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Localities visited on Excursions during the Nordic Symposium on Frozen Ground Morphology

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The localities showing periglacial phenomena of various kinds that were demonstreated on September 7, 8 and 10 during the frozen ground symposia are described in this report with text and illustrations. The objects demonstrated were, i.a., periglacial valleys formed chiefly through gelifluction, an ice-wedge cast with infilling of lime, large ice-wedge casts of the most common type in south Sweden, lateglacial aeolian sand underlain by wind eroded stones and boulders, fossil periglacial ground surfaces with overlying sand with small ice-wedge casts and asymmetrical periglacial valleys.

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The Excursion of September 7, 1982

In the afternoon we drove from Lund to Glumslöv via Landskrona. Our first stop was the Hilleshög valley, a broad »bottle-valley« overlooking the island of Ven. From a Swedish point of view this district is quite peculiar because it is the only counterpart we have in our country to the Danish cliff coasts. A prerequisite for such steep cliffs to remain almost perpendicular is that there lies in the storm shore line a hard and tough clay material not too easily eroded by waves, and that landslips and landslides from above are inconsiderable. It is the so called Norwegian till that forms the bed of the lower sediment accumulations at these localities. The Norwegian ice advanced from the north before the main phase of the Weichselian glaciation. The exact date of the advance of the former ice cannot now be established.

Unfortunately there are no good intersections left that can illustrate the stratigraphy of Glumslöv Hills, for all the three clay pits near the coast are filled up now. In the sand and silt above the Norwegian till there were, ealier, localities with the largest and most numerous ice-wedge casts found in the whole of Sweden (Johnsson 1958, 1962 a and b, 1966, Adrielsson 1978, Adrielsson et al 1981).

The Hilleshög valley with its narrow opening out towards Öresund (the Sound) has, in my opinion, been a large dead-ice pit later extended through gelifluction and solifluction resulting in the formation of opening, niches and subsidiary valleys.

Fig. 1. An ice-wedge cast can be discerned to the left of the spade under diamicton material. The little wedge to the right only consists of material that has caved in. The ice-wedge cast can be followed 3 m down into the sand and gravel.
Fig. 1. Iskileaftryk i glaciofluviale sedimenter, til venstre for spaden.

In the region just north of Rydebäck we visited a gravel pit near the coast in the glacifluvial strata of the Örby-Råå delta. There we found an ice-wedge cast (Fig. 1) overlain by coarse diamicton material. This ice-wedge cast had no funnel-shaped upper part just below the ground. This is due to the top stratum in the delta having been exposed to strong gelifluction. In this layer there are often involutions or pots of different sizes and occasionally the stratum looks like till (Fig. 1). However, it is not a question of real till, which a lot of observations earlier in the then numerous gravel pits have confirmed.

Another ice-wedge cast at this locality is unique, filled with lime as it was (according to an anlysis nearly pure $CaCO_3$). Sometimes I have observed vertical streaks of gravel or sand in the lime. Also some horizontal layers up against the ice-wedge cast consisted of pure lime(Fig. 2). This ice-wedge cast does not show a clear upper funnel either, and the topmost material is also a diamicton. As I have been able to continually follow the gravel digging here I have observed, however, that there has sometimes existed a clearly discernible funnel in the topmost layer. This circumstance is an additional support of the theory that the upper layer has been disturbed by gelifluction. Such disturbances are occasionally found in patches (cf Johnsson 1981).

This is the only limy ice-wedge cast that has been found in the west and south of Skåne (Scania), where we have sediments of calcareous material of Baltic facies. On the other hand, such casts from the Kristianstad plain have been observed and described by Olsson (1973).

The last locality was Ättekulla in southern Helsingborg, where the beatiful periglacial valleys were demonstrated which from an upper gravel plateau of about 43 m above sea level stretching down to a sharp shore cut on a 30 m level. The valleys are dry valleys with no watering today and were once eroded through gelifluction processes. Perhaps the erosion has originally followed ice-wedge trenches, for ice-wedge casts occur both on the upper surface of the plateau and intersedimentarily inside the gravel (Johnsson 1961, 1962 a, 1979).

In the shore cut there is a gigantic boulder in situ consisting of gneiss with a high content of feldspar. It has been wind-polished from an easterly direction. Shore dunes and well sorted shore sand are not found on this ancient artic shore. The open water periods have been short, easterly winds have been predominant, and almost the whole year there has been ground frost in the shore zone which has perhaps also been protected by an ice foot, all of which has prevented strong abrasion and accumulation.

Fig. 2. The ice-wedge cast with infilling of nearly pure lime. A certain faint funnel formation can be observed in the diamicton material at the top. In the upper part of the wedge there is a little streak of gravel on the left side.
Fig. 2. Iskileaftryk udfyldt næsten alene med kalk.

