Southern Appalachians: [specimens] 25833-25899. No. 191 1896

Van Hise, Charles Richard, 1857-1918
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U. S. GEOLOGICAL SURVEY

FIELD SECTION BOOK

9-891

Notebook 191.

C. R. Van Hise 1896.

Southern Appalachians.

LAKE SUPERIOR DIVISION.

INSTRUCTIONS.

1. Ordinarily at least two pages of this book will be devoted to one section. On the left-hand page, place a map of as much of the section as has *actually been seen.* Denote rivers, lakes, marshes, etc., by the usual topographical signs. Denote the ledges of rock, when no structure is made out, by cross-hatching, making the cross-hatching cover as nearly as possible the areas occupied by the exposures. If the rock is a massive one, but still more or less plainly bedded, use the same sign with a dip arrow and number attached, showing the direction and amount of the dip. Denote a shaly or other very plainly bedded ledge by right parallel lines, and a ledge having a secondary structure by wavy parallel lines running in the direction of the strike, with dip arrow and number attached as before. The greatest care must be taken to avoid confusing slaty or schistose structure with bedding, and in all cases where there is the least doubt about the true bedding direction, indicate it by a query. To each exposure on the face of the map attach the number of the specimen representing it. In mapping the section count each of the spaces between the blue lines as 100 paces, and twenty of these spaces to one mile, or 2,000 paces. Usually the southeast corner will be placed at the bottom of the page, or at the first black line above the bottom of the page, and at the right-hand side. If, however, for any reason, it is desirable to show portions of an adjoining section, the southeast corner may be shifted up, or the map may be turned around and the north placed at the left-hand side of the page. The ruling of the left-hand pages is also arranged so that, if desirable, a larger or a smaller scale can be used, eight inches, two inches, one inch, or one-half inch to the mile. With the two-inch scale, the squares outlined in black represent sections, and those in red, quarter sections and "forties," while the space between the blue lines is 200 paces.

2. On the right-hand page place the notes descriptive of the exposures. Begin in each case with the number of the specimen, placing the number on the left-hand side of the red line, after which give in order on the right of the same red line the position of the ledges as reckoned in paces from the southeast corner of the section and the dip and strike when observable, the latter always being expressed from the north; for instance 4025, 250 *N.*, 300 *W.*, *Strike, N.* 78° *E.*, *Dip* 50° *S.* Then follow with a full description of the ledge. When topographical maps are used for locations this paragraph applies only in part.

3. Collect a specimen from every ledge, or wherever there is a change of rock on any one ledge, taking care to get fresh material, unless for a special purpose the weathered surface is desired. In case of trips made on foot or in canoes, for long distances, neighboring ledges, unquestionably of one kind of rock, need not be specimened. The position and extent of the ledges not specimened should be marked on the map, with notes that each is of a rock identical with specimen so-and-so. Under the same conditions small-sized specimens, trimmed to a uniform size of 2 x 2½ x ¾ inches will be allowed, but in all other cases *large-sized specimens*, trimmed to a size of 3 x 4 x 1 inches, must be selected, in accordance with section 3, chapter IV, p. 44, Regulations of the U. S. Geological Survey. Specimens should not be placed together without protection in the collecting bag, as the fresh surfaces, important in determining the character of rocks, are thus destroyed. They should be damaged by no temporary mark, but the numbers should be at once marked in at least two places upon the inclosing paper or cloth bags. Specimens may be permanently marked in camp by painting the numbers upon them in white upon a black background, using Silver White and Ivory Black oil tubes for color, with turpentine as a diluent.

4. On the last twenty-five pages of the book give, as may seem desirable, a general account of the examination of the region mapped in the previous pages, correlation of observations, sketches, cross sections, etc.

5. Forward this note book as soon as filled as registered mail matter to C. R. Van Hise, U. S. Geologist, Madison, Wis.

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C. R. Van Hise, 1896.

Continued from Notebook 190

Southern Appalachians
1896

Photographs taken along the Hiwassee between Livingston and Macfarland.

