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XIX. *On the Mineralogy of Disko Island.* By Sir CHARLES GIESECKE, F. R. S. Edin. M. R. I. A, Professor of Mineralogy to the Royal Dublin Society, and Member of the Royal Societies of Copenhagen, Upsal, &c. &c.

(*Read April 4. 1814.*)

**D**ISKO Island, (see Plate XV ), is situated in front of a bay in the continent of Greenland, within Davis' Strait, known by the name of *Disko Bay*, which is sometimes called, particularly in the old Dutch charts, *Sydost Bay*. This name is derived from an immense curvature, screened by innumerable islands, made in the continent by the sea. Disko Island is situated in  $69^{\circ} 14'$  of N. latitude. It is distant from the continent towards the south 12 German miles; on the west and north it is surrounded by the sea of Davis' Strait; and on the east, it is separated by a narrow sound, distinguished by the name of Waygat by the Dutch, and by the Greenlanders Ikareseksoak. It stretches northward from  $69^{\circ} 14'$  to  $70^{\circ} 24'$ ; and its greatest breadth, which is from Fortune Bay on the west, to Flakkerhuk, so named by the Dutch, on the east, is 10 German miles.

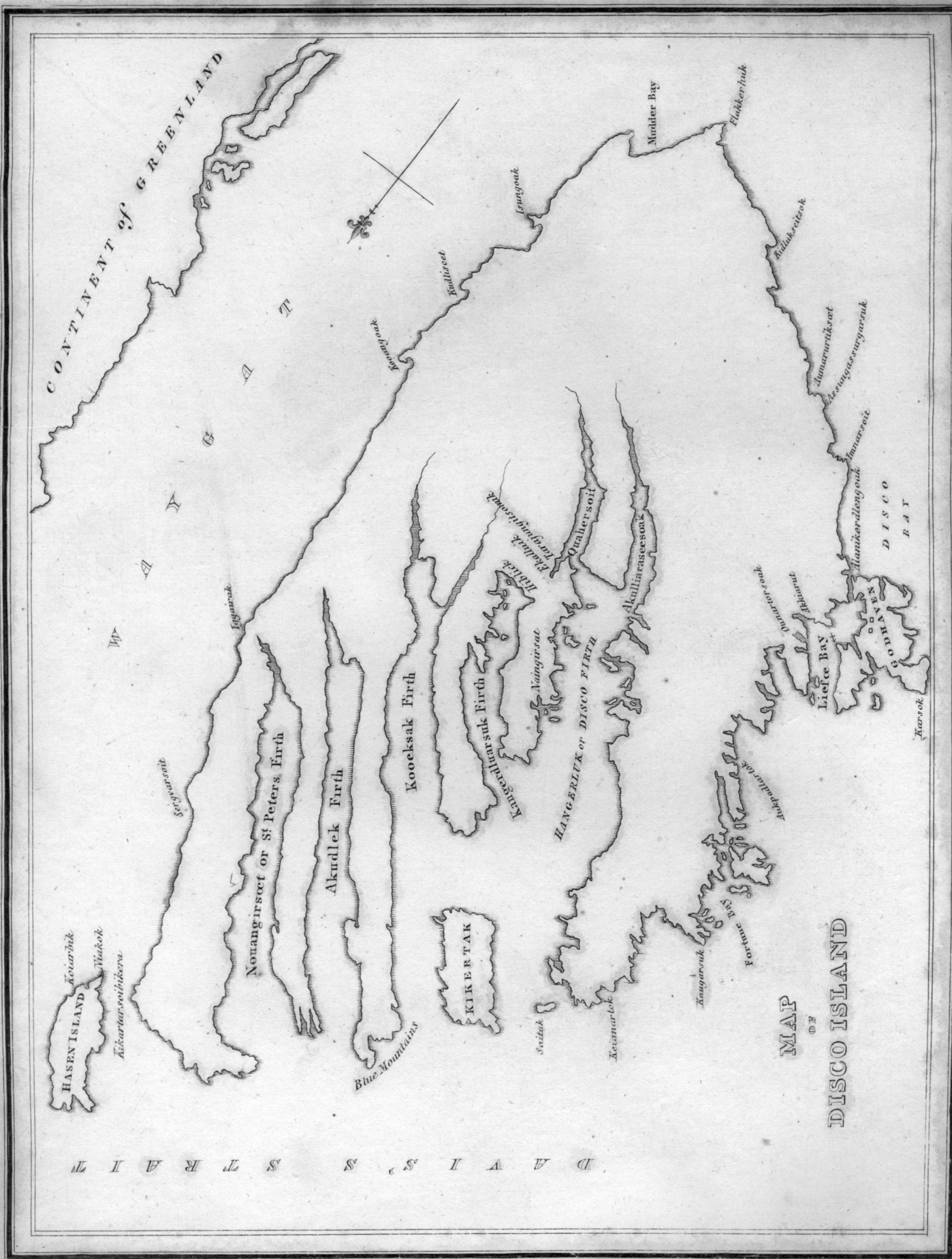
The whole of Disko Island belongs to the floetz-trap formation, which extends over part of the continent, beyond the Waygat, and shews itself on the other side at  $69^{\circ} 20'$  of N. Lat. continuing towards and occupying the peninsula of Noonsoak, which separates Disko Bay from the Bay of St James, called by the Dutch Stikkende Jakob's Bay. On the east end

