

Information Circular No. 9

Georgia Department of Forestry and Geological Development

DIVISION OF GEOLOGY
RICHARD W. SMITH, State Geologist
Atlanta, Georgia

Tripoli Deposits of Georgia



JANUARY 1937



By

GEOFFREY W. CRICKMAY

Partly Reprinted from Forestry-Geological Review, Vol. 7, No. 1.

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The name "tripoli" comes from northern Africa where a deposit of siliceous earth has long been known to occur near Tripoli in Italian Libya. This earth is made up mainly of the siliceous tests of minute plankton (diatoms), and the rock is thus sometimes called fossil flour or fossil meal. About 85 years ago siliceous earths were discovered near Dalton, Whitfield County, Georgia, during the construction of the Western and Atlantic railway, and these were used locally as an abrasive. Some 20 years later, in 1871, similar earths were mined in southwestern Missouri. They were called tripoli because they were erroneously thought to be similar to the well-known earths of Tripoli, from which they differ in containing no fossils and in being composed of chalcedonic rather than opalescent quartz. These differences are so fundamental that the two types of earth are now generally used for different purposes, but the name "tripoli" has remained with the Missouri earth while the African tripoli is known as diatomaceous earth or tripolite. Diatomaceous earth is known to occur in the Atlantic Coastal Plain but no deposit is known in Georgia. On the other hand, large deposits of tripoli are known in northwestern Georgia, and although these have not been extensively mined, their size and accessibility invite future development. This paper gives a general account of the properties of tripoli with comparative tests of Georgia material, followed by a description of the individual tripoli deposits of the State.

Siliceous earth¹ is commonly called "soft" silica to distinguish it from finely ground quartz, called "hard" silica. The

¹Weigel, W. M., *Technology and uses of silica and sand*: U. S. Bur. Mines, Bull. 266, 1927.

Johnson, B. L., and Davis, A. E., *Abrasive materials*: Minerals yearbook—1936: U. S. Bur. Mines, pp. 880-881, 1936.

Eardly—Wilmot, V. L., *Abrasives*—part 1—siliceous abrasives: Can. Dept. of Mines, pub. No. 673, pp. 70-77, 1927.

Ladoo, R. B., *Non-Metallic Minerals*—occurrence—preparation—utilization: New York, 1925, pp. 641-651.

U. S. Bureau of Mines includes all the soft silicas under the general name of tripoli but in the trade two types of soft silica are recognized. The abrasive earths obtained mainly from Missouri and Oklahoma are called tripoli; the earths for filler obtained mainly in Illinois and Tennessee are called amorphous silica. Slight differences in physical properties have led to widely different uses and consequently distinctions are made in the trade which are not generally recognized by the geologist. The usage of the U. S. Bureau of Mines is here followed, and tripoli or soft silica is divided into two types, the Missouri-Oklahoma and the Illinois-Tennessee types.

The Missouri-Oklahoma tripoli has a very low apparent specific gravity due to

its extreme porosity. It is generally loosely coherent so that a slight pressure between the fingers reduces it to a powder of round spongy grains less than .01 mm. in diameter. These little grains are quartz, and are thus hard enough to scratch steel. Their spongy character makes the coherent phases extremely absorbent, a property which recommends the material for filter blocks. The deposits occur in horizontal beds interstratified with limestone which may be partly replaced by chert. The predominant color is cream and pink but various shades from ivory to red are found.

The Illinois-Tennessee tripoli (amorphous silica to the trade) is not amorphous silica but is chalcedonic quartz with cryptocrystalline structure. The grains are

