Click to view Part 1

Appendices

Appendix 1: Reproducibility of R_o Values on Transects A and A Lake Erie Shoreline and Application of R_o Suppression Correction Factor

The R_o values reported by HGS for Devonian shale samples along transects A and A Lake Erie Shoreline are reasonably consistent with R_o values reported by other operators for similar intervals in the same drill holes (Figure Appendix 1-a; Table 1). For example, samples from drill hole A_{Ash} measured by four operators range from 0.37 to 0.52 % (mean value of 0.46 %) for the Marcellus Shale and from 0.38 to 0.48 % (mean value of 0.43 %) for the Rhinestreet Shale. Samples from drill hole A_3 measured by two operators range from 0.48 to 0.49 % (mean value of 0.49 %) for the Marcellus Shale, 0.47 to 0.48 % (mean value of 0.48 %) for the Rhinestreet Shale, and 0.47 to 0.50 % (mean value of 0.49 %) for the lower part of the Huron Member. In addition, samples from drill hole A_4 measured by three operators range from 0.42 to 0.62 % (mean value of 0.52 %) for the Marcellus Shale and 0.42 to 0.56 % (mean value of 0.48 %) for the Rhinestreet Shale (Figure Appendix 1-a). Although the R_o values reported by HGS in these datasets are consistently lower than the values reported by the other operators, the HGS analyses are within the limits of operator error and thus do not require significant changes to the Devonian shale isograd patterns in Figures 1 and 10. If R_o values differed significantly between operators, the isograd pattern would be suspect and require modification following the Lo (1993) method (see below).

The R_o values measured and reported by HGS in Ohio (drill holes A_1-A_4, A_{Lake}, and A_{Ash}) were corrected by HGS for vitrinite suppression (Figure Appendix 1-b, Table 1). The suppression factor applied by HGS was calculated from the cross plot of measured R_o vs. maximum R_o derived by Lo (1993, Figure 1, p. 654) where vitrinite suppression was shown to be directly related to the hydrogen index (HI) of the measured sample (Figure 11). In drill hole A_{Ash}, corrected R_o values increase from 0.37 to 0.45 % for the Marcellus Shale and from 0.38 to 0.56 % for the Rhinestreet Shale (Figure Appendix 1-b). By comparison, corrected R_o values in drill hole A_3 increase from 0.48 to 0.67 % for the Marcellus Shale, from 0.47 to 0.62 % for the Rhinestreet Shale, and from 0.47 to 0.72 % for the lower part of the Huron Member. Moreover, in drill hole A_4, corrected R_o values increase from 0.42 to 0.54 % for the Marcellus Shale and from 0.42 to 0.61 % for the Rhinestreet Shale. The R_o value (0.94 %) for drill hole A_7 is uncorrected because the HI of the sample is less than 100.

In comparison to the uncorrected R_o values shown on Figure 10, the corrected R_o values shown in Figure Appendix 1-b successfully convert the thermal maturity profile to a "normal" gradient in drill holes A_2 and A_3, whereas the "inverted" thermal maturity profile is still present in the vicinity of drill holes A_4 through A_6. In drill hole A_1 the corrected R_o value (0.69 %) is anomalously high in comparison to the adjoining Devonian shale and Pennsylvanian coalbed isograds. The uncorrected R_o=0.94 % value in drill hole A_7 on Figure Appendix 1-b restricts the coincident Devonian shale and Pennsylvanian coalbed 1.0 % isograds to the same location shown in Figure 10 and, thus, maintains a "normal" thermal maturity profile at the eastern end of transect A.

Click to view high-resolution image

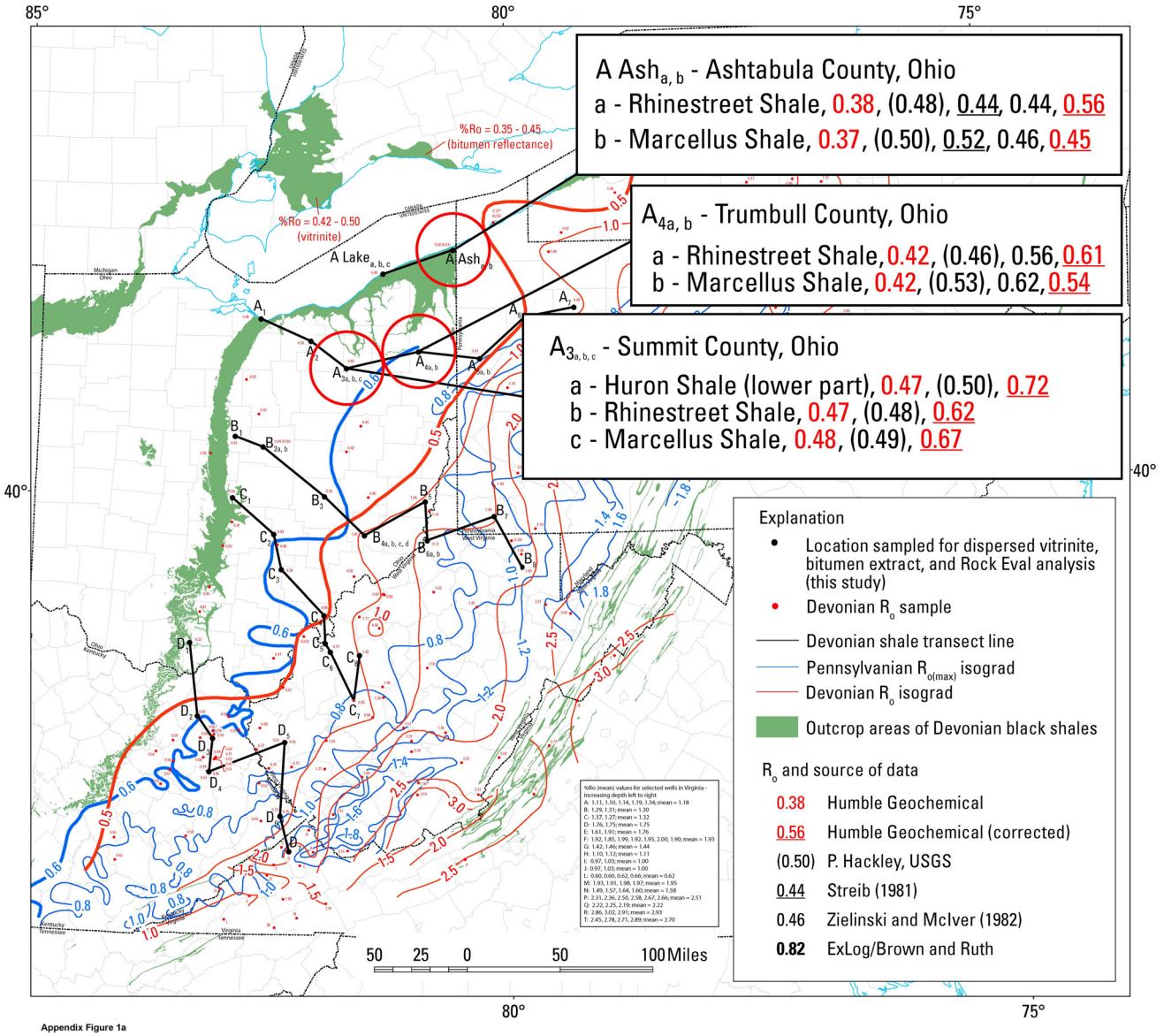
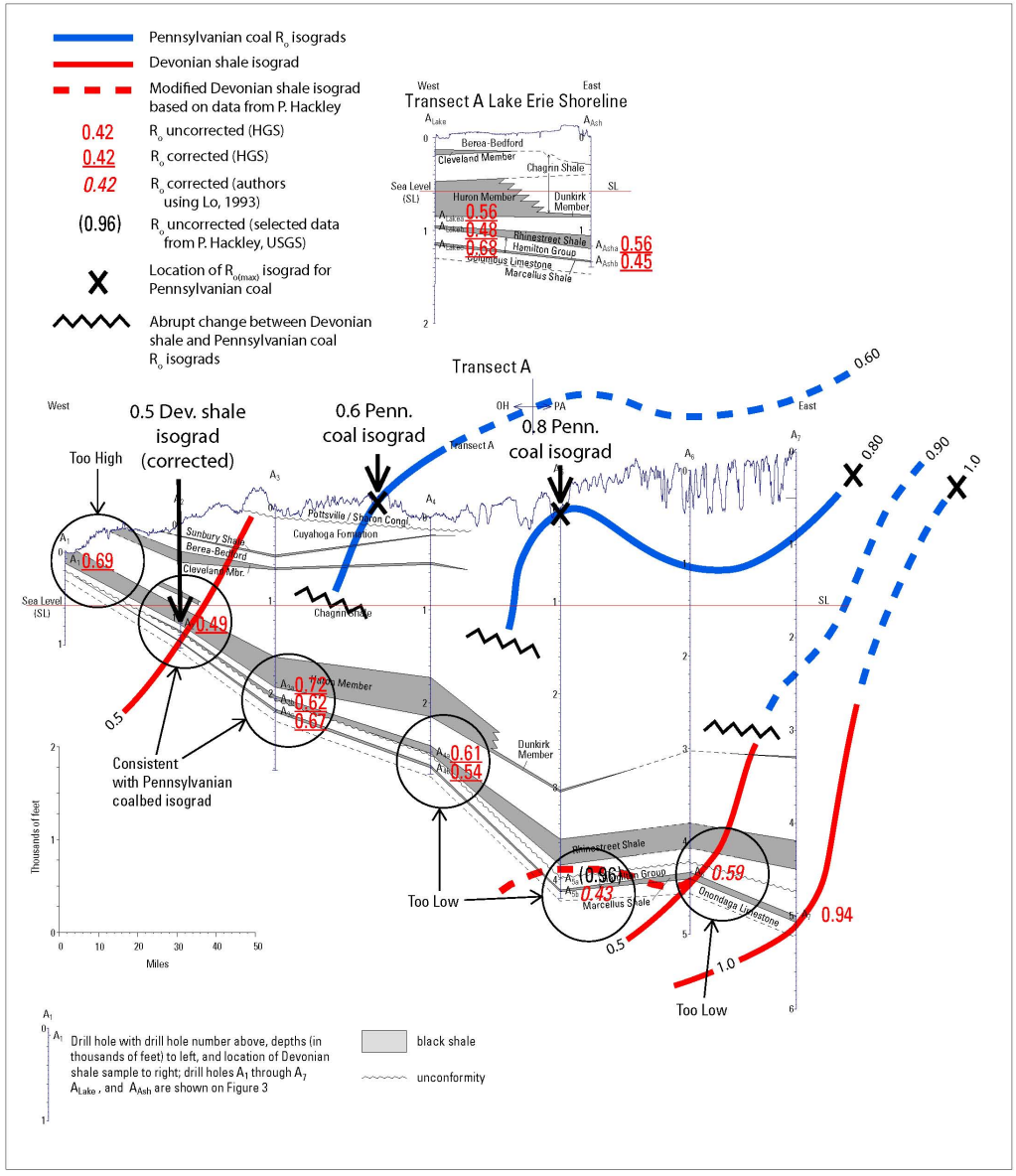


Figure Appendix 1-a. Comparison of Devonian shale R_o values measured by different operators in drill holes A_{Ash}, A_3, and A_4.

Click to view high-resolution image



Appendix Figure 1b

Figure Appendix 1-b. Comparison of suppression-corrected R_o values to uncorrected R_o values on transects A and A Lake Erie Shoreline. HGS, Humble Geochemical Services.

Appendix 2: Reproducibility of R_o Values on Transect B and Application of R_o Suppression Correction Factor

The R_o values reported by HGS for the Devonian shale samples along transect B are reasonably consistent with R_o values reported by other operators for similar intervals in the same drill holes (Figure Appendix 2-a; Table 2). For example, samples from drill hole B_{2a} measured by four operators range from 0.44 to 0.56 % (mean value of 0.50 %) for the lower part of the Huron Member. In addition, samples from drill hole $B_{4a,b,c,d}$, measured by as many as three operators, range from 0.75 to 0.96 % (mean value of 0.88 %) for the Marcellus Shale, 0.99 to 1.01 % (mean value of 1.00 %) for the Rhinestreet Shale, and 0.73 to 0.93 % (mean value of 0.82 %) for the lower part of the Huron Member. Samples from drill hole $B_{6a,b}$, measured by as many as three operators, range from 1.71 to 1.76 % (mean value of 1.73 %) for the Marcellus Shale and 1.56 to 1.62 % (mean value of 1.58 %) for the Rhinestreet Shale. Although two of the three R_o values reported by HGS in these datasets are lower than the values reported by the other operators, the HGS analyses are within the limits of operator error and thus do not require significant changes to the Devonian shale isograd patterns in Figures 1 and 12.

The R_o values measured and reported by HGS in Ohio (drill holes B_1 through B_4) were corrected by HGS for vitrinite suppression following the Lo (1993) method (Figure Appendix 2-b, Table 2). In drill hole B_1, corrected R_o values increase from 0.43 to 0.73 % for the lower part of the Huron Member. By comparison, corrected R_o values in drill hole B_2 increase from 0.38 to 0.51 % for the Rhinestreet Shale and from 0.44 to 0.75 % for the lower part of the Huron Member. In addition, corrected R_o values for the lower part of the Huron Member in drill hole B_3 and B_{4a} increase, respectively, from 0.43 to 0.66 % and from 0.73 to 0.83 %. R_o values for drill holes B_{4b} (1.01 %), B_5 (1.04 %), B_7 (1.44 %), and B_8 (1.6 %) are uncorrected because R_o values are greater than 1.0 % and HI values are between 50 and 250.

In comparison to uncorrected R_o values shown on Figure 12, corrected R_o values successfully converted the thermal maturity profile to a "normal" gradient in drill holes B_{2b} through B_{4a}; however, R_o values in drill holes B_1 and B_{2a} were overcorrected to anomalously high values. The uncorrected R_o=1.01, 1.04, 1.44, and 1.6 % values in drill holes B_{4b}, B_5, B_7, and B_8, respectively, on Figure Appendix 2-b restrict the coincident Devonian shale and Pennsylvanian coal 1.0, 1.5, and 2.0 % isograds to the same locations shown in Figure 12 and, thus, maintain a "normal" thermal maturity profile at the eastern end of transect B.

Click to view high-resolution image

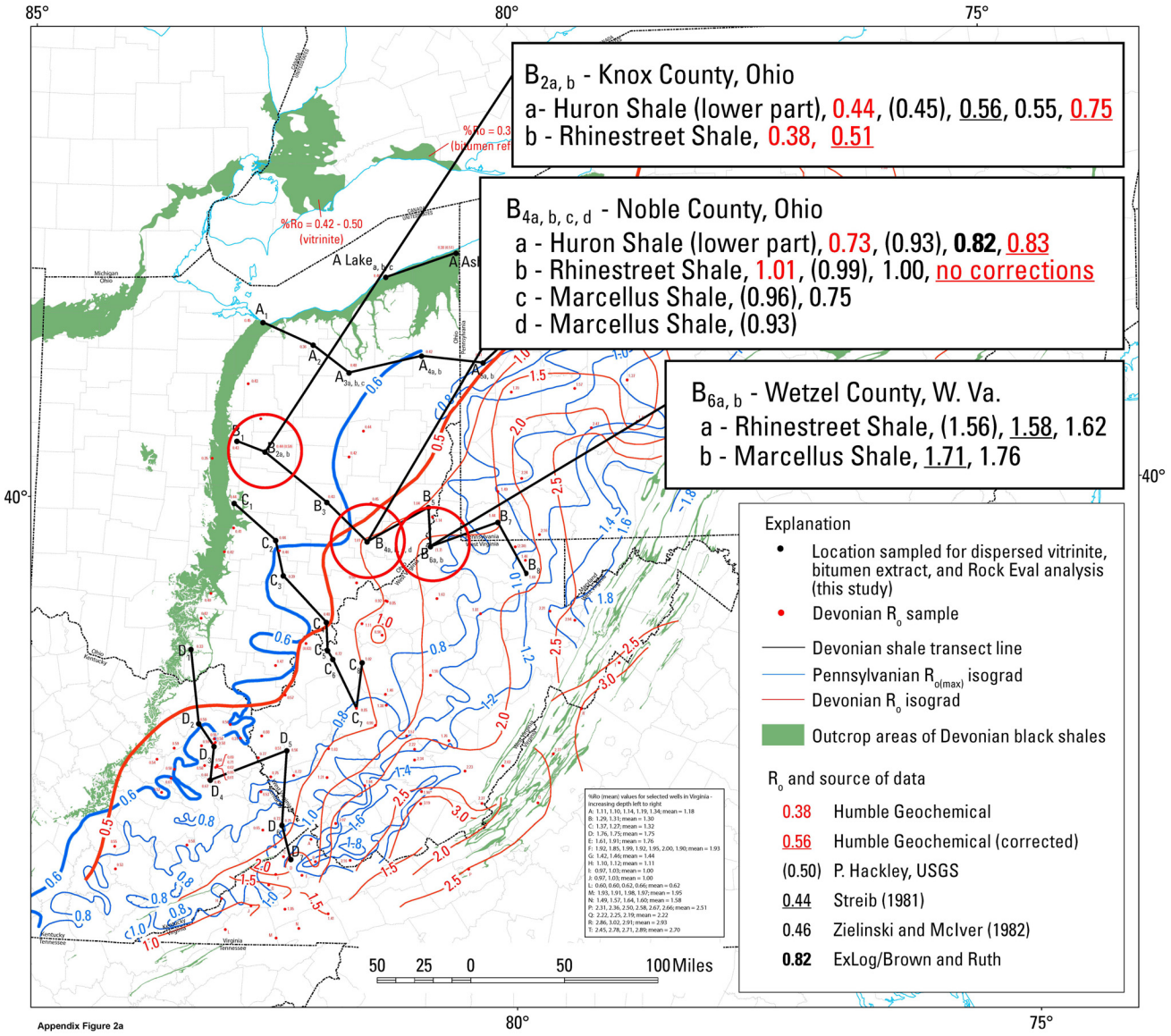
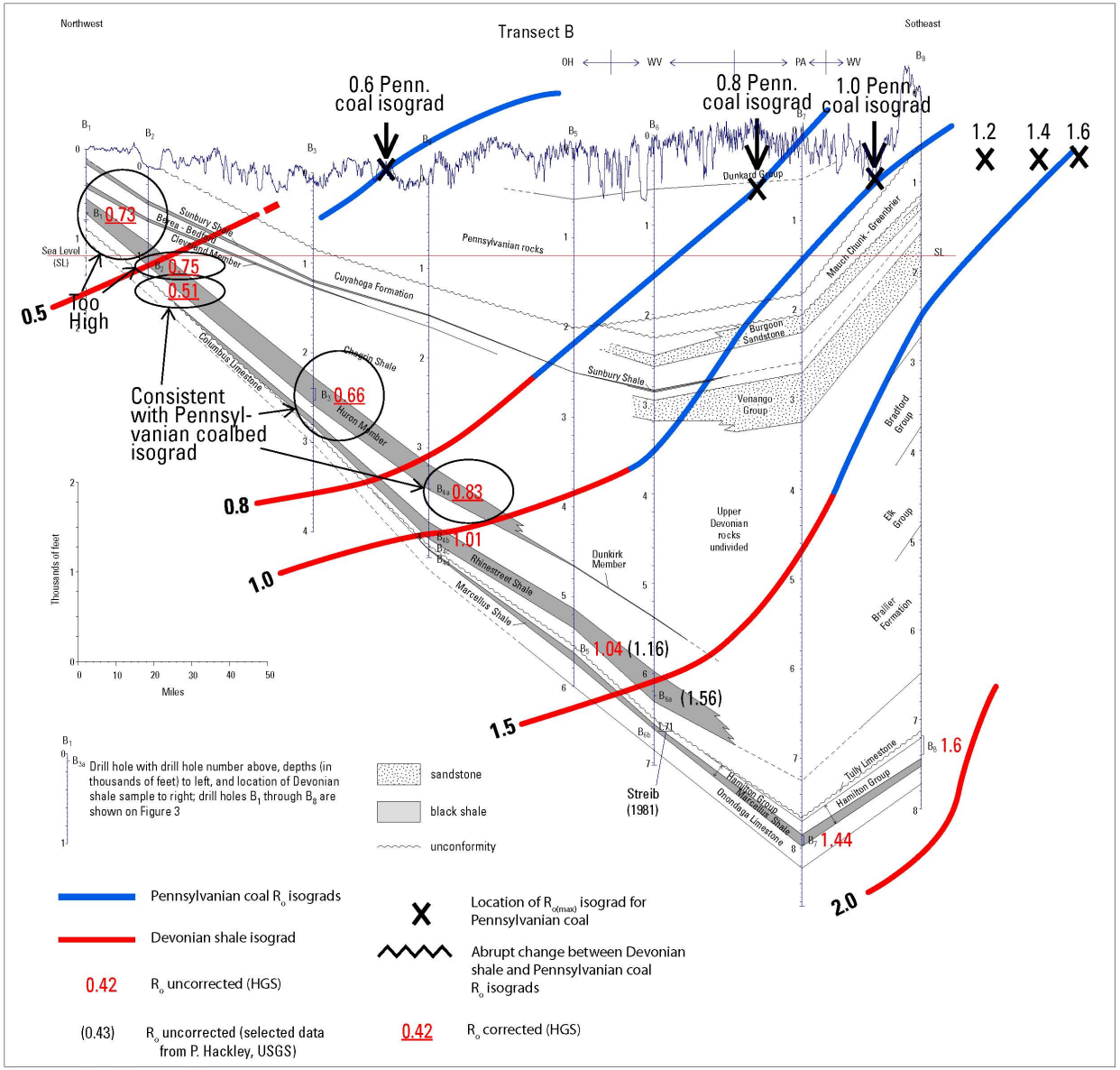


Figure Appendix 2-a. Comparison of Devonian shale R_o values measured by different operators in drill holes B_2, B_4, and B_6.

Click to view high-resolution image



Appendix Figure 2b

Figure Appendix 2-b. Comparison of suppression-corrected R_o values to uncorrected R_o values on transect B. HGS, Humble Geochemical Services.

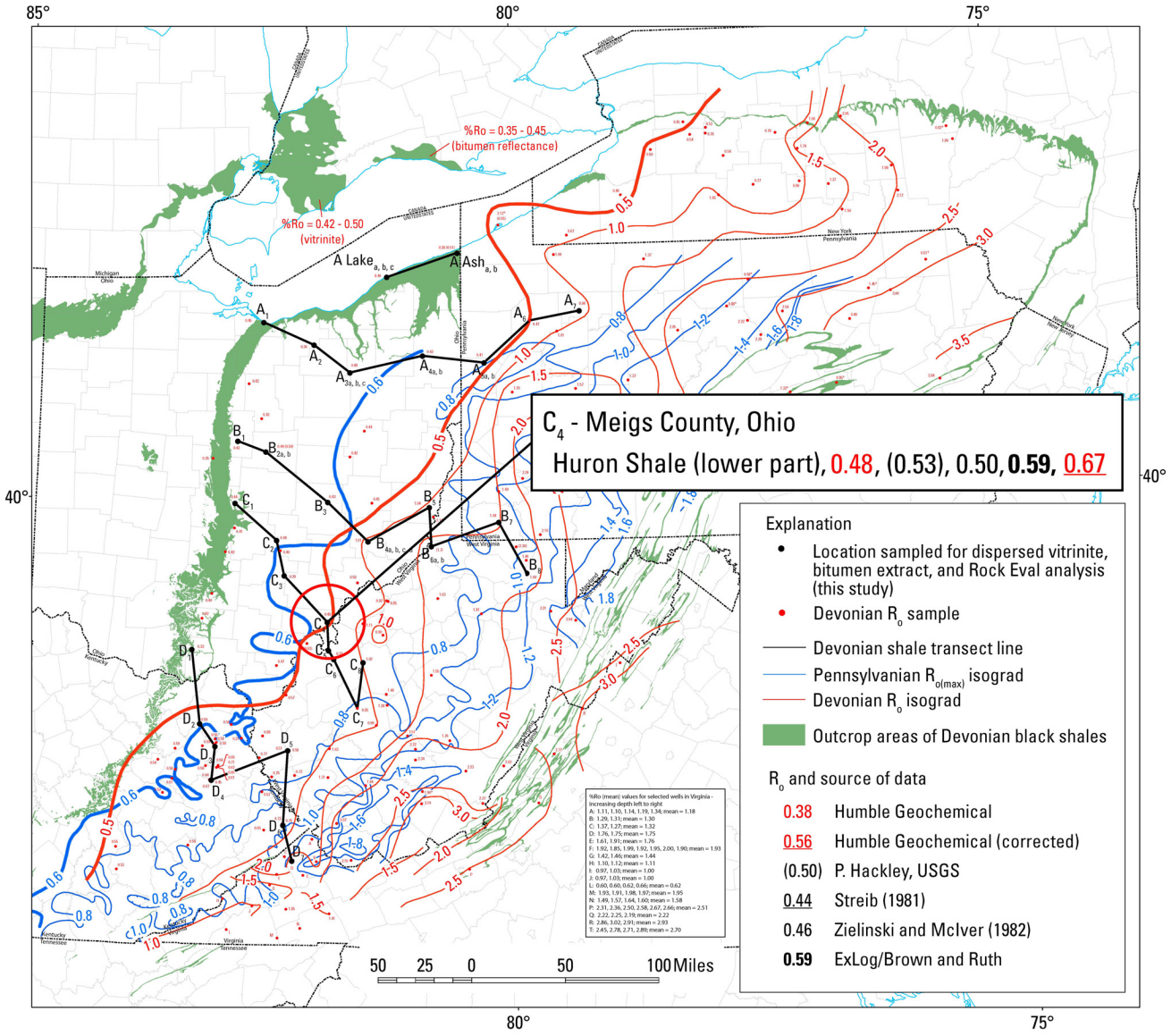
Appendix 3: Reproducibility of R_o Values on Transect C and Application of R_o Suppression Correction Factor

R_o values reported by HGS for the Devonian shale samples along transect C are reasonably consistent with the R_o values reported by other operators for similar intervals in the same drill hole (Figure Appendix 3-a; Table 3). For example, samples from drill hole C_4 measured by four operators range from 0.48 to 0.59 % (mean value of 0.52 %) for the lower part of the Huron Member. Although the R_o values reported by HGS in drill hole C_4 and drill holes C_1 through C_3 (see Table 3) are consistently lower than the values reported by other operators, the HGS analyses are within the limits of operator error and thus do not require significant change to the Devonian isograd patterns in Figures 1 and 13.

