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Report on the Sloss Co. Properties Contents of A - General Description Topography and Geological Formations

William Ruffner

Report on the Sloss I. & S. Co. W. H. R

Contents of A

Letter to Mr Seddon—

Lexington, Virginia,
November 27, 1888—

Thomas Seddon, Esq:
President of the Sloss Iron and Steel Company—

My Dear Sir—

Herewith I transmit to you my Report on the Landed Property of your Company. It contains, besides the report proper, a general account of the Mineral region of Alabama. In fact, the document embodies the results of my six-years study of the country;—and contains information nowhere else to be found in systematic form.

The mode of treatment is elementary,—much more so than is needed by yourself and others who are already intelligent on the subject. I try to make every thing clear to the least-informed reader; but I also indicate to those better informed how they may omit such explanations as they may not need.

I have been gratified at your intelligent appreciation, and that of your company, of the sort of work I was employed to do, and hope that the information given may be regarded as justifying your good opinion.

Personally, My dear Mr. Seddon, I have occasion to thank you, as on many former occasions, for

your confidence and your kind offices. Allow me also to mention thankfully the friendly services of Mr. Williams, Mr. Robertson, Mr. Tutwiler and others connected with your company.

Very truly yours,
W. A. Ruffner

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Report on the Landed Property of the Sloss Iron and Steel Company.

By W. H. Ruffner

To make this Report clear to the reader who may wish to read all of it, and to guide the reader, who may wish to read only certain parts, I not only arrange the topics systematically with descriptive headings, but I begin at once with an outline of the whole Report, and follow this with a full Table of Contents (p 6)

My aim is to prepare a permanent document concerning the Sloss property; not minute in every part, for this were impossible under the circumstances; but comprehensive, accurate as far as it goes, and founded upon topographical, geological and mineralogical facts and expositions, which will form a permanent basis not only for my present observations, but also for the future studies, reports, and developments of all who work in the same field, either scientifically or practically. In other words, I aim not only to give present information concerning the Sloss property, but to furnish a guide-book for all who serve the Company hereafter.

Outline of the Report.

I divide my Report into six parts -

see Table of Contents for condensed statement.

Outline of Part 1.

This part is subdivided into numerous topics as follows.

1. Introduction, in which I give some account of how the examination of the property was conducted.

2. Under this head I give some general account of the mineral lands owned by the Sloss Co.; their inclusive area, their locations, their elements of value, the different modes of tenure by which they are held and the number of acres in each class.

3. Under the third head, I sketch the topography of the area containing these lands, showing that the South end is an undulating region, with but few salient ridges, whilst the bulk of the area is made up chiefly of long lines of parallel ridges with narrow valleys between; the whole of the high country flanked with a wide plateau on each side.

4. I next describe the rock strata as to their lithology, the order of their grouping and the geological periods to which they belong.

5. I next give a general account of the valuable minerals belonging to the several rock groups,

viz: iron ores, coal, gold, limestone, sandstones and clay. At the same time I notice any other elements of value, such as timber, agricultural lands, etc. which the several tracts may posess. Of course iron ore and coal are most fully treated.

6. Under the sixth head, I give the geological structure of this region: that is, referring to the topography I tell how the rocks lie in the ridges and valleys, the character of the rocks in each, and the geologic period to which they severally belong. At the same time I indicate briefly where lie the valuable minerals before described.

Outline of Part II.

I now enter upon the special description of the various tracts of land belonging to the Sloss Company. The descriptive matter which has gone before makes it easy to locate the several tracts, and to give their physical and geological character and their mineral contents.

The mode of treatment is to go through with the iron and limestone lands first, and then treat of the coal lands; noticing however the subordinate interests incidentally in connection with each tract as considered. This plan of treatment is natural, and harmonizes with the topography and geology of the area as well as the location of the mineral beds. Beginning with the Southern tracts, I at the same time begin with the bottom rocks geo-

logically, and as I move North, I at the same time move upward geologically.

By reference to Mr. Barker's land map, it will be seen, that the Sloss lands lie in bunches or groups, with a few outlying tracts. These groups I consider as groups, and not as sections, or 40s. I give a name to each group which makes it easier to follow my descriptions.