Photo

1242 Curved cleavage in slate

1243 Shows flat dipping cleavage, now partly developed into ~~schistosity~~ fissility, and cutting across this at steep angles ~~and~~ a regular set of fissile planes. Probably cleavage first produced; then deformation in zone of fracture developed fissility along cleavage, and joints diagonal to the cleavage

1244 Cleavage and fissility parallel to cleavage and cross joints, as in ~~B~~. 1243

1245 Monoclinal secondary folds ~~between~~ in slate. This taken from one limb of an abnormal anticlinorium, to

1245 (cont). illustrate this kind of corruga-
tion

1246 Monoclinal folds in alternating hard and soft layers. Hard layers fractured and soft layers mashed, having developed a schistosity nearly parallel to the hard layers as a result of differential movement

1247 Beautiful isoclinal fold in slate, the cleavage going almost directly across the axis. Upon left ~~bigger~~ minor foliations of abnormal anticline noted.

1248 Radial cracks on anticline produced by stretching

1267 Graywacke showing radial tension joints on anticline. The openings are filled with secondary quartz.

We next went to Ducktown still on the Murphy sheet, and here studied the formations holding the copper ores. These rocks are in the Ocoee rocks, which have, however, been injected by igneous material. They are much more altered than those along the Hiwassee river. In fact they are so gneissic in aspect that for some time we were doubtful whether the rocks were really gneissic, or metamorphosed sedimentary ones. There is a remarkable similarity of this banded metamorphosed series to a series of metamorphosed fissile rocks which have been subjected to injection. The original series, as in the case of the Ocoee of the Hiwassee, evidently consisted of alternate layers of fine mud, grit, or even fine grained conglomerate. The grits and fine grained conglomerates are altered to mica-gneisses, which only occasionally show remaining material which can be distinctly made out as fragment. The muds have been metamorphosed to fissile mica-schists. If the metamorphism had gone a little farther, the rocks might be explained either as a completely metamorphosed sedimentary series or as a metamorphosed sedimentary series which had been injected by mica-gneisses, or, thirdly, as entirely composed of metamorphosed igneous rock.

r5833 More massive phase of Ocoee series on Ry between Ducktown and Isabella Junction. This is not extremely metamorphosed, and the mica-gneiss has a conglomerate aspect.

r5834 Finer grained mica-gneiss, which is interlaminated with r5833

r5835 Diorite or mica-schist injected by diorite on same section as r5833-4

25836 Diorite from parallel dikes on same R.R. section.

From Ducktown went to Marietta on the Marietta & North Georgia road. There saw the Georgia marble at various places along the road. The question immediately arises whether this not a more metamorphosed phase of the Knox.

From Dallas on the Marietta sheet made a section N.W. to Rockmark, and SE. to Austell. The rocks about Dallas have all the characteristics of the Archean, being composed of various granites, gneisses and schists, with their usual most intricate relations. However, at some distance N.W. of Dallas there appear slates which are regarded by Hayes and Brooks as Ocoee. These are only fresh at a few places, and they are especially well seen in one deep R.R. cut.

25838 - One of these Ocoee slates. This is probably volcanic, according to Brooks. The rock shows beautifully the numerous fault slips of fissility, and well illustrates what is meant by distributive faulting.

25839 is the freshest phase of same found.

25840 is a mica-gneiss, which is similar to that of the Ducktown area. Very likely Ocoee.

Near the N.W. corner of the atlas sheet before reaching Rockmart is the line where Hayes places the Cartersville overthrust fault. Evidence was shown of faulting here both by unusually crystalline character and fissility of the rocks surrounding, and also by brecciation, and, finally, by ferrugination.

The Rockmark roofing slates are placed in the Paleozoic. Hayes thought that in these slates the ~~parting~~ bedding and cleavage correspond, but a close examination of the slates shows the cleavage cutting the bedding at all angles, the bedding being in a set of rather close plications, but the cleavage being in one general general direction. In the trip from Dallas to Austell the complex character of the supposed Archean is well shown. In some places the different kinds of rocks are intricately intermingled; in other places a single rock appears to occupy a broad area. However, I am convinced that oftentimes this is more apparent than real, the more resistant rock showing at the surface, whereas the less resistent rocks are not exposed.

Aug. 31

Visited Toulouba Gorge

A close examination of the rocks here exposed convinced me that this is a micaceous quartz-schist or perhaps, more exactly a coarse mica-schist. The rock must originally have been a coarse argillaceous sandstone. At the bottom of the gorge the rocks are very massive, but faint bands marking the heavy beds may be followed by the eye, at the bottom of the gorge at the horseshoe.

Photo 1249 H Shows heavy massive rock at Upper Falls.

