Rocks, Space and the Organization of Production at a Prehistoric Quartzite Quarry

by David M. Lacy

Introduction

Two thousand feet above sea level and nearly two miles from the nearest road, a small upland stream flows past an expanse of fractured quartzite lying dormant under a layer of duff in the protective shadow of two mountains and stands of maturing hard woods. Hundreds and, perhaps, thousands of years ago, a different scene might have greeted us: under cloud cover we would see a dull expanse of grey-blue-white cobbles, boulders and spalls, but in direct sunlight it would seem a glistening lode of accessible raw material offered up by the earth.

Based on survey and collection work conducted by Green Mountain National Forest archaeologists intermittently over the last decade, we know that many people did indeed view this scene before the advent of written history. To what degree they did so as a spiritual experience in addition to a pragmatic tool-making foray into the uplands, we may never know. We do know, however, that they reduced a large amount of material to various forms of rubble (now designated site VT-RU-105) while caching or carting away a much smaller amount, mostly in the form of "blanks" for future use and/or exchange. This quarrying activity was almost entirely restricted to surface materials and appears at first blush to have resulted in a poorly structured, unsortable spread of partially obscured, overlapping, side-slope debitage. It is a challenge to understand the internal structure of the site such that we can address some archaeologically interesting questions.

This article provides a general overview of the site, including its discovery, size, structure, range of artifact types, and raw material, as well as our survey and sampling methods, and the direction analyses are heading.

Site Discovery

The site was originally discovered in 1986 in one of those strokes of good fortune that occur at the confluence of persistence, experience, awareness and good timing. The author and crew were en route to a more remote location on the National Forest to conduct tests when we were surprised to see what appeared to be a spread of newly-exposed quartzite flakes shining in the morning light for nearly 25 meters along the trail in front of us. It didn't take long to verify that these were indeed bifacial thinning flakes; that there were surface and near-surface indications of much more of the same material in the immediate vicinity; and that we were into something much bigger than we had ever expected to find. Given our location at nearly 2000 feet asl on the side of a mountain, we were (pleasantly) stunned.

Site Definition and Collection Strategies

That first season's post-discovery efforts were focussed on identifying site extent so that we could, at a minimum, keep potentially disturbing activities at bay. To this end, we conducted a large-scale walk-over reconnaissance of the area to get a feel for its horizontal dimensions, coupled with some widely spaced shovel test probes designed to determine the vertical structure of the site. This strategy was successful in establishing a couple of basic generalizations: the site was huge (hundreds of meters on a side), and it was shallow (there is no significant post-glacial soil development at this elevation; i.e., it is duff-on-till) with occasional alluvial deposits along the minimal "floodplain" of a nearby mountain stream.

The second, more intensive, phase (1987/88) consisted of placing 15 E/W transects (cross-cutting the slope) at 100 m intervals. "Sod turn" presence/absence test pits were dug at 10 m intervals along these transects, and N/S transects (stretching the 100 m between corresponding test pits) were walked in order to detect and map surface evidence. In addition, surface materials along the nearby trail were mapped and collected.

A third phase of collection (in 1988) consisted of placing 1-meter-square tests non-randomly in areas where our other samples had either failed to detect any material (but

