A FOSSIL RIVER BED IN EAST-GREENLAND

BY

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3 TEXTFIGURES

During the expedition to East-Greenland in 1930, sent out by *Norges Svalbard- og Ishavs-undersøkelser*, I brought home amongst other fossil collections about 65 pieces of fossilized wood from a locality near Myggbukta in East-Greenland. OVE ARBOE HÖEG, conservator at the *Kongelige Norske Videnskabers Selskab*, Trondheim, has been kind enough to examine this material and has in the paper: "The Fossil Wood from the Tertiary at Myggbukta, East-Greenland" (published in this volume, pp. 363—390), given a detailed description of it. In connection with his paper, I shall in the following give a short description of the finding point of the wood.

The fossil-bearing layer was discovered in the following way: FINN DEVOLD, the leader of a hunting expedition, showed me some pieces of fossil wood, which he had found in the second river valley east of the wireless station at Myggbukta. The pieces brought down to the station by him were all rounded, and their appearance clearly indicated that they had been subject to water action either in a river bed or on a beach. He could not say from where they originated. It was most likely that the fossils were to be found in Tertiary sediments somewhere in the neighbourhood. The previous year, however, I had seen no such sediments in this tract, which only seemed to be made up of Tertiary basalts and other volcanic rocks.

On July 31 I went up the valley, which I have named *Wood Valley*. It is developed as a canyon with high and steep walls. I soon found more of these fosilized trunk-remains in the gravel on the river bottom, the rocks of which were nearly entirely of volcanic origin. About 150 metres above sea-level I observed some sediments consisting of fine-grained sandstone, calcareous sandstone and silt-

stone, which had been pierced by the volcanic rocks, in which they are now enclosed as irregular patches. In these sediments no fossils could be found, but I think it is most likely that they are remnants of Tertiary rocks. The absence of fossils, however, makes it impossible to fix the age, and they may also belong to an older period.

The following day I searched the ground east of the valley, but did not find any sedimentary rocks or fossils, although I went right up to the mountains. If the fossil-bearing sediments still existed they must thus be situated somewhere in the upper course of the river. I consequently went down the westernmost of the upper river branches. I first noticed som remnants of light coloured sedimentary rocks without fossils, and a short distance farther down I stumbled on the fossil source. In the steep eastern river wall a great many light spots were visible in a dark rock. In the rock wall before me was exposed a 15—20 metres thick bed of a dark conglomerate interbedded between basaltic rocks, and from the conglomerate projected a great many fosilized chunks of wood. The rock waste below also contained a good deal of this material.

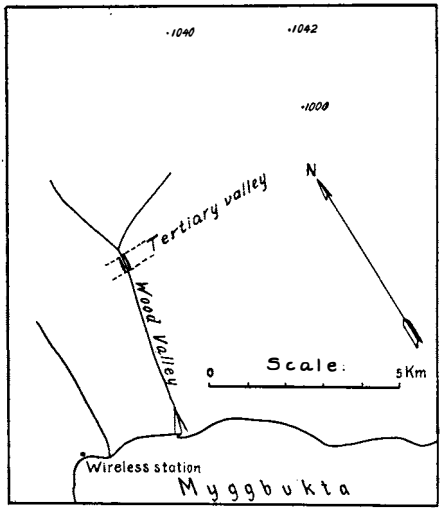

Fig. 1. Sketch-map of Wood Valley.

The fossil locality was situated about 200 metres above the sea-level.

The conglomerate was dark brown, and resembled from the distance the over- and underlying basaltic rocks. The pebbles and cobbles consisted of more or less rounded stones of a dark siltstone, and the matrix was made up of sand, and was partly calcareous. The conglomerate was porous in parts and rich in iron oxides. In some places I noticed vugs and other small cavities covered with small rhombic crystals of brownspar. The conglomerate rested upon a dense basaltic rock, which under the microscope was found to be a plagioclase-basalt, and it was overlain by a porphyritic olivine-basalt, both belonging to two different eruptions. I collected as many fossil

specimens as I was able to carry, and took a photograph of one of the greatest trunks being about 3 metres long and 0.5 metres thick (fig. 2).

