

PENNSYLVANIAN STRATIGRAPHY OF PART OF
SOUTHERN INDIANA¹

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INTRODUCTION

By H. R. WANLESS

During more than a year of field work in southern Indiana Mr. Franklin studied most of the outcrops of the Pennsylvanian from the West Franklin limestone on down in Perry, Spencer, Warrick and parts of Dubois and Pike counties. He worked out a composite columnar section of the lower Pennsylvanian in these counties which is reproduced in this paper (Fig. 1). Although the outcrops in these counties have been studied by earlier investigators² Mr. Franklin worked out the detailed succession of the lower Pennsylvanian below coal IIIa in greater detail than previous students of the area had done. The succession from the West Franklin limestone down to coal IIIa is reasonably well known and is similar to that farther north in Indiana and in adjacent parts of western Kentucky. The succession below coal IIIa differs from that in other parts of the Eastern Interior basin in that fossiliferous marine limestones and cherts occur at a larger number of positions than elsewhere. Mr. Franklin's section shows 9 limestones below coal IIIa. In most other parts of the basin there are not more than two marine limestones below Illinois coal No. 2, Indiana coal IIIa and their correlatives. These marine zones are the Seahorne and Seville limestones of western Illinois, the Stonefort and Curlew of south-

ern Illinois and western Kentucky, and the Silverwood³ and Minshall of Indiana. Although Mr. Franklin refers one of the limestones to the Curlew it seems wiser to designate it by the local names used in this report until it has been traced to Union County, Kentucky where the type exposure of the Curlew is located.

The part of the Eastern Interior basin described in this paper is nearer to the Appalachian coal field than practically all other parts of this basin. It is worthy of note that in southern Ohio there are several marine zones, the Hamden limestone, Putnam Hill limestone, Zaleski flint, Upper Mercer limestone, Lower Mercer limestone, Boggs limestone, Poverty Run limestone and Sharon ore which seem to be older than coal IIIa of Indiana. It seems possible that careful comparative studies of the lithology and faunas of the marine limestones described by Franklin with those of southern Ohio may permit some exact correlations and thereby aid in matching the succession in the Eastern Interior basin with that of the Appalachian field. Recent studies of the ostracod faunas of the Ferdinand and Fulda limestones by Chalmer L. Cooper suggest that these faunas have no counterparts elsewhere in the Eastern Interior basin but seem to be equivalent to the Bostwick limestone member of the Barnett Hill formation (top of Morrow) and of the Dornick Hills group of the Wapannucka formation (base of Lampasas) Oklahoma. Al-

¹ Published with the permission of R. G. Kurtz, Ohio Oil Company.

² Ashley, G. H., The coal deposits of Indiana: Ind. Dept. Geol. and Nat. Res., Ann. Rept. 23, 1899, Dubois County pp. 1096-1156, Pike County pp. 1156-1230, Perry County pp. 1255-1298, Spencer County pp. 1298-1348, Warrick County pp. 1349-1398.

Fuller, M. L., Ditley folio, U. S. Geol. Survey Geol. Atlas, folio 84, 1902.

Wanless, H. R., Pennsylvanian correlations in the Eastern Interior and Appalachian coal fields. Geol. Soc. Amer. Spec. Paper 17, 1930, plate 1, columns 13 and 14, plate 2, columns 17 and 18, 1939.

³ Alexander, J. W., Pennsylvanian geology of eastern Vermillion County, Illinois, northern Vermillion County, Indiana, and Warren and Fountain Counties, Indiana. Master's thesis at the University of Illinois, 1942, a name applied to the marine cap rock of Indiana coal II from outcrops along Coal Creek one mile east of Silverwood, southwestern Fountain County, Indiana.

TABLE 1.—CUMINGS' CLASSIFICATION OF PENNSYLVANIAN STRATA IN INDLANA

System	Series	Group
Pennsylvanian.....	Post-Allegheny	Wabash (250-300 ft.) Merom (75-90 ft.) Shelburn (150-235 ft.)
	Allegheny	Petersburg (180-300 ft.) Staunton (150-250 ft.)
	Pottsville	Brazil (60-80 ft.) Mansfield (80-300 ft.)

though several of the lower Pennsylvanian limestones described in this paper do not outcrop in Illinois, they probably underlie parts of the Illinois basin where they may be encountered in oil well drilling operations.

