STATE OF OHIO
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Open-File Report 2002-01

AUGUST F. FOERSTE'S UNPUBLISHED FIELD NOTES FOR THE AREA OF THE SERPENT MOUND DISTURBANCE

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2002

INTRODUCTION

The "rediscovery" of August Foerste's and Raymond Lamborn's 1918 and 1919 geologic maps of the Bainbridge 15-minute quadrangle illustrating the Serpent Mound disturbance (SMD) and August Foerste's associated field notes occurred during my research for the "Previous work" section of Baranoski and others (in prep.). The geologic mapping of the Bainbridge quadrangle was a team effort with August Foerste mapping rocks of Ordovician, Silurian, and Devonian age and Raymond Lamborn mapping rocks of Mississippian age except in the region of the SMD. Notations on an undated draft of the Bainbridge quadrangle geologic map state that August Foerste mapped all the rocks of the SMD including the Mississippian.

Conversations with Dr. Michael R. Sandy, University of Dayton, about August Foerste's mapping of the SMD revealed that Foerste's field and office notes were archived at the Smithsonian Institution Archives in Washington, D.C. (Dutro, 1991). I traveled to the Smithsonian Archives in November 1996 and located Foerste's original field notes of the SMD. Foerste's hand-written notes are reproduced in this report, along with a typed transcription.

The rediscovered field notes provide "new data" useful in the revision of the Bainbridge quadrangle geologic maps drawn in 1918 and 1919. These maps confirm that Foerste was the first geologist to map the SMD (Baranoski and others, 1997; Schumacher, 2002). Also, Foerste's mapping was generalized and published as part of the 1920 *Geologic map of Ohio* (Bownocker, 1920). These findings correct the mistaken assertions of some authors (e.g., Sappenfield, 1951; Reidel and others, 1982; Hansen, 1994), who credit Walter Bucher as the first to map the geology and publish a geologic map of the SMD.

STRATIGRAPHY

The stratigraphic nomenclature for the rocks exposed in the SMD region has a long and complex history that will not be discussed here. Interested readers are referred to the excellent studies of Orton (1871), Prosser (1905), Foerste (1917), Rogers (1936), Reidel and others (1982), and Swinford (1985) for additional details. Figure 1 compares the stratigraphic nomenclature used by Baranoski and others (in prep.) with the stratigraphic nomenclature of Foerste (1917), the field notes of Foerste, and the mapping of Foerste and Lamborn in 1918 and 1919.

ACKNOWLEDGMENTS

I thank Dr. Michael R. Sandy for sharing his knowledge and background information on August Foerste's field notes and unpublished manuscripts archived at the Smithsonian Institution Archives. I greatly appreciated the assistance and excellent service provided by William Cox and James Steed of the Smithsonian Institution, who made my visit highly successful. Thanks to the staff of the Smithsonian Institution Archives for copying the selected field notes of August Foerste transcribed in this report. Earlier versions of this report were improved by the comments suggested by Thomas M. Berg, Dennis N. Hull, E. Mac Swinford, Glenn E. Larsen, and Mark T. Baranoski. Financial support for travel expenses were provided by the Ohio Division of Geological Survey.

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System	Stratigraphic nomenclature of Baranoski and others (in prep.)	Stratigraphic nomenclature of Foerste (1917), Foerste's field notes, and the 1918 and 1919 maps of Foerste and Lamborn	
Mississippian	Cuyahoga Formation	Waverly Group	
	Sunbury Shale		
Devonian or Mississippian	Berea Sandstone		
Devonian	Bedford Shale	Bedford drift	
	Ohio Shale	Ohio Black shale (slate)[2]	
	Olentangy Shale	Olentangy clay	
	Hillsboro Sandstone		
Silurian	Tymochtee Dolomite	Monroe Formation	
	Greenfield Dolomite		
	Peebles Dolomite	Cedarville Dolomite	
	Lilley Formation	West Union Fm.	Upper Lilley bed (Member)
			marl
	Bisher Formation		lower (Bisher Member)
	Estill Shale	Crab Orchard white clay	
	Dayton Formation	Dayton Limestone	
	Noland Formation		
	Brassfield Formation	Brassfield (Clinton) Limestone	Ferruginous or iron ore bed
	Belfast Mbr.		Belfast bed
Ordovician	Drakes Formation Waynesville Formation Arnheim formation[1] Grant Lake Limestone Fairview Formation Kope Formation Point Pleasant Formation	Cincinnatian rocks	

[1]Informal stratigraphic unit.
[2]Foerste used Ohio Black slate on p. 128 of field notes. Ohio Black shale used in remaining notes.

FIGURE 1.—Comparison of modern surface lithostratigraphic nomenclature for the Serpent Mound disturbance region with the stratigraphic nomenclature used by August Foerste.

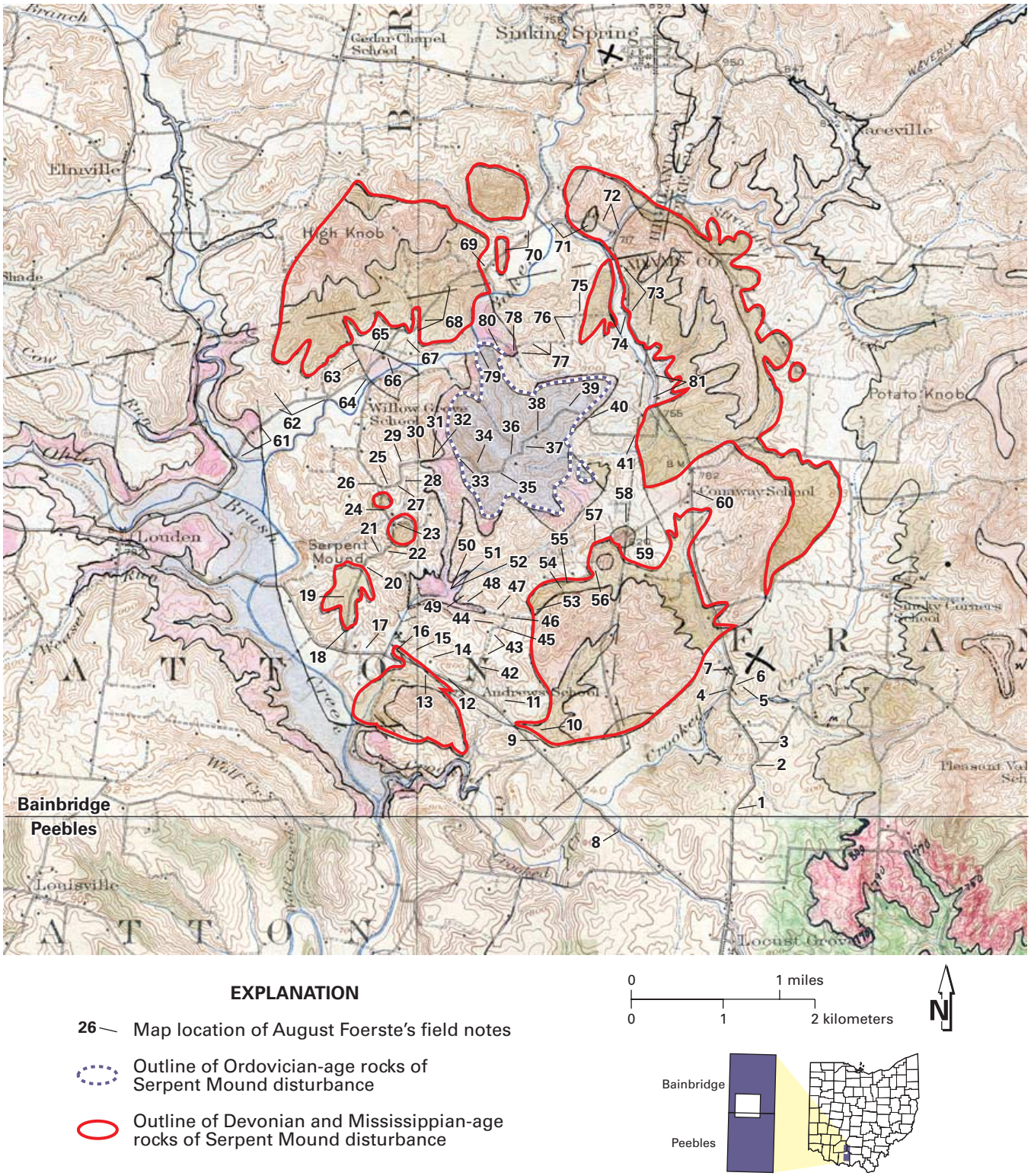
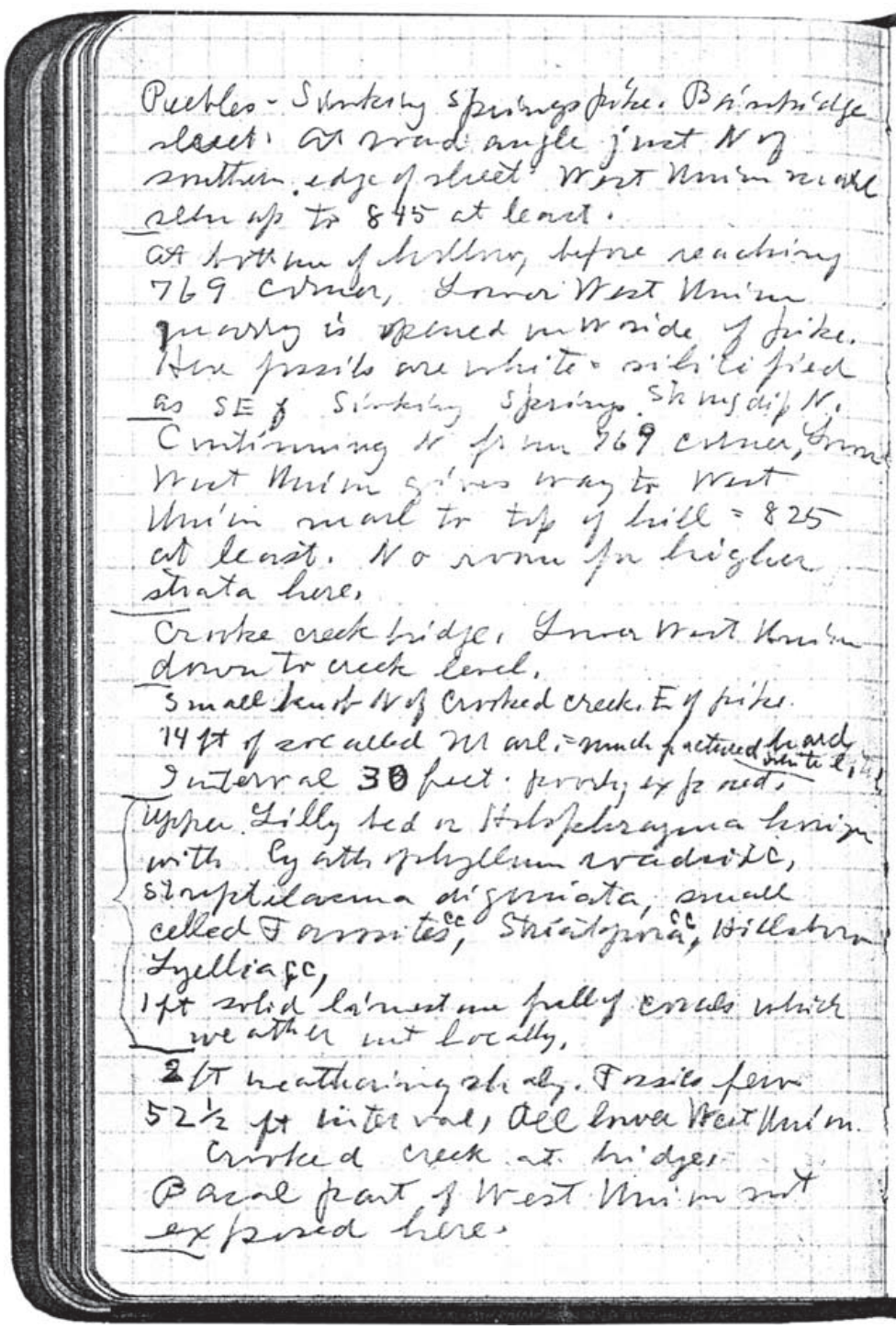


