Some Bauxite and Clay Deposits in Northeastern Alabama

GEOLOGICAL SURVEY BULLETIN 1199-P

Some Bauxite and Clay Deposits in Northeastern Alabama

By NORMAN M. DENSON *and* KARL M. WAAGÉ

BAUXITE DEPOSITS OF THE SOUTHEASTERN UNITED STATES

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Bauxite and pisolitic clay deposits in five areas of northeastern Alabama

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BAUXITE DEPOSITS OF THE SOUTHEASTERN UNITED STATES

SOME BAUXITE AND CLAY DEPOSITS IN NORTHEASTERN ALABAMA

By Norman M. Denson and Karl M. Waagé

ABSTRACT

Deposits of bauxite and pisolitic clay in five areas in northeastern Alabama in Cherokee, Calhoun, and Talladega Counties were investigated in 1942–43 as part of an evaluation of the Nation's mineral resources. None of the areas contains bauxite of commercial importance as a source of aluminum under economic conditions obtaining through the 1960's. The bauxite and clay deposits are in an area underlain by rocks of Early Cambrian to Ordovician age. Extensive surficial deposits of Tertiary and Quaternary age obscure the bedrock in many places.

In the Nances Creek area, one deposit at site N.C. 2 was explored by drilling; the material is largely grade D bauxite and kaolin, with two small lenses of grade C bauxite, the highest grade found in the area.

The other deposits in the Nances Creek area are smaller and apparently lower in grade. They were not drilled. Of these, the deposit at site N.C. 1 is the most promising. It is about 1,500 feet northeast of N.C. 2 and is similar to it, but probably smaller.

Erosion has exposed the bauxite at N.C. 1 and N.C. 2 but probably has not removed much of the original deposits. The other three deposits are in a less favorable topographic position for preservation, and at least one of these is mainly an accumulation of float. The remaining two may be parts of original deposits plus rubble of reworked material, or they may be merely accumulations of float. It is suggested that at one of these, the Love prospect, one or more holes be drilled to test the prospect at depth.

In the Jacksonville area, the only deposit of bauxite known is the Kitchens prospect. The size of the deposit may be moderate for the Appalachian Alabama district, but the bauxite is high in iron and silica and does not appear to be commercial-grade material.

The Parsons mine in the Talladega area lies within an area underlain by carbonate rocks of the Knox Group of Cambrian and Ordovician age. Associated white gravels of Tertiary age are younger than the bauxite, but their exact age and relation to the bauxite is unknown. Most of the bauxite is moderately high grade and low in iron. It is generally soft, pink or white, and pisolitic to nonpisolitic. About 500 tons of bauxite was shipped during World War I.

Except for the De Armanville prospect, the so-called deposits in the De Armanville and Congo areas appear to be concentrations of pebbles and boulders of pisolitic kaolinitic clay as constituents of a widespread gravel of Tertiary age.

The ultimate source of the pisolitic clay is unknown. The De Armanville prospect includes a deposit of pisolitic clay exposed discontinuously along a roadcut for about 150 feet. Chemical and X-ray analyses show no gibbsite in any of the pisolitic clay samples. Kaolinite is the only major constituent.

INTRODUCTION

Deposits of bauxite in northeastern Alabama (fig. 1) were studied during World War II by the U.S. Geological Survey and the U.S. Bureau of Mines as part of a cooperative program of the evaluation of the Nation's resources of aluminum ore. The bauxite and clay deposits discussed here are scattered over an area about 70 miles long, in Cherokee, Calhoun, and Talladega Counties. Because of the short time available for the field studies and because of the inferior grade and small size of the deposits, geologic mapping in each area was limited to the immediate vicinity of the deposits. In 1943 deposits of bauxite in the Jacksonville and Talladega areas (fig. 1) and deposits of pisolitic clay in the De Armanville and Congo areas were investi-

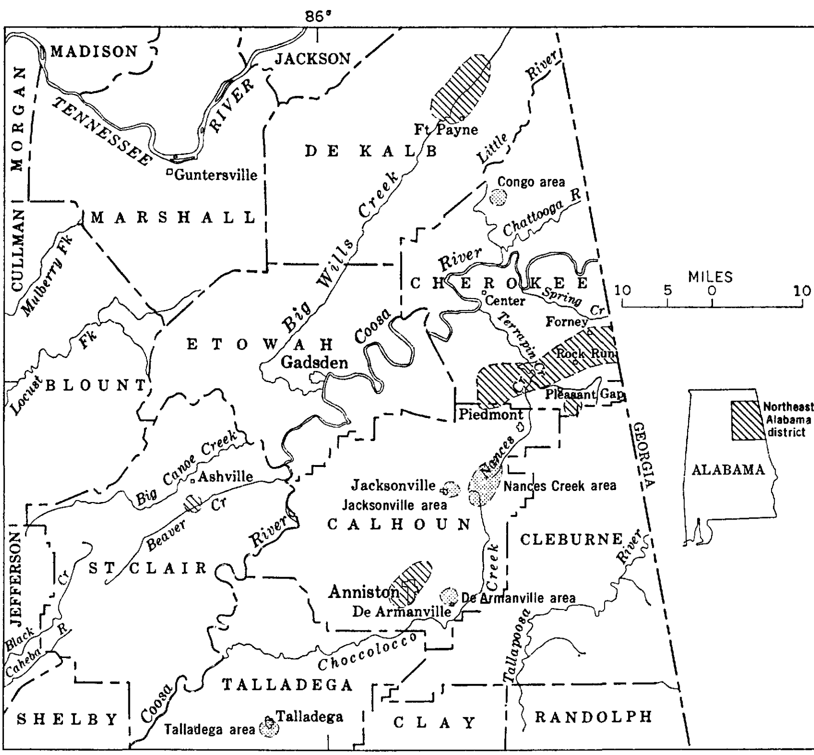

FIGURE 1.—Location of the known areas of bauxite and high-alumina clay: the Jacksonville, Nances Creek, Talladega, De Armanville, and Congo areas and other areas in northeastern Alabama.

gated by Waagé. Bauxite and high-alumina clays at five localities in the Nances Creek area were studied by Denson; the U.S. Bureau of Mines drilled 18 exploratory holes at one property in that area. Only the Parsons mine in the Talladega area and the Kitchens prospect in the Jacksonville area are of possible commercial interest, and even these are considered submarginal deposits under marketing conditions existing in 1958.

The Geological Survey's work in northeastern Alabama was done under the direction of Preston E. Cloud, Jr. Much of the core taken from the Bureau of Mines drill holes was logged by Helmuth Wedow, W. B. Baldwin, K. M. Waagé, and R. L. Heller; some of the geologic mapping was done by Wedow. Heller assisted in the topographic mapping of the Jacksonville area.

GENERAL GEOLOGY

Major topographic features of the general area of investigation are Choccolocco Mountain, Choccolocco Valley, Dugger Mountain and intervening lowlands drained by Nances Creek and Cottaquilla Creek, and Lookout Mountain. Rocks outcropping in the areas studied range from Paleozoic to Tertiary in age; surficial deposits of Quaternary age occur extensively in the lowlands. More detailed descriptions of the rocks are given by Cloud (1966 a, b).

The Weisner Quartzite of Early Cambrian age is exposed in the Nances Creek and Jacksonville areas. It consists of fine- and coarse-grained arenaceous strata a few inches to several feet thick. In the Nances Creek area the beds are tangentially crossbedded light-pink to buff-gray locally quartzitic sandstone. Subordinate interbedded material is dark-gray, olive-green, pink, and light-maroon micaceous arenaceous shale and slate. The Weisner Quartzite is more resistant to erosion than the younger Cambrian and Ordovician formations and forms Choccolocco and Dugger Mountains. The Weisner is in contact with younger formations along the trace of a hypothetical low-angle thrust fault.

The Alabama State geologic map (Adams and others, 1926) shows the Shady Dolomite of Early Cambrian age resting conformably on the Weisner on the southeast side of Choccolocco Mountain. Study by Denson, however, in the Nances Creek area suggests that the bedrock of post-Weisner age in the vicinity of Borden's Branch, S½ sec. 33, T. 13 S., R. 9 E., belongs to the Knox Group (Ordovician) and that consequently the Shady Dolomite is either absent or is deeply buried under younger strata. The Weisner Quartzite is assumed to be directly overlain by the Rome Formation. The Shady Dolomite may be present in the De Armanville area. (See p. P22.)