Original R_o values measured and reported by HGS in Ohio (drill holes C_1 through C_4) were corrected by HGS for vitrinite suppression (Figure Appendix 3-b, Table 3). In drill holes C_1 and C_2, application of the Lo (1993) correction factor result in increase of R_o values for the lower part of the Huron Member from 0.44 to 0.73 % and 0.44 to 0.71 %, respectively. Similarly, corrected R_o values in drill hole C_3 increase from 0.39 to 0.62 % for the lower part of the Huron Member. Finally, in drill hole C_4, corrected R_o values increase from 0.48 to 0.67 % for the lower part of the Huron Member. R_o values for drill holes C_6 (0.72 %), C_7 (0.85 %), and C_8 (1.02 %) are uncorrected because the HI values of the samples are less than 160.

Comparison of uncorrected R_o values (Figure 13) with corrected R_o values (Figure Appendix 3-b) show that only in drill hole C_2 were R_o values successfully converted to a “normal” thermal maturity profile. In drill hole C_3 and C_4 the corrected R_o values are too low for a “normal” thermal maturity profile, whereas in drill hole C_1 the corrected R_o value is unreasonably high in comparison to the adjoining 0.6 % Pennsylvanian coal isograd between drill hole C_2 and C_3. The uncorrected Devonian shale R_o values in drill holes C_7 (0.85 %) and C_8 (1.02 %) are coincident with the Pennsylvanian coalbed 0.8 and 1.0 % isograds and, thus, maintain a “normal” thermal maturity profile at the eastern end of transect C.

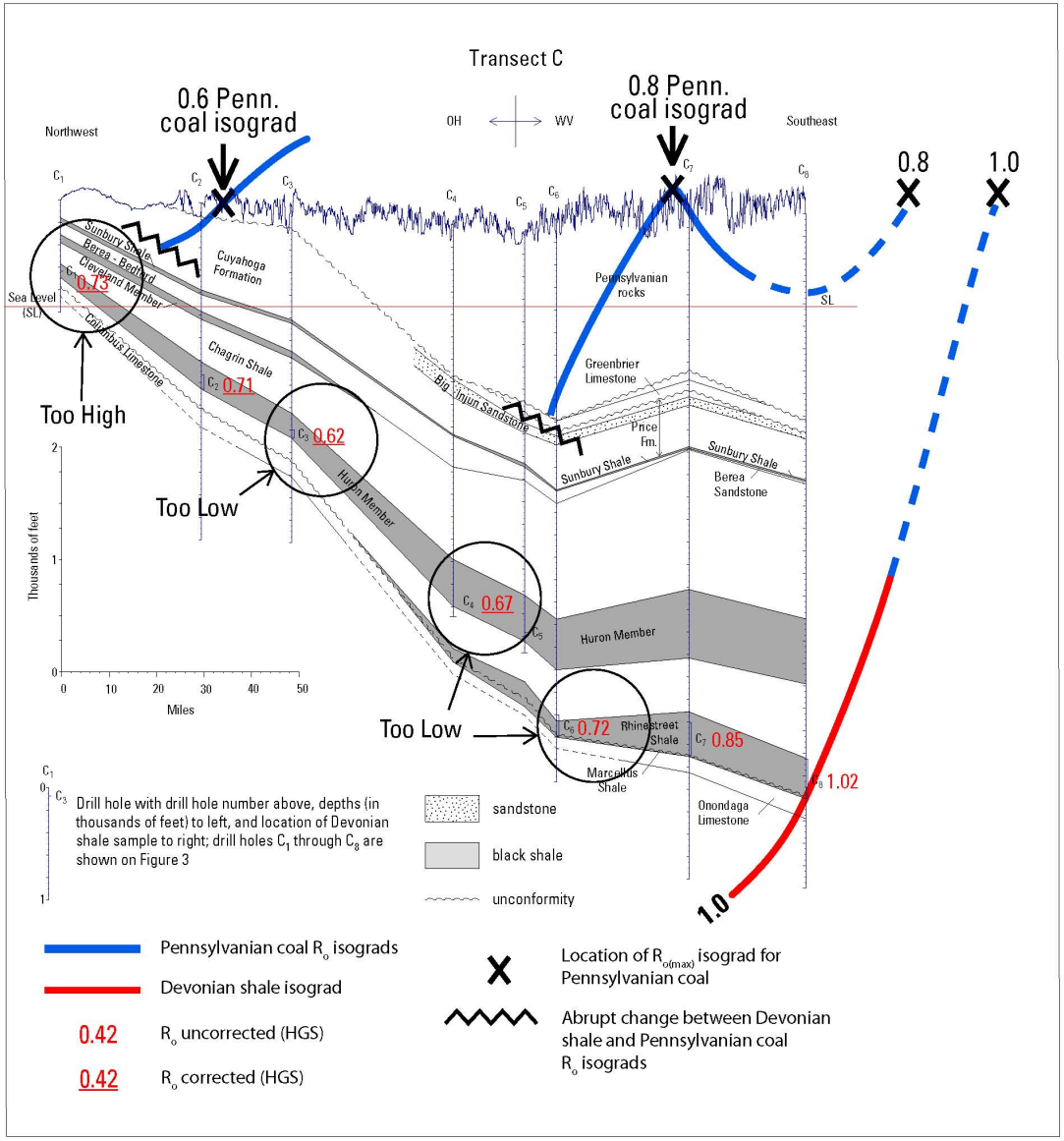
Click to view high-resolution image



Appendix Figure 3a

Figure Appendix 3-a. Comparison of Devonian shale R_o values measured by different operators in drill hole C_4.

Click to view high-resolution image



Appendix Figure 3b

Figure Appendix 3-b. Comparison of suppression-corrected R_o values to uncorrected R_o values on transect C. HGS, Humble Geochemical Services.

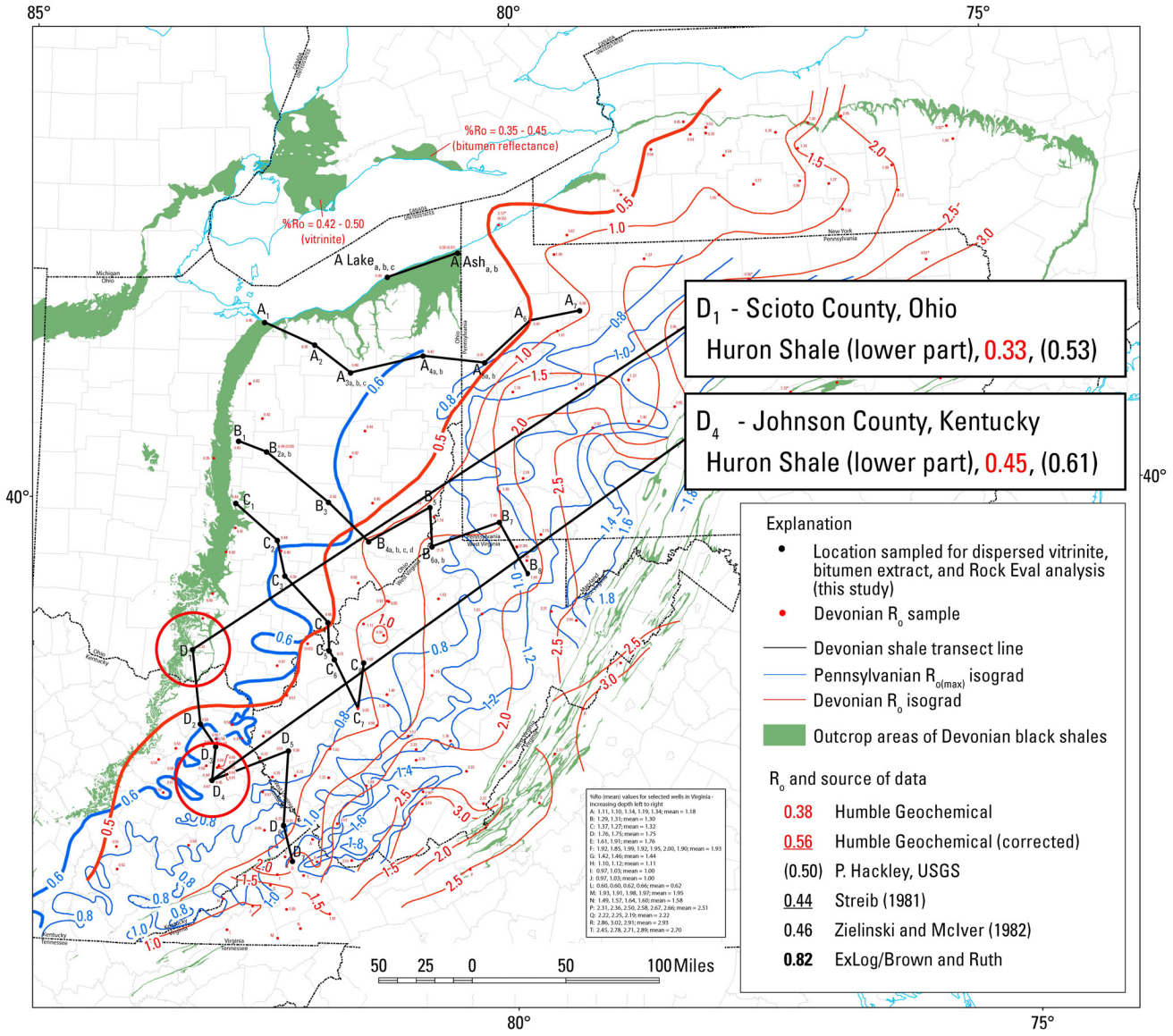
Appendix 4: Reproducibility of R_o Values on Transect D and Application of R_o Suppression Correction Factor

R_o values reported by HGS for Devonian shale samples along transect D are reasonably consistent with R_o values reported by other operators for similar intervals in the same drill hole (Figure Appendix 4-a). For example, samples from drill holes D_1 and D_4 measured by two operators range from 0.33 to 0.53 % (mean value of 0.43 %) and 0.45 to 0.61 % (mean value of 0.53 %), respectively, for the lower part of the Huron Member (Figure Appendix 4-a). Although the R_o values reported by HGS in drill holes D_1 and D_4 and in drill holes D_2 and D_5 through D_7 (Table 4) are lower than the values reported by other operators, the HGS analyses are within the limits of operator error and thus do not require significant changes to the Devonian isograd patterns in Figures 1 and 14.

In drill hole D_1, application of the Lo (1993) correction factor resulted in the increase of R_o values from 0.33 to 0.53 % for the lower part of the Huron Member (Figure Appendix 4-b). In addition, corrected R_o values for drill holes D_2 through D_5 were estimated by the authors from the Lo (1993) cross plot. R_o values for drill holes D_6 (0.75 % HGS and 1.42 % P. Hackley) and D_7 (1.76 %) in Figure 14 are uncorrected because in D_6 the HI value of the sample is less than 100 and in D_7 the R_o value of the sample is greater than 1.0 %.

In comparison to uncorrected R_o values (Figure 14), corrected R_o values (Figure Appendix 4-b) maintain a "normal" thermal maturity profile between drill holes D_1 and D_2; however, the 0.5 % Devonian shale isograd is shifted 20 to 30 mi farther northward. Furthermore, corrected R_o values in drill holes D_2 (0.78 %) and D_3 (0.78 %) improve the "normal gradient" of the thermal maturity profile with respect to the overlying 0.6 % Pennsylvanian coal isograd. However, corrected R_o values in drill holes D_4 (0.62 %) and D_5 (0.62 %) still are too low to cause a reversal of the "inverted" thermal maturity profile. Uncorrected R_o values for D_6 (0.75 %, HGS; 1.42 %, P. Hackley) and for D_7 (1.76 %) (Figure Appendix 4-b) restrict the coincident Devonian shale and Pennsylvanian coal 1.0 and 1.5 % isograds to the same locations shown in Figure 14 and, thus, maintain a "normal" thermal maturity profile at the eastern end of transect D.

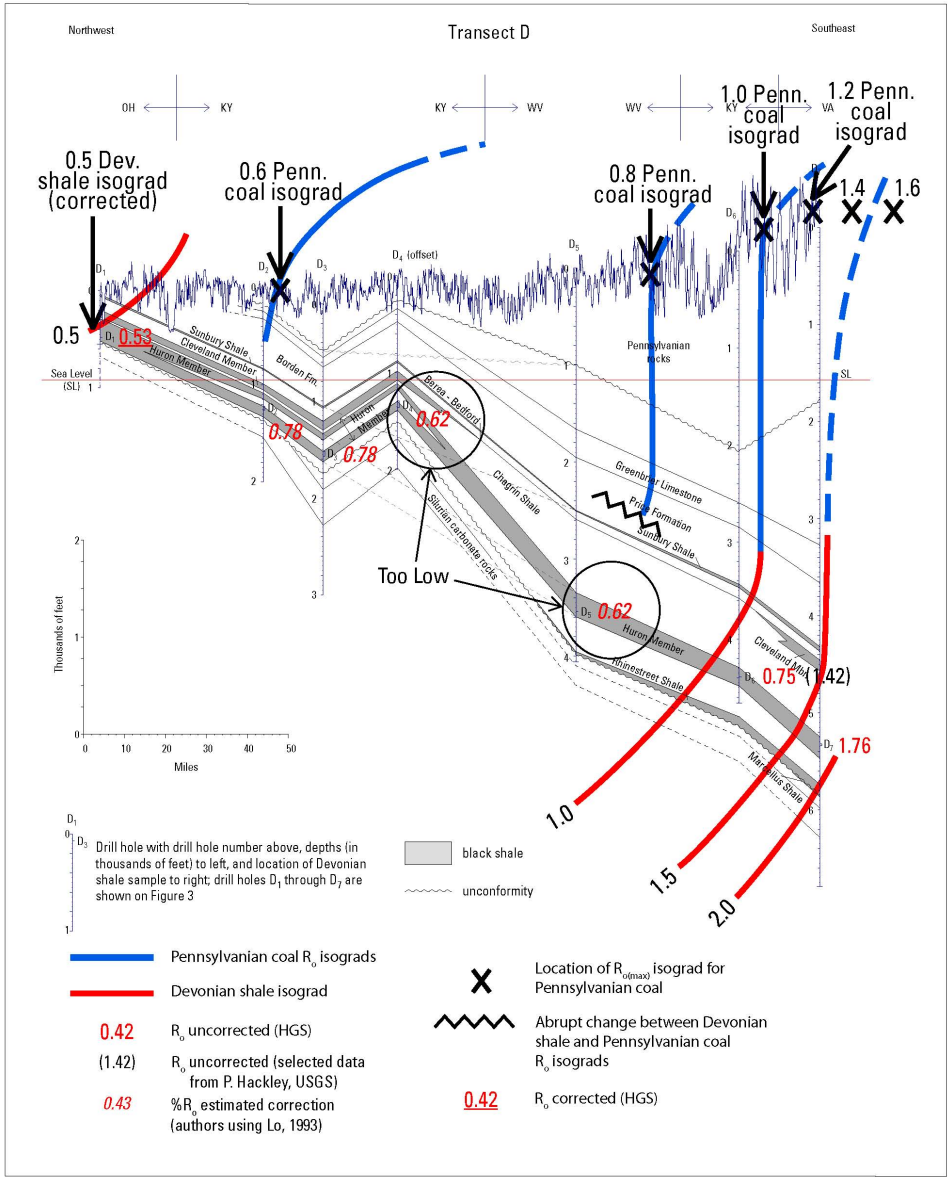
Click to view high-resolution image



Appendix Figure 4a

Figure Appendix 4-a. Comparison of Devonian shale R_o values measured by different operators in drill holes D_1 and D_4.

Click to view high-resolution image



Appendix Figure 4b

Figure Appendix 4-b. Comparison of suppression-corrected R_o values to uncorrected R_o values on transect D. HGS, Humble Geochemical Services.

Transect A (main and ancilliary data points)

Abbreviations used: A Abundant, C Common, Co Conodonts, Co_A Conodonts (abundant), Co_L Conodonts (local), L Local, L_{CD} Local (from core description), Lg Linguloid, Lg_C Linguloid (common), N none observed, NS, no sample, T Tasmanites, T_A Tasmanites (abundant), T_C Tasmanites (common), T_L Tasmanites (local), Te Tentaculites, Te_C Tentaculites (common), X present, X(A) present (abundant), X(C) present (common), X(L) present (local).

American Petroleum Institute number	Latitude (decimal degrees)	Longitude (decimal degrees)	Well on Transect	Lease name	County	State	Township or Quadrangle (7.5')	Sample No.	Formation	Interval sampled (ft)	Sample Type	Fossils	Bitumen
34-043-20005	41.39594118	-82.54485625	A_1	N.Y., Chicago, & St. Louis Railroad (Core 734)	Erie	Ohio	Huron Twp.	A_1	Huron Member of Ohio Shale	73-75	core	T_C	N
34-093-21100	41.22613346	-82.02591146	A_2	B & R McGuire (Core 2909) (OH-5)	Lorain	Ohio	Grafton Twp.	A_2	Huron Member of Ohio Shale	1,072-1,073	core	T_C, Lg	L_{CD}, N
34-153-60416	41.01541419	-81.65529901	A_3	Core 510	Summit	Ohio	Norton Twp.	A_{3a}	Huron Member of Ohio Shale	1,880-1,886	core	T_L	L
								A_{3b}	Rhinestreet Shale	2,050-2,054	core	T_L, Lg	L
								A_{3c}	Marcellus Shale	2,176-2,180	core	Te, T_L (dark)	N
34-155-21238	41.14683235	-80.91297921	A_4	M & A Meleski (OH-7) (also Core 2962)	Trumbull	Ohio	Newton Twp.	A_{4a}	Rhinestreet Shale	2 528	core	T_L	L
								A_{4b}	Marcellus Shale	2,697-2,698	core	T_L (dark)	N
37-073-20022	41.09200528	-80.28192361	A_5	No. 1 Sokevitz (PA-5)	Lawrence	Pa.	New Castle North Quad.	A_{5a}	Marcellus Shale	3 984	core	Co_A, T_L (dark), Lg	L
								A_{5b}	Marcellus Shale	4 124	core	NS	NS
37-121-22642	41.41419528	-79.8093475	A_6	No. 348 Grant Fee	Venango	Pa.	Franklin Quad.	A_6	Marcellus Shale	4,320-4,350	cuttings	NS	NS
37-053-20903	41.48463111	-79.29677583	A_7	No. 1 Collins-Clinger	Forest	Pa.	Tylerville Quad.	A_7	Marcellus Shale	4,970-5,020	cuttings	N	? (greasy appearance)
34-085-20017	41.75489757	-81.28214872	ALake	New York Central System (Core 855)	Lake	Ohio	Painesville Twp.	$ALake_a$	Huron Member of Ohio Shale	841-843	core	T_L, Co_L	N
								$ALake_b$	Rhinestreet Shale	952-954	core	T_C	N (Sample looks bleached; recrystallized; silty)
								$ALake_c$	Marcellus Shale	1,156-1,158	core	Lg_C, Te_C, T_L, Co_L	N
34-007-21087	41.94016595	-80.55170368	AAsh	Bessemer & Lake Erie Railroad Co. (OH-4) (Core 2839)	Ashtabula	Ohio	Conneaut Twp.	$AAsh_a$	Rhinestreet Shale	1,172-1,173	core	T_C (dark)	L_{CD}, L
								$AAsh_b$	Marcellus Shale	1,342-1,343	core	T_L	L

Table 1. Data collected and analyzed on transect A (1 of 5).

Transect A (main and ancilliary data points)

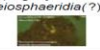
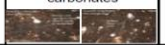
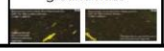
	Dispersed macerals							
American Petroleum Institute number	Bituminite and (or) alginite (amorphous kerogen)	Telalginite	Vitrinite	Inertinite	Asphalt	Bitumen	Pyrobitumen	Spectral Flourescence: Mean λ_{max}
34-043-20005	X (A) 	X (A) Tasmanites and Leosphaeridia(?) 	X 			X		554
34-093-21100	X 	X (A) Leosphaeridia(?) 	X 	X		X 		531
34-153-60416	X  X  X 	X  X  X (brightly fluor. *Leiosphaeridia*(?) 	X  X  X 	X X (fusinite)	X	X  X X (void filling) associated with carbonates 		551 555 610
34-155-21238	X (partially converted to bitumen network) X (converted to bitumen network) 	X  X (brightly fluor.) (macerated as well as liptodetrinite) 	X 	X X	X X	X  X	X	599 614 615
37-073-20022				X		X (A) bitumen network		
37-121-22642								
37-053-20903			X	X		X (A) bitumen network		
34-085-20017	X X(A)  	X (A) Tasmanites abn.  X  X (A) - lacks internal reflections and high relief / strong color 	X  X (c)	X		Bitumen (0.81 Ro, others above and below 0.52) X (local) 		535 583 581
34-007-21087	X (A)  X (A) 	brightly fluor. X (A)  brightly fluor. X (A) in bituminous groundmass 	X  X	X (fusinite) X (fusinite)		X 		567 592

Table 1. Data collected and analyzed on transect A (2 of 5). Thumbnails are linked full-size images.

Transect A (main and ancilliary data points)

	Minerals				
American Petroleum Institute number	Pyrite	Carbonate	Quartz	Quartz / rutile	Clay-rich fragments
34-043-20005	X(A) framboids				
34-093-21100	X			X	
34-153-60416	X(A) framboids X (A) framboids	X (A) rhomb			
34-155-21238	X (framboids)	X (nodules and rhombs)			
37-073-20022	X	X (dolo.)			
37-121-22642					
37-053-20903	X (A) framboids				
34-085-20017	X (A) framboids X (A) framboids commonly associated with telalginite	X calcite rhombs	X	X	
34-007-21087	X (framboids) associated with. telalginite X (A) framboids	X rhombs			

Table 1. Data collected and analyzed on transect A (3 of 5).