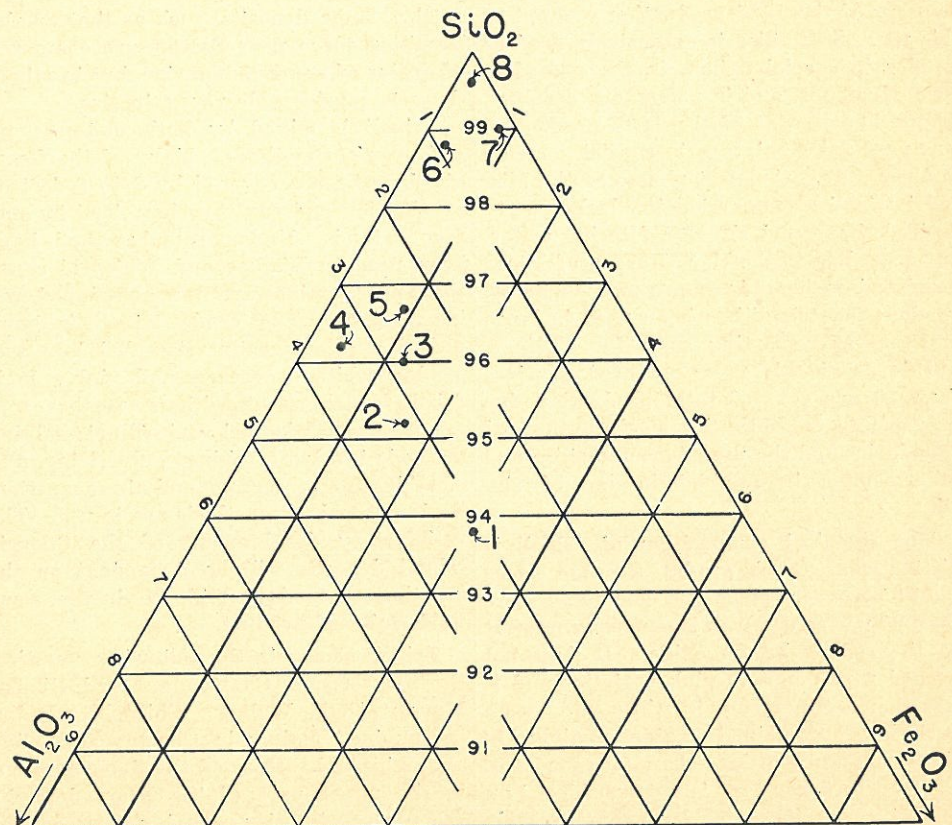


Figure 1—Diagram showing proportion of silica, alumina, and iron oxide in tripoli (analyses of Georgia tripoli by Edgar Everhart). The apex of the diagram represents 100 per cent silica; for example, number 8 contains 99.6 per cent silica and very little iron or alumina; number 1 contains less than 94 per cent silica and nearly equal portions of iron and alumina. 1—Old Bobo place, Floyd County; 2—L. J. Vaughn, Cataoosa County; 3—G. B. Hulme, Bartow County; 4—J. R. Heistand, Bartow County; 5—W. H. Boss, Walker County; 6—Missouri cream tripoli; 7—Missouri rose tripoli; 8—Illinois tripoli.

very similar in appearance to the Missouri earth, but are commonly of smaller diameter (average diameter of grains is said to be about .002 mm.). The material is commonly compact and not highly porous. Pure white tripoli, rare in the Missouri-Oklahoma area, is common in the Illinois-Tennessee fields.

The Georgia tripoli compares most closely with the Missouri-Oklahoma material which it closely resembles in shape and size of grains. The grains are composed of chalcedonic quartz. The color of Georgia tripoli is generally lighter than the Missouri earth; many deposits include a large amount of ivory to white tripoli.

According to the U. S. Bureau of Mines, total tripoli production in 1935 was 27,375 short tons valued at \$383,416, with average value of \$14.00 a ton. This is nearly 7,000 tons more than that produced in 1934, but the average price is \$2.00 a ton less. Crude tripoli generally sells for less than \$6.00 a ton at the mine; the average price of crude in 1935 was \$2.25 a ton. Refined and classified tripoli ranges in price from \$8.00 to \$40.00 a ton.

Tripoli is used mainly as an abrasive, and 37 per cent of the 1935 production was put to this use. The Missouri tripoli is particularly suited for buffing and burnishing. Tripoli is the abrasive agent in many scouring soaps and powders. The next most important use is as a filler, and 18 per cent of the 1935 production was put to this use. Soft silica is extensively used as a filler in special paints, in the manufacture of rubber, and in refractory cements. About 11 per cent of the 1935 production was used for admixture in special cements and concrete. Compact phases of the Missouri tripoli are quarried in blocks cut to desired shape and size for filtering water, but according to the U. S. Bureau of Mines nearly all such products are now exported. In the past, tripoli has been used in large amounts as a parting sand for castings, but in 1935 this use accounted for less than 10 per cent of total production due presumably to both the small output of foundries and the use of ground silica and other competitive products in place of tripoli.

The chemical composition of tripoli is distinctive. Good grades average more than 95 per cent silica and commonly more than 98 per cent. Iron is generally present as the red or brown oxide. It does not exceed 2 per cent in pink varieties and is less than 0.2 per cent in white and cream varieties. Combined water, mainly in clays, amounts to less than 0.5 per cent. Clay up to 5 per cent is not considered an impurity for it seems to impart certain desirable qualities. The alumina content, generally less than 2 per cent, gives some measure of the amount of clay present. A series of analyses in graphic form is presented in figure 1. Here is shown the similarity of Georgia tripoli with commercial grades from Missouri and Illinois.