The Rome Formation (Lower Cambrian) was identified in the Nances Creek area. It consists of mauve to purplish-red sandstone and mudstone interbedded with gray-green and reddish-brown micaceous fissile shale. No fossils were found in the Rome Formation, but the characteristic mauve and reddish-purple colors of the residuum make it readily recognizable in the field. Low, rounded knobs and ridges are characteristic surficial features in those parts of the Nances Creek and Cottaquilla Creek valleys in which this formation crops out.

The Conasauga Shale (Middle and Upper Cambrian) consists of gray-green fissile micaceous shales interbedded with subordinate amounts of dark-gray dolomitic limestone. A characteristic residuum resulting from weathering of the upper part of the formation includes cellular chert and aggregates of crystalline quartz. The formation is believed to rest conformably on the Rome Formation, but at the foot of Dugger Mountain the Conasauga is in fault contact with shale, slate, and sandstone, probably of Weisner age.

The formation is present in the Nances Creek and Jacksonville areas and, possibly, in the De Armanville area.

The Copper Ridge Dolomite (Upper Cambrian) underlies the ridge in the northwest part of the Jacksonville area and the crests of four low hills within the basin (pl. 3). Dolomite crops out, and the formation was mapped by observing the areal distribution of types of chert float that are known to characterize terrain underlain by the Copper Ridge in adjacent areas.

Concretions of chert showing liesegang banding and rhombohedrally fractured light-gray blocky, ropy chert occur in henna-colored soil near Choccolocco Mountain (pl. 1) that has been mapped as underlain by the Longview Limestone or the Newala Limestone, both of which belong to the upper part of the Knox Group of Early Ordovician age. According to P. E. Cloud, Jr. (oral commun., 1943) this assemblage of residual materials is characteristic of areas underlain by rocks of late Knox age; and the diagnostic fossil *Ceratopea*, in very light gray massive chert at a locality 800 yards east of the Dothard prospect (pl. 1), indicates that at least part of the bedrock that is in contact with the Weisner Quartzite along the foot of Choccolocco Mountain, in a belt once mapped as Shady Dolomite (Adams and others, 1926), is actually the Newala Limestone.

On the Alabama State geologic map, the area in the vicinity of the Parsons bauxite deposit, Talladega area, is represented as being underlain by carbonate rock of the Knox Group of Cambrian and Ordovician age. Though the bedrock in the vicinity is obscured by surficial deposits and the only outcrop observed was an exposure of residual clay containing beds of weathered chert, presence of carbonate rock in the subsurface is indicated by numerous sinkholes, as well as by much chert float that is strewn about on the surface. The chert is typical of the Knox Group as a whole but is not diagnostic of any one formation within it. In the Congo area the Knox Group is represented at the surface only by accumulated residuum that consists largely of clay and chert. The most conspicuous residual material is chert, fragments of which occur rather abundantly as float in the part of the area that is underlain by carbonate rocks. The distribution of chert fragments here and elsewhere in the area indicates that carbonate rocks of the Knox Group also underlie the valley of Spring Branch and the ridge east of it. The assemblage of chert types present as float in the Congo area is similar to that occurring in the upper part of the Copper Ridge Dolomite in the Rock Run and Goshen Valley areas, farther southeast in Cherokee County. These types include banded black and white chert, chert-bearing cryptozoons, and small amounts of porous chert characterized by minute lenticular voids and by cavities, rhombohedral in shape, that are identifiable as dolomolds.

In the Congo area silty and sandy olive and tan shales, interbedded with buff sandstone, crop out in gullies and roadcuts. These beds are part of the Red Mountain Formation which, in Alabama, includes all strata of Silurian age. Fossils were collected from a locality in the northwest corner of the SE¼SE¼NW¼ sec. 35, T. 8 S., R. 9 E., where olive-yellow shales and sandstones are exposed in a roadcut on the east side of the road due southeast of the A. B. Miller home. The following fossils were identified by P. E. Cloud, Jr.:

Leptaena rhomboidalis
Leptelloidea aff. *L. transversalis*
Dalmanella sp.
platycerid gastropod
Small winged pelecypod
Pelmatozoan columnals with large lumen

Although the faunal evidence is equivocal, the absence of diagnostic Clinton forms suggests that the beds belong to the lower part of the Red Mountain Formation which is of Albian age (Butts, 1926, p. 139).

Surficial materials occurring in the areas investigated consist of Recent alluvium and slope wash and of deposits at slightly higher altitudes, believed to be of Tertiary age (found in the Talladega and De Armanville areas). The Tertiary deposits include two categories of clastic materials: a mantle of red unbedded clastic material that commonly caps the hills and white bedded deposits that unconformably underlie the red material.

Bauxite in this report is classified according to a modification of the grades set up by Thoenen and Burchard (1941, p. 38). Their lowest grade has been divided into two parts, grade D and grade D′, in order to differentiate between kaolin which contains some gibbsite and that which does not. These two divisions also roughly correspond to the division of the low-grade and clayey material into bauxitic clay and kaolin or kaolinitic clay, respectively. The modified classification is as follows:

Grade	*Alumina (percent)*	*Silica (percent)*
A (bauxite)	>55	<7.
B (bauxite)	50–55	<15.
C (bauxlte)	45–50	<30.
D (bauxitic clay)	30–45	Less than that of alumina.
D′ (kaolinitic clay)	30–45	More than that of alumina.

BAUXITE DEPOSITS

NANCES CREEK AREA

Bauxite and high-alumina clay deposits were studied between February 24 and May 27, 1943, at five sites in the Nances Creek area (pl. 1) in eastern Calhoun County. The sites are all in the lowlands, in areas of extensive surficial deposits. Most exposures of bedrock in the lowlands are so poor that they have been identified largely on criteria of questionable value: fragments of sandstone and shale, and the relative abundance of chert.

The Alabama State geologic map (Adams and others, 1926) shows a conformable sequence of outcropping strata from the Weisner Quartzite (Cambrian) on Choccolocco Mountain to the Knox Formation (Ordovician) on the west side of Dugger Mountain. Mapping by Denson suggests that the geology of the Nances Creek bauxite area is more complex, perhaps even more so than is indicated in section *A–A′* (pl. 1). The interpretation illustrated in the section involves the hypothesis that the Weisner Quartzite, as mapped in the two large parts of the Nances Creek bauxite area that are occupied by Choccolocco Mountain and Dugger Mountain, has been thrust northwestward, over younger rocks, on a undulatory low-angle fault surface. The Weisner is thought to have been present above this hypothetical surface as a continuous sheet that has been stripped away by subsequent erosion from the lowland that lies between the two mountains; thus were exposed the overridden younger formations.

The postulate that a great thrust fault underlies Choccolocco and Dugger Mountains is consistent with the occurrence of breccias, jasperoid, and chert in the vicinity of contacts between the Weisner

Quartzite and the younger formations of Paleozoic age. Breccia of sandstone and quartzite, such as might well occur near the sole of an overthrust sheet, is exposed in streambeds on the east side of Choccolocco Mountain; good examples of such breccia can be seen at the midpoint of the east boundary of sec. 33, T. 13 S., R. 9 E., and at the center of the SE¼SE¼ sec. 8, T. 14 S., R. 9 E.

Chert and jasperoid crop out near prospect N.C. 1 (pl. 1) and chert was recovered from a depth of 80 feet in drill hole P–316 near the Dothard prospect (pl. 2, sec. *B–B'*). Though the chert and jasperoid have yielded no fossils, they are interpreted as having been derived from the Knox Group, probably the Longview or the Newala Limestone. Drusy vesicular jasperoid, believed to be derived from the Conasauga Shale, occurs in the vicinity of the hypothetical fault trace at the contact between the Weisner and younger formations along the west side of Dugger Mountain.

In most places the dip of the Weisner strata is between 40° and 60° SE. The thickness of an unbroken sequence of strata so steeply inclined, if measured across their strike along a line equal in length to *A–A'*, would be more than 10,000 feet. The actual thickness of the Weisner, however, is believed to be much less than that inasmuch as neither this formation nor stratigraphic units equivalent to it anywhere in the Appalachian region are known to be so enormously thick. The illusion of great thickness is thought to be due to internal deformation of the thrust sheet by imbricate fault slices above the thrust surface as indicated in section *A–A'* (pl. 1).