STRATIGRAPHY

By D. W. FRANKLIN

This paper presents a very condensed description of about 1000 feet of lower Pennsylvanian strata exposed in the two southern tiers of counties of Indiana. Its object is to show the relations of the various named strata to each other and to indicate typical outcrops where the more important key beds can be observed. No attempt is made to indicate the nature of the lateral variations in succession within the area or the outcrop patterns of the various subdivisions. The Troy coals, Fulda, Ferdinand and Grandview limestones and the Buffaloville coal are named here for the first time and the Holland limestone is redefined.

The lower Pennsylvanian of Indiana was divided into Divisions I to VII by Ashley⁴, each division extending up to the base of the coal

with the next higher number. Cumings⁵ proposed a different classification (Table 1). This classification is followed in the present paper. The Wabash and Merom groups are younger than the youngest strata outcropping in the area of this report.

Figure 1 shows the succession of lithologic units recognized in southern Indiana. This figure shows 136 lithologic units aggregating 1092 feet. It should be recognized, however, that practically all of these beds vary in thickness within the area and that some of the beds are absent at some outcrops.

In this paper several of the more important outcrops are described and the type localities of newly named beds designated. The outcrops of beds younger than coal IIIa are not described since this succession had been worked out correctly by Ashley, Fuller, Wanless, and others and have been described in an earlier paper.

MANSFIELD GROUP

The basal sandstone of the Mansfield group is massive, coarse-grained and conglomeratic at some places.

⁴ Op. cit.

⁵ Cumings, E. R., Nomenclature and description of the geological formations of Indiana: Ind. Dept. Cons., Publ. 21, Handbook of Indiana Geology, pp. 519-530, 1922.