FIGURE 2.—August Foerste's 1919 geologic map of the Serpent Mound disturbance modified to include locations of field observations and to emphasize geologic contacts. Base maps are the Bainbridge (1917) and Peebles (1918) 15-minute topographic quadrangles.

TRANSCRIBED FIELD NOTES

Smithsonian Institution Archives record unit 7242
August F. Foerste Papers, 1887- *circa* 1916 and undated

Note: Schumacher added the text and numbers enclosed by brackets. Field note numbers allow cross-reference between Foerste's field notes and the geographic location of each field note shown on figure 2. Transcription is uncertain for questioned words enclosed by parentheses.



Box 3, folder 1, field notes on page 126:

[1] Peebles-Sinking Springs pike. Bainbridge sheet. At road angle just N of southern edge of sheet West Union marl seen up to 845 at least.

[2] At bottom of hollow, before reaching 769 corner, Lower West Union quarry is opened on W side of pike. Here fossils are white and silicified as SE of Sinking Springs. Shales dip N.

[3] Continuing N from 769 corner, Lower West Union gives way to West Union marl to top of hill = 825 at least. No room for higher strata here.

[4] Crooke[d] creek bridge. Lower West Union down to creek level.

[5] Small knob N of Crooked Creek E of pike 14 ft. of so called marl = much fractured hard (interval?). Interval 30 feet poorly exposed. Upper Lilley bed or *Holophragma* horizon with *Cyathophyllum roadsi* cc, *Streptelasma digoniata*, small celled *Favosites* cc, *Striatopora* cc, (Hillsboro?), *Lyellia* cc, 1 ft. solid limestone full of corals which weather out locally.

[6] 2 ft. weathering shale. Fossils few
52½ ft. interval, all lower West Union. Crooked Creek at bridge. Basal part of West Union not exposed here.

Box 3, folder 1, page 127:

[7] A little farther north on west side of pike is a quarry there were found *Camarotoechia roadsi, Leptaena, Brachyprion* large with front end of pedical valve depressed gently along medium parts as at West Union, *Cornulites* large, all in one layer.
See section below:

1 ft. very fossiliferous *C. roadsi* bed,
20 ft. interval,
1/2 ft (*Homalonotus*?) horizon,
8 ft. interval. Weathering like ss,
[Next five units included in an interval Foerste noted as]
Shale below Lilley bed.
2 ft. bluish shale & indurated rock,
2 ft. limestone,
1/2 ft. weathering shale,
1 1/2 ft. solid limestone,
1/2 ft. clay shale,
Solid limestone.

The crinoidal layers found at the top of the section SE of West Union, Ohio appears to occur in the preceding section a short distance below the *Cyathophyllum roadsi* bed.
[The last entry of page 127 is located on the Peebles 15-minute quadrangle outside of the Serpent Mound disturbance]
Locust Grove 3/4 mi SW to cemetery at road crossing.
Olentangy-Monroe contact at 885 ft. Not actually identified as Monroe.

A little farther north on west side of pike is a quarry there were found Camarotoechia roadsi, Leptaena, Brachyprion large with front end of pedicel were depressed gently along medium parts as at West Union, Cornulites large, all in one layer, See section below:-

1 ft very fossiliferous C roadsi bed.
20 ft interval.
1/2 ft Homalonotus horizon.
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Shale below Lilley bed.
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1 1/2 ft solid limestone.
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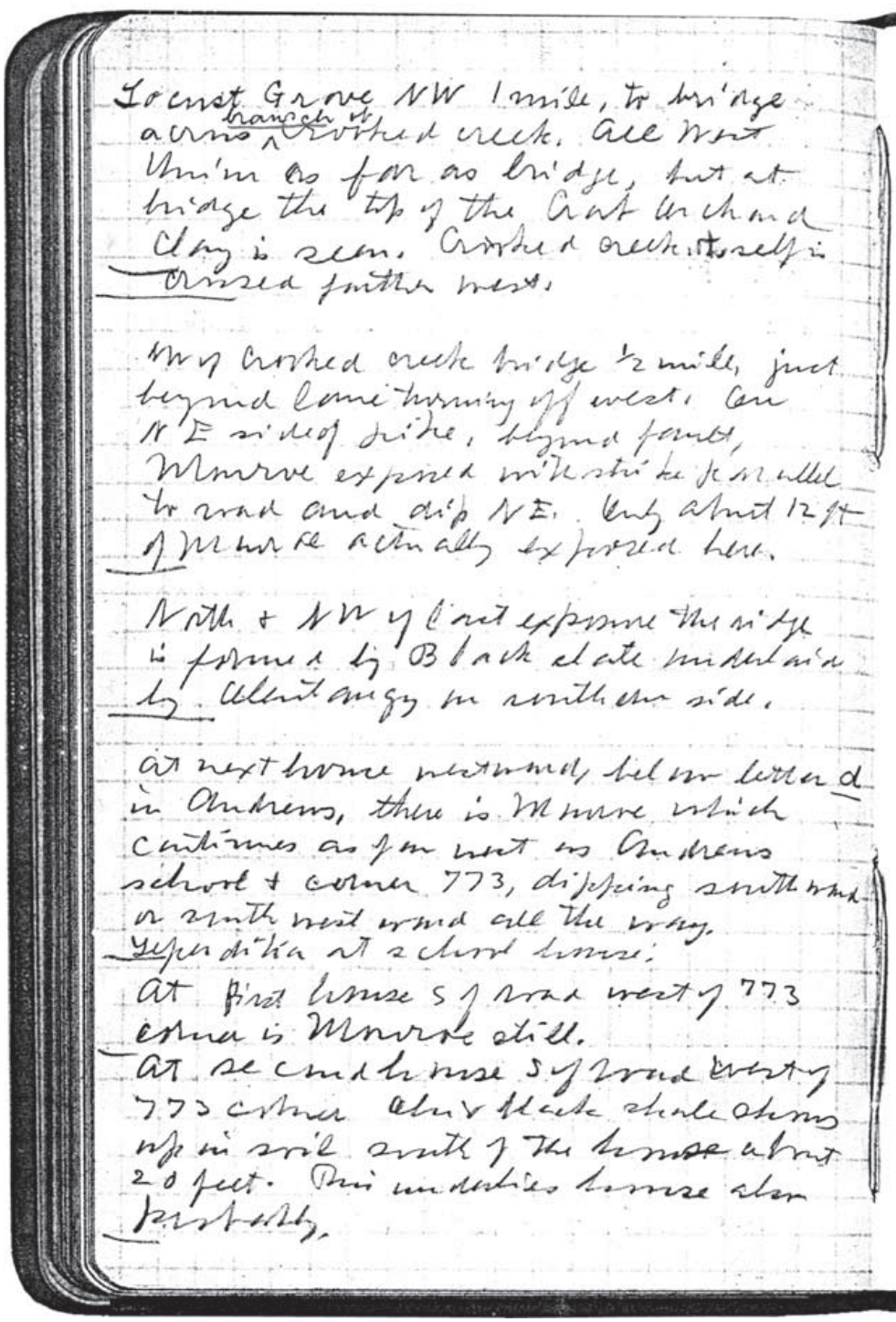
The crinoidal layers found at the top of the section SE of West Union Ohio appears to occur in the preceding section a short distance below the Cyathophyllum roadsi bed.

