MANGANESE DEPOSITS IN THE VICINITY OF WALNUT GROVE, ETOWAH AND BLOUNT COUNTIES ALABAMA

By

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Contents

	Manuscript page
Abstract	1
Introduction	1
Geology	4
Manganese deposits	10
Manganese mines	17
Silver Gap Mines	18
Mines on Midvale tract	18
Bynum mine	20
Hardt mine	20
Wynnville Creek gap mines	21
Saye mine	21
Other mines	21
Mines northeast of Locust Fork	21
Prospects near Oneonta	22

Illustrations

Plate 1. Geologic map of Murphree Valley in Etowah County and part of Blount County, Alabama, and geologic cross-sections

2. A, Argillaceous limestone of Cincinnatian age at top of Chickamauga limestone, Road cut 3 miles northeast of Oneonta.
B, Bangor limestone, quarry 1½ miles north of Oneonta. 6

3. A, Cliff of 60-foot sandstone lentil in Tuscumbia limestone, 1 mile northwest of Walnut Grove. Sand Mountain escarpment in background.
B, Near view of 60-foot cliff of sandstone lentil in Tuscumbia limestone, 1 mile northwest of Walnut Grove.. 8

Illustrations - Cont'd.

		Manuscript page
Plate 4.	A, Sandstone bed at base of Fort Payne chert, 3 miles southwest of Aurora.	
	B, Polygonal cracks on bedding surface of basal sandstone of Fort Payne chert, 3 miles southwest of Aurora.	10
5.	A, Fort Payne chert in roadside quarry north of Oneota. .	
	B, Argillaceous limestone beneath Fort Payne chert, Road cut north of Oneonta.	12
6.	A, Manganese mine pits and dumps. Silver Gap group of mines.	
	B, Well and workings on Haardt manganese property	20
Figure 1.	Index map of northeastern Alabama showing location of Walnut Grove district.	1
2.	Sketch section of northwest slope of Red Mountain. . . .	13
3.	Sketch map of Walnut Grove district showing location of manganese mines and mining properties.	18

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By George W. Stose

ABSTRACT

Manganese deposits in the vicinity of Walnut Grove, Ala. occur in the Fort Payne chert of Mississippian age, on the northwest limb of the Murphree Valley anticline. The ore is largely soft pulverent pyrolusite in chert and clay residual from the weathering of the Fort Payne chert. It occurs on low terraces on the lower northwest slopes of Red Mountain where it was concentrated by circulating ground water. ~~Less than~~ almost 14,000 tons of ore, varying from 25 percent to 51 percent manganese, have been ~~mined in the~~ marketed from the area. The geology and structure of the rocks of the area are briefly described and shown on a map, ~~with~~ accompanied by structure sections.

INTRODUCTION

Walnut Grove is in Etowah County, about 20 miles west of Gadsden, Ala. (See fig. 1.) Manganese ores have been mined in the vicinity of Walnut Grove since 1915, and small trial shipments of 22 tons of ore in 1898 and of 17 tons in 1901 were apparently from this district. The ore is chiefly a soft pulverent pyrolusite, difficult to mine and handle. Although the ore is of high grade, the quantity produced has been ~~small~~ relatively.

Figure 1.--Index map of northern part of Alabama showing location of Walnut Grove area.

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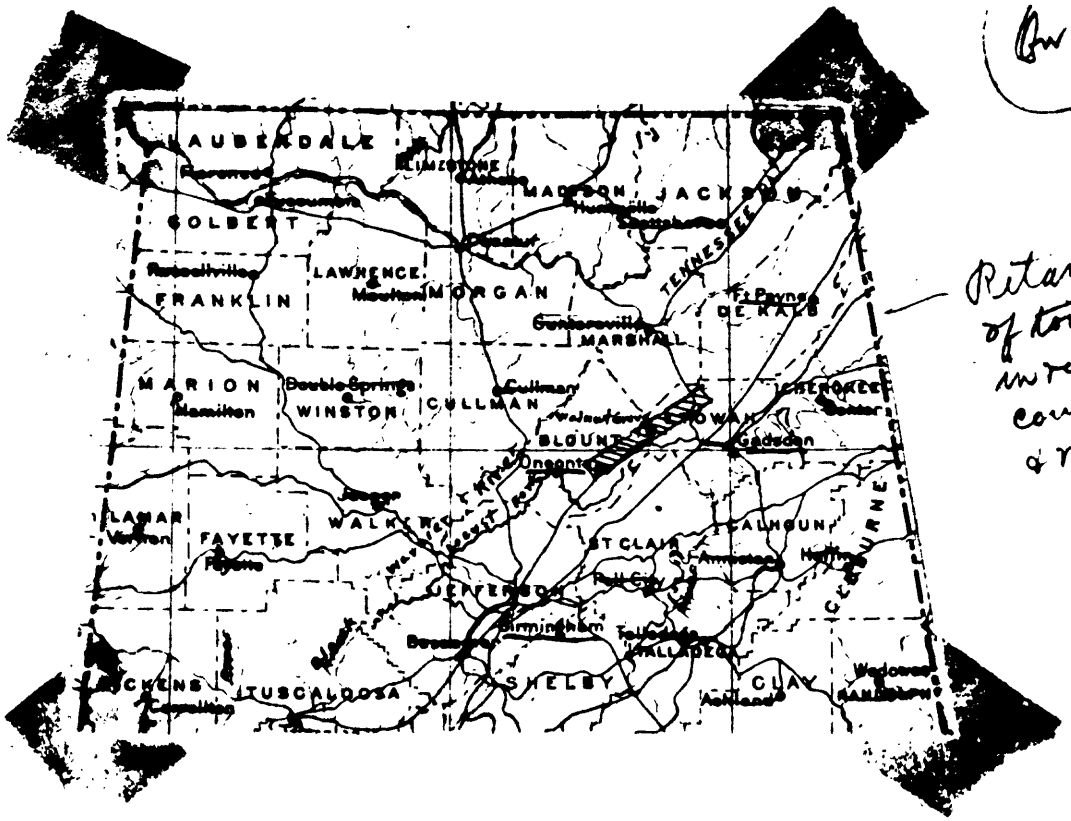

Retain names of towns marked in red. Show counties + rivers & main streams

Figure 1. Index map of northern part of Alabama showing location of Walnut Grove area.

The manganese deposits in this district were briefly described in a report / of the Geological Survey of Alabama in 1893. In 1902 R. A. Elliott

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/ Gibson, A. M., Geological structure of Murphree's Valley and its minerals and other material of economic value; Geol. Survey of Alabama Report, pp. 112-119, 1893.

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examined the properties for the Louisville & Nashville Railroad Co. and wrote a report for the President of the company. In 1913 J. L. W. Birkinbine examined the deposits for the Midvale Mining & Developing Co. of Montgomery, Ala. and his report to the company was printed. In 1938 Stewart J. Lloyd of the Geological Survey of Alabama prepared ~~issued~~ an unpublished memorandum on the manganese deposits of Walnut Grove. Copies of these reports were available to the writer, and analyses of carload lots of ore from the Walnut Grove mines were furnished by Arthur Blair of the Tennessee Coal, Iron & Railroad Co. of Birmingham. The following table from the records of the U. S. Bureau of Mines shows the production of manganese ores from this area:

Production of Manganese ores in Etowah and Blount Counties, Ala.
(Long tons)

Year	Mn 35% or better	Mn 10% to 35%	
1915	200	-	
16	27	-	
17	264	-	
18	709	368	
19	40	-	
20	25	-	
21	-	-	
22	-	-	
23	-	451	
24	1,222	206	
25	358	67	
26	896	446	
27	663	734	
28	421	-	
29	-	415	
30	-	207	
31	-	26	
32	184	751	
33	506	638	
34	-	327	
35	185	498	
36	372	540	
37	289	279	
38	202	356	
39	84	310	
40	196	-	
41	125	-	
	7,258	6,619	Total 13,877

S. J. Lloyd stated in 1939 that the records of the Alabama Geological Survey showed that a total of 13,490 long tons of manganese ore had been produced in the Walnut Grove area up to the close of 1936. This larger figure may include low-grade manganiferous iron ores.

