surprise. For it seems indeed to be quite a different race. In West Greenland we are accustomed to regard the Eskimos' racial character as distinctly "Mongolian", and up here the Mongolian type is little in evidence in comparison with another type, which may provisionally be called "Indian", in spite of the fact, that it also occurs in North-Asia and that it is not so marked as in the traditional, extreme Indian type. It is a type which is much less separated from the European than the Mongolian is, and I have a very strong impression that the reason why the existence of this type in West Greenland is almost entirely overlooked is, not only that the Mongolian type is perhaps predominant, but also that these non-Mongolian individuals have been unintentionally considered as mixed-European more than they really are.

The Polar Eskimos resemble more the Central Eskimo tribes on the mainland, for example, the Netchillik Eskimos[1], than the West Greenlanders to the south. Probably the natives in the Upernivik district form a transition, however, as is pointed out by Søren Hansen[2]. The same author[3] also shows, that the so-called Mongolian racial characters, namely, the low nose, oblique eyes, flat face, broad and big cheek-bones etc., are more prominent in the women than in the men of West Greenland. Exactly the same condition is found among the Polar Eskimos.

The colour of the skin is not so variable individually as is the case in West Greenland. This applies for the rest to practically all characters and is evidence, that the tribe is unmixed or at least only in very little degree mixed with European elements. Even in the generation which is growing up, there are but few exceptions to this rule. The skin has always a yellowish ground-colour, but this may appear in various modifications in

[1] cf. Roald Amundsen, Nordvest-Passagen. Kristiania 1907.

[2] Bidrag til Vestgrønlandenes Antropologi. Meddel. om Grønland. Vol. 7.

[3] l. c.

the same individuals. On the covered parts of the body it is as a rule yellowish-white, whereas on the face and especially on the cheeks it changes over to reddish-brown or copper-coloured. To the touch the skin is soft and somewhat oily. The so-called "Mongolian spot" is present; I observed one 6 cm long and 3 cm broad on a 13 months old child; it lay over the sacro-lumbar region along the vertebral column with a slight asymmetry to the right side.

All the individuals have dark-brown or brown eyes. In a single case the colour of the eyes was nearly brownish black, and in one older individual the iris was somewhat spread out, so that the colour was almost light-brown. The opening of the eyes was in most cases fairly even, but in several it could be noticed, that the upper eyelid descended very far down at the inner corner, so that this curved downwards at a sharp angle. The whole opening of the eye might thus appear somewhat oblique, though it in no case attained the most distinct form of the oblique Mongolian eye.

The colour of the hair did not differ appreciably in any case from the pure black. Even the old Krulé only had some few scattered gray hairs. The hair is smooth and coarse, but with a tendency to be slightly wavy. It grows strongly and in quantities, and no tendency was observed to baldness. The early loss of hair, which the West Greenland cause by their tightly bound hair-top, does not occur among the Polar Eskimos, as the hair is here worn more loosely. One woman, the young Arnanguak, was an exception in having such short hair that it could not be bound up in "chignon", but hung loose. The greatest length of hair I observed in any of the men was 48 cm; the rule was about 40 cm. There was but slight growth of a beard, and this was further reduced by the habit of pulling out the hairs of the beard, as the ice which forms in it in winter is extremely troublesome and dangerous.

The faces are broad and are chiefly characterized by the strong cheek-bones and the broad, muscular lower jaw. The length of the face is here measured from the root of the nose to the chin; but if we consider the whole length of the face from the beginning of the hair to the chin, its form becomes on the whole a broad oval. The painter Moltke[1] states, that they have "smooth faces. The features are like those of a child. The lines quiet and round. It is as if a smoothing hand "has passed over them" and thus produced a beneficial peacefulness and greatness in the lines — but also sometimes taken away something of the character".

The form of the nose is fairly constant. The root is not specially depressed and the nose itself projects distinctly forward and has a straight and comparatively long ridge. There is not seldom an inconsiderable prominence, which gives the nose a tendency to be aquiline. The tip of the nose may be a little hanging. The breadth is not great, but in the case of a few women with the broadest faces, e. g. Inadtliak, the nostrils were somewhat distended, so that they appeared slightly broader than high.

The teeth are fine and strong and form regular rows almost always. It is well-known how they are greatly worn down, and it is a common view among anthropologists, that the woman's skull can be distinguished from the man's among the Polar Eskimos by the fact, that the teeth in the former are most worn, due to the work of chewing skins done by the women. It is quite possible that the women's teeth become on the whole somewhat more worn than the men's in the course of time; but that the difference in the amount should be so great and obvious, that we could use it with any certainty to distinguish the sexes, I think I can safely deny.

The men certainly do not chew skins; but they use the teeth for so many different kinds of work and almost always

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[1] Mylius Erichsen og Moltke, l. c., p. 592.