This detailed account which I give of the Sloss tracts which were visited by me concludes Part II.

Outline of Part III.

Part III consists simply of partial analyses made by Mr. Carter of samples of iron ore which I personally collected from the Sloss lands. It will be observed that only the iron, silica and lime were determined in these analyses; but I will here state that Mr. Carter was furnished with a set of small bottles in which he promised to keep a part of each sample, so that in future any or all of the ores can be exhaustively analyzed if so desired.

Outline of Part IV

This Part consists of Practical Suggestions as to various points which I thought called for immediate attention. These have reference to the development of the property at different points, to the purchase of additional

tracts necessary to give greater value to some now possessed, to settle certain land lines, to dispose of timber etc. etc.,

Outline of Part V.

This consists of a description of the furnace properties of Birmingham and North Birmingham by the General Manager, Mr. Kenneth Robertson.

Outline of Part VI.

In this Part I give a Concluding Summary of the most important points embodied in the Report, with remarks.

Table of Contents

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List of Maps & Sections (in separate package).

Partial Map of Alabama.

Table of Sections, to wit:

Vance's, 3 Sections,
Woodstock & Blocton,
Bessemer & Sloss Mines,
Irondale, 4 Sections,
Newcastle,
So. of Tinkley Creek,
Higginbotham Mtn. & Clayton's Cove,
Allgood Gap (Brown Ore),
Fanet's at Vance's,
Column of geological formations.
across Main Valley & Little Basin.

Barkin's Land Map.

Report.

Part I.

1. Introduction.

The examination.

I spent most of the last Spring and Summer in examining the lands of the Sloss Iron and Steel Company with special reference to its iron making materials; giving an eye at the same time to any other valuable contents which might exist therein. The property being very large and scattered, I could not of course in three or four months study every part in minute detail. Hence, speaking generally, my examination was rather a reconnoisance than a survey. But I dwelt on each tract long enough to understand its main features and form an opinion as to its probable value. Most time was given to the tracts regarded as specially valuable, and those whose contents were promising but as yet undeveloped. I did not dig much except in

one locality, but I had the advantage of a line of diggings made on West Red Mountain, North of Birmingham by the Louisville and Nashville Railroad Company. By the help of these and other occasional openings, and guided always by natural geological indications, I was able to accumulate such facts and observations as I thought would meet the design of the Company in employing me.

My chief embarrassment arose from the want of exact information as to the boundary lines of the tracts. Nobody really knew in most cases, but I could generally get such neighborhood testimony as enabled me to find the tracts without difficulty, but this was not sufficient to enable me to decide questions of ownerships near the borders. Whilst such uncertainties were annoying I do not know that they materially impair the value of my observations except in a few cases. For, although I might not in considering a particular

spot know whether it were Sloss land or not, I could feel sure that I was near enough to avoid any serious mistake.

2. A General Description of the Sloss Properties.

In eight counties.

The Sloss lands lie in eight adjoining counties - namely - Tuscaloosa, Bibb, Shelby, Chilton, Jefferson, St. Clair, Blount and Etowah. The string is about 100 miles long and 40 miles wide in the widest part. Birmingham stands about the middle of the group. The topography and transportation lines make nearly all the tracts convenient of access, as will easily be seen by the accompanying maps.

Values.

All of these lands are, or were expected to be, mineral lands suited to the purposes of the Company, and a large proportion of them do contain either iron ore, coal or limestone. Besides these many of them possess other elements of value; such as timber, farming lands, lime-rock, building stones,

town lots, &c.

Tenure. These lands are held variously; some of them in fee simple, others only by mineral right, others by undivided half mineral right, and in two cases at least by one third mineral right. According to the documents furnished me the number of acres held by these different tenures are respectively

Below I give aggregates obtained by counting tracts as given on Barkin's Map: wh. is defective in that it does not indicate wh. of the tracts are joint. These are important tho' not numerous.

		No. of acres.
Exclusive of coalbeng	In fee simple --	12,640
	Mineral right --	17,060
	Coalbeng -	
	Fee	10,160
	Mineral	2,920
	Total	42,780
Furnace Lots		
	In Birmingham	11
	" North Birmingham	60

3. The General Topography of the Region.

Topography. The Southern part of the region, say south of Lat. 33°, which includes most of the County of Chilton is simply a hill country. The Sloss lands lie in the Eastern

The Hill-Country

half of the county. This region is watered by the Wayahatchie creek, Yellow Leaf creek, which empties into the Wayahatchie, and Walnut creek. All the drainage is into the Coosa River.

