TRAILS OF THE VORE SITE STONE

By Gene Gade

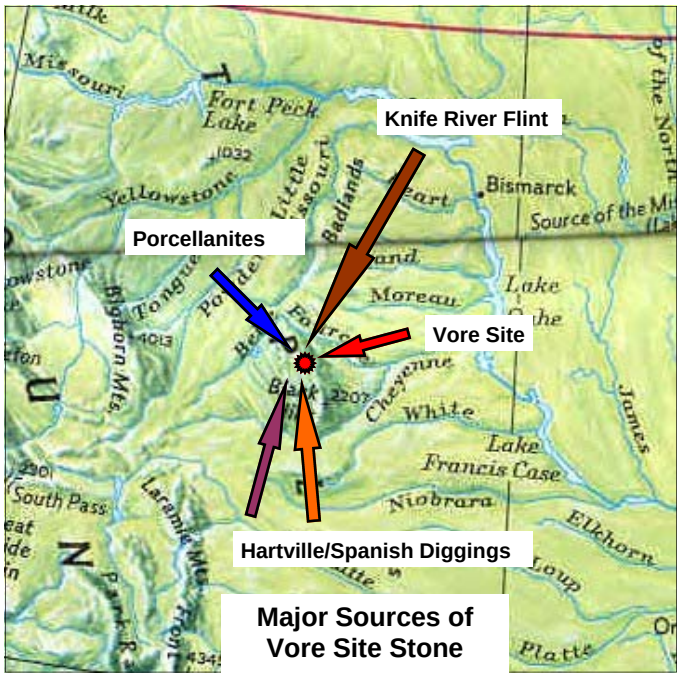
Of the thousands of varieties of rocks and minerals, few have the properties required to make good stone tools. The stones used to make arrow points, knives, scrapers, and so on needed to be hard and capable of forming and holding a sharp edge when they were flaked. For their tools, Native Americans favored use of a group of rocks with very similar chemical composition—minerals composed of silica (SiO_2) —collectively called "silicates."

Rocks of the silicate group (which include all forms of quartz) are extremely common in the earth's crust, however they differ in how they are formed, in the size and uniformity of their crystals, amounts of impurities, etc. The ones useful for stone tools either have extremely small crystals or none at all. They often have a smooth, waxy luster and when struck or pressure flaked, they form the characteristic concoidal (cone-shaped) fractures that are so typical of Indian tools. Traces of other chemicals within the basic silica matrix give stones hues ranging from nearly white to brown, yellow, orange, red, purple or even green.

Silica-based tools can be formed from all of the three major rock types. Obsidian is an igneous silicate formed from molten rock that cooled so fast that it is essentially "volcanic glass" that contains no discernable crystals at all. Obsidian is usually black, but sometimes red, and it is capable of forming edges sharper than any steel blade. The volcanic fields of Yellowstone, and the lava fields of the Columbia River plateau, Cascade Range, Great Basin and Southwest all have outcrops of excellent quality obsidian.

Several types of workable silica stone are formed as sedimentary rocks when silica precipitates out of solution to form hard nodules. Often such nodules are found embedded in other kinds of sedimentary deposits, such as the limestones found in the Black Hills. Common names of these sedimentary stones include: flint, jasper, chalcedony, and agate. There are excellent deposits of these in the Great Plains.

Finally, there are metamorphic silicates. The most common of these is quartzite, a chemically-similar rock that forms when a pure quartz sandstone is subjected to so much heat and pressure that the sand grains begin



Major Sources of Vore Site Stone

to melt and fuse into a more uniform solid. Quartzite can also formed when the rounded grains of a very pure quartz sandstone are cemented together by silica minerals. This is called "orthoquartzite" as distinguished from metamorphic quartzite. Spanish Diggings quartzite is of the ortho variety.

Similarly, silica-based shales can be baked and pressed, by burning coal seams for example, into hard, ceramic or glass-like rocks called "porcellanites."

All of the silica-based rocks mentioned share the desirable traits of being hard, forming concoidal fractures and sharp edges. However, while silicates are common, tool-quality deposits of them are not. They are often separated by hundreds of miles. Over the centuries, native peoples found particularly large or high-quality deposits and returned often to replenish their supply of the essential stone resources. Quality stone sources were usually known about and used by many tribes, and often tool-grade stone became a trade commodity for tribes that lived near them or controlled access to them.

Stone tools can often be traced back to the quarries they came from, because the rocks from a particular area or geologic formation have unique signature properties...trace impurities, color, crystal size, etc. Such "lithic source analysis" can provide important inferential evidence about the territorial range and travel patterns of people who used archaeological sites, trading relationships, perhaps even, who used a site and when. **(Continued)**

Sources of Vore Site Stone

Dr. Charles Reher, UW archaeologist and VBJF Vice President, made a preliminary source analysis of the points, flakes, and other tools found during the Vore site excavations of the early 1970's. As expected, some of the stone came from "local" sources in or close to the Black Hills. However, the majority of the stone analyzed thus far is from three main sources, all located at considerably greater distances from the Vore site.

Spanish Diggings

By far, the greatest source of stone at Vore came from two distinctive, but somewhat-related quarry sites south of the Black Hills. Almost 2/3 of the stone came from the so-called "Spanish Diggings" quarries located southwest of present Lusk, WY in the Hartville Uplift. Quartzite from the Flint Hills region of SW South Dakota, contribute another 6 to 7%. These sources, used by many Plains tribes including Cheyenne and Arapaho, are from 120 to 200 miles south of the Vore site.

Knife River

The famous and distinctive dark brown Knife River Flint is found as nodules imbedded in glacial gravels in northcentral North Dakota about 225 miles NNE of the Vore site. Knife River Flint makes up about 6.5% of the artifacts found there. Knife River flint was highly prized and has been found as far south as central Colorado. In the 300 year period of Vore site use, the Hidatsa and Mandan tribes that had villages near the confluence of the Knife and Missouri Rivers, controlled this quarry. The Crow tribe branched from the Hidatsa during the Vore site use-period and moved south and west.

A projectile point from Spanish Diggings stone found at the Vore Buffalo Jump

Powder River

The second major stone type (representing about 10% of the total, is porcellanite that probably came from the Tongue and Powder River drainages in southern Montana. The best quality of this material is from areas 120 miles or more NW of the Vore site. The Shoshone are known to have used this stone. The Crows also moved into the area where it was found and probably used it.

Interestingly, the percentage relationships among these stone sources varies at different cultural levels in the Vore site. For example, of the 10 levels that Dr. Reher analyzed and reported, the two oldest contained only Spanish Diggings rock. Level 5 (middle), had the highest percentage of Knife River Flint (13.5%). The three most recent levels have, by far, the highest percentages of the Tongue/Powder River porcellanites. What does all this mean in terms of possible tribal affiliations, shifting territories, trade, etc.? Several lines of evidence indicate that probable Vore site users (ex. Hidatsa/Crow, Shoshone, Kiowa/Apache, and Cheyenne) were actively moving around and in cultural flux during VBJ the use period. It's intriguing to speculate, but further research is needed to . Stay tuned!

Spanish Diggings Quartzite | **Knife River Flint** | **Powder River Porcellanite**

The three most common stone types found at the Vore Buffalo Jump