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# Names of Coals West of the Mississippi River

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drainage in no way dependent upon the Carboniferous drainage. Where the great uplift of Missouri and Arkansas over the northern part embraced by the so-called Ozark isle and the southern part composing the Ouachita mountains were made up of resistant limestones, these yielded less quickly to erosion than the central soft shales, and the Arkansas river which happened in the old peneplain to traverse the central part of the uplifted area was able to cut its way down as fast as the region rose and was thus able to maintain its old course. The present uplift, which is due to one general movement, is now apparently divided into two elevated regions separated by a low valley.

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## NAMES OF COALS WEST OF THE MISSISSIPPI RIVER.

BY CHARLES R. KEYES.

The coals of commerce acquire names by which they are widely known, and upon which their reputations stand. These names are not geological titles; and coal samples having the same name may, and usually do, come from different mines and even from different horizons. Many analyses and physical tests are made for various industrial purposes from samples taken from the railroad cars, after the latter have reached their destinations.

In the American coal fields, east of the Mississippi river, some coals noted for particular qualities are widely known by special designations. The names have a peculiar value in purely scientific work because the seams are of great areal extent. The geological positions of such coals are inferred as soon as the names are mentioned.

In the Western Interior coal field, numerous names of coals are widely known to the trade; but on account of the rather limited lateral extent of most of the seams their geological horizons cannot be easily inferred. In the following pages is given a list of all of the important coals

known to the trade, together with the first references to the introduction of their names into scientific literature. In this sense their enumeration is as geological titles.

The general geological section of the Carboniferous of the Western Interior coal field is about as follows, the middle three series constituting what is commonly called the coal measures:

| SERIES. | TERRANES. | THICKNESS IN FEET. |
|---|---|---|
| Oklahoma. | Not here differentiated. | 10 |
| Missourian. | Cottonwood limestones. | 500 |
| | Atchison shales | 80 |
| | Forbes limestones. | 150 |
| | Platte shales. | 50 |
| | Plattsmouth limestones. | 300 |
| | Lawrence shales | 85 |
| | Stanton limestones. | 100 |
| | Parkville shales. | 50 |
| | Iola limestones | 75 |
| | Thayer shales | 100 |
| | Bethany limestones | |
| Des Moines. | Marais des Cygnes shales. | 200 |
| | Henrietta limestones. | 100 |
| | Cherokee Shales | 275 |
| Arkansan. | Sebastian. | |
| | Spadra. | |
| | Norristown. | |
| | Boonville. | |
| | Appleton. | |
| | Danville. | |
| | ———. | |
| | Millstone grit | |
| Mississippian | Not here differentiated | |

The terranes being the stratigraphical units, are the main sub-divisions to be regarded in the present connection. All appear to be more or less well defined throughout the series in which they occur. Over a greater part of the area, the more resistant members—the limestones—form usually prominent topographic features. In this role they appear as conspicuous ridges or eastward facing escarpments, running with many minor sinuosities nearly parallel to one another and separated from each other by lowlands which are worn out on the softer shales. In consequence, the individual layers of the latter are usually so covered with talus and other rock waste, and so easily weathered and

converted into mixed clays and soils, that there is small chance for the shales to crop out. On the whole, the different formations are remarkably well outlined on the surface of the ground, and the stratigraphical bearings of any particular locality are readily made out with ease and confidence.

The layers of the area occupied by the coal measures are, with some minor exceptions, tilted toward the west, and are now beveled. Deformation has not yet been sufficiently marked to change this general arrangement, except perhaps at the extreme southern extremity of the great coal fields, where the Ouachita mountains cross.

Nowhere else is the lenticular character of the strata and terranes better shown than in the coal measures. Inappreciation of this fact has led to great over-estimations of the actual thickness of the coal measures as a whole, and of its several parts. This element of error will be largely overcome when it is more carefully considered that the various formations form a series of limited, interlocking lenses, instead of continuous sheets of nearly uniform thickness over the entire district occupied by the coal-bearing terranes. The slightly tilted and beveled beds, as we find them in the region under consideration, present phenomena comparable to the shingled roof of a house. If, along the surface, the thickness of the various outcropping strata were measured successively and then added together, a very different result would be obtained regarding the thickness than if the measurements were made in a boring. In the case of both the shingles and the tilted strata there would be enormous over-estimates of values. That this is really so in regard to strata was recently shown in central Iowa, where a test cross section was made under very favorable conditions. The added surface measurements gave a figure three times as great as the actual borings.