I observed only two salient ridges; one of them is near the junction of the Yellow Leaf with the Wayahatchie 100' to 200' in height with a N.E. trend; the other, and more continuous and commanding ridge crosses the country in a general East and West direction but with a Southerly inclination toward the East, and reaches the Coosa River in Township 22. Its axis seems to cross the Louisville and Nashville railroad near Jamieson Station. Its average elevation is about 200' above the surrounding country. One of its high points was used as a flag station by the Coast Survey. Locally this ridge is called Hayes' Mountain in one part, and Rocky Mountain at another.

The Mountain Country. The country North of parallel

33° is what is known as the Mountain country. Prof. Tourney put its beginning at Big Sandy Creek, sixteen miles South East of the city of Tuscaloosa. This South line is interesting, for here the great Appalachian Mountain System dies out; although geologically Hayes' ridge above mentioned is, if not a part at least an outlier of the system. We may however say in general, that a line drawn from Centreville through the city of Tuscaloosa would sufficiently indicate the South West limit of the Appalachian Mountain Chain.

The same line if prolonged to the South East until it passes five or six miles beyond Clanton, would indicate in a general way the extreme Southerly limit of the Blosslands. The extreme northern limit to which these lands extend would in like manner be indicated by a line beginning a little South of Attalla, crossing Blount Mountain and Murphree's Valley a little South of Walnut Grove.

The East and West edges are too irregular to be limited by straight lines, and can only be clearly indicated by local descriptions. There is nothing East of the A. G. S. road and nothing West of the Locust Warrior.

Birmingham Valley. The valley in which Birmingham is situated forms the central line of this region from the South West to the North East limit, and is topographically as well as geologically the commanding axis or key of the whole. This valley is called Roup's Valley from the Southern extremity as far as the gap in the West Red Mountain where Valley Creek passes through near Old Jonesboro. From this gap to Village Springs it has been called Jones' Valley, and from Village Springs to its northern extremity Murphree's Valley. When I speak of the Birmingham Valley I mean this entire valley from end to end. This valley runs between the two Red Mountains (East and West) which may be said to bound the valley on either side throughout its whole length, although in fact there are breaks; one of them

Two lines of Red Mtn.

in the West Red Mountain of ten miles. And North of Village Springs East Red Mountain has but little prominence, and in some places does not appear above the surface. Along this part of the line Blount Mountain is generally the boundary line of the Valley.

South of Village Springs on the East side there is an offset and a gap. The distance between the lines of Red Mountain varies from less than one mile at Village Springs, to four or five miles not far South of that point. These lines of Red Mountain are usually 200' or 300' in height above the bottom of the valley and in rare cases reaches 400'. It often however tapers down to nothing.

Chert ridges.

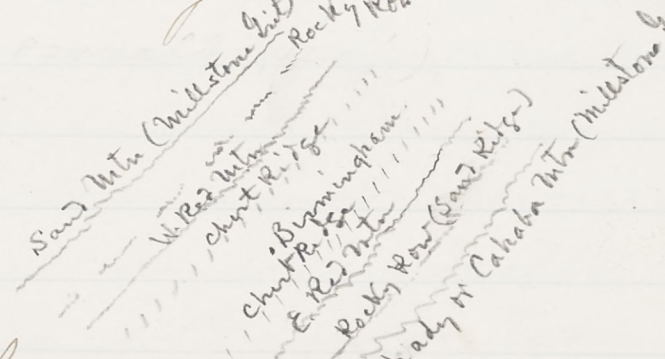
Within the Valley between the two Red Mountains are usually two ridges, though sometimes only one, running parallel with the Red Mountains. These intermediate ridges are usually covered with chert blocks and gravel, and at intervals with patches of iron ore.

though usually lower, occasionally they rise as high as Red Mountain. So much for the Birmingham Valley proper.

Two lines of Sand Mtn. outside.

Outside of the two Red Mountains run another pair of mountains separated from Red Mountain in each case by a narrow valley.