The Walnut Grove area lies in the Murphree Valley (see fig. 1), a northeastward-trending valley in Blount and Etowah Counties, Ala., between Sand Mountain on the northwest and Straight or Raccoon Mountain on the southeast. Most of the Murphree Valley in Etowah County is called Bristow Cove. A low longitudinal ridge, 200-300 feet high and called Red Mountain, divides

the valley into two unequal parts, the northwestern part being much narrower than the southeastern. The manganese deposits lie on the northwest slope of Red Mountain and in the adjacent narrow valley. Manganese deposits are known only northeast of Oneonta, and the present study, therefore, was restricted to the part of the Murphree Valley northeast of Oneonta, extending to the end of the valley 4 miles northeast of Aurora. The area mapped is 25 miles long and about 4 miles wide. (See pl. 1.)

Geology

The rocks exposed in the Walnut Grove area range in age from Middle Cambrian to Pennsylvanian. The general character and thickness of the rock formations present at the surface are given in the following table.

Rock formations in Walnut Grove area, Ala.

Age		Formation	Thickness Feet	Character
CARBONIFEROUS	PENNSYLVANIAN	Pottsville formation	1,000 +	Cross-bedded sandstone and shale (Walden sandstone) above; thick cross-bedded sandstone and conglomerate (Lookout sandstone) below.
	MISSISSIPPIAN	Pennington shale	130-0	Gray, green, to pink shale and cherty poorly exposed; sandstone lentil about 60 feet thick locally present above shale northwest of Walnut Grove. Formation apparently absent southwest of Wynnville Creek.
		Bangor limestone	200	Thick-bedded light-gray crystalline fossiliferous limestone. Contains Archimedes, Pentremites, Productus, and other shells and corals. Weathered to yellow clay in places Some beds very dark and have asphaltic odor.
		Tuscumbia limestone (Oxmoor sandstone lentils)	500 (estimated (300+-0)	White oolitic and fine-grained grey limestone, highly fossiliferous. Fossils of St. Louis age; locally seen at base; elsewhere weathered to yellow clay. Two or more lenticular sandstones (Oxmoor) become very thick west of Walnut Grove.
		Fort Payne chert Unconformity	125-200	Thin-bedded chert, sparingly fossiliferous, and interbedded limestone weathered to clay; manganese oxide deposits around Walnut Grove. Lithostrotion at top, Fenestella in middle, large crinoid stem at base.
		Argillaceous limestone	150-0	Very argillaceous limestone, calcareous shale, and thick calcareous sandstone. Present only in southwestern part, near Oneonta.
		Chattanooga shale Unconformity	20-40	Black carbonaceous shale, minute conodont teeth and Lingula. May be in part of Devonian age.
SILURIAN		Clinton formation Unconformity	170-300	Grey, yellow, and pink shale and thin platy micaceous sandstone. Contains thin fossiliferous hematite bed.
ORDOVICIAN		Chickamauga limestone	100-300	Thin-bedded blue limestone, argillaceous limestone, and pure dove, fine-grained limestone. Highly fossiliferous; bryozoa and shells.
CAMBRIAN	UPPER	Knox dolomite	1,000 (estimated)	Thick-bedded dolomite, mostly weathered to clay, and thick interbedded chert. Weathers to very cherty soil.
	MIDDLE	Conasauga limestone	50 +	Thin-bedded argillaceous limestone and earthy yellow shale; exposed only near Hoods Cross Roads.

The older rocks are exposed in the center of an elongate anticline which trends northeast parallel to Murphree Valley. (See pl. 1.) These older rocks are soluble carbonate rocks and form the flat floor of Murphree Valley. The Murphree Valley anticline pitches northeast and the valley ends a short distance northeast of Aurora, where the soluble rocks dip beneath the harder rocks that compose Red Mountain at the plunging end of the fold.

The Knox dolomite forms the flat floor of the valley and is rarely exposed in the area because of its soluble nature. It is represented chiefly by chert fragments in a cherty clay soil. Crumbly fractured chert of the Knox dolomite is quarried at several places in the valley for road material. The Chickamauga limestone outcrops on the lower southeast slopes of Red Mountain, and ledges of fresh blue limestone are exposed in places. The most complete section of the limestone is exposed on State Highway 32, 2 miles northeast of Oneonta.

Chickamauga limestone, 2 miles northeast of Oneonta

	Feet
Very impure hackly blue limestone weathering to sandy shale and soft sandstone. (See pl. 2A.) Contains brachiopods of Cincinnatian age.	50 ±
Hard knoty fossiliferous limestone. Contains bryozoa and brachiopods.	5
Concealed	65 ±
Hard silicious laminated blue limestone and dove to buff fine-grained limestone. Contain gastropods, cephalopods, and bryozoa.	80 ±
Concealed	55 ±
Shaly earthy-weathering limestone	10 ±
Dark and light banded crystalline limestone. Contains fossils.	15 ±
Shaly black limestone	40 ±
Black banded limestone with wavy carbonaceous partings. Contains gastropods and Gervanella)	60 ±
	380 ±

All the fossils collected, except those in the uppermost beds, are of Middle Ordovician age.

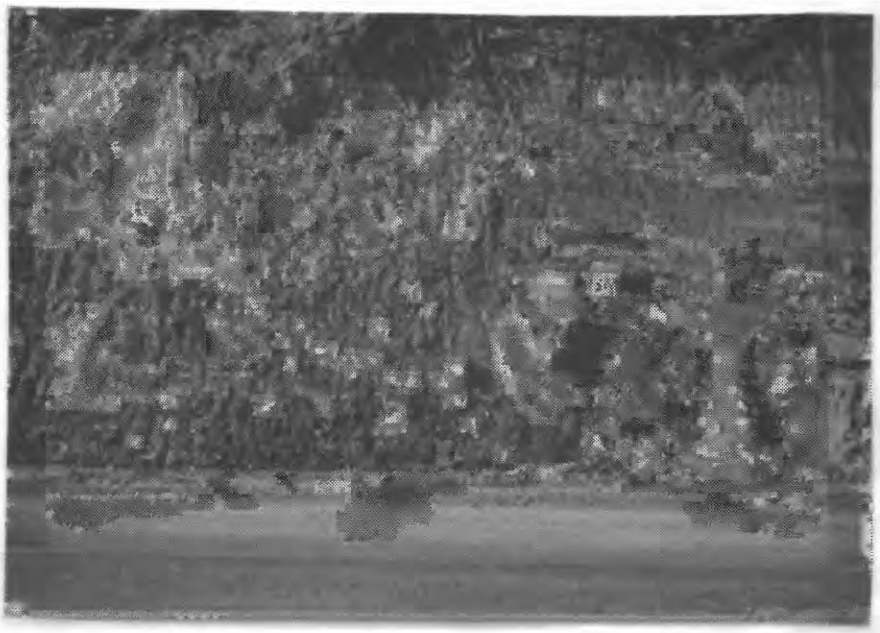


Plate 2A. Argillaceous limestone weathering to clay, in upper part of Chickamauga limestone. Contain Cincinnatian fossils. Road cut 3 miles NE of Oneonta

2B. Bangor limestone quarry, 1 1/2 miles N of Oneota.

The Clinton formation is largely soft shale, and North of Nix Gap, is exposed on the upper east slopes of Red Mountain. In the vicinity of Aurora about 300 feet of shale, which contains a thin bed of hematite iron ore and a thin hard sandstone at the base, is exposed. At Nix Gap the sandstone at the base becomes thicker and more resistant and makes the crest of the ridge from here southwestward to Cheonta, where the sandstone is 10 feet thick. The shale in this part of the area lies on the upper west slopes of Red Mountain..

