

PETROGRAPHIC CHARACTERISTICS OF ROCK SAMPLES FROM SELECTED ARCHAEOLOGICAL QUARRY SITES, CENTRAL NORTH CAROLINA PIEDMONT

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Purpose

This project was undertaken to assist the Cultural Resources Office at Fort Bragg, North Carolina, in attempting to determine the sources of lithic artifacts found at archaeological sites on the base. In the first phase of the study, known and suspected archaeological quarry sites in the central Piedmont of North Carolina were visited. From each quarry, hand specimens were collected and petrographic thin sections were examined in an attempt to establish a basis for distinguishing the quarries. If material from each quarry were sufficiently distinctive, then quarry sources could potentially be matched with Fort Bragg lithic artifacts. A companion study is investigating chemical characteristics of the same quarry samples. In the next phase of the study, thin sections of selected artifacts will be studied for comparison to the quarry information.

Procedure

74 samples from 12 quarries and quarry groups were examined. 31 of these samples are from five quarry groups in the Uwharrie Mountains region; 20 of these were collected and described previously by Daniel and Butler (1996). 43 specimens were collected from seven additional quarry sites in Chatham, Durham, Person, Orange, and Cumberland Counties.

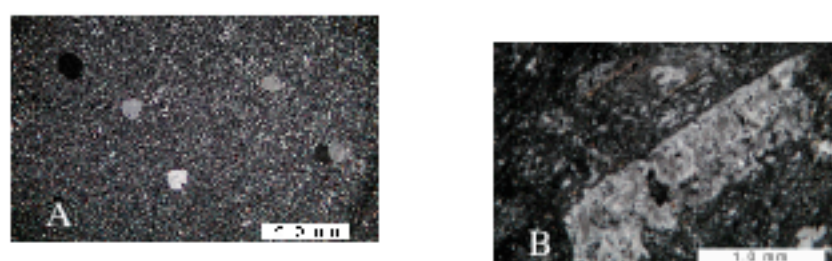


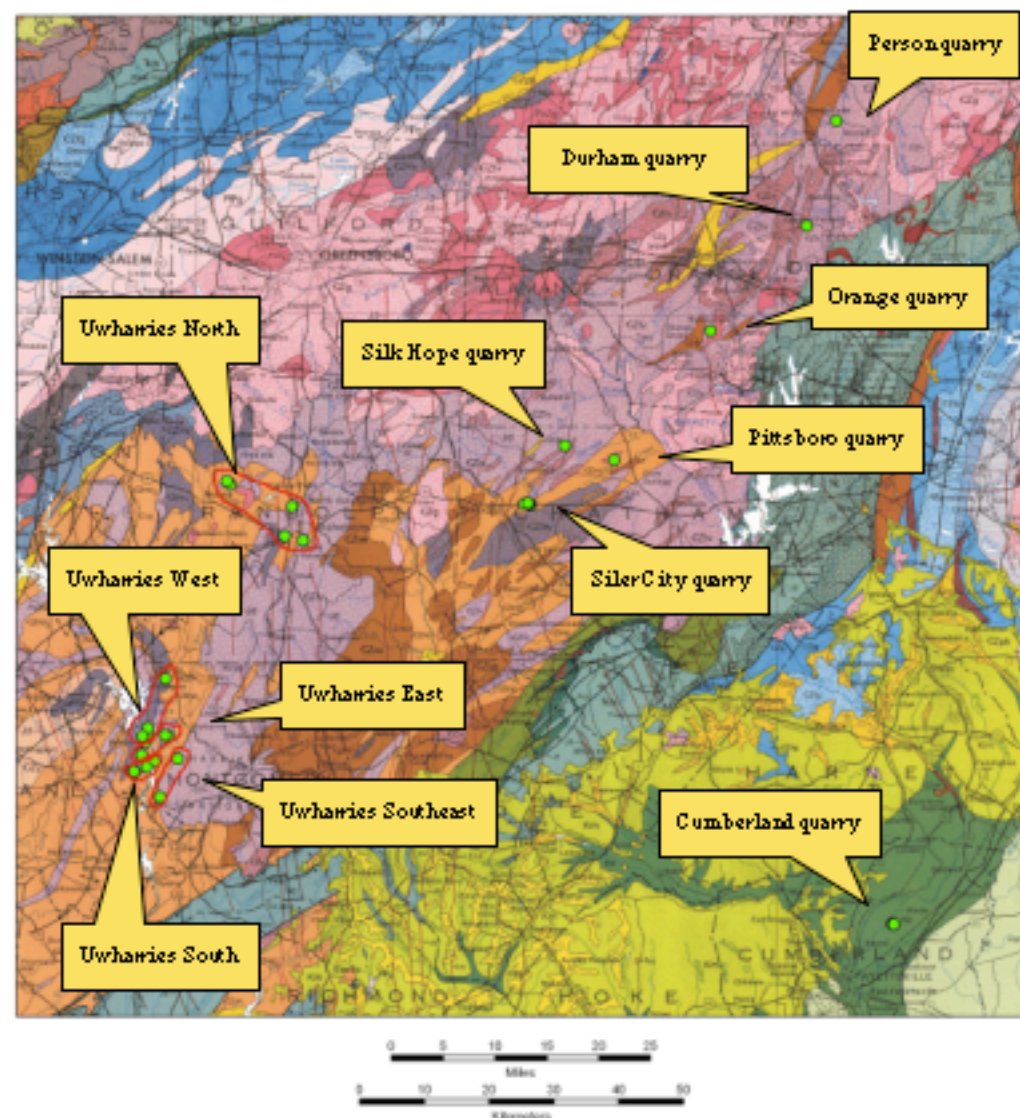
Figure 1. Relict igneous phenocrysts. A. Quartz (β forms) and plagioclase, Uwharries East. B. K-feldspar, Silk Hope. C. Euhedral and resorbed quartz, with plagioclase, in porphyry, Orange County. Crossed polars.