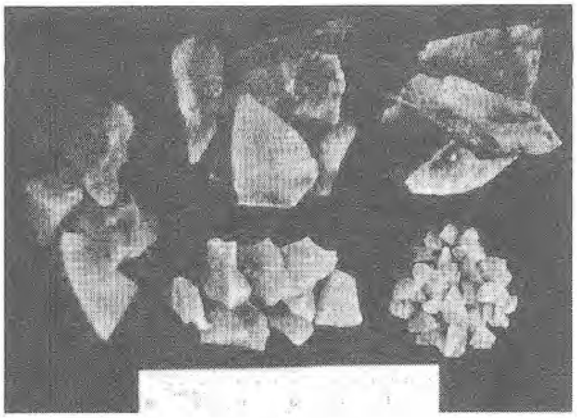


Plate 1. *Size sorted reduction flakes (VT-RU-105).*

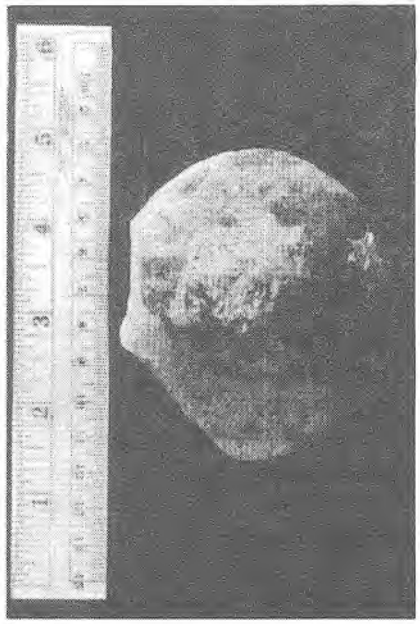


Plate 2. *Hammerstone found within an activity area (VT-RU-105).*

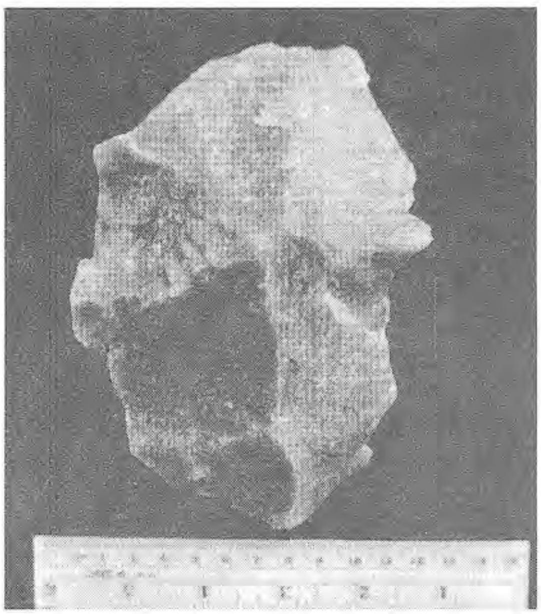


Plate 3. *Small expended core (VT-RU-105).*

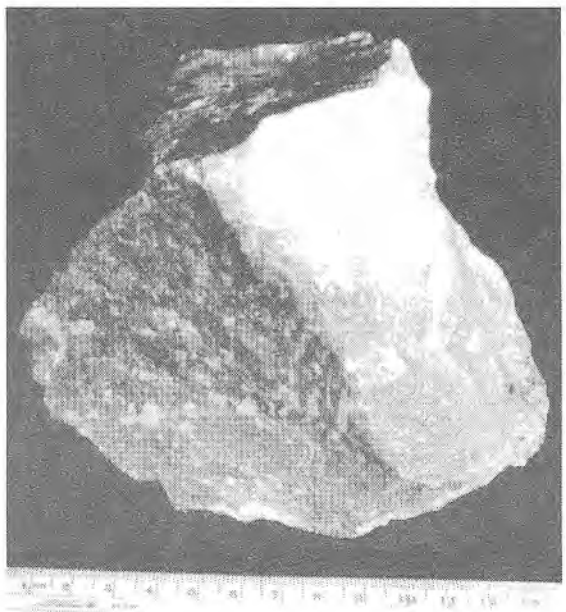


Plate 4. *Large expended core (VT-RU-105). Resulting flakes were probably used to provide unifacial blanks.*

were expected to), or where surface indicators suggested "finish" work was occurring (since our burgeoning collection still did not contain a single temporally diagnostic artifact). We also mapped and collected surface material from a nearby campground.

Finally, in 1989, in an effort to divert an intermittent stream's spring torrent from rushing down the associated trail's path and eroding sections of the site, we excavated a 1 X 5 meter trench for placement of a stone culvert. In the years since, we have monitored the site, checking for erosional damage and vandalism, collecting only the occasional surface find if it appears unusual or instructive.