The formations of post-Weisner age that are presumed to have been overridden by the thrust sheet are hidden beneath the Weisner Quartzite in the parts of the Nances Creek area that are occupied by Choccolocco and Dugger Mountains and are largely concealed in the intervening lowland by surficial deposits of Quaternary age. As a consequence, little is known about the structure of these formations. Structural features whose presence is nevertheless deducible from the fragmentary data available are: (1) a concealed fault (pl. 1), believed to be a thrust fault, the trace of which extends in a northeasterly direction between outcrops of the Rome Formation and the Knox Group, and (2) a synclinal feature between that fault and the SE cor. sec. 3.

Four of the five reported bauxite localities in the Nances Creek area had been prospected prior to exploration by the Federal government, but little could be learned of the results of this earlier work. In the exploration program test holes were drilled at only one of the localities, site N.C. 2.

Erosion by the headwaters of Borden's Branch has exposed the bauxite at sites N.C. 1 and N.C. 2, but probably only a small part of the deposits has been eroded away. Deposits at the other three localities, the Borden prospect, the Boozer prospect, and the Love prospect (pl. 1), are within the Nances Creek-Cottaquilla Creek valley and in a much less favorable topographic position for preservation. The Borden prospect is merely an area of accumulation of bauxite float. The deposits at the Boozer and Love prospects show effects of considerable erosion and reworking of bauxitic materials, for they include large boulders of bauxite in a clay matrix. Buried deposits may be present also at these localities, but if so, they are probably very small.

The bauxite at sites N.C. 1 and N.C. 2 is considered to have filled sinkholes in carbonate rock. A thrust bringing arenites of the Weisner Quartzite to rest on relatively soluble limestone and dolomitic limestone may have been the major factor controlling the circulation of ground waters which effected the formation of sinkholes. Whether the bauxite was formed before or after deposition in sinkholes cannot be determined, but fragmental structures in bauxite and surrounding clay indicate some movement after deposition, such as redeposition at a lower level.

SITE N.C. 1 (ALABAMA MINERAL LAND CO. PROSPECT 1)

The Alabama Mineral Land Co. prospect 1, in the NE¼SE¼ sec. 33, T. 13 S., R. 9 E., at an altitude of 1,000 to 1,060 feet (pl. 2) is on the east slope of a spur which branches southeastward from one of the principal ridges on the east side of Choccolocco Mountain. The prospect is believed to be that referred to by Jones (1940, p. 64) as "No. 42 outcrop" but, if so, it was incorrectly described by him as in the SW¼ sec. 33. It is accessible over a dirt road, shown on plate 2 as leading north from Joe Dothard's house and over an abandoned continuation of that road that extends as far as the Cowan iron ore prospect.

The area is underlain by carbonate rocks, probably belonging to the Longview Limestone or the Newala Limestone, and is close to the trace of the thrust fault (pl. 1) that is believed to extend under Choccolocco Mountain. Much material of bauxitelike appearance is present in the rubble that blankets the area, and boulderlike masses of such material, showing numerous nodules and irregular inclusions of dense white clay in a silty clay matrix, are exposed in numerous shallow pits (pl. 1). Analyses of the material show a composition close to that of kaolinite, with low percentages of iron and titania. A sample analyzed by the U.S. Bureau of Mines contained 45.7 percent insoluble, 38.2 percent Al_2O_3, 0.4 percent Fe_2O_3, and 1.4 percent TiO_2, with 13.9 percent ignition loss.

Much, if not all, of the deposit is high-alumina clay of grade D or grade D′. The site has not been adequately explored, and the size of the deposit is unknown. Suggested locations for exploratory drill holes are shown on plate 2.

SITE N.C. 2 (DOTHARD PROSPECT)

The Dothard prospect is mostly in the W½NW¼SE¼ sec. 33 and partly in SE¼NE¼SW¼ sec. 33, T. 13 S., N. 9 E. (pl. 2). This prospect, otherwise known as Alabama Mineral Land Co. prospect 2, or prospect NC–2, is believed to have been erroneously reported by Jones (1940, p. 64) as about 6 miles farther south, in the actual location of the Borden prospect. Carbonate bedrock in the neighborhood of the Dothard prospect is believed to belong to the upper part of the Knox Group, probably the Longview Limestone or the Newala Limestone; it may, however, belong to the Shady Dolomite.

Abundant float occurs in the bottoms and along the sloping sides of the two draws shown in plate 2. Among the float fragments in the bottom of the northern draw and on the hillside south of it are several large boulderlike masses of pisolitic material, each roughly 3 feet in diameter. One of the three shafts shown in plate 2 was dug by the Bureau of Mines during the Federal exploration program; the other two, which were already in existence, were cleaned out and sampled by the Bureau. The bauxite and high-alumina clay exposed in the shafts are mostly pisolitic siliceous pinkish-red to cream-colored materials. The 18 exploratory holes shown on plate 2 indicate that the bauxite and high-alumina clay occur in three bodies whose dimensions, shapes, and spacing are shown on plate 2 and figure 2. The material of greatest thickness and best grade was found in the lower body. The three bodies are surrounded and separated from one another by sandy and silty clays. The lower body apparently occupies the deepest part of an ancient sinkhole; the other two may represent material deposited in a separate sinkhole or, possibly, deposited later in the same sink, after its enlargement by further solution.

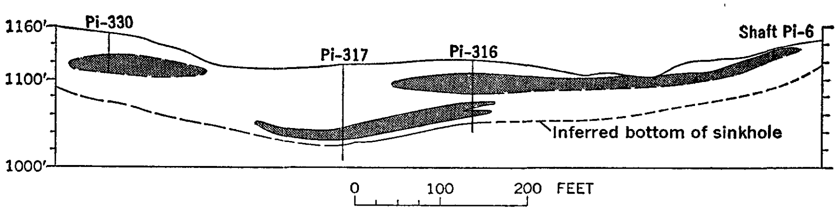

FIGURE 2.—Section showing the spatial relationship between the bauxite bodies at site N.C. 2 (the Dothard prospect).

Most of the material in all three bodies has a chemical composition close to that of kaolinite. Cores from drill holes in both of the upper bodies show some pisolitic structures that suggest presence of gibbsite, but none of the analyses of material from these bodies show more alumina than silica. Therefore, most if not all, of the material of the upper two bodies is kaolinitic clay of grade D′. This is believed to be true also of similar nonpisolitic and slightly pisolitic materials that make up the greater part of the lower body, wherein grade C material, as recorded in drill hole Pi–319, also occurs in two lenses: one 8 feet thick at depths of 44 to 52 feet and another 5 feet thick at depths of 62 to 67 feet. This is the only material in the Nances Creek area that is known to be classifiable as better than grade D. Chemical analyses of core samples of the bauxite and high-alumina clay from drill hole Pi–319 are given in table 1.

TABLE 1.—*Chemical analyses, in percent, of core samples from drill hole Pi–319*

[From Coulter (1948, p. 27)]

Depth (feet)		Al_2O_3	SiO_2	Fe_2O_3	TiO_2	Ignition loss
From—	To—					
40	44	38.9	42.3	0.8	2.9	14.3
44	49	49.0	24.3	1.3	2.1	22.6
49	52	50.1	23.0	1.2	2.4	22.9
52	57	43.3	36.1	.9	2.0	17.4
57	62	45.4	32.1	1.2	2.8	18.7
62	67	49.6	24.2	1.0	2.4	22.4
67	74	42.4	38.5	1.0	1.8	16.8
74	79	47.2	33.5	1.1	1.6	17.1
79	84	42.3	38.1	1.1	2.0	16.9
84	89	39.2	41.7	1.3	2.6	15.5
89	92	38.7	43.5	1.2	2.4	14.5
92	97	40.1	44.7	1.0	1.3	14.4
97	102	38.8	44.6	.7	1.5	14.4
102	104	39.0	43.7	1.3	3.1	13.6
104	105	32.9	40.0	11.2	1.6	14.3
105	112	38.5	44.0	2.1	1.9	13.9

In the preceding analyses and in those of cores from other holes, the percentages of titania and of alumina appear to vary independently; the titania content is also unrelated to presence of pisolitic or fragmental structures. The iron-oxide (Fe_2O_3) content of most of the bauxite and high-alumina clay is very low, ranging from 0.2 percent to about 3 percent. The iron-oxide content of most of the material in the two smaller bodies, however, is between 4 and 19 percent and is between 4 and 10 percent in the bottom few feet of about half the holes in the lower body.

