COLUMNAR SECTIONS

GENERALIZED SECTION OF THE SEDIMENTARY ROCKS OF THE BESSEMER AND VANDIVER QUADRANGLES

SCALE: 1 INCH=1,000 FEET

System	Series	Formation	Birmingham Valley and Warrior Coal Field: Section	Birmingham Valley and Warrior Coal Field: Minor Divisions	Shades Valley and Cahaba Coal Field: Section	Shades Valley and Cahaba Coal Field: Minor Divisions	Cahaba Valley and Coosa Coal Field: Section	Cahaba Valley and Coosa Coal Field: Minor Divisions	Character of Rocks and Topography
CARBONIFEROUS	PENNSYLVANIAN	Pottsville formation.		Gwin coal. Razburg sandstone member. Cobb coal group. Camp Branch sandstone member. Pratt coal group. Mary Lee coal group. Black Creek coal group.		Helena coal. Straven conglomerate member. Thompson coal. Smithshop coal. Quarry coal. Gholson ? coal Clark ? (Little Pittsburgh) coal. Moyle coal. Youngblood (Black shale, Coke) coal. Buck (Atkins) coal Rocky Ridge sandstone member. Pump (Alice and Jones) coal. Coke Oven (Big Bone) coal. Wadsworth coal. Harkness coal. Nunnally coal group. Chestnut sandstone member. Gould coal. Pine sandstone member. Shades sandstone member. Sandstone of Bee Ridge.		Calvary coal. Red shale. Red shale. Thin coal. Martin coal. Straight Ridge coal. Straight Ridge sandstone member. Wolf Ridge coal. Wolf Ridge sandstone member. Howard coal. Nivens coal. Clow coal. Black shale. Cunningham coal.	Shale, sandstone, conglomerate, and coal beds. Sandstone siliceous and feldspathic (arkosic), thick-bedded and flaggy. The Shades, Pine, Chestnut, and Boyles sandstone members, which are siliceous, hard ridge makers, compose the "Millstone grit" of Alabama. The shale is generally of clayey composition and of dark color, but some is siliceous. This formation contains all the coal of Alabama.
				UNCONFORMITY Parkwood formation		Parkwood formation. Sandstone of Bluff Ridge. Sandstone of Little Shades Mountain.			Shale and sandstone, predominantly gray, much like the Pottsville, but without coal. Carries a sparse Mississippian fauna in lower part and a sparse fauna of Pennsylvanian aspect in upper part. Generally unfossiliferous.
		Boyles sandstone member.							Mainly dark to black clay shale including thin layers of argillaceous limestone and a considerable proportion of fine-grained greenish sandstone, apparently as a general rule in lenticular layers of no great extent. Some gray and finely conglomeratic sandstone. Bangor limestone in section No. 1 mainly gray, rather thick-bedded, fairly pure limestone.
	MISSISSIPPIAN	Upper tongue of Floyd shale.				Floyd shale.		Floyd shale.	
		Bangor limestone.							Hartselle sandstone: Gray medium thick-bedded hard to soft friable sandstone in Sand Ridge, along the southeast side of Red Mountain, southwestward about to the latitude of Bessemer.
		Hartselle sandstone.							Gasper formation: Mainly dark to black clay shale below the Hartselle sandstone in the valley between Sand Ridge and Red Mountain southwestward to the latitude of Bessemer, where it merges with the Floyd shale.
		Gasper formation.							Warsaw limestone: Thick-bedded, rather coarse grained bluish-gray limestone along the southeast base of Red Mountain and in the midde of Shades Valley in the the vicinity of Morgan and Bison Ford.