Locust Grove 3/4 mi SW to cemetery at road crossing.
Olentangy - Monroe cont act at 885 ft. Not actually identified as Monroe.



Locust Grove NW 1 mile, to bridge across branch of Crooked creek. All West Union as far as bridge, but at bridge the top of the Crab Orchard Clay is seen. Crooked creek itself is crossed further west.

NW of Crooked creek bridge ½ mile, just beyond lane turning off west. On NE side of pike, beyond fault, Monroe exposed with strike parallel to road and dip NE. Only about 12 ft of Monroe actually exposed here.

North & NW of last exposure the ridge is formed by Black slate underlaid by Olentangy on southern side.

At next house westward, below letter d in Andrews, there is Monroe which continues as far west as Andrews school & corner 773, dipping southward or southwestward all the way. Leperditia at school house.

At first house S of road west of 773 corner is Monroe still.

At second house S of road westy 773 corner Ohio black shale shows up in soil south of the house about 20 feet. This underlies house also probably.

Box 3, folder 1, page 128:

[8] Locust Grove NW 1 mile to bridge across branch of Crooked creek. All West Union as far as bridge, but at bridge the top of Crab Orchard Clay is seen. Crooked Creek itself is crossed farther west.

[9] NW of Crooked Creek bridge ½ mile, just beyond lane turning off west. On NE side of pike, beyond fault, Monroe exposed with strike parallel to road and dip NE. Only about 12 ft. of Monroe actually exposed here.

[10] North & NW of last exposure the ridge is formed by Black slate underlaid by Olentangy on southern side.

[11] At next home westward, below letter d in Andrews, there is Monroe which continues as far west as Andrews school & corner 773, dipping southward or southwestward all the way. *Leperditia* at school house.

[12] At first house S of road west of 773 corner is Monroe still.

[13] At second house S of road west of 773 corner Ohio black shale shows up in soil south of the house about 20 feet. This underlies house also probably.

Box 3, folder 1, page 129:

[14] West of the next house, on N side of road, is Olentangy on N side of road.
[15] Farther W beyond small dry run indicated only by contour line on map is Monroe.
[16] Farther W, is plenty of Ohio Black shale.
[17] No outcrops west of straight stream coming in from N as far as first road turning off N, beyond house. Turn N on this road (dirt only).
[18] 1/4 mile N of pike, west of road, Olentangy-Monroe contact at about 760-20 = 740 fairly exact.
[19] At road angle 3/8 mi. N of pike, west of road, Olentangy-Monroe contact is about 765-50 = 715, indicating dip toward south [north?] here.
[20] At lane heading west toward Serpent Mound, the marl shows up about 25 ft. below road level.
[21] No exposure along road until crest of road at small 840 ft. knob NE of Serpent Mound lane is reached. Here Crab Orchard shows up over Lower West Union dipping nearly 60 degrees east. Level of contact = about 820.
[22] Northward, down hill, Crab Orchard shows up below the same Lower West Union.

West of the next house, on N side of road, is Olentangy on N side of road.
Farther W, beyond small dry run indicated only by contour line on map, is Monroe.
Farther W, is plenty of Ohio Black shale.
No outcrops west of straight stream coming in from N as far as first road turning off N, beyond house. Turn N on this road (dirt only).
1/4 mi N of pike, west of road, Olentangy-Monroe contact at about 760-20 = 740 fairly exact.
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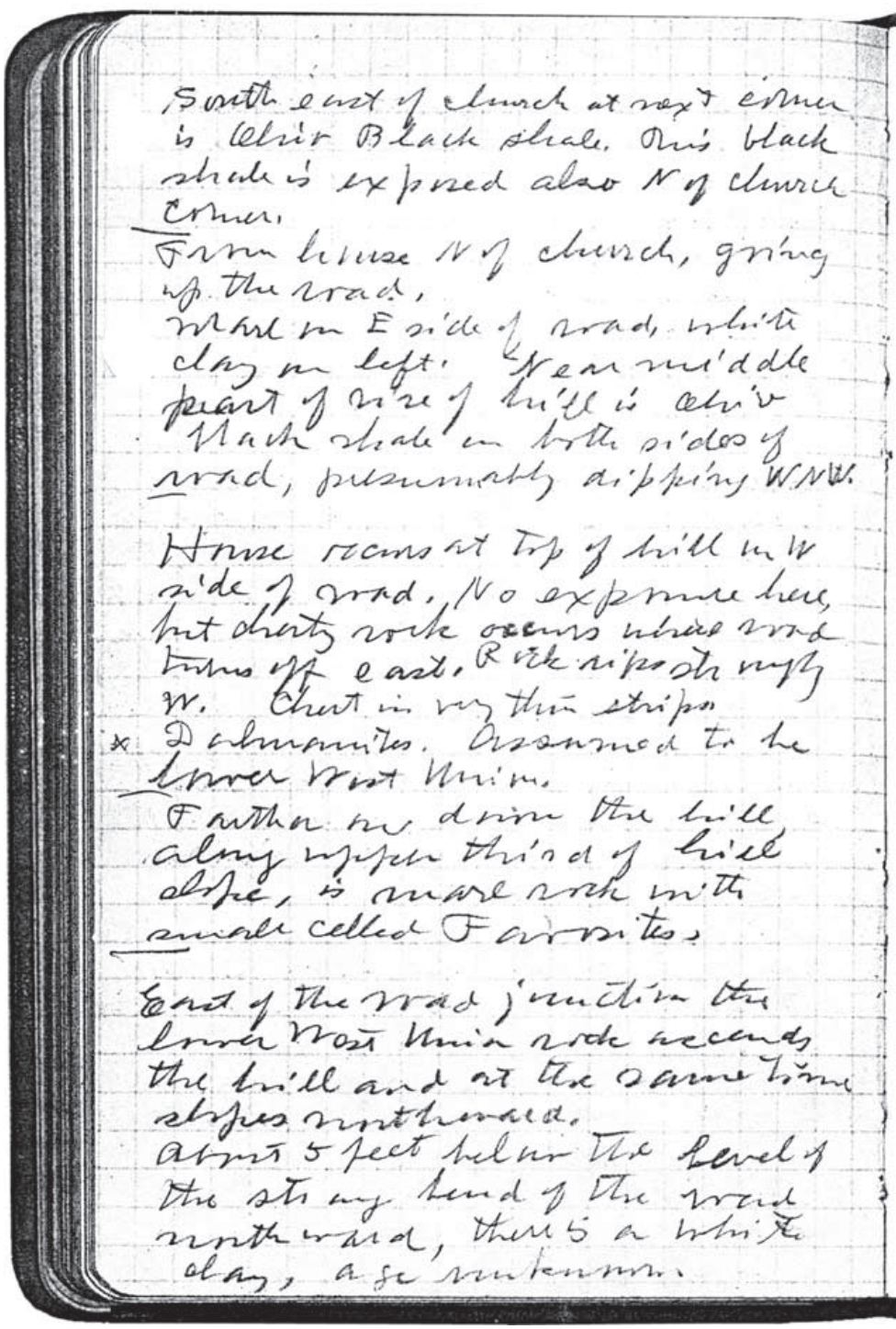


Box 3, Folder 1, page 130:

[23] Southeast of church at next corner is Ohio Black shale. This black shale is exposed also N of church corner.

[24] From house N of church, going up the road. Marl on E side of road, white clay on left. Near middle part of (rise?) of hill is Ohio Black shale on both sides of road, presumably dipping WNW.

[25] House occurs at top of hill on W side of road. No exposure here, but cherty rock occurs where road turns off east. Rock dips strongly W. Chert in very thin stripes. *Dalmanites*. Assumed to be lower West Union.

[26] Farther on down the hill, along upper third of hill slope, is marl rock with small celled *Favosites*.

[27] East of the road junction the lower West Union rock ascends the hill and at the same time slopes northward.

[28] About 5 feet below the level of the strong bend of the road northward, there is a white clay, age unknown.

Box 3, Folder 1, page 131:

[29] Just before reaching strong bend in road toward east, white clay below Lower West Union shows up.

[30] East from strong bend in road 1/8 mi. where road descends the hill, there is lower West Union dipping strong[ly] NNW, underlaid at lower part of hill by White Clay, Crab Orchard probably.

[31] Hill occurs N of road. Along edge of this hill bordering the road occurs white Crab Orchard clay.

