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TWO POSSIBLE SOURCE AREAS FOR THE QUARTZITE ARTIFACTS OF THE HUDSON-MENG SITE – A COMPARATIVE STUDY

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ABSTRACT

Quartzites from quarries at Flint Hill, South Dakota and Spanish Diggings, Wyoming were examined using a binocular and petrographic microscope. A textural difference was discovered between material from the two quarries. Artifacts and debitage from the Hudson-Meng site (25 S x 115) was then examined and compared with quarry material. Tentative quarry affinities have been assigned to a portion of the Hudson-Meng collection.

Archaeologists are frequently interested in the source area for exotic (non-local) material found in an archaeological context. Such knowledge may shed light on trade and/or migration patterns of pre-historic peoples. Further, if the materials from a site are recovered under good control, and if the site itself is dated, then a minimum age for exploitation of the source areas may be inferred. The source areas are often interesting archaeological sites in their own right.

Fig. 1. Quarry Sites in relation to Hudson-Meng.

QUARRY SITES IN RELATION TO HUDSON-MENG

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In attempting to determine the source area of lithic material found in archaeological sites, the major problems are the restrictions placed upon the methods of inquiry. Archaeologists are rightfully indignant over requests to thin section or otherwise damage their artifacts. Work is thus largely restricted to megascopic and binocular microscopic examinations. Such methods are not as quantitative as petrographic or trace element analysis and results are necessarily less conclusive. Certainly, the challenges are great.

This study concerns itself with possible source areas for the quartzite artifacts and debitage from the Hudson-Meng site. This is a Paleo-Indian Bison Kill located 25 miles NW of Crawford in Sect. 17 and 18, T. 33N, R. 53W, Sioux County, Nebraska. The quartzite inventory after two field seasons, included one complete projectile point, two basal portions of projectile points, one scraper and 70 waste flakes. Quartzite is not available in the immediate area of the site and must have been transported to the locality.

Two major known quartzite quarry complexes occur within 70 air miles of the Hudson-Meng site. Assuming minimal transport distance for a particular lithic material one, or both, of the complexes seem a likely source for the quartzite.

FLINT HILL, SOUTH DAKOTA (39 FA 95)

The quartzite quarry nearest the Hudson-Meng site is Flint Hill. It is located 40 air miles north of the site in Sec. 19 and 20, T. 8S, R. 4E, Fall River County, South Dakota. Here, along the southern flanks of the Black Hills uplift are exposed, southerly dipping, sandstone beds of the lower Cretaceous Fall River Formation. These sandstones have been locally enriched with silica, forming pods and lenses of very dense and workable quartzite (Bell and Post, 1971. p. 550).

Quarry activity is manifest along the western and southern upper portions of Flint Hill proper. Here one observes a series of large conical pits 20-30 feet in diameter and up to 15 feet deep. The walls and bottoms of these excavations are covered with refuse and reject materials and low mounds of the same material form concentric circles about the pits. The area about Flint Hill supports a pine forest but the quarry area itself is nearly treeless. Grass and low shrubs almost obscure some of the pits.

The quartzite exposed in the refuse piles is of varigated hues ranging from purples and reds to rich brown. On the southern slope of the hill are several large float blocks which show the lens-like occurrence of the quartzite in contact with the unaltered parent sandstone. The silica enriched area appears to be approximately 10 to 15 feet thick in the quarry area.

The relatively flat top of Flint Hill is covered with stone circles and is littered with rejects, hammerstones, and waste flakes indicating workshop activities.
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The pit and quarry area proper cover 3 to 4 acres while the workshop area constitutes another 10. Other camp and workshop areas are located along the ridge of which Flint Hill is a part.