with hard materials, that their teeth have good opportunities of becoming worn. Both in the men and the women the incisors are more worn than the molars, and of the latter the first two molars are often the most worn. In the old Masaitsiak the front teeth were so much worn, that the new growth of dentine in the pulp took up a great part of the plane, worn surface; on the molars both the cusps and the hollows were worn, so that all the enamel had disappeared except along the edge. According to the scale set up by Broca for degrees of wornness, these teeth were thus in the 4th or extreme stage. In the old woman Krulé the stumps remaining did not show any greater degree of wornness than in Masaitsiak. In the 50 year old woman Kiajuk the front teeth were worn down a good deal into the pulp; the first molar teeth were in the 3rd stage, as the chewing surface was just worn level; on the wisdom tooth, however, the cusps were not yet worn. In the ca. 35 year old Samik the pulp could be seen in the front teeth, and the cusps were already worn down on the molars. In the ca. 30 year old woman Tukuminguark the pulp was not yet bare in the front teeth, and the molars had not yet been worn quite level. In the scarcely 30 year old man Manigssok the pulp of the front teeth could already be seen, whilst the molars were perhaps a little less worn than was the case with Tukuminguark, who was about the same age. In the 20 year old man Miterk facets had just begun to appear on the front teeth, but distinct facets had not yet been worn on the enamel of the molars. The unmarried girl Arnanguak, who was ca. 16 years old, was at exactly the same stage, whilst the ca. 18 year old, married woman Akutak also had distinct facets on the molars. Thus, individual differences certainly occur in the amount the teeth are worn, so that it is impossible to base general rules for the wear of the teeth in men and women on so few examples; but I think that the above observations are sufficient to prove my contention, that the teeth of the men are also greatly worn.

The outer ear is fairly small in the Polar Eskimos and symmetrically rounded. The lobe is in some cases faintly indicated, but is wanting in most, so that the lower margin of the ear is directly attached to the head. The so-called Darwin point is but little apparent.

The form of the skull is far from being subject to such great variations as would be the case in Denmark in a similar number of individuals. The differences occurring are not so great, that they cannot be regarded perhaps as variations of one and the same typical form. This form is characterized by a narrow, somewhat weakly arched forehead, and by a rising crown which furthest back slopes down towards the occipital bone, which is somewhat prominent. It is a form which greatly resembles the common, long-skull form in Europe, and the breadth-length indices found are also evidence of distinct dolichocephaly, which for the rest was already well-known for the Polar Eskimo skulls. It is also the same form which by some anthropologists is named the palæasiatic.

Apart from pulling out the beard, no kind of deformation occurs. Nor is it the custom or use to tattoo. Only a single one of the persons observed had tattoo markings. This was the woman Tukuminguark who by means of soot, thread and a needle had produced some few marks on her skin. Thus she had 4 quite small spots in a row on the left forearm. On the upper part of each breast she had a couple of larger, parallel streaks, but the operation was only to some extent successful on the left breast. On asking why she had tattooed herself, she only returned an uncertain answer, that she had seen something of the kind. This has probably been among the last-living of the Ponds Inlet immigrants, in the mother tribe of which tattooing is a traditional custom. Tukuminguark's few, casual and quite formless tattoo marks are thus to be regarded as an unorganised offshoot of an organised tradition.

The following table brings together some of the principal anthropological measurements on the men and women. The first three columns give respectively the total height, the height in a sitting position (measured from the board sat upon) and the spread of the arms in cm. The two following columns give the length and breadth of the head in mm, from which the index cephalicus has been calculated and given in column 6. The last two columns contain similarly the length and breadth of the face in mm.

	Height	Height in sitting position	Spread of arms	Length of head	Breadth of head	Index cephalicus	Length of face	Breadth of face
Men:								
Masaitsiak	156	80	156	200	158	79	124	154
Samik........	163	83	161	205	155	76	128	153
Napsanguark ..	162	84	159	193	154	80	133	151
Uvdloriark	159	89	155	200	155	77,5	124	150
Itsukusuk	158	83	159	189	145	77	128	136
Ihré	152	82	152	195	157	81	130	153
Manigssok	156	82	154	196	150	77	127	147
Miterk........	153	77	150	192	148	77	113	138
Women:								
Kiajuk	146	79	143	186	151	81	115	145
Tukuminguark.	150	80	145	190	144	76	118	145
Alakrasina	149	79	141	192	136	71	123	140
Arnaruniark ..	145	80	144	197	152	77	115	146
Akutak	143	77	141	189	143	76	112	136
Sáwuak	143	76	139	181	145	80	117	140
Krulé	142	75	138	180	146	81	121	143
Kagssâluk	145	79	144	179	137	77	123	134
Inadtliak	146	79	145	197	146	74	119	147
Arnanguak....	145	77	143	185	149	81	120	139

In the following figures 66—89, protraits are given of all the adult Polar Eskimos measured, with exception of Kagssâluk and Inadtliak, whose photographs are given earlier, as also of the ca. 16 year old girl Arnanguak, who is daugther of Napsanguark and still unmarried, for the reason, so it was said, that she is not beautiful, chiefly owing to her short hair, which is considered very ugly among the Eskimos; her photograph was not successful.

Figs. 66—67. *Masaitsiak* — ca. 55 years old; one of the greatest angakoks of the tribe. He is sitting on the chair I used for the anthropological measurements.

Figs. 68—69. *Ajorsalik* — ca. 40; a little of an angakok. At my request he has taken off his sealskin pelt and birdskin shirt to be photographed.

Figs. 70—71. *Samik* or Anjudtluk — ca. 35; very intelligent and one of the best hunters and cleverest handworkers of the tribe. The hair is bound up in a peculiar method, otherwise never used.

Figs. 72—73. *Napsanguark* — ca. 45; he is wearing the hair-band typical for the Polar Eskimo men.

Fig. 74. *Uvdloriark* — ca. 35; his wife is Kagssâluk, whose photograph is given in figs. 31—32.

Fig. 75. *Itsukusuk* — ca. 24; son of Masaitsiak. Along with Uvdloriark he occupied the largest and best tent in Umanark (cf. fig. 17 and 22).

Fig. 76. *Ihré* — ca. 35; he is wearing skin gloves.