The Chattanooga shale is soft and therefore is poorly exposed. The lower part is gray and finely sandy, and the upper part very black, fissile, and carbonaceous. These black beds carry minute fossils. The Fort Payne chert, which contains the manganese deposits, is described in some detail under the heading "Manganese deposits". At the gap of the Calvert Prong of Little Warrior River and southwestward the Fort Payne chert is underlain by impure fossiliferous limestone (see pl. 5B) of Mississippian age, which is not present to the northward. No formation name has been given to these beds.

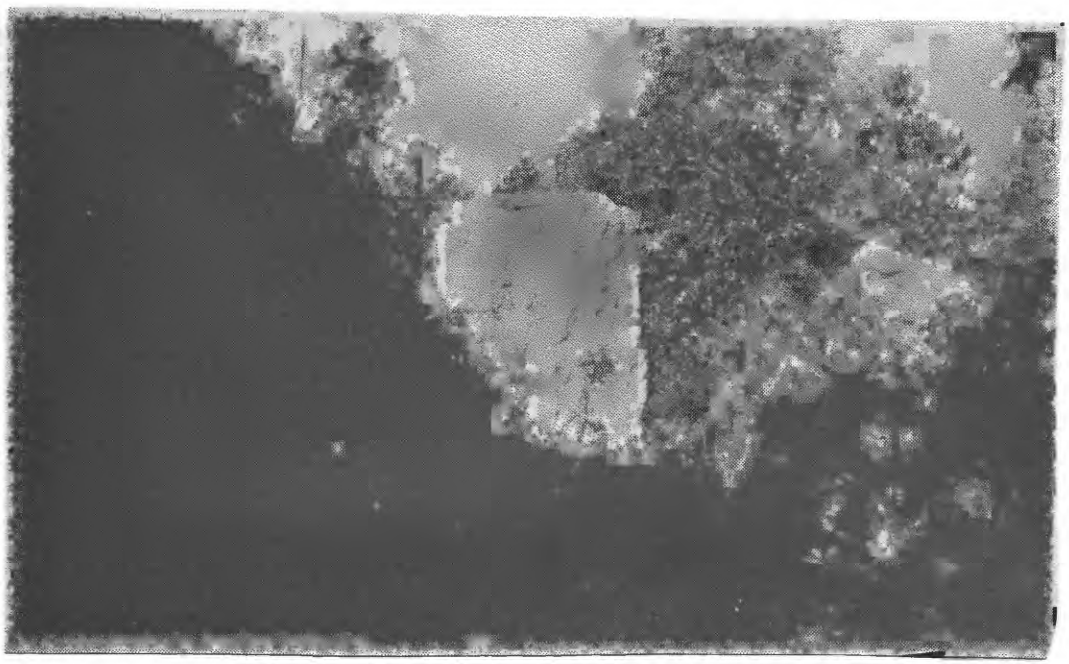
The rocks overlying the Fort Payne chert are generally concealed because they are deeply weathered to clay soil and are probably mostly limestone. In the manganese workings northwest and west of Walnut Grove a white oolitic limestone and a fine-grained gray limestone above the ore-bearing Fort Payne chert were encountered in the lowest pits on the slope of Red Mountain. This represents the Tuscumbia limestone. Elsewhere in the area the limestone is concealed by residual clay and chert wash. In the stratigraphic interval between the Fort Payne chert and the Bangor limestone, however, there are many exposures of sandstone which vary in thickness along the strike and evidently take the place locally of the Tuscumbia limestone. These

sandstones are lenticular and are thickest west of Walnut Grove, where they nearly completely replace the limestone. The sandstones have been called Oxmoor, and may be in part equivalent to the Hartselle. Northwest of Walnut Grove, one such sandstone lentil makes cliffs 60 feet high above the valley lowland (see pl. 3) but is traceable only a mile or two along the strike. The Bangor limestone makes cliffs at many places on the steep southeast face of Sand Mountain and is extensively quarried north of Gneonta. (See pl. 2B) In places, however, it is largely weathered to clay. The Pennington shale is poorly exposed, but in places forms a narrow shelf above the Bangor limestone. The Pottsville formation, the most resistant formation in the region, caps Sand Mountain (see pl. 3.) and Straight Mountain and forms plateaus that slope away from these mountains.

Plate 3

Red Mountain is composed of rocks that are not as soluble as the adjacent limestones and are therefore more resistant to weathering and form a ridge. Fort Payne chert and a sandstone at the base of that formation form the crest of the ridge in Etowah County and the northern part of Blount County, but southwest of Nix Gap a thick sandstone in the underlying Clinton formation forms the crest of the ridge. These rocks dip northwestward on the northwest limb of the Murphree Valley anticline. Red Mountain, which trends northeast parallel with Murphree Valley, curves eastward north of Aurora, and then bends sharply south and southwest at the northeast-plunging end of the anticline. The mountain terminates east of Aurora, where the hard rocks that form it are cut out by a fault. This fault is interpreted as a high-angle reverse fault because the rocks adjacent to the fault on the south limb of the anticline are vertical or overturned and dip steeply northwest, indicating that the fold was steeply overturned toward the southeast and broke at its crest, the older rocks in the anticline being thrust southeastward on a high-angle fault over the younger rocks lying to the southeast. The rocks that form Red

Plate 3A. Cliffs of 60-foot sandstone lentil in Tuscumbia limestone in bottom of Murphree Valley, 1 mile NW of Walnut Grove, Sand Mtn. escarpment in background composed of Bangor limestone, capped by Lookout sandstone.



3-B. Near view of 60-foot cliff of sandstone lentil in Tuscumbia limestone. 1 mile NW of Walnut Grove.

(Photograph by H. D. Miser.)

Aurora because they are faulted out.

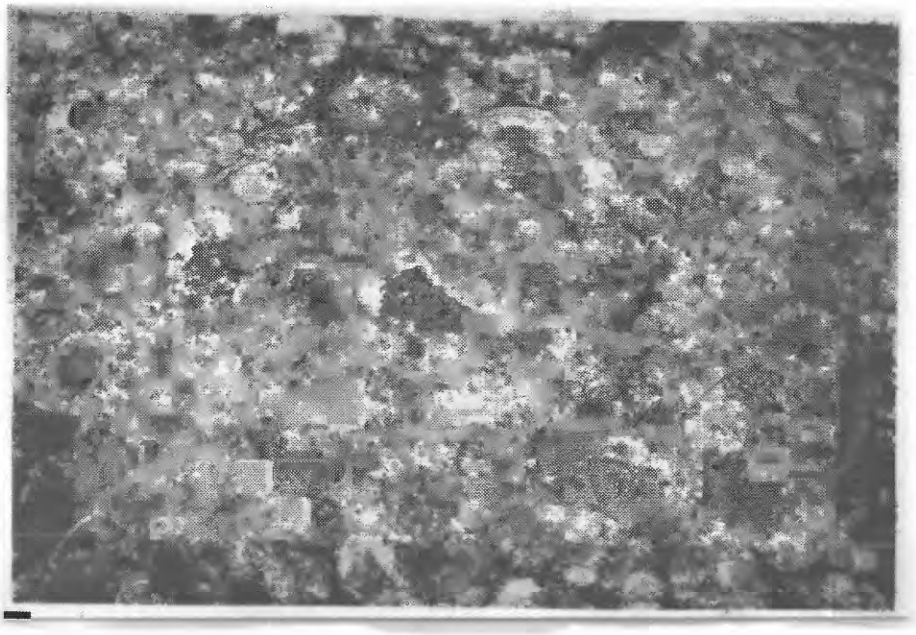
Sand Mountain, the northwest rim of Murphree Valley, and Straight Mountain, the southeast rim of the valley, are composed of the Lookout sandstone of the Pottsville formation of Pennsylvanian age. It is a hard resistant rock which makes rocky ledges and cliffs on the inner sides of these mountains. These rocks dip northwest on Sand Mountain and southeast on Straight Mountain, on the respective limbs of the Murphree Valley anticline. (See sections, pl. 1.)