		Warsaw limestone.							Gray thick and thin bedded chert on crest and southeast slope of Red Mountain and Little Oak Mountain.
		Fort Payne chert.							Thin green and purplish shale (Chattanooga) and sandstone 2 to 10 feet thick (Frog Mountain sandstone)* of Oriskany age in Red Mountain and of Onondaga age in Little Oak Mountain.
D. or C.		Chattanooga shale and Frog Mountain sandstone		UNCONFORMITY		Little Oak limestone.			Thick-bedded dark, partly cherty fossiliferous limestone in Little Oak Mountain.
D.				UNCONFORMITY		Athens shale.			Black fissile graptolitic shale with layers of black argillaceous limestone.
SIL.		Red Mountain formation.		UNCONFORMITY		Lenoir limestone.			Thick-bedded dark medium-grained clay-veined limestone, the clay veins making a network on the surface of weathered layers of the limestone.
ORD.		Chickamauga limestone.		UNCONFORMITY		Mosheim limestone.			Thick-bedded compact light bluish-gray pure fossiliferous limestone. Fossils mostly gastropods.
						Odenville limestone.			Poorly exposed impure siliceous argillaceous limestone yielding chert and many silicified fossils.
CAMBRIAN OR ORDOVICIAN		Copper Ridge dolomite.				Newala limestone. Longview limestone. Chepultepec dolomite.			Thick-bedded compact light bluish-gray limestone with layers of dolomite and magnesian limestone. Yields no or very little chert. Many beds of Cahaba Valley extensively utilized for lime burning. Sparingly fossiliferous.
									Thick-bedded, partly magnesian limestone and dolomite yielding an abundance of rather brittle chert, which commonly contains silicified casts and impressions of fossils of the formation, especially its characteristic genus *Leconospira*.
		Ketona dolomite.		UNCONFORMITY					Medium thick-bedded, rather coarse grained dark bluish-gray dolomite yielding cavernous fossiliferous chert characteristic of the formation A considerable thickness of thick-bedded light bluish-gray compact limestone in basal part, at least locally.
CAMBRIAN	UPPER CAMBRIAN	Conasauga ("Coosa") limestone.		UNCONFORMITY					Thick-bedded, mainly dark bluish-gray dolomite; some light-gray fine-grained dolomite. Yields a profusion of boulders and large masses of dense jagged chert; much more than any other formation in Alabama; chert very sparingly fossiliferous.
	MIDDLE CAMBRIAN								Thick-bedded dark-gray dolomite which is an almost absolutely pure carbonate rock of strictly dolomitic composition. To a large extent contains not over 2 per cent of insoluble matter. Extensively utilized for flux in blast furnaces.
	LOWER CAMBRIAN								Mainly thin-bedded limestone with intercalated shale which aggregates a considerable proportion of the whole. Limestone somewhat impure, with argillaceous and siliceous matter and also somewhat magnesian. Makes low, flat, poorly drained land, called Flatwoods.
		Rome ("Montevallo") formation.		UNCONFORMITY					Red shale, fine-grained calcareous sandstone weathering rusty, and a small amount of limestone, some layers of which appear to be fairly pure. Generally makes rough land of low hills. Sparingly fossiliferous.