Fig. 77. *Manigssok* — ca. 28; he is married to the already photographed Inadtliak (fig. 30), who may be ca. 24 years old.

Fig. 78—79. *Miterk* — ca. 20; brother of Itsukusuk and son of Masaitsiak. He was the only one unmarried of the men mentioned.

Figs. 80—81. *Kiajuk* — ca. 50; now married to Masaitsiak.

Figs. 82—83. *Tukuminguark* — ca. 30; married to Ajorsalik and mother of 4 children, of whom 2 are boys.

Figs. 84—85. *Alakrasina* — ca. 40; married to Ihré and in this marriage mother to a 5 years old boy, Kalé.

Fig. 86. *Arnaruniark* — ca. 21; married to Samik and mother of a 3 years old boy, Umark, who is standing furthest to the left in front of his mother in fig. 90.

Fig. 87. *Akutak* — ca. 18; married to Itsukusuk and still without children. She is wearing a foxskin pelt.

Fig. 88. *Sáwuak* — ca. 40; married to Napsanguark and daughter of Krulé. She is carrying a child in the amaut.

Fig. 89. *Krulé* — ca. 65; widow, cf. fig. 18 and p. 325. She is wearing a foxskin pelt.

Fig. 66.

Fig. 67.

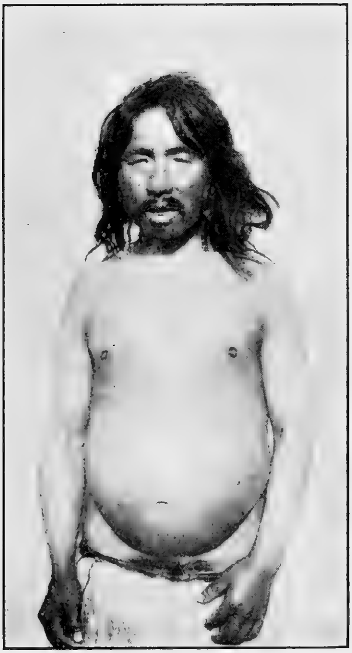

Fig. 68.

Fig. 69.

Fig. 70.

Fig. 71.

Fig. 72.

Fig. 73.

Fig. 74.

Fig. 75.

Fig. 76.

Fig. 77.

Fig. 78.

Fig. 79.

Fig. 80.

Fig. 81.

Fig. 82.

Fig. 83.

Fig. 84.

Fig. 85.

Fig. 86.

Fig. 87.

Fig. 88.

Fig. 89.

Fig. 90.

Fig. 91.

Fig. 90. Adults and children in front of a tent at Umanark. All the grown-up men and women are wearing sealskin pelts with exception of Inadtliak and Masaitsiak, who are standing together in the centre of the picture and both of whom have birdskin shirt or inner pelt. Inadtliak's is specially light as it is quite new (cf. p. 339). To the left 3 small boys are standing in front of their mother, with bearskin trousers like the adult men. The mother farthest to the left is Arnaruniark with the loose, helmet-shaped hat on her head.

Fig. 91. Group of children from Umanark.

VIII.

It was in the year 1818 that the Polar Eskimos first entered into the light of history, and important and interesting changes in their culture have occurred since that time. As the years which have been of special importance for the cultural history of the Polar Eskimos, during the hundred years that have nearly passed, may be named ca. 1862—1863, 1891, 1904 and 1909.

At the date mentioned in the sixties the visiting Eskimos from Ponds Inlet taught them the use of the forgotten apparatus the kayak, the bow and arrow, as also the method of fishing for salmon. 1891 was the year of Peary's first visit. In 1904 a Danish expedition showed them the way over the ice of Melville Bay, and since then the Polar Eskimos annually make trading visits to the Danish trading posts in the district of Upernivik. In 1909 a permanent Danish Mission Station was settled in their country.

The history of the Polar Eskimos before 1818 is shrouded in the deepest mystery. Where did they come from? What other Eskimo tribe is their nearest kin?

From the West Greenland Eskimos they have been separated geographically and culturally, and they seem to be so even in regard to physical type. The attitude of the two tribes towards one another, which has been partly one of avoidance partly of direct hostility, also shows that they have not maintained any visiting or family relations with one another throughout the years, but that they have ignored one another's existence if they chanced to meet on the ice of Melville Bay.

The Polar Eskimos are at the least just as different from their nearest neighbours on the other side of Baffin Bay, the Ponds Inlet Eskimos, and it is quite impossible to think, that they could have been directly transplanted from North Baffin Land to Smith Sound. In addition to differences in apparatus and dress we have also the evidence that the Polar Eskimos were not reindeer hunters. In Baffin Land the reindeer hunting is of very great importance, and the Ponds Inlet Eskimos have also always been keen hunters of this animal. When Mc Clintock met Kridlarssuark and his little band on the east side of North Devon in 1858, the only thing they had to complain about was that there was no reindeer in that country.

To this must be added, that the nearest route from the Ponds Inlet district to Smith Sound, namely, along the east coast of North Devon and Ellesmere Land, is not of such a nature, that it specially tempts the Eskimos to migrate. Kridlarssuark's migration is certainly a typical Eskimo migration in regard to the mode of travelling and the period of time used, but it is quite otherwise in regard to its motive. He and his band did not journey because new hunting-places enticed them further and further away, but — as is expressly stated — because they wished to seek the people the whalers had spoken about as living further north along the coast, of whose existence also they certainly had seen material signs, when the whalers came to Ponds Inlet after visiting Cape York a short time before. The route followed, along the Ellesmere coast, is namely not the least inviting to the Eskimos, as has already been mentioned in this paper. The unfortunate fate of the returning Ponds Inlet Eskimos in their attempt to get back the same way, is indeed also witness that the country is not favourable to human life. Nor do there seem to be any ruins of Eskimo houses on the east coast of Ellesmere Land, from the mouth of Jones Sound towards Cape Isabella, except some few more recent houses, which are said to be known to the Polar Eskimos as having been built by Kridlarssuark and his party.