See Map.



The outside mountains usually present a mural or cliff front on their inward faces, whilst the slopes in the rear are comparatively gentle, and soon merge into broad plateaus. On the West side the outside line is usually called Sand mountain. On the East side it is called Cahaba Mountain as far as Springville where there is a skip westward to Blount Mountain which latter name it bears to the head of the valley. There are irregularities in these outside mountains as there are in the Red Moun-

tains.

Usually between the Red Mountains and these outlying sandstone Mountains the valleys have sufficient width for cultivation, but sometimes they are narrowed into mere defiles, and sometimes are wholly extinguished. Wherever these valleys exist there is an outcrop of hard sandstone forming a middle rib which sometimes becomes quite prominent and is locally known either as Sand Ridge or Rocky Row, the latter name being preferable.

Six parallel ridges in pairs.

Thus we really have between and including the two Sand Mountains when all are in place, six parallel ridges more or less prominent, and five, perhaps we might say seven, trough like valleys. These valleys are usually fertile, and inhabited by an industrious and orderly people, though taken separately not exceeding a fourth of a mile in width.

The Springville Valley.

There is one important offshoot from this leading group of valleys which must be described.

I refer to the valley which begins between Trussville and Springville which is also flanked on each side with a Red Mountain and extends indefinitely to the North East, furnishing a tract for the Alabama Great Southern Railroad and preserving a general parallelism to the main valley, with a tendency to a widening of the intermediate space Northward. On the South East side the line of Red Mountain is irregular, and rarely prominent, but on the North West side, is well defined and exhibits its usual characteristics, though on an average not so high or so regular as in the Birmingham Valley. Between this Valley which we may call the Springville Valley and Murphree's Valley lies the mass of Blount Mountain, which is simply a plateau country with a bold line of cliff on the East, West and South. And at the South end of Blount Mountain there is a cross valley called Clayton's Cove, which nearly connects the Springville valley with the Birmingham Valley.

Blount Mtn

Chandler's Mtn. Opposite to Steele's there is a small mountain, called Chandler's Mountain, cut off by denudation from Blount Mountain and likewise showing a cliff front on every side.

These Sand mountains are usually of about the same height as the Red Mountains, though in some places they are higher.

Cahaba Valley. There is another valley on the South East, ten to fifteen miles from the Birmingham Valley, and parallel with it and of greater length. It is known as the Cahaba Valley along a large part of its length, and I shall give it this name along its whole length. It lies between the Coosa and Cahaba Coal fields. At the North end it merges into the Springville Valley; the Cahaba Coal field which separated the two having been cut off. Toward the South end it widens and merges into the hill country of Chilton and Bibb Counties.

Coosa Mtn. On the South East side of this valley runs the Coosa Mountain,

another Sand Conglomerate Mountain which corresponds with the Sand Mountains that outlie and are parallel with the Birmingham Valley. There is no Sand Mountain on the North West side of the Cahaba Valley next to the Cahaba Coal field, the mountain naturally belonging here having dropped out of sight along the line of the fault; but there is a high Chert ridge running along the line of the fault.

This Valley is crossed by the Georgia Pacific Railway and the Columbus & Western Railway at Leeds, and the Louisville and Nashville Railroad enters it at Helena, and crosses it diagonally at Calera. Whiting Station on the Louisville and Nashville Railroad is in this Valley and will be spoken of hereafter.

Oak Ridges. In the Cahaba Valley as in some other corresponding valleys a subordinate ridge known as Oak Ridge lies at the foot of the Coosa Mountain, and is characterized by beds of limonite (or brown

iron ore).

Coosa Valley. On the opposite side of the Coosa Coal Field, and fronting the main valley of Coosa River run lines of mountains similar to those just described, but less prominent. The outlying ridge corresponds with the Oak Ridge of Cahaba Valley. It rises sometimes at least 300', and carries some large pockets of limonite.