SPANISH DIGGINGS, WYOMING

The other quarry site, Spanish Diggings, Wyoming, is located approximately 50 air miles southwest of the Hudson-Meng. Quarries in this area were described in 1900 by Dorsey who was much impressed with the phenomena. According to him the quarries were referred to as the "Mexican Mine" by local residents who believed them to be the work of early Spaniards searching for precious metals (Dorsey, 1900, p. 211). R. F. Guilder visited the area in 1906 and in an article for the Omaha World Herald popularized the name Spanish Diggings. Guilder drew a sketch map of locations and gave names to a number of particular quarry sites in a general area he called Spanish Diggings (Guilder). Holmes, although he apparently did not visit the area personally, devoted a short chapter of a 1919 publication to the phenomena (Holmes 1919). Renaud visited the area in 1931 and notes that it was little changed since Dorsey's visit (Renaud, 1932).

As mentioned above, Guilder gave names to quarries in the general area he called the Spanish Diggings. His names should have precedence, but unfortunately his work was completed before the region was accurately surveyed and thus his sketch map is of limited utility. Modern usage of the term Spanish Diggings is restricted to a single set of closely related quarry phenomena in the NW ¼ Sec. 1, T. 30N, R 67 W, Platte Co., Wyoming (USGS, 1949). Only this quarry area has been closely inspected by the authors (this location probably corresponds to Guilder's Owto two quarry).

Spanish Diggings, as thus described, is situated on the northern flank of a long, east-west trending, erosional scarp. The quarried material is derived, as at Flint Hill, from rocks of lower Cretaceous age. S. H. Knight assigned these beds to the Cloverly Formation but in current nomenclature they would properly be assigned to the Lakota Formation.

The Quartzite occurs as lenses and pods in a clean gray to buff sandstone. Beds in the immediate area strike to the NE and dip gently to the SE.

The quarry activities greatly resemble those previously described for Flint Hill. A series of 40 or 50 conical depressions 15 to 50 feet wide at the top are surrounded by hummocks of rejected material. The quartzite is discontinuous and it is evident that much material was perforce removed in order to obtain the more indurated, workable stone. Several specimens found in refuse heaps show that small nodules of jasper are present. It is probable that both materials were quarried. Jasper may even have been the preferred
material, but being relatively rare, was certainly not as important volumetri-

cally as the quartzite.

Here too the quartzite comes in multitudinous colors: shades of brown,
gray, red, yellow and even (rarely) black. Many small blocks show banding
and mottling of 4 or 5 colors over a very small area.

In some cases the quarry pits are overgrown with vegetation. Other pits
lack plant growth and reject blocks look very fresh. From this one might
conclude that Spanish Diggings was in use later than Flint Hill. However some
of this difference in appearance may reflect precipitation, which is somewhat
greater at Flint Hill.

METHOD OF STUDY

Thirty-two quartzite specimens were collected from Flint Hill and 40
from Spanish Diggings. Only material which appeared workable was selected.
An attempt was made to color match specimens from the two quarries but
this proved impossible. Although color differences were subtle, they are real,
and are evident in a specimen-specimen comparison.

Specimens were first examined and compared megascopically. It was
noted that in addition to the color, the luster of specimens from the two
areas was slightly different. Flint Hill material appears to have fewer, but
larger, areas of high reflection than specimens from Spanish Diggings. Under a
hand lens Flint Hill specimens have a slightly rougher surface in areas of
conchoidal fracture.

In order to ascertain the reasons for the differences manifest in
handspecimens, a small, thin flake was struck from each specimen and
subjected to examination under a binocular microscope. The basic differences
between the materials became more evident.

Flint Hill is composed of larger grains and appears to possess more
cement than Spanish Diggings material. Milky quartz grains are larger and
more numerous in Flint Hill material giving a spotted appearance. Larger
grain size and greater percentage of cement allowed rare breakage around
grains, rather than through them in Flint Hill samples. In a specimen for
specimen comparison only one of the 40 Spanish Diggings approached the
grain size of Flint Hill.

With the single exception from Spanish Diggings, it appears as though the
two source areas may be differentiated on the basis of texture. The authors
were able to identify source area of sample flakes with greater than 90%
accuracy after a little practice.

It is difficult to determine exact grain boundaries using a binocular
scope. This difficulty is compounded if the specimens worked with are gray,
since their color tends to further obscure grain boundaries. Thin sections, cut
from 9 specimens selected from each quarry site, were subjected to petrographic examination (Fig. 2). The results, although not as yet quantified, have been gratifying. Of the nine specimens cut from Spanish Diggings material, 8 appear to possess substantially smaller grains, grains appear better rounded, and less cement is present, than in Flint Hill material.