As will be seen a twig is still attached to it, and it looks exactly like the wood one finds in recent streams. The greater part of the fossil wood was to be found in the upper part of the conglomerate.

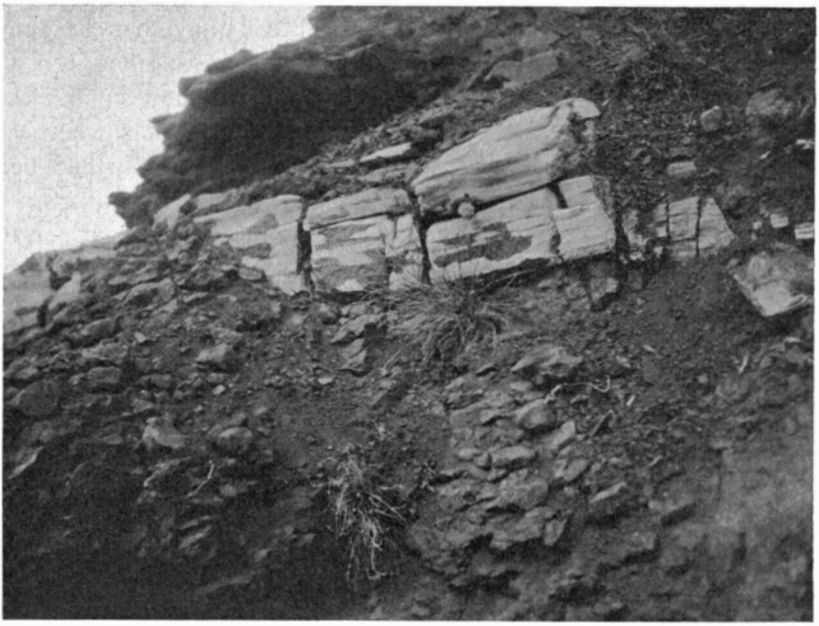

Fig. 2. Trunk, about 0.5 metres thick, of *Piceoxylon laricinoides* n. sp. according to determination by Ove Arboe Höeg. From the Tertiary conglomerate, Wood Valley at Myggbukta. A. K. Orvin phot. 1—8—1930.

I also tried to find other fossils, which might give a hint as to the exact age of the deposit, but without success.

By closer examination the conglomerate was found to wedge out against the slopes of the underlying basalt, both to the north and the south, clearly indicating that the conglomerate belongs to an ancient river bed, which seems to have had its trend at about right angles to the present Wood Valley (fig. 3). In the western side of the river bed the conglomerate could also be noticed, but it was here much covered with débris and only little could be seen. In the débris I noticed many pieces of fossil wood.

Whereas the trend of the ancient river must have run in an east-westerly direction, I could not fix the direction of the current. It is, however, possible that this may be ascertained by a closer examination of the arrangement of the sand and gravel around the greater stones and pieces of wood.

The conglomerate could not be observed in other places in the neighbourhood, but it may perhaps be exposed in other localities at some distance, and the course of the river bed may then be better known in the future.

On the slope of the western side of Wood Valley small pieces of coal and black shale were also found. I had no tools wherewith to get these rocks exposed, but as the soil here obviously had been formed through disintegration of the underlying rock it could not be doubted that the coal and shale would be found *in situ* between the two basalt streams. They scarcely belong to the river bed. The coal and shale must either belong to a series older than the ancient valley, or they originate from peat covered with clay situated on the ancient river bank. The latter is the most reasonable explanation. The coal shows some lamination, but seems macroscopically to consist chiefly of vitrite (bright coal). An old coal-seam close under the covering lava-stream would certainly have become coked, and living wood on the then existing surface would have burnt, leaving some charcoal (fusite) only.

I also observed a few streaks of coal (vitrite) in the conglomerate on the east side of Wood River. The coals have not been examined under the microscope, but macroscopically I could observe neither coke nor charcoal. The reason why coal-streaks have been formed in one instance and silicified wood in another is difficult to say. A possible explanation is that the material from which coal has been formed was not suitable for the process of silicification. It is doubtful at what time these wooden trunks and pieces have been silicified. It is possible that this process took place already before the eruption of the olivine-basalt, but I should think it more reasonable that they have been silicified by percolating silicious water and gases emanating from the overlying lava.

