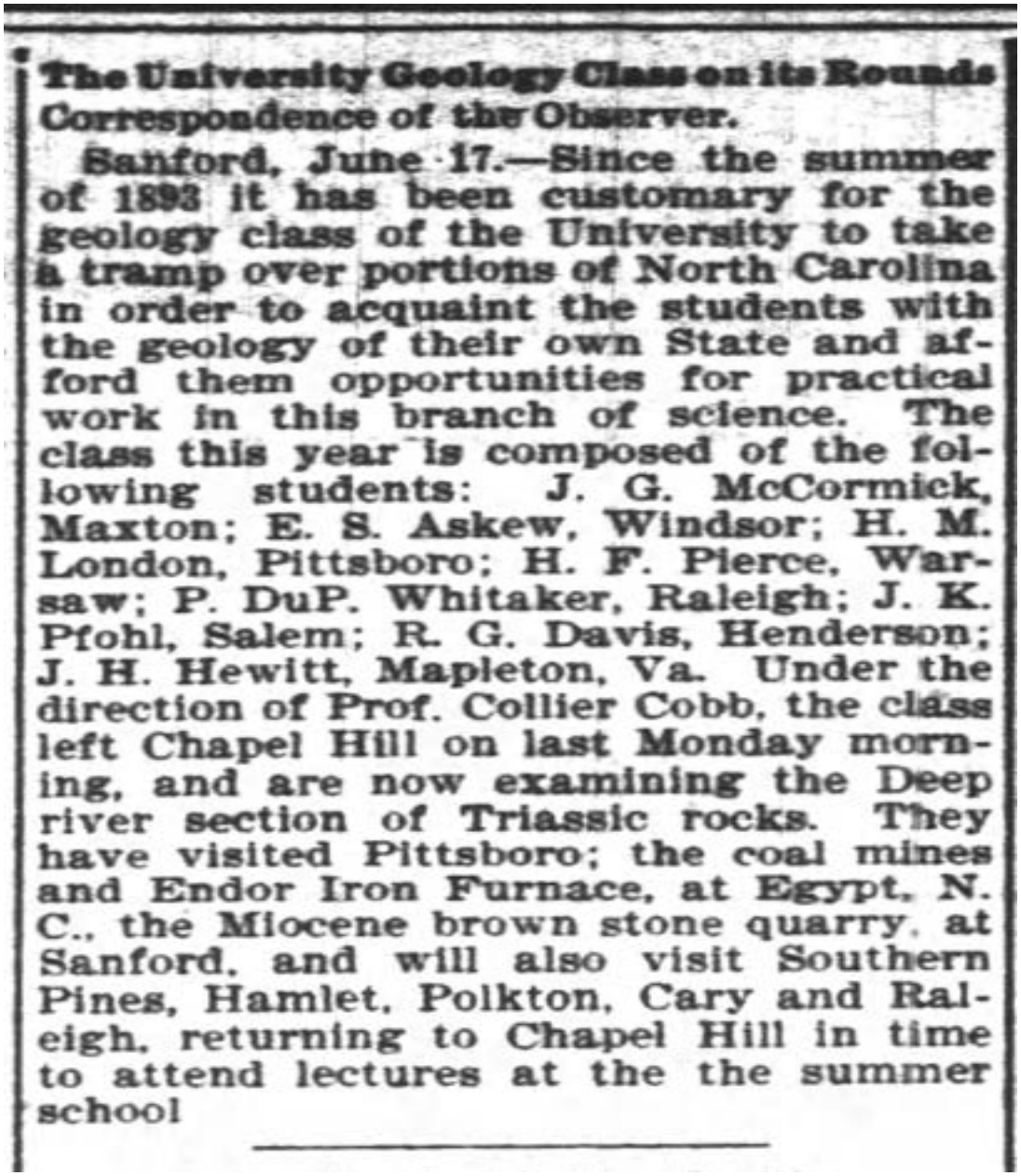
Outline of Chatham County Geology Supplement:
Chatham County "Geologic Facts and Oddities"

This compilation of "Geologic Facts and Oddities" has been prepared as an supplement to the "*Outline of Chatham County Geology*" *2021* (see CCHA web site). Short discussions are presented to answer questions posed to Chris Palmer by residents during rock identification sessions and a presentation of the "Outline" in April, May and June 2022 held at CCHA.

Some field location information is presented herein however one should never enter any property unless property owner permission (preferably written) is granted to enter and/or to collect samples.



The University Geology Class on its Rounds
Correspondence of the Observer.