Any group of Ponds Inlet Eskimos that passed over to North Devon simply for the sake of hunting, would certainly not be enticed northwards along the east coast of Ellesmere Land, but would go westwards along the coasts of Jones Sound over to the west side of North Devon and Ellesmere Land, where plenty of musk-ox are to be found; an example of this was obtained by Boas[1] from an Eskimo woman, whom he met at Cape Kater. She had been with an Eskimo band, which had passed over the ice-covered North Devon on sledges and on to the south-west part of Ellesmere Land, which is called the "Umingman Nuna" or the musk-ox land, where it is said they even found some natives. For the rest, there is still the belief among the Ponds Inlet Eskimos, that a musk-ox hunting Eskimo tribe lives up in these regions, a belief, however, that later expeditions have shown to be incorrect for the present time.

Further, it is known that the Ponds Inlet Eskimos sometimes journey to North Somerset to hunt the musk-ox, and that this journey may then extend over the Barrow Strait to the south-west coast of North Devon[2]. This last direction represents, I think, an old and original route for the expansion of the Eskimos. From North Somerset it goes straight north to the west coast of North Devon, right across the north-westernmost part of this island and further north along the west coast of Ellesmere Land as far as Bay Fjord, where one route goes eastwards overland to Buchanan Bay and Smith Sound, whilst another continues northwards up to Lake Hazen in the interior. The part of the route which is connected with Elles-

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[1] Baffin Land. Petermann's Mitteilungen. Ergänzungsband. 1884, p. 40.
[2] A. P. Low. l. c. p. 57 *et seq.*

mere Land[1] has been made known by Gunnar Isachsen[2], who took part in the Fram Expedition under O. Sverdrup. In agreement with F. Boas[3] Isachsen considered that the main route went from Ponds Inlet over the eastern end of North Devon and from there along the north coast of this island; but I am of the same opinion as H. G. Simmons[4], that this route is certainly only used exceptionally.

In using the word "route" I must however remark, that this does not mean a definite, measured line of migration. An Eskimo band in pursuit of the musk-ox will direct its course according to the distribution of the animals and will only be tempted to move by richer hunting grounds; but the distribution of the islands and their position in the Polar Archipelago is of such a nature, that the main result of the migrations is, that the Eskimos tend to go in definite directions. The starting-points will be on the one hand the northern Baffin Land, where for the rest it is the lines of migration of the reindeer, which — in addition to the coastal ice and the voyages with the women's boats — determine the migration routes, and on the other the north-eastern Barren Grounds themselves. And I imagine, that the oldest migratory groups went out from this last-mentioned region and from there followed the east coasts of Boothia Felix and North Somerset, where ruins on the coasts are evidence of earlier visits of the Eskimos.

With regard to these ruins of houses and other remains of earlier Eskimo settlements reference may be made to W. Thalbitzer's chart[5], where their occurrence is indicated. In agree-

[1] I use this name to indicate the whole of the large island lying to the NW. of Greenland.

[2] G. Isachsen, Die Wanderungen der östlichen Eskimo in und nach Grönland. Petermann's Mitteilungen 1903.

[3] The central Eskimo. 6th Ann. Rep. of the Bur. of Ethn. Washington 1888.

[4] Eskimåernas Utbredning och Vandringsvägor. "Ymer" Stockholm 1905, p. 182.

[5] A Phonetical Study of the Eskimo Language. Meddelelser om Grönland. Copenhagen 1904. — cf. Boas, Ueber die ehemalige Verbreitung der

ment with the distribution of the ruins, I have indicated on the accompanying chart, where the distribution of the musk-ox is given after A. G. Nathorst[1], the main route along which the Eskimo bands in pursuit of the musk-ox may be considered to have been enticed further and further away from the American continent. Some have gone westwards along the south coasts of the Parry Islands, but the main body has gone up to Ellesmere Land, and there is now — after that the Danish "Danmark" Expedition under Mylius Erichsen has proved the occurrence of Eskimo remains right up to the Peary Channel on the north coast of Greenland — no ground to doubt that they have continued their journey northward round Greenland to the north-east coast. For the rest, G. Holm long ago maintained this migration north round Greenland, and later it has been supported by C. Ryder and G. Amdrup on the basis of observations made on their expeditions respectively to Scoresby Sound in 1891—92 and to the coast between Angmagsalik and Scoresby Sound in 1898—99 and 1900.

As further support for the view, that these North-East Greenlanders have been musk-ox hunters, we have the following information, which I have received through the kindness of Mr. C. B. Thostrup, who took over the ethnological investigations on the "Danmark" Expedition after the death of Mylius Erichsen. "There is no doubt, that the Eskimos have carried on the musk-ox hunting on a large scale at several places, for example, at Sælsö at the head of Dove Bay [i. e. ca. 77° N. B.] — evidence of this is found in the many, large food-depots and the bones in them, which were almost exclusively those of *Ovibos moschatus*. A number of bones were brought home from the remains of the Eskimo buildings and their determina-

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Eskimos (Zeitschrift der Ges. für Erdkunde, Vol. 18, Berlin 1883); C. R. Markham, On the origin and migrations of the Greenlander Esquimaux (Journ. Roy. Geogr. Soc Vol. 35. 1865).