The Excursion of September 8, 1982

First we examined two gravel pits south of Tåstarp church to the north of Munka Ljungby. They are situated in a very large glacifluvial delta, the distalt part of which is a few metres lower than HK (Swedish Högsta Kustlinjen = Highest Coastline), probably about 57 m here. Glacifluvial deltas on such a level in western Sweden generally contain the largest and most numerous ice-wedge casts found in late glacial sediments in southern Sweden. These ice-wedge casts have been described by Johnsson (1959) and the polygonal patterns by Svensson (1974). All these ice-wedge casts are of an uncomplicated type.

We then went to south-west to Svedbergakulle (Svedberg Hill), a drumlin towering high above the surrounding sand and clay plain. The drumlin is remarkable because its main direction is N-S, whereas in the northern part there is a drumlinoid ridge NW-SE. I cannot enter upon the interpretation of this problem here.

According to the commentary on the Quaternary map Höganäs NE-Helsingborg NV (Daniel 1978) the till in this district is supposed to have been washed by the sea up to the 55-60 m level. On the north-east side the till is unwashed above about 50 m. On the north-west side it is also unwashed but here it is covered with aeolian sand. The boulders below the aeolian sand, 1.5 m deep at most, are beautifully wind eroded from the east (Fig. 3) Also a sea ice pressed boulder in the topmost shore cut shows wind erosion. Near the eastern edge of the upper drumlin was also shown, in an excavated pit, a layer of eolian sand 1 m deep, underlain by fine sand and silt. On the contact surface were found wind-eroded pebbles.

The eastern side of the drumlin has two extraordinarily sharp shore cuts with adherent shore planes, about 45 and 22 m above sea level respectively. Here the shore material is

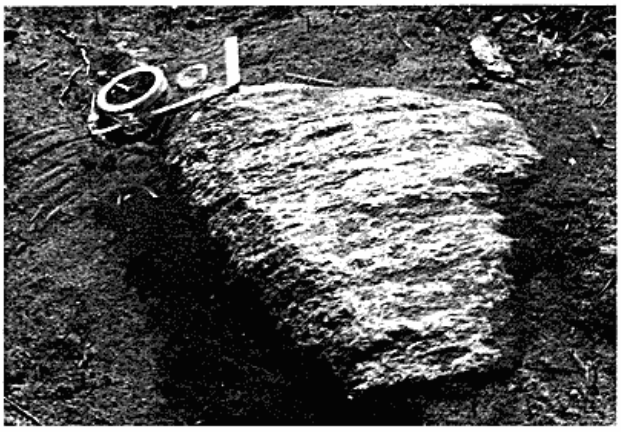

Fig. 3. Wind eroded gneiss boulder under aeolian sand, north-west part of Svedbergakulle. Wind direction left-right, i.e. East-West.
Fig. 3. Vinderoderet gnejsblok, overlejret af flyvesand, nordvestlige del af Svedbergakulle. Vindretning fra venstre mod højre, dvs. fra ost mod vest.

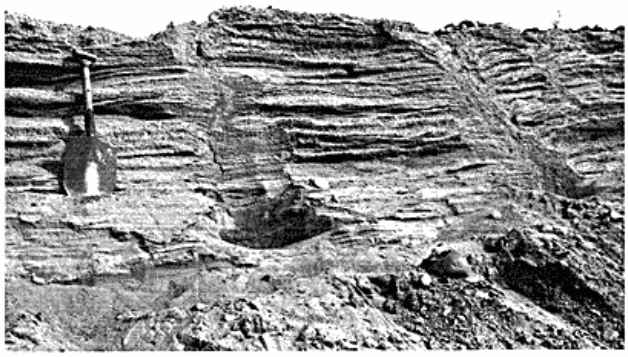

Fig. 4. Lower wind eroded stone pavement and above it about 2 m shore sand and gravel with 3 small ice-wedge casts. The one furthest to the right is only 70 cm deep and is an exception to the rule that the wedges go right down to the stone pavement.
Fig. 4. Nedre vinderoderede stenbrolægning, overlejret af ca. 2 m littoralt sand og grus med tre synlige små iskile-aftryk.

better assorted than on the west side. Probably the aeolian sand originates from these two shore planes. No aeolian sand is found belov the shore cut on the 22 m level on the western side, so evidently the sea has, on the same level, abraded it away. Thus, the eolian activity took place between the 22 m and 45 m levels in late glacial time during some hundred years after the deglaciation.

The fetch towards the east may have been long, up to 30 km, so the east wind has here given a free rein and has had a considerable morphologic effect. It has also been possible for the winds to collect more sand material here than at the other shore cuts along the Sound that are exposed to the west. This is the only observation of aeolian sand in Skåne that can with any certainty be considered of late glacial age.