There are in the so-called coal measures, composing what the geologists of the region now term the Arkansan, Des Moines and Missourian series, fifteen distinctive shale formations, separated in the upper part of the section by extensive limestones. All of these terranes carry coal to

some extent, though in several the amount is so small that it may be neglected altogether, for it is no greater than is found in almost every geological formation. None of the last named have any claim to the title of coal-bearing strata.

One important feature which has been clearly brought out by the recent investigation is the fact that the great workable coal bodies of the Trans-Mississippian region are definitely limited in their stratagraphic extent. By this great restriction in geological range of the coals as compared with that formerly supposed, the figures for the actual available tonnage are, perhaps, not so much affected as are the figures for the areal extent of the district that can now be regarded as a possible producing field.

To present the proposition more clearly, we may tabulate the coal production of the entire region according to the percentages, in each state, that each geological formation, or terrane, supplies.

TERRANE PERCENTAGES OF COAL PRODUCTION.

| FORMATIONS. | Iowa. | Missouri | Kansas | Ark. | Ind. Ter. | All |
|---|---|---|---|---|---|---|
| MISSOURIAN SERIES: | | | | | | |
| Atchison shales | 0.2 | | | | | |
| Platte shales | | | 6.0 | | | 1.2 |
| Lawrence shales | | | 0.3 | | | |
| Parkville shales | | | | | | |
| Thayer shales | | | 0.2 | | | |
| DES MOINES SERIES: | | | | | | |
| Marais des Cygnes shales | 1.0 | 0.1 | 0.8 | | | 0.4 |
| Henrietta formation | 15.4 | 18.5 | 0.2 | | | 7.0 |
| Cherokee shales | 83.4 | 81 4 | 92.5 | 90.0 | 100.0 | 91.4 |
| ARKANSAS SERIES. | | | | 10.0 | | |

It appears somewhat startling that from the Cherokee division alone should come nine-tenths of the total coal output. Yet this is about the proportion that it will continue to supply in the future. If anything, the Cherokee percentage will increase, rather than diminish, as the Henrietta coals come from a single seam. At least, there appears to be only one seam in a locality belonging to the

Henrietta, but it is not believed that it is everywhere the same continuous bed. At present, however, this median member of the Des Moines series furnishes about 7 per cent. of the total supply. The coal of the Henrietta division lies everywhere very near the base of the formation. Hence, if we should take a few feet of this terrane and add it to the Cherokee, we would have practically 98 per cent. of the entire Trans-Mississippian output of coal north of the Arkansas river coming from the lowermost member of the coal measures of this region—the Cherokee shales.

It is a noteworthy fact that south of the Boston mountains the coal measures thicken enormously, and that the coal horizons, instead of being near the base of the section, are high above the Mississippian limestones. This is believed to be explainable by the fact that a very considerable part of the Arkansas and Indian Territory coal measures are by depositions unrepresented north of the southern boundary of Missouri. In the northern portion of the field the great erosion unconformity, which everywhere is found at the base of the Des Moines series, probably represents the time when, in the south, deposition was going on. This great sequence in Arkansas lying below the horizon of all the Cherokee, as displayed north of the Boston mountains, is perhaps sufficiently important to receive a taxonomic rank equivalent to the Des Moines or the Missourian. The exact upper limiting horizon of this great Arkansan series is not as yet determined.

The thickness of the Cherokee shales may be taken to be about 300 feet. From this measurement they taper out eastwardly to a feather edge. If the total thickness of the coal measures (Des Moines and Missourian series) north of Arkansas are taken at 2,000 feet, the basal one-seventh furnishes 98 per cent. of the whole output.

## NAMES OF COALS.

**Ardmore coal, lower, Gordon.** (Missouri Geol. Sur., Vol. IX, Sheet Rept. No. 2, p. 21, 1894.) In Macon county, Missouri, one of the lower coals of the Cherokee

**Beech coal, Marbut.** (Missouri Geol. Sur., Vol. XII, pt. ii, p. 348, 1898.) In Howard county, Missouri, a thin seam in the Henrietta division.

**Bevier coal, McGee.** (Trans. St. Louis Acad. Sci., Vol. V, p. 334, 1888.)

In Macon county, Missouri, the principal seam opened. Cherokee division.