Manganese deposits

The Manganese deposits of the Walnut Grove district consist of manganese oxides in residual clay and chert of the Fort Payne chert. Because it is manganese bearing, the Fort Payne chert will be here described in some detail.

The Fort Payne chert outcrops on the top and west slope of Red Mountain on the west limb of the Murphree Valley anticline. It weathers readily to chert fragments, and bedded rocks are seldom exposed except in artificial excavations, such as quarries, mine pits, and road cuts. The Fort Payne chert in this area is an alternation of thin-bedded white chert and thin beds of limestone which is weathered at the surface to yellow clay. (See pl. 5A). At the base of the formation there is a sandstone of variable thickness which in places makes conspicuous ledges and locally forms the crest of Red Mountain. Three miles southwest of Aurora this sandstone forms ledges, the bedding surfaces of which show polygonal blocks due to sun cracks. The sandstone here caps Red Mountain. (See pl. 4). At Silver Run, west of Walnut Grove, the sandstone is exposed in the road cut and in ledges above the road which consist of several beds 1 to 3 feet thick, totaling about 20 feet in thickness. The lowest beds of chert contain large segments of characteristically marked crinoid stems and geodiferous white quartz concretions. Higher beds in the formation, best exposed in the road cut ½ mile northeast of Aurora, are soft greenish cherty argillite filled with delicate branching Fenestelloid bryozoa. The uppermost beds, best exposed in a road quarry north of Wynnville Creek gap, contain heads of Lithostrotionella corals and large brachiopods, Echinoconchus. The formation at this quarry is about 200 feet thick. A partial section measured in the road cut northeast of Aurora is as follows:

Plate 4A Sandstone bed at base of Ft. Payne chert capping Red Mtn. 3 miles SW of Aurora



4B. Polygonal blocks on bedding surface of basal sandstone of Ft. Payne Chert. 3 miles SW of Aurora

Fort Payne chert, northeast of Aurora

	Feet
Upper beds not exposed; estimated.	75 ±
Chert and interbedded green cherty arcillite full of well-preserved branching Fenestelloid bryozoa stained with manganese oxide.	25
Alternating thin-bedded chert and clay representing thin limestones; hard chert at base with large segments of crinoid stems and joints and bedding surfaces are stained with manganese oxide.	50 ±
Thin-bedded clay with chert layers.	50 ±
	200 ±

At the Locust Fork gap in Red mountain, 1½ miles northeast of Walnut Grove, a partial section of the formation is exposed in a roadside quarry and in road cuts.

Fort Payne chert at Locust Fork gap.

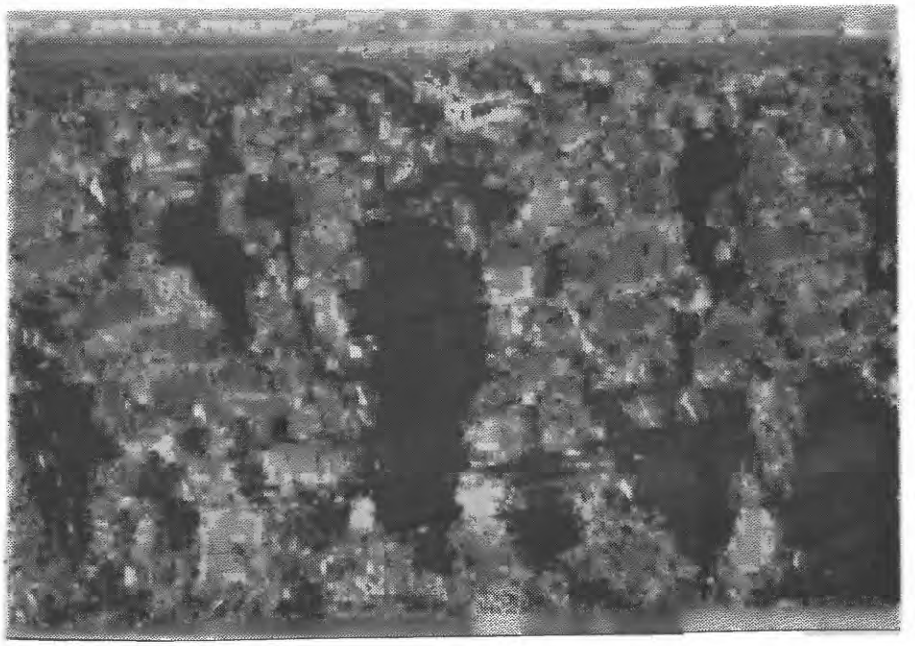
	Feet
Upper beds not exposed. Estimated	70±
Crumbly white and nodular buff chert, containing Fenestelloid bryozoa and brachiopods	20 ±
Yellow, white, and black banded thin-bedded chert. ..	30
Yellow and white clay and interbedded thin chert beds, stained with manganese oxide	15
Blue limestone and fossiliferous chert, largely concealed	20 ±
Concealed; crinoidal chert fragments. Estimated. . .	30 ±
	185 ±

The formation thins southwest of Wynnville Creek Gap, and the sandstone bed at the base is apparently absent. A road-side quarry northwest of Oneonta exposes about 110 feet of thin layered chert with interbedded clay (see Pl. 5A), and it is little stained by manganese oxide. The chert contains numerous segments of crinoid stems. The higher more fossiliferous beds are not exposed and seem to be absent.

The manganese deposits on the Walnut Grove district are of two types, hard ore and soft ore. The hard ore occurs in the lower beds of the Ft. Payne chert which outcrop on the upper steeper slopes of Red mountain. Manganese oxide, chiefly psilomelane, cements and partly replaces brecciated chert, and the ore is, therefore, highly silicious. The hard ore, as described by Birkinbine, occurs as thin layers of ore-bearing chert, 1 to 6 inches thick, interbedded with layers of relatively barren chert. He examined 17 pits in hard ore that were open in 1913. He states that the ore-bearing chert must be mined by blasting and that the hard ore is of poor quality because of its high percentage of silicia. He gives an analysis of run-of-mine hard ore which contains 15.23 ~~15.23~~ Mn., .11% P, and 15% (estimated) SiO_2. He states that to concentrate this ore to a marketable grade would require fine crushing of the chert and briquetting of the concentrates. Few of the pits in hard ore are now accessible and those examined by the writer showed little manganese ore. Most of the hard ore produced in the district was mined by Gaston Scott and by J.R Cook near the top of Red mountain, southwest of the Haardt mine. The ore was hand cobbed before shipping.

The soft ore is mostly pulverent pyrolusite and wad with lumps or "dornicks" of hard ore up to 1 foot in size. These harder lumps are largely crystalline pyrolusite ~~and manganite~~ with a lesser amount of dull psilomelane. The soft ore occurs in the upper half of the Ft. Payne chert, exposed on the

Plate 5A. Chert layers with interbedded clay derived from limestone beds; Ft. Payne chert. In roadside quarry north of Oneonta



5B. Well-bedded argillaceous limestone of Mississippian age beneath Ft. Payne chert. Road cut north of Oneonta.

lower western slope of Red mountain and on flat benches or terraces at its foot. (See fig. 2.). The ore is in residual clay with chert fragments, and the ore-bearing layer varies from mere stringers to beds 3 feet thick. Figure 2 --
In places it expands into lenses or pockets that are reported to reach 10 feet in thickness. The ore in pits highest on the slope, and therefore in the lowest beds stratigraphically, is at or near the surface and was discovered in plowing. The ore in pits lower on the slope is generally about 20 feet below the surface and some pits in the lowland at the foot of the slope pass through barren limestone of the Tuscumbia and underlying cherty clay to a depth of 30 feet or more before reaching ore. The soft ore is removed in bags and pans and is stored in bins or on the ground and shipped without beneficiation.