Sanford, June 17.—Since the summer of 1893 it has been customary for the geology class of the University to take a tramp over portions of North Carolina in order to acquaint the students with the geology of their own State and afford them opportunities for practical work in this branch of science. The class this year is composed of the following students: J. G. McCormick, Maxton; E. S. Askew, Windsor; H. M. London, Pittsboro; H. F. Pierce, Warsaw; P. DuP. Whitaker, Raleigh; J. K. Pfohl, Salem; R. G. Davis, Henderson; J. H. Hewitt, Mapleton, Va. Under the direction of Prof. Collier Cobb, the class left Chapel Hill on last Monday morning, and are now examining the Deep river section of Triassic rocks. They have visited Pittsboro; the coal mines and Endor Iron Furnace, at Egypt, N. C., the Miocene brown stone quarry, at Sanford, and will also visit Southern Pines, Hamlet, Polkton, Cary and Raleigh, returning to Chapel Hill in time to attend lectures at the the summer school

Charlette *Observer* Newspaper dated June 17, 1893 account of a University of North Carolina geology field trip to points in and around Chatham County.

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Chatham County and "Chapel Hill Grit"

References: *Soil Survey of Chatham County, North Carolina*, 1937, pgs. 44-48; *Soil Survey of Chatham County, North Carolina*, 2006, (see pgs. 383-387): Both surveys Natural Resource Conservation Service (NRCS and U. S. Dept of Agriculture (USDA), USGPO.

Numerous people asked about "Chapel HIll Grit." The "Grit" is part of the soils formed over bedrock by weathering and erosion. The following short discussion is summarized from the two soil surveys cited above. First we must introduce general geology and soil information and then the "Grit."

The "Carolina Slate Belt" geology underlies roughly 72 percent of Chatham County. Rock consists of metavolcanic and granitic and granodiorite plutons. The Sanford and Deep River Basins are underlain by sedimentary and metasedimentary rocks locally crosscut by Jurassic dikes. The igneous volcanic and plutonic rocks are approximately 650 to 570 million years before present (mybp).

Soil types vary widely due the local variation in type, composition, and distribution of the rocks from which they formed. Both the 1937 and 2006 USDA Chatham County soil surveys present an overview discussion of County geology and a comprehensive list and discussion of soil types.

Weathering processes decompose rock and minerals into clay and leach trace elements forming the soil profile. As a general rule weathering forms soil from the surface for several feet, then transitions into highly weathered/disintegrated rock from roughly 4 to 10 feet or deeper in depth. More weathering resistant minerals such as quartz tend to remain in as residual soil strata. Weathering oxidizes rock and forms clay minerals coloring County soil to a characteristic orange/red brown and/or mottled color appearance.

As a general rule "slightly weathered" bedrock depths range can vary from a few feet to more than 20 feet depending upon location. This transitions to "fresh" or unweathered bedrock at deeper depths.

Northeastern Chatham County is underlain in part by the Fearrington granite and granodiorite plutonic rocks. These rocks weather to a coarse residual soil typically a light brownish orange to orange colored mixed sandy to fine gravelly layer.

"Chapel Hill Grit" appears to form primarily from the underlying granite and granodiorite rocks. Soil types in this area that contain this residual sandy and gravelly soil/strata are locally termed the "Chapel Hill Grit." The "Grit" is locally used for driveway, garden paths and other surficial fill use.

An example of "Chapel Hill Grit" formed from decomposed and weathered plutonic rock (granite/granodiorite) in the northeastern part of the County. Note that it contains highly weathered rock fragments and well as fine to coarse sand and fine gravel sized particles.

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The "Worthless Land" Bennett Flatwoods and "Devil's Tramping Ground" Southwest Chatham County

References:

- *"Map Shewing the Routes of the Central and Cape Fear and Yadkin Railroads" 1852.* University of North Carolina, Wilson Library Map Collection web site: https://library.unc.edu/wilson/digital-collections/
- Devil's Tramping Ground YouTube video and short discussion; UNC-TV Science link- https://www.youtube.com/watch?v=ZVTQgsPMqk8
- Hadley, W., H, Horton, D., G and Strowd, N. C., 1976, *Chatham County 1771-1971*: Edwards Brothers, Inc. Lillington, NC, pgs. 183-185.
- Additional information courtesy of Jim and Beverly Wiggins and Wanda Pender.