There are no accepted standards for tripoli principally because many of the physical characteristics are not susceptible to measurement and specifications are different for each use. The material marketed by the largest producers in Missouri and Illinois has become "standard" only by custom. Consumers are mainly large industrial concerns who select a particular type of tripoli by trial and error. Newly found deposits are slow in development because the consumer, lacking any standard of comparison, is generally unwilling to change to a different earth. This study has shown that some of the Georgia tripoli is similar in many respects to the "standard" Missouri tripoli, but Georgia producers have found considerable difficulty in marketing their product.

Figure 2 presents the results of screening tests on Georgia tripoli, showing size distribution of grains. The lump material was first carefully broken down in an iron mortar, then rolled on paper, so as to loosen the individual grains without breaking them. A sample of white tripoli from Lysterly was more completely ground in the iron mortar to find out how much error was possible in the pulverizing method. The histogram of this material shows that this error is small, and that the diagrams are accurate enough for comparative purposes. The Georgia tripoli is shown to be generally coarser grained than the Missouri earth. Some deposits, such as that on the Hamilton place near Dalton, are composed of grains of nearly equal size, but in others there is considerable range in size.

Tripoli is mined by both underground and open-cut methods. Many of the Georgia deposits are covered by 2 to 6 feet of overburden and can thus be mined by surface methods. Under-ground methods have been used in Walker and Whitfield counties but the mines are now abandoned and inaccessible. The crude tripoli is hand picked and generally classified into two grades, white or cream, and pink. It is dried for shipment without further separation. In Missouri and Illinois milling methods involve crushing, pulverizing, and classification by screens and air separation. Both wet and dry methods are in use. The satisfactory development of the Georgia tripoli deposits will be dependent on the erection of modern mills to insure some uniformity of product.

Tripoli occurs in the following counties; Bartow, Catoosa, Chattooga, Floyd, Gilmer, Murray, Polk, Walker, Whitfield. It has been mined mainly in Chattooga, Walker and Whitfield. Most of the deposits occur in the upper part of the Knox dolomite (Cambro-Ordovician), and are associated with chert layers. Tripoli also occurs in association with the Bangor limestone (Mississippian), Shady limestone (Cambrian), and Murphy marble (pre-Cambrian).

The origin of tripoli is debatable. Some deposits, such as those in Bartow County,

are found to grade downwards into unaltered siliceous rocks such as novaculite. Most of the Georgia deposits, however, change very little with depth. The deposit near Harrisburg has been prospected by auger hole to a depth of 65 feet, and no appreciable change in coherence has been found. Some geologists argue that tripoli has been formed by disintegration of chert (a siliceous replacement of limestone) but gradations between chert and tripoli are not known in Georgia. Many of the Georgia deposits occur apparently at a definite horizon high in the Knox formation suggesting that the siliceous character of the beds may perhaps be original, for intense silification of this peculiar type is not likely to occur at one horizon over a wide area. In some places (noted particularly at the deposit near Dalton, Whitfield County) silica has been introduced into the tripoli and now forms narrow veinlets along joints and bedding planes. Two general theories seem plausible. One holds that the tripoli originates from decomposition of limestone containing silica which was deposited at the same time as the enclosing rock; the other maintains the silica was introduced at a later date by solutions, possibly hydrothermal. No definite evidence favoring either one of these theories has been obtained in this study.

DESCRIPTION OF PROPERTIES

Bartow County

Tripoli occurs at a number of places in Bartow County but nowhere are the deposits large enough to be mined. The material most commonly overlies and is gradational into a very fine-grained siliceous rock resembling novaculite which occurs as irregular masses in the Shady limestone. The "novaculite" is thought to be a siliceous replacement of the limestone. The tripoli seems to have resulted by weathering of the "novaculite", and thus the deposits are restricted to a surficial weathered zone. The writer has seen small deposits of this type on the property of the Paga Mining Company, 3 miles south southeast of Cartersville, and on the property of the White Manganese Corporation, about 1 mile south of White. Tripoli has been reported to occur at a number of other places in the area underlain by the Shady limestone.²

A small deposit of tripoli is said to occur near Kingston in an area underlain by the Knox dolomite.

Catoosa County

Tripoli is exposed at several places in the central part of the county, 4 to 6 miles south southwest of Ringgold in an area underlain by the Knox dolomite.³ The de-

²Hull, J. P. D., La Forge, L., and Crane, W. R., Manganese Deposits of Georgia: Georgia Geol. Survey Bull. 35, 1919. (See map opposite p. 34).

