MINDRE MEDDELELSER

DREDGED BASALT FROM SKAGERRAK

by

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Professor O. HOLTEDAHL (1940) has given a good picture of the morphological conditions in Skagerrak, where the Norwegian Deep is an important feature in the Earth's crust (fig 1).

Our knowledge of the geology of Skagerrak is at present second-hand as it is mainly based on the study of fossiliferous boulders which occur in North and West Jutland. These boulders are of Jurassic age and were first described by MADSEN and SKEAT (1898).

The Jurassic erratics are found in glacial deposits, which otherwise almost exclusively carry material from the southern part of Norway where strata of Mesozoic age are unknown. It therefore seems beyond doubt that the Jurassic boulders have been picked up from the intervening stretch when the Great Ice crossed Skagerrak from north to south.

As demonstrated by ROSENKRANTZ (1939) the distribution of the erratics is such that the oldest, which are of Lower Kimmeridge age, are found in the west, those of Middle Kimmeridge age occur in the centre, and those of Upper Kimmeridge-Portland age lie farthest to the east. To explain this ROSENKRANTZ suggested that the boulders were picked up from a sedimentary rock sequence with an easterly dip and a N–S strike.

During a cruise in Skagerrak in March 1965 the Danish marine research vessel "Dana" dredged at station 13304 a collection of fairly large stones all of which consisted of a uniform, extremely fine grained, dark rock; the same type of rock was also found at another station in the vicinity. The position of the haul was 58° 05′ N, 9° 50′ E; the locality is thus situated on the south side of the Norwegian Deep.

Dr. H. LEMCHE from the Zoological Museum of the University of Copenhagen secured the sample which is described in this note. Concerning the sample locality he comments as follows: "The sloping Danish side of the Norwegian Deep has an escarpment which shows up well on the echogram and which falls ca. 15–20 m from a crest at a depth of about 200 m. The sample is characteristic of the locality and may belong to a submarine talus in front of the escarpment". (Personal communication).

The rock is a basalt, the sample an angular block about 10×6×5 centimetres, its shape resembling that of a fragment of a basalt column; it shows no signs of having been transported.

The occurrence of angular basalt blocks on the southern flank of the Norwegian Deep probably means that volcanics occur in this part of Skagerrak; if so, the two bulges on fig. 1 might mark outcropping sills or dykes.

This first supposedly in-situ basalt from Skagerrak shows the following features.

Under the microscope the rock is seen to be very fine grained and intensely impregnated with calcite, spongy patches of which may reach 3.5 mm in diameter. Black ore grains, about 0.5×1.0 mm across, are in part automorphic, whereas smaller ore grains are irregular in shape. A few slender phenocrysts of labradoritic plagioclase may reach a length of 2.5 mm, their breadth however, never exeeds 0.1 mm. Miss ME MOURITZEN, made a complete chemical analysis which is given below, table I.

Although alteration and calcitisation is intense, there can be little doubt that the basalt, being quartz and hypersthene normative is an oversaturated tholeiite. (TILLEY and YODER, 1962); the normative content of chromite is remarkable.

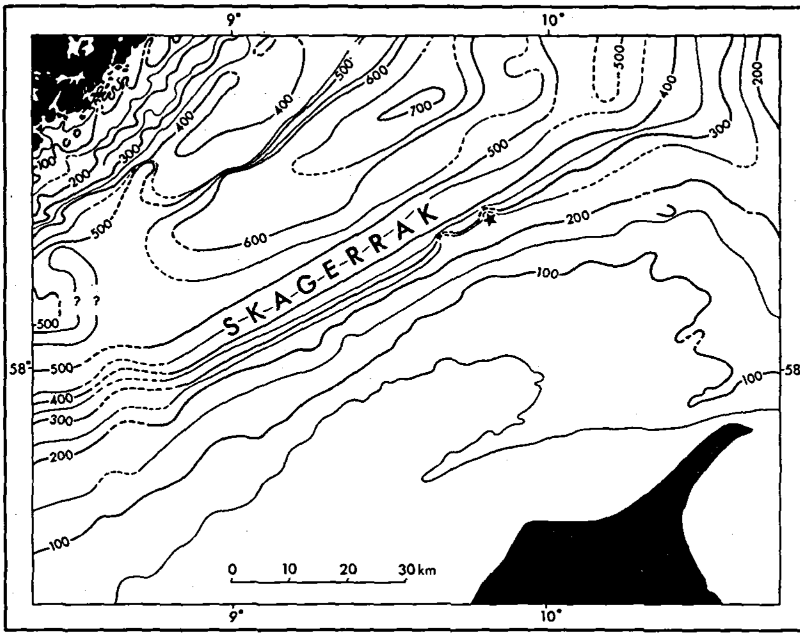

Fig. 1.

The platform-like Danish side of Skagerrak probably consists of a sequence of sedimentary rocks which, judging from the erratics mentioned, is most likely to be of Jurassic age; the basalts dredged by "Dana" could either rest on this or be intruded into it; in either case they are post-Jurassic.

Table I.

SiO_2	39.69
TiO_2	0.63
Al_2O_3	12.11
Fe_2O_3	1.97
FeO	11.86
MnO	0.19
MgO	8.15
CaO	10.39
Na_2O	0.86
K_2O	0.32
P_2O_5	0.48
H_2O+	5.67
$H_2O÷$	0.23
Cr_2O_3	0.08
S	0.56
CO_2	7.14
Cl	tr.
	100.33
Less O for S	–0.28
	100.05

C.I.P.W.-norm			
Q	7.86		
or	1.67		
ab	6.81		
an	15.85		
C	3.67		
		Σ sal	35.86
ap	0.34		
cm	0.65		
pr	0.80		
il	1.22		
mt	2.78		
en	20.30		
fs	17.95		
		Σ fem	44.04
		H_2O	5.90
		$CaCO_3$	14.28
			100.08

Analyst: ME. MOURITZEN

A natural question then presents itself. Could there be a relation between the post-Jurassic basalts from Skagerrak and the mainly basaltic ash layers which have a widespread distribution in the so-called Moclay and the other marine clays of Eocene age in Denmark?

These ashes have been described petrographically by BØGGILD (1918), who counted about 200 ash layers in all, totalling 4 metres in thickness. Later papers on the ashes have been published by ANDERSEN (1937), NORIN (1940) and NOE-NYGAARD (1965).

BØGGILD (1918) held the view, based on studies of ash grain size, that the ash particles of the Limfjord area in northern Jutland had been carried between one and two hundred kilometres from north or north-west by aeolian transport. The locality for the Skagerrak basalt lies within this distance.

New observations from Norway may be of interest in this connection. Attempts to estimate the age of some dolerite dykes with normal polarity which cut the Precambrian Egernsund anorthosite complex west of Lindesnæs, point to a possible Tertiary age for the group of dykes with a W-E to NW-SE strike (STORETVEDT, 1965). There may be a relation between these Egersund dolerites, the basalts from Skagerrak described here and the Eocene ashes known from old in northern Jutland.

So far the site of the central volcanic area is not known; a magnetic anomaly south of Kristianssand, mentioned by STORETVEDT (1966), awaits further investigation.

The possible occurrence of early Tertiary volcanism connected with the Norwegian Deep in Skagerrak would geologically bridge the gap between the basalt plugs connected with the faulted Fenno-Scandian border zone in Scania (NORIN, 1934), and the vast Brito-Arctic province of the North Atlantic.

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