A study of exposures of Ft. Payne chert in quarries, where ore is not present in
~~has been concentrated~~ into workable deposits, reveals thin seams and layers of clay impregnated with manganese oxide interbedded with layers of chert. These thin, manganiferous layers can be traced nearly continuously for 100 or more feet along the bedding. The thin layers in places swell to 6 inches or more in thickness, and have nodules and lumps of crystalline ore that are enclosed in soft pyrolusite and wad. At a few places, the oxide also follows nearly vertical joints leading from the manganiferous layers.. From these studies and from an examination of the ore-bearing beds in mines it is concluded that the manganese oxide was derived from the weathering of certain manganese-rich limestone beds interbedded with the chert. Fresh limestone has not been seen in the vicinity of manganese deposits, so that it is not known what manganese-bearing mineral was deposited in the sediment, but it is probably a manganese-bearing carbonate that was ~~deposited as sedimentary grains~~

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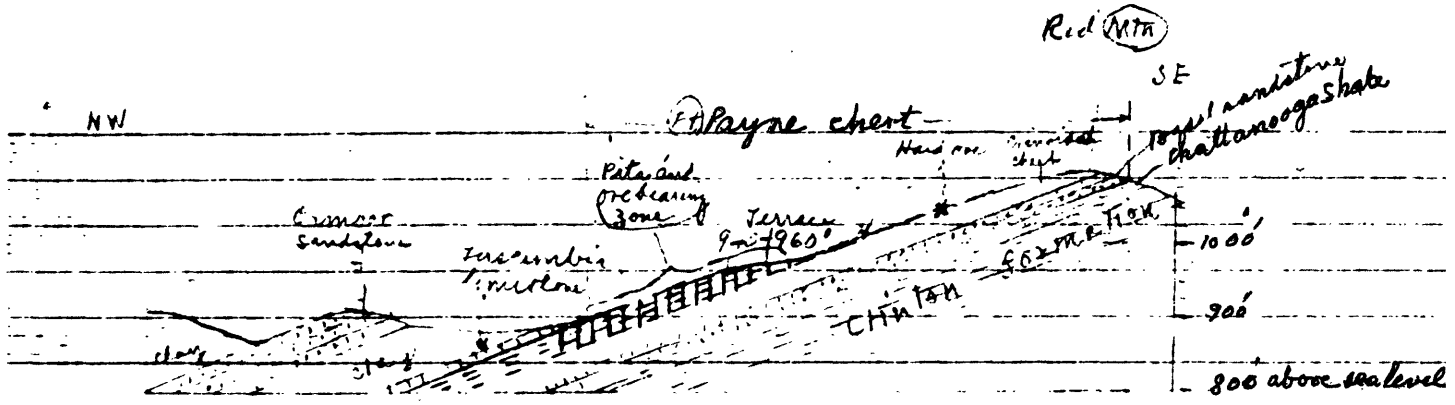


Fig. 2. Sketch section of NW slope of Red Mtn showing general relations of the ore-bearing zone in the Ft Payne chert to topographic features in the Silver Gap area

disseminated with the lime carbonate. When the limestone was dissolved by meteoric waters, the soluble manganese carbonate also went into solution and was deposited as oxide in the residual clay and along joints in the chert layers and coated fragments of fractured chert. In favorable places, such as on terraces where downward-moving meteoric waters percolated slowly for a long period of time, the concentration of oxide was greater, and some of the clay and chert were also replaced by the oxide forming thick layers and pockets of rich ore. The richest and largest deposits, therefore, are to be found on remnants of low terraces at the west foot of the Red mountain.

Manganese deposits rich enough to be mined are limited also along the strike of the beds. Such deposits have been found in the Walnut Grove district only for a distance of 5 miles along the outcrop of the Ft. Payne chert, between Wynnville Creek Gap in Red mountain and a small gap 3 miles northeast of Walnut Grove. Beyond this restricted area chert fragments and residual soil of the Ft. Payne exposed in Murphree Valley have only a stain or thin coating of manganese oxide and no deposits of valuable ore have been discovered. Some manganese ore was reported by Adams to have been found at outcrops of Ft. Payne chert southwest of the Walnut Grove district near Oneonta, but the quantity was small. It is evident, therefore, that the quantity of disseminated manganese-bearing minerals in the Ft. Payne chert varies along the strike and that workable deposits in the residual clay are restricted in distribution.

The soft ore is generally of high grade, being composed of pulverulent pyrolusite containing solid lumps of harder pyrolusite, ~~manganite~~, and psilomelane. Considerable wad and some chert are mixed with the high-grade ore as mined, and such ore is lower in manganese content and may approach

the hard ore in composition. The hard ore is generally highly silicious, as much of the chert cannot be removed in hand cobbing. Most of the ore mined in the Walnut Grove district was marketed at Birmingham, but during the World War the ore mined by the Southern Manganese Corp. was smelted in electrical furnaces at Anniston. The Tenn. Coal, Iron & R.R. Co. of Birmingham, permitted the writer to examine their records of carload shipments of ore from the Walnut Grove district. From a group of analyses of 38 carloads of high-grade ore shipped by W. C. Kilpatrick from the Bynum tract in 1918, the following were selected by the writer as representative.

Analyses of high-grade ore in carload lots from Bynum tract.

Fe	SiO_2	Al_2O_3	Mn	P
1.13	13.47	2.52	48.70	.17
1.12	9.80	2.08	51.10	.19
1.13	10.45	2.55	50.83	.19
7.52	18.93	3.21	39.32	.49

Representative analyses of carload lots of lower grade ore, shipped by Bain and Marsh from a mine southwest of the Bynum tract, are as follows:

Analyses of Lower grade ore in carload lots from near Bynum tract.

Fe	SiO_2	Al_2O_3	Mn	P
2.0	23.0	4.57	36.0	.41
2.07	19.28	4.36	38.38	.37
1.96	15.07	3.44	42.44	.78

Other analyses selected at random show the variation of carload lot shipments.

Analyses of carload shipments from Walnut Grove district

	Fe	SiO_2	Al_2O_3	Mn	P
H.C.Abbott 1918	2.06	14.75	4.17	43.88	.19
	4.69	40.75	6.11	25.53	.18
	3.28	22.33	5.58	37.40	.20
J.R.Cook 1923	3.28	20.12	4.38	36.87	.52
	2.75	27.85	7.13	31.46	.33

The largest and richest deposits of manganese ore in the area seem to center at the Bynum tract and the immediately adjoining part of the Midvale tract and extend southwestward across the road through Silver Gap onto the Haardt tract. These richer deposits have been largely mined out by means of pits or wells more or less systematically dug about 50 feet apart along a belt about 200 feet wide and less than ½ mile long. Small mines opened on the Midvale tract northeast of these richer deposits produced only a small tonnage of low-grade ore, mostly hard silicious ore, so that little high-grade ore can be expected in this direction. One mile southwest of the Haardt tract considerable high-grade soft ore has been mined on the Saye property also owned by the Midvale Co. Although a large number of pits were dug on the Saye property, and a fairly large amount of ore has been removed, it is apparently not completely mined out and some rich ore is believed to be still present. Southwest of the Saye property no ore is known to have been mined or exposed by prospecting, ~~and concentrated ore apparently ends here.~~

The fact that high-grade ore occurs on the Haardt property and on the Saye property suggests that similar good ore may occur in the intervening area. A few prospects in this interval exposed only hard ore in chert in the lower beds of the Ft. Payne. The upper beds of the formation, where the richer ores are to be expected, are concealed by wash and the overlying Oxmoor sandstone. It is, therefore, possible that valuable deposits of manganese ore may be found ~~beneath the thick cover of wash on the lower slope of Red Mountain,~~ below the old mines and prospects in hard ore between the Haardt ~~property~~ and ~~the~~ Saye property. No estimate of such possible reserves can be made without further prospecting.