Site Structure and Integrity

Based on our survey and collection work, we determined that the site runs at least 1000 meters along the slope and up to 500 meters up-slope; rarely has deposits deeper than 40 cm, always starting just below the duff; and consists of a large number of contiguous (and only occasionally overlapping) activity areas. At the base of some of the more treacherously steep slopes, artifactual material has been buried by colluvial deposits, consisting largely of cobbles. In addition, there is an apparent patterning of material across the site, suggesting lateral zones of reduction activity corresponding to the slope's contours, and possible differentiation of work groups or activities (more on this below).

The physical integrity of the site appears to be reasonably good. Logging does not appear to have occurred during this century, and it is likely that the earlier timber harvesting was done with horse-drawn equipment, possibly over snow, in the late 19th century (to feed charcoal kilns located a mile or so away). Questions of downslope movement of material have been raised, given the moderate-to-steep slopes and occasional intermittent stream; it would appear that there is some movement of materials, but it is not widespread (no "sheeting" has occurred), and informal observations of size sorting indicate that the mix of flake and artifacts by size at any point along the slope is a function of stage-of-reduction rather than differential movement of materials.

What Was Found

As you would expect at a quarry or extraction site, the full range of reduction sequences is represented by the artifact assemblage. There is evidence for the "scoping", or quality control, aspect of material selection (i.e., testing and selecting cobbles, boulders and spalls, usually up-slope); primary reduction of selected samples down to manageable/portable sizes; further, or secondary, reduction of these cores to workable, if crude, blanks; the gross thinning stage associated with the production of good quality bifacial blanks; and finally evidence for finer bifacial thinning work in selected locations.

These activities are represented by thousands upon thousands of pieces of debitage, including large primary reduction chunks, shatter and flakes; smaller, but still relatively "blocky", secondary reduction flakes; a broad spectrum of bifacial thinning flakes (Plate 1); a handful of hammerstones (Plate 2); several expended cores (Plates 3 and 4); partially completed/rejected crude bifacial blanks (apparently rejected based on flawed material); fractured large and small bifacial blanks in nearly finished form (Plates 5, 6 and 7); a single cache of 125 unifacial blanks (and an associated workshop, including another 75 "rejects"); a few scrapers; one knife; and one non-diagnostic point tip (Plate 8).

In retrospect, our collection strategies would appear to have under-represented certain artifact types, including hammerstones, scrapers, and unifacial blanks. While it is possible that hammerstones were carted from the site for re-use, or were superceded at this site by use of antler billets, it seems more plausible to me that the disposal pattern for expended hammerstones may have hidden them from archaeological view (e.g., they could have been tossed into the stream, or at least into areas not otherwise identified as "activity areas"). Scrapers, on the other hand, may be present but under-identified in the existing collection due to the gross level of inventory/analysis conducted to date (i.e., we simply may not have identified them all yet). Unifacial blanks (in this case, characterized as flakes removed from a core with subsequent flaking on just one face to create an edge), are likely underrepresented in the collection, but not the site itself, since our lone cache was found in a unique setting at the end of the last concentrated field season. There are numerous examples of this setting within the site area, and further field work would likely result in additional examples of this artifact type.

Other items or features notable by their absence are hearths or other signs of domestic activity (although these features are likely present at a known site nearby); organics of any sort suitable for dating (partly attributable to the lack of hearths, in part to the lack of soil development, contributing to easy scavenging and rapid deterioration); and diagnostic artifacts (with the exception of several bifacial blanks that are teasingly similar to so-called Petalas blades, found in both Hudson and Connecticut drainage Woodland period sites).

The possible use of anvils was suggested by the occurrence of flakes, apparently in situ, on the level tops of side-slope boulders (now covered with moss). Given the small number of flakes occurring in this setting at any one location, however, an equally compelling explanation is that these artifacts were left as offerings. This ritual or social aspect of site formation ("giving something back") may also apply to some of the fractured "finished" blanks which may have been intentionally broken and left on-site, particularly hose found out of context (e.g., not within an activity area). Finally, and at something of a tangent to the "intentional breakage" point, it is an instructive lesson in "curation behavior" to compare the size, volume and quality of the "rejected" materials at this site with the same category at sites a significant distance from a lithic source (i.e., much of the rejected material at the quarry would have been saved and re-used elsewhere, never showing up in the archaeological record).