Chickamauga limestone: Thin-bedded fine argillaceous nodular limestone of Trenton age at top. Bentonite bed at base. Thin-bedded limestone above thicker-bedded below, of Black River age. Unconformity: Little Oak limestone and Athens shale absent. Thick-bedded limestone with impure nodular fossiliferous layers, variegated limestone shale and Attalla conglomerate at base; of Chazy age.

*Includes Clear Branch sandstone of Oriskany (Lower Devonian) age, on Red Mountain; Frog Mountain sandstone has recently been restricted to beds of Onondaga (Middle Devonian) age.

Ordovician and Cambrian formations of central Alabama, showing different usages and equivalents

System and series		Alabama						Tennessee (U. S. Geological Survey reports)				New York (New York State Survey reports)	
		Montevallo-Columbiana folio	Bessemer-Vandiver folio		Birmingham folio		Alabama Geological Survey reports	Central basin	Appalachian Valley				
			Cahaba Valley	Birmingham Valley	Birmingham Valley	Cahaba Valley			Western areas	Eastern areas			
										Knoxville folio	Morristown folio		
Ordovician.	Middle Ordovician.	Absent.	Absent.	Basal Trenton represented.	[Represented.]	[Absent.]		Trenton fully represented.	[Represented]	[Absent.]	[Sevier shale northwest of Clinch Mountain= Martinsburg shale. Lower part=Trenton.]	Trenton limestone.	
				Represented.	[Represented.]			[Not represented.]	[Represented?]		[Represented?]	Black River group.	Amsterdam limestone. Watertown limestone.
		?		Represented.	[Represented.]			Carters limestone.	[Represented.]	Bays sandstone.	Moccasin limestone. Northwest of Clinch Mountain. / Bays sandstone [typical]. Southeast of Clinch Mountain.		Leray limestone. Lowville limestone.
	Lower Ordovician.	Little Oak limestone.	Little Oak limestone.	Chickamauga limestone. Not represented.	Chickamauga ("Pelham") limestone. [Not represented.]	Chickamauga ("Pelham") limestone.	Pelham limestone.	[Not represented.]	Chickamauga limestone. [Probably not represented.]	Sevier shale [typical; Ottosee shale of Ulrich].	Sevier shale southeast of Clinch Mountain.	Chazy group.	Rysedorph conglomerate.
		Tellico sandstone not represented.	Not represented.							Tellico sandstone.	[Not represented.]		Normanskill shale and Valcour limestone.
		Athens shale.	Athens shale.							Athens shale.	Athens shale.		
		Absent.	Absent.							Holston marble member of Chickamauga limestone.	Chickamauga limestone southeast of Clinch Mountain.		
		Absent.	Absent.					Stones River group. Lebanon limestone.					Pamelia limestone.
		Lenoir limestone.	Lenoir limestone.	Stones River group represented. Attalla chert conglomerate member at base.	[Stones River group represented] Attalla conglomerate member at base.			Ridley limestone.					Crown Point limestone.
		Absent.	Absent.					Pierce limestone.		Chickamauga limestone.			
								Murfreesboro limestone. Bottom not exposed.	[Stones River limestone represented.]				Day Point limestone.
		Mosheim limestone.	Mosheim limestone.	Absent.	[Absent.]	?	?	[No lower rocks cropping out or exposed.]			?		
		Odenville limestone.	Odenville limestone.										
		Newala limestone.	Newala limestone.										Beekmantown limestone.
		Longview limestone.	Longview limestone.	Absent.	[Absent.]								
	Cambrian or Ordovician (Ozarkian system of Ulrich).	Chepultepec dolomite.	Chepultepec dolomite.	Absent.	Knox dolomite. [Absent except in Murphrees Valley.]	Knox dolomite. [Chepultepec dolomite present.]	Knox dolomite.		Knox dolomite.	Knox dolomite.	Knox dolomite.		Chert bed at top of Little Falls dolomite.
		Copper Ridge dolomite.	Copper Ridge dolomite.	Copper Ridge dolomite.	[Copper Ridge dolomite present.]	[Copper Ridge dolomite present.]							
		Bibb dolomite.	Bibb dolomite.	Absent.	[Absent.]	[Absent.]			[Absent.]	[Absent.]	[Absent.]		
		Ketona dolomite.	Ketona dolomite.	Ketona dolomite.	Ketona dolomite member.	Ketona dolomite member.							
		Brierfield dolomite.	Brierfield dolomite.	Absent.	[Absent.]	[Absent.]							Hoyt limestone. Theresa dolomite. Potsdam sandstone.
Cambrian.	Upper Cambrian.	Conasauga ("Coosa") limestone.	Absent.	Conasauga ("Coosa") limestone.	Conasauga ("Coosa") limestone.	[Absent.]	Coosa (Flatwoods) shale.		Conasauga shale.	Nolichucky shale. Maryville limestone. Rogersville shale.	Nolichucky shale. Maryville limestone. Rogersville shale.		
										Rutledge limestone.	Rutledge limestone.		
	Middle Cambrian.	Rome ("Montevallo") formation.	Rome ("Montevallo") formation.	Horizon not exposed.	[Horizon not exposed.]	Rome ("Montevallo") formation.	Montevallo variegated shales and sandstones.		Rome formation.	Rome formation.	Rome formation.		Stissing limestone.
	Lower Cambrian.	Absent (?); may be represented in Rome formation.	[No lower rocks cropping out or exposed.]				[Absent.]		Not exposed.	Beaver limestone. Apison shale.	[Not exposed.]		Lower Cambrian slates, quartzites, and limestones with Poughquag quartzite at base.
		Shady limestone.					Aldrich limestone.			[Not represented.]			
		Weisner quartzite.					Weisner sandstone and shale.			Hesse sandstone [or quartzite]. Murray shale. Nebo sandstone. Nichols shale. Cochran conglomerate.			