³Hayes, C. W., U. S. Geol. Survey Geol. Atlas, Ringgold folio (No. 2), 1892.

posits have not been adequately prospected, and their extent is unknown.

L. J. Vaughn Property (R. F. D. 1, Ringgold, Georgia) consists of lot 320, 28th. district, 3rd. section, 1.3 miles north of Mt. Pisgah Church on the Ringgold-Beaumont road. The property lies 4 miles south southwest of Ringgold, the nearest shipping point on the N. C. and St. L. Railway. White tripoli with red streaks is said to extend to the bottom of a 7 foot test pit which is now caved. Screen tests show the material to be amongst the finest grained of any of the Georgia deposits; more than 80 per cent readily passes through a 200-mesh screen. Chemical analysis by E. Everhart of a grab sample collected by R. W. Smith in 1929 shows 3.14 per cent alumina indicating a relatively high content of clay (see fig. 2). No shipments have been made from this property. The extent of the deposit cannot be determined without further prospecting. Further deposits are said to crop out on hill slopes a quarter of a mile east of the county road. The overburden is everywhere thin, generally less than 5 feet, and if the deposit proves large enough it could be satisfactorily developed by surface mining.

Chattooga County

Tripoli occurs in two separate areas in Chattooga County; in the southern part near Lyerly, and in the northern part near Harrisburg. The deposits near Lyerly are underlain by the Knox dolomite (Cambro-Ordovician),⁴ those near Harrisburg are underlain by the Bangor limestone (Mississippian).⁵

Mose Clayton Property (R. F. D. 1, Lyerly, Georgia) is 1¼ miles (2 miles by road) west of Lyerly, the nearest shipping point on the Central of Georgia Railway. The deposit has been prospected by an open pit 25 feet in length which exposes 4 to 6 feet of friable white tripoli on the east side of the county road. The bed strikes N. 20° E., and dips 75° E. Screen tests of a sample of cream tripoli, submitted by W. J. Seas of Harrisburg, show the material to be very fine-grained, 80 per cent readily passes through the 200-mesh screen (see fig. 2). Most of the tripoli now exposed is white rather than cream. Screen tests of the white material show more than 50 per cent retained on the 200-mesh screen. A small tonnage is said to have been shipped from this property but the cut is now abandoned, and the sides are partly slumped.

T. M. Mitchell Property consists of lots 54 and 55, 13th. district, 4th. section, about ½ mile south of Harrisburg station on the Tennessee-Alabama and Georgia Railway.

The deposit is in the hands of the owner and W. J. Seas, operating under the name of Tennessee Valley Mineral Company (R. F. D. No. 3, Summerville, Georgia). About 450 tons of tripoli have been mined from an open cut which is largely slumped. The body is between 40 and 50 feet in width and has been traced about 1000 feet along the strike but probably extends further. Three beds are exposed in the cut. A layer of white tripoli 15 feet thick occupies the western side; cream tripoli 15 feet thick forms the center; white tripoli 8 to 10 feet thick occupies the eastern side. The strike of the formation, as indicated by chert layers, is N. 25° E., and the dip is 80° E. A chert layer, in places having an amethystine color, is exposed along the western margin of the body, and is 2 to 3 feet thick. The chert contains an unidentified green clay-like mineral which was noted at a number of the tripoli deposits of the state. W. J. Seas reports auger holes were put down 60 to 65 feet in depth revealing good grade tripoli throughout. Green clay occurs as "horses" in the body and also forms the hanging wall on the east side. This clay superficially resembles a fullers earth but has not been tested for bleaching

properties. The footwall of the deposit consists of fine-grained sandy shale containing a few thin tripoli layers and considerable chert. Although no limestone is exposed in the immediate vicinity of the pits, the deposits appear to lie within the Bangor limestone.

Floyd County

A large part of southeastern Floyd County is underlain by the Knox dolomite⁶ in which tripoli occurs at a few scattered localities. The deposits near Silver Creek, 5 miles south of Rome, are the most extensive.

Old Bobo Place is situated on the east side of the Southern Railway just south of Silver Creek station, (owned by the Dabbes estate). This property was examined by R. W. Smith in 1929 who reports that three test pits on the hillside reveal good grade of white to buff tripoli with about 4 feet of overburden which includes some chert. The tripoli in places contains a perceptible quantity of clay which may prove undesirable for some uses. Thin veinlets of quartz occur in the tripoli, and these would have to be removed by screen-

⁶Hayes, C. W., U. S. Geol. Survey Geol. Atlas, Rome folio (no. 78) 1902.