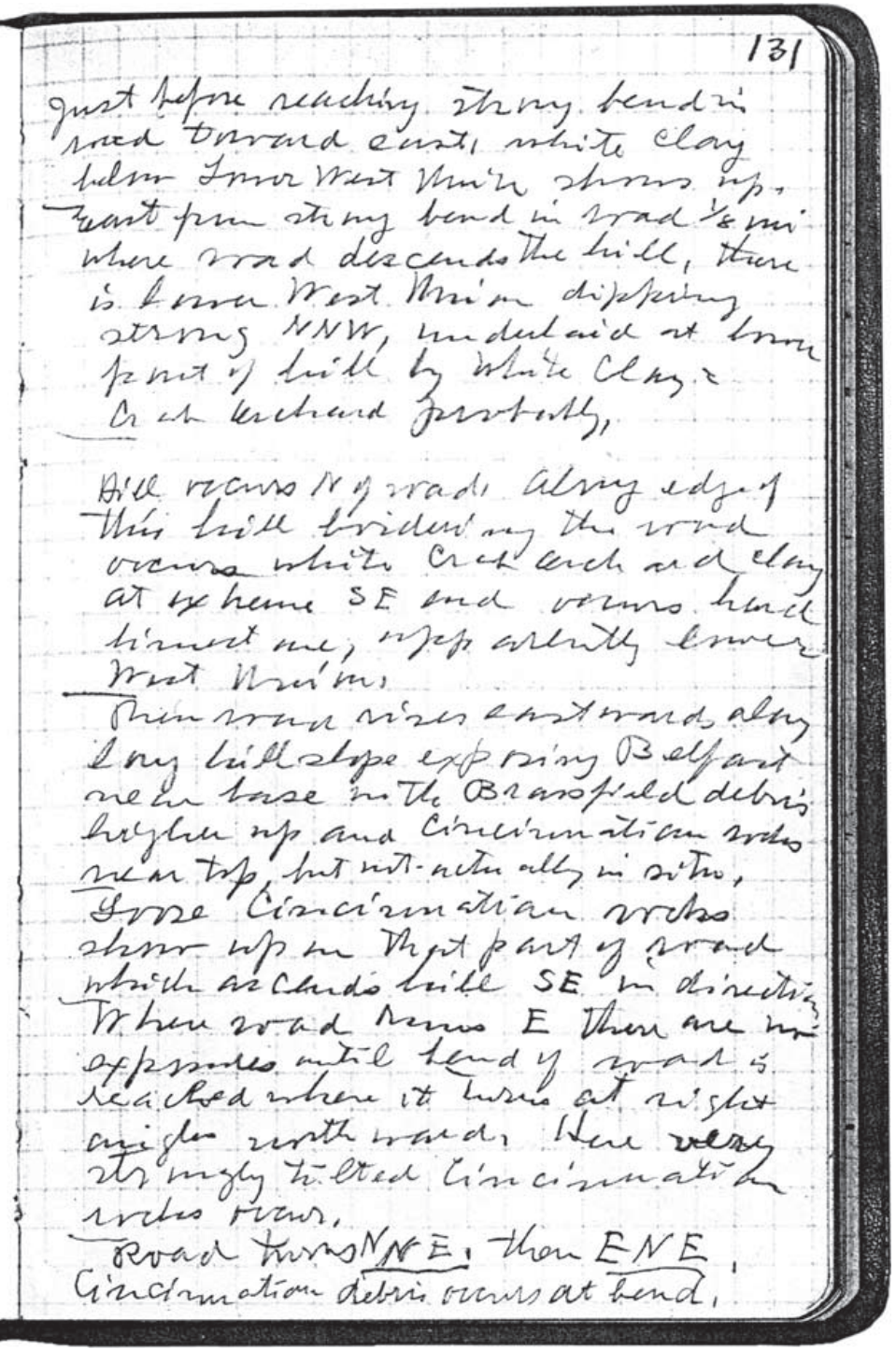
[32] At extreme SE end occurs hard limestone, apparently lower West Union.

[33] Then road rises eastwards along long hill slope exposing Belfast near base in the Brassfield debris higher up and Cincinnatian rocks near top, but not naturally in situ.

[34] Loose Cincinnatian rocks show up on that part of road which ascends hill SE in direction.

[35] Where road runs E there are no exposures until bend of road is reached where it turns at right angles northward. Here very strongly tilted Cincinnatian rocks occur.

[36] Road turns NNE then ENE, Cincinnatian debris occurs at bend.



131

Just before reaching strong bend in road toward east, white clay below Lower West Union shows up.

East from strong bend in road 1/8 mi. where road descends the hill, there is Lower West Union dipping strong NNW, underlaid at lower part of hill by White Clay & Crab Orchard probably.

Hill occurs N of road. Along edge of this hill bordering the road occurs white Crab Orchard clay at extreme SE end occurs hard limestone, apparently lower West Union.

Then road rises eastward along long hillslope exposing Belfast near base in the Brassfield debris higher up and Cincinnatian rocks near top, but not actually in situ.

Loose Cincinnatian rocks show up on that part of road which ascends hill SE in direction.

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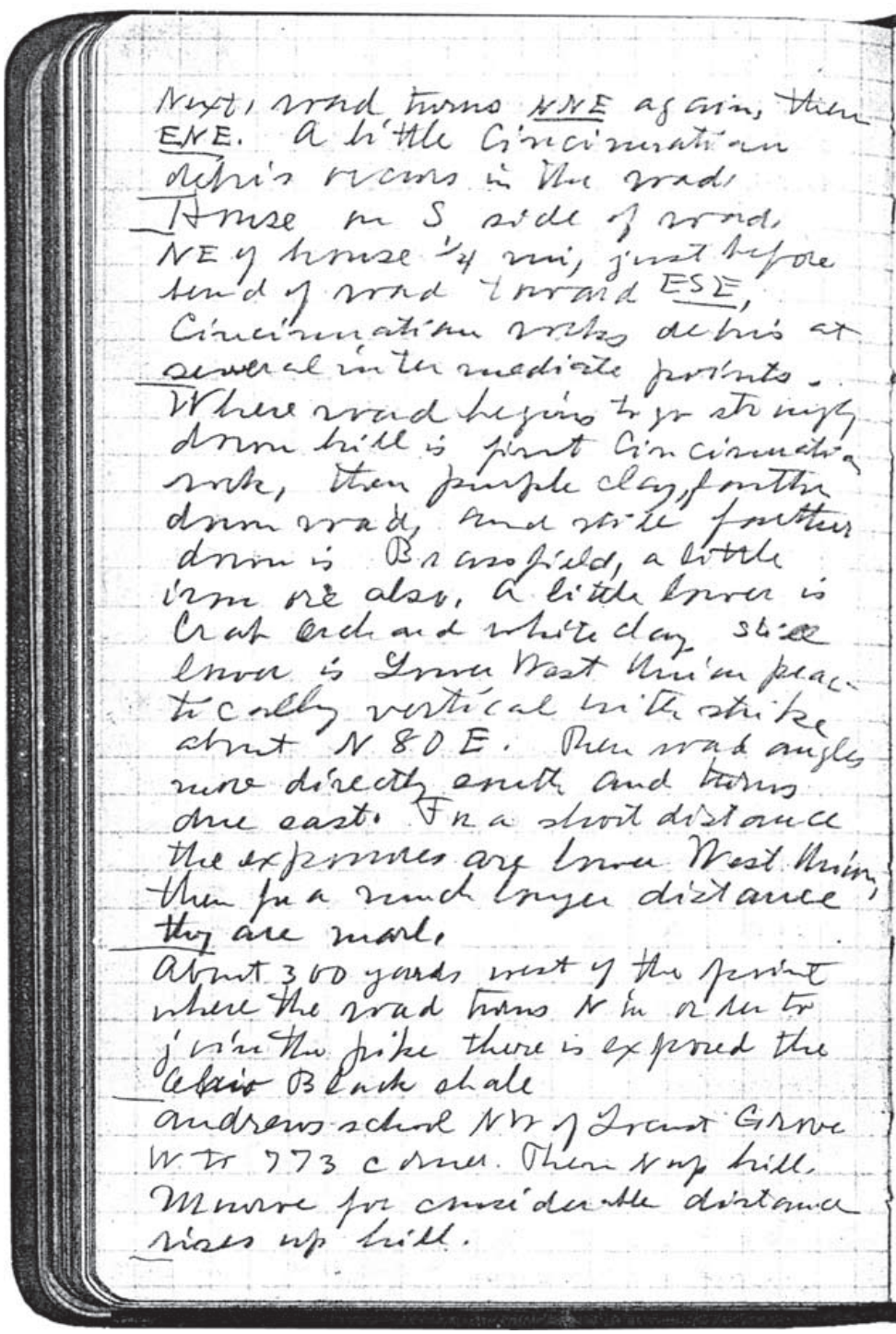

Next, road turns NNE again, then ENE. A little Cincinnatian debris occurs in the road.
House on S side of road.
NE of house 1/4 mi, just before bend of road toward ESE, Cincinnatian rocks debris at several intermediate points.
Where road begins to go strongly down hill is first Cincinnatian rock, then purple clay, farther down road, and still farther down is Brassfield, a little iron ore also. A little lower is Crab Orchard white clay, still lower is Lower West Union practically vertical with strike about N 80 E. Then road angles more directly south and turns due east. For a short distance the exposures are Lower West Union, then for a much longer distance they are marl.
About 300 yards west of the point where the road turns N in order to join the pike there is exposed the Black shale
Andrews school NW of Locust Grove W to 773 corner. Then N up hill. Monroe for considerable distance rises up hill.