The "Worthless Land" Bennett Flatwoods

The *"Map Shewing the Routes of the Central and Cape Fear and Yadkin Railroads"* dated 1852 was prepared by W. Schlater. This survey was conducted for a potential route of the Central and Cape Fear and Yadkin Railroad west of Raleigh following a "direct" line from Raleigh to Salisbury, in part along the route of US Hwy 64. South of the current location of Siler City in southwest Chatham County, is a pencil notation "worthless land" on the proposed Railroad Route Map.

We do not know who marked "worthless land" on the map or what it meant. Was that land worthless for the railroad or did it refer to something else? When the North Carolina Railroad was constructed over 20 years later, it followed a more northerly alignment, leading to the development of towns such as Burlington and High Point. The "worthless land" in southwest Chatham County was bypassed.

This region also contains the "Devils Tramping Ground" and a small peak known as Paul Beck Hill which was the site of a paleo-Indian rhyolite quarry and numerous camps. The area has been heavily timbered and a timber railroad was built in the mid-1800's. Mr. Tim Sweeney owns a portion of this land for habitat and rare biota conservation and preservation. The open glade-like environment still harbors many rare and locally unusual plant species, and to improve conditions with a longleaf pine restoration project on 3000 acres.

He noted that the "worthless land" area is now known as the Bennett Flatwoods "where ancient volcanic ash deposits create water-impermeable soils unsuitable for agriculture, and promoted the growth of longleaf pine and scrubby oak trees." Mr. Sweeney had taken numerous photos in the area that can be viewed at this link; https://www.flickr.com/photos/timsweeneynature/albums/72157632278868267

A speculation is that pioneer farmers could not farm the land possibly due to soil impermeability, thin soil or other reasons. Hence considered "worthless" people moved on to other available land.

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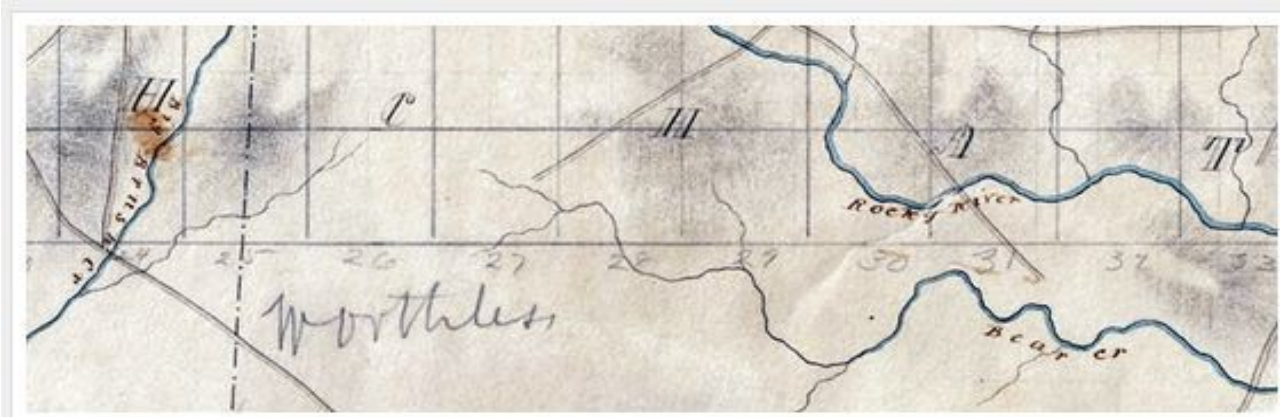
Devil's Tramping Ground

The Devil's Tramping Ground, located near Harper's Crossroads in Bear Creek, pertains to small circular area of bare ground devoid of plant life. It has been alleged that nothing has grown within the roughly diameter 40-foot ring for one hundred years or longer. Legends reported over the last two hundred years regarding supernatural events, including the Prince of Darkness walking about the bare ground contemplating evil deeds (Hadley et al, 1976: UNC-TV video). Apparently an early land description dating from the late 1700s(?) refers to this site as "poisoned land."



The "worthless land" notation in southwest Chatham County between the Rocky and Deep rivers, noted on this enlargement of the *"Map Shewing the Routes of the Central and Cape Fear and Yadkin Railroads, 1852"* (UNC Wilson Library Map Collection).

"Map Shewing the Routes of the Central and Cape Fear and Yadkin Railroads, 1852" (entire map sheet). Arrow points to "worthless land" note on Map (UNC Wilson Library Map Collection).

Visitors to Devils Tramping Ground circa late 1800s photo courtesy William and Sandy Jarrell.