1250 I Shows character of wall at same place, giving distinctly the bedding, or what is taken for bedding.

1251 J Shows appearance of wall at

water's edge a little lower down stream.

1252 K Same place as 1251, from a greater distance, and therefore shows higher portions of bedded wall.

In approaching the top of the gorge the bedding gradually becomes more distinct and at the top the quartz-schist is as well bedded to all appearances as a common sandstone, this being the result of disintegration

1253 – –1258 4-2 Show the appearance of the upper part of the wall. of the gorge at various places.

It is only occasionally that the rock shows on the weathered surface a ~~weathered surface~~ fragmental appearance. However, the rock fractures more like a fragmental ~~b~~ rock than like a granite. However, it is iron-stained in a peculiar fashion which is rather characteristic of clastic rocks.

The quartz-schist continues as far up the river as the ordinary tourist goes. How much farther not known. It evidently extends to the bottom of the gorge, as what is taken for the same rock is seen along the R.R. track as far as Turnerville, and perhaps 2 miles beyond. However about 2 miles below Turnerville the rock is a gneissoid granite, and this, with its intrusives apparently continues to Demorest, as near as could be determined from observations from the train.

25841 Micaceous quartz-schist from Upper Toccoa Falls

25842 Another phase of the same lower down.

25843 Still another phase, yet lower down.

25844 Another phase still lower down, showing faintly a fragmental charac-ter.

25845 Disintegrated phase of the quartz-schist upon R.R. cut just below the falls.

In passing from 25841 to 21845 we are going to higher and higher members, as the dip is to the SE.

25846 Mica-gneiss about 2 miles S of Turnerville.

Toulozla series, as near as could tell from slow train, extends within a half mile or mile from this place.

A trip was made from Demorest, through G across Glade creek to where the road crosses the R.R. about 2 miles N.E. of Glade creek. We then turned S. and found the gneissic series to extend for about a mile, where the

Toulouba series, or something equivalent to it appeared.

25847 Mica-gneiss. First rock noted which apparently belongs to sedimentary series in passing from Turnerville to Toccoa Rock, by way of lime kilns.

25848 Quartz-schist in mica-gneiss. Fractured in a most complicated way along shearing planes. This taken a short distance before reaching Little Panther Creek.

25849-50 Phases of the schist before reaching Little Panther Creek, and therefore before reaching the limestone series. 25849 shows fault slipping, and fracturing along another set of diagonal planes.

25851-52 Siliceous blue limestone just E. of Panther Creek. There is here a sharp contact between the limestone and the schist. The schist, from 8 to 20 feet thick, before the surface is reached, is above the limestone, which is exposed below in places to a thickness of 15 feet. Limestone on ledge below exposed 8 to 15 feet.