Box 3, Folder 1, page 132:

[37] Next, road turns NNE again, then ENE. A little Cincinnatian debris occurs in the road.

[38] House on S side of road.

[39] NE of house 1/4 mi, just before bend of road toward ESE, Cincinnatian rocks debris at several intermediate points.

[40] Where road begins to go strongly down hill is first Cincinnatian rock, then purple clay, farther down road, and still farther down is Brassfield, a little iron ore also. A little lower is Crab Orchard white clay, still lower is Lower West Union practically vertical with strike about N 80 E. Then road angles more directly south and turns due east. For a short distance the exposures are Lower West Union then for a much longer distance they are marl.

[41] About 300 yards west of the point where the road turns N in order to join the pike, there is exposed the Ohio Black shale.

[42] Andrews school NW of Locust Grove W to 773 corner. Then N uphill. Monroe for considerable distance rises up hill.

Box 3, Folder 1, page 133:

[43] At first crest of hill is marl and this marl continues to second crest, a short distance S of house on left of road.
[44] From this house northward to bend of road is Lower West Union.
[45] Then E to bend of road.
[46] Then NNE down hill where rock is Lower West Union to road junction with house toward NE side of junction.
[47] West of this house is white Crab Orchard clay, and farther west in stream bed Brassfield boulders are common. Some of these are ferruginous.
[48] A short distance before reaching the house and end of lane, a dry weather stream is indicated by the contour lines. Brassfield is exposed SE of this stream crossing in a low elevation in this valley base. Some of this Brassfield is ripple marked on large scale. The iron ore layer is included here in the debris. The iron ore bed is well exposed west of this dry water stream dipping strongly eastward. Ore bed about 2 ft. thick. The dry stream goes only about 2 feet below this ore bed. Ore bed rises to point where road turns NW to house.

133

At first crest of hill is marl and this marl continues to second crest, a short distance S of house on left of road.
From this house northward to bend of road is Lower West Union.
Then E to bend of road.
Then NNE down hill where rock is Lower West Union to road junction with house toward NE side of junction.
West of this house is white Crab Orchard clay, and farther west in stream bed Brassfield boulders are common. Some of these are ferruginous.
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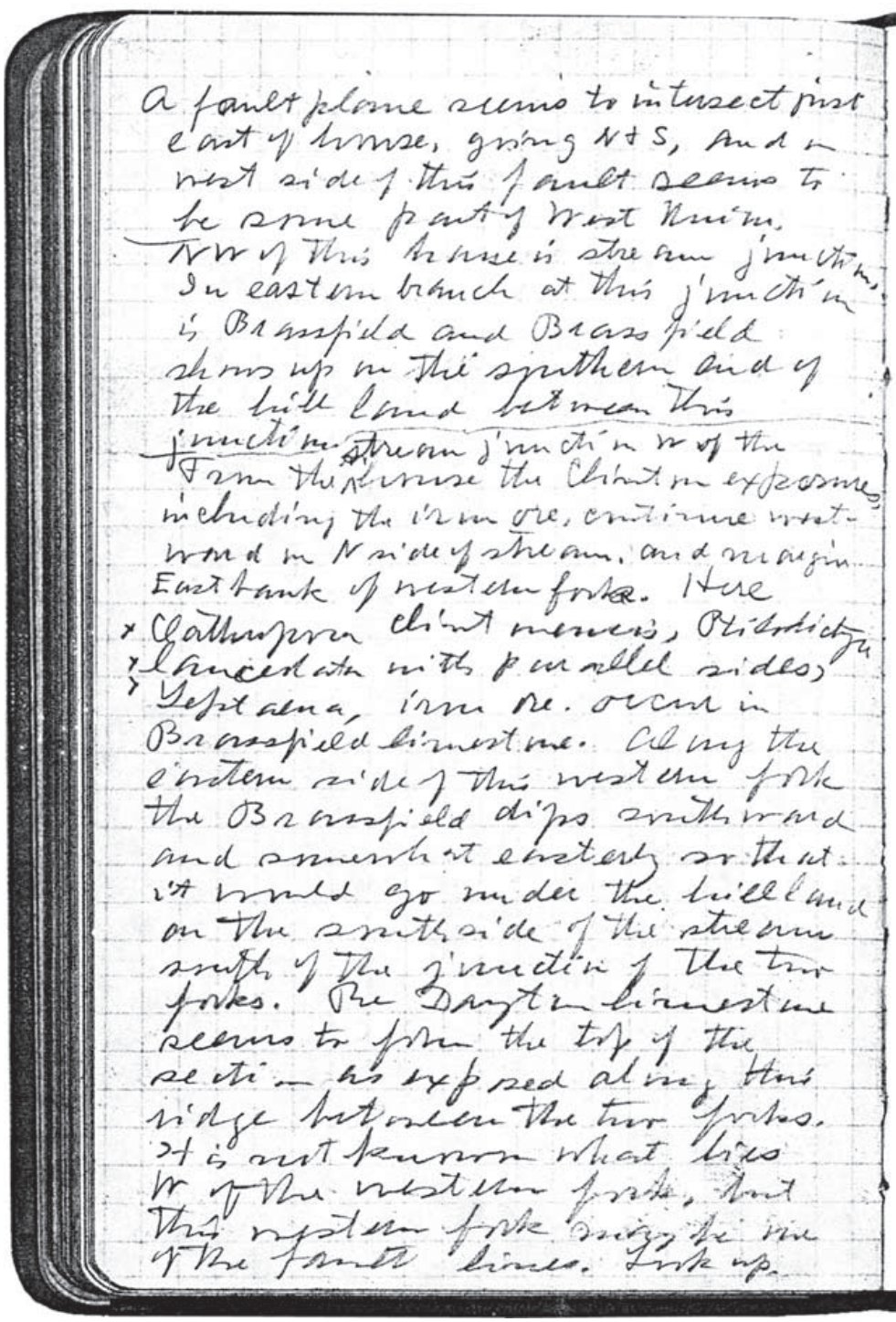

A fault plane seems to intersect just east of house, going N & S, and on west side of this fault seems to be some part of West Union.
NW of this house is stream junction. In eastern branch at this junction is Brassfield and Brassfield shows up in the southern end of the hill land between this junction stream junction W of the
From the house the Clinton exposures including the iron ore, continue westward on N side of stream, and margin.
East bank of western fork. Here
× Clathropora clintonensis, Ptilodictya
× lanceolata with parallel sides,
× Leptaena, iron ore. occur in
Brassfield limestone. Along the
eastern side of this western fork
the Brassfield dips southward
and somewhat easterly so that
it would go under the hill land
on the south side of the stream
south of the junction of the two
forks. The Dayton limestone
seems to form the top of the
section as exposed along this
ridge between the two forks.
It is not known what lies
W of the western fork, but
this western fork may be one
of the fault lines. Look up.

Box 3, Folder 1, page 134:

[49] A fault plane seems to intersect just east of house, going N & S, and on west side of this fault seems to be some part of West Union.

[50] NW of this house is stream junction. In eastern branch at this junction is Brassfield and Brassfield shows up in the southern end of the hill land between this junction.

[51] From the stream junction W of the house the Clinton exposures, including the iron ore, continue westward on N side of stream, and margin.

[52] East bank of western fork. Here *Clathropora clintonensis, Ptilodictya lanceolata* with parallel sides, *Leptaena*, iron ore occur in Brassfield limestone. Along the eastern side of this western fork the Brassfield dips southward and somewhat easterly so that it would go under the hill land on the south side of this stream south of the junction of the two forks. The Dayton limestone seems to form the top of the section as exposed along this ridge between the two forks. It is not known what lies W of the western fork, but this western fork may be one of the fault lines. Look up.

Box 3, Folder 1, page 135:

[53] Return to road junction a little over 1/2 mi. NNE from Andrews school. Go E. Probably Crab Orchard clay in creek bottom. Then NE, probably also Crab Orchard clay in creek bottom and on south side of valley.

[54] Before reaching point where road turns short distance N, Ohio black shale is exposed on S side of road and also on N side of road farther uphill. Here the black shale dips strongly west so that at road angle where road turns straight N there is Monroe with Black shale westward, the plane of contact dipping strongly west.

[55] Road turns straight north, Monroe. Road turns ENE. Monroe at road corner. House on north side of road. Monroe or marl very poorly exposed along road. Farther east is bituminous marl along the road.

[56] The road turns straight N again. East of this road are great areas covered with Ohio Black shale apparently overlaid with Bedford drift.

[57] Along the road northward is white clay, probably Olentangy. Still farther N, as far as road angle, is Ohio Black shale.