Then we went south-east towards Söderåsen (the South Ridge) and the large Kvidinge delta about 10 km east of Åstorp at the north-west point of the horst. At V. Sönnarslöv this glacifluvial delta reaches a height of 50 m in its distal parts and 55 m in its proximal parts. On the eastern side of the delta there is a shore cut about 41 m above sea level. Even at this locality the easterly winds were dominating. The delta continues towards the SE in new delta planes on different levels. The sedimentation occured from the southest (cf Sandgren 1979).

In the delta material there are in many places lower fossil ground surfaces marked by stone pavements and frost shattered and wind eroded stones and boulders. The fossil ground surfaces stretched right down to the 25 m level (Johnsson 1982, now in the press). The water surfaces where the delta was deposited has evidently risen. The transgression or the transgressions have been considerable; the cause of this is still not clear (Johnsson 1980; cf Sandgreen 1979).

In the gravel pit 500 m south of the side road to V.Sönnarslöv church was shown such a stone pavemant with frost shattered and wind eroded stones and boulders overlain

by horizontally stratified sand and gravel. The gravel grains are well rounded. The layers have been interpreted as a shore formation. In these sand and gravel layers above the coarse glacifluvial material there are in several places in the delta small sand-wedge casts or ice-wedge casts, up to 2.5 m deep and 5-6 cm wide, sometimes with and sometimes without an upper funnel (Fig. 4). Usually they are only 1 m deep or a little more but almost always they penetrate the sand and gravel to the lower stone pavement where they cease. Sometimes they are intersedimentary (Johnsson 1980).

These sand-wedge or ice wedge casts form polygons, usually with sides 4 to 8 m long. Sometimes they are rectangular, sometimes square, and sometimes very irregular.

Another gravel pit 1 km WSW of Krika with such overlying shore sand and gravel a very small sand-wedge cast was shown. In this gravel pit which is now closed down have earlier been found numerous sand-wedge or ice-wedge casts of up to 3.5 m depth and a lower fossil ground surface with intersedimentary ice-wedge casts on a level of 36 m above sea level. The sandwedge casts have an infilling of vertical streaks of sand and are sometimes ramified at the bottom. All the infilling material has come from above. The ice-wedge casts have an infilling both from above and from the sides.

The excursion came to an end with a visit to Kopparhatten (the Copper Hat) with its steep descent about 70 m into the Skäralid ravine. Time did not permit a visit to the niches on the sides of the valley (Mattsson 1962) or to the locality with probably periglacial tor formations in a quartz breccia near Röstånga church.

Return to Lund September 10, 1982

On our way back to Lund we drove on the south-west side of Söderåsen to Kågeröd, where was shown the asymmetric transverse profile of the large Kågeröd valley and a small subsidiary valley (Fig. 5). The asymmetry is shaped so that the sunny side, i.e.the eastern side, is steep and the shady side slopes gently down.

Frost and thawing processes have been intensive on the sunny sides and the active layer has melted faster and deeper here. The water in the valleys has not been able to erode very deep because of the permafrost here in the ground. The erosion has mainly taken place on the sunny sides, as the permafrost has almost reached the ground surface on the shady sides in summer.

On the steep sonny sides gelifluction processes have, besides, carried down material removed by the water stream. In the small subsidiary valleys only melted snow water has flowed along but the large valleys have also been supplied with water from dammed up ice lakes further southwest.Unfortunately our bus was much delayed so time prohibited an inspection of more periglacial valleys in this district. The valleys were first described by Johnsson (1961).

Fig. 5. A markedly asymmetric small valley subsidiary to the large Kågeröd valley. The valley has only received melting snow water and ice water from the active layer.
Fig. 5. Asymmetrisk sidedal til Kågeröd-dalen. Dalen er i dag tør, men har tidligere modtaget smeltevand fra sne samt fra aktivlaget.

SUMMARY

The excursions showed that in NW Skåne (Scania) there are traces of many different kinds of periglacial phenomena. In this district we find the only locality in Skåne so far discovered with lateglacial aeolian sand, som gravel pits with the largest lateglacial ice-wedge casts in southern Sweden, and the largest and most numerous periglacial valleys. In addition, in the ancient arctic shore cuts along Öresund (the Sound) are found periglacial niches and niche valleys which are probably unique in Sweden. Fossil periglacial ground surfaces bear witness to a powerful transgression in the lateglacial sea or in som ice lake dammed up by the landice in Öresund.

SAMMENDRAG

På ekskursioner i det nordvestlige Skåne demonstreredes forskellige periglaciale lokaliteter. Området repræsenterer det eneste område i Skåne, hvor senglacialt flyvesand indtil nu er påvist. I området findes desuden de største kendte iskileaftryk i Sydsverige, samt de største og fleste periglaciale dale. Langs Øresundskysten findes periglaciale nicher og nichdale, der sandsynligvis er enestående i Sverige. Fossile periglaciale terrænoverflader viser tegn på en vigtig transgression af enten det senglaciale hav eller en issø opstemmet af Øresundsgletscheren.

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