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Fornväninen 129-137
Ingår i: samla.raa.se
Prehistoric Quartz Quarrying in Norrland

A preliminary report of finds made at Gummark in Västerbotten and some observations concerning quartz technology

By Noel D. Broadbent

The complex of archaeological sites located along the Skellefteå River drainage in the vicinity of Klutmark, Skråmträsk and Gummark in Västerbotten has been the object of several archaeological investigations since 1969. The area has long been known as yielding stone implements, notched stone sinkers, and dwelling site debris consisting of quartz detritus and fire-cracked stone. The first systematic archaeological excavations were undertaken in 1969 under the auspices of Docent Hans Christiansson’s Norrland research project, Nordarkeologi. Two sites were excavated: Heden, located to the south of the Skellefteå River on a sandy, sloping terrace of the Finnfors Stream, a tributary of the Skellefteå River; and Lundfors, located ca. 3 kilometers to the southwest of Heden in a valley of silty sediment and sandy moraine adjoining the Finnfors Stream at right angles. Both sites were formerly coastal hunting settlements as clearly evidenced by finds of burned Ringed seal bone (Pusa hispida) and fragments of both mussel shell and barnacles on the sites. Osteological analysis has been performed by Dr Johannes Lepiksaar of the Natural History Museum of Gothenburg.

The Lundfors site is, at present, located at the 78 meter curve above sea level and the Heden site is at the 65 meter level. The exact dating of these two sites has not yet been established as no fully reliable curve of shoreline displacement has been made for the area and the results of C 14 tests and pollen analysis are not yet available.

According to the shoreline displacement curve for the central Västerbotten coastal area, the Lundfors site should be dated between the 3rd and 4th millennia B.C. and the Heden site between the 2nd and 3rd millennia B.C. This curve is based upon the extrapolated rate of land rise from 10 meters per century immediately following glacial melting, to the 1 meter per century rate of the present day. The highest salt water limit of the Litorina Sea has been fixed at ca. 120 meters above present sea level.

The approximate archaeological datings may be compared and correlated with another site in the Västerbotten coastal area, Bjurselet. The Bjurselet site on the Byske River, some 40 kilometers to the north, is a major find location for thick-butted adzes of south Scandinavian manufacture. This settlement was also connected with seal hunting activities and is located between the 52-54 meter levels above sea level. The archaeological dating of the site is ca. 2 000 B.C.

1 E. Granlund, Beskrivning till jordartskarta över Västerbottens län nedanför odlingsgränsen. 1943, p. 111.
radio-carbon years B.P. A consensus would thus place the settlement sometime within the range of these dates. The ultimate dating of all the sites in question will depend on further study of shoreline displacement and archaeological sites in conjunction with C14 and pollen analysis results. Whatever the final results, the coastal sites within this area of Västerbotten offer an exceptional opportunity for studying the archaeological record of Norrland.

Since 1970, the author has analyzed the excavated material from Lundfors and Hedén and undertaken a systematic study of the area as well as materials collected through the years at the Skellefteå Museum. Surface collections from over 20 sites have been examined and the dominating raw material encountered on these sites consists of a homogeneous rose and smoky quartz. An area of 124 square meters of the Lundfors site has been excavated and this site alone has yielded 197 kilograms of quartz; the whole site is estimated as having over 1,300 kilograms of this material! This particular site is not exceptionally large (ca. 30 x 30 meters) and is only one locus of a series of sites at the same level in the same valley.

The large amounts of quartz material on the dwelling sites reflect an intense effort of stone resource procurement. Such great amounts of stone imply regular quarrying and the location of such quarries would, in turn, reflect upon settlement location. It was therefore deemed of vital importance to survey the area in search of any such quarries.

It was first assumed that the quartz had been quarried in the mountains, Skalberget and Gammelbodberget, located immediately behind the sites (Fig. 5). Numerous attempts since 1969 to locate such quarries showed that this was not the case. There was, in fact, almost no quartz of any quantity or quality in evidence there. Geologist Klas Westerberg of the Boliden Mining Company supplied a list of registered quartz locations in Västerbotten County, but none fell within the immediate area of our sites. From the viewpoint of simple logistics, however, it did not seem logically possible for such quarries to be too far distant.