Topography of Coal Fields. It only remains to give some account of the topography of the coal fields, so far as included in our survey. Whilst in a few localities the surface of the coal fields scarcely rises above the level of the leading valleys above described, generally the level of the plateaus, that is, the high table lands, is 100' to 200' above the valleys. But there are many variations in the height and width of the plateaus, and ravines run in every direction. There is a bold ridge in the coal fields usually running behind, parallel to the Sand Mountains, which is often equally high and composed

of harder materials. It is tunneled by the Georgia Pacific Railway near Kerr's Gap. This is the only characteristic ridge that I have observed in the coal fields. There are numerous steep and high ridges, but they are local: none of them except the one just mentioned having the length and uniform trend of the ridges in the valleys, which latter are ~~the~~ in fact the regular ribs of the Appalachian System.

Drainage. The drainage of the Birmingham Valley is into the Black Warrior River. The Springville and Cahaba Valleys belong to the Cahaba basin. The trough of the Black Warrior is about 200' lower than the Birmingham Valley. The Cahaba River has not ploughed so deeply into the country.

Geological Formations

The Geological Formations represented in this Region.

The hill country spoken of as lying in the South and South East of our area, is composed mainly of the oldest group of rocks, but not of the oldest division of these

Archean rocks. The Archaen, or oldest of formations, is usually divided into two parts- namely- the Laurentian, the lower, and Auronian, the upper. The Laurentian rocks are usually harder and more massive than the Auronian. Granite, Syanite & other Hornblendic rocks, also hard mica, slates &c usually make up the Laurentian system. The Auronian rocks are less massive and more friable. They consist of silicious and argillaceous slates and Conglomerates, Micaceous and Hornblendic Schists and Slates, Chlorites, Epidote and Limestones. These rocks also carry beds of iron ore of every sort, magnetite, limonite and hematite. In other parts of the country such beds are also found in the Laurentian division. But according to my observation this is not true any where South of the Potomac. This point however will be specially considered under the next head.

Divisions Laurentian & Auronian

The Auronian rocks constitute the body of this country, but

Quaternary or Drift.

there is over the most of it a top-dressing of drifted material belonging geologically to the opposite end of the scale, namely, the Quaternary, the most modern. This is composed of sand, gravel (generally in the form of rounded Quartz pebbles) clay and iron ore. A thin sprinkling of this material is to be found in the valleys belonging to what is known as the Mountain region for a considerable distance North of the hill country. I observed it in the Northern part of Bibb County and over the highest ridges about Vance's. It does not form a continuous sheet, however, in any part of the region we are specially considering. In Chilton County there are large areas which show nothing but drift, generally fine grained. The only stratification being of the iron ore which seems to be of the nature of a bog deposit generally but two or three inches in thickness, though locally it may be of as many feet. On the higher grounds are

usually to be seen only scattered white pebbles which do not conceal the underlying rocks, and in many places even these are wholly wanting.

Silurian

Returning to the regular geologic order, we find the Silurian rocks immediately associated with, and overlying the Auronian. The bottom group of the Silurian is the Potsdam Sandstone formation, which is largely developed further North as in the Anniston and Talladega region, and in the Valley of Choccoloco Creek. The only rocks I saw in the region under review which I could ascribe to the Potsdam series was the quartzite ridge which I spoke of as running East and West through Chilton County. It seems to stand in the midst of Auronian rocks on both sides of it. This however seems to belong rather to the question of structure which will be hereafter considered.

Bottom Group of Silurian: Potsdam Sandstone.

The Potsdam rocks usually consist of heavy beds of hard

sandstone, or quartzite with alternate beds of clay and damourite slates carrying iron ores. A part of the Anniston furnace supply of ores comes from this group.

Moving northward we enter the mountain country, which we find to be composed of the higher rocks in regular ascending order.

New Y. Lower Silurian limestone

The Lower Silurian limestones, which in Alabama belong geologically next above the Potsdam Sandstones and Shales, form the basis of the mountain region, and show themselves in the leading valleys. These limestones are variously subdivided by geologists, and in nature vary in different parts of the United States. In Alabama they differ from the same group in the Northern States chiefly in the omission of certain strata. In fact, beginning in New York and coming Southward, we find a gradual "petering out" and disappearance of one set of strata after another, until on reaching Alabama we find that taking both Upper and Lower Silurian

we have lost more than half the subdivisions with which we started.