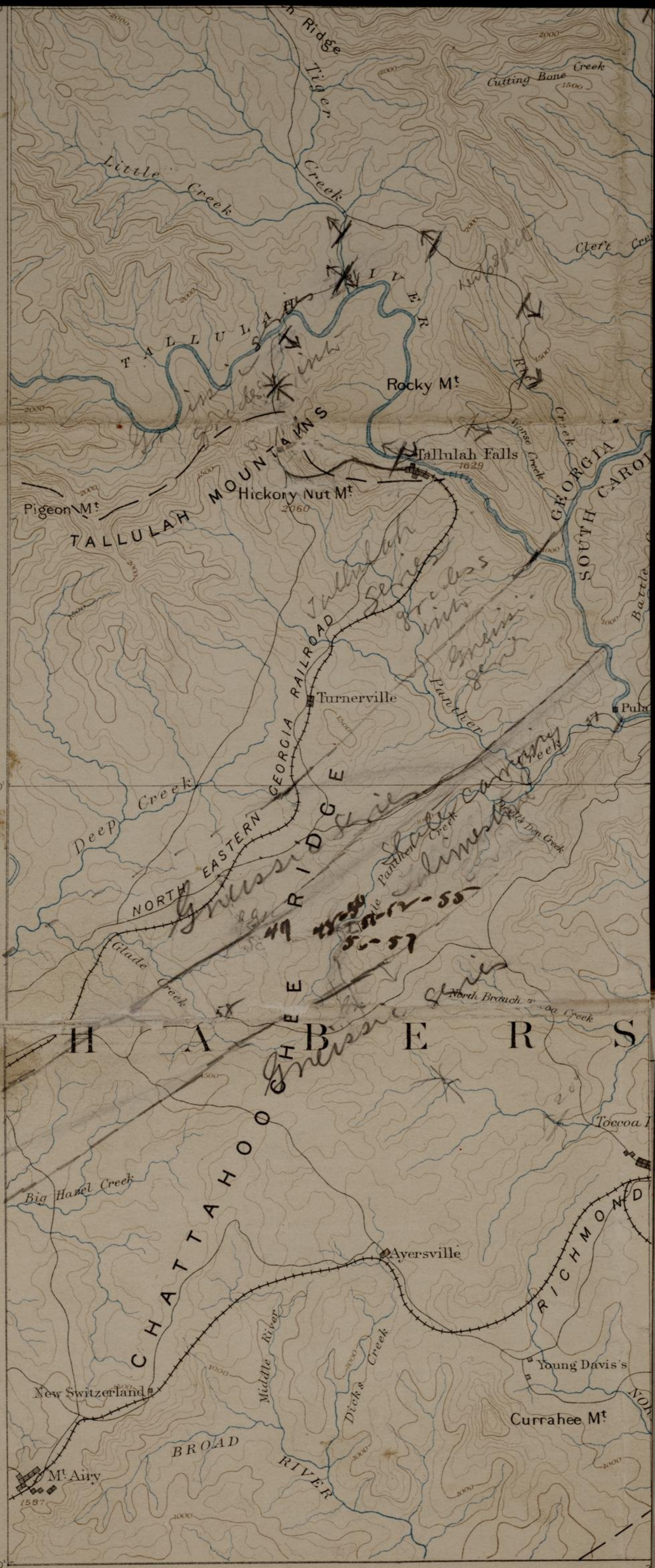
75853
75854
75855 Different phases of the schist overlying the limestone and in contact with it. Strike of contact N. 60° E. Dip 15° SE. This contact is seen continuously for nearly 100 feet.

75856
75857 Phases of schist about ½ mile up Little ~~Thunder~~ Panther creek from limestone. It therefore overlies the limestone.

75858 Calcareous mica-schist where Glade Creek crosses the Toccoa road.

In passing to Toccoa road, after leaving Panther Creek, and for some distance along Toccoa road, the gneissic series occurs, and the schistose series comes in about a half mile before road crosses Glade Creek (58) and

S.E. corner of Walhalla sheet.



Henry Gannett, Chief Geographer.
Gilbert Thompson, Geographer in charge.
Triangulation by U.S. Coast and Geodetic Survey.
Topography by C. M. Yeates.

Surveyed in 1885.

~~continuous~~ nearly or quite to the R.R.

Made trip from Demorest on road running SW.

25859 Mica-schist, where this road crosses Mud Creek. Strike N. 55° E. Dip. 30° SE.

25860 Limestone on branch of Mud Creek about 1½ miles farther on. About ⅛ mile SE. of road. Strike N. 35 to 45° E. Dip 30°-35° SE.

25861 Mica-schist, just a short distance up branch from limestone, and geologically above same. Strike N. 40 E. Dip. 45 SE.

25862 Quartz-schist about ½ mi SE. of

main road. Strike N 55 E Dip 45° SE.

This quartz-schist shows in a marked degree the result of shearing motion, and also the effects of fault-slips at intervals of 1/8 to 1/4 inch, as is shown by