The "Tramping Ground circle" below is reputed have an effect on compasses and has been used for campfires. An NC Department of Agriculture soil chemical test was conducted in 2008 on a soil sample taken in the circle. Results are inconclusive and repeated fires may have influenced soil chemistry results. Vegetation appears around, but not within, the circle as seen below.

The Devil's Tramping Ground photo circa 2008? Note fire pit and trash.

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Gold in Chatham County

References:

- *Map of Chatham County Historic Mines,* March 2022: Chatham County Planning Department.
- Jackson, L. W. *Map of Cane Creek Gold Mines Chatham County, North Carolina, circa 1877*; State Archives of North Carolina https://dc.lib.unc.edu/cdm/ref/collection/ncmaps/id/2384
- *Gold in North Carolina, undated pamphlet;* North Carolina Geological Survey.

Gold occurs in North Carolina however most gold mines and producers are west of Chatham County (for example in Mecklenburg and Cabarrus Counties). Gold mined from the North Carolina supplied the US Mint coinage from about the 1790s into the early 1800s.

Chatham County is underlain by widespread Neoproterozoic aged volcanic and plutonic rocks. These rocks usually have mineralized hydrothermal fluids associated with them when intruded or erupted. These hydrothermal fluids may contain and deposit various metallic elements including gold, silver, copper, zinc, lead and other metals.

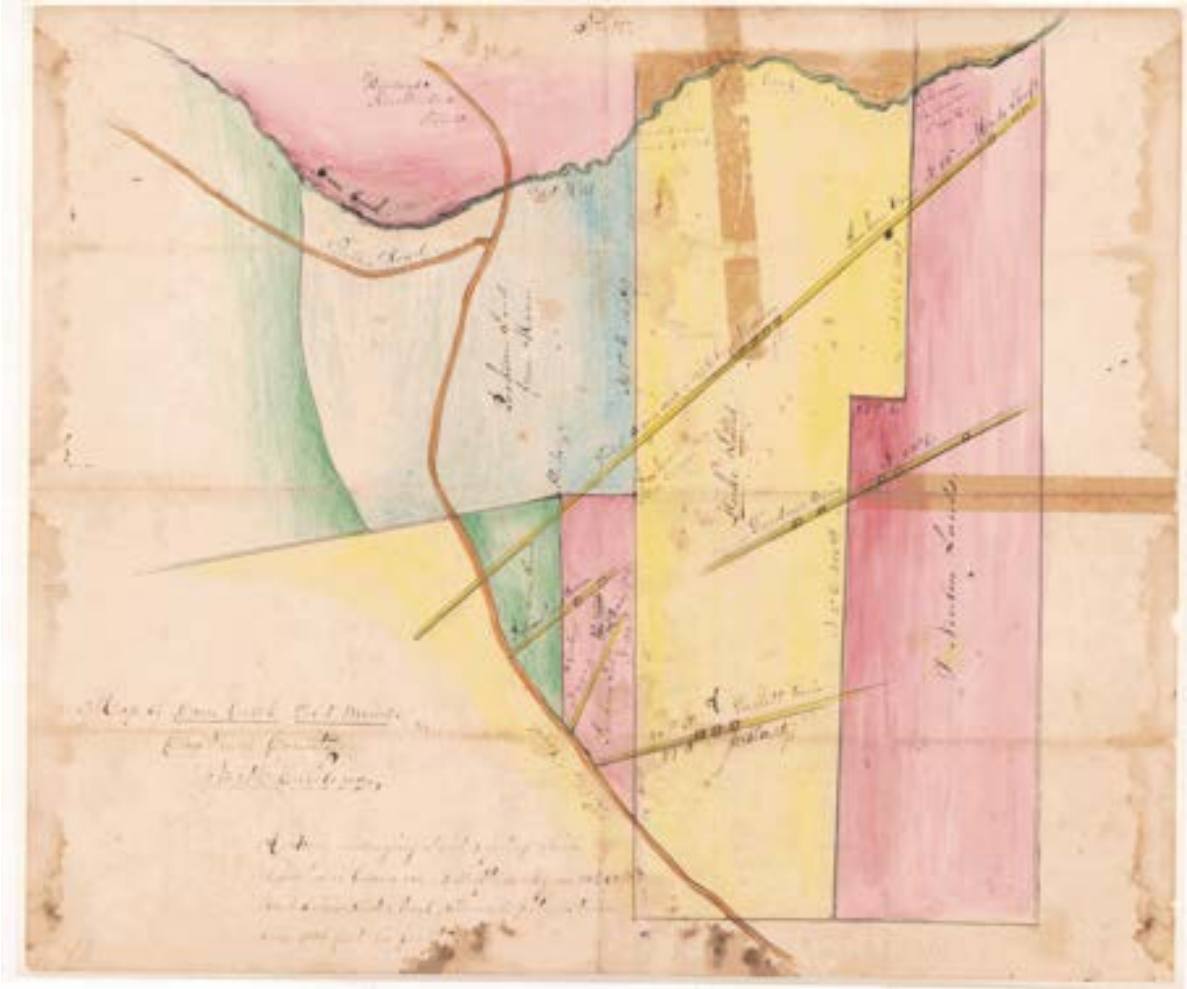
If geochemical conditions are favorable these metals may be deposited within the rock, along fault lines, fractures or in association with quartz veins. The metals may form ore deposits large enough to be mined economically. Locations where trace amounts of metals occur are usually termed "prospects" but are not economic to mine.