I have seen nothing in Alabama which seems to correspond with Dana's Calciferous division or Safford's Tennessee Knox Sandstone and but little of his Knox Shales. They are however reported in localities which I have not studied. Between the Potsdam Sandstone group and the Chazy, I have seen only a thick bed of blue limestone, the upper half of which is in somewhat massive layers, whilst the lower half seems to have had originally a laminated and flaggy structure, but was subsequently cracked in various directions and finally cemented into a solid mass, at least in many places, by the infiltration of calcareous waters which deposited streaks and seams of calcareous spar in every direction. This Sparry division has also been noticed in the disturbed region of

South West Virginia, but not North of the great watershed at Christiansburg. The same phenomenon is often seen in the Trenton limestone in Virginia.

This limestone seems to correspond most nearly with Dana's Quebec, and Safford's Knox Dolomite.

Dolomite. Sub-division.

I simply call it the Dolomites or Dolomitic Group, because the rocks of this group are usually characterized by a considerable proportion of Magnesian limestone. The upper layers contain nodules of Chert. I do not know the exact thickness of the dolomite but taking lower and upper it probably exceeds 1000'. This is the chief iron bearing limestone. It makes good soil.

Chazy Sub-division.

The Chazy division of the Lower Silurian rocks comes next in ascending order. It is 200' to 300' thick and is composed chiefly of pale blue argillaceous limestone, interstratified with what are beds of chert and cherty

conglomerate: and also through the body of the limestone are nodules and blocks of chert. This disengaged chert bestrews the face of the country largely. Some iron is found in the Chazy (Shāsy).

Trenton Sub-Division.

The Trenton is the upper of the three divisions into which the Lower Silurian limestones may be conveniently divided. This is a good blue limestone of a few hundred feet in thickness, massive near the bottom and flaggy near the top, though not running into shaly limestone or calcareous shales like the Hudson River or Cincinnati group.

Gap in the Series.

Now we have a notable gap in the series.

In Virginia and northward the heavy Sandstone beds of the Medina group overlie the Trenton, but in Alabama I have not seen any Medina rocks. I suspect that the Southern shore of the Medina sea was in East

Tennessee.

Upper Silurian. The Clinton group in Alabama lies immediately upon the Trenton limestones. This group is 100' to 400' thick, and consists of sandstones chiefly red, shales chiefly yellow, some layers of highly ferruginous limestone, and stratified beds of iron ore: all of which will be fully described under the next head.

Gap again: no Helderberg, or Oriskany. Ascending we miss two interesting and important divisions of the Silurian system as it exists in Virginia and Northward, namely, the Lower Helderberg Limestone and the Oriskany Sandstone. The latter derives its importance from its great iron ore beds, and the former from its purity and convenient position for furnace use.

The Clinton is the top group of the Silurian system of Alabama.

Devonian. The Devonian Age comes next and forms a highly important member of the geologic scale every where in the Appa-

lachian range except in Alabama and Tennessee. In Pennsylvania its rocks are 14000' thick: in Virginia, nearly 1000': in Tennessee 100', and in Alabama 25'. All that we find in Alabama is a thin bed of black shale, which probably belongs near to the bottom of the Devonian group: which shows that the Devonian sea shore remained as far South as Alabama only for a comparatively short time, and that it gradually retreated Northward: whilst its waters were deepest and remained longest in the region of Pennsylvania. The thin bed in Alabama is friable and rarely shows itself. It is locally called "black band": a name likely to be confounded with the black band ore beds of the coal measures, and hence should be dropped.

Very thin.

Carboniferous. We now pass to the next higher grand division of the Palæozoic rocks, namely, the Carboniferous. I here include

Includes Sub-Carboniferous. in this term (as does Prof. Safford) the Sub-Carboniferous division: because in Tennessee and Virginia coal beds of importance are found in this group: but I shall use the term Sub-Carboniferous to distinguish the rocks below the Sand Mountain Conglomerate from the regular coal measures which lie above.

Described. The Sub-Carboniferous formation in Alabama is about 1000' thick and consists of sandstones, shales, chert and limestones. In my Report to the Georgia Pacific Railway company, I divide this group into five parts. In this Report I ~~xxxxxxx~~ make 6 divisions. ~~xx xxxxxxx~~.