[1] Två Somrar i Norra Ishafvet. Stockholm 1900. Vol. II.

tion here — by Inspector H. Winge — has proved that among the land animals it was chiefly the musk-ox, which served the Eskimos for food. Reindeer bones occur but in smaller quantity. Phoca foetida was found in considerable quantity everywhere at the settlements". Bones of hare, bear, walrus, bearded seal, narwhal, Greenland whale, salmon etc. also occurred.

We now have evidence from various sides with regard to the importance the musk-ox has had for the Eskimos, right from the regions between Repulse Bay and Back River[1] to North-East Greenland. Both the Barren Grounds Eskimos and the Polar Eskimos are very fond of musk-ox flesh and fat. Its fat can also replace the blubber for the lamps, its skin can be used for clothes, and its horns for various implements[2].

But we may now ask: if the occurrence of the musk-ox has played so great a part for the migrations of the Eskimos, why is it that we do not find the musk-ox regions inhabited at the present day? — The answer is quite simply: because a lasting settlement of a hunting-people can only occur at the places, where there is always some reserve means of obtaining food should the hunting fail at any time. In the temperate regions there are roots and fruits of plants, bark (e. g. birch-bark) etc. The polar regions do not have such easily obtained plant-materials; but among the Polar Eskimos, for example, the bird-hunting is such a reserve livelihood in the summer, whilst the seal hunting and in part the walrus hunting are the same in winter. For most of the more southerly arctic Eskimo tribes, fish is the reserve food in summer, and for the sub-arctic tribes this holds good throughout the year.

As already mentioned, the coast from Cape York to Etah is, however, an oasis in comparison with other regions in the same latitude. Robeson Channel is poor in seal, walrus and bears; west of Ellesmere Land the northern limit for the seal

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[1] F. Boas, The Central Eskimos. P. 450 *et seq.*

[2] cf. Nathorst, l. c., p. 143, Note.

and bear passes over the north end of Eureka Sound and goes due westwards from the south end of Heiberg Land[1].

Thus, for the so-called musk-ox Eskimos the seal and the walrus could not have offered such a certain reserve livelihood or so considerable a store of food as is the case among the Polar Eskimos. The districts about Wellington Channel and the west end of Jones Sound have perhaps been the nearest approach to this. Nor could the birds have been of any importance as reserve food during the summer[2]. The Eskimos must have done the same as the previously mentioned 8 families, who left Peary in 1906 and went to Lake Hazen; they lived on musk-ox and hares throughout the autumn and winter, and in the spring went on to the sea-ice, where they hunted the seal on the way south.

The best time of year for the musk-ox hunting is the summer and autumn, at which seasons the animals are fat and owing to their size (up to about 550 kg) are able to yield large quantities of meat and tallow for storage and fuel. These times are the same as the seasons for the true reindeer hunting, and further, the musk-ox lives in quite different localities from those which are suited for the reindeer, as it does not feed on lichens like the latter[3]; we can understand, therefore, that where the musk-ox hunting is the main source of livelihood, the other forms of summer hunting must be neglected or even quite given up. The forms of hunting which are thus apt to die out of use are for example the kayak hunting and the salmon fishing. We can now understand, why we meet with the winter-houses in the interior of the land at Lake Hazen, whilst tent-rings are found at so many places on the coasts;

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[1] H. G. Simmons, l. c. p. 179. — Isachsen, l. c. Chart (Pl. 14).

[2] Possibly the wild-goose and eider-duck have been of importance locally. — The "Eider-duck nests" found in the west end of Jones Sound and considered by the Sverdrup Expedition as originating from the old Scandinavian Greenlanders, are, I think, old Eskimo egg-depots (cf. p. 300).

[3] cf. Nathorst, l. c., Vol. II, p. 148. — Greely, l. c., Vol. II, p. 362.

these latter have without doubt been set up in the spring-time, especially in May and June, when the Eskimos carried on the "utok" hunting on the sea-ice.

For the rest, it appears from the experience of the expeditions, that the small *Rangifer Pearyi* only occurs in relatively small numbers in Ellesmere Land and North Devon[1]. On the other hand, apart from the eastern part of North Devon and corresponding stretches in the eastern Ellesmere Land, where the land is high and covered with glaciers, the musk-ox occurs in considerable quantities. The latter, however, which lives in local, small herds, can never become a constant and permanent means of livelihood.

After being hunted for some time, perhaps as a rule after a single year, the reduced herds of musk-ox can no longer yield the considerable quantities of food for storing, which are required for men and dogs, and the Eskimos must move on.

These Eskimo bands cannot have been very numerous. They were most probably groups of ca. 8—10 families, which separated off from the constantly inhabited Eskimo centres on the coast of the mainland and the Barren Grounds. Some have again returned home; others have been enticed so far away, that new generations have perhaps grown up, before the band has gone under during a famine period in one or other out of the way corner[2], or perhaps succeeded in reaching a Greenland coast, where a sure, reserve livelihood could be obtained.

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[1] Greely, l. c., Vol. II, p. 363; O. Sverdrup, Nyt Land, Vols. I—II; R. Peary, Nearest the Pole, pp. 60, 62, 70 etc.