One gold ore prospect is located in northern part of the County according to the County Planning Historic Mines Location Map. No gold mines or widespread gold production are known or reported in the County.

The State Archives web site has the following notation discussing the Cane Creek Gold Mines Map:

- "A vein averaging about 3 feet of which 12 inches is brown ore. 3 shafts sunk from 50 to 60 ft. and below water level, & Tunnels between them over 300 feet in length." The map portrays an area along Cane Creek in Chatham County and shows the locations of veins of gold ore and mine shafts along the veins. Individual tracts of land are platted and their metes and bounds are recorded on the map. This area was in Alamance and Chatham County when the map was produced, but is entirely in Alamance County now."

Apparently gold was not present in economic quantities to warrant more widespread prospecting or exploration mining activity at this location.



Map of Cane Creek Gold Mines Chatham County, North Carolina, circa 1877 showing prospecting gold bearing vein trends. The area included parts of Alamance and Chatham County at the time of mapping.

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"Sheep Rock"

Reference:

- Crutchfield Crossroads Geologic Map, Chatham County, NC: Bradley, P. J., Hanna, H. D. and Peach, B. T. North Carolina Geological Survey 7.5 minute Quadrangle, Open File Report 2017-10.
- NC Geologic Maps available at https://deq.nc.gov/about/divisions/energy-mineral-land-resources/north-carolina-geological-survey/ncgs-maps/how-to-order-maps-publications

A large part of Chatham County is underlain by the Neoproterozoic Hyco Formation that is composed of complex igneous geology. These very old rocks include some intrusive and extrusive pyroclastic volcanic rocks. Numerous eruptions build up layers in the Hyco of hard rock that are resistant to erosion and weathering. A rock outcrop off Sheep Rock Road is thought to have the appearance of a sheep head and is locally called "Sheep Rock."

Sheep Rock and vicinity are geologically mapped as dacite, pyroclastic volcanic rocks tuffs, welded and non-tuffs and volcanic conglomerates. These rocks are folded and faulted and have been subjected to low grade metamorphism. Bradley (et al, 2017) report "rock exposures may occur as resistant finned-shaped outcrops that occur locally outside of drainages" (refer to the Crutchfield Crossroads Geologic Map for more detailed information).

All rocks ultimately undergo surface weathering (chemically and mechanically decomposing rock) and erosion (transporting broken and weathered rock from its original location). Rocks can weather and erode at different rates depending upon rock type, climate and composition.

This differential erosion process forms "rolling hills" and stream cut valley topography seen in the County. These resistant higher hill top rock outcrops tend to have surrounding rock eroded away and depending upon rock lithology form the finned shaped rock outcrops.

Sheep Rock is interpreted as an example of such pyroclastic volcanic resistant rock. Differential erosion can be seen throughout the County for example as other "fin-shaped outcrops" as well as boulder covered hilltops in the Pittsboro and Fearrington Village areas.

"Sheep Rock" on private property off Sheep Rock Road, northern Chatham County (photo courtesy Jim and Bev Wiggins).

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"Blue Stone" (Soapstone)

References:

- *Blue Stone Soapstone Quarry*, Summer 1984: North Carolina Archaeological Society, vol. 1, no. 1. (See also North Carolina Office of State Archaeology web site for general information on "blue stone").
- Stuckley, J. L., 1928, *The Pyrophyllite Deposits of North Carolina with a More Detailed Account of the Geology of the Deep River Region*: Bulletin Number 37 North Carolina Department of Conservation and Development, Raleigh, 62 pages with map.
- Wilson, W. F. and Carpenter, A. 1975 (rev. 1981), *Region J Geology: A Guide for North Carolina Resource Development and Land Use Planning, Regional Geology Series 1*: North Carolina Geological Survey Section, North Carolina Dept. of Natural Resources and Community Development.
- *Geologic Map of Chatham County and Surrounding Areas, NC,* Final Nov. 2022: Map compiled by Bradley, P. J., North Carolina Geological Survey Open File Report 2022-03.