Boicourt coal, Haworth. (Kansas Univ. Quart., Vol. III, p. 305, 1895.) In Linn county, eastern Kansas, near base of Marais des Cygnes division

Brooks coal, Haworth. (Kansas Univ. Quart., Vol. III, p 305, 1895 ) One of the seams in the lower portion of the Thayer shales in Wilson county, southeastern Kansas.

Carbon coal. McGee. (Trans. St. Louis Acad Sci., Vol. 5, p. 334, 1888.) In Macon county, Missouri, one of the lower seams in the Cherokee.

Chariton coal, Norwood. (Missouri Geol Sur., Rept. 1873–4, p. 298, 1874.) In Schuyler county, north Missouri, the equivalent of the Mystic seam of Iowa. Henrietta division.

Chariton river coal, Norwood. (Missouri Geol. Sur., Rept. 1873–4, p. 298, 1874.) Same as Chariton coal.

Cherokee coal, Hay. (Trans. Kansas Bd. Ag.ic , 1875, p. 125, 1876 ) One of the three principal seams of Kansas, in what is now known as the Cherokee shales.

Coal hill coal, Winslow. (Arkansas Geol. Sur., Ann. Rept., 1888, Vol. III, p. 31, 1888 ) Near middle of Arkansan series. in Johnson county, Ark.

Columbus coal, Haworth. (Kansas Univ. Quart., Vol. III, p. 300, 1895.) In the extreme southeast corner of Kansas, a seam lying in the lower part of the Cherokee

Cross coal, Marbut. (Missouri Geol. Sur., Vol. XII, pt. ii, p. 359, 1898.) In Chariton county, Missouri, a thin seam in the Henrietta division.

Douglass county coal, Haworth. (Kansas Univ. Quart., Vol. III, p. 305, 1895 ) In east-central Kansas, a term given to the seam in the upper part of the Lawrence.

Edwards coal, Winslow. (Missouri Geol. Sur. Vol. IX, Sheet Rept. No. 1, p. 64, 1892 ) One of the lower seams in Lafayette county, Missouri, lying in the middle part of Cherokee.

Eureka coal, Winslow. (Missouri Geol. Sur., Vol. IX, Sheet Rept. No. 2, p. 53, 1894.) The lowest bed in Macon county, northeast Missouri, and situated in the Cherokee.

Farmington coal, Gordon. (Iowa Geol. Sur., Vol. IV, p 223, 1895.) A small pocket at the base of the Cherokee, in Van Buren county, Iowa.

Fayette coal, Broadhead. (Missouri Geol. Sur., Rept. 1873–4, p 190, 1874.) In Howard county, in central Missouri, a title given to one of the principal seams of the Cherokee.

Fort Scott coal, Saunders (Trans Kansas Bd. Agric., 1872, p. 388, 1873.) Widely applied to one of the chief coals in southeastern Kansas, lying in the Henrietta division.

Fort Scott coal bed, Broadhead. (Missouri Geol. Sur., Rept. 1873–4, p. 133, 1874 ) Seam in Vernon county, in southwest Missouri, located in the Henrietta division.

Fort Scott red coal, Haworth. (Kansas Univ. Quart., Vol. III, p. 298, 1895.) In southeastern Kansas, a seam near the top of the Cherokee.

Franklin county coal, Haworth. (Kansas Univ. Quart., Vol. III, p. 305, 1895.) In east-central Kansas, a name applied to several seams occurring near the base of the Lawrence.

Glasgow coal, Broadhead. (Missouri Geol. Sur., Rept. 1873-4, p. 187, 1874 ) In Howard county, in central Missouri, applied to a seam in the Cherokee.

Grady coal, Chance. (Trans. Am. Inst. Min. Eng., Vol. XVIII, p. 656, 1890.) In basal part of equivalent of Des Moines series, in eastern Indian territory.

Hilltown coal, Norwood. (Missouri Geol. Sur., Rept. 1873–4, p. 293, 1874.) In Schuyler county, in north Missouri, the equivalent of the Mystic seam of Iowa, Henrietta division.

Holden coal, Broadhead. (Missouri Geol. Sur. Iron Ores and Coal Fields, pt. ii, p 168, 1873 ) A thin seam in the lower part of the Marais des Cygnes division, in western Johnson county, west-central Missouri.

Honey creek coal, Marbut. (Missouri Geol. Sur., Vol. XII, pt. ii, p. 78, 1898.) A small seam in Henry county, Missouri, in the upper part of the Cherokee.