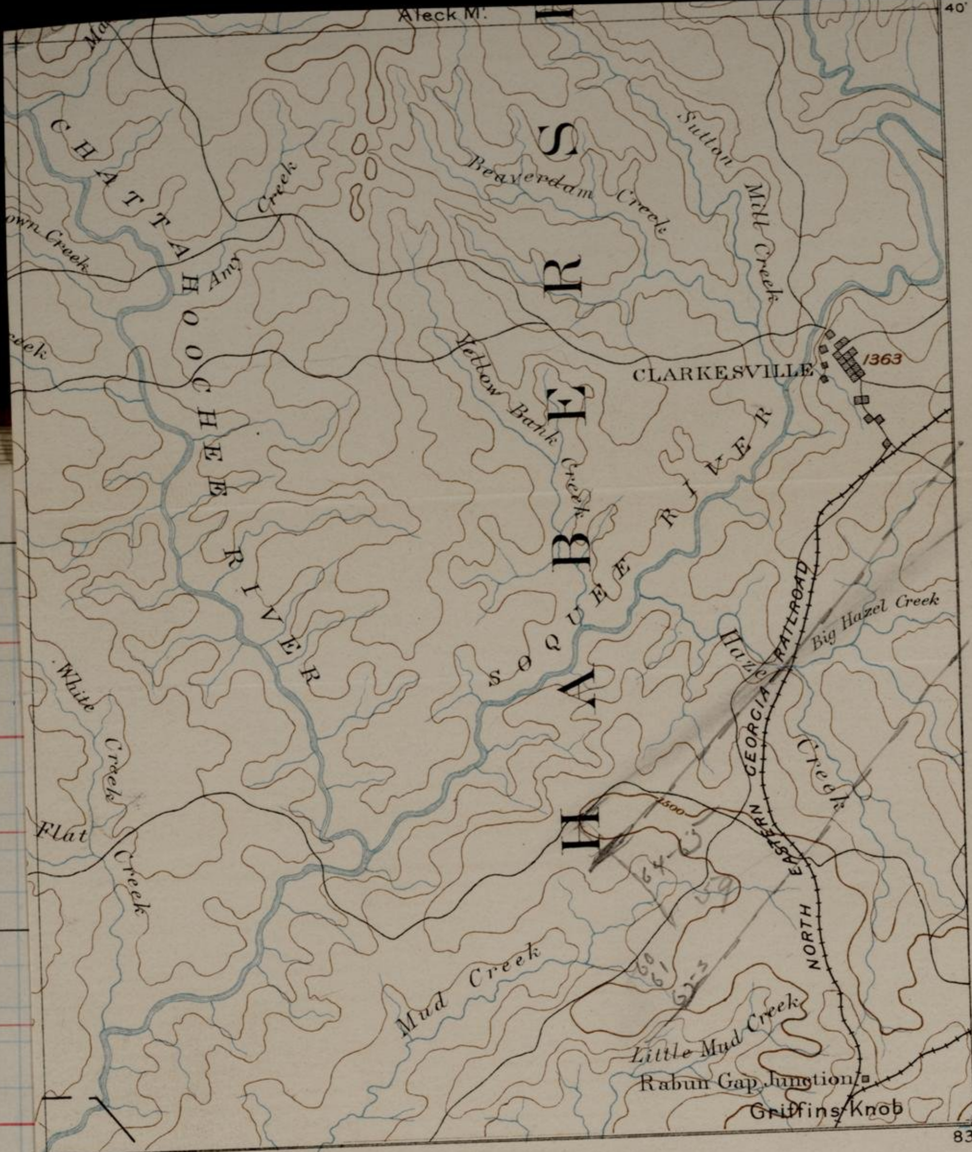
25863 another phase of the same.

Taking cross road to S.W. from main road, and crossing Mud Creek, the mica-schist continues a mile or more toward the main road. After crossing the creek the schist has a peculiar chloritic phase represented by 24864-5,

25864 which have been mined as

25865 soapstone.

After reaching the main road and turning to the N.E. the mica schist becomes injected in parallel fashion with pegmatite and granite. These injections come in gradually and at the same time the schist takes on a more feldspathic aspect. Whether this is a more feldspathic



Edition of Mar. 1892.

Dahlonega Sheet, Ga.

S. T. R.

6—747

series than the mica-schist series, or whether this is a mica schist injected and permeated by granite, could not be determined. The sections along the 2 main roads from the Corners, both going out and coming in, look like the latter. The increased feldspathic character on this theory would be entirely produced by the permeation of the schist by the granite juice, or by some mode of pegmatization

25866 Peculiar calcareous rock from vein or injection in gneissic series, on main north road, just after pegmatite appears.

The schistose marble series on Mud Creek and branch of same is directly in line of strike of that visited the day before on Little Panther Creek, and is doubtless a continuation of it. This marble-bearing series is said by the inhabitants to extend SW. to Gainsville, and perhaps farther.

From work about Demorest it is perfectly clear that in the midst of the old complex gneissic series we have a very extensive sedimentary series, represented on the greatest scale of exposure along Tallulah Gorge, but also extending up Little Panther Creek, perhaps to Pulaski and very likely joining the Tallulah series somewhere along the Tallulah river.