COMPOSITE COLUMNAR SECTION

DUBOIS, PERRY, PIKE, SPENCER, AND WARRICK COUNTIES, INDIANA

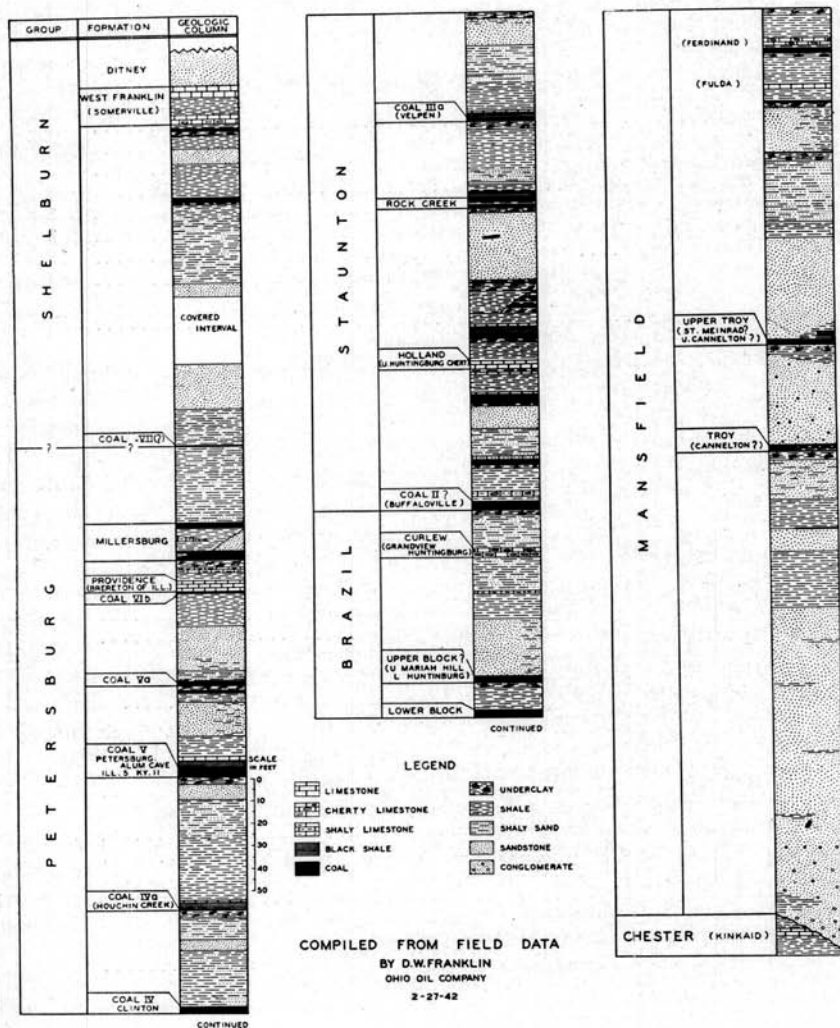


FIGURE 1.

It is probably equivalent to the Lower Conglomerate of the Caseyville of Kentucky. There are two prominent coals in the lower part of the Caseyville, known as the Lower Cannelton and Upper Cannelton near the town of that name and the Lower Troy and Upper Troy near

that town in Perry County. The Lower Cannelton coal is characterized at some places by a black slaty canneloid shale roof. The lower part of the Caseyville is well exposed at LaFayette Spring, Perry County (Geologic section 1).

At a road-cut on State Highway

Geologic section 1.—Exposures in SW. ¼ Sec. 2, T. 7 S., R. 3 W., near LaFayette Springs, Perry County, measured by C. A. Malott and amended by D. W. Franklin.

	Thickness	
	Ft.	In.
Pennsylvanian system		
Mansfield group		
Sandstone, massive, fine-grained, perhaps with shale breaks	13	
Coal (Upper Cannelton)	2	
Underclay	4	
Shale, gray, silty, with sandstone beds	25	
Sandstone, massive, fine-grained, with small quartz pebbles	15	
Shale, black, canneloid	0-3	
Coal, splint (Lower Cannelton)	3	
Underclay, slightly silty, light blue gray	3	
Sandstone, flaggy	35	
Shale, gray, silty (coal reported in literature)	36	
Sandstone, massive, fine-grained	32	
Shale, gray, silty	35	
Sandstone, medium-grained, sparkling, massive, cliff-forming, cross-bedded, with honeycomb weathering, bands of large quartz pebbles	50	
Mississippian system		
Limestone (Kinkaid) with associated shale		

Geological section 2.—Exposure in the S. ½ SW. ¼ SE. ¼ Sec. 33, T. 4 S., R. 4 W.

	Thickness	
	Ft.	In.
Pennsylvanian system		
Mansfield group		
Sandstone, fine-grained, micaceous, poorly exposed	10	
Concealed interval, some show of sandstone	5	
Sandstone, with abundant carbonaceous matter, fine-grained, very micaceous, medium-bedded to massive, ledge-forming	6	
Shale, black, soft		6
Limestone, medium blue gray, with abundant marine fossils	1	
Chert, black, mottled with white, leached, with numerous fossils, thickness variable, diamond-shaped jointing; locally in two beds (Ferdinand)	0-1	
Limestone, medium blue-gray, finely crystalline, with marine fossils (Ferdinand)	1	
Shale, light blue gray, soft	1	
Coal, bright, blocky	1	
Underclay, dark		6+
Concealed interval, some show of light blue gray shale	12	
Limestone, dark blue-gray, compact, brittle, with solution widened joints (Fulda)	2	6
Shale, light blue gray, soft, top poorly exposed, probably with coal... (Base of exposure)	6	

66 near Troy a massive sandstone a little above the Upper Troy coal contains marine fossils and plant debris and is probably a beach deposit. This part of the column is excessively variable. The St. Meinrad coal, mined near the town of that name in northern Perry County is tentatively

correlated with the Upper Troy and Upper Cannelton.