Huntington coal, Winslow. (Arkansas Geol. Sur., Ann. Rept., 1888, Vol. III, p. 28, 1888.) At base of equivalent of Des Moines series in western Arkansas.

Hydraulic limestone bed, Winslow. (Missouri Geol. Sur., Vol. I, p. 133, 1891.) Local name for the Tebo seam in Henry county, Missouri, the position of which is in the median Cherokee.

Independence coal, Haworth. (Kansas Univ. Quart, Vol. III, p. 305, 1895.) One of the seams of Montgomery county, southeastern Kansas, in the lower part of the Thayer shales.

Jordan coal, Winslow. (Missouri Geol. Sur., Vol. I, p. 134, 1891.) The lowest bed in Henry and adjoining counties Missouri. Its location is near the base of the Cherokee.

Lacona coal, St. John. (Geology Iowa, Vol. I, p. 273, 1870.) In central Iowa applied to a seam near the base of the Marais des Cygnes division.

La Cygne coal, Haworth. (Kansas Univ. Quart., Vol III, p. 305, 1895.) In Linn county, eastern Kansas, at base of the Marais des Cygnes division.

Leavenworth coal, Winslow. (Missouri Geol. Sur., Vol. I, p. 103, 1891.) The principal seam at Leavenworth, Kansas, and mined at depths of about 800 feet. It lies in the Cherokee

Lebec coal, Broadhead. (Missouri Geol Sur., Rept. 1873-4, p. 71, 1874.) One of the lower beds in the Cherokee, of Cedar county, southwest Missouri.

Lewis coal, Marbut (Missouri Geol. Sur., Vol. XII, pt ii, p. 147, 1898.) A local bed in Henry county, Missouri It lies in the Cherokee division.

Lexington coal, Broadhead, (Missouri Geol. Sur., Iron Ores and Coal Fields, pt. ii, p. 46, 1873.) Along the Missouri river in western Missouri, the principal seam of the Henrietta division.

Lick Creek coal field, Hawn. (Missouri Geol. Sur., 1st and 2d Ann. Repts., pt. ii, p. 123, 1855.) Basal coal of the Cherokee, in Ralls county, in northeast Missouri.

Lonsdale coal, St. John. (Iowa Geol. Sur., Vol. I, p. 282, 1870.) In Guthrie county, Iowa, one of the uppermost seams of the Marais des Cygnes division.

Macon City coal, Gordon. (Missouri Geol. Sur., Vol. IX, Sheet Rept. No. 2, p. 13, 1894.) In Macon county, Missouri, one of the upper seams of the district. Cherokee division.

Marshall coal, St. John. (Iowa Geol. Sur., Vol. I, p. 279, 1870.) In Guthrie county, Iowa, one of the median seams of the Marais des Cygnes division.

Mammoth coal, Broadhead. (Missouri Geol. Sur., Rept. 1873-4, p. 388, 1874.) The thick local pocket in Callaway county, central Missouri. Base of the Cherokee.

Mammoth coal, Marbut. (Missouri Geol. Sur., Vol. XII, pt. ii, p. 147, 1898.) A local bed in the Cherokee division, deposited in Henry county, Missouri.

Marais des Cygnes coal, Swallow. (Kansas Geol. Sur., Prelim. Rep't., p. 22, 1866.) Main coal of Marais des Cygnes, or Pleasanton formation, in eastern Kansas.

Marais des Cygnes group, Broadhead. (Missouri Geol. Sur., Rept 1873-4, p. 124, 1874.) Name applied in Vernon county, in southwest Missouri, to the upper part of the Cherokee.

Mastodon coal, Broadhead. (Missouri Geol. Sur., Rept. 1873-4, p. 388, 1874.) A limited pocket, 80 feet thick, in Callaway county, Missouri. Base of Cherokee.

Mayberry coal. Chance. (Trans. Am. Inst. Min. Eng. Vol. XVIII, p. 655, 1890.) At top of the equivalent of Des Moines series, in the Choctaw field, in eastern Indian Territory.

McAlester coal, Chance. (Trans. Am. Inst. Min. Eng., Vol. XVIII, p. 657, 1890.) Near middle of equivalent of Des Moines series, in Choctaw field, in eastern Indian Territory.