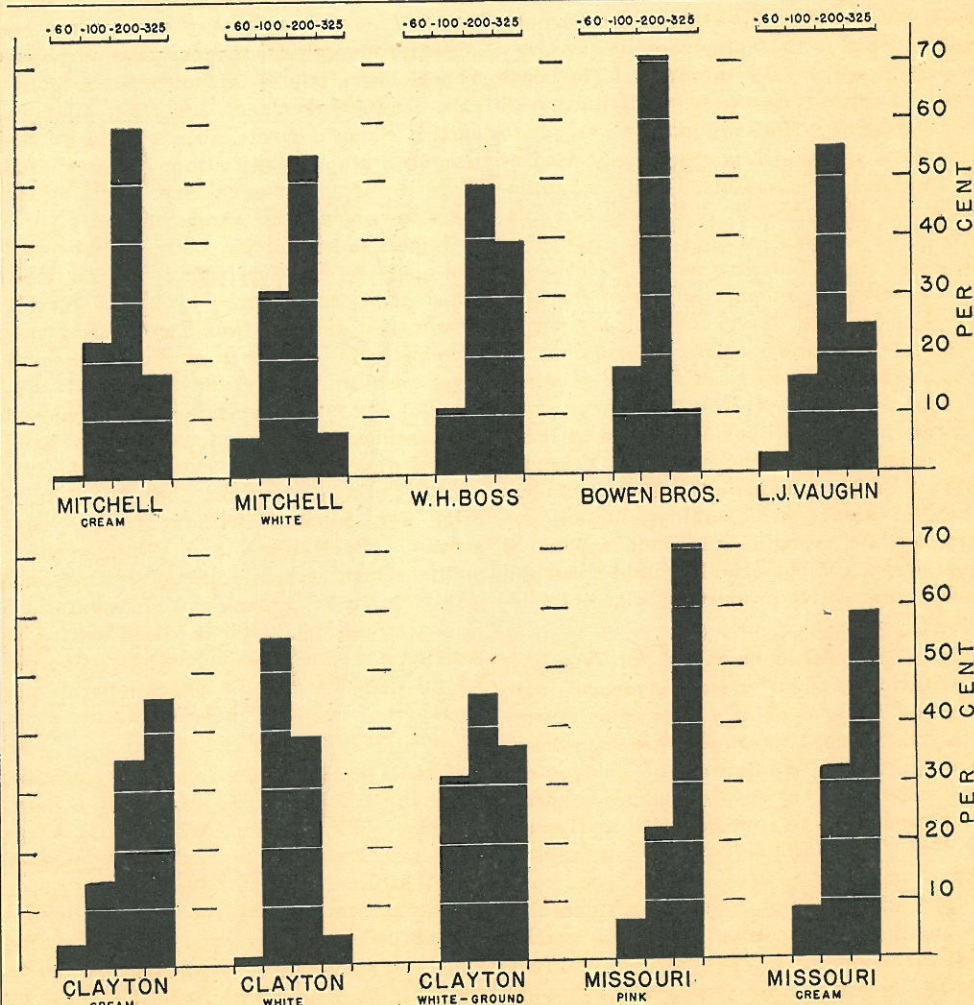


Figure 2—Diagram showing percentage grain-size distribution (histogram) of tripoli from Georgia and Missouri. Minus 60-mesh is less than .246 mm. in diameter; minus 100-mesh is less than .147 mm.; minus 200-mesh is less than .074 mm.; minus 325-mesh is less than .043 mm. Georgia tripoli is listed by property owners for which see description of deposits by counties. (Screen tests made in the laboratory of the Ceramics Department, Georgia School of Technology.)

⁴For distribution of this formation see: Hayes, C. W., U. S. Geol. Survey Geol. Atlas, Rome folio (no. 78), 1902.

⁵For distribution of this information see: Hayes, C. W., U. S. Geol. Survey Geol. Atlas, Ringgold folio (no. 2), 1892.

ing to obtain a marketable product. Chemical analyses by Edgar Everhart indicate an objectionably high content of iron and alumina (in two analyses alumina averages 3.56 per cent and iron averages 1.73 per cent). The property, in charge of E. C. Wright, (Rome, Georgia), is not now being worked. Tripoli is also said to occur on the F. H. Schalpback property near Silver Springs, Georgia.

Davis Bauxite Mine is 3 miles northeast of Cave Springs, on land owned by John Phillips (Cave Springs, Georgia). This property was examined by R. W. Smith in 1929 who reports impure white tripoli was disclosed in an open cut from which bauxite was mined in 1917. Chemical analysis by Edgar Everhart of a grab sample collected by Smith shows only 76.36 per cent silica and 12.46 per cent alumina. No attempt to mine tripoli has been made.