Geology

All quarries are within the Carolina terrane, and the Uwharries quarries sample the Tillery, Cid and Uwharrie Formations (Stromquist and Sundelius, 1969). Rocks include both metavolcanic and metasedimentary types. Compositionally, most metavolcanic rocks are dacitic, and include flows, tuffs, breccias, and porphyries. Metasedimentary rocks are metamudstone and fine metasandstone.

The Uwharrie quarries are divided into five groups: Uwharries North, South, East, West, and Southeast. The groupings are based primarily on macroscopic petrography and follow the results of Daniel and Butler (1996). Each of the Uwharrie quarry groups represents three to six individual quarries in relatively close proximity. Rock specimens are all various felsic metavolcanic rocks, but groups may be distinguished based upon mineralogy and texture. See Table.

The remaining quarries include three from Chatham County (Pittsboro, Silk Hope, and Siler City), and one each from Orange, Person, Durham, and Cumberland Counties. Rocks from the Pittsboro, Durham, and Person quarries are dominantly fine-grained metasedimentary rocks. The Silk Hope and Orange County quarries are meta-igneous. The Cumberland County (Cape Fear) quarry is from a deposit of alluvial cobbles, and the Siler City quarry is a mixture of metasedimentary and metavolcanic types.



METAVOLCANIC ROCKS				
GROUP/QUARRY	PHENOCRYSTS	METAMINERALS	TEXTURES	ROCK TYPES
UWHARRIES EAST (TILLERY FM; Hatteras, Skidaway, Sugarloaf Mts.)	PLAGIOCLASE + QUARTZ	GREEN BIOTITE, STILPOMELANE	QUARTZ - EPIDOTE - CHLORITE CLUSTERS	DACITE FLOWS, CRYSTAL-LITHIC TUFFS
UWHARRIES WEST (CID FM; Wolf Trap, Falls Mts.)	PLAGIOCLASE, K-FELDSPAR	GREEN BIOTITE, NO STILPOMELANE	SPHERULITES, NO FLOW BANDING	DACITE, RHYODACITE
UWHARRIES SOUTH (TILLERY FM; Morrow & Tater Top Mts.)	NONE	STILPOMELANE	SPHERULITES, BANDING, CLEAVAGE	DACITE, FELSITE
UWHARRIES NORTH (UWHARRIE & TILLERY FMS; Dares and Caraway Mts.)	PLAGIOCLASE, QUARTZ	GARNET, BROWN BIOTITE, STILPOMELANE	EPIDOTE - CALCITE - PYRITE CLUSTERS; PUMICE LAPILLI	DACITE TUFFS AND FLOWS
UWHARRIES SOUTHEAST (UWHARRIE FM; Horse Trough & Link Mts.)	QUARTZ + PLAGIOCLASE	ACTINOLITE, EPIDOTE, SPIENE	SPHERULITES, QUARTZ AMYGDULES, BANDING	DACITE FLOWS AND PORPHYRIES
SILK HOPE (CHATHAM CO.)	PLAGIOCLASE, K-FELDSPAR	PIEDMONTITE	VOLCANIC ROCK FRAGMENTS, GLASS SHARDS, FLOW BANDS	ANDESITIC (?) LAPILLI AND CRYSTAL-LITHIC TUFF AND BRECCIA
ORANGE COUNTY	(COARSE) QUARTZ + PLAGIOCLASE	CALCITE, LOW-T FELDSPAR CLOTS	NO BANDING, SAUSSURITIZATION	DACITE PORPHYRY, CRYSTAL-LITHIC TUFF
METASEDIMENTARY ROCKS				
PITTSBORO (CHATHAM CO.)	BEDDING, LAMINAE, GRADED BEDS, RIPPLES, X-BEDS			MUDSTONE, SILTSTONE, SANDSTONE
DURHAM COUNTY	PLAGIOCLASE, ROCK FRAGMENTS, EPIDOTE VEINS, LAYERING			DACITE TUFF, TUFFACEOUS SANDSTONE
PERSON COUNTY	BEDDING, GRADED BEDS, TRACE FOSSILS(?), PUMICE(?), MICROFAULTS			MUDSTONE, SILTSTONE, SANDSTONE, TUFF
HETEROGENEOUS ASSEMBLAGES				
SILER CITY (CHATHAM CO.)	crystal-lithic tuff and metasedimentary rocks			
CAPE FEAR (CUMBERLAND CO.)	split, greenstone, and (meta-) gabbro, basalt, andesite/diorite, lapilli tuff, and heterolithic tuff breccia			