"Blue stone" and/or "soapstone" has various industrial and ornamental uses including grave markers. Grave marker use was reported by some people to have been "widespread" in parts of Chatham County in the 18th and 19th century. People commented that the rock was "easy to work or carve" and available to retrieve and/or quarry from local sources.

Pyrophyllite rock is relatively wide spread in the "Carolina Slate Belt" with occurrences in central and western Chatham County and near Deep River (see Stuckley Index map page 11). Stuckley (1928, see pg. 12) presents a short history of the pyrophyllite deposits, related rocks and locations, and early uses:

- "One of the earliest reports that gave any information regarding the geology of that portion of the slate belt [Carolina Slate Belt] in which the pyrophyllite deposits are found was a descriptive list of rocks and minerals from North Carolina published by Denison Olmstead in 1822. In this list he described novaculite, slate, hornstone, whetstone, and talc and soapstone from several counties, including Orange and Chatham. He stated that the talc and soapstone were extensively used for building and ornamental purposes, and added that Indian utensils of the same materials were common."

Wilson and Carpenter (1975; 1981, page 10) report that "...ultramafic rocks are primarily black to green soapstone, serpentinite, actinolite-chlorite rocks which consist chiefly of talc, antigorite, chlorite, actinolite and carbonate..." These rocks have been metamorphically altered by tectonics and hydrothermal fluids. Talc and pyrophillite are soft rocks that may be carved or sculpted into various sizes and forms mentioned above.

It is speculated that talc, pyrophillite or similar metamorphosed rock was commonly called "blue stone" by people who locally quarried and used it.

Blues tone example William Smith grave marker in P36.1.

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"White Flint"

References:

- Asheboro *Courier-Tribune* feature "*The Rock Store a solid reminder of days gone by"*: Sept. 26, 2016.
- *"Quartz, Chert and Flint":* University of Pittsburgh Department of Geology and Planetary Science
- "Flint and Chert": *The Quartz Page*. http://www.quartzpage.de/flint.html
- *"Chert":* https://geologyscience.com/rocks/sedimentary-rocks/chert/
- *Geologic Map of Chatham County and Surrounding Areas, NC,* Final Nov. 2022: Map compiled by Bradley, P. J., North Carolina Geological Survey Open File Report 2022-03.

People inquired about "white flint" used as a building material in Chatham County. The *Courier-Tribune* news article referenced above discusses its use in the "Rock Store" in Asheboro. This structure was built in 1911-1913 by James "Dink" Cheek used "white flint". The reporter correctly notes this is also known as "quartz."

Mineral quartz is hard with a Mohs Mineral Hardness of 7. Chert and Flint are microcrystalline varieties of quartz. Igneous quartz occurrence is widespread in the County as quartz pegmatities and veins crosscutting County rocks. Chert and flint quartz variations may appear similar with minor compositional differences.

Microcrystalline chert and flint may be white, milky white, or grayish in color and typically have a conchoidal fracture that is smooth that does not "cleave" to a straight surface. These rocks also may have red orange or rusty-colored iron oxide weathering traces and stains in fractures.

Flint and chert can be worked to fine cutting edges. Both flint and chert can strike a spark to start fires, and usually flint is used to spark the powder charge in flintlock muskets and rifles. Quartz, flint and chert are durable and weathering resistant.

There are numerous quartz outcrops mapped in Chatham County (Bradley 2022) so local sources were available to people. Quartz can occur as large blocky pieces (such as from a large vein source) or quarried to rough size for use as a building material. Hence the "Rock Store" building and grave marker photos below likely uses mostly quartz and/or chert and flint quartz varieties).

"The Rock Store" located at 1412 Old Liberty Road Asheboro, NC, constructed 1911-1913, an example of using "white flint" for building.

Example of "white flint" boulder used in the "The Rock Store" construction. Note curving and rough surface and iron oxide weathering stains. The "white flint" is a variety of Quartz (Photo credit Asheboro *Courier-Tribune*).

Quartz "white flint" used to build a grave marker, Union Grove in AME J88.1.