Small amounts of muscovite and magnetite were present in thin sections from both areas. Otherwise the quartzites are amazingly clean.

CONCLUSIONS OF THE STUDY OF QUARRY MATERIAL

Differences between the material from Spanish Diggings and Flint Hill are manifest (with the single Spanish Diggings exception) in collected samples scrutinized megascopically, with the binocular scope and through petrographic examination. Flint Hill material is coarser grained and has a greater percentage of cement. Color differences were apparent, and neglecting heat treatment, it may be possible to identify specimens as to source area by color alone. Color shades are numerous and subtle, however, and an extensive reference collection would be required. Texture thus seems a more logical criterion.

We recognize the problems of using texture alone as a criterion for judging quartzite source areas. It is known that in a beach or reworked fluvatile, sand deposit grain size may be highly variable over a short vertical or lateral distance. Yet from our limited study of only two particular quarries, texture seems to be a valid criterion. With their crude excavating tools, aboriginal workmen must necessarily have chosen outcrops with easy access to the desired material. Thus their tools limited the depth and breadth of their excavations. Perhaps in a given quarry area these limitations restricted their labors to the extraction of material from a specific facies.

TREATMENT OF MATERIAL FROM HUDSON-MENG

Waste Flakes

Waste flakes from the Hudson-Meng were first sorted by color. Three basic colors were present: red, brown or tan, and gray; Each color class was further subdivided with the aid of a binocular scope on the basis of texture.

The 35 red flakes were subdivided into four categories on the grounds of minor textural differences. Likewise, the 17 brown flakes were subdivided into 3 categories. The 23 gray flakes were more difficult to work with and were subdivided into 2 or possibly 3 categories. Type flakes for each subdivision of each color were established and binocular comparison made with flakes of comparable color from the quarry areas.

The brown flakes from Hudson-Meng without exception were coarse grained and possessed a relatively high percentage of cement. Milky quartz
grains were common. Most of the flakes could be perfectly color matched with quarry material from Flint Hill. The brown flakes are consequently assigned a tentative Flint Hill affinity.

The gray flakes from Hudson-Meng were extremely fine-grained. Although no color match was achieved with material from either quarry, texture would lead one to assign a Spanish Diggings affinity to the gray flakes.

The red flakes present more of a problem. They are texturally like Flint Hill, but our one anomalous, coarse grained, Spanish Diggings specimen is also red. The affinity of the red material is thus open. The affinities assigned should not be considered absolute. They are subject to the limitations mentioned later in this paper.

Quartzite Artifacts from Hudson-Meng

The quartzite artifacts from Hudson-Meng, with the exception of the single scraper, were also subject to binocular examination.

HM-1014 is a brown quartzite basal section. It is coarse grained, milky quartz grains are common and there is a relatively high percentage of cement. Color and texture closely match Flint Hill quarry specimens. It is assigned a tentative Flint Hill affinity.

HM-945, a complete red quartzite projectile point, is fine grained. The grains are tightly packed. Milky quartz grains are common but small. No quarry sample from either site matched in color or texture. Based on grain size alone it might be tentatively assigned a Spanish Diggings affinity.

HM-166 is a red basal section. It resembles no quarry specimen. Affinity is open.

CONCLUSIONS AND LIMITATIONS

At this point definite source areas for the quartzite found at Hudson-Meng cannot be assigned. It is possible that both Flint Hill and Spanish Diggings material is represented in the site. If Flint Hill and Spanish Diggings were the only available source areas for quartzite, the authors would have more confidence in their now tentative source area affinities. There are, however, many quarry locations in Eastern Wyoming which have not been examined by the authors. It is hoped that an extended and comprehensive survey of the quarries will be made in the future.

The methodology employed in this investigation may enable future workers to inexpensively quantify and define differences in quartzite quarry material and thus aid archaeologists in the search for source areas.
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