Transect A (main and ancilliary data points)

	Total Organic Carbon (in wt. %)		Rock Eval						
American Petroleum Institute number	TOC	TOC Streib (1981)	S_1	S_2	S_3	HI	OI	T_{max}	PI
34-043-20005	5,8		1,44	25,85	0,4	446	7	429	0,05
34-093-21100	5,66		2,74	24,14	0,28	427	5	434	0,1
34-153-60416	9,21		4,76	39,42	0,46	428	5	440	0,11
	6,95		2,35	26,96	0,43	388	6	437	0,08
	6,33		1,49	25,18	0,34	398	5	438	0,06
34-155-21238	8,44		5,67	37,02	0,18	439	2	440	0,13
	5		4,6	18,16	0,38	363	8	444	0,2
37-073-20022	12,25		6,26	24,06	1,41	196	12	433	0,21
	4,54		3,28	6,94	0,48	153	11	440	0,32
37-121-22642	4,6		3,78	7,48	0,43	163	9	436	0,34
37-053-20903	6,1		2,53	3,19	0,62	52	10	454	0,44
34-085-20017	6,67		4,61	31,7	0,53	475	8	437	0,13
	2,11		0,57	4,78	0,3	227	14	436	0,11
	6,19		4,53	27,2	0,5	439	8	438	0,14
34-007-21087	6,63		2,96	28,76	0,29	434	4	442	0,09
	7,89		2,98	28,03	0,35	358	4	440	0,1

Table 1. Data collected and analyzed on transect A (4 of 5).

Transect A (main and ancilliary data points)

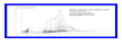
	Vitrinite Reflectance						Gas chromatography of bitumen extract		
American Petroleum Institute number	$\%Ro_{mean}$ Humble	$\%Ro_{mean}$ Humble (corrected)	$\%Ro_{mean}$ Hackley	$\%Ro_{mean}$ Streib (1981)	$\%Ro_{mean}$ Zielinski and McIver (1982)	$\%Ro_{mean}$ ExLog	Gas chromatography image	GC Code	Pristane / Phytane
34-043-20005	0,45	0,69							2,26
34-093-21100	0,36	0,49			0,56				0,96
34-153-60416	0,47	0,72	0,5						2,21
	0,47	0,62	0,48						1,99
	0,48	0,67	0,49						1,41
34-155-21238	0,42	0,61	0,46		0,56				1,87
	0,42	0,54	0,53		0,62				1,43
37-073-20022			0,96		1				1,30
	0,41	0.43 (corrected by authors using Lo, 1993)			1				
37-121-22642	0,47	0.59 (corrected by authors using Lo, 1993)							
37-053-20903	0,94								ND
34-085-20017	0,38	0,56	0,5						2,05
	0,42	0,48	0,81						2,17
	0,46	0,68	0,52						1,18
34-007-21087	0,38	0,56	0,48	0.40-0.54 med. = 0.44 n=23	0,44				1,90
	0,37	0,45	0,5	0.44-0.59 med. = 0.52 n=5	0,46				1,49

Table 1. Data collected and analyzed on transect A (5 of 5). Thumbnails are linked full-size images.

Transect B (main and ancilliary data points)

Abbreviations used: A Abundant, C Common, Co Conodonts, Co_A Conodonts (abundant), Co_L Conodonts (local), L Local, L_{CD} Local (from core description), Lg Linguloid, Lg_C Linguloid (common), N none observed, NS, no sample, T Tasmanites, T_A Tasmanites (abundant), T_C Tasmanites (common), T_L Tasmanites (local), Te Tentaculites, Te_C Tentaculites (common), X present, X(A) present (abundant), X(C) present (common), X(L) present (local).

American Petroleum Institute number	Latitude (decimal degrees)	Longitude (decimal degrees)	Well on Transect	Lease name	County	State	Township or Quadrangle (7.5')	Sample No.	Formation	Interval sampled (ft)	Sample Type	Fossils	Bitumen
34-117-60037	40,4774015	-82,78926321	B_1	Core 2770	Morrow	Ohio	Harmony Twp.	B_1	Huron Member of Ohio Shale	708-713	core	T_A	N
34-083-22599	40,3977816	-82,50287591	B_2	L. Beckholt (OH-3) (Core 2900)	Knox	Ohio	Clinton Twp.	B_{2a}	Huron Member of Ohio Shale	1,100-1,101	core	T_A	N
								B_{2b}	Rhinestreet Shale	1,188-1,189	core		
34-119-21617	40,01455938	-81,86942905	B_3	W & D Winegardner	Muskingum	Ohio	Salem Twp.	B_3	Huron Member of Ohio Shale	2,400-2,532	cuttings	T_A	N
34-121-22255	39,71358062	-81,46210232	B_4	H & M Shockling (OH-8) (Core 2936)	Noble	Ohio	Enoch Twp.	B_{4a}	Huron Member of Ohio Shale	3,462-3,463	core	T_C (dark)	N
								B_{4b}	Rhinestreet Shale	3,999-4,000	core	T_L (dark)	
								B_{4c}	Marcellus Shale	4,094.8-4,095.4	core	T_L (dark)	C
								B_{4d}	Marcellus Shale	4,097.8-4,097.9	core	T_L (dark)	C
34-013-20277	39,97860656	-80,84439782	B_5	R. L. Brown (Core 2842)	Belmont	Ohio	Mead Twp.	B_5	Marcellus Shale	5,574-5,577	core	Co_L, T_L (dark)	C
47-103-00645	39,67694	-80,82389	B_6	Emch & Pyles No. 1 (WV-7)	Wetzel	W. Va.	New Martinsville Quad.	B_{6a}	Rhinestreet Shale	6 246,30	core	T_L (dark/faint)	C
								B_{6b}	Marcellus Shale	6,599 and 6,618	core		
37-059-20038	39,86058556	-80,14601583	B_7	No. 1 Gordon	Greene	Pa.	Oak Forest Quad.	B_7	Marcellus Shale	7,860-7,7960	cuttings	T_L (amber)	
47-077-00086	39,466669	-79,870278	B_8	No. A-1 H.G. Walls	Preston	W. Va.	Newburg Quad.	B_8	Marcellus Shale	7,185-7,190	cuttings	N	

Table 2. Data collected and analyzed on transect B (1 of 5).

Transect B (main and ancilliary data points)

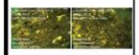
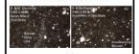
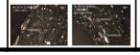
	Dispersed macerals							
American Petroleum Institute number	Bituminite and (or) alginite (amorphous kerogen)	Telalginite	Vitrinite	Inertinite	Asphalt	Bitumen	Pyrobitumen	Spectral flourescence; mean λ_{max}
34-117-60037	X 	X 	X (A) 	X		X (local) 		517
34-083-22599	X with scattered telalginite 	X 	X 	X				519
34-119-21617		X 	X 	X 		X		554
34-121-22255	X  X 	X (L) weakly fluor. 	X X slightly lower %Ro than pyrobitumen	X X (fusinite) X (fusinite)	X asphalt (L) 	X (anastomosing)  X X	X? X?  X dead oil (more abn. pyrobitumen than in Huron / Rhinestreet)  X pyrobitumen (impsonite) and asphalt (multiple generations); bituminous groundmass 	726 613 685 704
34-013-20277				X (fusinite)		X	X? (some pyrobitumen) anastomosing bitumen 	702
47-103-00645			X (scattered)	X (fusinite)			X? 	
37-059-20038			X 	X (fusinite)			X 	
47-077-00086			X some may be pyrobitumen	X (fusinite)			X (A) 	

Table 2. Data collected and analyzed on transect B (2 of 5). Thumbnails are linked full-size images.

Transect B (main and ancilliary data points)

	Minerals				
American Petroleum Institute number	Pyrite	Carbonate	Quartz	Quartz / rutile	Clay-rich fragments
34-117-60037	X (A)	X			
34-083-22599					
34-119-21617					
34-121-22255	X (A) in quartz-rich fragments	X	X (quartz-rich fragments)		X
	X pyrite-rich shale	X	X (quartz-rich fragments)	X	X
		X (rhombs)			
	X (C) framboids	X (rhombs)			
34-013-20277	X (A)				
47-103-00645	X (A) (framboids)				
37-059-20038					
47-077-00086	X (A) (framboids) 	X (authigenic)			

Table 2. Data collected and analyzed on transect B (3 of 5). Thumbnail is linked full-size images.

Transect B (main and ancilliary data points)

	Total Organic Carbon (in wt. %)		Rock Eval						
American Petroleum Institute number	TOC	TOC Streib (1981)	S_1	S_2	S_3	HI	OI	T_{max}	PI
34-117-60037	9,92		4,41	55,69	0,14	561	4	428	0,07
34-083-22599	7,2		4,74	39,13	0,25	543	3	439	0,11
34-119-21617	4,02		2,18	18,4	0,43	458	11	438	0,11
34-121-22255	7,03		4,5	17,52	0,14	252	2	449	0,2
	2,09		2,08	1,8	0,13	86	6	446	0,54
	4,40		2,74	10,95	0,22	249	5	442	0,20
	3,62		2,81	8,94	0,20	247	6	441	0,24
34-013-20277	5,97		3,58	3,62	0,22	61	4	443	0,50
47-103-00645	1,15	0.79 med; n=20	0,58	0,45	0,41	39	36	441	0,56
37-059-20038	5,92		1,15	3,07	0,56	52	9	406	0,27
47-077-00086	1,43		1,59	2,14	0,4	150	28	384	0,43

Table 2. Data collected and analyzed on transect B (4 of 5).

Transect B (main and ancilliary data points)

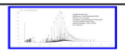
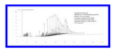
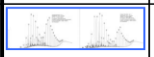
	Vitrinite Reflectance						Gas chromatography of bitumen extract		
American Petroleum Institute number	$\%Ro_{mean}$ Humble	$\%Ro_{mean}$ Humble (corrected)	$\%Ro_{mean}$ Hackley	$\%Ro_{mean}$ Streib (1981)	$\%Ro_{mean}$ Zielinski and McIver (1982)	$\%Ro_{mean}$ ExLog	Gas chromatography image	GC Code	Pristane/ Phytane
34-117-60037	0,43	0,73							1,90
34-083-22599	0,44	0,75	0,45	0.56 med. n=7	0,55				1,83
	0,38	0,51							
34-119-21617	0,43	0,66							1,83
34-121-22255	0,73	0,83	0,93			0,82			1,98
	1,01		0,99		1				1,54
			0,96		0,75				1,54
			0,93						1,54
34-013-20277	1,04		1,16						1,97
47-103-00645			1,56	1.58 med. n=18	1,62				
				1.71 n=2	1,76				
37-059-20038	1,44								1.51, 1.63
47-077-00086	1,6		2,03						1,50

Table 2. Data collected and analyzed on transect B (5 of 5). Thumbnails are linked full-size images.

Transect C (main and ancilliary data points)

Abbreviations used: A Abundant, C Common, Co Conodonts, Co_A Conodonts (abundant), Co_L Conodonts (local), L Local, L_{CD} Local (from core description), Lg Linguloid, Lg_C Linguloid (common), N none observed, NS, no sample, T Tasmanites, T_A Tasmanites (abundant), T_C Tasmanites (common), T_L Tasmanites (local), Te Tentaculites, Te_C Tentaculites (common), X present, X(A) present (abundant), X(C) present (common), X(L) present (local).

American Petroleum Institute number	Latitude (decimal degrees)	Longitude (decimal degrees)	Well on Transect	Lease name	County	State	Township or Quadrangle (7.5')	Sample No.	Formation	Interval sampled (ft)	Sample Type	Fossils	Bitumen
34-049-60004	39,99690459	-82,80555431	C_1	Core 859	Franklin	Ohio	Jefferson Twp.	C_1	Huron Member of Ohio Shale	636-638	core	T_A	N
34-045-20234	39,71695374	-82,38044488	C_2	Merckle	Fairfield	Ohio	Rush Creek Twp.	C_2	Huron Member of Ohio Shale	1,536-1,640	cuttings	T_A	N
34-073-20497	39,44455447	-82,29964201	C_3	Kappel	Hocking	Ohio	Starr Twp.	C_3	Huron Member of Ohio Shale	1,995-2,070	cuttings	T_A	N
34-105-22058	39,09108542	-81,86300335	C_4	Newell (Core 2921) (OH-9)	Meigs	Ohio	Chester Twp.	C_4	Huron Member of Ohio Shale	3,300-3,301	core	T_A (dark), Co_L	L
47-035-01371	38,873355	-81,848246	C_5	No. 120401 W.L. Pinnell (WV-2)	Jackson	W.Va.	Cottageville Quad.	C_5	Huron Member of Ohio Shale	3 564	core	T_A (dark), Co_L	L
47-035-00615	38,805835	-81,79583	C_6	No. 1 Nellie Sayre King	Jackson	W.Va.	Cottageville Quad.	C_6	Rhinestreet Shale	4,402-4,596	cuttings	T_A (dark), Co_L	L
47-039-00205	38,427776	-81,557778	C_7	No. 1 Robertson (GW-346)	Kanawha	W.Va.	Big Chimney Quad.	C_7	Rhinestreet Shale	4,605-4,896	cuttings	T_A ? (dark with faint outline)	L
47-087-00019	38,781388	-81,503891	C_8	Heinzman (4053)	Roane	W.Va.	Gay Quad.	C_8	Rhinestreet Shale	4,840-5,200	cuttings	T_L	N

Table 3. Data collected and analyzed on transect C (1of 5).

Transect C (main and ancilliary data points)

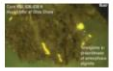
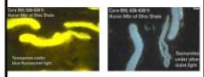
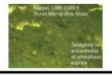
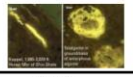
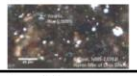
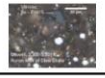
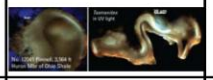
	Dispersed macerals							
American Petroleum Institute number	Bituminite and (or) Alginite (amorphous kerogen)	Telalginite	Vitrinite	Inertinite	Asphalt	Bitumen	Pyrobitumen	Spectral flourescence; mean λ_{max}
34-049-60004	X (A) with scattered telalginite 	X(A) brightly greenish fluor., numerous Tasmanites 	X 	X (fusinite)				522
34-045-20234	X (A)	X 	X 	X 		X 		543
34-073-20497	X with scattered telalginite 	X 	X 	X		X 		535
34-105-22058		X (A) 	X 	X 		X		611
47-035-01371		X (A) 	X 	X		X		612
47-035-00615								
47-039-00205								
47-087-00019								

Table 3. Data collected and analyzed on transect C (2 of 5). Thumbnails are linked full-size images.

Transect C (main and ancilliary data points)

	Minerals				
American Petroleum Institute number	Pyrite	Carbonate	Quartz	Quartz / rutile	Clay-rich fragments
34-049-60004					
34-045-20234	X	X (rhombs)		X	
34-073-20497	X (framboids)				
34-105-22058	X(A) (framboids)			X	
47-035-01371					
47-035-00615					
47-039-00205					
47-087-00019					

Table 3. Data collected and analyzed on transect C (3 of 5).

Transect C (main and ancilliary data points)

	Total Organic Carbon (in wt. %)		Rock Eval						
American Petroleum Institute number	TOC	TOC Streib (1981)	S_1	S_2	S_3	HI	OI	T_{max}	PI
34-049-60004	7,32		2,04	36,31	0,42	496	6	433	0,05
34-045-20234	5,95		3,03	29,01	0,57	488	10	432	0,09
34-073-20497	5,22		2,51	25,91	0,49	496	9	434	0,09
34-105-22058	5,52		4,34	21,68	0,22	392	4	448	0,17
47-035-01371	4,99		2,91	24,38	1,42	488	28	441	0,11
47-035-00615	2,12		0,77	3,21	0,37	151	17	440	0,19
47-039-00205	1,89		1,2	1,4	0,68	74	36	448	0,46
47-087-00019	1,22		1,23	2	0,38	164	31	396	0,38

Table 3. Data collected and analyzed on transect C (4 of 5).

Transect C (main and ancilliary data points)

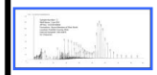
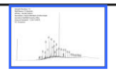
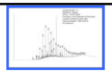
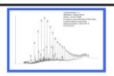
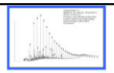
	Vitrinite Reflectance						Gas chromatography of bitumen extract		
American Petroleum Institute number	$\%Ro_{mean}$ Humble	$\%Ro_{mean}$ Humble (corrected)	$\%Ro_{mean}$ Hackley	$\%Ro_{mean}$ Streib (1981)	$\%Ro_{mean}$ Zielinski and McIver (1982)	$\%Ro_{mean}$ ExLog	Gas chromatography image	GC Code	Pristane / Phytane
34-049-60004	0,44	0,73	0,53						1,92
34-045-20234	0,44	0,71	0,47						1,61
34-073-20497	0,39	0,62	0,45						2,00
34-105-22058	0,48	0,67	0,53		Mean 0.5	0,59			1,83
47-035-01371			0,54						2,27
47-035-00615	0,72								
47-039-00205	0,85								
47-087-00019	1,02								

Table 3. Data collected and analyzed on transect C (5 of 5). Thumbnails are linked full-size images.

Transect D (main and ancilliary data points)

Abbreviations used: A Abundant, C Common, Co Conodonts, Co_A Conodonts (abundant), Co_L Conodonts (local), L Local, L_{CD} Local (from core description), Lg Linguloid, Lg_C Linguloid (common), N none observed, NS, no sample, T Tasmanites, T_A Tasmanites (abundant), T_C Tasmanites (common), T_L Tasmanites (local), Te Tentaculites, Te_C Tentaculites (common), X present, X(A) present (abundant), X(C) present (common), X(L) present (local).

American Petroleum Institute number	Latitude (decimal degrees)	Longitude (decimal degrees)	Well on Transect	Lease name	County	State	Township or Quadrangle (7.5')	Sample No.	Formation	Interval sampled (ft)	Sample Type	Fossils	Bitumen
34-145-60142	38,86479477	-83,20466644	D_1	Core 2814	Scioto	Ohio	Brush Creek Twp.	D_1	Huron Member of Ohio Shale	480-481	core	T_A	N
16-043-16235	39,293272	-83,111354	D_2	No. 11-1 Warnie Stapleton	Carter	Ky.	Grahn Quad.	D_2	Huron Member of Ohio Shale	1,220-1,260	cuttings	T_L	N
16-063-26619	38,120524	-82,955943	D_3	No. 3 I.R. Ison (Stephens Unit)	Elliott	Ky.	Mazie Quad.	D_3	Huron Member of Ohio Shale	1,520-1,570	cuttings	T_c	N
16-115-63403	37,859252	-82,984129	D_4	No. 4 Conley	Johnson	Ky.	Oil Springs Quad.	D_4	Huron Member of Ohio Shale	1,290-1,360	cuttings	T_c (dark)	N
47-043-01656	38,096671	-82,240838	D_5	Columbia/McCoy (20402) (WV-4)	Lincoln	W.Va.	Ranger Quad.	D_5	Huron Member of Ohio Shale	3 542	core	T_A (dark)	L
16-145-82020	37,52161	-82,277058	D_6	No. 69 Ford Motor Co.	Pike	Ky.	Belfry Quad.	D_6	Huron Member of Ohio Shale	4 387,5	core	T_c (dark)	L
45-027-20147	37,24702238	-82,18590051	D_7	No. 9781 Pittston	Buchanan	Va.	Prater Quad.	D_7	Huron Member of Ohio Shale	5,320-5,340	cuttings	N	N

Table 4. Data collected and analyzed on transect D (1 of 5).

Transect D (main and ancilliary data points)

	Dispersed macerals							
American Petroleum Institute number	Bituminite and (or) alginite (amorphous kerogen)	Telalginite	Vitrinite	Inertinite	Asphalt	Bitumen	Pyrobitumen	Spectral flourescence; mean λ_{max}
34-145-60142	X 	X 	X (A) 	X 		X		538
16-043-16235	X 	X 	X 	X 		X		559
16-063-26619	X (A) 	X (A) 	X?	X (fusain) 		X 		562
16-115-63403		X 		X		X (A) 		552
47-043-01656		X 				X (A) 		661
16-145-82020				X (fusain) 		X 		
45-027-20147				X (fusain)		X 		

Table 4. Data collected and analyzed on transect D (2 of 5). Thumbnails are linked full-size images.

Transect D (main and ancilliary data points)

	Minerals				
American Petroleum Institute number	Pyrite	Carbonate	Quartz	Quartz / rutile	Clay-rich fragments
34-145-60142	X (A)			X	
16-043-16235	X (A)				
16-063-26619					
16-115-63403					
47-043-01656					
16-145-82020					
45-027-20147				X 	

Table 4. Data collected and analyzed on transect D (3 of 5). Thumbnail is linked full-size images.

Transect D (main and ancilliary data points)

	Total Organic Carbon (in wt. %)		Rock Eval						
American Petroleum Institute number	TOC	TOC Streib (1981)	S_1	S_2	S_3	HI	OI	T_{max}	PI
34-145-60142	9,57		4,03	51,04	0,65	533	7	433	0,07
16-043-16235	6,76		2,46	27,68	0,51	409	8	429	0,08
16-063-26619	9,05		3,4	37,38	1,1	413	13	434	0,08
16-115-63403	6,43		2,02	27,09	0,84	421	13	433	0,07
47-043-01656	6,36		4,2	22,24	0,4	350	6	448	0,16
16-145-82020	6,01		1,78	3,72	0,25	62	4	463	0,32
45-027-20147	2,15		4,01	4,85	0,67	226	31	409	0,45

Table 4. Data collected and analyzed on transect D (4 of 5).

Transect D (main and ancilliary data points)

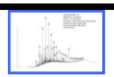
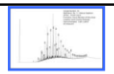
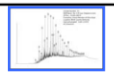
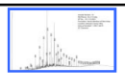
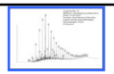
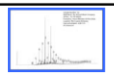
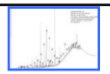
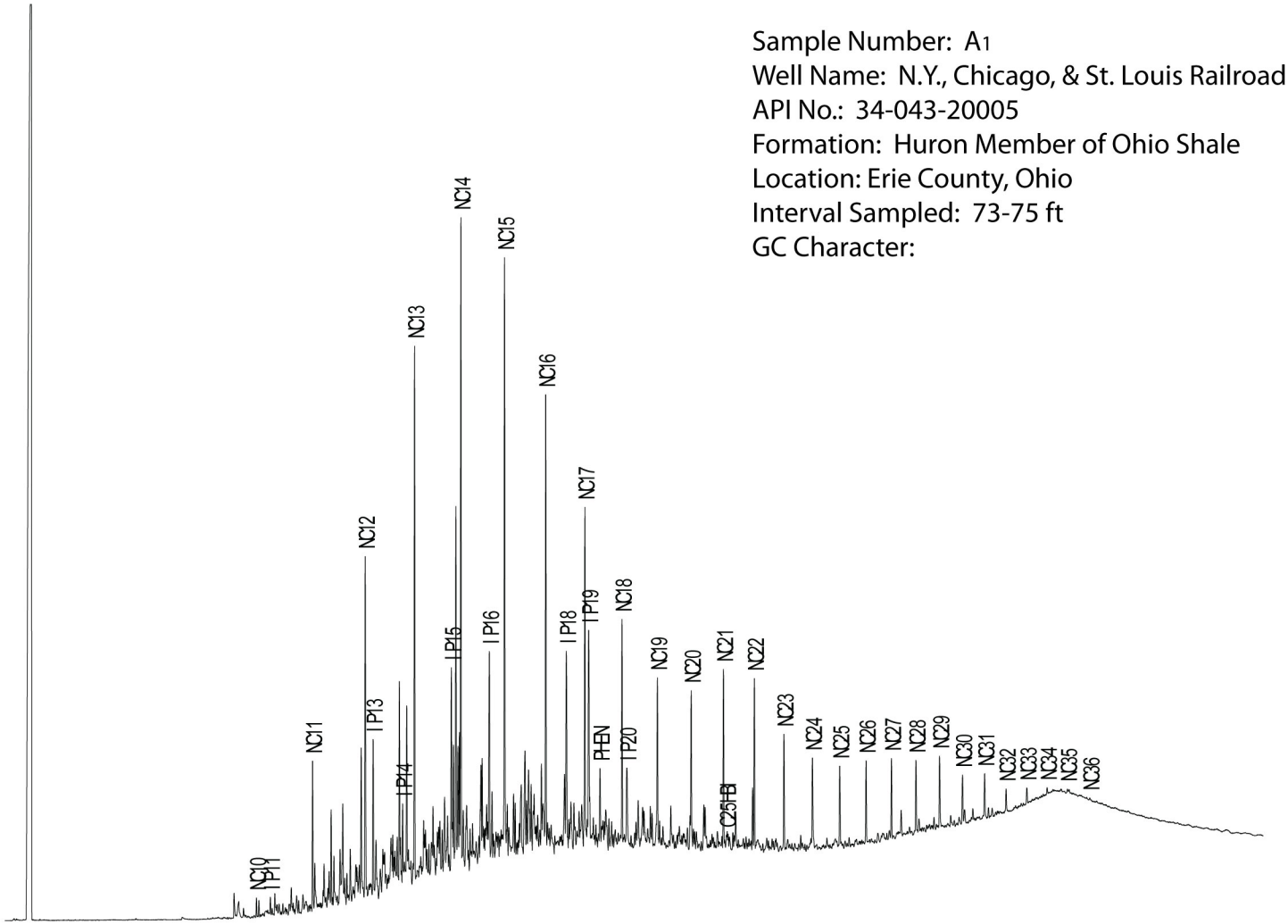
	Vitrinite Reflectance						Gas chromatography of bitumen extract		
American Petroleum Institute number	$\%Ro_{mean}$ Humble	$\%Ro_{mean}$ Humble (corrected)	$\%Ro_{mean}$ Hackley	$\%Ro_{mean}$ Streib (1981)	$\%Ro_{mean}$ Zielinski and McIver (1982)	$\%Ro_{mean}$ ExLog	Gas chromatography image	GC Code	Pristane/Phytane
34-145-60142	0,33	0,53	0,53						1,69
16-043-16235	0,59	0.78 (corrected by authors using Lo, 1993)	0,66						1,44
16-063-26619	0,58	0.78 (corrected by authors using Lo, 1993)	0,5						1,72
16-115-63403	0,45	0.62 (corrected by authors using Lo, 1993)	0,61						1,68
47-043-01656	0,51	0.62 (corrected by authors using Lo, 1993)	0,66						1,83
16-145-82020	0,75		1,42						1,18
45-027-20147	1,76		1,85						

Table 4. Data collected and analyzed on transect D (5 of 5). Thumbnails are linked full-size images.