[2] As example of how quickly a tribe, which has difficulties in finding a reserve mode of obtaining food, may die out, I may mention the inhabitants of Southampton Island, a small, almost untouched Eskimo tribe, which lived essentially on reindeer hunting with the bow and arrow and numbered 68 persons in 1900. In 1902 a whaler landed a party of Baffinlanders armed with rifles on the island and these so destroyed the hunting, that the original dwellers all to a man perished of hunger in the course of the winter (A. P. Low, l. c., pp. 187—188).

The stretch of coast which, from its position and wealth of animal life, as described in preceding pages, is best suited to attract these wanderings bands, is that occupied by the Polar Eskimos. And from these remarks with regard to the wanderings of the musk-ox Eskimos — remarks, which are naturally hypothetical, but which can only be contradicted or confirmed by archæological investigations in the regions mentioned — it will scarcely be surprising, if I express the opinion, that the Polar Eskimos are just the latest arrivals of the musk-ox Eskimos. It is quite possible, of course, that hundreds of years have passed since they came to Greenland; the remains of houses found on Ellesmere Land seem all to be fairly old. It is also probable that the tribe is made up of a fusion of several bands.

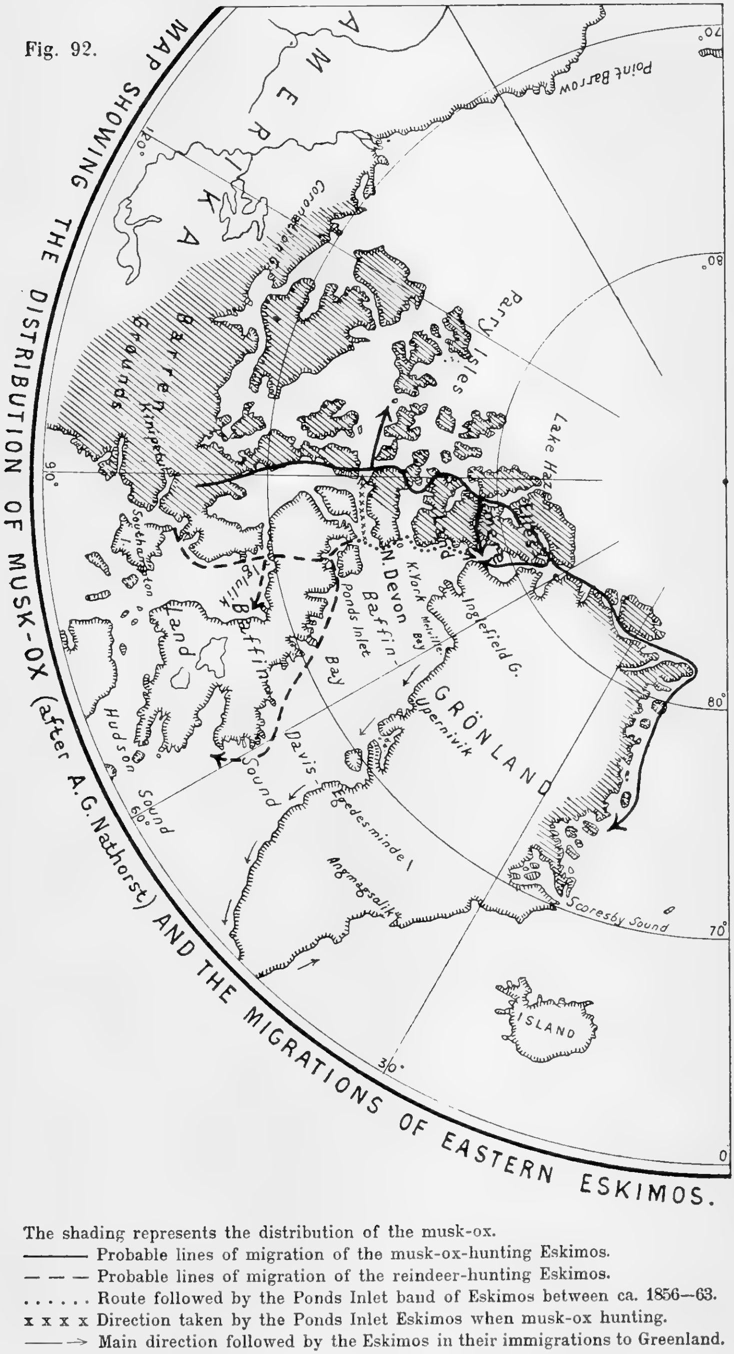
This view of the origin of the Polar Eskimos I base further on the following points.

1. As I have already pointed before, the Polar Eskimos must at an earlier date have lived under conditions, when the kayak hunting, the reindeer hunting and salmon fishing, or in other words the main, summer modes of livelihood of the ordinary, arctic Eskimo culture, had fallen into disuse. It is difficult to imagine that this happened except under the conditions described, when the musk-ox hunting was the main mode of livelihood in the summer.

2. The musk-ox hunting has never been forgotten by the Polar Eskimos and is still to this day a special attraction for them.

3. In their folk-lore and their own experience the regions beyond Smith Sound play a much greater part than, for example, the lands lying to the south of them, and they held the view, at any rate in Kane's and Hayes' time, that musk-ox hunting Eskimos lived up here. Thus, a Polar Eskimo, who was convinced that Hayes would meet with Eskimos to the north, said: "There are good hunting-grounds to the north, plenty of musk-

Fig. 92.



The shading represents the distribution of the musk-ox.

——— Probable lines of migration of the musk-ox-hunting Eskimos.

— — — Probable lines of migration of the reindeer-hunting Eskimos.

. . . . . . Route followed by the Ponds Inlet band of Eskimos between ca. 1856—63.

x x x x Direction taken by the Ponds Inlet Eskimos when musk-ox hunting.