BOOZER PROSPECT

The Boozer prospect is in about the center of sec. 16, T. 14 S., R. 9 E. (pl. 1). The prospect is at an altitude of 825 feet, on a hillside sloping gently to the northeast, near the bottom of a shallow draw. It is about a hundred feet from a good wagon road that leads southeastward about three-eighths of a mile to W. P. Boozer's farmhouse. The area is probably underlain by the Conasauga Shale.

Reddish-brown, coarsely pisolitic material is scattered as float over an area of approximately 30 acres. A small pile of such material 150 feet south of the center of sec. 16 is said by Mr. Boozer to have been taken by him from pits, now filled, in a field immediately east of the pile. If an ore body is present in this neighborhood, it is probably small and is composed mainly of high-alumina clay.

BORDEN PROSPECT

The Borden prospect occupies a low knoll at an altitude of 850 feet in SW¼NE¼NW¼ sec. 3, T. 14 S., R. 9 E., in the western part of the Nances Creek Valley (pl. 1). The area is underlain by the Longview Limestone or the Newala Limestone. Here material that differs little, if any, in appearance from the high-alumina clay and bauxite at the Dothard prospect is scattered as float over an area of about 5 acres. A specimen of the float contained 37.5 percent A_2O_3, 43.5 percent SiO_2, 2.8 percent Fe_2O_2, and 2.0 percent TiO_2, with 13.6 percent ignition loss.

No test pits or shafts are known to have been opened in this vicinity, and very possibly the float is derived from the Dothard prospect and from site N.C. 1, whence it may have been transported by Borden's Branch, the present course of which passes only a few hundred feet north of the area in which the float occurs.

LOVE PROSPECT

The Love prospect, in NE¼SW¼SE¼ sec. 16, T. 14 S., R. 9 E. (pl. 1), at an altitude of 800 feet, is on the east side of a narrow ridge trending north-south a few hundred feet west of Cottaquilla Creek.

The area is probably underlain by the Conasauga Shale. Float of red to reddish-buff bauxite and high-alumina clay occurs on the ridge, and boulderlike masses of such material in a clay matrix are exposed in a prospect pit about 30 feet in diameter and 5 to 7 feet deep. Two analyses given by Jones (1940, p. 63) show 5.1 and 3.6 percent SiO_2, 52.4 and 39.6 percent Al_2O_3, 15.6 and 29.2 percent Fe_2O_3, 2.5 and 2.2 percent TiO_2, and 26.4 and 25.4 percent loss on ignition. The deposit is probably small and appears to consist largely of scattered boulderlike masses of bauxite and high-alumina clay in an argillaceous matrix.

JACKSONVILLE AREA

The Jacksonville area (pl. 3) occupies about 2 square miles on the northeastern outskirts of Jacksonville, in Calhoun County. The area lies at the foot of the western slope of Choccolocco Mountain; the only known occurrence of bauxite in the area is the Kitchens prospect, about $1\frac{1}{4}$ miles northeast of the center of Jacksonville.

The Jacksonville area is a shallow topographic basin into which flow six small intermittent streams from Choccolocco Mountain. The east rim of this depression is formed by the foothills of the mountain; because the north and south rims are two low ridges that converge westward but that terminate without joining, a narrow gap occurs in the vicinity of Mountain Avenue in the northern part of Jacksonville through which all the drainage from the basin flows westward. At one time the basin was filled by gravel and silt deposits derived from the arenaceous rocks of Choccolocco Mountain, but intermittent streams have since cut deep gullies in the fill. Bedrock is exposed only at the rims of the depression and on a few low hills within it from which the gravel cover has been stripped.

STRATIGRAPHY

The bedrock comprises three geologic formations; in ascending sequence, these are the Weisner Quartzite, the Conasauga Limestone; and the Copper Ridge Dolomite.

Weisner Quartzite.—The Weisner Quartzite crops out extensively in Choccolocco Mountain, although plate 3 shows only the part of its outcrop that extends along the foothills between the main ridges of the mountain and the trace of a low-angle thrust fault on which the Weisner has ridden westward over younger Cambrian rocks.

The Weisner consists of white, gray, and pink coarse- and fine-grained quartzite. In the quarry at the east end of Mountain Avenue in Jacksonville, the quartzite beds are intensely faulted and fractured. Except in this quarry, no outcrops of the Weisner strata are known to occur in the area mapped, although great quantities of float made up of small blocks seldom exceeding 10 inches in length cover the low hills east of the thrust fault. The intense fracturing shown in the quarry probably accounts for the presence of so much surficial debris and the lack of outcrops in the foothills. No fossils are known to be present in the quartzite.

Conasauga Limestone.—The greater part of the village of Jacksonville is believed to be underlain by the Conasauga Limestone. Unweathered rock of the Conasauga does not crop out within the area shown in plate 3, but long-continued leaching of its high content of carbonates has resulted in thick accumulations of residual material on low ridges and rounded hills along the south margin of the area. The residuum is largely red silty clay containing heavy beds, stringers, and thin plates of residual siliceous aggregate that cut through the clay at many different angles. When freshly exposed, such aggregate consists generally of massive granular blue-gray material, but on further weathering breaks up into rounded porous gritty fragments. No fossils have been found in any of the residuum, and the exact stratigraphic position of the undistintegrated rocks on which it rests is unknown. The probability that they represent only the upper part of the Conasauga is, however, suggested by the character of the siliceous residue, which resembles material known to occur in that stratigraphic position elsewhere in the region as, for example, in the Rock Run and Goshen Valley areas.

Copper Ridge Dolomite.—The Copper Ridge Dolomite is mapped as shown on plate 3 by observing areal distribution of chert float. Stromatolitic chert, characteristic of the basal strata of the Copper Ridge Dolomite, was not found in the Jacksonville area. The basal beds are probably concealed beneath the thick alluvial fill that occupies the wide, low plain between the areas shown on plate 3 as being underlain by the Conasauga and Copper Ridge strata.

Tertiary deposits.—Quartz pebbles are in the prospect trenches of the Kitchen bauxite deposit and in three of the many iron and manganese prospect pits. They are common also in float occurring on slopes below the contact of the alluvium and bedrock formations at several localities. Most of the gravel fill in the basin, however, contains no such pebbles. The quartz pebbles are thought to represent vestiges of widely distributed deposits of light-colored clay, sand, and gravel that formed during a physiographic stage earlier than that in which the Jacksonville basin became filled. Such materials that have been observed in the Anniston basin include clay that carries a fossil flora of early Tertiary age. The Kitchens bauxite deposit and the associated iron deposits may accordingly be remnants of continental deposits that accumulated in Midway or Wilcox time in depressions or sinkholes that had formed in terrain underlain by dolomite of Early Cambrian age.

Small "horses" of light-gray sandy semiplastic clay associated with thin sand and gravel stringers also occur in two of the iron prospect pits at nearly the same altitude as the bauxite deposits.

Quaternary alluvium and slope wash.—Most of the deposits of sand and gravel which fill the topographic basin in the Jacksonville area are of relatively recent origin. They consist chiefly of lenses and lentils of gravel interbedded with sandy silt and sand. The predominant colors are dark red and brick red. The gravels are composed of rounded pebbles of quartzite and sandstone derived from the Weisner Quartzite. Pebbles of chert are scarce. The most recent alluvium and slope wash, ranging from yellow brown to red brown, includes derivatives from these gravels as well as subangular fragments of

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chert and sandstone from the formations which protrude through the gravel.

STRUCTURE

In the hilly belt along the eastern margin of the area shown in plate 3, the Weisner Quartzite is believed to rest on rocks of post-Weisner Cambrian age and to be separated from them by a low-angle thrust fault. The trace of the thrust fault is marked locally by presence of jasperoid in outcrops and as float. Jasperoid is conspicuous for about a quarter of a mile north and south of the Kitchens prospect, and especially at the break in slope just above the bauxite deposit. Elsewhere in the Jacksonville area jasperoid is a minor constituent of the float and, in places, is absent from it. The strata of the Conasauga Limestone and the Copper Ridge Dolomite are assumed to dip gently eastward.