Manganese Mines

Before 1915 some prospecting for manganese ore in Etowah County and adjacent part of Blount County in Murphree Valley was done by the Birmingham Mineral Railroad, by Gaston Scott of Montgomery, and by the Midvale Mining and Development Co. Shortly after 1900, E.P. Amerine of Montgomery, Ala. organized the Midvale Mining and Development Co. and acquired the mineral rights on about 2000 acres in the Walnut Grove district. Prospecting was carried on from time to time on this property and in 1913 J. L. W. Bickinbine examined and reported on the property. At that time there were 20 shallow pits on the Midvale property from which small test shipments of ore had been made. At the beginning of the World War I mining was stimulated and the first ore was shipped from the Walnut Grove district in 1915. All the mining has been on a small scale by individuals and small companies who leased small tracts from the Midvale Co. and from other owners.

A Philadelphia Co., headed by Jack Turner, operated a mine in 1916, and

Gaston Scott of Montgomery, Ala., J. R. Cook, and others opened other mines. In 1917-18 the Southern Manganese Corporation leased several tracts from the Midvale Co. and shipped a large quantity of ore to Anniston to be smelted in their electric furnaces. A large tonnage was also mined at this time on the Bynum property, adjoining the Midvale tract. More recently John H. Haardt of Montgomery, Ala., acquired the mining rights on about 300 acres of land covering much of the manganese-bearing area on the northwest slope of Red Mountain, west and southwest of Walnut Grove. Since 1915, mining of manganese has continued on a small scale on all these properties and has varied from year to year, as shown by the table of production on page 23.

In describing the mining operations in the Walnut Grove district, they will be grouped under 3 headings, Silver Gap mines, Wynnville Creek Gap mines, Mines east of Locust Fork. (See fig. 3.).

Figure 3 --

Silver Gap Mines

The mines in this group embrace the ~~richest~~ most productive deposits of manganese ore in the district. They lie chiefly east of the road running northwest from Walnut Grove through Silver Gap. They embrace several mines on the Midvale property, a small but ~~rich mine~~ productive tract called the Bynum mine, and the Haardt mine southwest of Silver Gap.

Mines on the Midvale tract.- The Midvale property extends along the northwest slope of Red Mountain from Silver Gap to Locust Fork of Black Warrior River and includes all the known manganese-bearing ground in this strip except 40 acres controlled by J. S. Bynum. This tract has been systemmatically mined from numerous small shafts, called wells, 10 to 30 feet deep, placed

(Ga P 18a

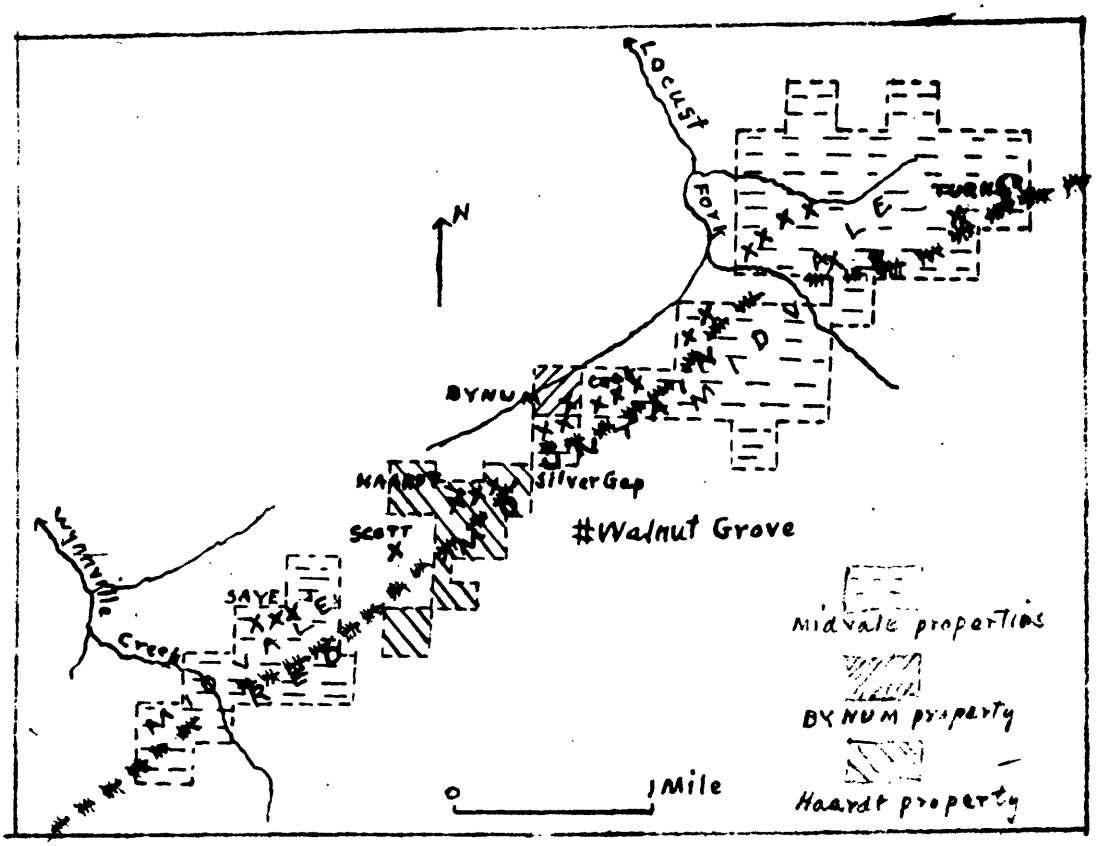


Fig. 3. Sketch Map of Walnut Grove district showing location of manganese mines and mining properties

~~10~~

from 20 to 50 feet apart, and the ore between wells was mined out by tunnelling and stoping. (See fig. 2). Large pillars were left, which were later robbed and the roof has caved in places. The pits range in altitude from 930 feet to 1,000 feet and extend along the strike for about 500 feet. The ore in the higher wells was near the surface and the pits are shallow. Most of the wells are about 20 feet deep, but those at the lowest levels are 30 or more feet deep and pass through a few feet of Tuscumbia limestone and barren chert before reaching the ore. In most pits there were found 1 or more beds of ore-bearing clay and chert, 6 inches to a foot thick, separated by barren chert, which dipped toward the lowland with the dip of the rock. The ore-bearing zones are variable, and thicken in places to lenses or pockets of rich ore reported to be 6 to 10 feet thick. From one such pocket Frank Wynn reported that he took 3 carloads of ore from a lenticular body 6 feet thick and 15 feet long down the dip. From another such body 5 carloads of ore were reported obtained. These mines have been operated by several individuals at different times. One, called the Turner mine, was worked by a Philadelphia group headed by Jack Turner. The Cook mine was operated by J. R. Cook. During 1917-18, several of the mines were operated by the Southern Manganese Corp. of Anniston, Ala. At the southwest end of the Silver Gap group, south of the Bynum mine, W. H. Hepinstall and ~~S~~. Stanfield had a mine in 1925, which was later operated by Bain and Marsh and 200 tons of ~~ore are~~ were reported to have been taken out. The total production from ~~this group of~~ these mines is not known, but most of the ore credited to the Midvale Co. came from ~~this group~~ there. ~~The rich ore is believed to be largely mined out.~~