LIST OF IRON MINES
IN RED MOUNTAIN FORMATIOM

Location indicated on the map by numbers

1. Potter
2. No. 3 Raimund
3. No. 2 Raimund
4. No. 1 Raimund
5. No. 1 Muscoda
6. No. 2 Muscoda
7. No. 4 Muscoda
8. No. 5 Muscoda
9. No. 6 Muscoda
10. No. 1 Sloss
11. No. 2 Sloss
12. No. 1 Woodward
13. No. 3 Woodward
14. No. 2 Woodward
15. No. 6½ Wenonah
16. No. 7 Wenonah
17. No. 8 Wenonah
18. No. 9 Wenonah
19. No. 9½ Wenonah
20. No. 10 Wenonah
21. Songo
22. No. 11 Ishkooda
23. No. 12 Ishkooda
24. Clinton
25. No. 13 Ishkooda
26. No. 14 Ishkooda
27. No. 15 Ishkooda
28. Spaulding
29. Valley View
30. Hedona
31. Shannon slope

LIST OF COAL MINES

(COAL BEDS IN BLUE ON MAP)

Location indicated on the map by numbers

1. Wylam No. 8
2. Dolomite No. 1½
3. Dolomite No. 2
4. Dolomite No. 1
5. Acton No. 4
6. Acton No. 5
7. Acton No. 1
8. Acton No. 1½
9. Acton No. 2
10. Elvira
11. Ruffin
12. Paramont No. 2
13. Paramont No. 1
14. Falliston
15. Wadsworth Red Aash
16. Eureka No. 1
17. Eureka No. 4
18. Eureka No. 2
19. Janeway
20. Eureka No. 3
21. Coalmont No. 2
22. Coalmont No. 1
23. Coalmont No. 3
24. Coalmont No. 4
25. Mossboro No. 2
26. Mossboro No. 1
27. Bamford

DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

ILLUSTRATIONS I

ALABAMA
BESSEMER AND VANDIVER QUADRANGLES

PLATE I.—VIEW ACROSS CAHABA VALLEY FROM CREST OF LITTLE OAK RIDGE ABOUT 1 MILE SOUTHWEST OF KEYSTONE, LOOKING NORTHWEST

Valley on Lenoir, Newala, and Longview limestones. Newhope Mountain in the distance made by the Copper Ridge dolomite. Chepultepec dolomite crops out on slope

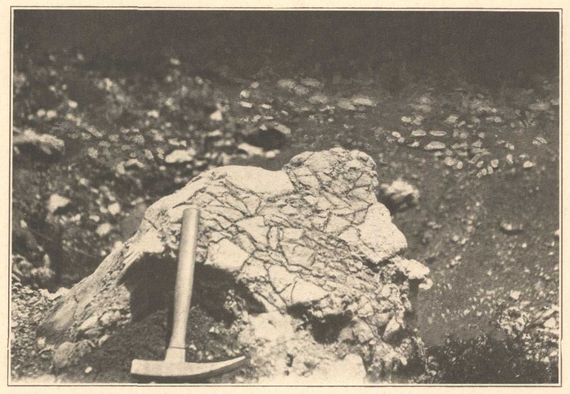

PLATE II.—BRECCIATED KETONA DOLOMITE IN QUARRY OF REPUBLIC IRON & STEEL CO., THOMAS, 4 MILES NORTHEAST OF WYLAM

PLATE III.—BOULDER OF DENSE, TOUGH CHERT CHARACTERISTIC OF COPPER RIDGE DOLOMITE, FROM NEWHOPE RIDGE, GORGE OF BUCK CREEK BETWEEN HELENA AND PELHAM