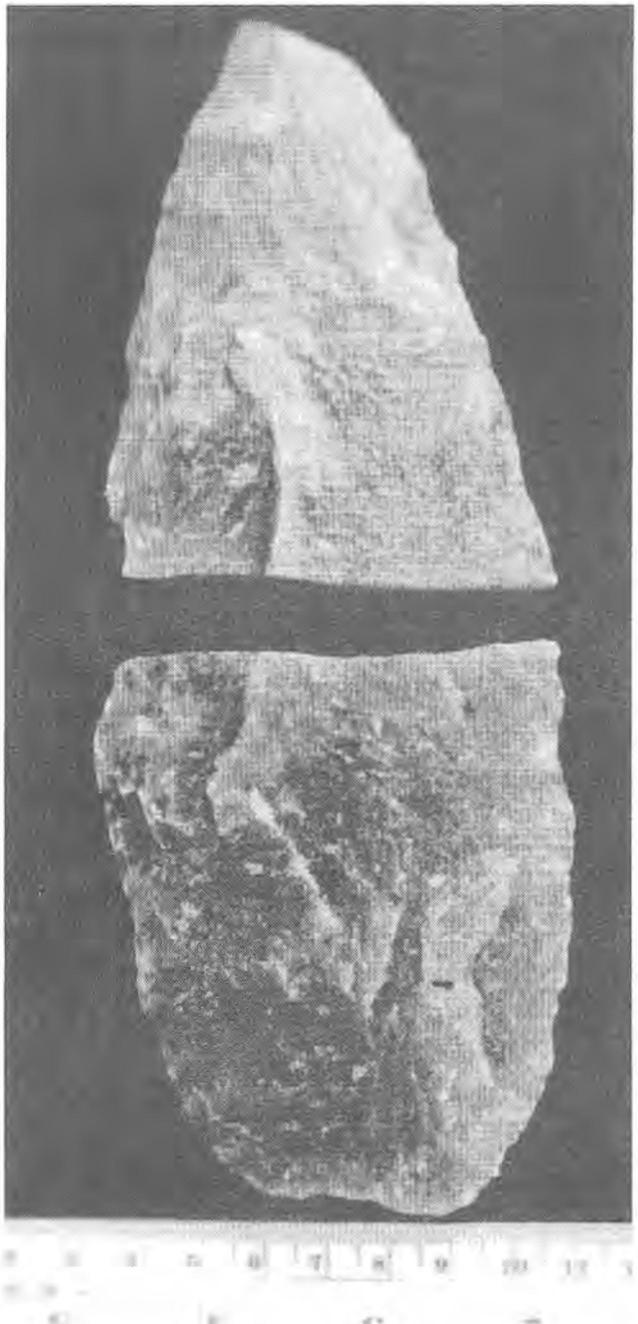


Plate 5. *Large bifacial blank "re-fit" (VT-RU-105). Note the crescent-shaped ridge (left mid-point of the artifact) including point of hinge fracture from attempted removal of a large thinning flake.*

Raw Material

Like (at least some) other archaeologists in Vermont, I was content to label just about any reasonably flakeable quartzite "Cheshire" prior to discovering this site ten years ago. Indeed, the bedrock maps identified the very spot as being underlain by Cheshire bedrock. However, it appears that folks at this site were collecting and reducing the surface materials, which were deposited (probably through glacial action) on top of the Cheshire. The outcrop source for this material has not been pinpointed, but it appears to be Dalton quartzite — an older, more metamorphosed, translucent, grey-blue, "glassy" lithic which is mapped as a thin band at higher elevations in the mountains.

Descriptive Summary

The combination of surface access to high quality lithic material, a pleasant and protective high elevation setting, proximity to travel ways and mountain passes, and strategic location near the headwaters of feeder streams connecting to the Champlain, Connecticut and Hudson watersheds contributed to long-term use of this south-central Vermont site by Indian people. This use resulted in numerous activity areas producing debitage and artifacts reflecting the full range of stone-tool making reduction stages/activities, spread over an area of approximately 1 X 0.5 kilometers. We do not, however, have specific dates of site use/occupation since we lack diagnostics, vertical stratigraphy and dateable organics, so it remains an open question as to when and for how long the site was occupied. As I have commented informally elsewhere, the spectrum of possibilities ranges from Mom-and-Pop-and-the-kids arriving every weekend (or month, or fall hunting season, or other logical interval) for thousands of years, to a one-time mountainside tool-making "Woodstock" (with the reality, of course, lying somewhere in between).