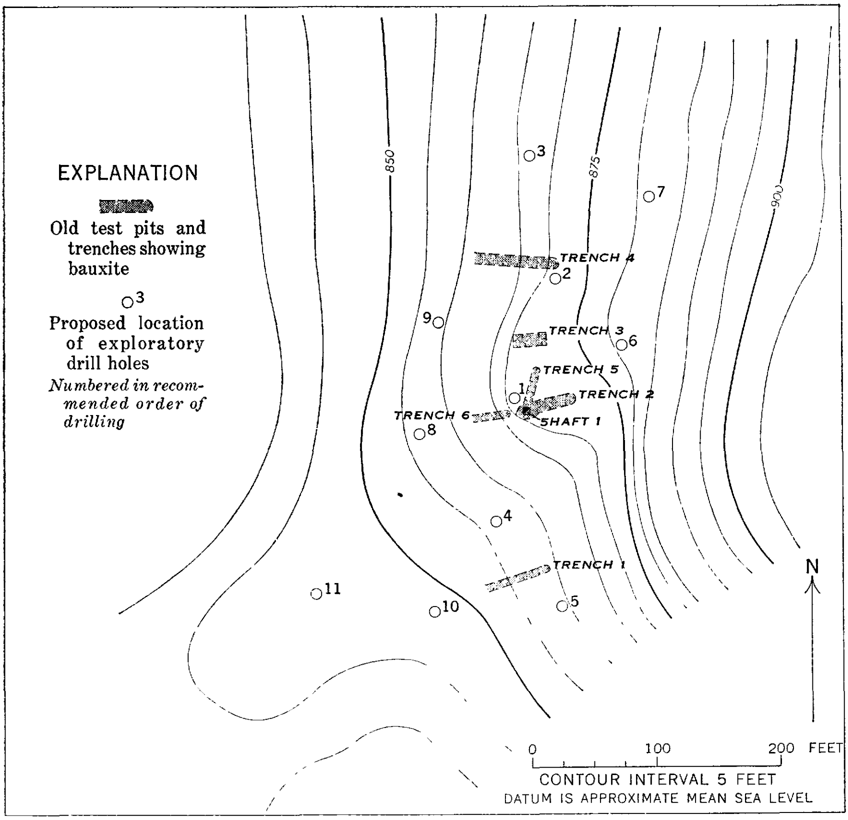
KITCHENS PROSPECT

Two occurrences of bauxite in the Jacksonville area were reported by Jones (1940, p. 61–62) : "Outcrop No. 37" on the property of J. F. Crow and "Outcrop No. 36," the "Windom or Walker" prospect. The latter is the Kitchens prospect of this report. The location of the Crow prospect was probably incorrectly stated by Jones. Information given by Mrs. J. F. Crow and by Ed Nesbit of Jacksonville indicates that the part of the Crow property referred to by Jones is near the Kitchens prospect and that the bauxite occurring on the Crow property is merely float derived from the Kitchens deposit.

The Kitchens prospect is in the E½SW¼NE¼SE¼, sec. 12, T. 14 S., R. 8 E., Calhoun County, at an altitude of 850 to 880 feet. The prospect is on a low saddle connecting two hills, one of which, southwest of the area shown in figure 3, is underlain by the Copper Ridge Dolomite. The deposit lies immediately below a break in slope that marks the juncture of the saddle with the steep hill on its northeast side, which is capped by Weisner Quartzite.

The deposit is probably underlain by the upper part of the Copper Ridge Dolomite. The trace of the thrust fault that is shown in plate 3 is about 70 feet higher than the deposit and east of it. Between the trace of the fault and the Kitchens deposit the outcropping rock is jasperoid that is believed to be associated in origin with the fault. None of this material was found in place downhill from the deposit.

Float of hard bauxite or bauxitic clay is sparsely scattered in the small valleys northwest and southeast of the prospect, and surrounds the old test pits and trenches. Despite the hardness of the float, no bauxite crops out in the area.



Mapped by K. M. Waagé and R. L. Heller, 1943

Figure 3.—Planetable map of the Kitchens prospect, E½SW¼NE¼SE¼ sec. 12, T. 14 S., R. 8 E., Jacksonville area, Alabama.

The deposit was discovered accidentally in a prospect dug in search of manganese or iron ore during the early 1890's. The ore has not been mined but was explored and developed in six trenches and one test shaft dug soon after its discovery. The material strewn over the surface is predominantly hard red or white pisolitic bauxite but owing to the dilapidated condition of the trenches and shaft, little else concerning the types of bauxite and their extent could be observed in 1943 and 1954. Jones (1940, p. 61) reports some soft white bauxite, underlying the hard, in "a shaft * * * sunk into this ore body" (presumably shaft 1, fig. 3). The bauxite exposed at the surface appears to be high in silica. In trench 4, large dornicks of bauxite with patches of horny-looking dense white clay were found. Jones implies that both the hard siliceous bauxite and the ferruginous red bauxite occur only in the upper part of the deposit.

The following chemical analyses, in percent, of samples obtained at the time the trenches were dug are given by McCalley (1897, p. 721):

Name	SiO_2	Fe_2O_3	Al_2O_3	*Ignition loss*
Red variety	10.25	25.25	41.0	21.97
White variety	21.08	2.14	48.92	23.86
Average of 2 analyses of red bauxite	18.87	11.86	45.94	21.20
Average of 2 analyses of white bauxite	7.73	19.95	47.52	23.57

These analyses indicate that the ore is generally high in both iron oxide and silica and, consequently, rather low in alumina. Most of it is accordingly inferior in quality with respect to current specifications for bauxite to be utilized by the aluminum, chemical, or refractory industries.

Surface indications suggest that the Kitchens deposit extends at least 300 feet in a north-south direction and is about 100 feet wide, but only the six trenches showed bauxite. McCalley states (1897, p. 720) that pits showing bauxite are distributed "within a distance of about 250 yards in a general northeast and southwest direction" and that in one pit "the ore is exposed to a thickness of 12 to 14 feet and in another to a thickness of about 25 feet, though in neither of these pits is it exposed to its full unknown thickness." These data indicate that the size of the deposit is moderate in comparison with that of other deposits in the part of the Appalachian region that extends into Alabama.

Gravelly, sandy loam that forms the overburden does not exceed 3 feet in thickness and in places is only about a foot thick. Recommended locations for 11 holes to be drilled in any future exploration of this deposit are shown on figure 3. If holes 3 and 5 show bauxite, additional holes should be located on 100-foot centers in the area between the 860- and 875-foot contours. Because jasperoid crops out above 885 feet, drilling is not recommended above that altitude. Hole 6 and hole 7 should provide data for determining the eastern limit of the orebody. Holes 8, 9, 10, and 11 are so located as to test the possibility that the deposit extends along the saddle to the southwest.

TALLADEGA AREA

The Talladega bauxite area (fig. 4), in the north-central part of Talladega County, Ala., includes a large part of Talladega, the county seat.

The Parsons deposit, the only known deposit of bauxite, which lies within the corporate limits of the town, about eight-tenths of a mile

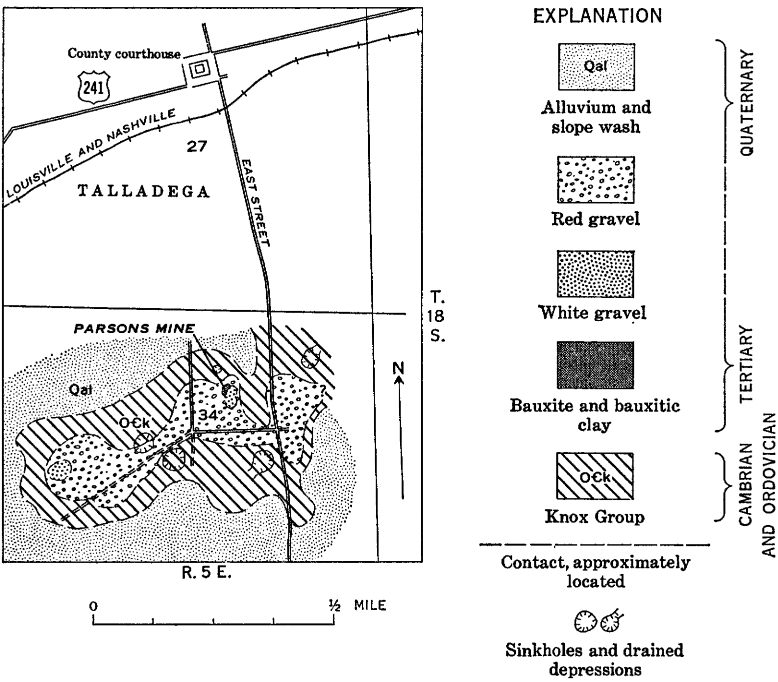


FIGURE 4.—Geologic map of the Talladega bauxite area, Talladega County, Alabama.

due south of the County courthouse, in a patch of woods just northeast of the center of SE¼NW¼NE¼ sec. 34, T. 18 S., R. 5 E. (fig. 4).