135

Return to road junction a little over
½ mi NNE from Andrews school.
Go E. Probably Crab Orchard clay in
creek bottom. Then NE, probably
also Crab Orchard clay in creek bottom
and on south side of valley.
Before reaching point where road
turns short dist ance N, Ohio black
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up hill. Here the black shale dips
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there is Monroe with Black shale
westward, the plane of contact
dipping strongly west
Road turns straight north. Monroe.
Road turns ENE. Monroe at
road corner. House on north side of
road. Monroe or marl very
poorly exposed along road.
Further east is bituminous marl
along the road.
The road turns straight N again.
East of this road are great areas
covered with Ohio Black shale
apparently overlaid with Bedford
drift.
Along the road northward is
white clay, probably Olentangy. Still
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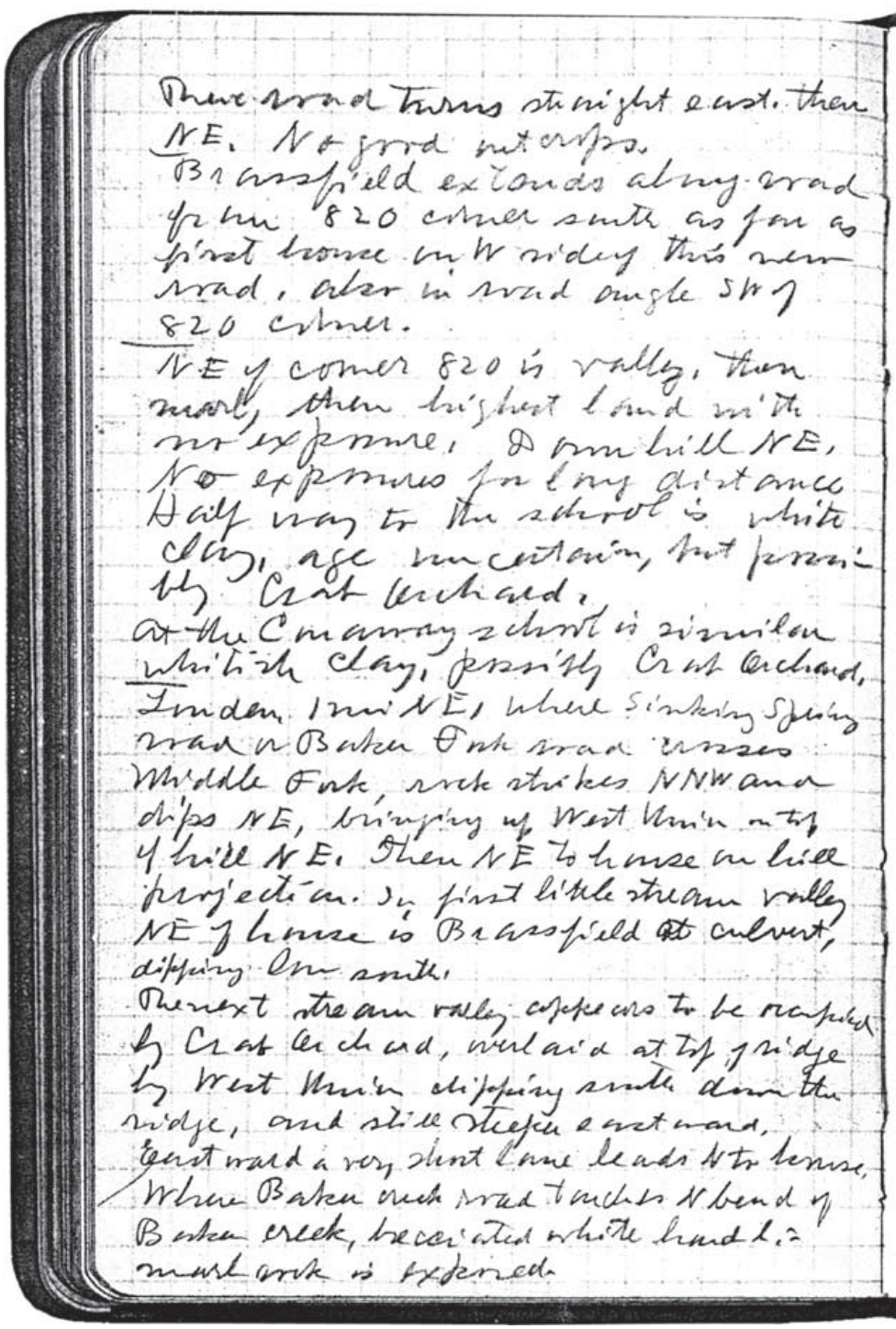


There road turns straight east, then NE. No good outcrops.
Brassfield extends along road from 820 corner south as far as first house on W side of this new road, also in road angle SW of 820 corner.
NE of corner 820 is valley, then marl, then highest land with no exposure. Down hill NE, No exposures for long distance. Half way to the school is white clay, age uncertain, but possibly Crab Orchard.
At the Conaway school is similar whitish clay, possibly Crab Orchard.
Louden, 1 mi NE, where Sinking Spring road or Baker Fork road crosses Middle Fork, rock strikes NNW and dips NE, bringing up West Union on top of hill NE. Then NE to house on hill projection. In first little stream valley NE of house is Brassfield at culvert, dipping low south.
The next stream valley appears to be occupied by Crab Orchard, overlaid at top of ridge by West Union dipping south down the ridge, and still steeper eastward. Eastward a very short lane leads N to house. Where Baker creek road touches N bend of Baker creek, brecciated white hard l. = marl rock is exposed.

Box 3, Folder 1, page 136:

[57 continued] There road turns straight east, then NE. No good outcrops.

[58] Brassfield extends along road from 820 corner south as far as first house on W side of this new road, also in road angle SW of 820 corner.

[59] NE of corner 820 is valley, then marl, then highest land with no exposure. Down hill NE, no exposures for long distance. Half way to the school is white clay. Age uncertain, but probably Crab Orchard.

[60] At the Conaway school is similar whitish clay, possibly Crab Orchard.

[61] Louden, 1 mi NE, where Sinking Spring road or Baker Fork road crosses Middle Fork, rock strikes NNW and dips NE, bringing up West Union on top of hill NE. Then NE to house on hill projection. In first little stream valley NE of house is Brassfield at culvert, dipping low south.

[62] The next stream valley appears to be occupied by Crab Orchard, overlaid at top of ridge by West Union dipping south down the ridge and still steeper eastward. Eastward a very short lane leads N to house. Where Baker creek road touches N bend of Baker creek, brecciated white hard l. [ls.] = marl rock is exposed.

Box 3, Folder 1, page 137:

[62 continued] This underlaid immediately eastward by that part of the banded mottled coarse grained West Union which underlaid the *Holophragma* clay zone, but no *Holophragma* clay fossils are seen here. Dip = W steep.

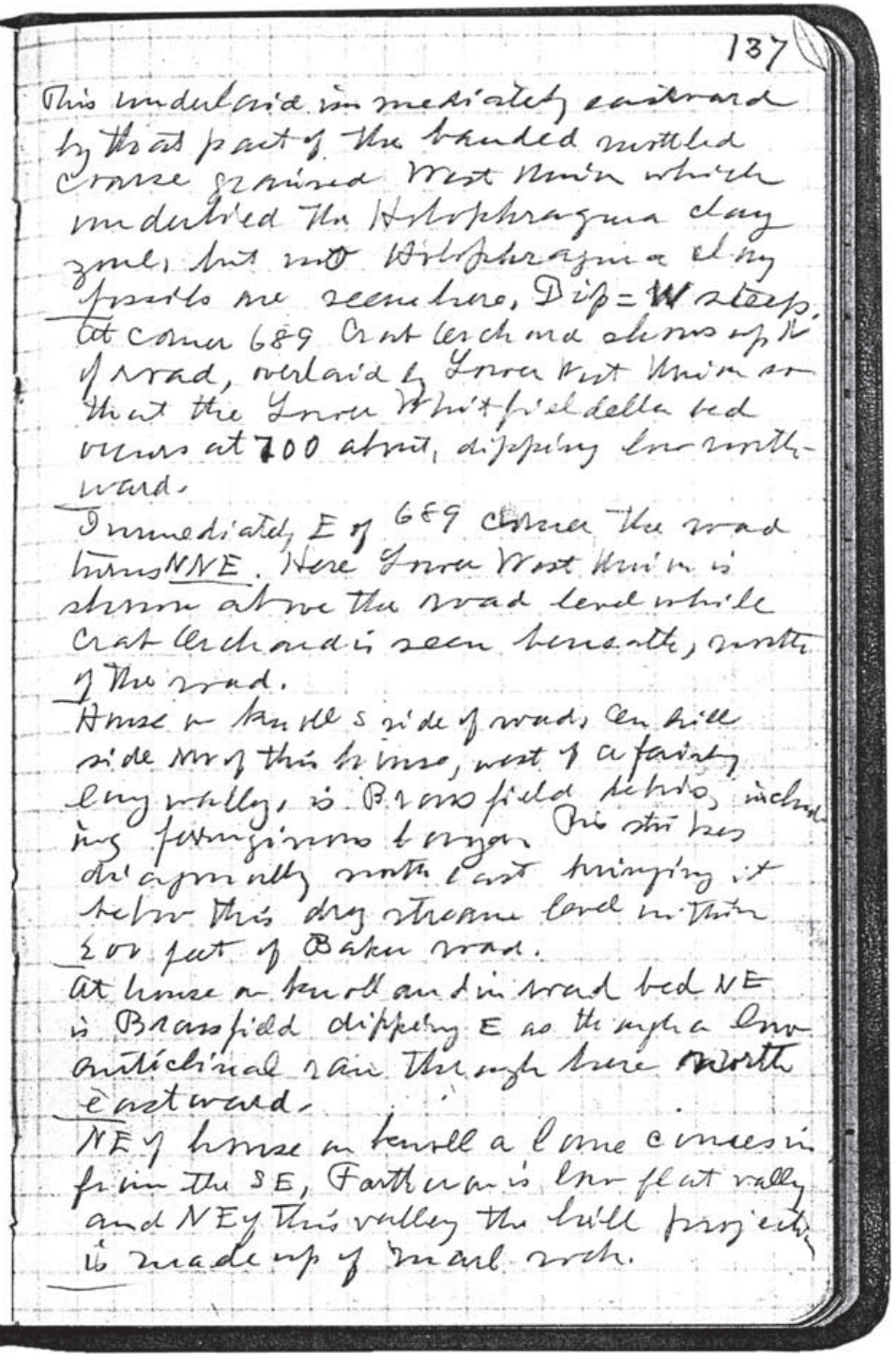
[63] At corner 689, Crab Orchard shows up N of road, overlaid by Lower West Union so that the Lower *Whitfieldella* bed occurs at 700 about, dipping low southward.