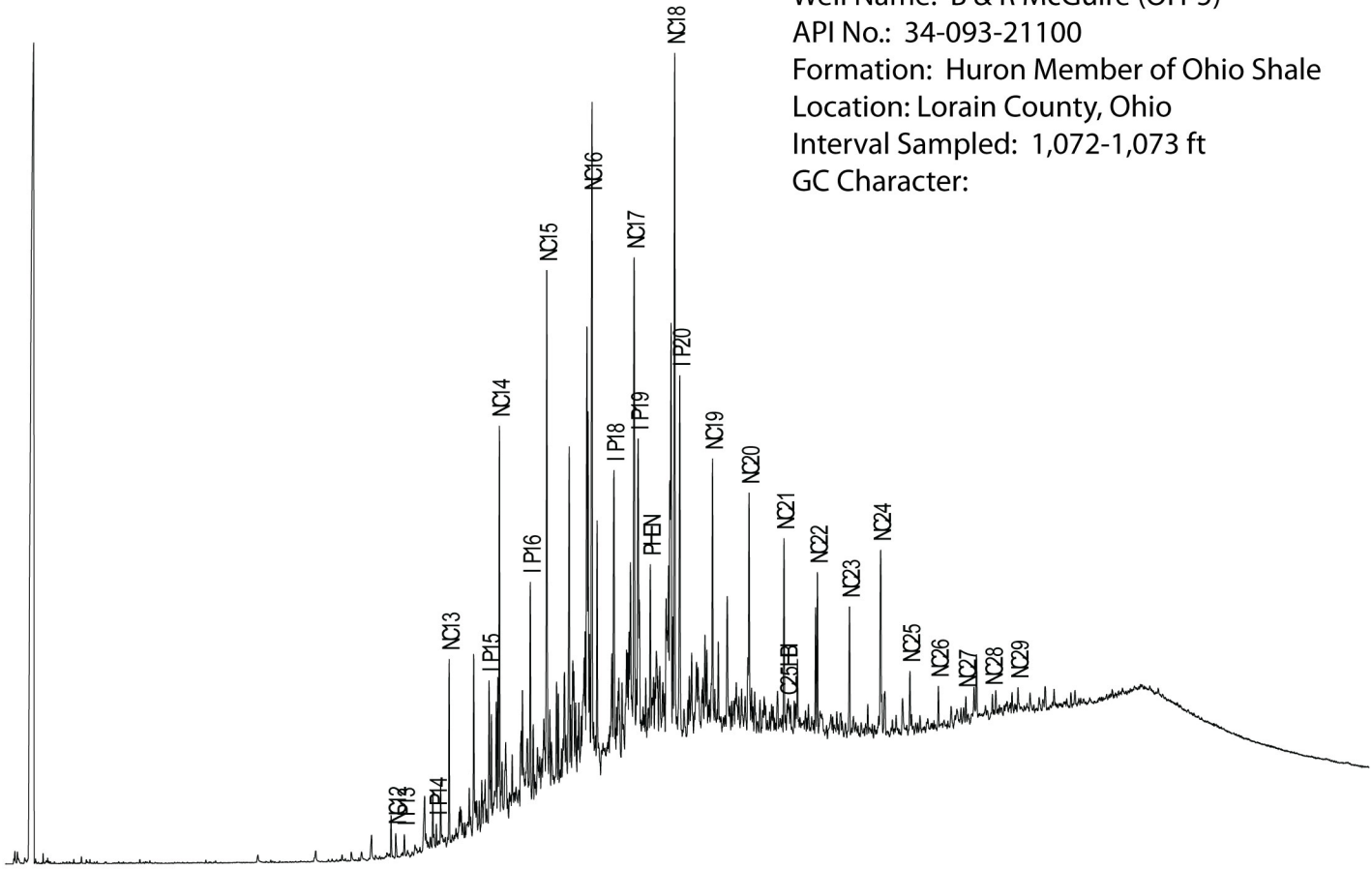
Click to view Part 1

Appendix 5. Chromatograms from Gas Chromatographic Analyses by Humble Geochemical Services

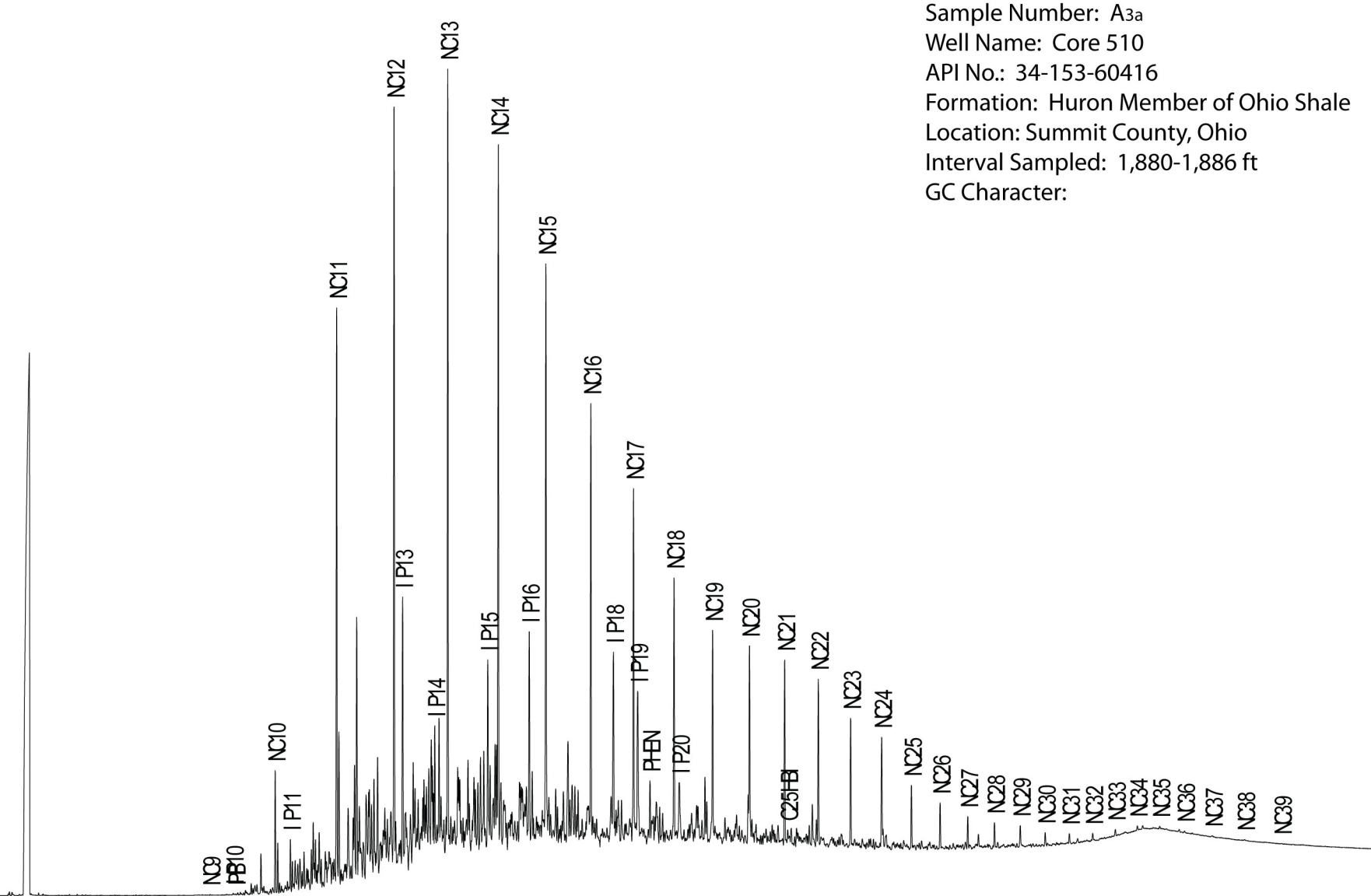
Results of analyses of samples from the following wells and cores are presented on pages 34 to 70:
Beckholt, Bessemer, Brown, CollinsClinger, ColumbiaMcCoy, Conley, Core510, Core859, Core2770, Core2814, Ford, Gordon, Ison, Kappel, McGuire, Meleski, Merckle, Newell, NYCentral, NYChicago&StLouis, Pinell, Pittston, Shockling, Sokevitz, Stapleton, Walls, Winegardner


Sample Number: A1
Well Name: N.Y., Chicago, & St. Louis Railroad
API No.: 34-043-20005
Formation: Huron Member of Ohio Shale
Location: Erie County, Ohio
Interval Sampled: 73-75 ft
GC Character:
NC10
NC11
NC12
NC13
NC14
NC15
NC16
NC17
NC18
NC19
NC20
NC21
NC22
NC23
NC24
NC25
NC26
NC27
NC28
NC29
NC30
NC31
NC32
NC33
NC34
NC35
NC36
IP11
IP13
IP14
IP15
IP16
IP18
IP19
IP20
PHEN
C25HB

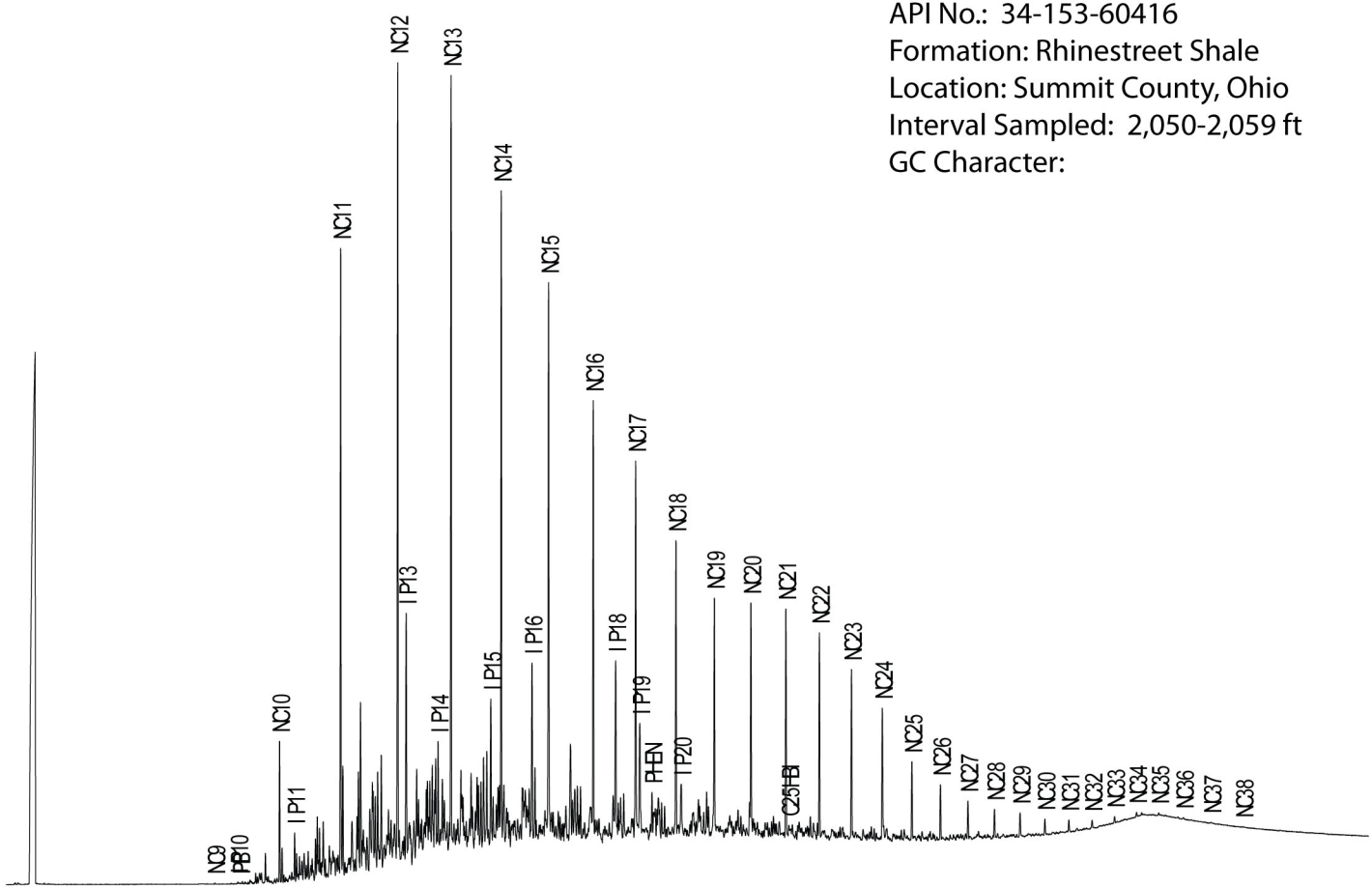
Sample Number: A_2
Well Name: B & R McGuire (OH-5)
API No.: 34-093-21100
Formation: Huron Member of Ohio Shale
Location: Lorain County, Ohio
Interval Sampled: 1,072-1,073 ft
GC Character:



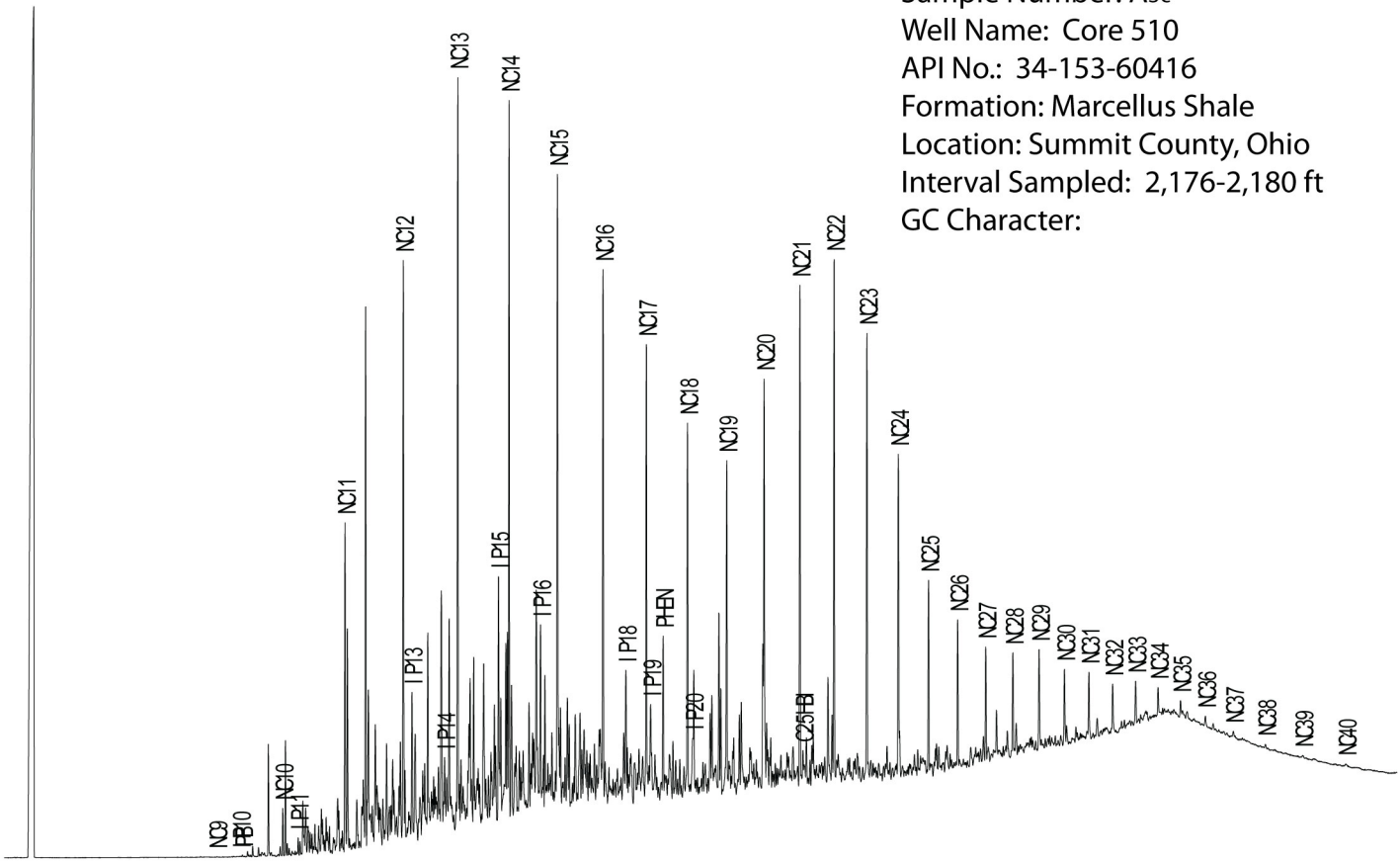
Sample Number: A3a
Well Name: Core 510
API No.: 34-153-60416
Formation: Huron Member of Ohio Shale
Location: Summit County, Ohio
Interval Sampled: 1,880-1,886 ft
GC Character:

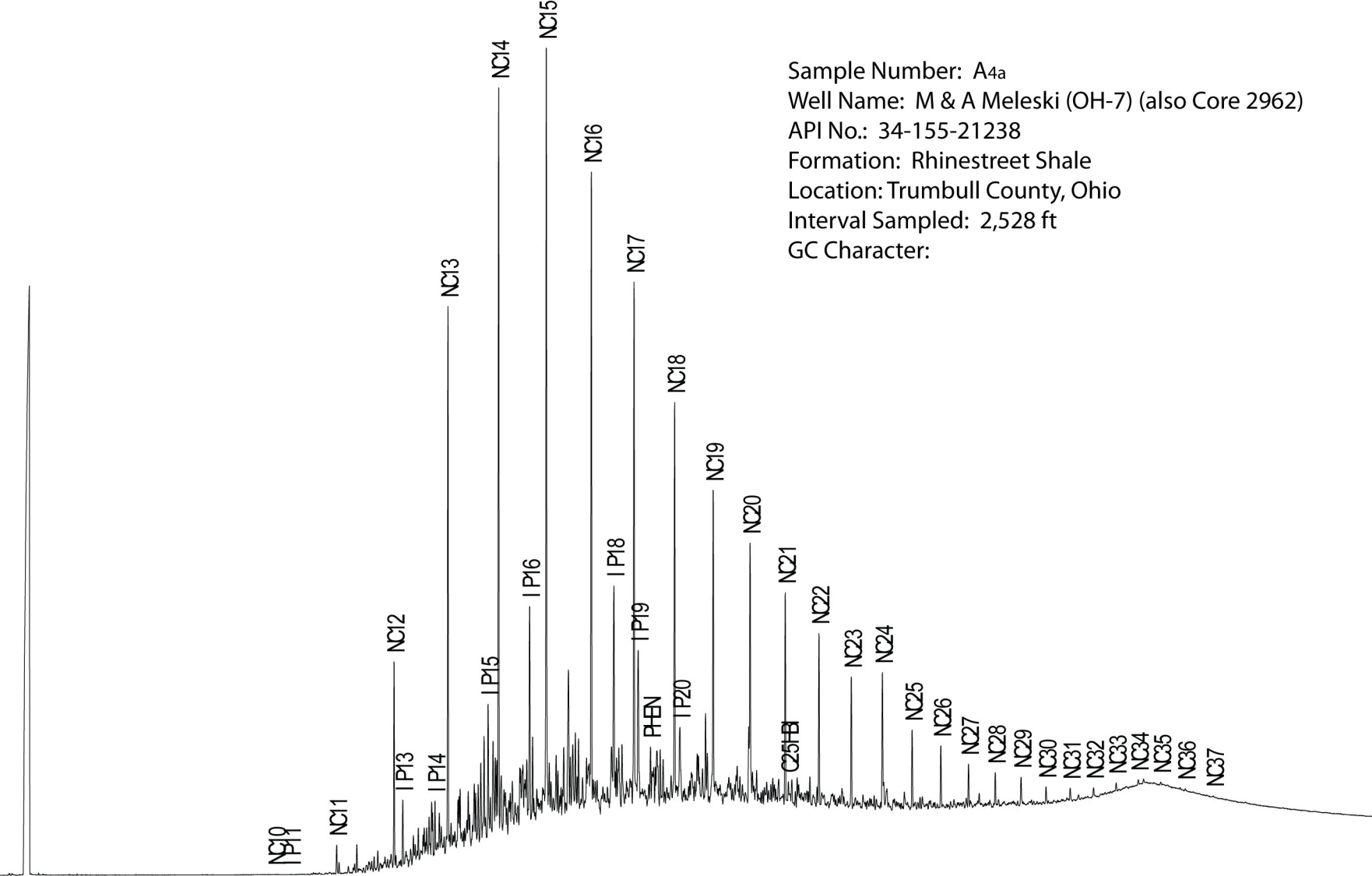


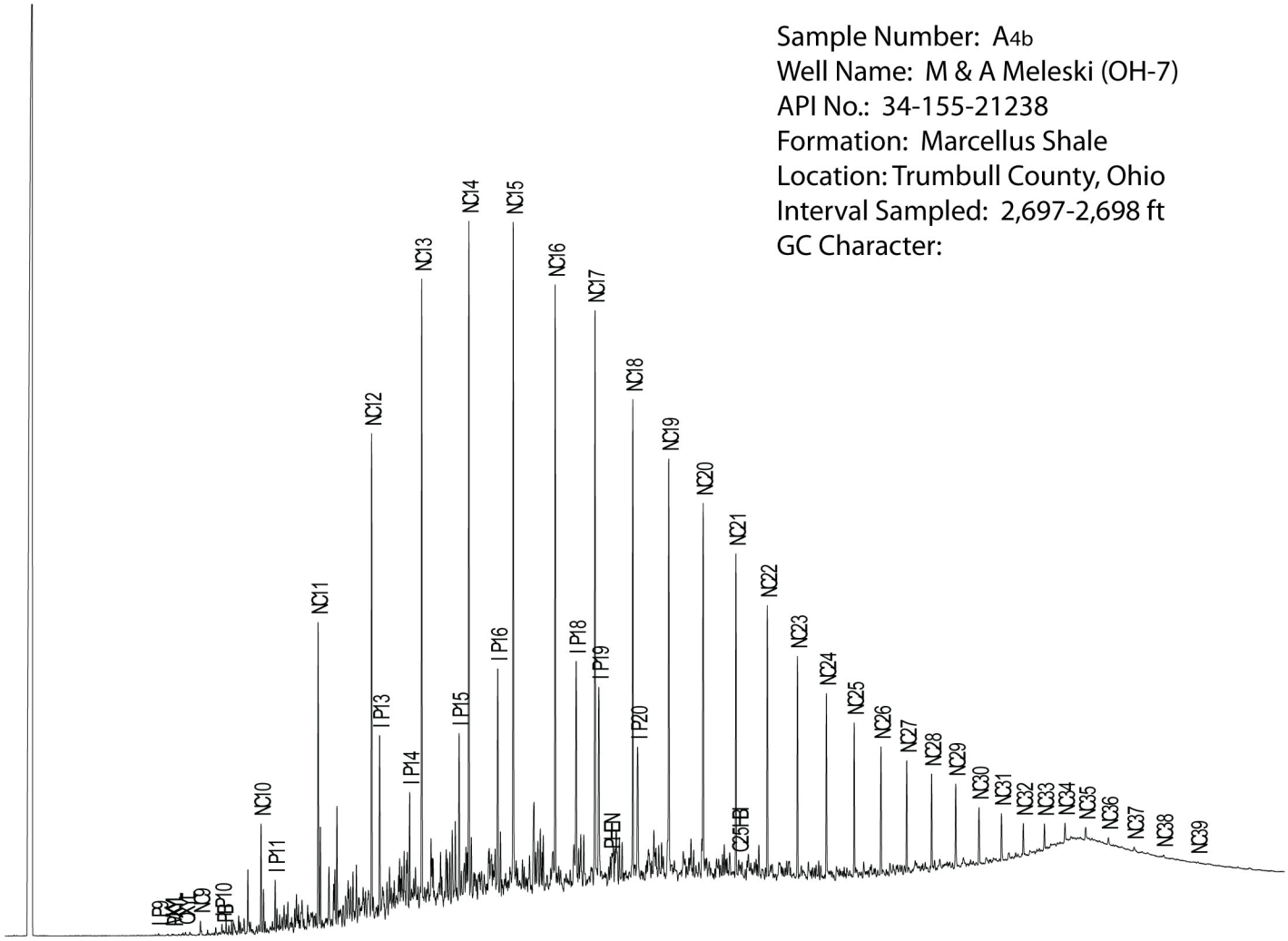
Sample Number: A3b
Well Name: Core 510
API No.: 34-153-60416
Formation: Rhinestreet Shale
Location: Summit County, Ohio
Interval Sampled: 2,050-2,059 ft
GC Character:



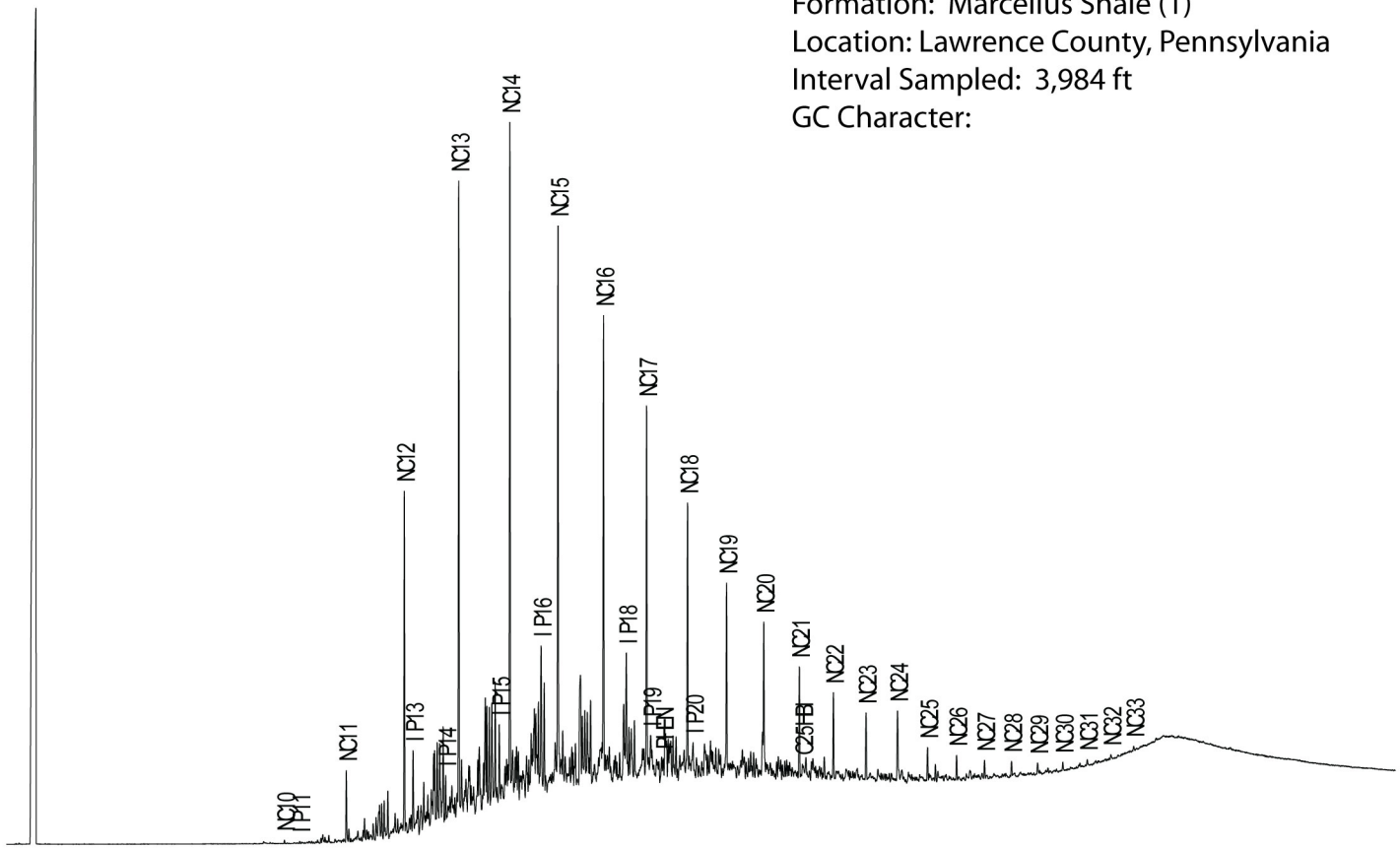
Sample Number: A3c
Well Name: Core 510
API No.: 34-153-60416
Formation: Marcellus Shale
Location: Summit County, Ohio
Interval Sampled: 2,176-2,180 ft
GC Character:

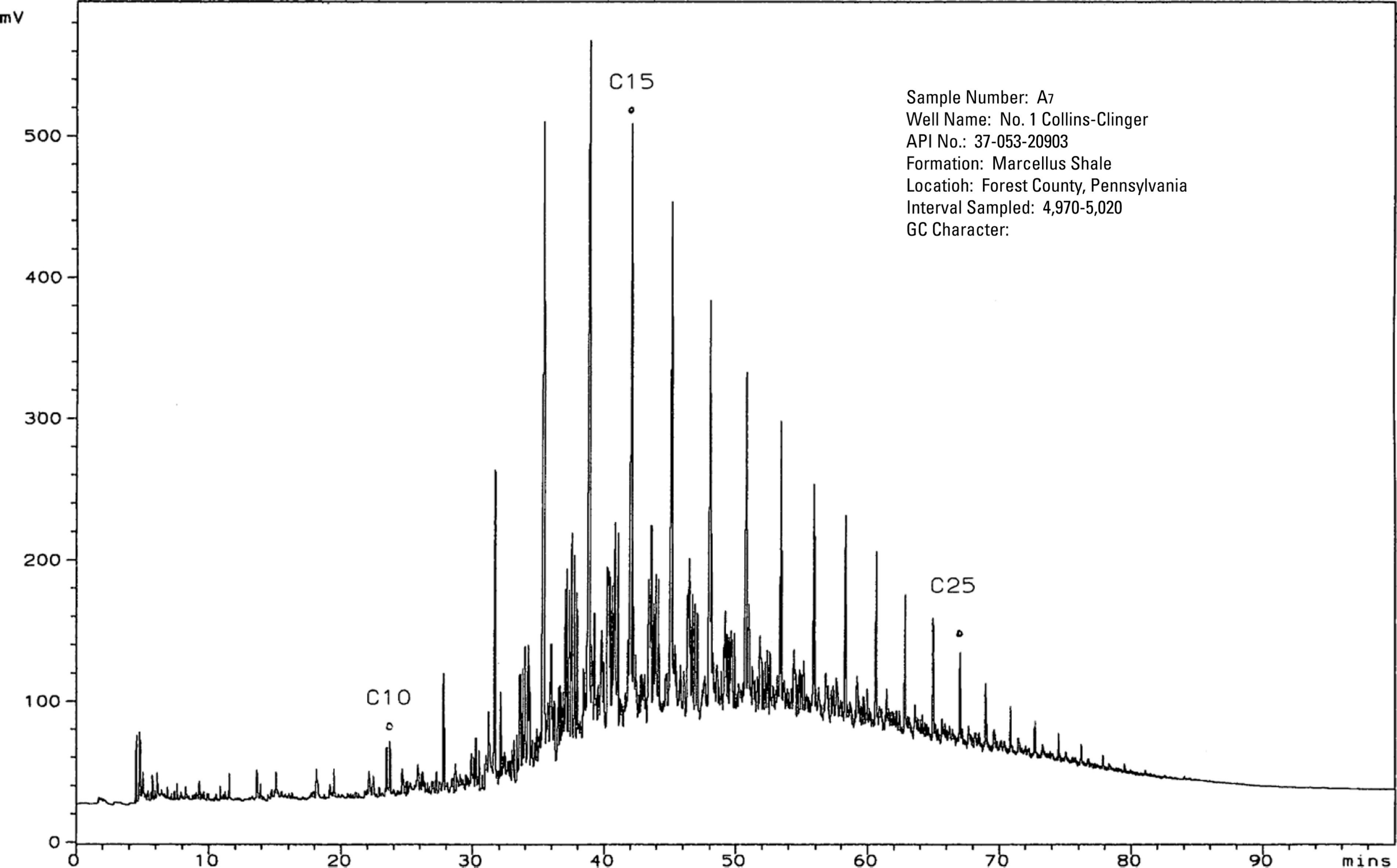


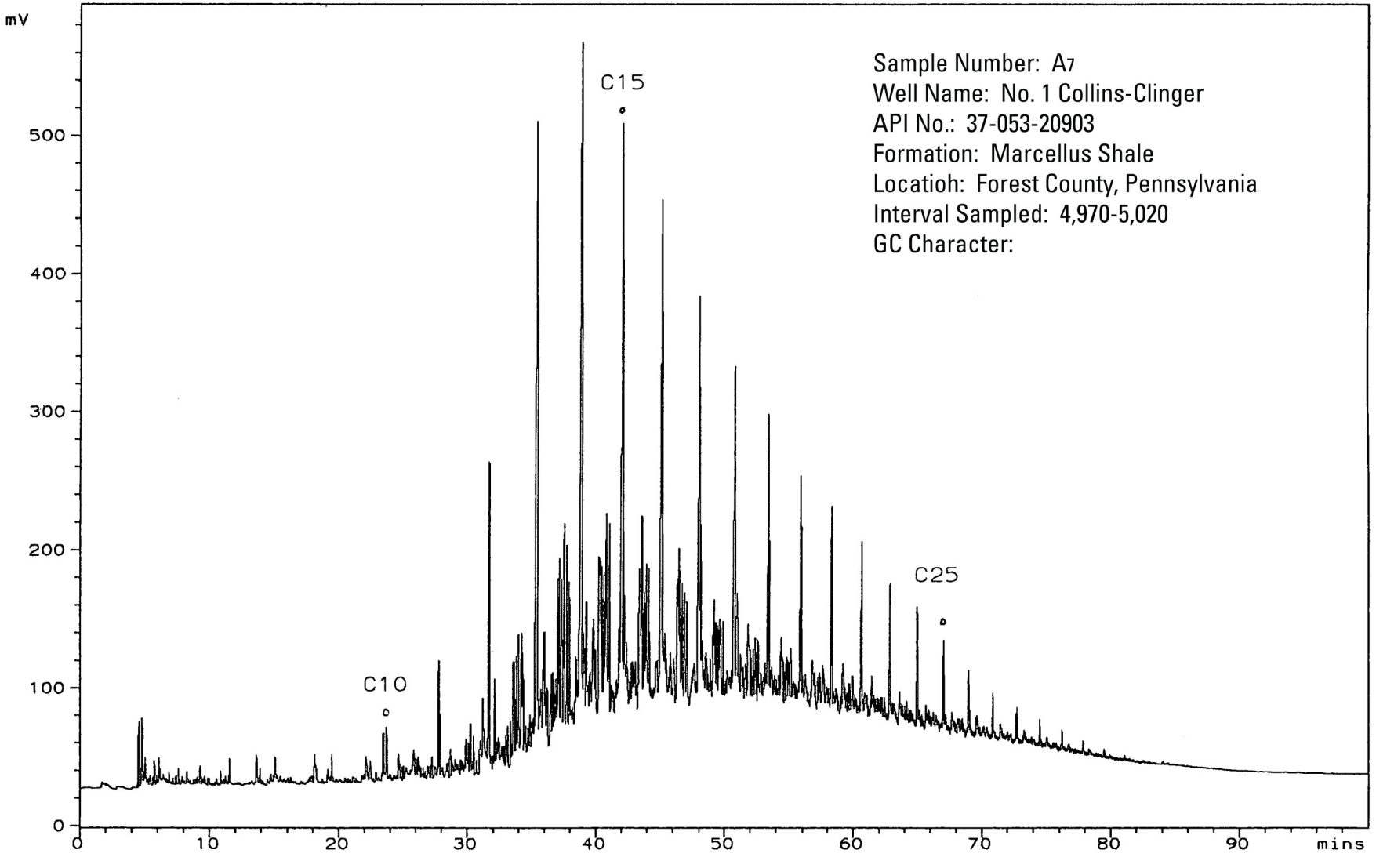

Sample Number: A4a
Well Name: M & A Meleski (OH-7) (also Core 2962)
API No.: 34-155-21238
Formation: Rhinestreet Shale
Location: Trumbull County, Ohio
Interval Sampled: 2,528 ft
GC Character:
NC10
NC11
NC12
NC13
NC14
NC15
NC16
NC17
NC18
NC19
NC20
NC21
NC22
NC23
NC24
NC25
NC26
NC27
NC28
NC29
NC30
NC31
NC32
NC33
NC34
NC35
NC36
NC37
IP13
IP14
IP15
IP16
IP18
IP19
IP20
PHEN
C25HBI


Sample Number: A4b
Well Name: M & A Meleski (OH-7)
API No.: 34-155-21238
Formation: Marcellus Shale
Location: Trumbull County, Ohio
Interval Sampled: 2,697-2,698 ft
GC Character:
nC10
iP11
nC11
iP13
nC12
iP14
nC13
iP15
nC14
iP16
nC15
iP18
nC16
iP19
nC17
iP20
nC18
nC19
nC20
nC21
nC22
nC23
nC24
nC25
nC26
nC27
nC28
nC29
nC30
nC31
nC32
nC33
nC34
nC35
nC36
nC37
nC38
nC39

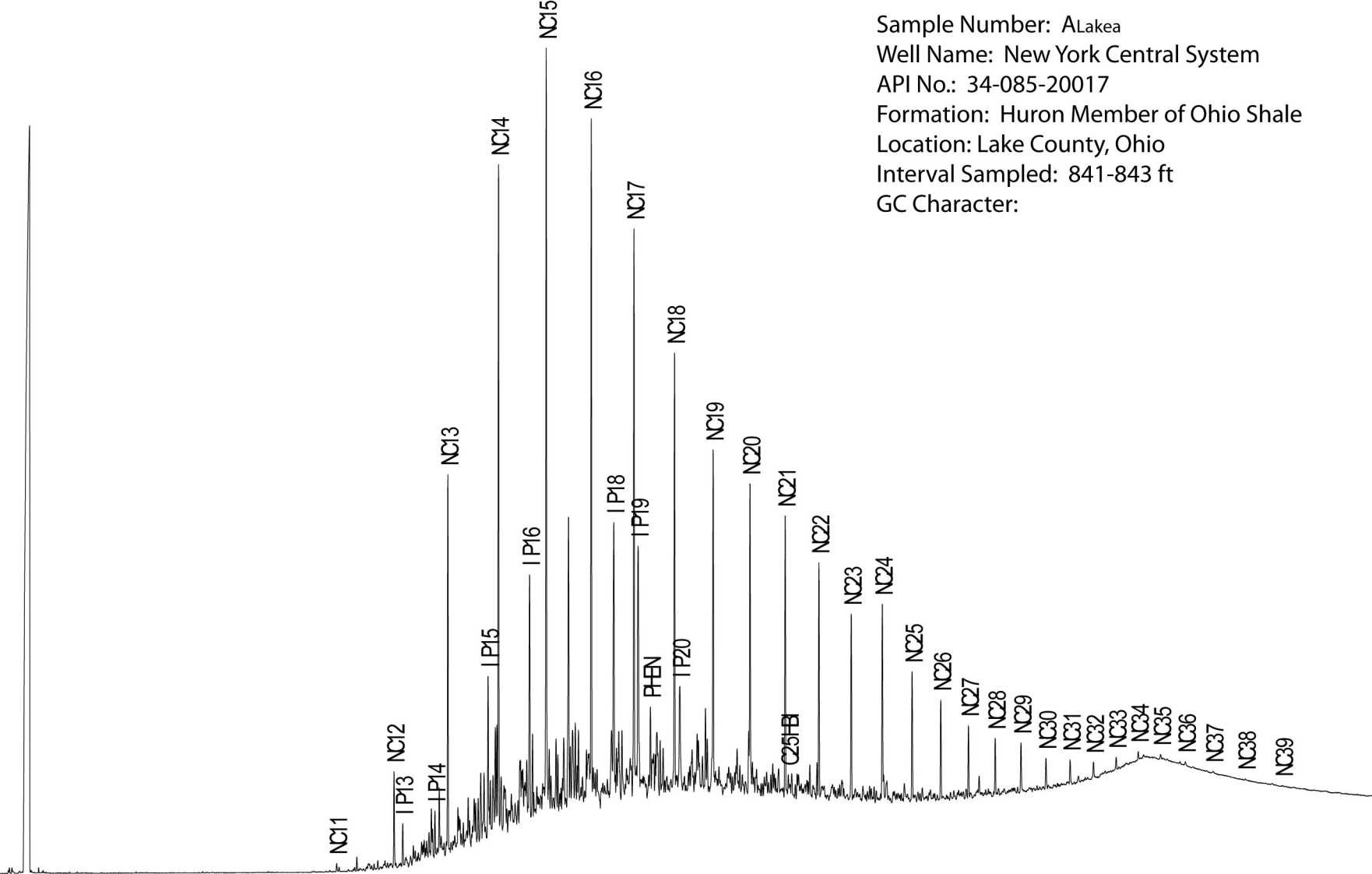
Sample Number: A5a
Well Name: No. 1 Sokevitz (PA-5)
API No.: 37-073-20022
Formation: Marcellus Shale (1)
Location: Lawrence County, Pennsylvania
Interval Sampled: 3,984 ft
GC Character:

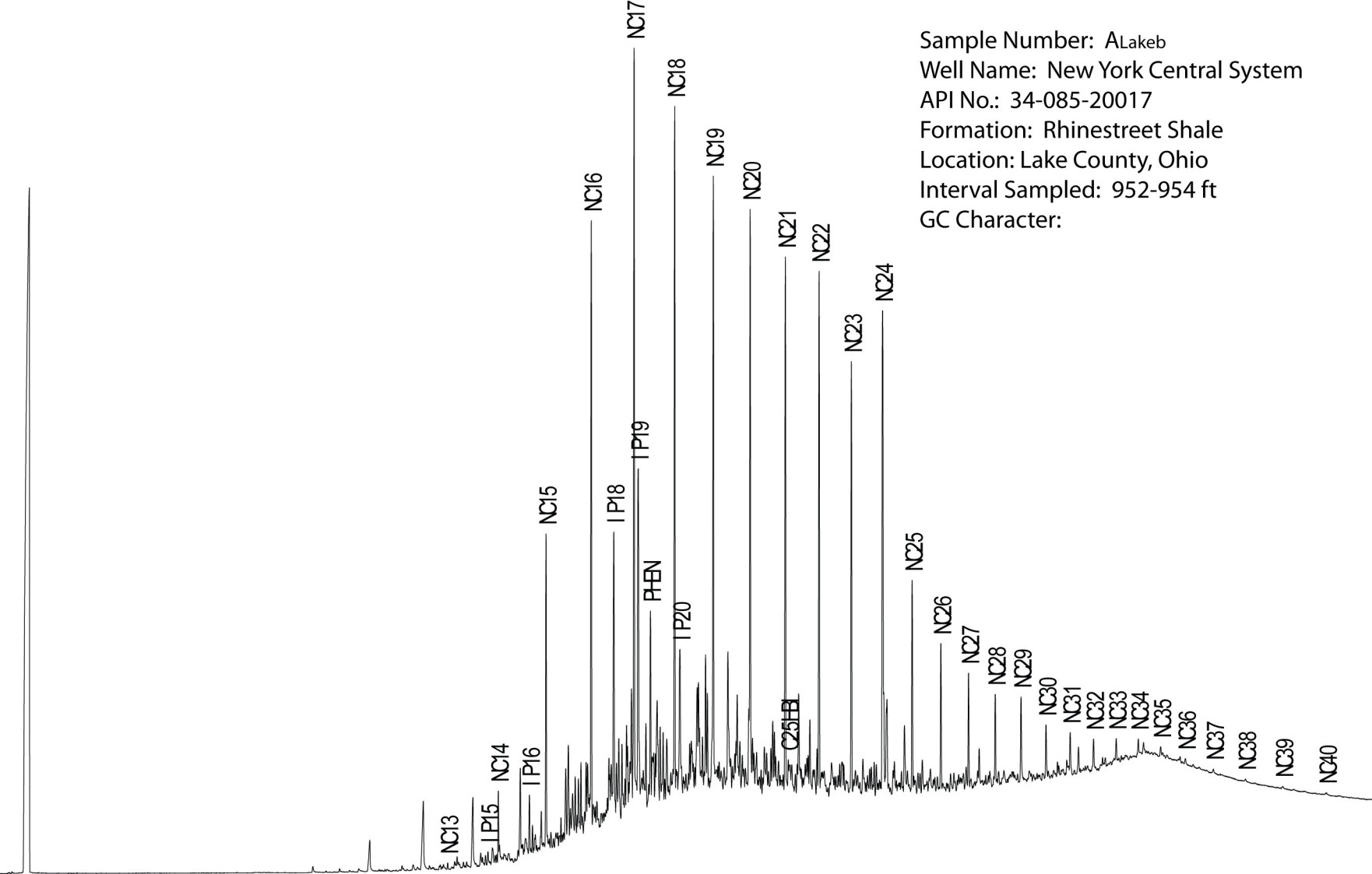


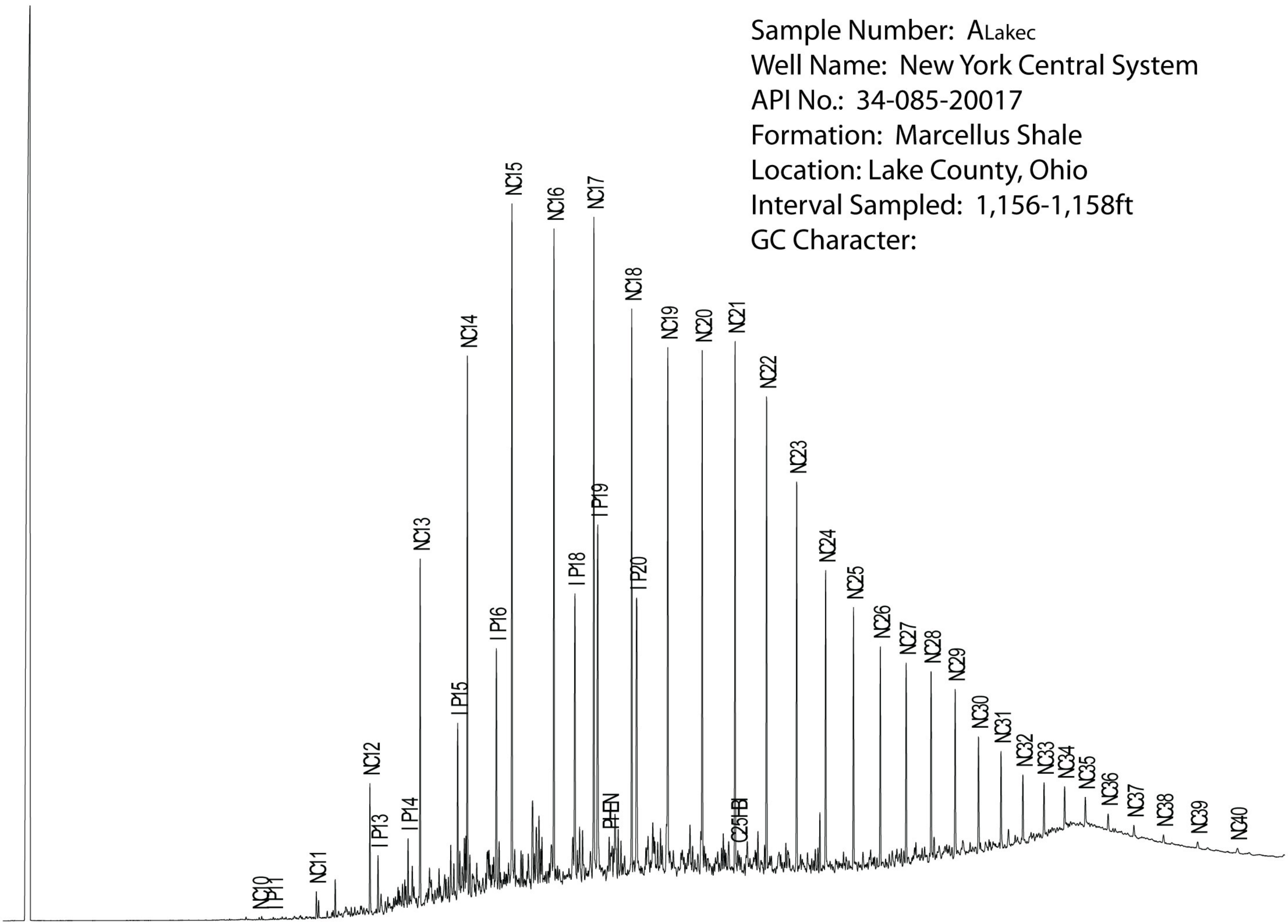

mV
500
400
300
200
100
0
C15
C10
C25
Sample Number: A7
Well Name: No. 1 Collins-Clinger
API No.: 37-053-20903
Formation: Marcellus Shale
Locatioh: Forest County, Pennsylvania
Interval Sampled: 4,970-5,020
GC Character:
0
10
20
30
40
50
60
70
80
90
mins