The first clue came toward the end of the 1971 summer season through information concerning an abandoned feldspar quarry on Fromberget, located some 10 kilometers to the southeast of the Lundfors site. This mining project had been an abortive affair producing more quartz than feldspar. Two areas about 500 meters apart had been blasted and in each case considerable amounts of rose and smoky quartz had been removed from the hillside. Some of the attractive crystals found their way into local collections and finally came to my attention.

An examination of these sites proved to be well worthwhile. It appeared that stone had been quarried there prior to the recent projects as indicated by the presence of quartz detritus beneath the soil cover adjacent to the recently disturbed areas. The material we found could not have been associated with any recent prospecting and was too widespread to be the result of frost cracking or other natural breakage. A description of these sites before blasting seemed in order. An attempt was made to find the people responsible for the blasting but no contacts were made until the following summer.

Further inquiries in 1972 revealed that the feldspar mining project had been carried out in 1955. Our suspicions of earlier quarrying were confirmed by the blaster, a resident of Gummark, who not only described the quartz below the soil cover which we had observed, but mentioned evidence of fires having been lit there. The quartz veins at the two sites were approximately 1 1/2 meters in diameter and had been transversely exposed in the rock face.

of the mountain. The same informant was also a source for other possible quarry sites as he had previously prospected the area in search of paying feldspar deposits. Some further prospecting on our part revealed Fromberget and the adjoining Degerberget as being uncommonly rich in easily accessible vein quartz of the kind we were looking for; it appears that these two mountains were a major source of the quartz on the living sites.

Although the first evidence of quarrying came from violently disturbed sites, it took no more than several hours to locate undisturbed evidence of prehistoric quarrying. A number of locations were found in which quartz veins had been systematically opened. We investigated two of these sites and both were associated with fire-setting and stone artifacts. One site appears, on the basis of the stone tools found, as not belonging to the Lundfors horizon, but the second has given strong proof of association. This site, locus IV, is located near the crest of the Degerberget–Fromberget ridge. It consists of a small, even surfaced rock outcropping approximately 1 1/2 meters high. This shelf-like projection was partially overgrown with lichens and a deep, spongy vegetation layer surrounded the rock (Fig. 1). Running along the southeast side of this projection is a longitudinally exposed quartz vein 30 to 40 centimeters in width. Beneath the 20 to 30 centimeter thick ground cover and immediately beneath the quartz vein was found a fire lens resting upon a thick mass of rose and smoky quartz. As in the case of the first mentioned sites, fire-setting seems to have played a part in the extraction process. This method greatly simplifies the extraction of crystalline rocks and was certainly well known in antiquity. Nevertheless, successive quarrying of the same site over a period of centuries is a distinct possibility and it cannot yet be established whether the use of fire-saving.
Fig. 2. Horseshoe-shaped concentration of quartz detritus and implements at locus IV. Feature ca.
130 cm square. Opening 60 x 70 cm. Viewed from the west. Photograph by author. — Hästskoformad
koncentration av kvartsavslag och artefakter vid lokal IV. Område ca 130 x 130 cm. Öppning 60 x
70 cm. Sedd från väster.

Fig. 3. Close-up view of exposed quartz finds in root and soil matrix at locus IV. Photograph by
author. — Närbild av frilagda kvartsfynd i marken vid lokal IV.
setting represents the efforts of the Lundfors people at the quarries.

The most remarkable finds were made not below the shelf, but upon it. Here, it appears, a quarrier took his raw material and proceeded to work it using the rock shelf as a work bench and anvil. Careful brushing exposed a horseshoe-shaped concentration of quartz detritus as would be formed around a single individual at work. The whole mass was tightly cemented in a matrix of earth and roots (Figs. 2 and 3). With the exception of this unusual concentration, the rock was clean of any other accumulations of quartz, soil or vegetation.

The artificial presence of the quartz created the only foothold for soil or vegetation on the otherwise sterile, even surface of the outcropping. Soil particles became fastened among the stones, grasses left their roots and the feature became stabilized on the stone shelf which, while drained on several surfaces, has slightly raised margins. The quartz concentration consisted of 2,268 waste pieces as well as 29 stone implements. The waste material weighs nearly 16 kilograms and ranges from fist size chunks to tiny splinters. A waste material analysis was attempted but gave no meaningful results.

