THE GENESIS OF THE COMPLEX ACCUMULATION IN ÄNGERSJÖ, SOUTHERN VÄSTERBOTTEN

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Abstract. The complex ridge in Ängersjö was in the first phase built up as a crag-and-tail. In the second phase a drumlin with a bedrock core was formed. Finally, in the third phase an esker was accumulated towards the proximal part of the moraine ridge.

The interpretation of the genesis of the complex ridge in Ängersjö (locality 2 in Fig. 2) implies a subglacial accumulation. A bedrock knob was probably the initial cause of the formation. When the land ice moved over a convexity of the underlying bedrock, a crag-and-tail was subglacially formed as an embryonic form of very hard, basal till (seismic velocity 2000–2200 m/sec.). The till-loaded basal ice continued the plastering of till (1400–1500 m/sec.) on the bedrock knob and formed a drumlin with a bedrock core. The orientation and the dip of the particles in the till are easily compatible with a formation in more or less well-defined shear planes in the ice. The slight divergence between the particle orientation and the ice movement, parallel to the direction of the ridge, can be explained either by local, continuous, differential, ice movements caused by the bedrock knob or by different mobilities between debris-rich ice and pure ice. The latter explanation, applied to the genesis of the basal till in the southern part of the ridge, presupposes a greater mobility of pure ice in the depression between locality 1 (Fig. 2) and locality 2 than of debris-rich ice over the convex bedrock surface east of the depression. However, there was not only a horizontal transition from pure ice to debris-rich ice but also a vertical transition, a basal, slow-moving, debris-rich ice overridden by a rather debris-free and active ice.

The narrow proximal part of the ridge of locality 2, formed as an esker, was probably built up in a short, subglacial tunnel. During a later stage of the ice recession, a fracture line, initiated by the bedrock knob, was enlarged to a tunnel and a channel, in which meltwater collected and flowed southwards. The variations of the bedding and the composition of the sediments testify to large and rapid variations of the velocity and capacity of the meltwater stream. No glaciofluvial sediments have been found in the southern part of the ridge. Possibly the subglacial river, when faced with the proximal part of the moraine ridge, turned off and escaped along the eastern or western slope of this ridge.

The retreat of the land ice over the southern part of the coastal plain in Västerbotten has been governed by calving from a terminus standing in deep water. According to Bergström (1968, pp. 52 ff.), the velocity of the ice recession over the Ängersjö area can be calculated as 250–300 m/year. In combination with either an intense calving in a local estuary, developed in the glaciofluvial river mouth, or an east-westerly ice border, the subglacial river very soon found another drainage channel. There may possibly have been a diversion of the subglacial river from the flat depression east of Ängersjö to the deep valley of the Hörneån rivulet (Granlund, 1943, the map of Quaternary deposits). After the disappearance of the subglacial river the upper, loose, sandy to fine sandy till was deposited by the melting of the land ice. Finally, during the land uplift, the regression of the sea exposed this till to wave-washing.

REFERENCES

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