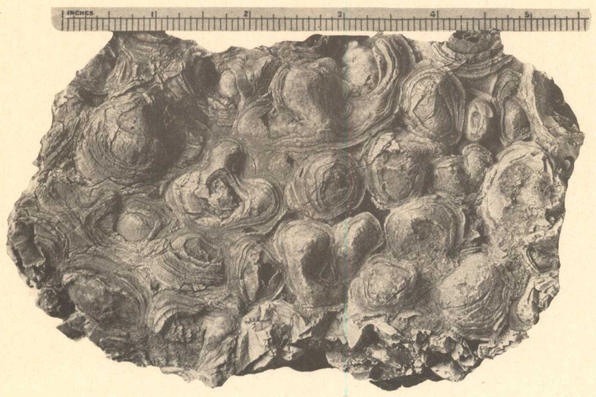

PLATE IV.—CRYPTOZOON RESEMBLING C. UNDULATUM FROM COPPER RIDGE DOLOMITE NEAR HUFFMAN, 7 MILES NORTHEAST OF BIRMINGHAM

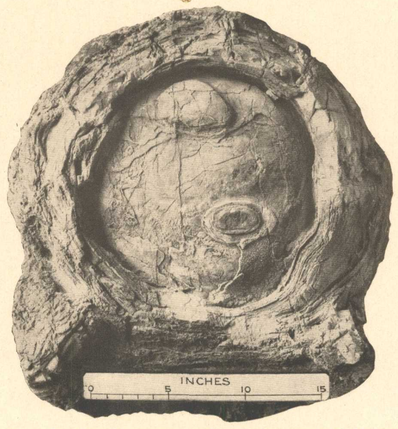

PLATE V.—CRYPTOZOON CF. C. PROLIFERUM FROM COPPER RIDGE DOLOMITE, MOSTELLER, COLUMBIANA QUADRANGLE, ABOUT 5 MILES EAST OF SHELBY

PLATE VI.—CAVERNOUS FOSSILIFEROUS CHERT CHARACTERISTIC OF CHEPULTEPEC DOLOMITE, FROM EAST BASE OF NEWHOPE RIDGE IN GORGE OF BUCK CREEK BETWEEN HELENA AND PELHAM

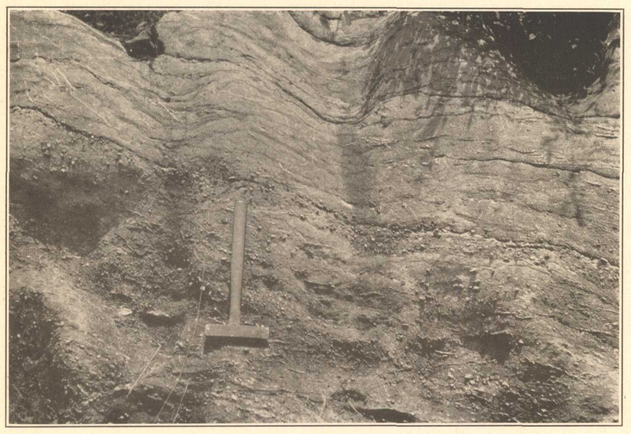

PLATE VII.—QUARTZ, CHERT, AND LIMESTONE PEBBLES IN BASAL PART OF LENOIR LIMESTONE, BETWEEN WAGON ROAD AND RAILROAD NEAR SOUTH EDGE OF BESSEMER QUADRANGLE, IN CAHABA VALLEY

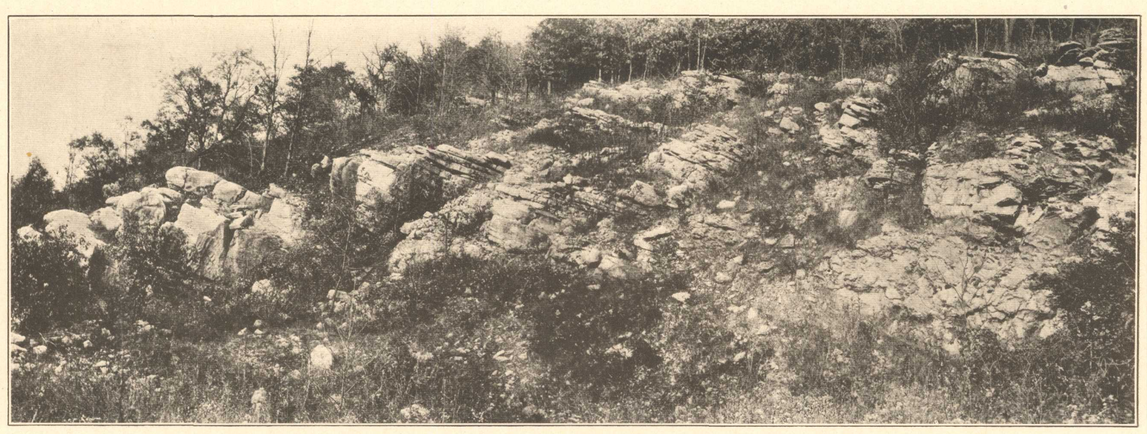

PLATE VIII.—OLD QUARRY IN CHICKAMAUGA LIMESTONE HALF A MILE NORTH OF GATE CITY AND 5¾ MILES NORTHEAST OF CENTER OF BIRMINGHAM, WEST FACE OF RED MOUNTAIN, LOOKING NORTHEAST