——→ Main direction followed by the Eskimos in their immigrations to Greenland.

ox (oomemak), and wherever there are good hunting-grounds, there the Esquimaux will be found"[1].

This explanation of the origin of the Polar Eskimos from the north and west is in itself quite natural. What is remarkable in the matter is, however, that they have come to Greenland more on the basis of a pure land-hunting, such as for the musk-ox, than in their character as dwellers on the coast. And even after they had passed Smith Sound, the Polar Eskimos still retained this distinctive land-life, changing from their earlier summer hunting, the musk-ox hunting, to the still easier bird-catching. They lived for 3 months of the year on the margin of the open sea without standing in any cultural relation whatsoever to it.

That they did not build kayaks stands just as much in connection with the fact, that they did not hunt the reindeer as with their relation to the sea; for the Central Eskimos, namely, who live on and near the Barren Grounds, the kayak is chiefly a river-conveyance, which is used in the reindeer hunting of the summer[2]. The absence of wood would not of itself be a sufficient cause for giving up an established custom of building kayaks, but might well delay the adoption of this apparatus from neighbouring tribes. Had the Polar Eskimos been accustomed to and felt the need of building kayaks, they would certainly have found some way of continuing to do so. The Iglulik Eskimos had certainly just as little wood, and yet Lyon[3] found kayaks there in 1822, regarding which he writes: "The ribs, of which there are sixty or seventy, are made of ground willow, small bones, whalebone, or if it can be procured, of good grained wood".

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[1] Hayes, The open Polar Sea, p. 385. — cf. Carl Petersen, Erindringer etc., pp. 80 and 91; Knud Rasmussen, Nye Mennesker, p. 118; Peary, Northward etc., I, p. 488.

[2] H. P. Steensby, l. c. —

[3] G. F. Lyon, The private journal etc. London 1824, p. 322.

The story or tradition which Knud Rasmussen heard[1], that some disease had once in the olden days carried away all the old people, who knew how to build kayaks, and that these were buried together with their owners, does not give a rational explanation either of why they should give up the use of the kayaks, since such a cause could have no effect with a tribe accustomed to use the kayak. A probable explanation of the story is, that these kayak builders who died were immigrants — presumably from Baffin Land — who continued their customary summer mode of life, without at that time finding any imitators among the true Polar Eskimos.

Taken on the whole, we must guard against concluding that the absence of use means the complete absence of knowledge. It is not at all strange, therefore, that the Greenlanders more to the south, who certainly must also have come originally along the "musk-ox way", early took up the use of the kayak for their hunting by sea. It was only necessary that the whole way from a kayak-building region in America to south of Melville Bay should be traversed by a single band within the period of a single generation, so that some would remain to take the initiative and produce a model for others to follow, when they found it suited the conditions. The same applies with regard to the reindeer hunting, the use of the bow and arrow etc.

I shall not enter, however, upon the question of the immigration of the more southerly Greenlanders. From an anthropogeographical standpoint it is obvious, that the main mass must have come down along the west coast. The western immigrants already find the natural basis for a more permanent settlement at Etah, just as the band which goes to the north, first meet with corresponding conditions at Scoresby Sound or perhaps even only at Angmagsalik.

Between Scoresby Sound and Angmagsalik lies the coastal stretch charted by Amdrup, which is perhaps the most unap-

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[1] Nye Mennesker, p. 32.

proachable and for the Eskimos most difficult to pass along the whole coast of Greenland. Nevertheless, there is no doubt that there has been some communication along this stretch of coast and certainly in both directions. The old Scoresby Sound Eskimos seem, according to Ryder[1], to have been distinctly reindeer hunters, which points to a southern origin. On the other hand, the smallness of the houses, their square-shaped form and various other features point northward to Ellesmere Land[2]. The rectangular ground-plan however is only a result of using wood or whale-bones for the roof. It is only the places, seemingly, where the roof is also built of stone, that the ground-plan becomes rounded; this holds good, for example, not only for the Polar Eskimos but also at Lake Hazen[3].

The fact pointed out by Holm, that the natives of Angmagsalik knew about the musk-ox, suggests that they have been in connection with the north. Among the West Greenlanders there are only uncertain traditions regarding this animal, perhaps indeed it has been completely forgotten. On the other hand, there is no reason to go so far as Schultz Lorentzen[4], who maintains that not only the Angmagsaliker but also the southern West Greenlanders have migrated north and east round Greenland. I am in agreement with O. Solberg[5] in his criticism of this hypothesis. From the cultural standpoint the Angmagsaliker are decidedly related to the West Greenland population, but we are obliged to take up the view that they have been mixed with immigrants from the north.

In this way we perhaps obtain an explanation of the con-

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1 Om den tidligere eskimoiske Bebyggelse af Scoresby Sund. Meddelelser om Grönland 1895.

2 Simmons, l. c., pp. 190—91.

3 Greely, l. c., Vol. I, pp. 379—82.

4 Eskimoernes Indvandring i Grönland. Medd. om Grönland 1904. — cf. H. P. Steensby, Die Einwanderung der Eskimos nach Grönland. Petermann's Mitteilungen 1905.