Sept. 7, 1896

With Prof. Smith drove from Ironoton (Ashland sheet) to Talledega creek, SE. of Blue Mt on SE. course across strike.

First examined ore deposits in Cambrian shales. In places these ores become white, and Smith says they pass below into limestone. The Cambrian is intermediate between slate and phyllite. The Ocoee is considered as coming in just SE of Ironoton on first ridge. There is absolutely no difference between the 2 rocks, so far as I could see, except that the rocks are rather more crystalline. Where the rocks of the Ocoee are well exposed, they are a fair phyllite, not the most crystalline, perhaps, but still they would be called phyllite. It is to be noted that at the place where the Cambrian and Ocoee come together there are large ore deposits, and that the walls are more crystalline. Are not these evidences of distributive faulting?

In passing over the gap in Talladega Mt., the rock becomes less crystalline, and on the flank
25867 of the Mt. is slate. The slate continues well toward the top of the ridge, and then is replaced by
25868 quartzite,
25869 25869 Missing.

25870 and quartzite-conglomerate, which, however, is interlaminated with thin layers of slate.

The conglomerate for much of the way is mashed but little, but at various places the pebbles are distinctly flattened. This is more marked along slipping surfaces than elsewhere. The quartzite conglomerate, as well as the slates dip to the SE. Smith regards the mountain as an anticline, but did not myself take dips so as to get any observation on this point. The resistant quartzite occupies a considerable breadth, at least 1/2 to 3/4 mile, but upon the
25871 SE. flank of the mountain, slate

S. T. R.

75874 From the old McKenzie quarry just southeast of Talladega along the thrust fault which separates the Ocoee from the younger rocks.

See letter from Wm F. Prouty, Jan. 23, 1914.

again appears.

September 8 and 9

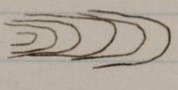
Made section across the ~~M~~ Cambrian to Talladega Mt. in two other places on roads SE of Talladega. My impressions of the previous day as to fault and change in character of phyllite fully confirmed. SE. of Talladega the rock nearest the Ocoee is a marble instead of the Cambrian shale. In one place this marble is not more than 100 to 150 steps from the Ocoee.

95872 } 95873 } The marble has rapidly varying effects of metamorphism, as though this were due to the fault or a local phenomenon instead of to regional folding. Much of the marble shows a distinct lamination due to the fault-slipping of fissility in a distributive fashion, the parts along the

95874 slips giving a distinct cleavage.

Just to the N.W. of the ridge, marking the appearance of the Ocoee at the

SE, is a distinct valley parallel
to the ridge. The fact that the
Ocoee is marked by a distinct ridge,
or at least a series of hills, the fronts
of which make a ridge, may be taken
as indicative of faulting. Smith says
this a characteristic feature in chang-
ing from the Cambrian to the Ocoee area.
25875 Furthermore the Ocoee phyllite where
it first appears is much broken
and it weathers into little leaflets.
As we pass ~~upward~~ toward Talledega
Mt. the phyllite becomes distinctly
less crystalline, and in all of the
cross sections made is for some distance
a slate, first shown by specimens of
yesterday. At the gap of Talledega
Creek the quartzite shows cross overfolds -
recumbent in fact, as shown by the
NE. end of one which from the SE.
looked thus:



The pitch of this fold, which is at
least 50 ft. high, is to the SE. - and
this corresponds to the dip of the

major folds, and gives a beautiful illustration of the relations of cross folds. In this gap the Acove - the
25876 finer grained material, is a phyllite which shows cross puckering caused by the complex folding. The folding therefore is in part at least later than the cleavage for after this structure had developed, slipping along the cleavage formed the puckers, and doubtless made the rock more crystalline.

To the SE. of the phyllite south of Talladega Mt. comes in Prof Smith's
25877 Hillaba formation. Just above this the phyllite is rather coarse. The Hillaba is a belt varying from a broad one several miles across to a narrow belt of a few hundred feet.

At Chambers Springs the rock is a
25878 schist showing augen of quartz

At the narrow tongue of Hillaba passed in going to Chambers Springs
25879 is a black schist, which at the surface weathers into a most finely fissile slate of a whitish or greenish color. Beyond the Hillaba to the South a narrow

25880 belt of phyllite or grit comes in
which quickly passes into a broad
belt of of garnetiferous mica-gneiss.
The large garnets along one belt are
2 or 3 inches in diameter.