Mendota coal, Winslow. (Missouri Geol. Sur., Vol. I, p. 57, 1891.) This is the Mystic seam of Iowa; and its horizon is in the Henrietta division. Now applied in northeast Missouri, in Putnam county chiefly.

Mormon Ridge coal, Beyer. (Iowa Geol Sur., Vol. IX, p. 218, 1899.) In lower part of Des Moines series, in Boone county, Iowa.

Mound City coal, Haworth. (Kansas Univ. Quart., Vol. III, p. 305, 1895.) In Linn county, eastern Kansas, in median part of Marais des Cygnes division.

Muchakinock coal, Bain. (Iowa Geol Sur., Vol IV, p. 361, 1895.) One of the most extensive seams in the lower part of the Cherokee, in Mahaska county, Iowa.

Mulberry coal, Broadhead. (Missouri Geol. Sur., Rept. 1873-4, p. 168, 1874.) In Bates county, in southwest Missouri, refers to a seam near the base of the Marais des Cygnes division (Pleasanton.)

Mulky coal, Broadhead. (Missouri Geol. Sur., Iron Ores and Coal Fields, pt. ii, p. 46, 1873.) Title given in Lafayette county, Missouri, to the second principal coal bed.

Mystic coal, Keyes. (Iowa Geol. Sur., Vol. II, p. 408, 1892.) In Appanoose county and adjoining country, the principal coal mined. Henrietta division.

Neodesha coal, Haworth. (Kansas Univ. Quart., Vol. III, p. 305, 1895.) One of the seams in the lower part of the Thayer division, in Wilson county, southeast Kansas.

Nodaway coal, Broadhead. (Missouri Geol. Sur., Iron Ores and Coal Fields, pt. ii, p. 398, 1873.) Name applied to the principal coal seam of the Nodaway river valley, in northwest Missouri. It lies about 75 to 100 feet above the base of the Atchison shales.

Norman coal, Chance. (Trans. Am. Inst. Min. Eng., Vol. XVIII, p. 658, 1890.) Near middle of equivalent of Des Moines series, in Choctaw coal field, in eastern Indian Territory.

Oberholz coal, Broadhead. (Missouri Geol. Sur., Iron Ores and Coal Fields, pt. ii, p. 64, 1873 ) In Ray county, Missouri, the equivalent of the Lexington seam. Henrietta division.

Osage coal, Owen. (Geol. Sur. Wisconsin, Iowa and Minnesota, p. 138, 1852.) Name applied to very thick seams found on the Osage river and on the Missouri river above the mouth of the Osage, in central Missouri. The seam is really disconnected and consists of very limited pockets of great thiekness—75 feet in some cases. They may be considered as situated at the very base of the Cherokee.

Osage coal, Haworth (Kansas Univ. Quart., Vol. III, p. 278, 1895.) In Osage county, Kansas; it appears to lie in the Platte shales.

Osage coal, Saunders. (Trans. Kansas Bd. Agri , 1872, p. 388, 1873 ) A name known widely through central Kansas for one of the principal coal seams. Platte shales.

Osage coal field, Hay. (Trans. Kansas Bd. Agri , 1875, p 125, 1876 ) The seam is in the Platte shales, in central Kansas.

Osage City coal, Haworth. (Kansas Univ. Quart. Vol. III, p. 304 1895 ) Seam in Osage and adjoining counties, in Platte shales.

Osage river coal, King. (Proc. American Asso. Adv. Sci., Vol. V, p 174, 1851.) In basal part of Cherokee, in central Missouri.

Osage river coal, Johnson. (U. S. 28th Cong., 1st Sess., Senate Doc. 436, p. 539, 1844.) Seam exposed on the Osage river, in central Missouri. Base of Cherokee.

Oswego coal, Crane. (Univ. Geol. Sur Kansas, Vol. III, p. 154, 1898.) In southeast Kansas, a name given to a coal seam that is, perhaps, the same as the Pittsburg seam of the Cherokee shales.

Ouita coal, Winslow. (Arkansas Geol. Sur., Ann. Rept. 1888, Vol. III, p. 34, 1888.) In lower part of Arkansan series, in Pope county, Arkansas.

Panora coal, St. John. (Iowa Geol Sur., Vol. I, p 274, 1870.) One of the lower seams of the Marais des Cygnes, in Dallas county, Iowa.

Philpott coal, Winslow. (Ark. Geol. Sur.. Ann. Rept. 1888, Vol. III, p. 33, 1888.) Near the top of Arkansan series, in Johnson county, Ark.