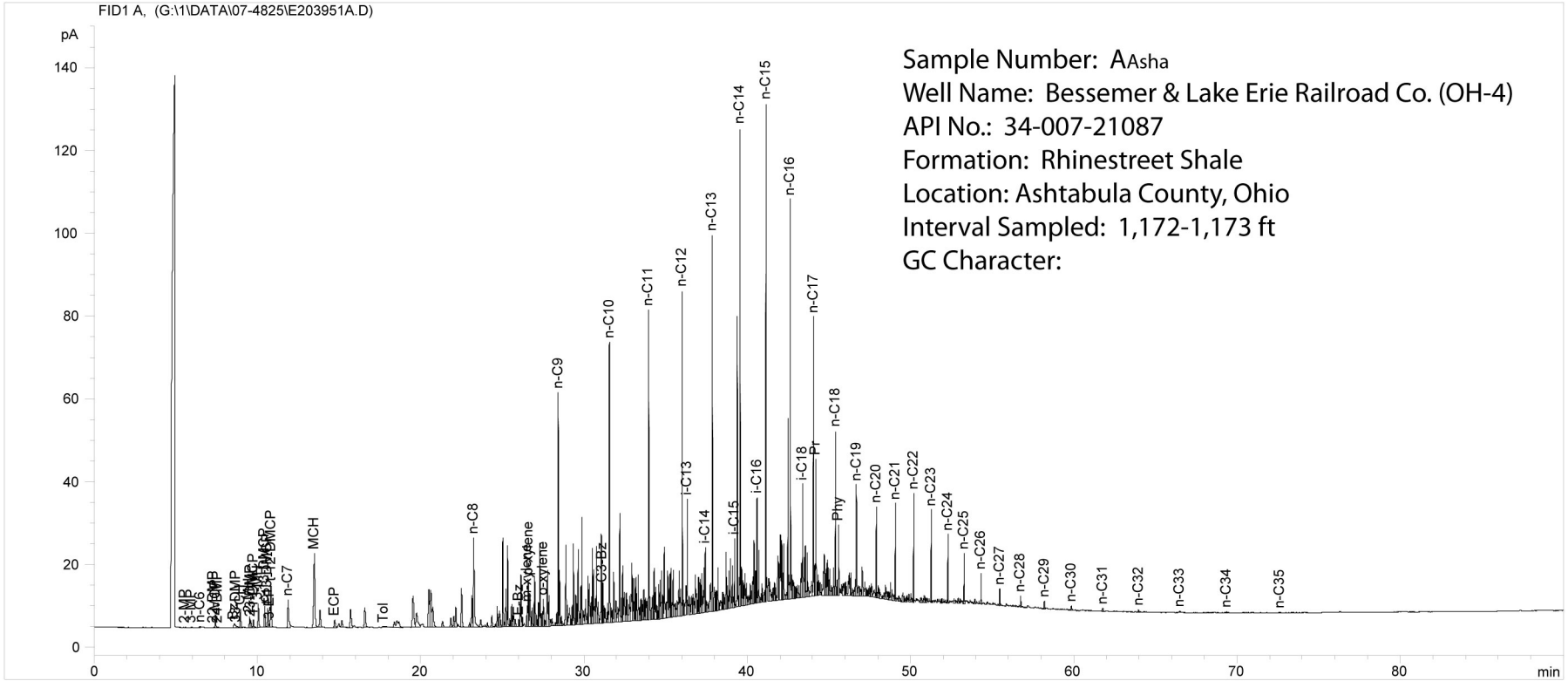

mV
500
400
300
200
100
0
C15
C10
C25
Sample Number: A7
Well Name: No. 1 Collins-Clinger
API No.: 37-053-20903
Formation: Marcellus Shale
Locatioh: Forest County, Pennsylvania
Interval Sampled: 4,970-5,020
GC Character:
0
10
20
30
40
50
60
70
80
90
mins

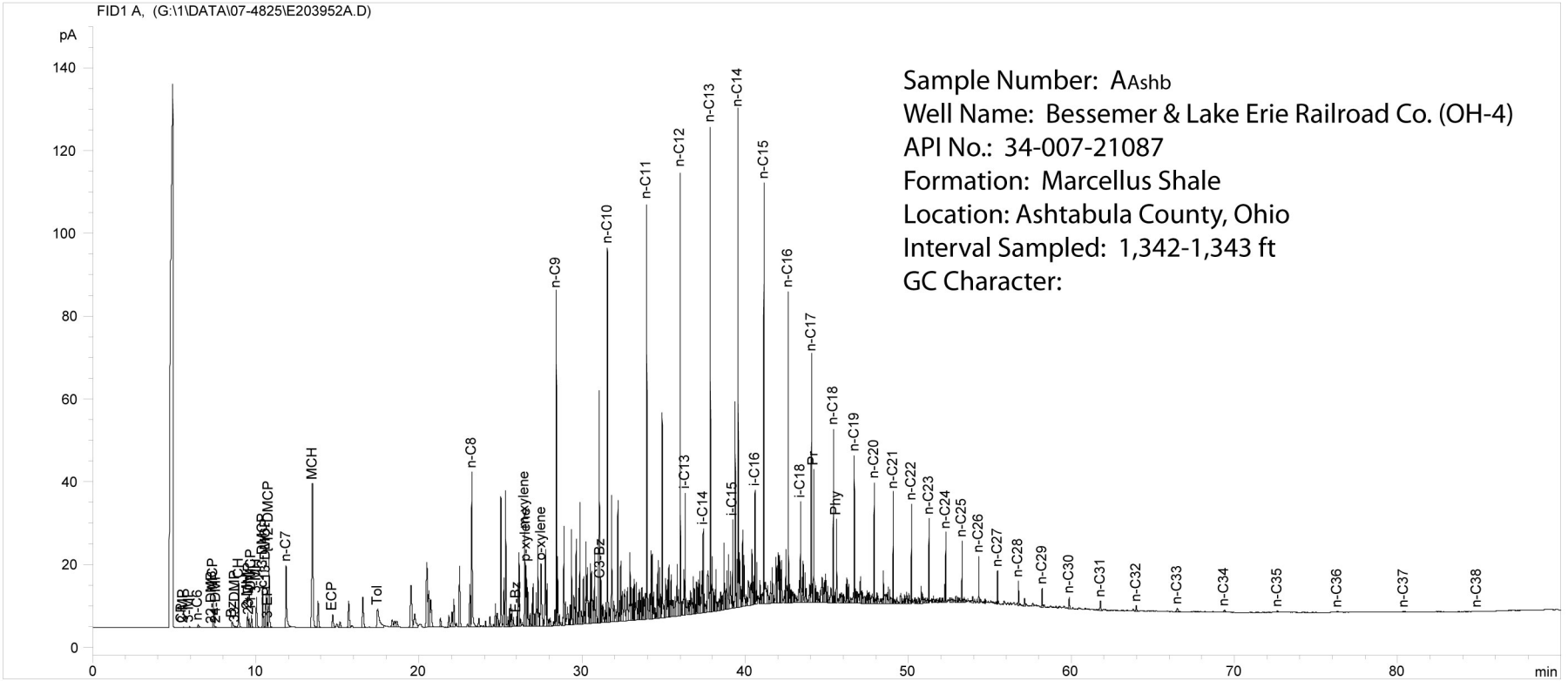
Sample Number: ALakea
Well Name: New York Central System
API No.: 34-085-20017
Formation: Huron Member of Ohio Shale
Location: Lake County, Ohio
Interval Sampled: 841-843 ft
GC Character:



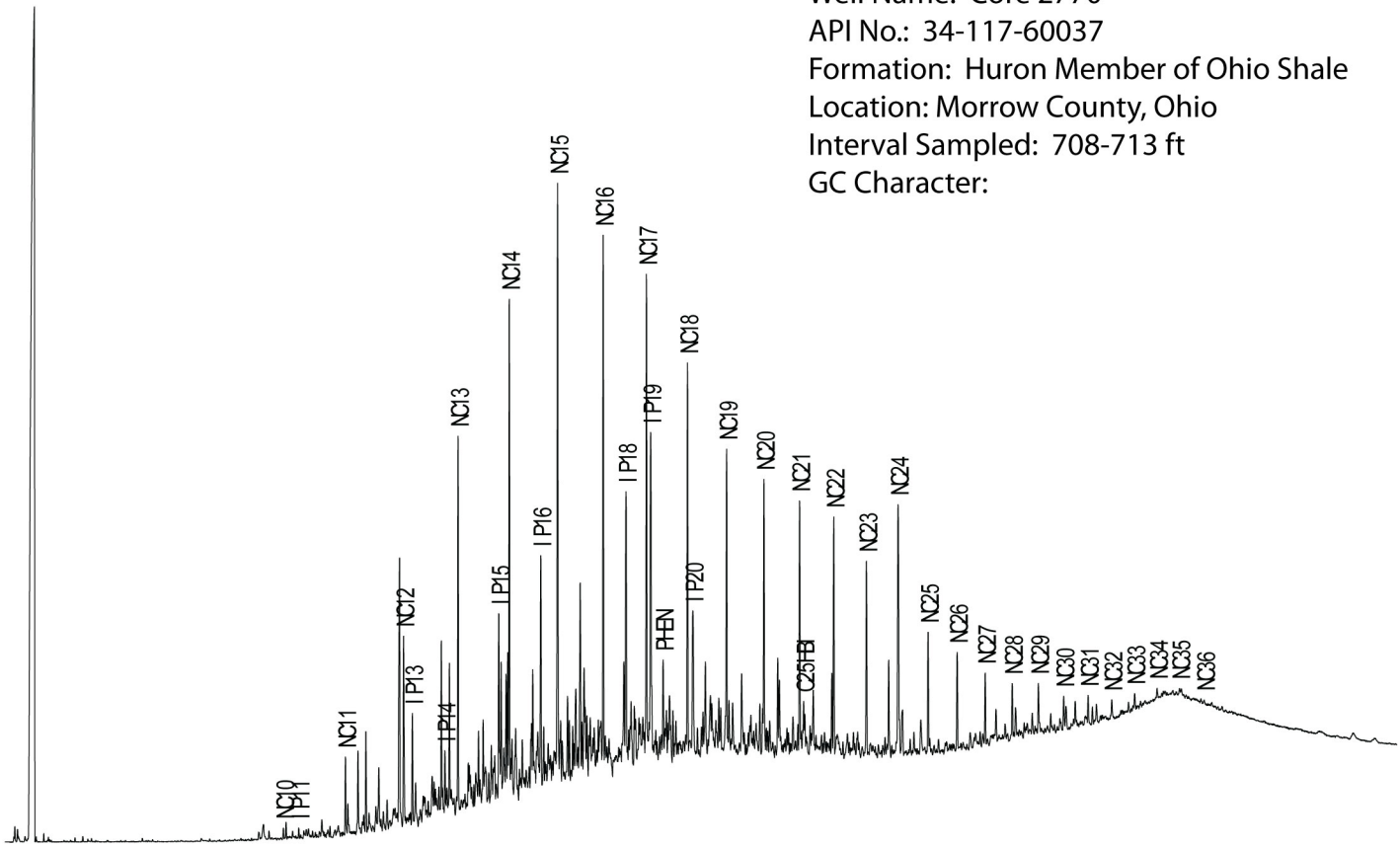

Sample Number: ALakeb
Well Name: New York Central System
API No.: 34-085-20017
Formation: Rhinestreet Shale
Location: Lake County, Ohio
Interval Sampled: 952-954 ft
GC Character:
NC13
IP15
NC14
IP16
NC15
IP18
IP19
PHEN
IP20
NC16
NC17
NC18
NC19
NC20
NC21
C25HB
NC22
NC23
NC24
NC25
NC26
NC27
NC28
NC29
NC30
NC31
NC32
NC33
NC34
NC35
NC36
NC37
NC38
NC39
NC40


Sample Number: ALakec
Well Name: New York Central System
API No.: 34-085-20017
Formation: Marcellus Shale
Location: Lake County, Ohio
Interval Sampled: 1,156-1,158ft
GC Character:
NC10
I P11
NC11
NC12
I P13
I P14
NC13
NC14
I P15
I P16
NC15
NC16
I P18
NC17
I P19
PHEN
NC18
I P20
NC19
NC20
NC21
C25HBI
NC22
NC23
NC24
NC25
NC26
NC27
NC28
NC29
NC30
NC31
NC32
NC33
NC34
NC35
NC36
NC37
NC38
NC39
NC40

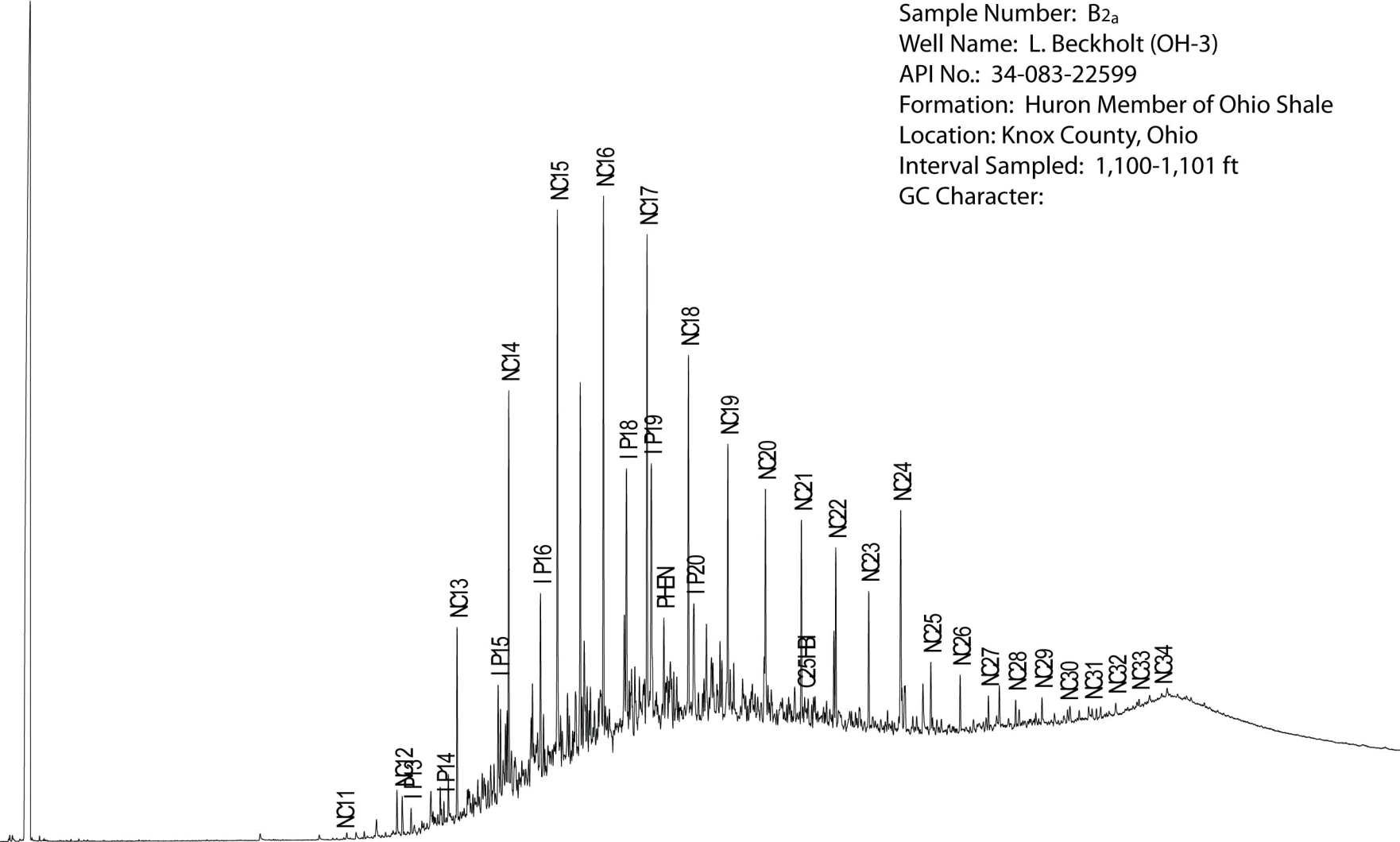

FID1 A, (G:\1\DATA\07-4825\E203951A.D)
pA
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
min
Sample Number: AAsha
Well Name: Bessemer & Lake Erie Railroad Co. (OH-4)
API No.: 34-007-21087
Formation: Rhinestreet Shale
Location: Ashtabula County, Ohio
Interval Sampled: 1,172-1,173 ft
GC Character:
n-C7
MCH
ECP
Tol
n-C8
n-C9
n-C10
n-C11
n-C12
i-C13
n-C13
i-C14
n-C14
i-C15
n-C15
i-C16
n-C16
i-C18
Pr
n-C17
Phy
n-C18
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35

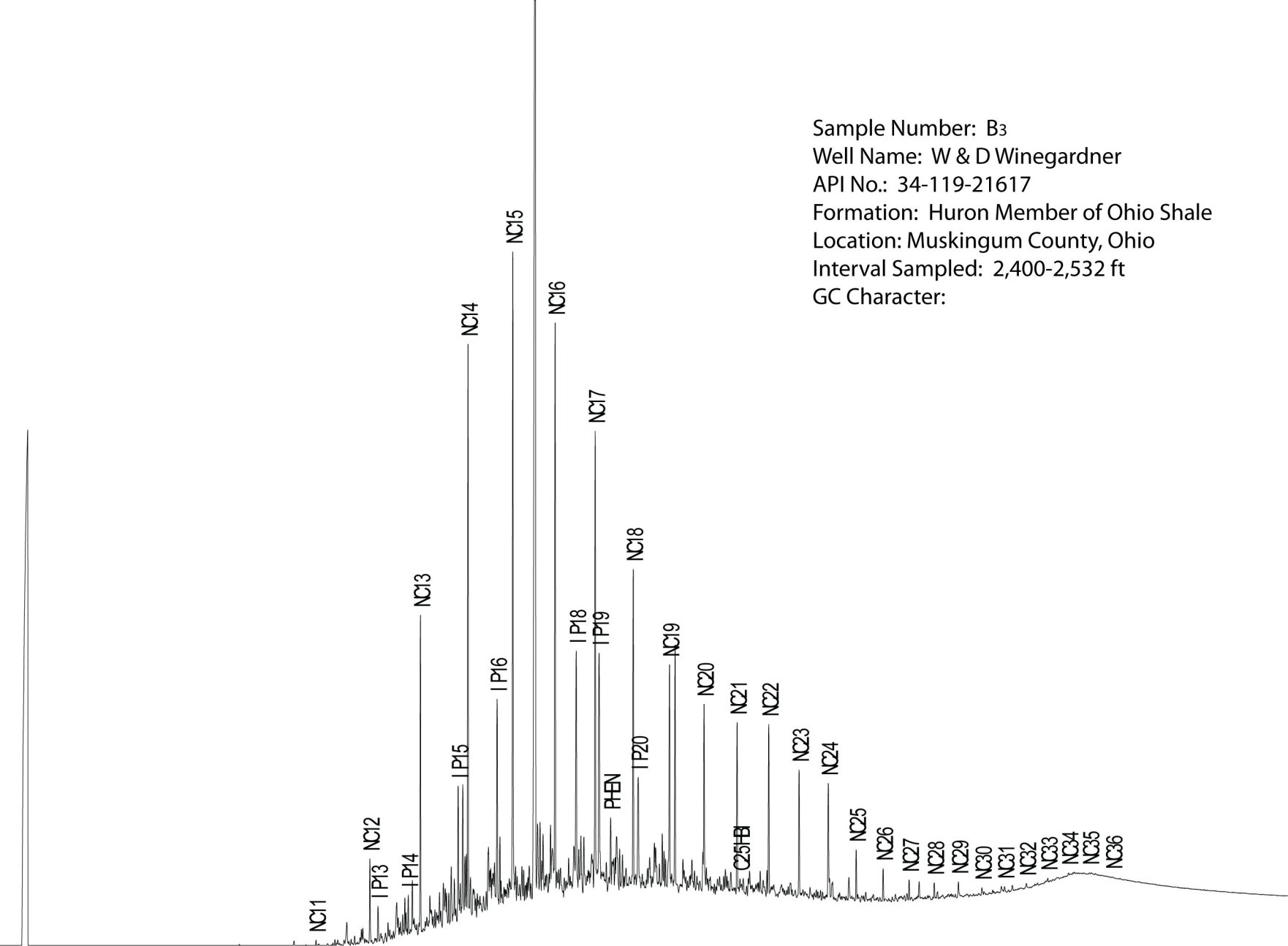

FID1 A, (G:\1\DATA\07-4825\E203952A.D)
pA
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
min
Sample Number: AAshb
Well Name: Bessemer & Lake Erie Railroad Co. (OH-4)
API No.: 34-007-21087
Formation: Marcellus Shale
Location: Ashtabula County, Ohio
Interval Sampled: 1,342-1,343 ft
GC Character:
n-C7
MCH
ECP
Tol
n-C8
n-C9
n-C10
n-C11
n-C12
n-C13
n-C14
n-C15
n-C16
n-C17
n-C18
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
n-C36
n-C37
n-C38
i-C13
i-C14
i-C15
i-C16
i-C18
Pr
Phy