Proposed Analysis

Given the ubiquitous nature of lithics at prehistoric archaeological sites, and the "industrial" nature of this site in particular, a question of interest to me has been whether we could make enough spatial sense of the distribution of materials at the site to address the organization of production at the site; more specifically, if we could determine whether and/or to what degree there were task groups or indications of specialization. This would help in understanding the specific history of this site, perhaps lending insight into where use patterns fell between the extremes of extensive small scale use of the site over the millennia (the "Mom and Pop" scenario) and intensive large-scale use for short periods ("Woodstock"). It would also have implications beyond the site since it might be another case where we could identify a form of social or productive organization that spiked a hierarchical or specialized high note in an otherwise seemingly level social playing field. In other words, since Vermont-based prehistoric societies can be, and are, portrayed as loosely organized, largely egalitarian hunter-gatherer economies full of "can-do" all-purpose nuclear family units who did not need, or could not afford, "specialization", it would add a sense of diversity (and reality?) to our picture of these peoples' lives.

The question, of course, is how to make the connection from this high-minded "organization of production" rhetoric to the mind-boggling spread of lithic/industrial debitage covering the forest floor. In order to get a handle on this complexity, and to come up with an analytical method that does not require micro-examination of every recovered flake, I needed to frame the problem with some baseline assumptions.

A first, simplifying assumption is that the site's landscape/setting would have dictated where some activities would have occurred in broadly predictable ways, regardless of time period (e.g., topography, modified by distribution of surface materials). A second assumption is that task group organization would result in stage-of-reduction work stations that were more specialized in function than would be necessary given the "natural" constraints in the first assumption (e.g., delivery of high quality raw material and/or crude blanks from one production point to a specialists' or finishing location, rather than the whole reduction sequence in one spot). A third assumption is that there will not *necessarily* be a significant difference in the number and two-dimensional measurements of flakes found at primary/secondary reduction stations and finishing stations since, for example, the former will generate a lot of shatter but not many thinning flakes. A fourth assumption, however, is that there will be a significant and noticeable differentiation between the three-dimensional measurements, or average volume, of flakes of similar two-dimensional size categories (i.e., length-and-width) occurring as a by-product of different stages-of-reduction.

Essentially, then, the premise is that there is a higher proportion of chunky flakes and shatter in those areas with early-stage reduction activities, lots more thinning flakes at later-stage/thinning stations, and that the presence of task groups and specialists would result in significant separation of those activities across the site. One way to measure and plot the gross distribution of reduction activities across the slope of this site is to *compare the average weight per flake of a given size range* (I realize this sounds a little like saying that "things that are heavier weigh more", but it provides a way to break up the site into manageable analytical units). Thus, we can take the thousands of flakes from one area of the site, sort them by five gross size categories, count them, weigh them as a group, and come up with an average weight per flake. The results, expressed as histograms, can be compared across the site.

I can't simply assume that the numbers make sense, of course. In fact, I've found in initial trials that the high (e.g., spall) and low (e.g., pressure flake) ends of the spectrum do not respond to the gross-ness of the process. But the mid-range materials seem to track nicely, and we are presently (finally) in the process of conducting this analysis.

Future Goals

By the time the next issue of this Journal is produced I hope to have completed this stage of the analysis. In addition, a formal site report and National Register of Historic Places nomination should be well on their way. Finally, I am planning to provide some (off-site) interpretation for the public to enhance their understanding of past resource extraction and land-use in the mountains of Vermont.