Bedrock in the vicinity of the Parsons deposit is obscured by surficial deposits; the only outcrop seen is residual clay containing beds of weathered chert typical of the Knox Group.

Recent alluvium and slope wash fills the valleys to unknown depth, and thins toward the low flanking hills. Deposits at slightly higher altitudes, believed to be Tertiary in age, include nonbedded red clastic material that caps the hills and bedded deposits of white material that unconformably underlies the red material.

The red clastic material, predominantly sandy silt and fine sand, contains pockets and small lenses of unsorted gravel and coarse sand, as well as scattered pebbles and cobbles. The gravel commonly consists of rounded pebbles of quartz, quartzite and sandstone, concretions and pebbles of ferruginous material, and angular to subangular fragments of chert. Abundant small concentrations of iron oxide (chiefly limonite) have been mined as iron ore. The predominant red color is due partly to ferruginous coatings on sand grains and pebbles and partly to a matrix of the silty red clay in which the sand grains are most commonly imbedded. Much of the unbedded clastic material, however, is salmon pink and dirty yellow.

The white bedded deposits, the distribution of which is spotty, consist predominantly of coarse- to fine-grained quartz sand and gravel, containing rounded quartz pebbles and cobbles and including small lenses of sandy, micaceous clay and grit-free subplastic unctuous white clay. The gravel is crudely sized within any one lens, but bedding is evident only where there is a sharp lithologic difference between layers. Though the bedded deposits are mostly white, they include lenses of yellowish sandy clay and, in some places where they are exposed to weathering, are red to a depth of 1 or 2 feet. Even where thus reddened by exposure, however, they are lithologically distinct from the overlying red gravel.

PARSONS DEPOSIT

The Parsons bauxite deposit (fig. 5) lies near the foot, and on the west side of a northward-projecting spur. According to Jones (1940, p. 66), about 500 tons of bauxite taken from this deposit were shipped

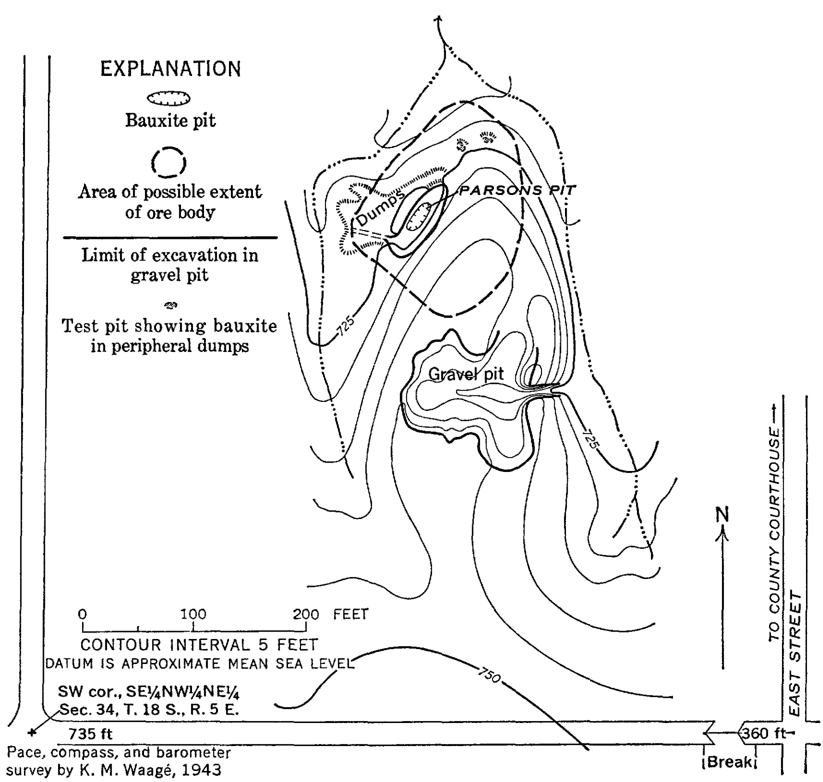


FIGURE 5.—Topographic map of the Parsons bauxite deposit, Talladega area, Alabama.

to Canada during a few months of mining in 1918–19. The ore was dug from an open pit now badly slumped and largely filled in, whose present floor is at an altitude of 720 feet. As the pit appears today, it is a brushed-over subrectangular hollow, approximately 75 feet wide and 8 feet deep, elongated northeastward along the west side of the spur. The overburden, which consists of gravel and sand, probably does not exceed 15 to 20 feet in thickness under the highest part of the spur north of the gravel pit, and thins progressively down the slopes. Dumped waste material covers the slope between the pit and the gully to the northwest. Around the pit are a few small test pits; encircling two of these are dumps that show a little bauxite.

The Parsons bauxite deposit may be of the same age as similar white bedded deposits of gravel and clay at Anniston (fig. 1) from which plant remains of early Tertiary (Midway ? or Wilcox ?) age have been recovered. The bauxite in the Talladega area is exposed at altitudes lower than those of the white bedded deposits and appears to underlie them. This relation is uncertain, however, because all contacts between these two types of material are obscured by slump and slope wash and the only clues to the type immediately overlying or surrounding the bauxite are furnished by dumps around the pits from which it was dug.

The spotty distribution of both the white bedded deposits and the bauxite suggests that both represent material that was entrapped and preserved in ancient sinkholes. Both may have accumulated at the same time as heterogeneous deposits, as is suggested by the similarity of the micaceous clays associated with both, or the bauxite could be a sinkhole deposit older than and capped by the white bedded deposits.

North of these two test pits the ground slopes downward to altitudes lower than any part of the main pit; this condition probably precludes extension of the deposit in that direction. Although the bauxite may extend a greater distance south than is shown on figure 5, none is exposed in the test pits. The excavation in the gravel pit on the top of the spur to the south apparently did not penetrate the material below the base of the gravel. Possible extensions of the deposit thus appear to be limited to an area on the west side of the toe of the spur.

The bauxite and bauxitic clay in the dumps or stock piles at the mine are of three varieties, as follows:

1. Soft gray-white pisolitic bauxite in which the pisolites are about a quarter of an inch in diameter and are solid on fresh breaks. This variety is present chiefly on the dumps at the north end of the pit, but some has been found on the southwest side.
2. Soft white and pink bauxite, silty and micaceous in places, which

is rarely pisolitic and contains inclusions of bauxitic clay. This variety occurs principally on dumps at the southwest corner of the mine.

3. Pebbles and cobbles of very dense, hard gray pisolitic bauxite and bauxite clay, scattered about the north end of the mine.

According to Jones (1940, p. 66) the average chemical composition of soft bauxite is 10.6 percent silica, 56.7 percent alumina, 2.8 percent iron oxide, 2.0 percent titania, and 27.0 percent ignition loss. Clays associated with the bauxite, which are somewhat similar to the clay of lenses in the white gravel, are of two distinct types: purple highly micaceous clayey silt and light-yellow subplastic grit-free unctuous clay with limonite streaks and blebs.