of this bay, the floetz-trap disappears under the stupendous glacier or ice-blink of this immense arm of the sea ; and on the opposite side of it, not the smallest vestige of floetz-trap is to be discovered. On quitting the shore, however, towards the north, the same formation occurs, at the island of Upernavik or Spring-Island, which is formed of basalt, with immense beds of sandstone, containing veins of brown and bituminous wood-coal. Two considerable islands situated beyond the Frith, one named Ubekjendte or Unknown Island, and the other Hasen or Hare Island, belong also to the floetz-trap.

These islands, although now detached, all appear to have originally belonged to the same mass, and to have been torn asunder by the impetuosity of the sea, which, impelled by the winds from every quarter, runs with a force almost beyond belief. During such a tempest, I have myself seen the jaws of the great Greenland whale, *Balæna mysticetus*, thrown to a distance of 200 feet inland upon the beach.

Beyond the Bay of St James, towards the great Northern Cape called Svartenhuk, the floetz-trap is interrupted, either by the primitive rocks, or by an immense plain covered with alluvial soil. Svartenhuk is composed of a granitic rock, with large beds of micaceous schistus, mixed with small garnets. In the adjacent bay, called Hytten, the floetz-trap shews itself in small hills, resting on a bed of sandstone, in which bituminous wood occurs. From this point, the continent of Greenland, which consists of granite, stretches away to the east of north, and is covered with an incredible number of small islands, called the *Vrowen* or *Womens' Islands*. The base of these islands is uniformly granite or gneiss ; the last sometimes, though rarely, mixed with garnets. Some of the islands are covered with beds of the floetz formation, particularly Kakar-soak, the largest of the group,

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To the north of Kakarsoak, in the colony of Upernavik, in Lat.  $72^{\circ} 32'$ , the floetz-trap again disappears, and granite, alternating with gneiss, present themselves, and continue to Lat.  $73^{\circ} 32'$ , at the islands of Udjordlersoak and Tessiursak. Near Cape Nullok, in Sanderson's Hope, the floetz-trap again appears in large masses of columnar basalt, resting on gneiss; but beyond this place, there is no farther approach, the country being covered by the Great Boreal Glacier,—the Northern Iceblink.