Gilmer County

Tripoli is extremely rare in the area of crystalline rocks, and therefore it is of some interest to find small deposits associated with the Murphy marble in Gilmer County.⁷

W. H. Searcy Property consists of lot 215, 7th. district, 2nd. section, ½ mile south of Cherrylog. Buff tripoli, apparently of good grade, has been found here but no screen or chemical analyses have been made. The deposit has not been prospected, and its extent is unknown.

Gordon County

Tripoli appears to be rare in Gordon County, although a large area is underlain by the Knox dolomite, the formation with which tripoli is most commonly associated. A deposit is known to occur on the property of W. M. Scott (Plainsville, Georgia), 1 ½ miles north of Plainsville.

Murray County

Tripoli has been known to occur in Murray County near Spring Place for many years but no extensive development has ever been made. No examination has been made of the properties and the following brief descriptions are taken largely from verbal reports by property owners.

Tilton Property is about 2.5 miles west of Spring Place in an area underlain by the Knox dolomite. Several other deposits are reported in this vicinity but their extent is not known. The tripoli is said to be a good grade of cream to buff color, and maintains 5 to 10 per cent clay. A similar deposit, not yet prospected, has recently been found 1.5 miles south of Spring Place.

Buff tripoli is reported to occur on the property of S. F. Johnson, near Crandall.

Polk County

The tripoli deposits of Floyd County ex-

tend southwestward into Polk County but as far as known only near Hematite, on the Southern Railway, about 18 miles southwest of Rome, is there a deposit worthy of prospecting. Here a good grade of white tripoli occurs on the property of Clifford D. Fite (Cedartown, Georgia). No screen tests or chemical analyses of the material have been made.

Walker County

Tripoli is reported to occur at a number of places in Walker County, but at only one locality, the Boss property, described below, have deposits been developed. It seems probable that the deposit on the Mitchell property in Chattooga County extends northward into Walker County but insufficient prospecting has been done to outline the deposit with any certainty.

W. H. Boss Property (LaFayette, Georgia), consists of lot 125, 7th. district, 4th. section, 1 ¼ miles southwest of Naomi. The property is 4 miles (6 miles by road) southeast of LaFayette, the nearest shipping point on the Central of Georgia Railway. The mine, abandoned in 1929, is now caved in, and exposures are inadequate to determine thickness and structure. There appears to be three separate beds of tripoli with intervening cherty layers containing

ovoid chert nodules. Many of these nodules are crossed by open cracks in part filled with an unidentified green mineral also seen at the Mitchell property in Chattooga County. The tripoli is a good grade of cream to buff color with rare seams of limonite, generally less than a quarter inch in thickness. The soft and incoherent surface material grades downwards within three feet of the surface into coherent but friable tripoli. The beds appear to belong in the upper part of the Knox dolomite. Considerable tonnage of tripoli is said to have been shipped from this mine which at one time had over 300 feet of underground tunnels.

Whitfield County

Tripoli was first discovered in Georgia near Dalton, on the Hamilton property described below, during or shortly after the construction of the Western and Atlantic Railway in 1857. This is the only property in the county that has been developed.

Hamilton Property lies along the west side of the N. C. and St. L. Railway, 1.5 miles north of Dalton and ¼ mile north of Dalton water works. The property has been under lease to Bowen Brothers (Dalton, Georgia) for a number of years but active mining has now been discontinued.