5 Beiträge zur Vorgeschichte der Osteskimo. Christiania 1907. p. 57 *et seq.*

dition, first pointed out by Holm[1] and later by Ryder[2] for the Scoresby Sound Eskimos, namely, that there are cultural points of connection between the east coast of Greenland and something so far to the west as the Point Barrow Eskimos. Recently Thalbitzer has also observed such points of resemblance[3]. When these authors only mention the Point Barrow Eskimos, the reason is certainly, that we have more definite knowledge of these than of the other tribes along the coast of the mainland to the north. Possibly, these resemblances will also prove to exist with the tribes on the mainland from Boothia Felix to Coronation Gulf, but from these tribes the "musk-ox way" — also perhaps by slightly different lines from that shown on the accompanying chart — leads northwards round Greenland, where the conditions of life will mean a constant advance for a wandering band and not permit of a long sojourn at any definite region. On the other hand, we can hardly think of a direct connection from more westerly regions than Coronation Gulf.

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[1] l. c., pp. 152 *et seq.*

[2] l. c., p. 343; cf. G. Amdrup, The former settlements on the East coast of Greenland. Medd. om Grönland. 1909, p. 326.

[3] W. Thalbitzer, The Amdrup Collection from East Greenland. Medd. om Grönland. 1909, pp. 446, 492.

Contents.

		page
Chap. I.	Discovery of Polar Eskimos — Ponds Inlet immigrants — Recent expeditions	255
— II.	Anthropogeographical features of the Polar Eskimos' district	268
— III.	Industrial culture of the Polar Eskimos	281
— IV.	Umanark — Winter-houses — Tents	306
— V.	Clothing — Work and technical skill of the men and women — Implements	333
— VI.	Psychology and sociology	363
— VII.	Anthropology	383
— VIII.	Origin of the Polar Eskimos	392

The ethnological investigations on the Polar Eskimos described in these pages were carried out on the initiative and at the expense of "Kommissionen til Ledelsen af de geologiske og geografiske Undersøgelser i Grønland". — The illustrations with exception of fig. 16 are original. The photographs were all taken by the author.

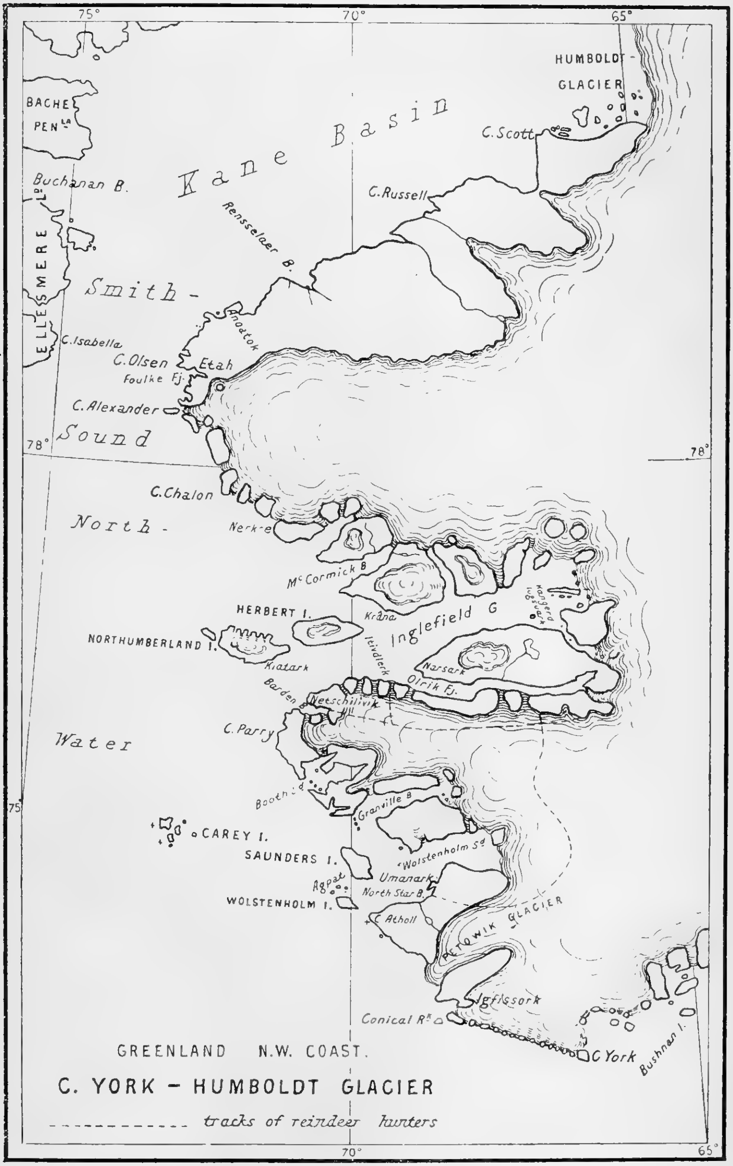
GREENLAND N.W. COAST.
C. YORK – HUMBOLDT GLACIER
tracks of reindeer hunters
Kane Basin
Smith-Sound
North-Water
HUMBOLDT-GLACIER
C. Scott
C. Russell
Rensselaer B.
Anoatok
Etah
C. Olsen
Foulke Fj.
C. Alexander
C. Isabella
Buchanan B.
BACHE PEN^LA
ELLESMERE L^D
C. Chalon
Nerk-e
M^c Cormick B.
Inglefield G.
HERBERT I.
NORTHUMBERLAND I.
Kiatark
Barden B.
Neeschilivik
Narsark
Olrik Fj.
C. Parry
Granville B.
CAREY I.
SAUNDERS I.
Wolstenholm S^d
Umanark
North Star B.
Agpat
WOLSTENHOLM I.
C. Atholl
PETOWIK GLACIER
Igfissork
Conical R^k
C York
Bushnan I.
75°
70°
65°
78°

Fig. 93.