Bynum Mine. - The Bynum mine is on a 40 acre tract 1/2 mile due north of Walnut Grove. It adjoins the Midvale property and embrases the most productive deposits of ore in the Walnut Grove district. The tract is at the foot of the slope at 920-960 feet altitude. The property has been worked more or less continuously since 1918, by T. R. Bynum, Wm. C. Kirkpatrick, J. S. Bynum, and H. C. McCright. Numerous wells about 20 feet deep struck rich pockets of soft ore, which has largely been removed by tunneling and stoping between pits. (See pl. 6A) In 1942 about 1 carload of soft ore ~~that~~ had been recently mined and was awaiting shipment. It was of low-grade because much wad and silicious matter was mixed with the soft ~~psilomelane~~ pyrolusite. ~~The deposit is apparently worked out.~~ A total of about 135 carloads of ore was reported obtained from this property, and

Haardt Mine. - John H. Haardt of Montgomery, Ala., owns the mineral rights on a tract southwest of the Bynum tract and of the adjacent part of the Midvale tract. The ore has been mined from about 20 pits scattered over the terrace at the foot of the mountain. (See pl. 6B.) The lowest pits are over 30 feet deep and penetrate barren Tuscumbia limestone overlying the ore. In 1942 there was about a ton of high-grade soft ore with hard lumps 6 inches to a foot in size of rich hard ore, which had been recently dug for the company by Frank Wynn. Although considerable ore has been mined from this tract, it is believed that much ore still remains in the ground between pits and beyond the present workings along the strike to the southwest.

Wynnville Creek Gap Mines

The Saye Mine. - The Saye mine is the chief producer in this group. It is located at the northwest foot of Red Mountain, 2 miles southwest of Walnut Grove, and is named from the Saye estate, owner of the land. The mining rights, formerly owned by Wm. Debs, were acquired by the Midvale Co.

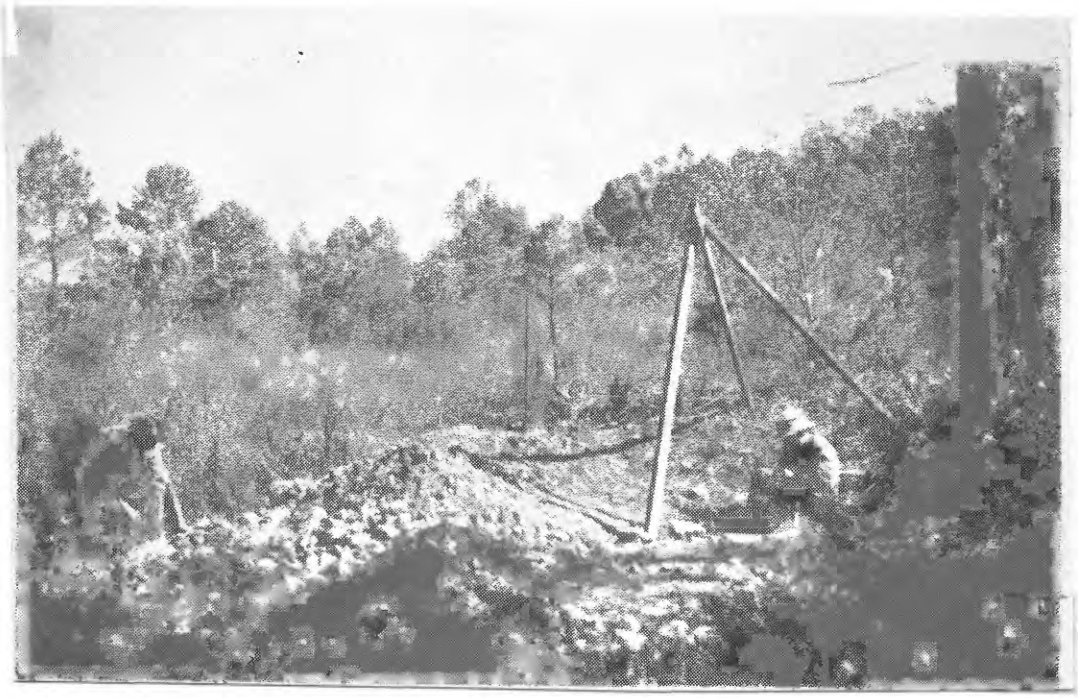


Plate 6A. Manganese mine pits and dumps at Silver Gap gourp of mines. (Photograph by H, D. Miser)

6B. Well and working on Haardt manganese property. (Photograph by H. D. Miser.)

The mine was leased and operated in 1917-18 by the Southern Manganese Corp. and later by E. V. Copeland and H. M. York. In 1918, when the property was first examined by the writer, a test trench across the strike, 8-10 feet deep, exposed good soft ore from the surface to the bottom. This was adjacent to a shallow open cut from which 10 car loads of good lump ore were reported to have been mined in 1915. Numerous wells, 20 to 30 feet deep, have been dug on the property at altitudes ranging from 960 to 1050 feet and extending along the strike for several hundred feet. The uppermost pit, at 1050 feet, exposed good hard ore in chert. The rest of the wells are in soft ore, and although a large tonnage of good ore is reported to have been mined, it is believed that the ore is not entirely mined out and that considerable ore still remains between wells and northeastward beyond the present workings.

Other mines.- About 3/4 mile northeast of the Saye mine, on the upper slope of Red mountain, manganese ore in chert was mined by Gaston Scott of Montgomery who is reported to have taken out over 500 tons of hard ore. Later J. R. Cook, Grady Turner, and Ad Collier mined over 300 tons of ore from this tract. The ore was hand cobbed to remove the larger pieces of chert from the highly silicious ore.

Mines Northeast of Locust Fork

Several small mines in this group mark the easternmost mining activity in the Walnut Grove district. At the east end of the group, about 1 mile east of Locust Fork, 8 or more pits were opened, which were worked first by E. H. Lindsay and O.B. Powell and later by Jack Turner for the Southern Manganese Corp. The ore was of the hard variety in chert and therefore was of low grade, but a few tons of high-grade crystalline lump ore was also

taken out. The pits are shallow and the production was apparently small. Little ore is now showing in the pits. In the lowland at the foot of Red Mountain just east of Locust Fork there were 8 or 10 shallow pits from which considerable high-grade soft ore was taken out by Turner and others. These are now plowed under and covered by fields and their location is lost. The amount of ore that was produced is not known.