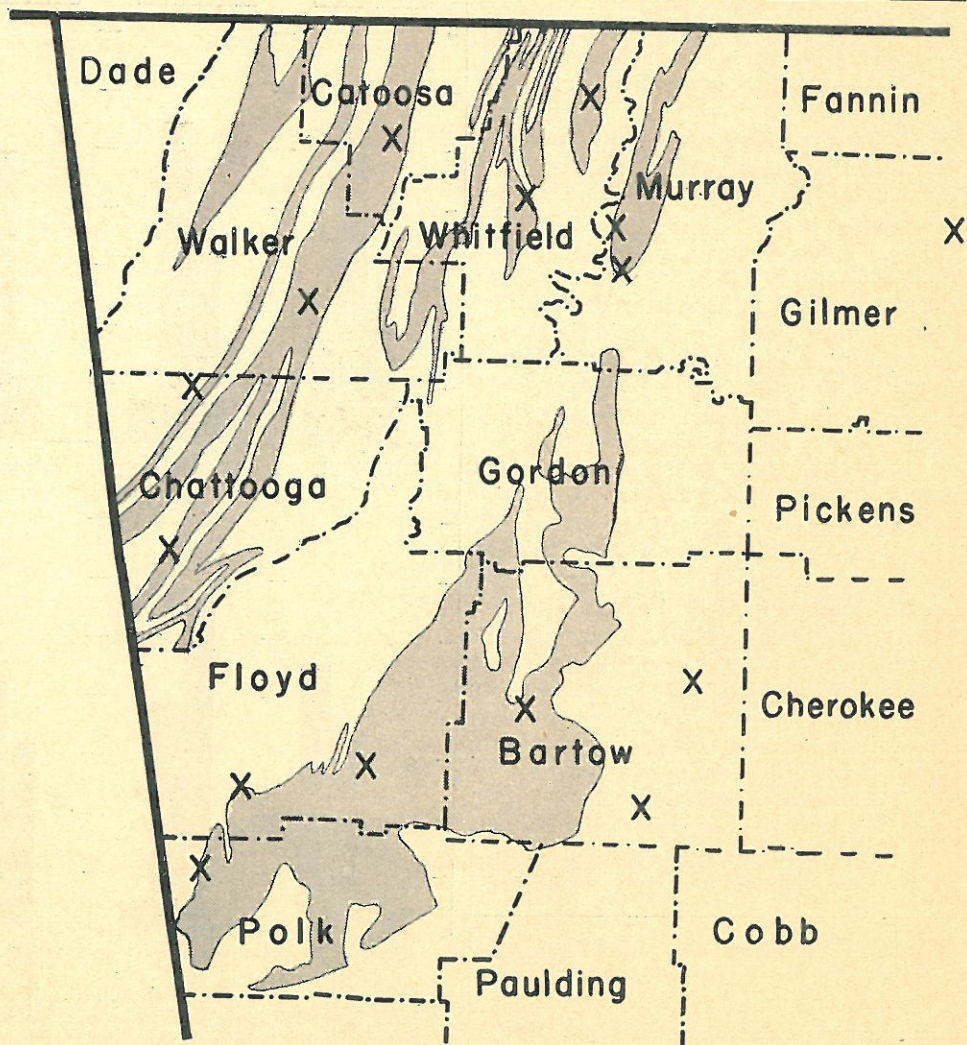


FIGURE 3.—Outline map of northwest Georgia showing distribution of tripoli deposits. Shaded area is underlain by Knox dolomite.

⁷La Forge, Lawrence, and Phalen, W. C., U. S. Geol. Survey Geol. Atlas, Ellijay folio (no. 187), 1913.

The first use for this earth, it is said, was prior to the Civil War for polishing brass on the newly constructed W. and A. Railway, and trainmen frequently stopped here to obtain a supply of this natural soft abrasive. A large but unrecorded tonnage has been shipped from this property which during the peak of activity between 1914 and 1918 was worked by both underground and open-cut methods. Most of the old workings are slumped but exposures reveal good grade buff to yellow-brown tripoli of undetermined thickness. Screen tests show that 82 per cent of the material readily passes through a 200-mesh screen, and of this 71 per cent is retained on the 325-mesh screen, (see fig. 2). This tripoli is thus particularly well adapted to a use which requires a narrow range in grain-size.

The tripoli here occurs in beds inter-layered with chert and ferruginous shale belonging apparently near the top of the Knox dolomite. The strike is N. 10° E. and the dip 40° E. The tripoli bodies are generally thinly bedded and in places the beds are separated by chert partings less than ¼ inch thick.

C. Peck Worthy Property includes lots 213, 224, and 249, 10th. district, 3rd. section, 9 miles northwest of Eton and 11 miles northeast of Dalton, Georgia. A selected sample submitted by the owner consists of good quality buff tripoli.

Summary

The tripoli deposits of Georgia have been only partly developed. Shipments have been recorded from Chattooga, Murray, Walker, and Whitfield counties. No mining is now being carried on. The current impression that Georgia tripoli is distinctly inferior to tripoli from other states is shown by this study to be erroneous. The character of the grains is remarkably similar to grains from Missouri earths although the grain-size is generally slightly larger. The grains of the Georgia tripoli are in part of the "amorphous" type and are thus distinct in this respect from the strictly chalcedonic Missouri tripoli. The Georgia producers have worked under the handicap of shipping unmilled earth which means that no guarantee of a uniform product can be given. The deposits are large enough and of sufficient purity to invite further development but it is believed satisfactory marketing cannot be achieved without screening and classifying the earth.