The Fulda limestone is named from exposures along the road between Fulda and New Boston, eastern Spencer County and is well shown in the outcrop described as geologic section 2. It is dark blue

Geologic section 3.—Section at double incline mines and gully to the east in the center of the E.½ sec. 29, T. 4 S., S., R. 4 W.

	Thickness	
	Ft.	In.
Pennsylvanian system		
Brazil group		
Shale, medium to dark blue gray with ironstones	6	
Coal, slightly blocky (Upper Block?)	2	6
Concealed interval	10	
Coal, thinning to 18 inches southward, slightly blocky (Lower Block?)	3	
Concealed interval	5	
Coal		6
(Base of measured section)		

gray, dense, pure, brittle and sparsely fossiliferous.

The Ferdinand marine zone is about 15 feet above the Fulda limestone and consists of black shiny opaque chert with abundant casts of productids and dark blue gray argillaceous dull limestone. It is best developed northeast of Ferdinand in T. 3 S., R. 4 W. and west of the Ferdinand State Forest.

BRAZIL GROUP

The Brazil group was defined by Cumings as extending from the Lower Block coal of the Brazil district, Clay County up to coal II, a little above the Minshall limestone. The coals designated as Upper and Lower Block coals in this paper have not been traced to tie in with the Block coals of the Brazil district but are of approximately the same age. The Block coals are reported as follows from a double incline mine.

The Upper Block coal is also mined by the Mariah Hill Super Block Coal Company in secs. 19 and 20, T. 4 S., R. 4 W.

The Grandview limestone and an unnamed limestone 13 feet below it are well exposed in the Ohio valley bluff east of Grandview. The lower limestone is dark blue gray, dense and dull and the upper limestone light gray, crystalline and crinoidal

with bedded chert. It is tentatively correlated with the Curlew of Kentucky. The type exposure of the Grandview limestone is described in the following measured section.

The Grandview limestone is 15 feet below the Buffaloville coal in the center of the NE. ¼ NE. ¼ sec. 21, T. 5 S., R. 5 W.

STAUNTON GROUP

The Staunton group of Cumings extends from the base of coal II up to the base of coal IV. Coal II is tentatively identified in this area with the Buffaloville coal mined commercially at the town of that name in Spencer County (Geologic section 5).

In addition to the limestone above the Buffaloville coal a dark blue gray dense limestone overlies a one-foot coal about 20 feet above this coal. The coal and limestone are not named, but are represented in Geologic section 6.

The name Holland limestone was applied by Ashley⁶ but there are three limestones in the vicinity of Holland and it is not clear to which Ashley intended to apply the name Holland. It is here applied to the uppermost which is the most distinctive. The other limestones are not named. (Geologic section 7).

Geologic section 4.—Exposures along State Highway 66 East of Grandview in the Ohio River bluffs in the SE. ¼ NE. ¼ sec. 15, T. 6 S., R. 4 W.

	Thickness	
	Ft.	In.
Pennsylvanian system		
Brazil group		
Limestone, light gray, finely crystalline, with bedded gray chert in nearby localities, large crinoid stems, massive, thickness to 5 feet (Grandview)	5	
Concealed interval	3	
Sandstone, thin bedded	4	
Concealed interval	6	
Limestone, dark blue gray, dense, dull		6
Sandstone, massive, cliff forming	13	
Shale, black, poorly bedded, hard, micaceous		8
Sandstone, massive to thin-bedded	8	
Siltstone, sandy, massive, with wavy carbonaceous laminae	2	
Coal (Upper Block?) in abandoned incline mine on Ohio River bluff just below this section		
Ferdinand limestone seen south of highway a little below the base of this section		
(Base of exposure)		

Geologic section 5.—Exposure in strip mine in the center of NE. ¼ NW. ¼ sec. 9, T. 5 S., R. 5 W.