Limestone of Lowville (lower Black River) age above, and of Stones River (Chazyan) age below. Contact marked by rubbly argillaceous bed cropping out at left margin of quarry at roots of the two small trees. Rubbly bed swells out to right into small coral reef in lower right-hand corner, believed to be of Black River age. Reef composed of a jumbled mass of large Stromatocerium and Columnaria heads with which are mixed abundant smaller heads of Solenopora. Bryozoa and brachiopods also fairly abundant. Cryptophragmus antiquatus Raymond or Beatricia Ulrich (common) and Tetradium cellulosum (abundant), two guide fossils of the Lowville, in the 20 feet of thin beds beginning about 10 feet above the rubbly bed. Great stratigraphic hiatus between Lowville and Stones River beds shown here due to absence of Holston marble, Athens shale, Tellico sandstone, and Sevier shale (Ottosee shale of Ulrich) of east Tennessee, aggregating as a maximum 7,000 or 8,000 feet in thickness

PLATE IX.—OLD QUARRY AT MOUNTAIN TERRACE, IN NORTHEASTERN ENVIRONS OF BIRMINGHAM, LOOKING EAST, SHOWING SAME SUCCESSION AS SHOWN IN PLATE VIII

Thinner layers at top possibly of upper Black River age. Rubbly bed and Stones River-Lowville contact at level of man's head

PLATE X.—CUT ON MOUNTAIN TERRACE ROAD IN NORTHEASTERN ENVIRONS OF BIRMINGHAM, LOOKING SCUTHEAST

Showing position of bed of volcanic ash (bentonite) and the overlying limestone of Trenton age. The bentonite bed is about 40 feet above the bottom of the thin-bedded limestone shown in the upper part of Plate IX

PLATE XI.—PART OF RED MOUNTAIN FORMATION IMMEDIATELY BELOW BIG SEAM OF IRON ORE, TWENTIETH STREET CUT, BIRMINGHAM, AT SUMMIT OF RED MOUNTAIN, LOOKING NORTHEAST

This part is of Brassfield (Medina) age

PLATE XII.—RED MOUNTAIN FORMATION AT BASE OF CUT 20 FEET ABOVE BOTTOM OF THE FORMATION, TWENTIETH STREET CUT AT SUMMIT OF RED MOUNTAIN, BIRMINGHAM, LOOKING EAST

Includes 20-foot bed of sandstone in the middle of the part below the Big seam shown in lower left corner of Plate XI, with bouldery sandstone in bottom

PLATE XIII.—BIG ORE SEAM (AT RIGHT) OVERLAIN BY RED SANDSTONE AND SHALE WITH CONGLOMERATIC MEDIUM-BEDDED RED SANDSTONE AT TOP, SUMMIT OF RED MOUNTAIN ON TWENTIETH STREET, BIRMINGHAM, LOOKING SOUTHWEST