PISOLITIC CLAY DEPOSITS

DE ARMANVILLE AREA

The De Armanville area (pl. 4) includes De Armanville, a settlement in southeastern Calhoun County, Ala., about 9 miles by road east-southeast of Anniston. As shown on the Anniston topographic quadrangle map, De Armanville is in the northeastward-trending Choccolocco Valley, which is underlain chiefly by carbonate rocks of Cambrian age. The valley is flanked on the northwest by Choccolocco Mountain, in which Weisner Quartzite is extensively exposed, and on the southeast by the intricately dissected Piedmont Province, which is underlain by metamorphic rocks.

The Cambrian rocks of the De Armanville area comprise three lithologic units which crop out in three southwest-trending belts: a northern belt occupied by purple clay shales, and two belts south of it occupied by carbonate rock units that are separable from each other on the basis of types of chert contained in each. For convenience, these units will be referred to hereafter as the clay-shale unit, the lower carbonate unit, and the upper carbonate unit. Owing to the small size of the area mapped (pl. 4) and the absence of paleontologic evidence, the three units cannot be assigned to established formations with certainty. However, the clay shale unit and the lower carbonate unit are provisionally assigned to the Shady Dolomite and the upper carbonate unit to the Conasauga Limestone. Contacts between the three units are obscured by surficial deposits and can be located only approximately. The contact separating the two carbonate units is particularly difficult to map because all the types of chert in the upper carbonate unit have counterparts in the lower and discrimination between the two units depends mainly on the presence of cherts and jasperoids in the lower unit which do not occur in the upper.

Clay-shale unit.—The lithology of the clay-shale unit is uniform within the small part of its belt of outcrop that is included in the area mapped (pl. 4). The unit consists of purple and pink micaceous clay shale which forms an unctuous gritty micaceous clay of variegated appearance on weathered surfaces. The strike of the bedding is northeastward and its dip is generally steep toward the southeast. This unit can be interpreted as belonging either to the Rome Formation or the Shady Dolomite. Lithologically it resembles the clay shales reported by Cloud (1966a) as possibly constituting the basal member of the Shady Dolomite of the Anniston area (fig. 1). It is nevertheless possible that the clay-shale unit may be a facies of the Rome Formation, though the sandstones and the red and purple argillites and siltstones that are typical of that formation elsewhere in the Southeastern States are not present in the De Armanville area.

Lower carbonate unit.—The lower carbonate unit in the De Armanville area is represented only by a residuum of chert float and a few outcrops of residual red clay. Characteristic float derived from this unit include chalcedonic white chert, brittle white chert, chalcedonic gray to black chert, banded dark-gray and black lenticular stony chert, cavernous siliceous aggregate, and jasperoid.

The float derived from the lower carbonate unit, particularly the gray and black lenticular stony chert and the jasperoid, is similar to float characteristic of the Shady Dolomite elsewhere in northeastern Alabama. However, this unit could be either the Conasauga Limestone or a carbonate facies of the Rome Formation.

Upper carbonate unit.—The upper carbonate unit, like the lower carbonate unit, occurs at the surface only as residuum characterized by chert float and chert-bearing residual red clay. The residual clay, however, is brighter red than that of the lower unit and commonly contains concentrations and pellets of limonite and manganese oxide. The predominant float element is cavernous columnar quartz aggregate. Massive light-colored chalcedonic chert is locally abundant. Some of the chert that is presumably in place in the residual clay has been weathered to soft tripolitic masses and brittle white layers.

The siliceous aggregates of the upper carbonate unit are similar to those in the Conasauga Limestone in the Rock Run and Goshen Valley areas of Cherokee County. This unit may nevertheless be part of the Shady Dolomite.

Tertiary and Quaternary.—A large part of the De Armanville area is covered by Recent alluvium and slope wash. Gravel deposits of two types that are distinctly older than the alluvium are also present. One type is exposed in a large pit in the northern part of the area, just southwest of the center of the SW¼ sec. 7, T. 16 S., R. 9 E.

(pl. 4). This gravel consists of lenticular beds of rounded quartz pebbles alternating with beds of white sand in a matrix of very micaceous unctuous clay. The deposit is similar to, and possibly corresponds to, the white gravel of the Talladega area.

The gravel of the other type forms a conspicuous capping on low hills in the Rhodes-Baker float area (pl. 4). The deposit, which is presumably derived from the underlying white gravel, consists of red gravelly, sandy loam containing fragments of chert, pebbles and cobbles of sandstone and quartzite, rounded fragments of quartz, and, locally, cobbles of pisolitic clay. This gravel is remarkably similar to the red gravel of the Talladega area which does not, however, contain the cobbles of pisolitic clay.

Pisolitic clay.—Pisolitic clay occurs in place in a single exposure, the De Armanville prospect, and as assemblages of cobbles of pisolitic clay float in three nearby localities: the De Armanville float area, immediately south of the prospect; the Rhodes-Baker float area, southeast of the prospect; and the Hudson float area 1½ miles east of the De Armanville Post Office. The outline of the float areas is shown on plate 4.

DE ARMANVILLE PROSPECT AND FLOAT

The De Armanville prospect is near the center of the E½NE¼ NW¼NE¼ sec. 13, T. 16 S., R. 8 E., Calhoun County. The deposit crops out along a road on the south side of a low ridge about midway between the crest and the foot of the slope. A southeastward-draining gully in a small flat marks the base of the slope.

Exposures are seen only in the roadcut. An area covered with float extends uphill to the crest of the ridge where pieces of pisolitic, horny-looking very dense clay occur in a gravelly red sand. Auger or power drilling would be necessary to prove whether the float at the crest of the ridge is a part of a continuous bauxite or clay deposit or whether the float is merely a constituent of the gravel capping the ridge. Float of a pisolitic, kaolinitic, or bauxitic clay extends southward about three-quarters of a mile and adjoins the Rhodes-Baker float area.

The deposit lies in the lower carbonate unit which is here interpreted as being the upper part of the Shady Dolomite. Apparently the bauxitic material lies on, or in depressions in, the residuum of the bedrock carbonates and presumably was deposited in ancient sinkholes. In the roadcut the bauxitic material appears to underlie the gravel containing pisolitic cobbles, but locally this gravel is difficult to distinguish from recent slope wash, and the relations are obscure. At its former position and altitude the bauxitic material may have furnished the pisolitic clays now found as cobbles in the gravel; but at present the bauxitic material is at a somewhat lower altitude than most of the scattered gravel deposits.

Pink and white sandy pisolitic clay, nonpisolitic clay containing dornicks of pisolitic clay, or a very dense hard clay with few small pisolites are exposed in the roadcut; X-ray analyses showed all of this material to be highly crystalline kaolinite (E. F. Overstreet, written commun., 1959). An analysis of a composite sample made at the U.S. Bureau of Mines laboratory in Tuscaloosa showed 38.52 percent alumina, 44.59 percent silica, 0.72 percent iron oxide, and 2.16 percent titanium, which indicate a material close to kaolinite in composition.

The size of the deposit cannot be determined from the outcrop. The length of the outcrop, which is the only dimension known, is approximately 150 feet. The topographic position precludes a large extension to the west and probably to the south. An extension of the deposit under the ridge to the east can only be determined by drilling or trenching, but the possibility of such an extension is remote. On the basis of the geology of the area and the outcrop in the roadcut, the deposit is considered to be small.

RHODES-BAKER FLOAT

Cobbles of very dense pisolitic clay of horny appearance are strewn as float over the surface of the Rhodes-Baker area (pl. 4), but there is no evidence that they overlie a body of pisolitic clay or bauxite. The cobbles are believed to occur as a constituent of the surficial gravels, but the ultimate source of the cobbles is unknown. If the cobbles were transported by a stream from the site of the De Armanville prospect, their present occurrence on hills and ridges of approximately the same altitude as the prospect suggests that this may have happened during a physiographic cycle when the surface at the site of the prospect was higher than it is today and sloped downward toward the Rhodes-Baker float area.

HUDSON FLOAT

The Hudson float occupies a hilltop in the center of the east side of the SE¼ sec. 18, T. 16 S., R. 9 E., and west side of the SW¼ sec. 17, T. 16 S., R. 9 E. A few cobbles of very dense pisolitic clay of horny appearance are scattered through a thin cover of gravel. Here residuum derived from the Conasauga(?) Limestone occurs in positions only slightly below the top of the hill, and there can be little doubt that the pisolitic cobbles are a component of the gravel cover.