[64] Immediately E of 689 corner, the road turns NNE. Here Lower West Union is shown above the road level while Crab Orchard is seen beneath, south of the road.

[65] House on knoll S side of road. On hill side NW of this house, west of a fairly long valley is Brassfield debris including ferruginous horizon. This strikes diagonally southeast bringing it below this dry stream level within 200 feet of Baker road.

[66] At house on knoll and in road bed NE is Brassfield dipping E as though a low anticlinal ran through here north eastward.

[67] NE of house on knoll a lane comes in from the SE, Farther on is a low flat valley and NE of this valley the hill projection is made up of marl rock.



137

This underlaid immediately eastward by that part of the banded mottled coarse grained West Union which underlaid the Holophragma clay zone, but no Holophragma clay fossils are seen here. Dip = W steep.

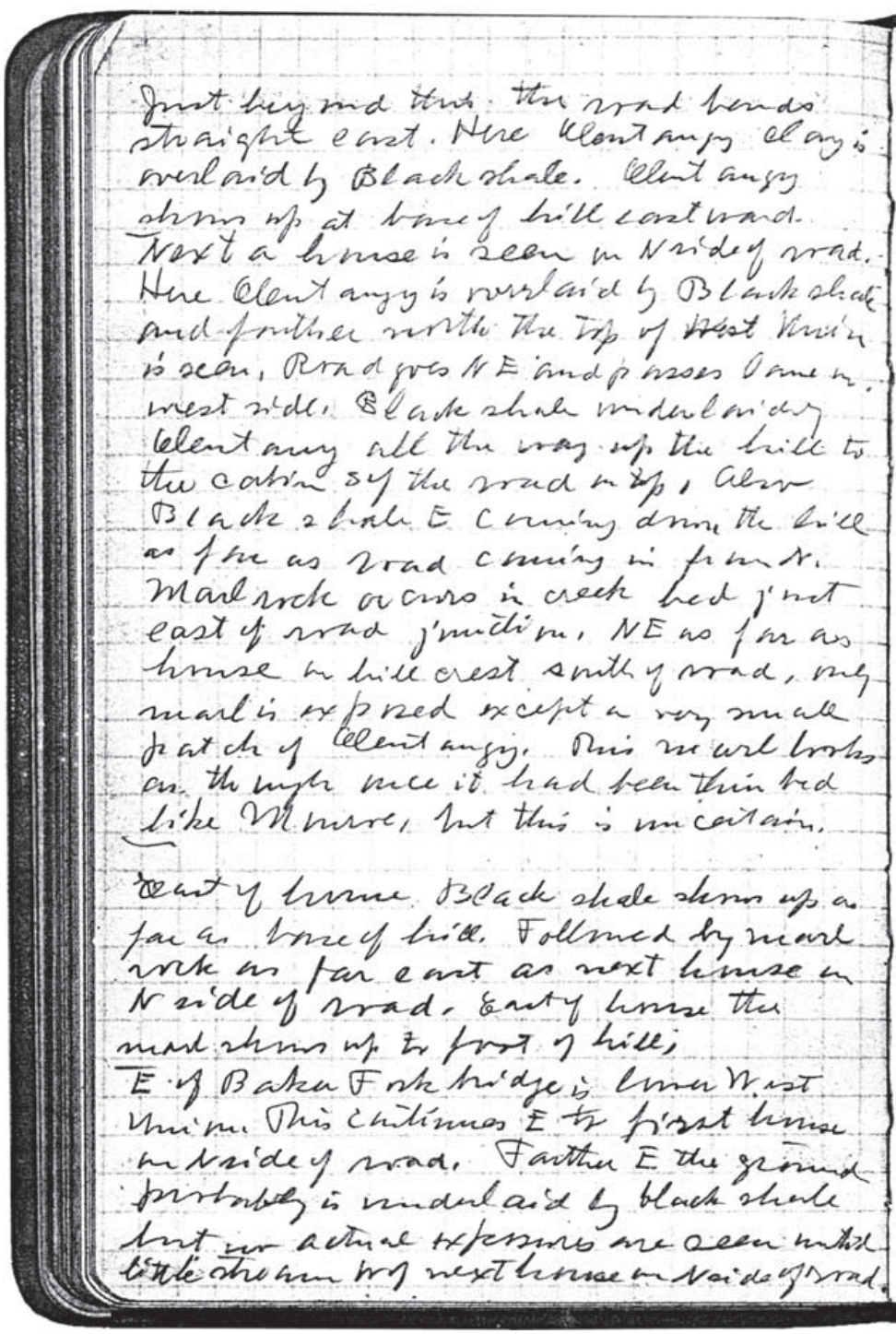
At corner 689 Crab Orchard shows up N of road, overlaid by Lower West Union so that the Lower Whitfieldella bed occurs at 700 about, dipping low southward.

Immediately E of 689 corner the road turns NNE. Here Lower West Union is shown above the road level while Crab Orchard is seen beneath, south of the road.

House on knoll S side of road. On hill side NW of this house, west of a fairly long valley, is Brassfield debris, including ferruginous horizon. This strikes diagonally southeast bringing it below this dry stream level within 200 feet of Baker road.

At house on knoll and in road bed NE is Brassfield dipping E as though a low anticlinal ran through here ~~north~~ eastward.

NE of house on knoll a lane comes in from the SE, Farther on is low flat valley and NE of this valley the hill projection is made up of marl rock.



Box 3, Folder 1, page 138:

[67 continued] Just beyond this the road bends straight east. Here Olentangy clay is overlaid by Black shale. Olentangy shows up at base of hill eastward.

[68] Next a house is seen on N side of road. Here Olentangy is overlaid by Black shale and farther north the top of West Union is seen. Road goes NE and passes lane on west side. Black shale underlaid by Olentangy all the way up the hill to the cabin S of the road on top. Also Black shale E coming down the hill as far as road coming in from N.

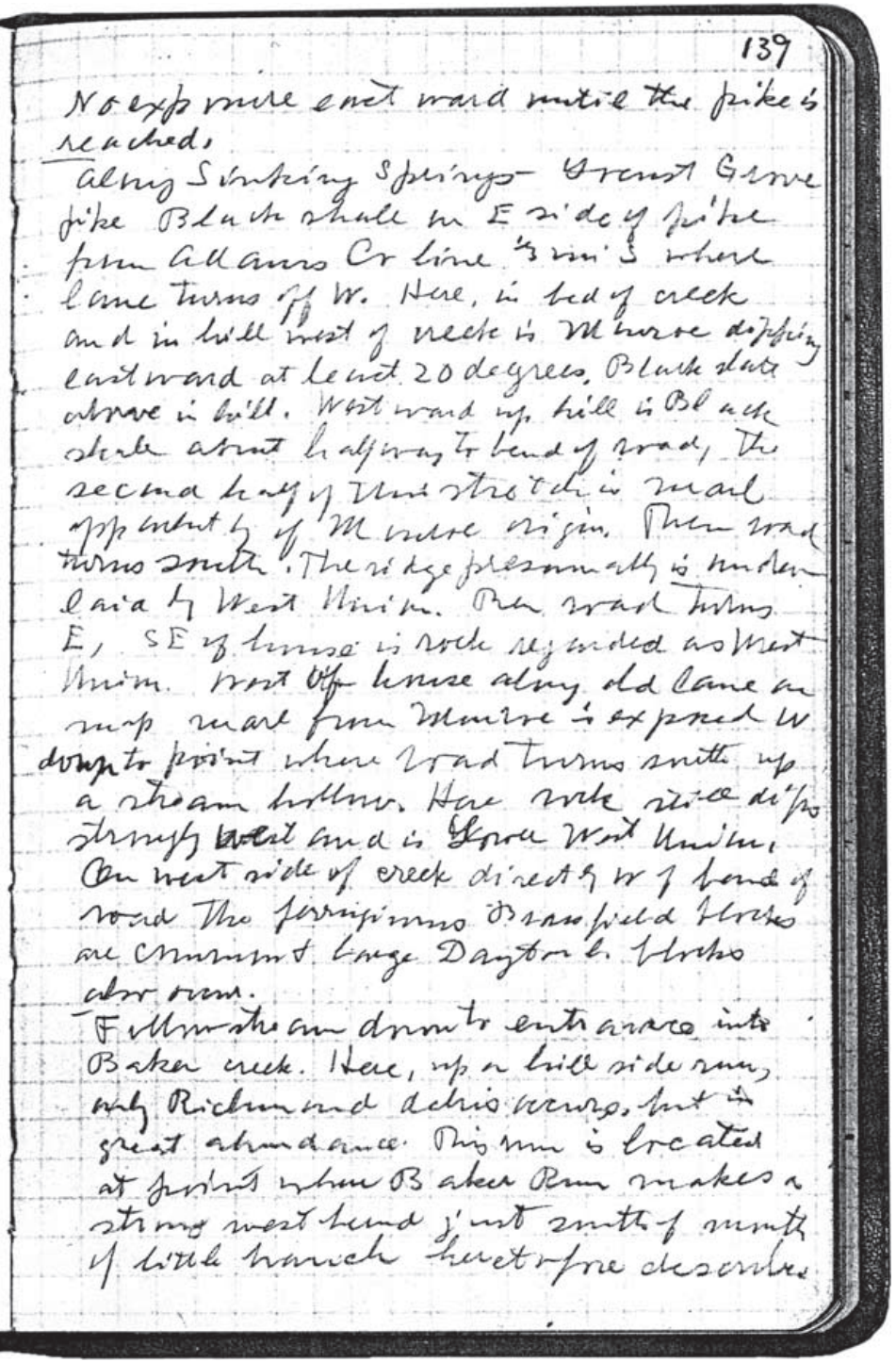
[69] Marl rock occurs in creek bed just east of road junction. NE as far as house on hill crest south of road, only marl is exposed except a very small patch of Olentangy. This marl looks as though once it had been thin bed like Monroe, but this is uncertain.