25881 More massive phase of mica-
gneiss

25882 More schistose phase

25883 In places this schist is curved and
in fact a more or less curved charac-
ter is very general. These mica
gneisses contain the gold mines of
the area visited.
The mica-gneiss is interlaminat-
25884 ed with broad belts of hornblende-gneiss,
and is cut by very numerous pegma-
tite veins, some of which have been
worked for mica. Is this mica-
gneiss but a more altered phase of
the phyllite formation? - the more
crystalline character being perhaps partly
due to intrusives?

Sept. 10, 1896

Drove from Chambers Springs over Little Top Mt., to Ashland, by way of Munroe's Mills, and south to Graphite.

Hilleba continues over Mt to near creek which runs by McGee's Mt. At one place the Hilleba becomes a greenish
25885 white schist, which Prof Smith says is only a phase of the igneous rock. At any rate it shows the differential distribution slipping or faulting. In passing from the Hilleba to the mica-gneiss, the two are seen to be interleaved, but the exposures are so poor that this could not be sufficiently determined. Shortly after the mica-gneiss first appears an eruptive pyroxenite is seen. This rock is found in many places, according to Prof Smith in the mica-gneiss and nowhere in the Hilleba. After the mica-gneisses appear, no good exposures are found until we reach Munroe's Mill. Here the rock is fresh and beautifully shows its true character. It is distinctly banded. Along the

bands quartz veins have formed, but the banding occurs independently of the veining. The bands are folded into a beautiful series of cross plications, of different orders from a few feet to 20 feet across. The pitch of the cross folds is to the SE., and the horizontal direction at right angles to the pitch is NW + SE. Thus the folds here again beautifully illustrate the relations of minor transverse folds to major longitudinal folds. The rock is a micaceous and garnetiferous mica
25886 gneiss, which on its weathered sur-
25887 face and general appearance is strikingly like the Towoula quartz-schists, except that the rock is here more feldspathic.

25888 Micaceous phase of rock.
25889 Unusually massive and feldspathic phase

However, it was not plain that the latter was intrusive in the schists probably of fragmental origin represented by 25886-7-8.

25890 From Smith's last band of crystalline schist (1) on Alabama map before main southeastern mass of crystalline schist (2) is reached. 25890 is one phase of the gneiss.

Most of the bands are clearly mashed granite either intrusive or belonging with the main area. The cleavage is very perfect and to the SE.

25891 }
25892 } Chloritic mica-schists perhaps belonging to Talledega slate series - from most southeasterly belt. Where crossed the belt is narrow, but farther to the N.E., according to Smith, it passes into a ridge called "The Devil's Back bone", which contains quartzite. This is also a gold-bearing belt. All these things indicate a sedimentary character.

25893 Pyroxenite from mass found a short distance after main area of crystalline schist (2) was reached. Many other areas or belts of same rock passed.

The main belt of crystalline schist (2) of Smith has all of the characters of the Archean, banded, contorted, knarled, granite-injected pegmatites containing basic and acid materials. The common rocks are hornblende-gneiss and biotite gneiss; Masses of mashed biotite-granite-gneiss and muscovite-gneisses, - All with perfect foliation.