It is with these rocks as with others they thicken northward. In Alabama they are something over 1000'; as above stated. In Tennessee they are given as 1350'; in Virginia they are 4500'; and in Pennsylvania still thicker. They are variously divided by the geologists in these several States, and yet they have certain characteristic resemblances which I think may lead to a satisfactory

correlation of the rocks along the whole line. It is worth while to study them, because they carry coal beds (not much noticed hitherto in Alabama) iron ores and limestones of superior quality.

In the Alabama group the lowest member is a hard, white and sometimes conglomerate sandstone associated with chert and variegated shales.

The second member ascending is both silicious and calcareous, generally containing a bed of limestone holding chert nodules decomposing into a very red soil, and at many points into a good brown iron ore.

Above this comes a bed of white sandstone, generally hard, and forming a low ridge usually called Rocky Row or Sand Ridge.

Above this is what is called the mountain limestone, well known for its purity and value as a flux, but it should be noted

what is not generally observed that there is usually between it and the Sandstone of Rocky Row a thin bed of black slate which further north thickens immensely. This slate is No. 4 of my new division.

The top member of the Sub-Carboniferous, No. 6, is a thick bed of shales and sandstones holding a number of thin coal seams in Alabama, as at Brock's Gap, and as reported by Gen. Gibson, much better developed in North Alabama along Sand Mountain, which Northward takes the name of Raccoon Mountain. These coal beds should be called the sub-conglomerate coals, because they underlie the great Sand Mountain Conglomerate or Millstone Grit. Although practically so unnoticed in Alabama, they thicken into importance in Tennessee, where there are at least three beds, one of which is the Aetna.

Sometimes contain coal seams which should be called Sub-Conglomerate coal seams.

Scarcely noticeable in Ala. Important in Tenn.

These coal seams do not seem to exist to any noticeable extent in Virginia, West Virginia,

and Pennsylvania.

Still lower seams in S. W. Va

But in South West Virginia there come in some small, though not unimportant, seams in the shales below the Mountain limestone, those shales which I mentioned awhile ago as thickening immensely northward.

I should remark here that in the Virginia group there is but one bed of limestone sub-carboniferous formation, and that is 800' thick.

Inasmuch as the coal field of Alabama has as yet been very imperfectly developed, I think it worth while to give a table showing in parallel columns the variations of the sub-carboniferous formation as seen in Tennessee and South West Virginia.

The Sub-Carboniferous Formation in Virginia, Tennessee and Alabama.

S.W. Virginia Section Descending	Ft.	Tennessee Section	Ft.	Alabama Section	Ft.
6. Variegated shales & sandstones, brown, red, greenish yellow; with a thin seam of coal near the top, & in some places limonite & spathic iron ore	1200.	6. Sandstones & shales, with 3 to 4 coal seams, & spathic iron ore	200.	6. Shales and sandstones, rather soft, generally yellow, sometimes greenish or orange red: thin seams of coal & iron ore in the upper part.	500.
5. Mountain Limestone of fine quality, containing Lithostrotion Canadense: making fertile soil	800.	5. Limestones, shales & marls of varied colors & texture.	160.	5. Mountain Limestone, light blue, pure: beds of shale & chert: black shale on top, sometimes all shale & chert	75 to 450.
4. Red shales	300	4. Variegated shales & limestones in layers.	180	4. Dark shale	20.
Dark slates	600				
Variable material	50				
Coal, very slaty	9				
Fossiliferous shales & sandstones	25	no coal		no coal	
Coal: Semi-anthracite, good: 3 to	2				
Dark shale	10				
3. "Quarry Rock" a massive, gray micaceous quartz sandstone	200	3. Sandstone, fine grained, more or less flaggy	48	3. Sandstone, whitish, sometimes hard, & flinty, usually fine grained to gritty	20 to 50
2. Soft clay shales & yellowish flags	300	2. Limestones, cherty, sparry & sandy.	340	2. Limestone, thin, siliceous: crinoidal chert; making deep red soil, yielding iron ore	20 to 150
1. Hard white Sandstone with base courses of Conglomerate, containing pebbles generally pea-sized, but sometimes (rarely) the size of a bird's egg. The upper part of the bed micaceous, flaggy sandstone.	500	1. Siliceous, cherty calcareous rock	110	1. Whitish sandstones, sometimes impure, sometimes conglomerate, sometimes with alternating beds of shale, and a little iron ore	20 to 100

Carboniferous proper.