[70] East of house, Black shale shows up as far as base of hill. Followed by marl rock as far east as next house on N side of road. East of house the marl shows up to foot of hill.

[71] E of Baker Fork bridge is lower West Union. This continues E to first house on N side of road. Farther E the ground probably is underlaid by black shale but no actual exposures are seen until little stream W of next house on N side of road.

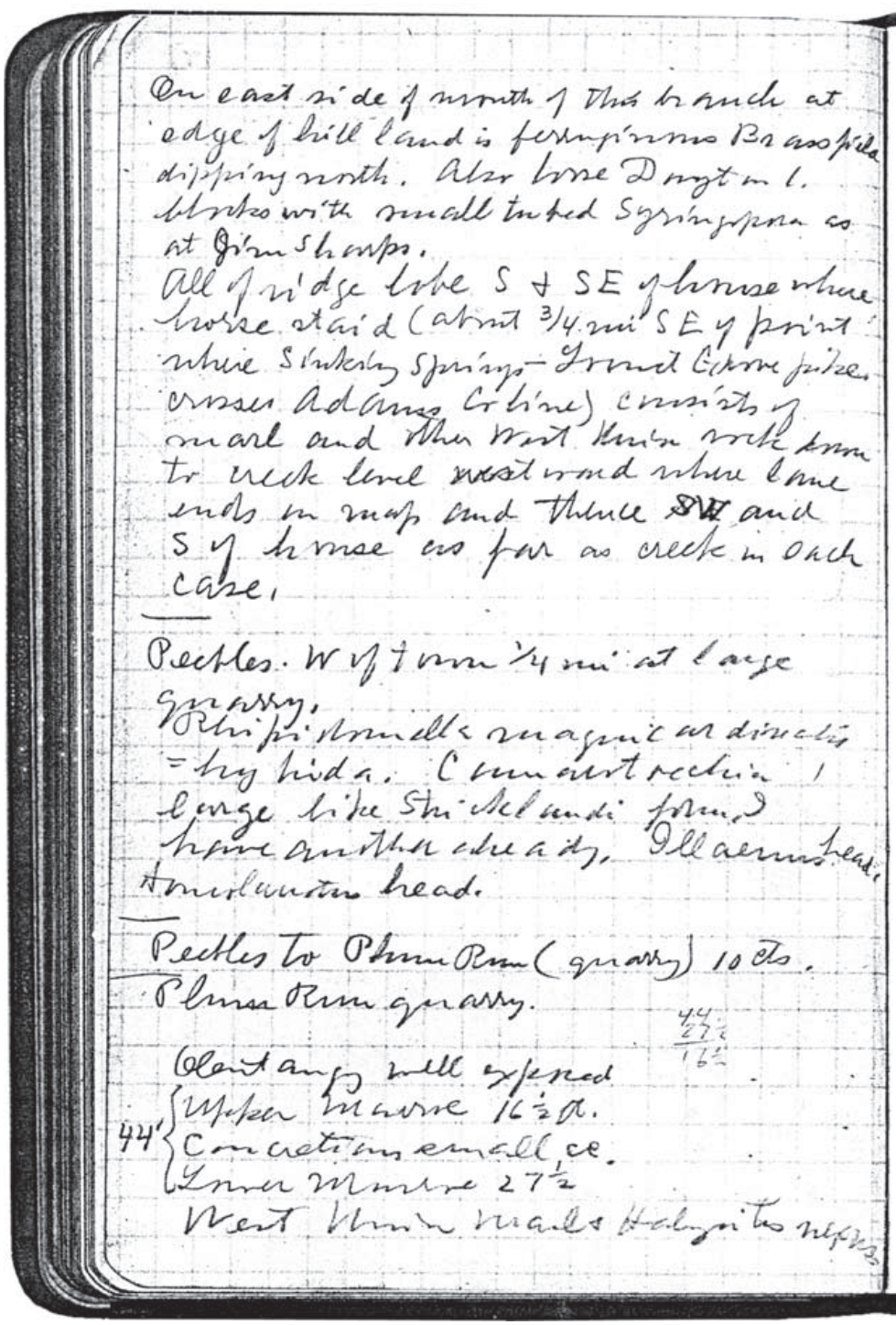
Box 3, Folder 1, page 139:

[72] No exposure eastward until the pike is reached.
[73] Along Sinking Springs-Locust Grove pike Black shale on E side of pike from Adams Co. line 1/3 mi S where lane turns off W.
[74] Here in bed of creek and in hill west of creek is Monroe dipping eastward at least 20 degrees. Black slate above in hill.
[75] Westward up hill is Black shale about halfway to bend of road, the second half of this stretch is marl apparently of Monroe origin.
[76] Then road turns south. The ridge presumably is underlaid by West Union. Then road turns E [W?], SE of house is rock regarded as West Union.
[77] West of house along old lane on map marl from Monroe is exposed W down to point where road turns south up a stream hollow. Here rock still dips strongly west and is Lower West Union.
[78] On west side of creek directly W of bend of road the ferruginous Brassfield blocks are common and large Dayton l. [Ls.] blocks also occur.
[79] Follow stream down to entrance into Baker creek. Here, up a hill side run, only Richmond [Cincinnatian] debris occurs, but in great abundance. This run is located at point where Baker Run makes a strong west bend just south of mouth of little branch heretofore described.



139

No exp wise east ward until the pike is reached.
along Sinking Springs - Locust Grove pike Black shale on E side of pike from Adams Co line 1/3 mi S where lane turns off W. Here, in bed of creek and in hill west of creek is Monroe dipping eastward at least 20 degrees. Black slate above in hill. Westward up hill is Black shale about halfway to bend of road, the second half of this stretch is marl apparently of Monroe origin. Then road turns south. The ridge presumably is underlaid by West Union. Then road turns E, SE of house is rock regarded as West Union. West of house along old lane on map marl from Monroe is exposed W down to point where road turns south up a stream hollow. Here rock still dips strongly west and is Lower West Union. On west side of creek directly W of bend of road the ferruginous Brassfield blocks are common & large Dayton l. blocks also occur.
Follow stream down to entrance into Baker creek. Here, up a hill side run, only Richmond debris occurs, but in great abundance. This run is located at point where Baker Run makes a strong west bend just south of mouth of little branch heretofore described.



On east side of mouth of this branch at edge of hill land is ferruginous Brassfield dipping north. Also loose Dayton l. blocks with small tubed Syringopora as at Jim Sharps.
All of ridge lobe S & SE of house where horse staid (about 3/4 mi SE of point where Sinking Springs-Locust Grove pike crosses Adams Co line) consists of marl and other West Union rock down to creek level westward where lane ends on map and thence SW and S of house as far as creek in each case.

Peebles. W of town 1/4 mi at large quarry.
Rhipidomella magnicostata = hybrida. Cum art reticularis 1 large like Stickelandi found here another already. Dillaenus head. Homalonotus head.

Peebles to Plum Run (quarry) 10 cts.

Plum Run quarry.

44 27½ 16½

Clint Angy well opened
44' { Water Moore 16½ ft.
Concretions small ce.
Inner Moore 27½
West Union marls Halysites reefs

Box 3, Folder 1, page 140:

[80] On east side of mouth of this branch at edge of hill land is ferruginous Brassfield dipping north. Also loose Dayton l. [Ls.] blocks with small tubed *Syringopora* as at Jim Sharps.

[81] All of ridge lobe S and SE of house where horse staid [stayed] (about 3/4 mi SE of point where Sinking Springs-Locust Grove pike crosses Adams Co. line) consists of marl and other West Union rock down to creek level westward where lane ends on map and thence SW and S of house as far as creek in each case.

Remaining notes of pages 140 and 141 describe the geology of the Plum Run Quarry region located south and outside of the Serpent Mound disturbance.

O.D.N.R.
GEOLOGICAL SURVEY