The quartz flake does not readily lend itself to significant statistical groupings and the nature of the site is such that it can be reasonably assumed that all desirable flakes or blades have been removed and distributed to any number of utilization sites. The presence of the artifacts, on the other hand, makes possible a unique study of the techniques of working quartz and the interpretation of the functions of certain artifacts in a specialized working area in which activities are clearly defined. It also provides the possibility of making a comparison of artifact forms with finds from nearby sites.

The artifacts in question consist of two marginally retouched pieces of unstyled form (scrapers), 3 hammerstones: 1 of feldspar and 2 of quartz, and 24 splintered pieces (outils écailés) of a very characteristic size and shape (Fig. 4).

The *outil écailé* is an internationally known type of artifact. It appears in both flint and quartz and the function has been variously interpreted as a punch for work-

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Fig. 5. Perspective sketch of the Lundfors sites and locus IV with a reconstructed sea level of ca. 78 meters above sea level. Viewed from the northwest. Sketch by author. — Perspektivskiss av Lundforsboplatserna och lokal IV med en rekonstruerad havsnivå av ca 78 meter över havet. Sedda från nordväst. Skiss av författaren.

ing stone, a core, and a chisel for bone working. The most characteristic attribute of these pieces is the splintered or crushed edge, which can be located on one or several opposite lying margins. The shape is normally square to rectangular and narrow chisel-like pieces are also quite common. The longitudinal cross-section is usually lenticular in shape.

Splintered pieces appear sporadically in the Norrland material, but no special study has been made of them and no doubt many such pieces have been missed by workers in the field. The outil écailé plays an important part in Finnish quartz technology and is found on sites throughout practically the whole of the stone age there. The form of these pieces alters little although the overall size may have some chronological significance.  

6 A. Bagge, Kjellmark, Stenåldersboplatserna vid Siretorp i Blekinge. 1939, p. 89.
7 J. D. Clark, The Prehistory of Africa. 1970, refer footnote 5. This idea was also communicated to me by Ari Siiriainen of the Archaeological Commission, Dept. of Prehistory, Helsinki, Finland.
8 Mulvaney (refer footnote 5).
9 The use of quartz in Finland begins with the earliest settlement (Askola-Suomusjärv) and continues in use into the Medieval period in northern Finland. In April 1972 the author examined artifact collections in the National Museum in Helsinki. Although it is far from being a proven fact, there is a very apparent trend from large splintered pieces (comparable in size to the specimens from Lundfors) to smaller ones through time. For example, samples from Jalsjärv (11769:49) were more than twice the size of splintered pieces from Kolpene 4 (18768:55).
The Lundfors site complex has splintered pieces as an important part of the artifact inventory. They have been found on every site at the 78 meter level and over 90 specimens have been excavated at the Lundfors site. Morphologically and metrically they are identical with the pieces from locus IV (Fig. 6). The Heden site lacks the artifact although rose and smoky quartz was still the main raw material in use at that time. There thus appears to be a chronological significance for splintered pieces within this area and a functional and cultural one within quartz technology as a whole.

Experiments with quartz have shown that the edge of the outil écaillé is produced on a piece of quartz by repeated blows with a hard instrument (stone hammerstone). The square shape is produced by rotating the piece so that blows are alternately delivered on opposite lying margins. The use of an anvil, such as the rock shelf at locus IV, is necessary for effectively doing this kind of work. The force of the initial blow bounces back off the anvil and doubles the impact on the piece. Such repeated blows remove narrow flakes and blades of various proportions depending upon the size of the piece. The final size of the core would therefore seem to reflect the size of the flakes desired by the stone worker. A large piece would produce blade-like pieces and a small core would produce micro-blade-like pieces. It is not only an efficient way of producing useful pieces of quartz but it is also one of the safest ways of working quartz with percussion techniques. The "splinter spray" is greatly reduced and danger to the eye is held at a minimum. This consideration must have been of great importance to the stoneworker whose life would have been cut short by a loss of vision. Quartz is, by its very structure, a difficult and largely unpredictable material to work with.

The splintered pieces at locus IV reflect stone implement manufacturing activities and are best described as cores in that context. Locus IV is one of a series of stone procurement and manufacturing centers with no indication of any other activities having been performed there. The two scrapers at locus IV imply tool manufacturing rather than skin preparation; they can very well be production rejects.