The name Carboniferous is usually confined to the rocks overlying those which have just been described. They begin with the Great Conglomerate Sandstone, The cliff rock of the outside mountains a rock which is familiar to all who have either read on the subject or travelled along the margin of the coal measures. The old English name Millstone Grit is still applied to it, and people still call it incorrectly the floor of the coal measures. As I claim to be the first to fix the place of the Alabama coal beds, in the face to of Scientific opposition, I will give some account of this formation, and shall use the divisions first established by the Rogers brothers, Henry in Pennsylvania, and William in Virginia. They numbered the whole of the Paleozoic series with the Roman numbers. The Potsdam Sandstone was number I. This Great Conglomerate rock of which I have just spoken was numbered No. XII. XII; and the Carboniferous series then ran from XII to XVI inclusive. The Rogers

brothers, especially William in Virginia, knew that this Great Conglomerate was properly divisible into two plates, which in New York ~~was~~ were separated by only a few inches of shale, which in Pennsylvania increased to 30' in the Northern part, and thickened Southward until by the time it reached New River, Virginia these two conglomerate plates were a thousand feet apart, and held important Coal Seams, viz. the Guinnemont, Pocahontas etc.; which however remained unnoticed until a recent period, and it is only within five years that geologists have admitted that this group extends South of Virginia. Geologists considered the bottom plate of the Great Conglomerate as embracing the whole of No. XII South of Virginia. Prof. Safford, who is a very able and well informed Geologist, regarded all the Coal formed above the two conglomerate in Tennessee and Alabama as belonging to No. XIII, which

Two plates

Error of the Geologists.

holds the most noted group of the soft coals of Pennsylvania and West Virginia. In this he was followed by Prof. Eugene A. Smith, Prof. J. L. Campbell and all other geologists, so far as I know, who visited the region. My researches, however, convinced me in less than a week that the coal beds of Alabama belonged not to No. XIII, but to No. XII. That is, their place geologically was between these two great plates of conglomerate of which I have just spoken, and hence should be called the Inter-Conglomerate Coal Group. And this conclusion I reached in spite of the fact that so far as I could discover the top conglomerate is wanting in Alabama.

Inter-Conglomerate Coals in Ala.

From what I have read of Prof. Safford's Geology of Tennessee, etc., and from my own observations in the Southern part of Tennessee near Chattanooga I think that all the coals of Tennessee lying above the Millstone Grit are Inter Conglomerate Coals, and

In Tenn. the Same

that in the Northern part of the State, where the rocks have suffered less denudation, these Inter Conglomerate Coal measures are very thick, perhaps over 2000'. If XIII exists anywhere in Tennessee it is near Cumberland Gap.

I also suspect that South of Jefferson County, Alabama this coal group continues to thicken until it dips beneath the surface at Tuscaloosa.

In Jefferson County, as stated in my Report to the Georgia Pacific Railway Company, I suppose there is left of the group about 2000': perhaps 2500'.

Prof. McCalley, of the Ala. geological Survey, gives the total thickness of the coal measures in Tuscaloosa County as over 3000', and I observe that Prof. McCalley ~~of the Ala. Survey~~ now properly denominates these coals Inter-Conglomerate, and I have also observed that the Northern geologists are doing the same of late.

Those who wish to study the

details of the Coal field as seen near Birmingham are referred to my Georgia Pacific Report. After the publication of that Report I made a special study of the Coosa and Cahaba coal fields and made Reports to the same Rail road Company. These have not been published, but no doubt could be seen by anyone wishing to study the Alabama Coal field.

Report on Ga. Pac. route.

Prof. McCalley's Report on the Warrior field is open to criticism, but has a great many details that are valuable. More will be said upon this subject under the next head.

Later Formations.

No later formation in this part of Ala., except Drift.

Formations newer than the Carboniferous are to be found South and South West of the area just described, but excepting the Quaternary Drift before mentioned, none of these newer rocks are to be found in the region we are specially considering, and hence will not be described.

We now pass from this general sketch of the geologic series to a consideration of the valuable minerals which are to be found imbedded in these formations in Alabama, and elsewhere.