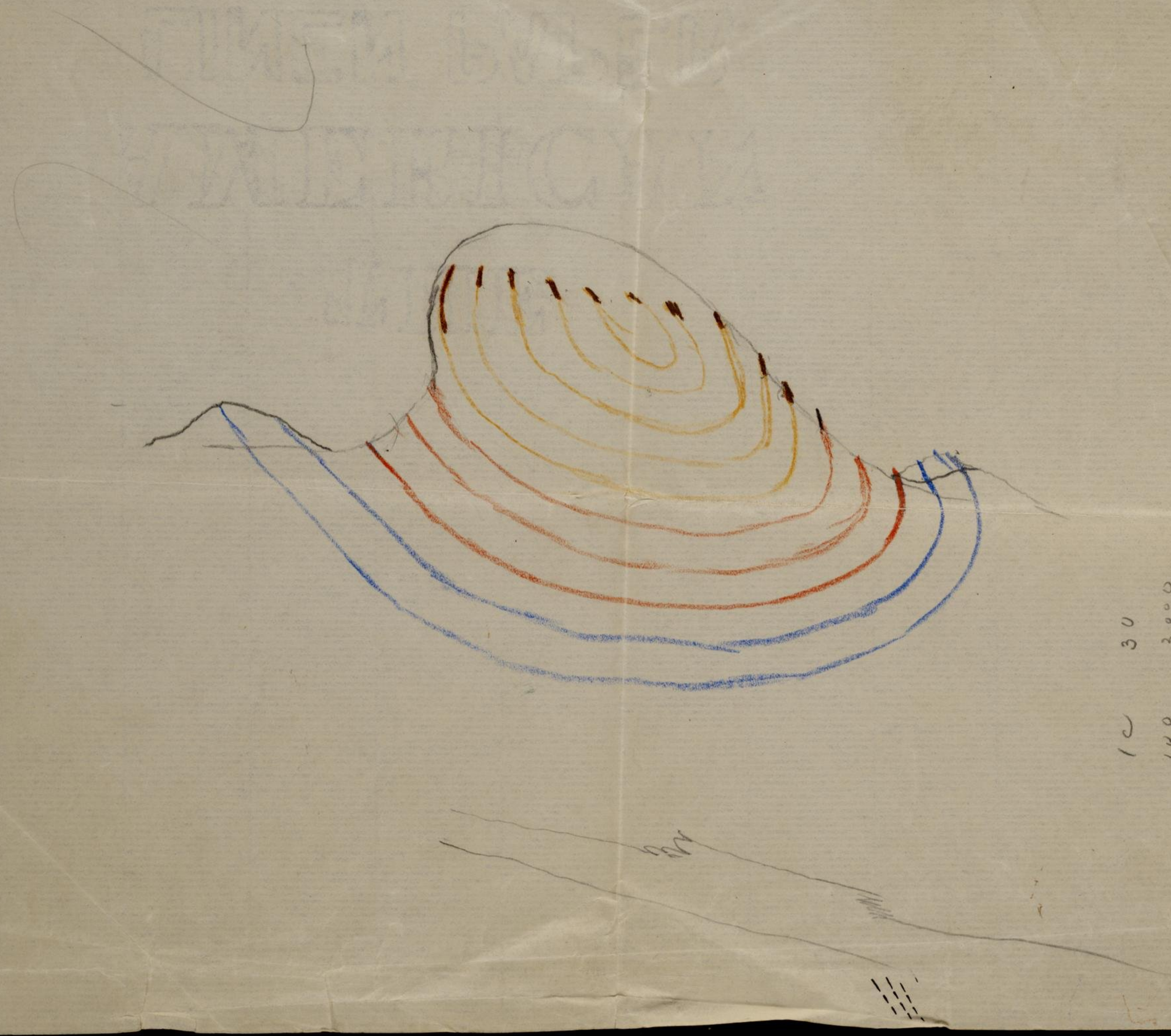
r5894 Hornblende-biotite-gneiss from branch about 3 miles N.W. of Opelika. This is a fresh phase of one of the contorted ~~banded~~ injected varieties.

r5895 White marble } 3 interlaminated
r5896 Gray marble } varieties from some beds
r5897 Blue marble } several ft. through.

The changes from one to another are abrupt, and sometimes take place in but a few inches, although ~~more common in thicker beds~~ some occur in thicker beds. Strike NE-SW. Dip on the SE. side of the quarry to the SE., and at the N.W. side of the quarry to the N.W. less steeply.
Therefore here is an anticline with N.W. axial plane, thus

SE.  N.W.

25898 Blue limestone overlain by
25899 micaceous schist, showing exact
contact about 2 or 3 miles N.E. of
quarter from which 25895-7 were taken.
Strike N.E.-S.W. Dip flat to the
N.W. The change is apparently a
gradation to some extent at least.
The limestone belt is about 6 miles
S.E. of Opelika. Between a coarse
augen gneiss is the predominant
rock. Has finely gneissic phases
intercalated. The limestone-schist belt
is similar to that S.E. of Demorest
in Georgia, and may be a continuation
of this general series, for to the
N.W. of it in each case lies the
main crystalline area of the Blue Ridge.
N.W. of this main area are the semi-
crystalline Talladega series, which are
supposed to be the Alabama equiva-
lents of the Ocoee to the N.W. The
question arises whether the crystalline
series S.E. of the main Blue Ridge
one may not be correlated with the
Ocoee semicrystallines to the N.W.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100 3000