Pittsburg coal, Haworth. (Univ. Geol. Sur., Kansas, Vol. III, p. 27, 1898.) In the lower part of the Cherokee, in southeast Kansas. It is also called the Weir City-Pittsburg heavy coal, or lower Weir City-Pittsburg seam.

Pleasanton coal, Haworth. (Kans. Univ. Quart., Vol. III, p. 305, 1895.) In Linn county, eastern Kansas, base of Marais des Cygnes division.

Rich Hill coal, Winslow. (Missouri Geol. Sur., Vol. I, p. 146, 1891.) The leading seam mined in Bates county, Missouri. It lies in the Cherokee.

Rulo coal bed, Broadhead. (Missouri Geol. Sur., Iron Ores and Coal Fields, pt. ii, p. 132, 1873 ) Name applied in northwest Missouri to a thin seam, best exposed at Rulo, Nebraska which lies near the base of the Atchison shales; now known to be the equivalent to the Nodaway seam.

Secor coal, Chance (Trans. Am. Inst. Min. Eng., Vol. XVIII, p. 658, 1890.) Near middle of equivalent of Des Moines series, in Choctaw field, in eastern Indian Territory.

Shinn coal, Winslow. (Arkansas Geol Sur., Ann. Rept. 1888, Vol. III, p. 35, 1888.) Near base of Arkansan series in Pope county, Arkansas.

Silver Lake coal, Beede. (Trans. Kansas Acad. Sci., Vol. XV. p. 80, 1898) One of the upper coal seams of the lower Waubansee (Atchison) shales. It is mined in Shawnee county, Kansas, at Silver Lake, and also southwest of Topeka.

Spadra coal, Winslow. (Arkansas Geol. Sur., Ann. Rept. 1888, Vol. III, p. 32, 1888) Near middle of Arkansan series in Johnson county, Arkansas.

Spring Creek coal seam, Broadhead. (Missouri Geol. Sur., Rept 1873-4, p. 236, 1874.) Believed to be the same as the Mystic or Mendota coal of Putman county, Missouri, adjoining Sullivan county on the north. It lies in the Henrietta division.

Summit coal, McGee. (Trans. St. Louis Acad. Sci., Vol V, p. 334, 1888.) In Macon county, Missouri, the highe-t seem mined. Upper part of Cherokee.

Tebo coal, Winslow. (Missouri Geol. Sur, Vol. I, p. 134, 1891.) Appellation of the chief seam in Henry county, Missouri. Horizon is middle Cherokee.

Thayer coal, Haworth. (Kansas Univ. Quart., Vol. III, p. 305, 1895.) A seam in the median part of the Thayer shales, in Neosho county, southeastern Kansas.

Topeka coal, Haworth. (Kans. Univ. Quart., Vol. III, p. 278, 1895.) One of the seams in the Platte shales, in Shawnee county, Kansas.

Warrensburg coal, Broadhead. (Missouri Geol. Sur., Iron Ores and Coal Fields. pt. ii, p. 184, 1873) A thin seam in the upper part of the Cherokee division, in Johnson county, Missouri

Wapello horizon, Bain. (Iowa Geol Sur, Vol. IX, p. 99, 1899.) An extensive coal in southeast Iowa, lying in the lower part of the Cherokee.

Waverly coal, Winslow. (Missouri Geol. Sur., Vol. IX, Sheet Rept. No. 1, p. 60, 1892) In eastern Lafayette county, Missouri, the lowest seam mined. Cherokee division.

Wheeler coal, St. John. (Iowa Geol. Sur., Vol. I, p. 276, 1870.) One of the lower coals of the Marais des Cygnes, in Warren county, Iowa.

What Cheer coal field, Bain. (Iowa Geol. Sur, Vol. IV, p. 284, 1895. This coal seam, in Keokuk and Mahaska counties, Iowa, lies very near the base of the Cherokee.

Wier City-Pittsburg View, Haworth and Kirk. (Kansas Union Quart, Vol. II, p. 105, 1894.) In southeast Kansas, the most important seam of the Cherokee.

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# VOLCANIC NECKS OF PIATIGORSK, SOUTHERN RUSSIA.

BY CHARLES R. KEYES.

## (Abstract.)

On the Rostov and Wladikavkas railroad, in southern Russia, there rises out of the flat steppes, a few hours before reaching the last mentioned place, a remarkable group