	Thickness	
	Ft.	In.
Pennsylvanian system		
Staunton group		
Shale, medium gray, calcareous at base	12	
Limestone, dark blue gray, argillaceous, fossiliferous	0-2	
Shale, dark gray, soft, calcareous, fossiliferous, poorly bedded, slightly silty, variable in thickness	3	
Shale, black, sheety to papery when weathered, unfossiliferous		6
Coal, blocky (Buffaloville)	3	6
Brazil group		
Underclay	3	

Geologic section 6.—Exposure southeast of Holland in the old Whitrock strip pit, center of S. ½ sec. 19, T. 3 S., R. 5 W.

	Thickness	
	Ft.	In.
Pennsylvanian system		
Staunton group		
Shale, gray, blocky (27 feet below Holland limestone)	11	
Shale, dark gray to black, very calcareous, soft, very fossiliferous ..	1	
Limestone, dark blue gray to black, very argillaceous, fossiliferous ..	2	
Coal	0-4	
Underclay, blue gray	1	6
Concealed interval, gray shale reported	12	
Limestone, blue to gray, dense, with gray, opaque, porous weathering chert	3	
Coal (No. II or Buffaloville)	3	

⁶ Ashley, G. H., Supplementary report on the coal deposits of Indiana: Ind. Dept. Geol. and Nat. Res., Ann. Rept. 33, pp. 112, 129-131, 1909.

Geologic section 7.—Exposure near Holland in the SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec.
26 T. 3 S., R. 6 W.

	Thickness	
	Ft.	In.
Pennsylvanian system		
Staunton group		
Sandstone, fairly massive	4	
Concealed interval	15	
Limestone, dark blue gray, dense		10
Shale, black, slaty, canneloid	3	
Coal, blocky	1	6
Underclay, dark blue gray, silty	1	6
Clay, coaly		4
Underclay, silty, hard, with hackly fracture	4	
Shale	2	
Chert, light gray to dark blue gray, ferruginous, with porous zone at top	1	
Limestone, light gray with brown mottling on weathered surface, dense, unconformity at base (Holland)	2	
Shale and clay, with limestone pebbles	1	6
Limestone, light gray, knobby, dense		6
Shale, light gray	3	

Geologic section 8.—Exposures at the center of the west line of the NE. $\frac{1}{4}$ NE.
 $\frac{1}{4}$ sec. 28, T. 3 S., R. 6 W.

	Thickness	
	Ft.	In.
Pennsylvanian system		
Staunton group		
Shale, gray, with alternating black streaks, and show of thin-bedded sandstone close above	2	
Shale, black, slaty		3
Shale, drab gray, rather slaty		6
Shale, black, slaty		3
Coal	2	
Underclay	2	8
Shale, black, poorly bedded		5
Coal		5
Underclay	1	8
Coal		3
Underclay		4
Coal		2
Underclay, silty	1	
Coal	1	3
Underclay, brown	3	
Concealed interval	5	
Sandstone, massive, at base of exposure		

There are three or four thin and variable coals and two or three thin unnamed marine limestones between the Holland limestone and the massive sandstone beneath the Rock Creek coals. The lowermost of these limestones and coals is indicated in Geologic section 7 above the Holland limestone.

The Rock Creek coals consist generally of two closely spaced coals overlying the thickest and most massive sandstone in this part of the column. They are typically described in Geologic section 8 and are probably approximately equivalent to the Davis and Dekoven coals of western Kentucky.

Geologic section 9.—Exposures at the center of the south line of the SW. $\frac{1}{4}$
NW. $\frac{1}{4}$ sec. 28, T. 3 S., R. 6 W.

	Thickness	
	Ft.	In.
Pennsylvanian system		
Staunton group		
Shale, silty, with thin sandstone beds	16	
Shale, silty, probably dark blue gray when fresh	10	
Concealed interval	8	
Limestone, dark blue gray to black, dense, very fossiliferous	1	
Shale, black, slaty, fissile, fossiliferous	2	6
Coal (Velpen or IIIa)	2	

Coal IIIa, the Velpen coal is overlain by a characteristic hard black slaty shale and thin dark gray fossiliferous limestone. It is correlated

with coal No. 2 of Illinois and is one of the best stratigraphic markers of the area (Geologic section 9).