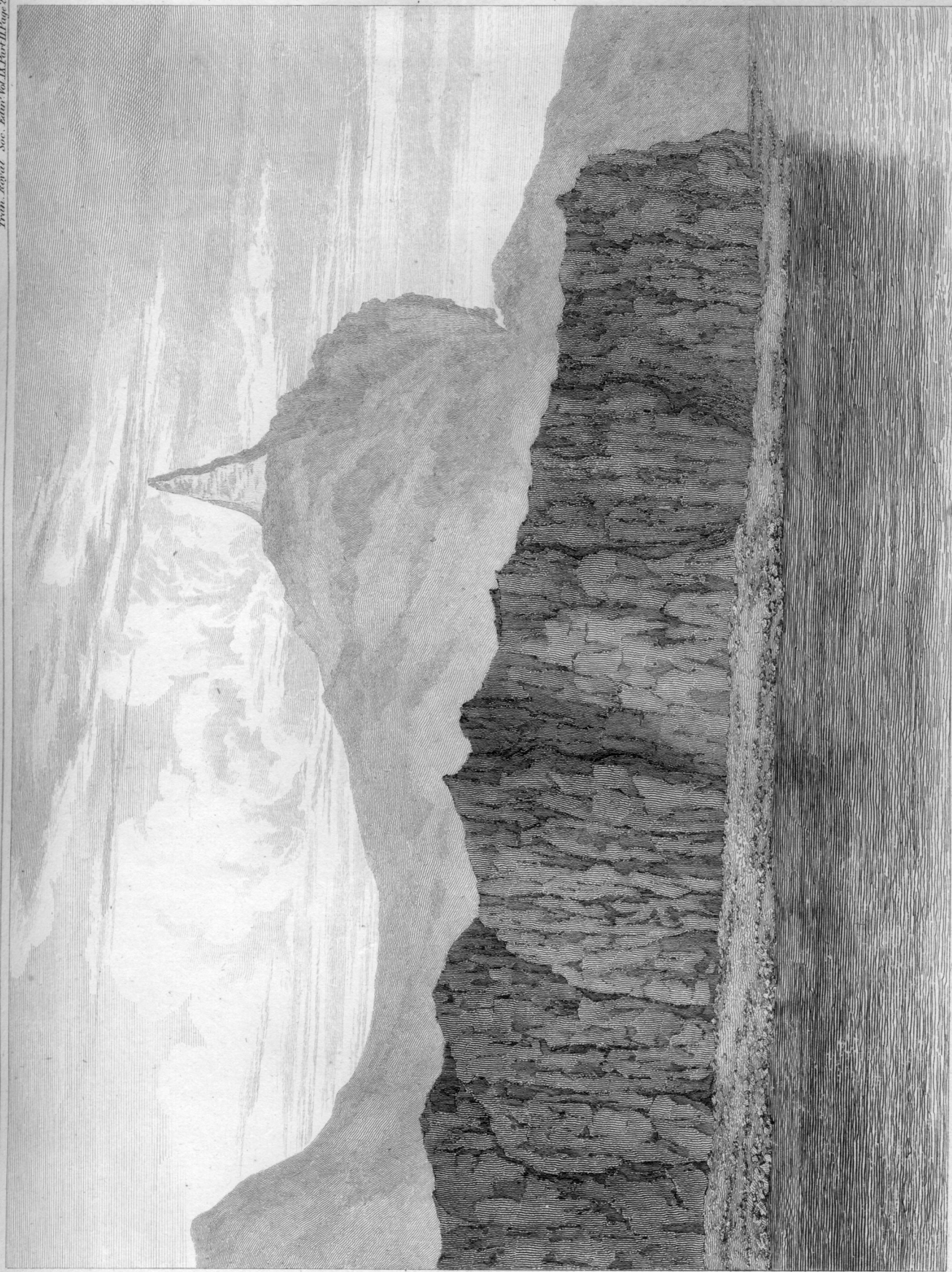
The direction of the trap-rocks, which are here spread over such an extent of country, is almost entirely similar, being nearly horizontal, stretching from south-west to north-east. The beds of which they are composed are of a very unequal thickness: those of basalt are most prevalent. The hills composed of gneiss and granite are never highly elevated; and the floetz rocks are placed immediately on the gneiss, which is always slightly decomposed upon the surface, where in contact with the trap. The prismatic basalt of this district, is of that species distinguished in Germany by the name of Basaltic Greenstone, (*Grünsteinartiger Basalt*). It is almost pure, but sometimes contains a few detached specks, perhaps crystals of felspar. I found only in one place some small grains of augite and of hornblende. The massive basalt, on the contrary, often becomes amygdaloidal, by the small globules of mesotype, stilbite and quartz which it contains. It occurs very generally undermost, and touching the primitive rocks, which is very rarely the case with the columnar basalt.

The Trap-tuff, which is very common among the floetz rocks of Disko, rests also always immediately on the primitive rocks: Indeed, I never found it in any other situation in that island. It appears to me here necessary to mark two varieties of this rock, namely, that which consists almost entirely of frag-