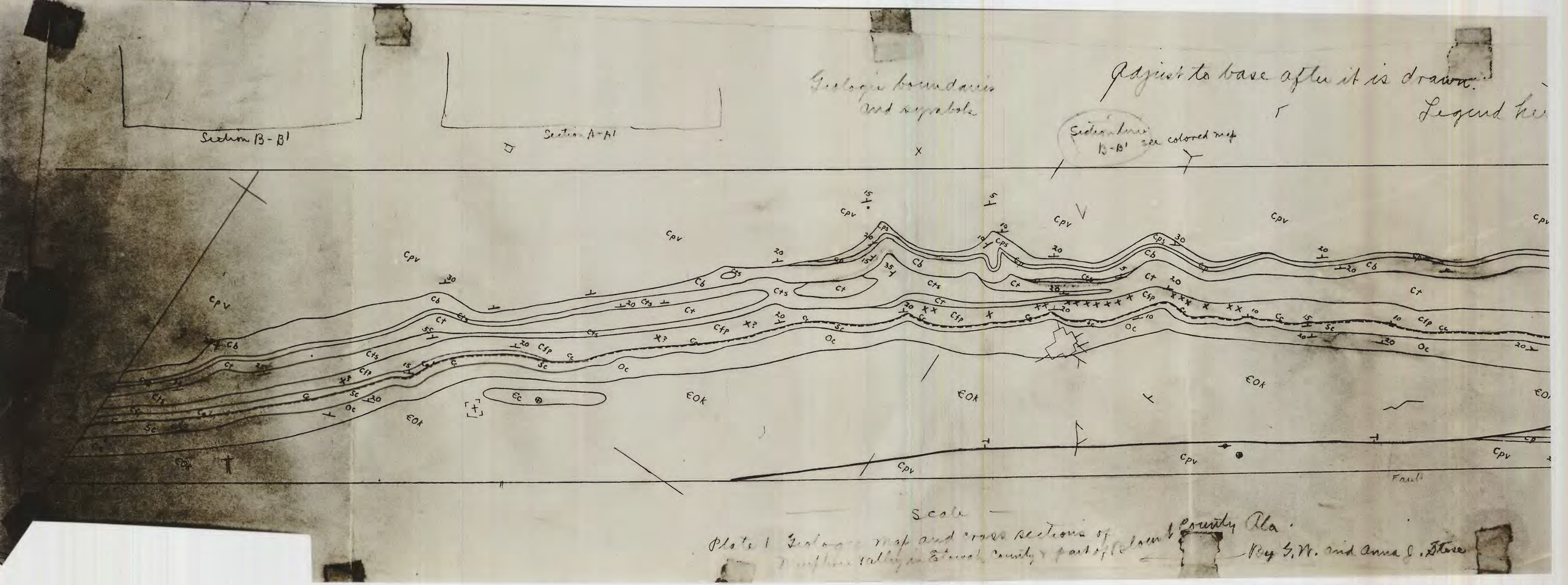
Prospects near Oneonta

Three prospects outside the Walnut Grove district are listed by Adams, and a small tonnage of ore was reported mined. These pits are not now readily accessible and were not visited by the writer. The Martha Allgood property, from which 17 tons of ore were reported mined in 1927 is about 2 miles northeast of Oneonta. A small amount of hard ore was reported collected from the surface on the Vines and A.W. Oden lands, 7 to 8 miles northeast of Oneonta. These deposits are in the Ft. Payne chert, southwest of the proved manganese ore bodies, and are probably not of commercial value.

Copy for base

Base from enlarged topog. map. Modified from air photographs and roads added and corrected.

1000
Hendrick
CALVERT PRONG OR LITTLE
RIVER
Wynnville Creek
Friendship
MARSHALL CO.
ETOWAH CO.
SAND MOUNTAIN
MOUNTAIN
Murphree Valley
MURPHREE VALLEY
Hoods X Roads
Murphree Valley
Walnut Grove
Bristow Cove
Bristow Creek



adjust to base after it is drawn.

Legend for

Scale —

Plate I Geologic map and cross sections of [illegible] County, Ala.

[illegible] Roy S. W. and Anna S. Stose

EXPLANATION

Penns'ylvanian

Cpv

Pittsville formation
(Lookout sandstone and overlying Wallace sandstone)

Cp

Pennington shale
(Cps, sandstone lentils)

Mississippian

Bangor limestone
(In part weathered to red and yellow clay)

Tuscumbia limestone
(Largely weathered to clay. Cts, sandstone lentils, in part Oxmoor sandstone)

CARBONIFEROUS

Fort Payne chert
(Contains manganese oxide deposits)

Argillaceous limestone
(Present only in vicinity of Oneonta)

UNCONFORMITY

Cc

Chattanooga shale
(Black carbonaceous shale, possibly in part Devonian)

UNCONFORMITY

Clinton formation
(Contains thin beds of hematite ore)

SILURIAN

UNCONFORMITY

Oc

Chickamauga limestone

ORDOVICIAN

Middle Upper

Knox dolomite
(Largely Copper Ridge chert)

Conasauga limestone

CAMBRIAN

Strike and dip of beds

Thrust fault
Toverthrust side

X manganese oxide pits
mostly inactive.

Copy for base
Base from enlarged topog map.
Modified from air photographs,
and roads added and corrected.
Neat line
Small houses
MARSHALL
BLOUNT CO.
ETOWAH CO.
LOCUST FORK
BLACK WARRIOR RIVER
SAND MOUNTAIN
MOUNTAIN
Bristow Cove
Bristow Creek
Red Mountain
Aurora Mt.
Aurora
860
Walnut Grove
862
Murphree Valley
Nix Gap
Bud
Murphree
Hoods Cross Roads
RIVER
STRAIGHT MOUNTAIN
Jordan Gap
1000
34°10'
86°10'
86°20'
H. F. & C. DIV.
Road

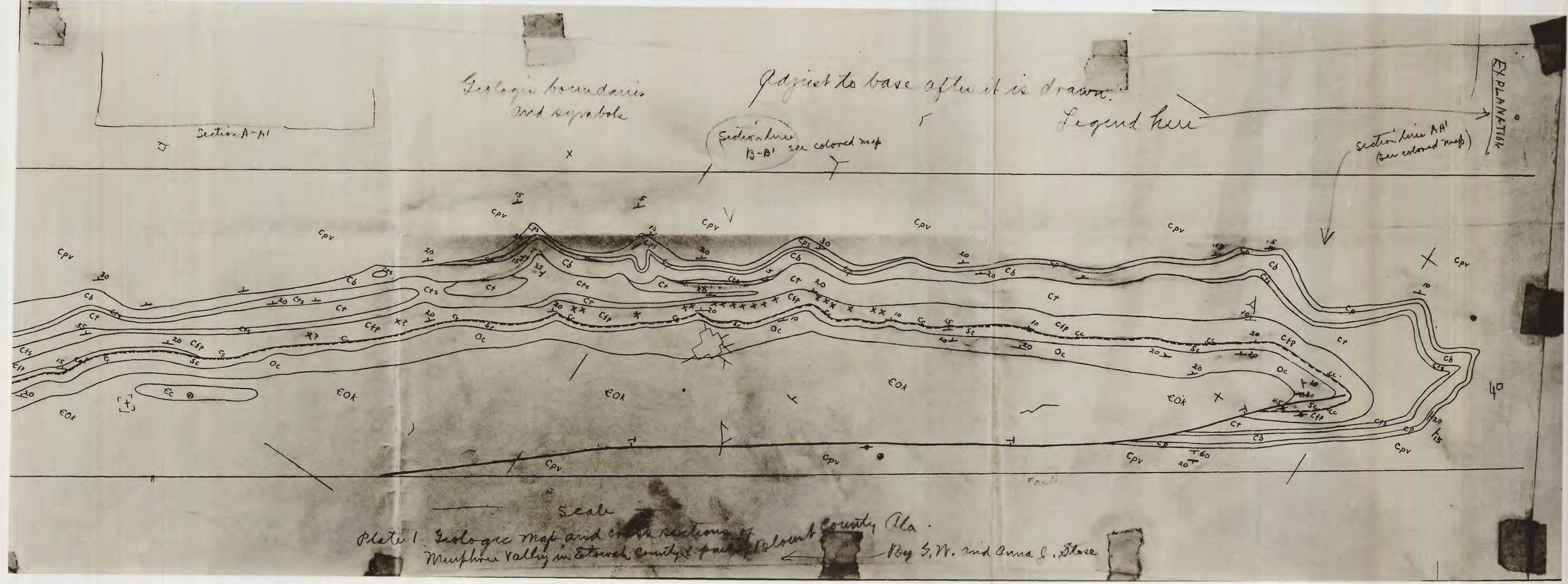


Plate I. Geologic map and cross sections of Murphree Valley in Etowah County & part of Calhoun County, Ala.

Boy G. W. and Anna C. Stose


Hendrick
Friendship
Clear Creek
Red Apple
BOUNDARY LINE
MARSHALL CO.
ETOWAH CO.
Jordan Gap
Plate
DE KALB CO.
ETOWAH CO.
H. F. & C. DIV.
1129
1109
1161
Aurora Mt
Mountainboro
Bristow Cove
Bristow Creek
Aurora
869
862
Walnut Grove
Murphree Valley
Murphree
Hoods X Roads
RIVER
STRAIGHT MOUNTAIN
Lookout
Wynnville Creek
Chickamauga
Nix Gap
Blount Springs