The fossils consist of trunks, twigs, and pieces of cortex all strongly silicified. They contain, however, still some humic substance imparting to them a dark brown colour. On the surface this humic content has been dissolved and carried away, and the

weathering has formed on the surface a film of greyish-white colour, consisting of nearly pure silica. In small pieces and twigs the humic content is now quite insignificant, and these pieces have a light colour throughout. When the dark brown fossil wood is heated to redness the humic substance will burn and the colour will turn into nearly white, without the fossil piece changing in volume or form.

This ancient Tertiary valley is scarcely unique in East-Greenland. On Jackson Island one of the members of our first expedition in 1929 found a piece of fossil wood exactly of the same appearance as those found at Myggbukta.

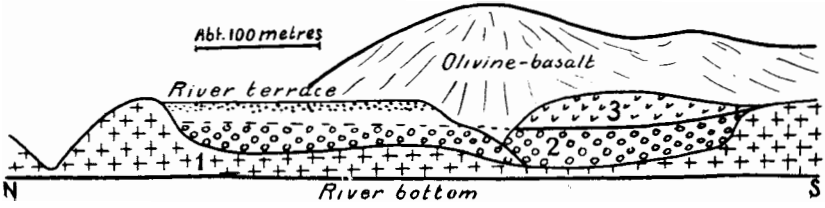

Fig. 3. Section through the Tertiary valley exposed in the canyon of Wood Valley at Myggbukta. 1. Plagioclase-basalt in the foot wall. 2. Tertiary conglomerate with fossil wood. 3. Hanging layer of olivine-basalt.

As to the age of this conglomerate we know very little. From the wood species may only be concluded that it must be of Tertiary age or younger. The sediments found at other points in Wood Valley were all older than the basaltic rocks and they may therefore as well belong to an older formation. Concerning the fossil valley one can only conclude with certainty that it is of Tertiary age, younger than the underlying basalt and older than the overlying olivine-basalt.

The two genera *Piceoxylon* and *Cedroxylon*, found by OVE ARBOE HÖEG in the material collected at this point, belong to a modern type and confirm the Tertiary age. A closer determination of the age cannot be done from the material available.

It must be regarded as quite certain that the wood found in the conglomerate has grown on Greenland in the intervolcanic period represented by the fossil valley, and the growing site cannot have been situated very far from the spot where the wood is now found. At the time when the olivine-basalt, now covering the wood-bearing conglomerate, had its eruption, the surface was probably rather barren, made up of basaltic hills and depressions, and valleys with

a rather thin cover of residual soil. This ancient surface has certainly been very uneven, and is difficult to trace now. However, future geological investigations of this tract, combined with an accurate geological mapping, may give us some hints as to the exact age of the valley and the different volcanic eruptions.

It is generally agreed that the basaltic rocks in Greenland are of old Tertiary age, and that the olivine-basalt of Jan Mayen is of Quaternary age. It seems, however, not probable that the olivine-basalt of East-Greenland should also be of this age. The wood found in the conglomerate, is according to HÖEG, very similar to Tertiary wood found in other places in Greenland.

According to LAUGE KOCH[1] the Tertiary beds of Sabine Island is of Eocene age, and on Cape Dalton, south of the entrance to Scoresby Sound, lower or middle Eocene marine sediments have been found, containing trunks of trees and pebbles of basalt. Thus the conditions here also show that these sediments were formed in an intervolcanic period, and it seems very probable that the sediments here and the Tertiary valley at Myggbukta have been formed contemporaneously. If this be the case the valley is of Eocene age. In any case it is not older. Where good sections of the volcanic rocks are exposed, it is seen that they are built up of different layers representing a series of eruptions. Tertiary remnants as described above may thus be expected to have been deposited in any of the intervolcanic periods.

[1] KOCH, LAUGE: The Geology of East Greenland, Med. om Grönland, B. LXXIII, 2. afd. 1929.

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