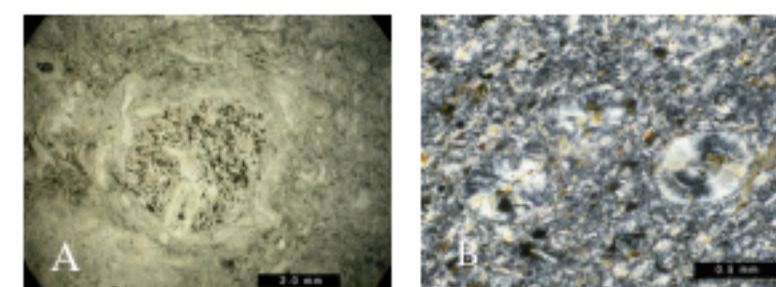


Figure 2. Relict igneous textures. A. Basalt fragment, Silk Hope; PP. B. Spherulites, Uwharries South; XP. C. Glass shard, Silk Hope; PP.

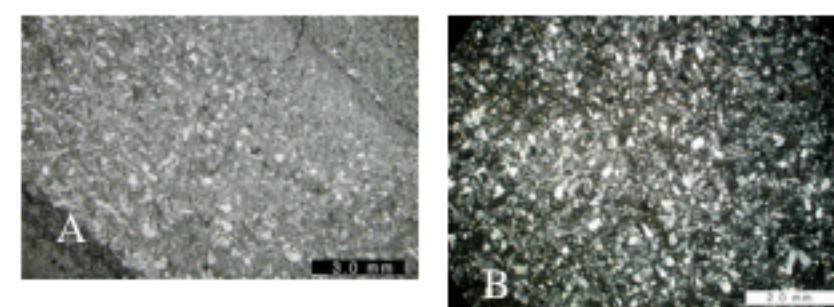


Figure 3. Relict sedimentary features. A. Graded bedding, Person County, XP. B. Volcanic sandstone, Durham County; XP. C. Possible trace fossil, Person County; PP.

Results

The table summarizes the results of the first phase of the study. Although two of the quarries (Siler City and Cumberland County) are too heterogeneous to be of much use in sourcing lithic artifacts, the other ten show promise.

Each of the seven metavolcanic quarry groups is texturally and mineralogically distinctive. Relict minerals (Figure 1) are quartz, plagioclase, and possible K-feldspar phenocrysts. Relict volcanic textures (Figure 2) include porphyritic texture, flow-banding, amygdules, inferred glass shards, spherulites, and pyroclastic material.

The three metasedimentary quarries preserve relict sedimentary textures (Figure 3) including laminations, ripples, and graded bedding. Possible cross-bedding and trace fossils are present. Individual samples from each of these sites may not be distinguishable, although the Pittsboro quarry is overall finer grained and the other two contain more obvious volcanic material.

Metamorphic textures include phyllosilicate cleavage. Metamorphic minerals (Figure 4) include chlorite, biotite, epidote, calcite, actinolite, titanite, pyrite, garnet, stilpnomelane, and piedmontite.

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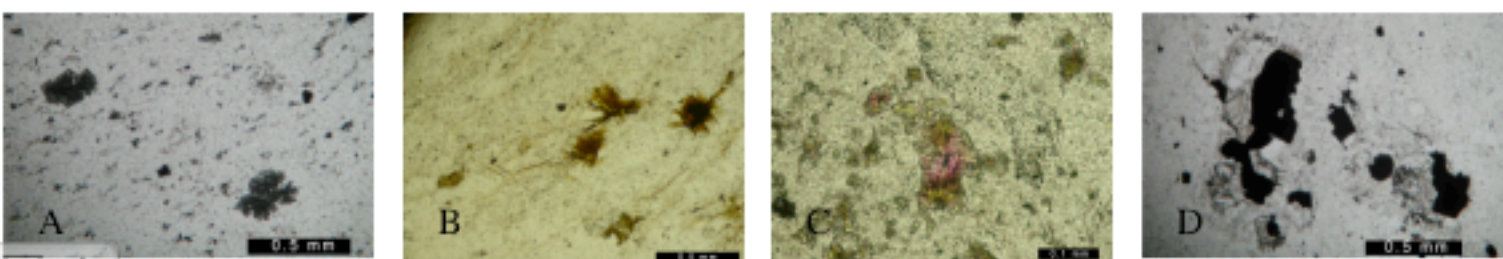


Figure 4. Metamorphic minerals. A. Garnet, Uwharries North. B. Stilpnomelane, Uwharries East. C. Piedmontite, Silk Hope. D. Pyrite-calcite-epidote cluster (after an amygdule?), Uwharries North. Plane-polarized light.