The possibility of a re-cycling of splintered pieces and application as chisels is also plausible. Their presence on the living sites speaks equally well for the working of cores at the settlement as application as chisels.
for bone or wood working. The association with bone implement manufacture has already been pointed out by Mulvaney. The obvious seal hunting orientations of the Skellefteå coastal settlements imply the use of bone equipment such as harpoons and ice picks as have been found in similar archaeological circumstances within the Baltic. The production of skin boats and waterproof clothing may also be considered as likely. The manufacture of bone needles and awls is seen as being important in this connection. As no burins have been found on any of the living sites, the splintered pieces can very well have functioned within the bone working technology of the Skellefteå coastal cultures.

Based upon the evidence thus far, sites lacking such splintered pieces, such as Heden, should be considered as technologically and perhaps economically distinguishable from sites having the artifact. There appears to be no transition: either one finds many pieces or none at all, a fact which supports the chronological differences between these sites within the same general area.

Aside from the particular functional aspects of quartz artifacts, there are other problems to be considered regarding the quarries. By assuming that the locus IV quarry and the Lundfors settlement were contemporary, we are confronted by the question of how the loads of quartz, both worked and unworked, were transported to the living sites. A reconstruction of the 78 meter level offers a partial answer to this question as there was, with only one break, a 7 kilometer long water way connecting the two places. In either frozen or liquid form this provided the easiest passage and was no doubt a connecting link between the stone resources and the settlements (Fig. 5). Rapid land rise, on the other hand, could have drastically cut off access to these quarries by further breaking the water passage. The position of the dwelling sites was in a delicate balance between the sea resources and the stone raw materials. It is interesting to note that the former estuary of the Skellefteå River was located approximately the same distance to the northwest of the settlements as the quarries on Degerberget and Fromberget were to the southeast. With the sea level 78 meters higher than today both of these resource areas could be quickly and easily reached by boat. The two areas are located within a 10 kilometer radius from the settlements.

The importance of analyzing the relationships of settlement location and resource areas cannot be overestimated. It is a theme which is essential to archaeological interpretation. It is only by locating hunting stations, quarry sites, and communication networks that social and economic patterns can be fully understood. Stone resources were as essential as food resources. Good quality quartz was the foundation of the Skellefteå coastal technology. This technology determined the degree of control that these people exerted over their environment. It determined their ability to survive.

Although the methodology of tool analysis has been greatly elaborated within the last decade, little understanding of the functional relevance of stone implements has been accomplished.

Quartz has long been the ogre of archaeology in Norrland. It is, nevertheless, a dominating find material there. It defies the archaeologist set upon stereotype artifact classification: quartz was not worked like flint nor was it a good substitute for flint working techniques. Quartz is best considered as a specialized material requiring specialized archaeological analysis.

The locus IV quarry has shed much light upon the particular problems of the coastal settlements in Skellefteå, but the significance goes beyond these sites. It reflects upon the general problem of quartz as a raw material in Norrland which is, as yet, very poorly understood.

Förhistoriska kvartsbrott i Norrland

I denna uppsats diskuteras nyupptäckta fynd av förhistoriska kvartsbrott på Fromberget och Degerberget vid Gummark i Västerbotten. Dessa platser var båda råmaterialkällor och bearbetningsplatser. En av platserna, (locus IV), visade en hästskoformad koncentration av kvartsavslag och ett trettiotal artefakter, något som tyder på att en man vid ett enstaka tillfälle har suttit på platsen och bearbetat föremål.

Mest framstående av fyndtyperna är det så kallade stötkantbearbetade redskapet (outil écaillé), som här tolkas som en kärna för tillverkning av skivor och spån. Fynden från Locus IV är identiska med dem man funnit vid Lundforsboplatsen som ligger ca 10 km nordost om brotten på den dåvarande Litorina-havstranden ca 78 m ö. h. Stötkantredskap av precis samma form och storlek är mycket karakteristiska för alla kvartsboplatser på denna nivå i trakten. De verkar däremot saknas på de 65 m ö. h. undersökta boplatserna. Enligt landhöjningskurvan för mellersta Västerbotten är Lundforsboplatsern daterad till ca 3500 f. Kr.