CONGO AREA

An occurrence of bauxite in northwest Cherokee County was mentioned by McCalley (1897, p. 770). In describing a belt of Silurian strata which crops out along the southeast side of Lookout Mountain in Cherokee County, McCalley says: "This belt has a cherty manganese deposit near its northwest edge, on top of the ridge in the SW¼ of S. 25, T. 8, R. 9 E. There is also some reported bauxite here or near here." Apparently this quotation is the only reference in the literature to this occurrence of bauxite.

The area is near Congo, an abandoned flagstop on the Tennessee, Alabama, and Georgia Railway (fig. 1), about 10 miles north of Centre, the county seat of Cherokee County.

The Congo area is underlain by rocks of the Knox Group of Cambrian and Ordovician age separated by a fault from the Red Mountain Formation of Silurian age (fig. 6).

Pisolitic clay, some of which may be bauxitic, occurs in the center of the N½NE¼SW¼NE¼ of sec. 35, T. 8 S., R. 9 E. (fig. 4). The deposit is just east of the crest of a relatively flat-topped ridge trending in a northeasterly direction, parallel to the trend of the ridges on Lookout Mountain, which stands across the valley to the west. The ridge on which the pisolitic material occurs is called Shinbone Ridge locally but is not continuous with the ridges to the northeast and southwest that are shown as bearing that name on the Fort Payne topographic quadrangle map. The altitude of the highest part of the deposit is 760 feet; that of an old test-pit site in the center of the part showing the greatest concentration of pisolitic material is 720 feet. Pebbles and cobbles of hard pisolitic clay are abundant as float within an area about 200 feet in diameter, the center of which is about 200 feet east of the top of the ridge and about 100 feet south of an east-west trench marking a property line. This property line corresponds to the north line of the SW¼NE¼ sec. 35. Outside this area of heaviest concentration, there is a scattering of the pisolitic clay pebbles downhill to the southeast, and along the slope for about another 200 feet to the southwest. A few cobbles were also found within 50 feet of the ridge crest. None was found along the slope to the northeast.

Exposures in gullies show the material underlying the float to consist of cobbles and pebbles of clay, chert fragments, and pebbles of coarse-grained sandstone sparsely scattered in a matrix of red sandy loam. The exposures show no pisolitic clay or bauxite in place from which the cobbles and pebbles of clay could have been derived, and the deposit is considered to be a small remnant of extensive gravel deposits of Tertiary age that have been removed by erosion from most parts of

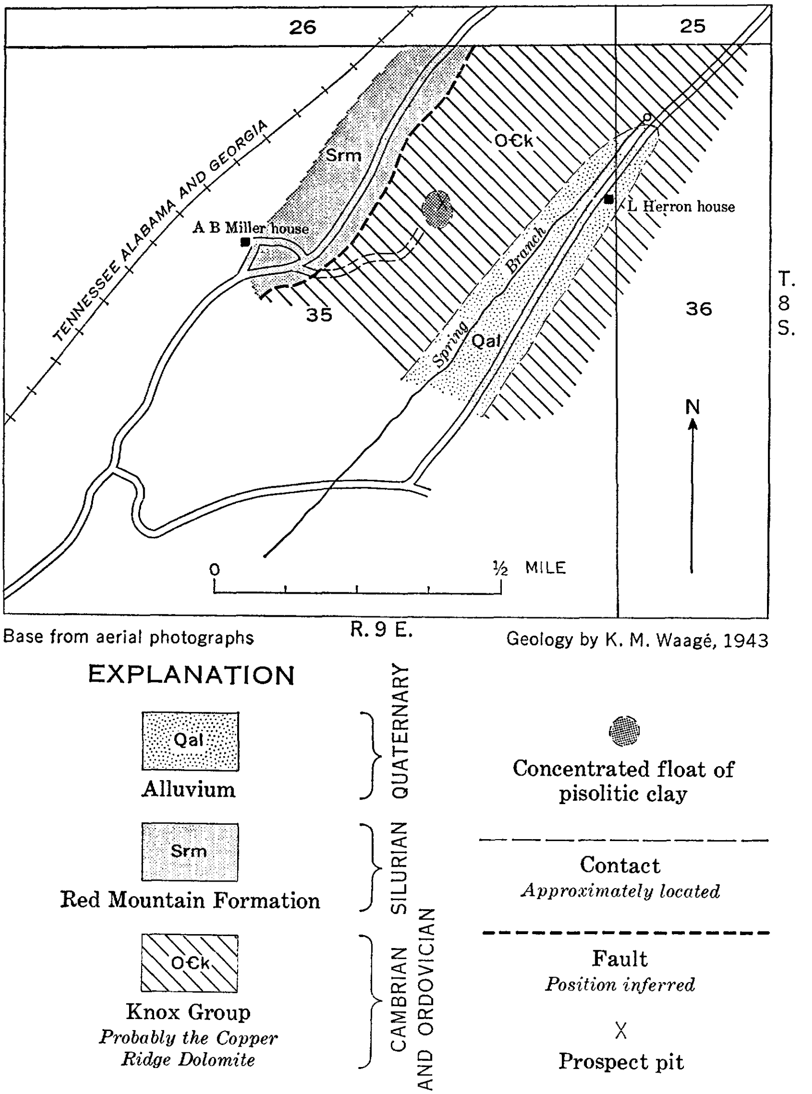


FIGURE 6.—Geologic map of the Congo bauxite area, Cherokee County, Alabama.

the area. Presence of the clay cobbles nevertheless suggests that the source was nearby, as attrition of such fragile material would presumably have reduced it to small particles if it had been transported by streams from a distant source. Presence of the chert fragments suggests, moreover, that the source may have been within the area underlain by carbonate rocks of the Knox Group that is shown on figure 6. It seems reasonable that, like many deposits of bauxite elsewhere in the southern Appalachian region, the pisolitic clay may have been deposited in one or more sinkholes in the carbonate rocks.

X-ray analysis of one sample of the pisolitic material showed well-crystallized kaolinite as a major constituent, but neither gibbsite nor quartz.

The materials present in the cobbles include three types of clay, each of which shows numerous minor variations. Many of the cobbles contain clay of all three types, and some specimens exhibit several variations of each type. Described in the order of their frequency of occurrence, the three types are as follows:

1. Clay in which unbroken pisolites, ranging in size from that of buckshot to 2 inches in diameter, occur in a matrix of hard dense clay. Some of the pisolites are solid globules; others are spongy with spherical laminations; still others are represented only by cavities, some of which contain loose pellets of clay.
2. Clay in which fragments of pisolites, represented by cavities only, and angular fragments of hard clay, usually solid, occur together in a hard dense clay matrix.
3. Massive dense hard nonpisolitic, nonfragmental clay of a horny appearance identical with that of the matrix material in types (1) and (2).

Freshly exposed surfaces of all types of clay are generally white, red, pink, or purple. In any one cobble the matrix material tends to be uniform in color, whereas the pisolites and angular fragments are commonly varicolored. The surfaces of cobbles, as well as the walls of cavities representing pisolites within cobbles consisting of porous materials, are commonly encrusted or stained by limonite. According to A. B. Miller, who has lived near Congo for 80 years, no comparable material is known to occur elsewhere in the Congo area; consequently, there can be no doubt that this is the material that was reported as bauxite by McCalley (1897, p. 770).

As far as known, this is the only published mention of pisolitic clay in the vicinity of Congo. The nearest known deposits of bauxite are those in the Fort Payne area, 10 to 15 miles to the north, and in the Goshen Valley area, 20 to 25 miles to the south.

No attempt has been made to mine the Congo deposit, and it is considered to be of no economic value. According to Mr. Miller (oral commun., 1943), the prospect was hand augered, with unknown results, about 1890 by a man from Georgia named Armington (alias B. F. Saylor), and in the early 1920's a test pit was dug, within the area of the heavy float. His recollections are that the pit was 10 or 12 feet deep, that the concentration of both the clay pebbles and chert fragments was observed to increase downward, that no large body of pisolitic clay was reached, and that most of the pisolitic clay removed from the pit, some of which was of boulder size, was carried away by local residents. The pit has since been filled in, but its position is marked by a shallow depression with a small pile of chert fragments on its south side.

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Bauxite Deposits of the Southeastern United States

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GEOLOGICAL SURVEY

William T. Pecora, *Director*

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