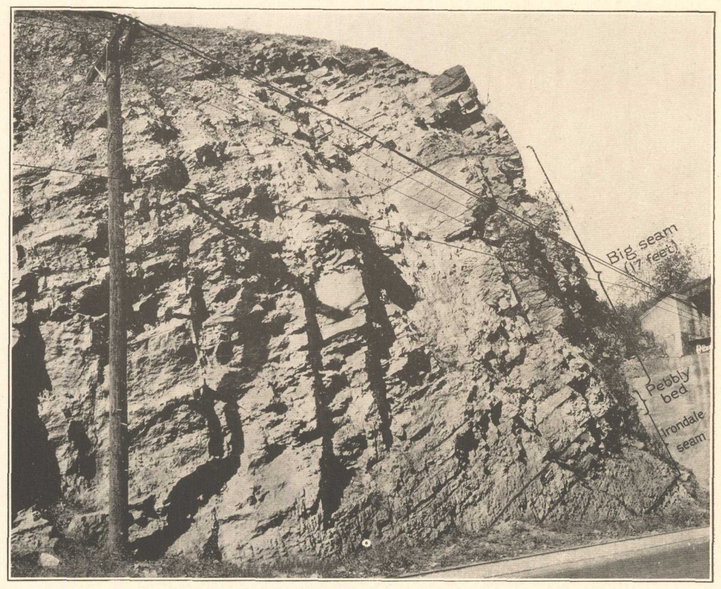

PLATE XIV.—BIG SEAM OF IRON ORE, TWENTIETH STREET CUT, RED MOUNTAIN, BIRMINGHAM, LOOKING SOUTHEAST

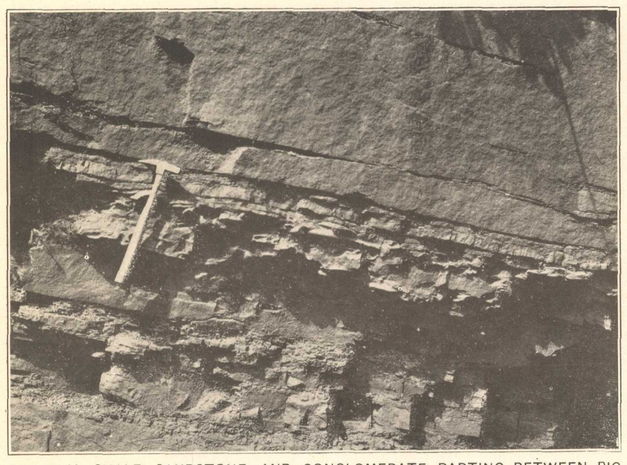

PLATE XV.—SHALE, SANDSTONE, AND CONGLOMERATE PARTING BETWEEN BIG SEAM AND IRONDALE SEAM OF IRON ORE, HELEN BESS MINE, IN NORTHEAST ENVIRONS OF BIRMINGHAM, LOOKING NORTHEAST

Slab with pebbles shown in Plate XVIII from shaly bed

PLATE XVI.—MASS FROM TOP LAYER OF LITTLE OAK LIMESTONE WITH CHARACTERISTIC COARSE MESHWORK OF EARTHY MATERIAL ON WEATHERED SURFACE

The white spots are blue limestone

PLATE XVII.—BED OF VOLCANIC ASH (BENTONITE) IN CHICKAMAUGA LIMESTONE AT TWENTIETH STREET, BIRMINGHAM, NEAR SUMMIT OF RED MOUNTAIN ON WEST SIDE, LOOKING EAST

The bentonite is a yellowish clay between the two prominent layers of limestone

PLATE XVIII.—SLAB OF PEBBLES FROM PARTING BETWEEN BIG SEAM AND IRONDALE SEAM SHOWN IN PLATE XV

The pebbles are of the same kind of limestone and are full of the same fossils as the limestone capping the Irondale seam at Ruffner No. 1 mine, northwest of Irondale, called by the miners "Jack rock"

PLATE XIX.—SHALE IN GASPER FORMATION WITH OVERLYING HARTSELLE SANDSTONE, RED GAP, JUST EAST OF GATE CITY, NORTHEAST ENVIRONS OF BIRMINGHAM

The Red Gap fault, on which the movement causing the earthquake in 1914 took place, is near and along the highway

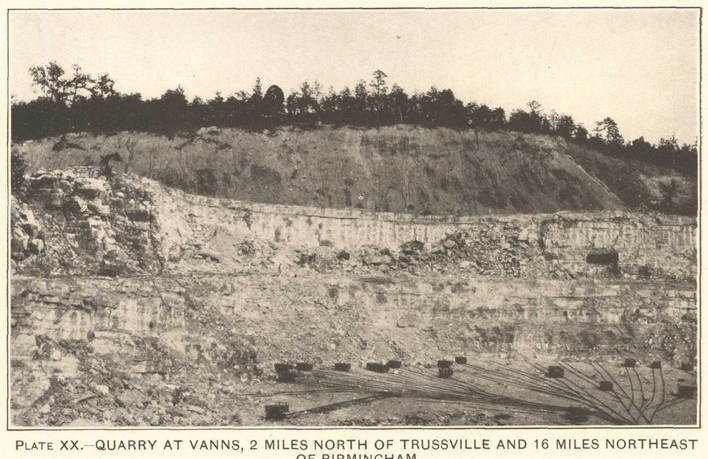

PLATE XX.—QUARRY AT VANNS, 2 MILES NORTH OF TRUSSVILLE AND 16 MILES NORTHEAST OF BIRMINGHAM

Fort Payne chert at bottom, Warsaw limestone about 90 feet thick next above. At top of quarry is about 7 feet of oolitic and slightly asphaltic limestone with Talarocrinus, of early Gasper age. Between the Warsaw and Gasper is an unconformity due to the absence of the St. Louis and Ste. Genevieve limestones. Above the oolitic bed is about 100 feet of dark to black shale constituting the main body of the Gasper in Birmingham Valley. The spur is capped by Hartselle sandstone