Conclusion

Prehistoric quarry sites are industrial in nature. They do not feature discrete analytical units, nor are they always easily pigeon-holed as belonging to specific cultural traditions or time periods given the stylistically neutral (i.e., non-diagnostic) nature of the items produced on-site. To date, the discovery of VT-RU-105 has raised more interesting questions than we have answered, but it may have already contributed to our discourse about archaeology in Vermont by reinforcing the message that there was significant prehistoric use of the mountains; giving us another node to build into our geo-archaeological models about lithic extraction and exchange networks in the region; reminding us of the need to identify the geological reference to quartzites more rigorously (is it really Cheshire?); and reinforcing the value of comprehensive recovery of cultural materials at a site (those flakes really are informative). I also believe that it is reasonable to expect that social issues like the nature of the organization of production can be addressed at industrial sites like this; demonstration of patterns showing task groups and specialization, for example, can provide additional depth and texture to our understanding of how Vermonters worked together in the past.

Acknowledgments

Thanks to Dr. John Cross for his insight into ways to get a handle on this large-scale problem; to Shelley Hight for her artifact photos from oh-so-long-ago; to the Green Mountain National Forest for their support; and, as always, to Barbara, Jameson and Mackenzie for their patience and good humor while I worked on this project.

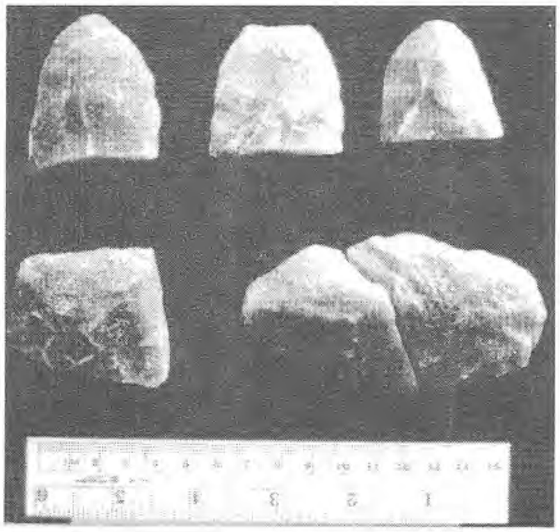


Plate 6. *Small bifacial blank fragments (VT-RU-105).*

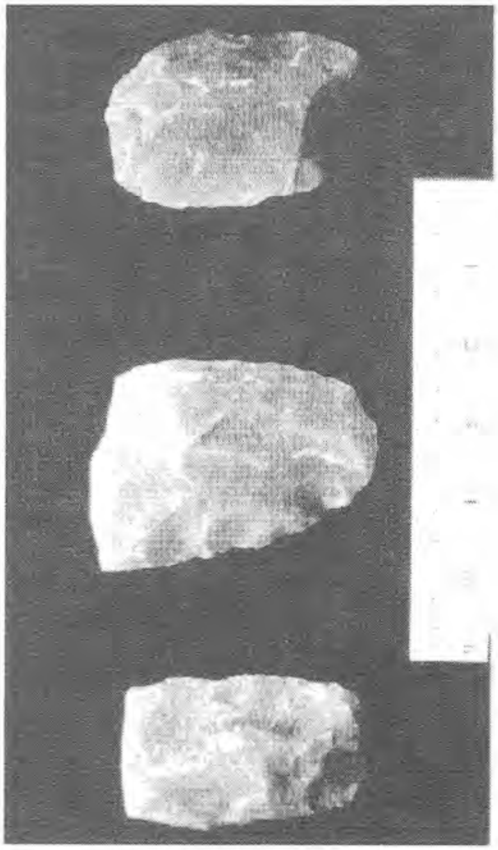
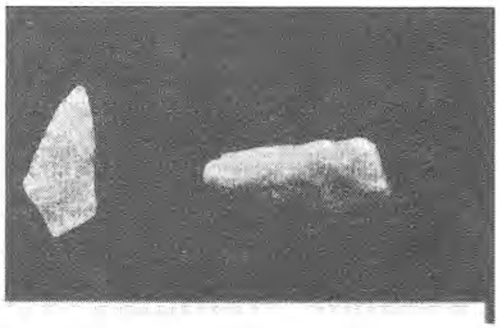


Plate 7. *Bifacial fragments (VT-RU-105).*



.Plate 8. *Projectile point tip and knife fragment (VT-RU-105).*