The color of Georgia tripoli ranges from white to reddish-brown. White tripoli, rare or absent in the Missouri-Oklahoma area, occurs in quantity in Chattooga County at both Mose Clayton and T. M. Mitchell properties, and in Catoosa County at the L. J. Vaughn property. In the abrasive trade many buyers have a preference for pink tripoli of the type mined in Missouri. The color is due to a small content of red iron oxide and could be "manufactured" in

Georgia by the addition of red iron ore in proper proportion.

Tripoli has such a variety of uses for each of which special properties are required that it has been impossible in this study to make a comprehensive series of

tests on Georgia earths to determine for what particular uses each is best adapted. The purpose of this circular is to give the outstanding features of the Georgia deposits with a brief description of properties.

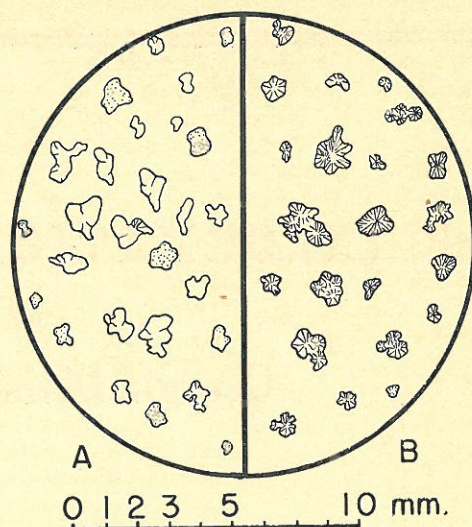


FIGURE 4. Tripoli grains magnified to show form.

- A.** Georgia tripoli from Bowen Bros. property, near Dalton. Stipled grains are not distinctly crystalline. Spherulitic structure is rare.
- B.** Missouri "cream" tripoli supplied by C. E. Heinz, Joplin, Mo. Grains are all chalcedony with spherulitic structure.

The following is a list of tripoli buyers: ⁸	National Sales Corp., 31-35 E. 13th St., Cincinnati, Ohio.
Braun Corp., 363 New High St., Los Angeles, Calif.	Samuel H. French & Co., 400-412 Callowhill St., Philadelphia, Pa.
Juergens & Anderson Co., 55 East Washington St., Chicago, Ill.	Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Martin Senour Co., 2520 Quarry St., Chicago, Ill.	Algenon Lewin Curtis, P. O. Box 61, Westmoor Lab., Chatteris, England.
Matchless Metal Polish Co., 842 W. 49th Place, Chicago, Ill.	
Charles Cooper & Co., 4 Mulberry St., New York City, (Buyer and Dealer).	The following is a list of tripoli producers: ⁸
Cooper & Cooper, Inc., 23 Cliff St., New York City.	Corona Products, Inc., Rogers, Benton County, Ark.
Eimer & Amend, 201-209 E. 13th St., New York City.	Western Talc Co., 1901 E. Slauson St., Los Angeles, Calif.
Jerome Alexander, 50 E. 41st St., New York City.	Tennessee Valley Mineral Co., Route 3, Summerville, Ga.
L. A. Solomon & Bro., 216 Pearl St., New York City.	Geo. S. Mephram Corp., East St. Louis, Ill.
The Globe Chemical Co., Murray Rd. & Big Four R. R., St. Bernard, Cincinnati, Ohio.	Olive Branch Minerals Co., Cairo, Ill.
Gustave Fox Co., 3rd. & Race Sts., Cincinnati, Ohio.	Ozark Minerals Co., 807½ Washington Ave., Cairo, Ill.
	Barnsdall Tripoli Co., Seneca, Mo.
	Independent Gravel Co., 220½ W. 4th St., Joplin, Mo.
	Penn Paint & Filler Co., Antes Fort, Lycoming County, Pa.

⁸Furnished by the Rare Metals and Non-Metals Division, U. S. Bur. Mines.

INFORMATION CIRCULARS

BY THE

Georgia Division of Geology



1. Gold in Georgia, by G. W. Crickmay, 1933.
2. Suggestions to Property Owners on Prospecting and Selling a Mineral Deposit, by R. W. Smith, 1934.
3. Kyanite, Vermiculite and Olivine in Georgia, by R. W. Smith, 1934. Out of Print.
4. Gold Deposits of Georgia, by Roy A. Wilson, 1934. Out of Print.
5. The Common Rocks and Minerals of Georgia, by Lane Mitchell, 1935.
6. The Bleaching Clays of Georgia, by Harry X. Bay and Arthur C. Munyan, 1935.
7. The Georgia State Museum, by G. W. Crickmay and Lane Mitchell, 1936.
8. Water, Georgia's Unknown Natural Resource, by R. W. Smith, 1936.
9. Tripoli Deposits of Georgia, by Geoffrey W. Crickmay, 1937.