ments of wacke, contained in a paste of the same substance in a state of decomposition; it is of a very fine grain, very soft, and almost friable. The other is composed of fragments of wacke, but more compact, and of globular pieces of basalt. When these globules are broken, the interior is occupied by geodes of crystallised apophyllite, accompanied with capillary mesotype, sometimes decomposed and reduced to powder, in which state it is known by the name of Earthy Zeolite. These are the only minerals I found in this globular basalt. The apophyllite I never observed in the other variety of trap-tuff, in which I discovered no simple mineral whatever, except some very small geodes of radiated zeolite. I shall distinguish the one by the name of Trap-tuff, and the other by that of Basalt-tuff. The last appears to me to be the oldest of the two, and occurs, wherever I saw it, under the other. If the tuff be entirely absent, then the Amorphous Basalt occupies its place, and on it rests the Amygdaloid the paste of which is of a reddish-brown colour. It is the amygdaloid of this colour in which the greatest number of minerals occur, such as stilbite, mesotype, quartz, calcedony, and igloit. When exposed to the action of the weather, this rock becomes extremely fragile, and falls in conchoidal fragments, almost like bole. It occasions, particularly in spring season, by reason of its feeble cohesion, immense devastation. Rent by the effects of the severe frosts of winter, it falls in huge blocks into the valleys, when the basalt, deprived of its support, is precipitated in enormous masses, and to such an extent, that rivers are often impeded in their course, and the whole neighbourhood laid under water. Over this amygdaloid, a mass of ferruginous clay occurs, similar to the Eisenthon of the Germans, which approaches to the jaspery oxide of iron. This is again covered by amorphous basalt, separated from columnar basalt, which usually





*Engraved by J. Miller Edin'*

MIANNIK in the WAYGAT Eastwards from DISKO ISLAND.



usually forms the summits of these hills, by another seam of the same ferruginous substance, of a brownish colour.

The mountain called Ounartorsak, near Godhavn, presents the following proportions in one of its precipices: (See Plate XVI.)

1.	~~~~~ Basalt, columnar.	Basalt, in columns of from three to seven sides, with some crystals of felspar.
2.	=====	Reddish-brown ferruginous clay.
3.	Basalt, amorphous.	Amorphous basalt, with geodes of radiated mesotype.
4.	=====	Reddish-brown ferruginous clay.
5.	Amygdaloid.	Reddish-brown wacke, containing stilbite, mesotype, &c.
6.	Trap-Tuff. Basalt-Tuff.	The last with apophyllite, &c.
7.	=====	Granite, with gneiss.
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All the basalt of Disko is magnetic. That found in the most elevated situations is most so; the fallen masses dispersed around the base of the mountains having more power over the needle than the others.

The mountains of Disko are almost all flat at the top, and at a distance present the appearance of large houses. It was only in the Waygat, and in the Bay of St James, (Omenak's Fiord), where I observed pyramidal and conical summits. Mannik, a mountain in Waygat, (see Plate XVII.), is terminated by an immense basaltic pyramid of four sides. On the summits of all the mountains which I ascended, I found numerous rolled masses of primitive rocks, often of considerable size, and of a weight beyond my power to move. These masses consisted either of granite, gneiss, mica-slate, siliceous-schist, quartz, or hornstone. Porphyry-slate is the rarest rock among those of the trap-formation in Greenland. Although I ascended several of the mountains, I found it only in two, Unknown Island and Hare Island, to the north of Disko; and there it occupied only the summit,

summit, in tables split into a thickness varying from six inches to two, affording a clear ringing sound when struck by a hammer. The Greenlanders informed me, that during tempestuous weather, even at the foot of the mountain, they often heard tones resembling those of music, and that Tornarsuk, their good and evil deity, when enraged, was the cause of them. He never, however, happened to be out of humour within my hearing.

At the foot of this immense trap-formation of Disko, considerable beds of Sandstone occur. It makes its appearance at Aukpadlartok, Akkiarut, and Imnarsoit; but the mass of greatest magnitude is at Aumarurtiksæt, where it is accompanied with beds of Coal. From this spot the beds extend along the edge of the sea, by Waygat, and become very considerable at Kudlisæt, where the stratification is disposed in the following arrangement:

~~~~~	Sandstone, sometimes with globules of pyrites.
_____	Brown coal.
_____	Schistose sandstone.
_____	Pitch-coal.
_____	Argillaceous schistus.
_____	Brown coal.
_____	Sandstone, with vestiges of plants.

The sandstone is very light, and sometimes friable, which is also the case with the clay-slate. The vegetable impressions that occur in the lowest bed, seem to be those of the leaf of the *Angelica archangelica*. The most considerable bed of coal is about 9 feet thick; while some of the seams are not above 7 or 8 inches.

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It is nearly impossible to render this coal available, as scarcely any shelter is to be found all along the Waygat, for vessels of any description, while a tempest almost continually prevails in the Strait. It is the same case with the coal of Hare Island, generally known on account of the grains of Amber which it contains. There it occurs under an argillaceous wacke, in the following order :

~~~~~	Coarse conglomerate.
_____	Argillaceous wacke.
_____	Brown coal, with amber.
_____	Fine-grained conglomerate.
_____	Sand.

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I have now only to mention the Simple Minerals which accompany the floetz-trap formation of this country, of which the different members of the family of zeolite, its usual companion in all quarters of the globe, are the most remarkable.

1. *Mesotype*.—The most common subspecies of this mineral is the fibrous and radiated. The last is found crystallised in rectangular prisms, truncated, with pyramids of four planes \*.

b. Ca-

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\* Dr BREWSTER has examined the *Greenland Mesotype*, and has found it to be an entirely different mineral from the *Auvergne Mesotype*. In its crystalline form it resembles the *Auvergne* specimens, while, in its optical properties, it resembles the *Iceland Mesotypes*. It is very remarkable, that the capillary crystals from *Sergvarsoit*, have been found by Dr BREWSTER to be different from the large crystals, and to be the same as those from *Auvergne*.

- b. Capillary.* Near Sergvarsoit in Disko, there is a small cave covered with capillary mesotype, which the Greenlanders consider as the hair of one of their magicians called Angekok. When this variety is decomposed, it forms the earthy or mealy zeolite.
2. *Stilbite*,—in thin hexagonal tables.
- b. In quadrangular prisms, acuminated by truncated pyramids.*
3. *Chabasie*,—crystallised in the primitive rhomb.
- b. In truncated rhombs.*
- c. In macles.*
4. *Analcime*,—crystallised in the form of the leucite.
5. *Compact Zeolite*, white and red.—This mineral occurs in cavities and veins in all the rocks of the floetz-trap formation, except the basalt-tuff.
6. *Apophyllite* or *Ichthyophthalme*, occurs,
- a. In prisms perfectly rectangular.*
- b. Also with the solid angles replaced.* This variety was mistaken for mesotype, and described as *Mesotype epointé*.
- c. By a curious arrangement of the particles, the crystals of apophyllite are sometimes cylindrical, and being contracted at the extremities, present the shape of a barrel \*. They also occur acuminated and diverging, sometimes in the form of a rose. In perfect cubes, the apophyllite occurs in Greenland only in the basalt-tuff, accompanied with delicate capillary mesotype.*

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\* The cylindrical Apophyllite, according to the experiments of Dr BREWSTER, who has examined some specimens which I transmitted to him, differs in a remarkable manner from the Apophyllite of Iceland, Faroe, Uto, and Fassa. Its optical properties he has found to be of a very curious kind.



type. Notwithstanding, in Faroe and Iceland it is found in wacke. This substance forms an opaque jelly in nitric acid, frothing up and exfoliating. 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.

8. *Carbonate of Lime* occurs in all the rocks of this formation, in cavities and veins, of a greyish-white colour, sometimes massive, sometimes crystallised in rhombs, also in pyramids of three and six planes, and in prisms of six planes. I have found it also crystallised in nearly perfect cubes.
9. *Igloite*, the Arragonite of HAÜY, and Hard Calcareous-spar of BOURNON, occurs fibrous, radiated, and crystallised in pyramids of three planes ; also in curvilinear prisms of six planes, terminating by degrees in pyramids.
10. Radiated and concentric globular mineral, of a yellowish-green colour, which I take to be *Wavellite*.
11. *Compact Quartz, bacillaire*, and crystallised in prisms, in geodes.
12. *Calcedony*, massive, and very rarely in cubes. Quartz and calcedony occur in all the rocks.
13. *Opal, common*, in veins and cavities, white and yellow, particularly in basalt.
14. *Cereolite*, a mineral of a yellowish, brownish, and greenish colour, very similar to compact lithomarge.
15. *Green Earth*, lining cavities, and sometimes filling geodes.
16. *Heliotrope*, in geodes and veins in basalt.
17. *Agate* in geodes in basalt.
18. *Felspar* in small crystals, constituting the basaltic-porphry and porphry-slate.

19. *Ferruginous Clay*, of a reddish-brown colour, the Eisen-  
thon of WERNER.
  20. *Bolus*, in small veins.
  21. *Bituminous Wood*, very rarely in minute beds, in wacke  
and basalt.
  22. *Brown-coal*.
  23. *Pitch-coal*, above described.
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The Primitive Rocks, which constitute some small islands on the south side of Disko, are very rarely accompanied with any of the simple minerals. The Felspar of the granite sometimes becomes opalescent; the granite contains occasionally compact and prismatic Epidote, also Diallage and Tourmaline; at Kangek it sometimes, but very rarely, contains some cubes of Pyrites; and in one place, I observed Magnetic Iron, in nodules, mixed with it. In the islets of Fortune Bay, I noticed some specks of the green oxide of Copper in the micaceous schistus.