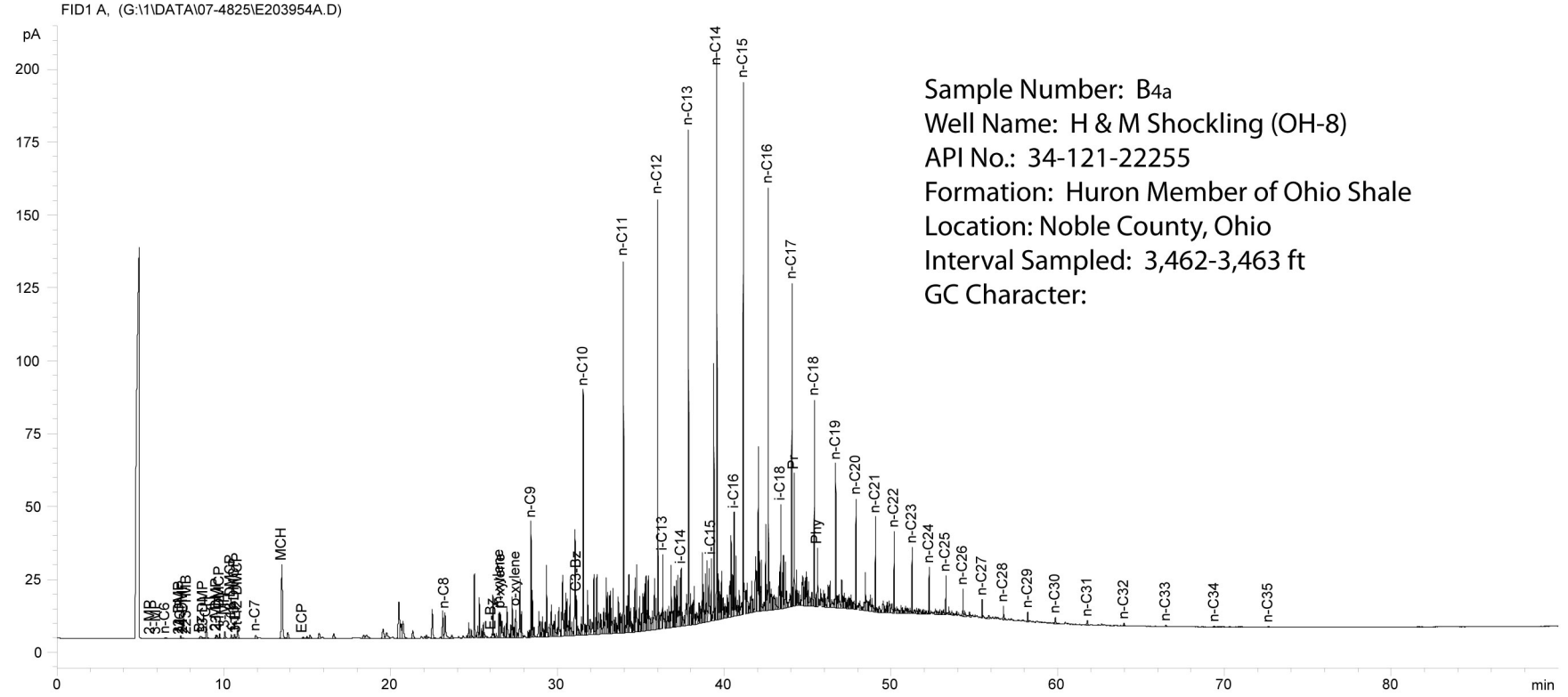
Sample Number: B1
Well Name: Core 2770
API No.: 34-117-60037
Formation: Huron Member of Ohio Shale
Location: Morrow County, Ohio
Interval Sampled: 708-713 ft
GC Character:

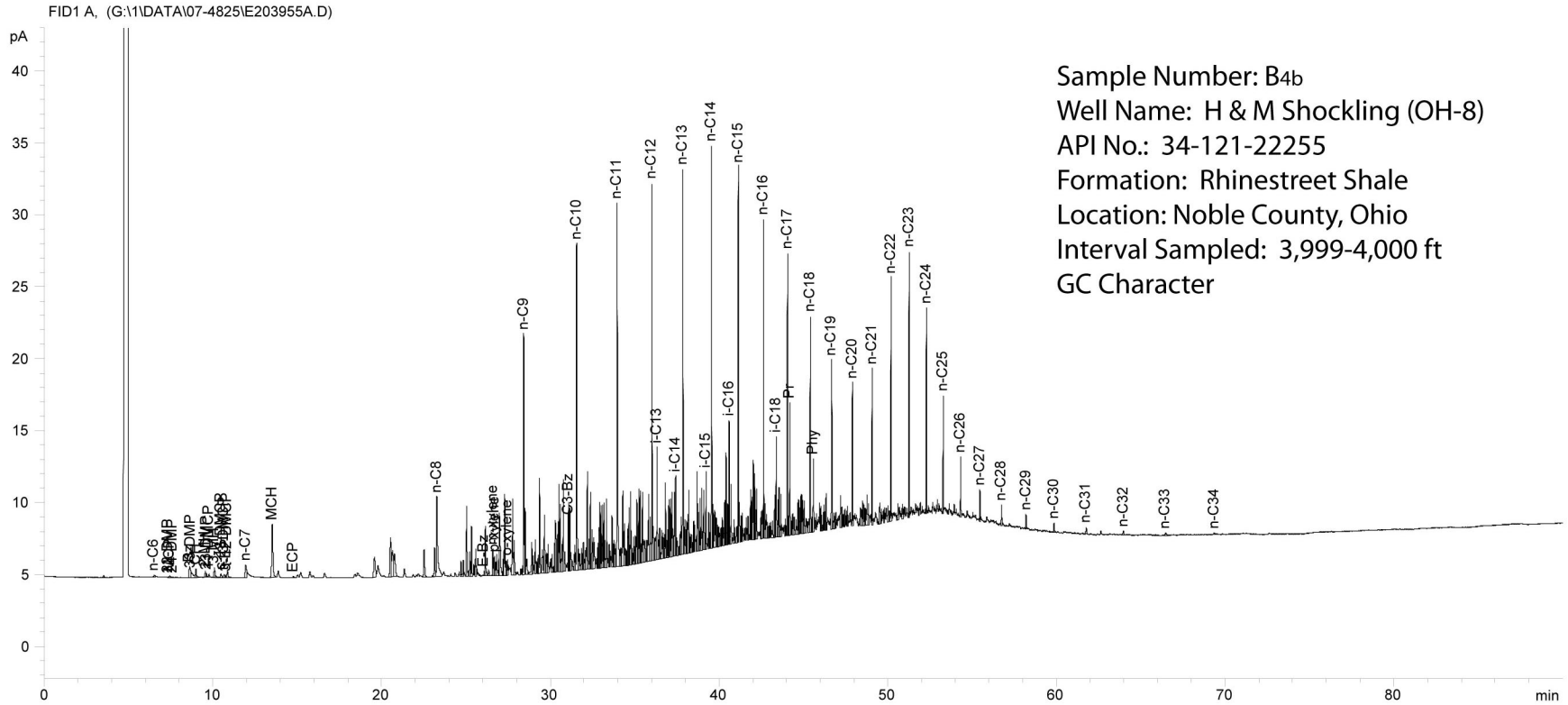


Sample Number: $B2_a$
Well Name: L. Beckholt (OH-3)
API No.: 34-083-22599
Formation: Huron Member of Ohio Shale
Location: Knox County, Ohio
Interval Sampled: 1,100-1,101 ft
GC Character:

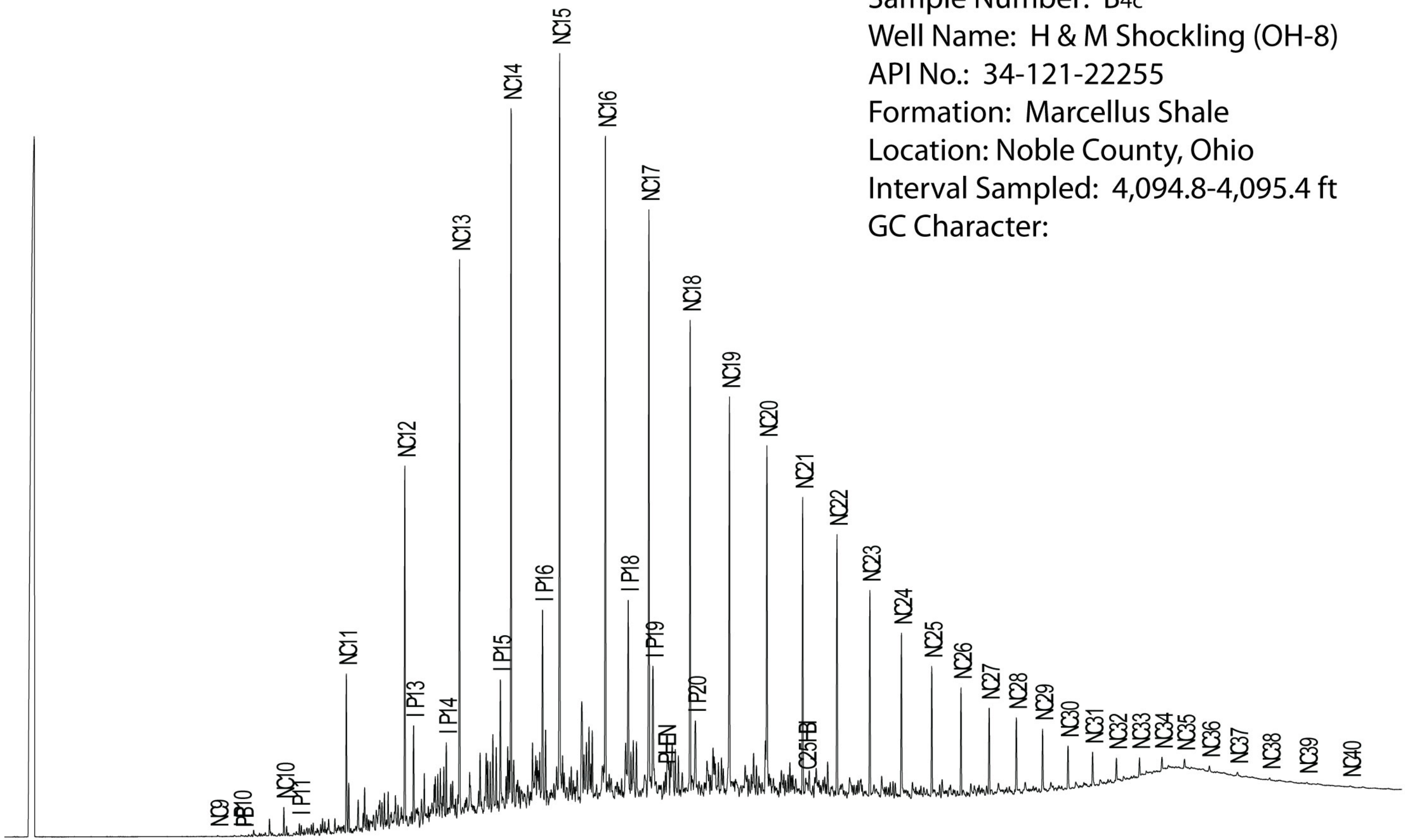


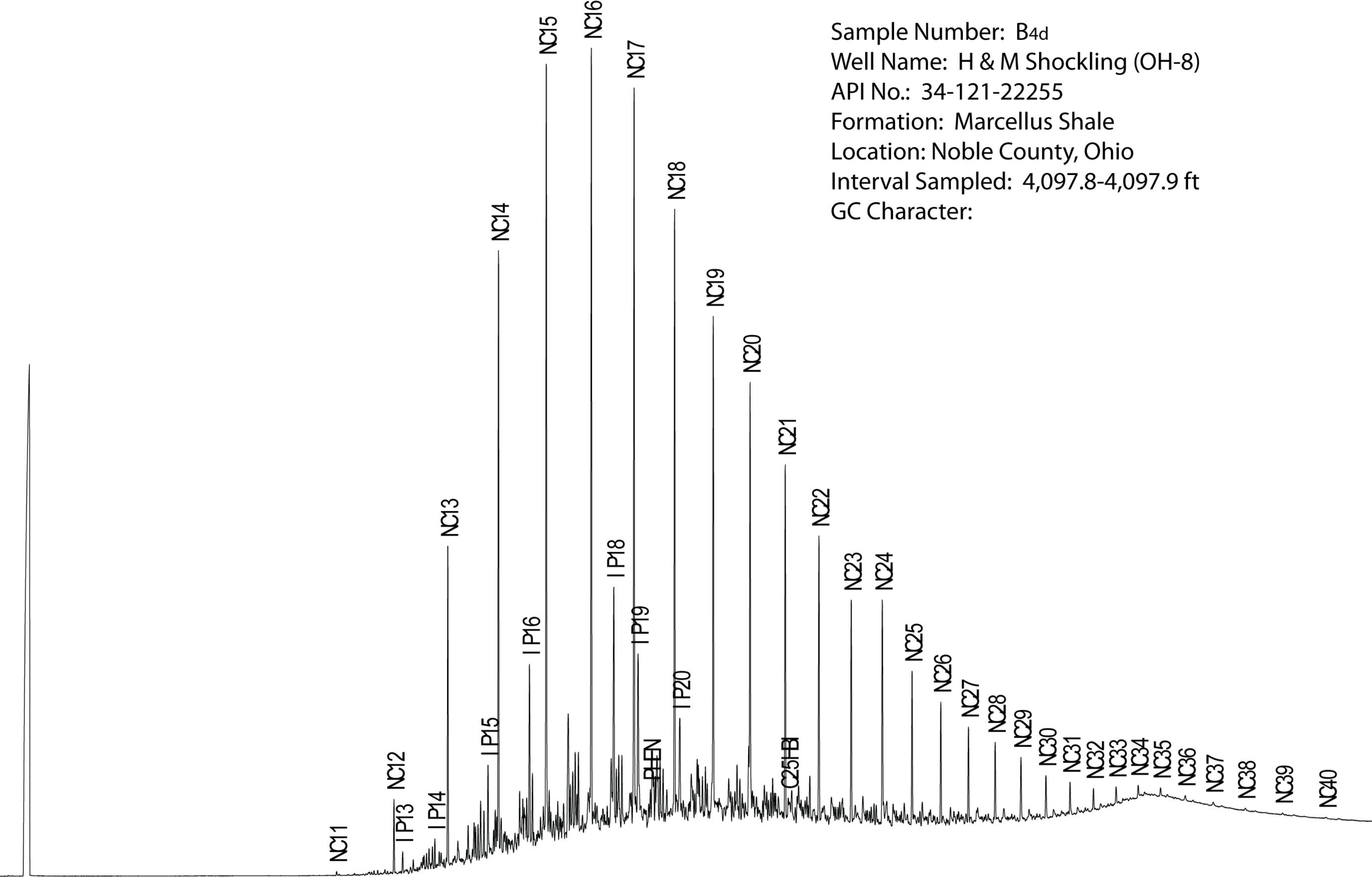

Sample Number: B3
Well Name: W & D Winegardner
API No.: 34-119-21617
Formation: Huron Member of Ohio Shale
Location: Muskingum County, Ohio
Interval Sampled: 2,400-2,532 ft
GC Character:
NC11
NC12
IP13
IP14
NC13
NC14
IP15
IP16
NC15
NC16
NC17
IP18
IP19
PHEN
NC18
IP20
NC19
NC20
NC21
C25HB1
NC22
NC23
NC24
NC25
NC26
NC27
NC28
NC29
NC30
NC31
NC32
NC33
NC34
NC35
NC36


FID1 A, (G:\1\DATA\07-4825\E203954A.D)
pA
200
175
150
125
100
75
50
25
0
0
10
20
30
40
50
60
70
80
min
n-C7
MCH
ECP
n-C8
n-C9
n-C10
n-C11
n-C12
n-C13
i-C13
i-C14
n-C14
i-C15
n-C15
i-C16
n-C16
i-C18
n-C17
Pr
n-C18
Phy
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
Sample Number: B4a
Well Name: H & M Shockling (OH-8)
API No.: 34-121-22255
Formation: Huron Member of Ohio Shale
Location: Noble County, Ohio
Interval Sampled: 3,462-3,463 ft
GC Character:


FID1 A, (G:\1\DATA\07-4825\E203955A.D)
pA
40
35
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
min
n-C6
MCH
ECP
n-C7
n-C8
n-C9
C3-Bz
n-C10
n-C11
n-C12
i-C13
n-C13
i-C14
n-C14
i-C15
n-C15
i-C16
n-C16
i-C18
Pr
n-C17
Phy
n-C18
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
Sample Number: B4b
Well Name: H & M Shockling (OH-8)
API No.: 34-121-22255
Formation: Rhinestreet Shale
Location: Noble County, Ohio
Interval Sampled: 3,999-4,000 ft
GC Character

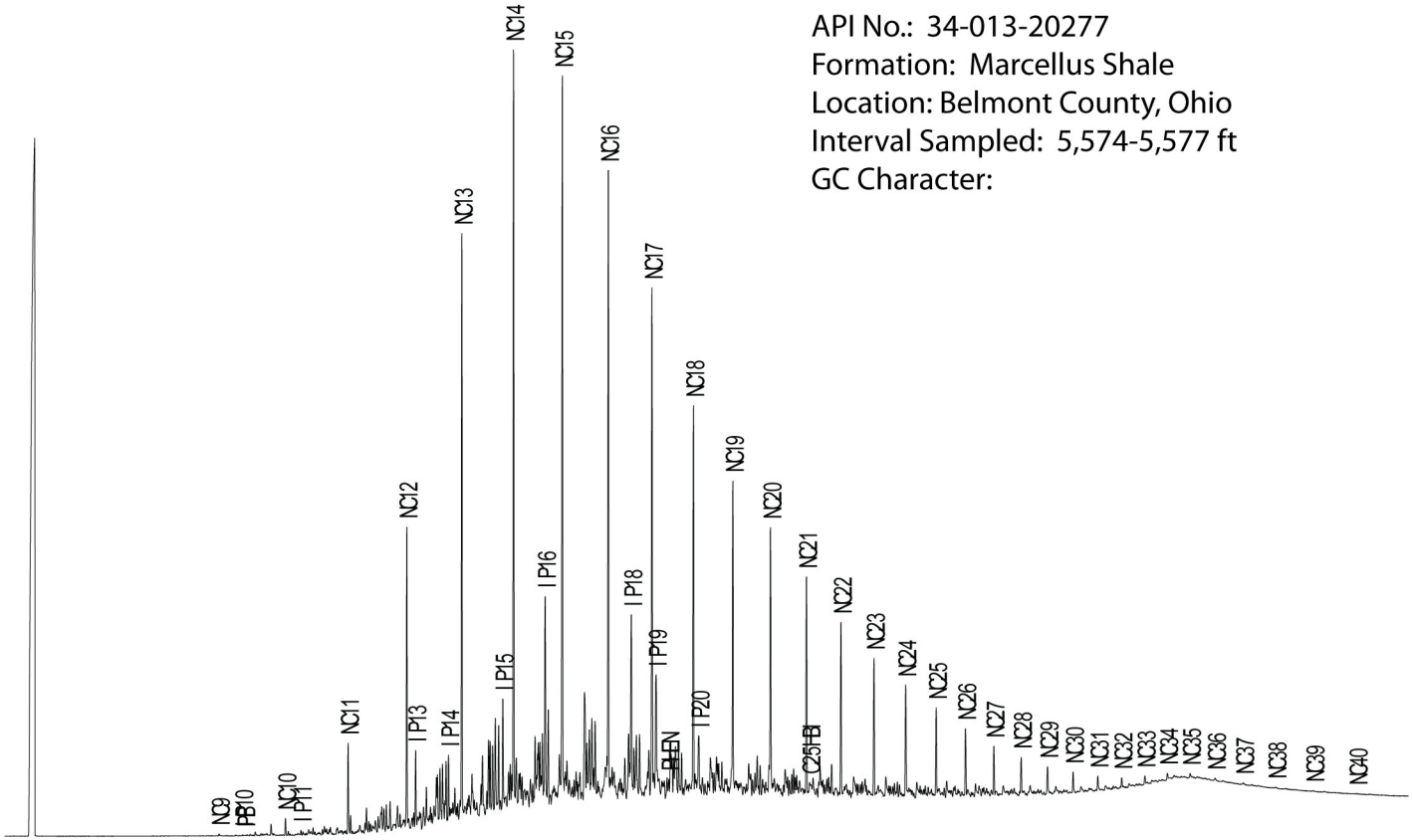
Sample Number: B4c
Well Name: H & M Shockling (OH-8)
API No.: 34-121-22255
Formation: Marcellus Shale
Location: Noble County, Ohio
Interval Sampled: 4,094.8-4,095.4 ft
GC Character:

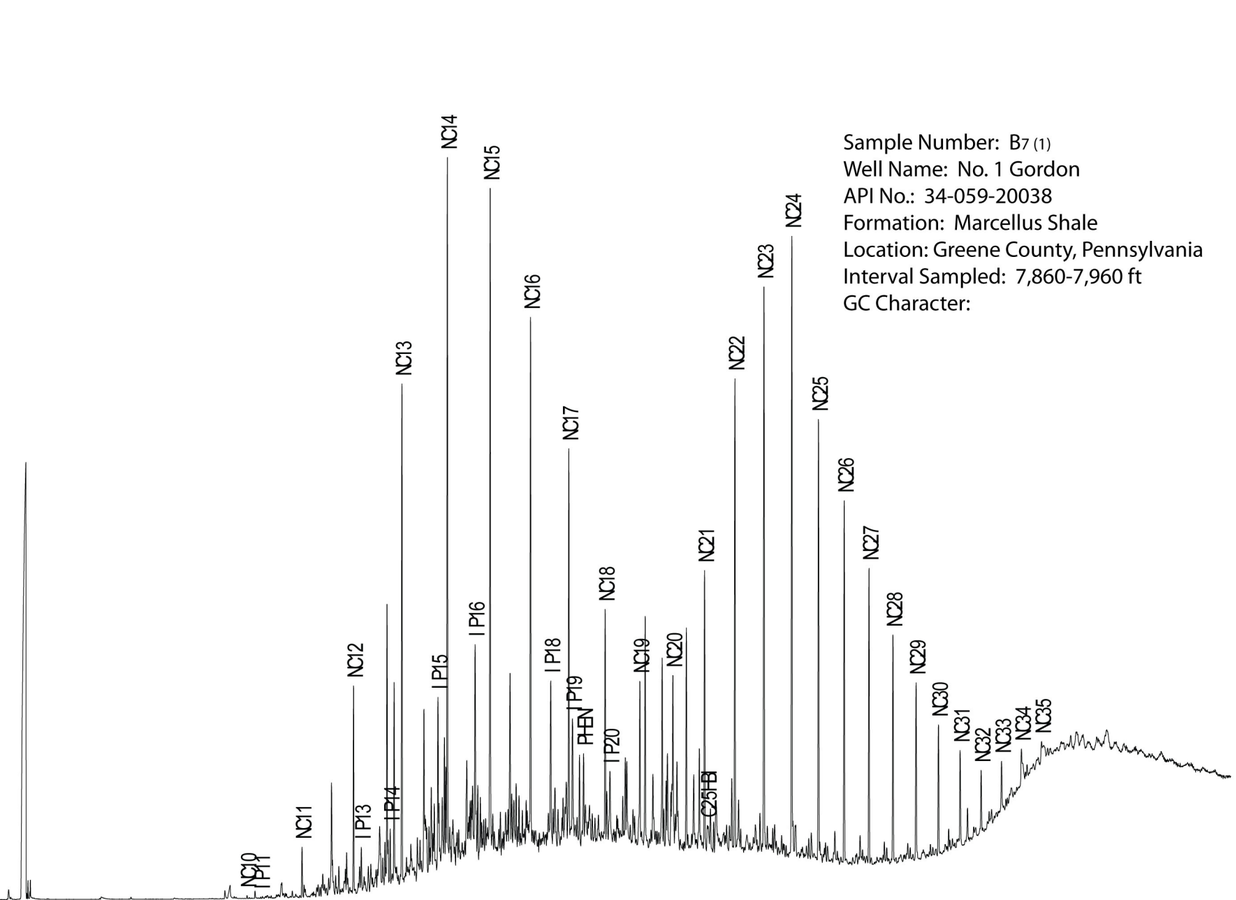


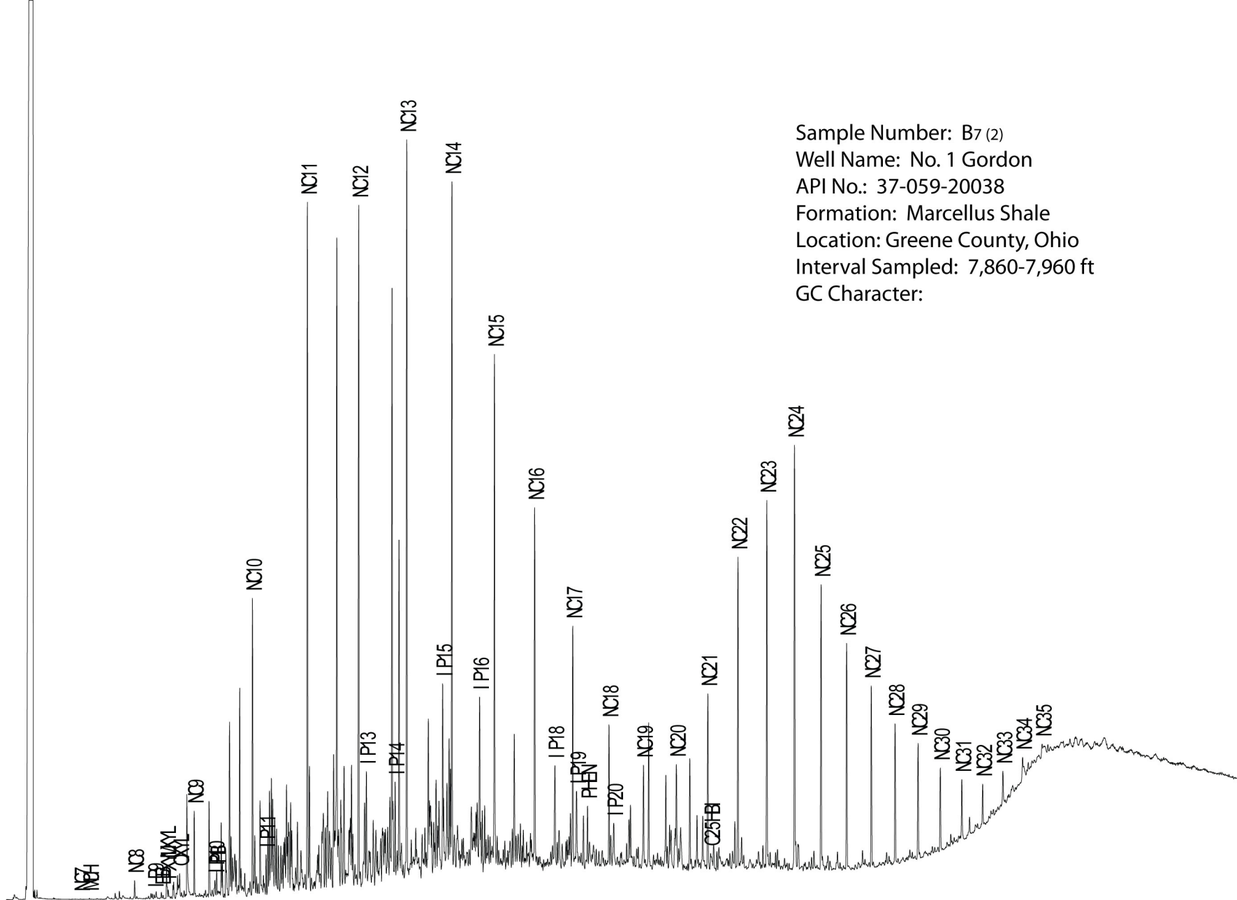


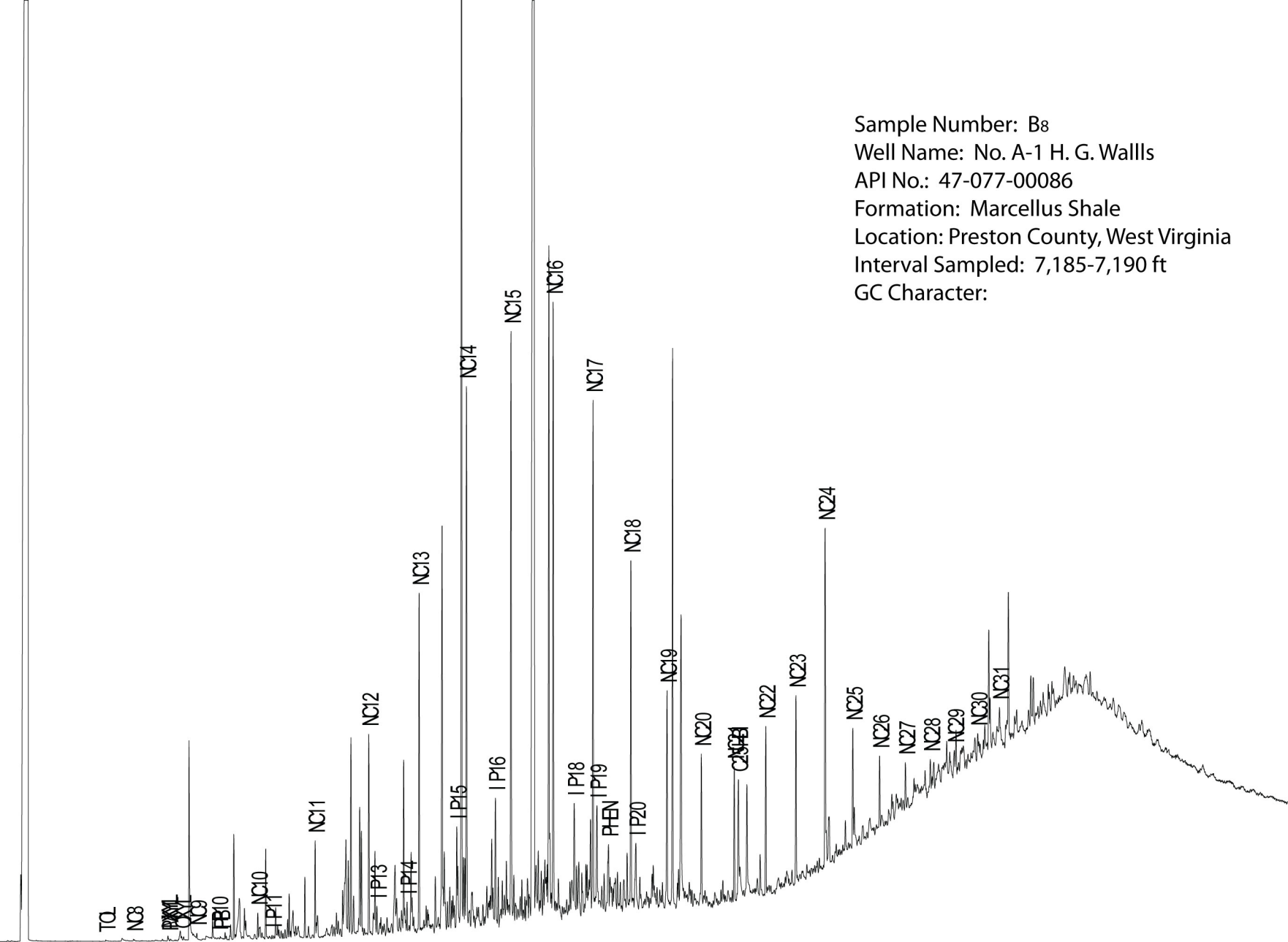
Sample Number: B4d
Well Name: H & M Shockling (OH-8)
API No.: 34-121-22255
Formation: Marcellus Shale
Location: Noble County, Ohio
Interval Sampled: 4,097.8-4,097.9 ft
GC Character:
NC11
NC12
I P13
I P14
NC13
I P15
NC14
I P16
NC15
NC16
I P18
NC17
I P19
PHEN
NC18
I P20
NC19
NC20
C25HBI
NC21
NC22
NC23
NC24
NC25
NC26
NC27
NC28
NC29
NC30
NC31
NC32
NC33
NC34
NC35
NC36
NC37
NC38
NC39
NC40

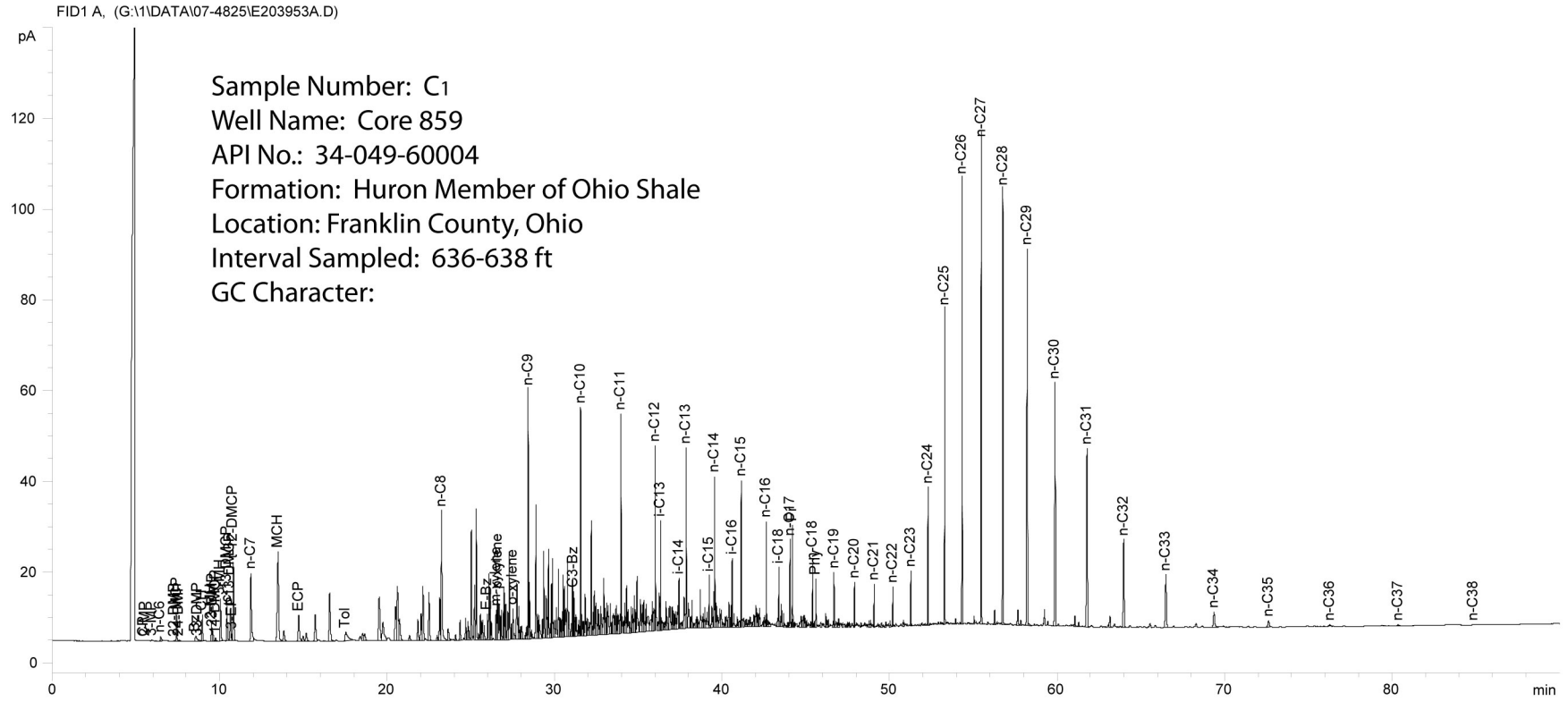
Sample Number: B5
Well Name: R. L. Brown
API No.: 34-013-20277
Formation: Marcellus Shale
Location: Belmont County, Ohio
Interval Sampled: 5,574-5,577 ft
GC Character:



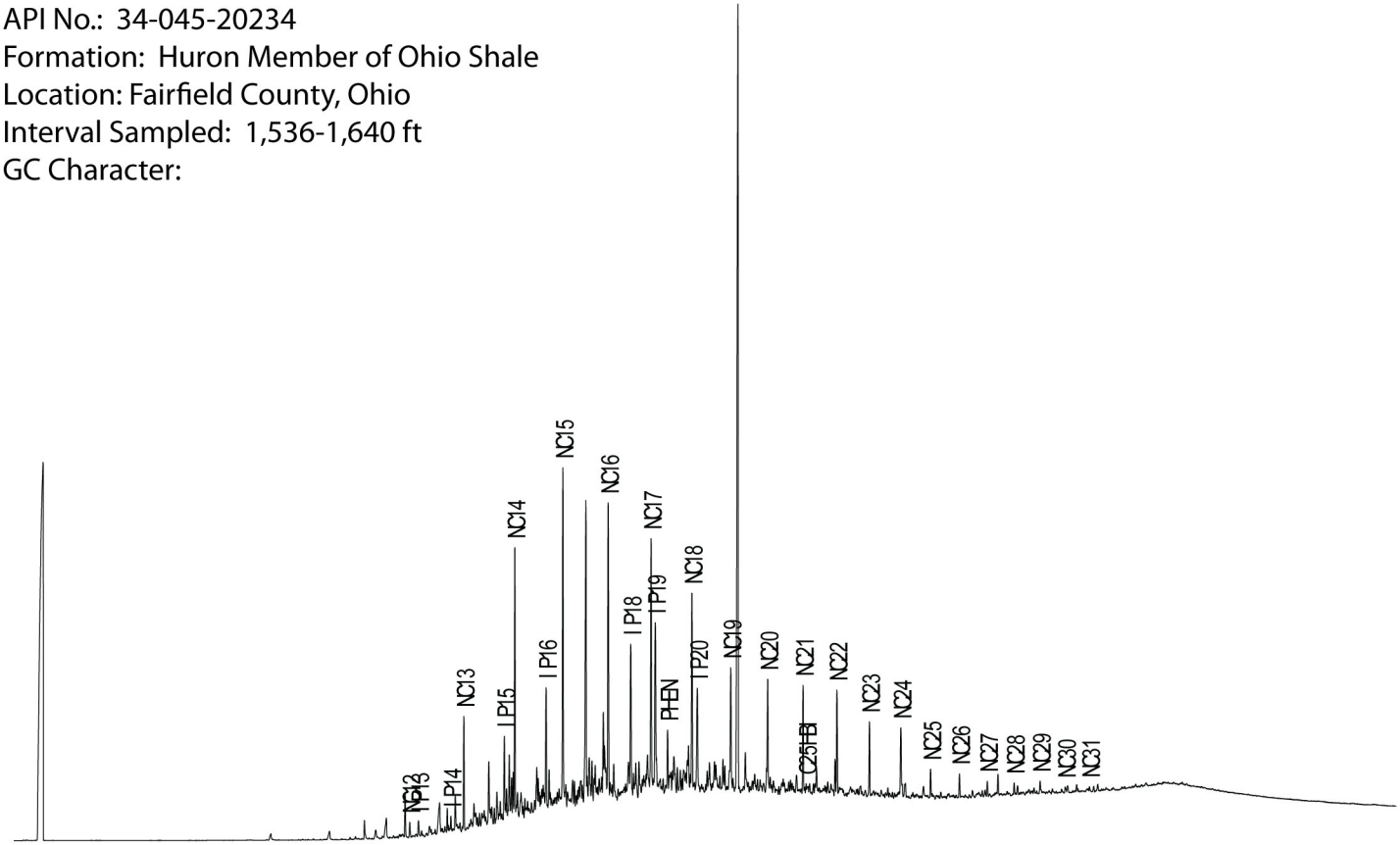

Sample Number: B7 (1)
Well Name: No. 1 Gordon
API No.: 34-059-20038
Formation: Marcellus Shale
Location: Greene County, Pennsylvania
Interval Sampled: 7,860-7,960 ft
GC Character:
NC10
NC11
NC12
NC13
NC14
NC15
NC16
NC17
NC18
NC19
NC20
NC21
NC22
NC23
NC24
NC25
NC26
NC27
NC28
NC29
NC30
NC31
NC32
NC33
NC34
NC35
I P13
I P14
I P15
I P16
I P18
I P19
I P20
PHEN
C25HB


Sample Number: B7 (2)
Well Name: No. 1 Gordon
API No.: 37-059-20038
Formation: Marcellus Shale
Location: Greene County, Ohio
Interval Sampled: 7,860-7,960 ft
GC Character:
NC8
NC9
NC10
NC11
NC12
NC13
NC14
NC15
NC16
NC17
NC18
NC19
NC20
NC21
NC22
NC23
NC24
NC25
NC26
NC27
NC28
NC29
NC30
NC31
NC32
NC33
NC34
NC35
I P13
I P14
I P15
I P16
I P18
I P19
I P20
PHEN
C25HB

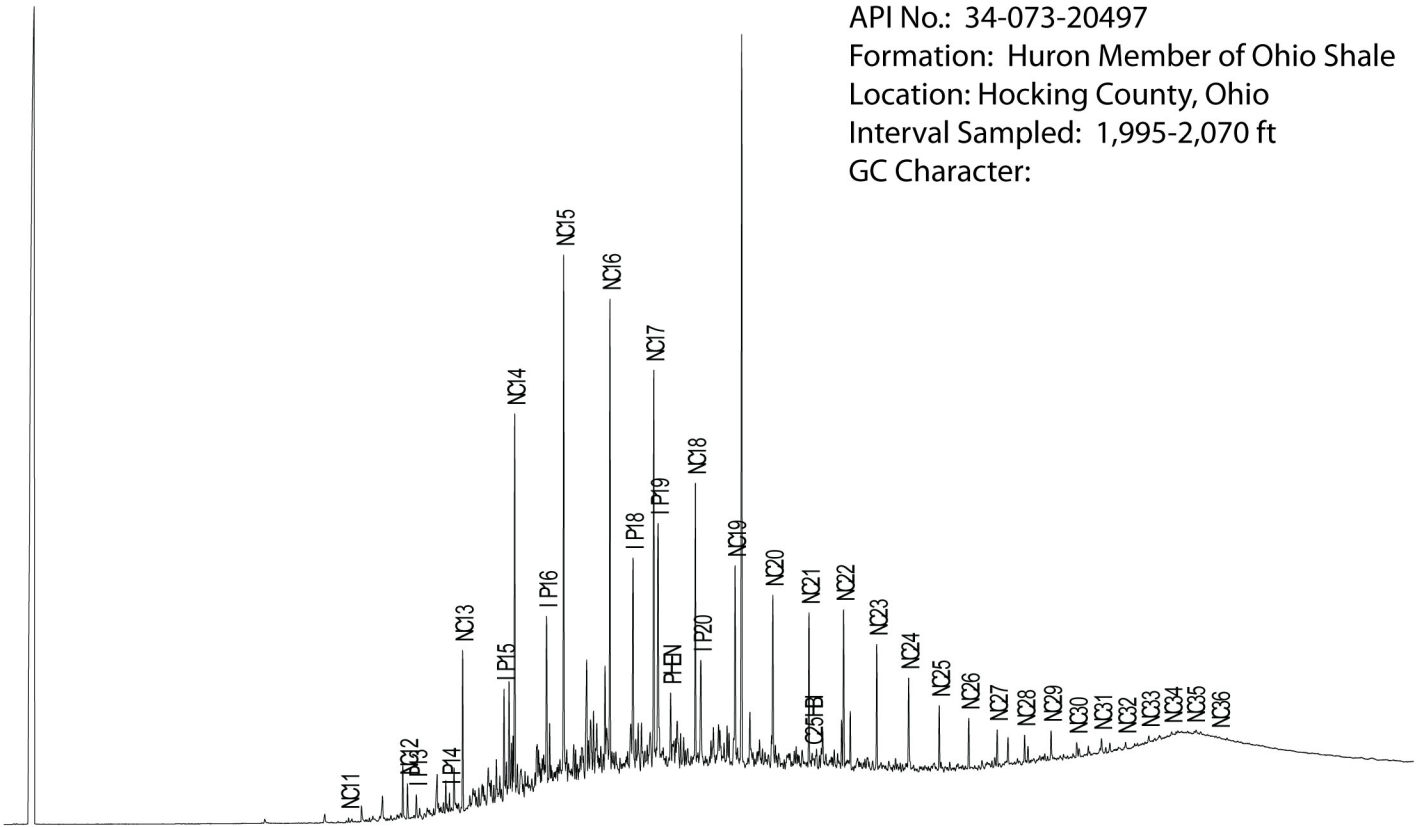

Sample Number: B8
Well Name: No. A-1 H. G. Wallls
API No.: 47-077-00086
Formation: Marcellus Shale
Location: Preston County, West Virginia
Interval Sampled: 7,185-7,190 ft
GC Character:
TOL
NC8
NC9
NC10
NC11
NC12
NC13
NC14
NC15
NC16
NC17
NC18
NC19
NC20
NC22
NC23
NC24
NC25
NC26
NC27
NC28
NC29
NC30
NC31
IP11
IP13
IP14
IP15
IP16
IP18
IP19
PHEN
IP20


FID1 A, (G:\1\DATA\07-4825\E203953A.D)
pA
Sample Number: C1
Well Name: Core 859
API No.: 34-049-60004
Formation: Huron Member of Ohio Shale
Location: Franklin County, Ohio
Interval Sampled: 636-638 ft
GC Character:
n-C7
MCH
ECP
Tol
n-C8
n-C9
n-C10
n-C11
n-C12
n-C13
i-C13
i-C14
i-C15
n-C14
n-C15
i-C16
n-C16
i-C18
n-C17
Phy
n-C18
n-C19
n-C20
n-C21
n-C22
n-C23
n-C24
n-C25
n-C26
n-C27
n-C28
n-C29
n-C30
n-C31
n-C32
n-C33
n-C34
n-C35
n-C36
n-C37
n-C38
min

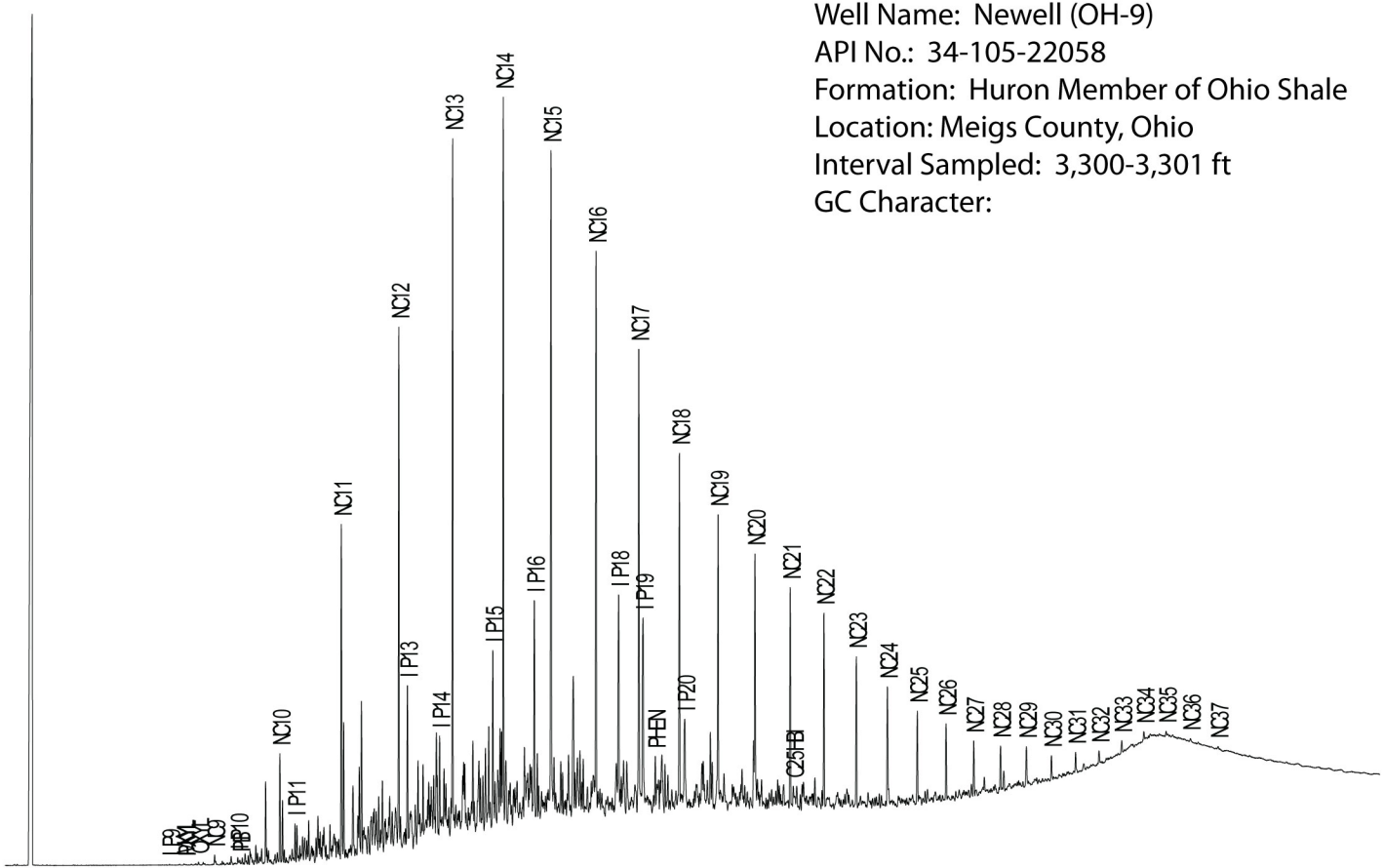
Sample Number: C_2
Well Name: D. Merckle
API No.: 34-045-20234
Formation: Huron Member of Ohio Shale
Location: Fairfield County, Ohio
Interval Sampled: 1,536-1,640 ft
GC Character:



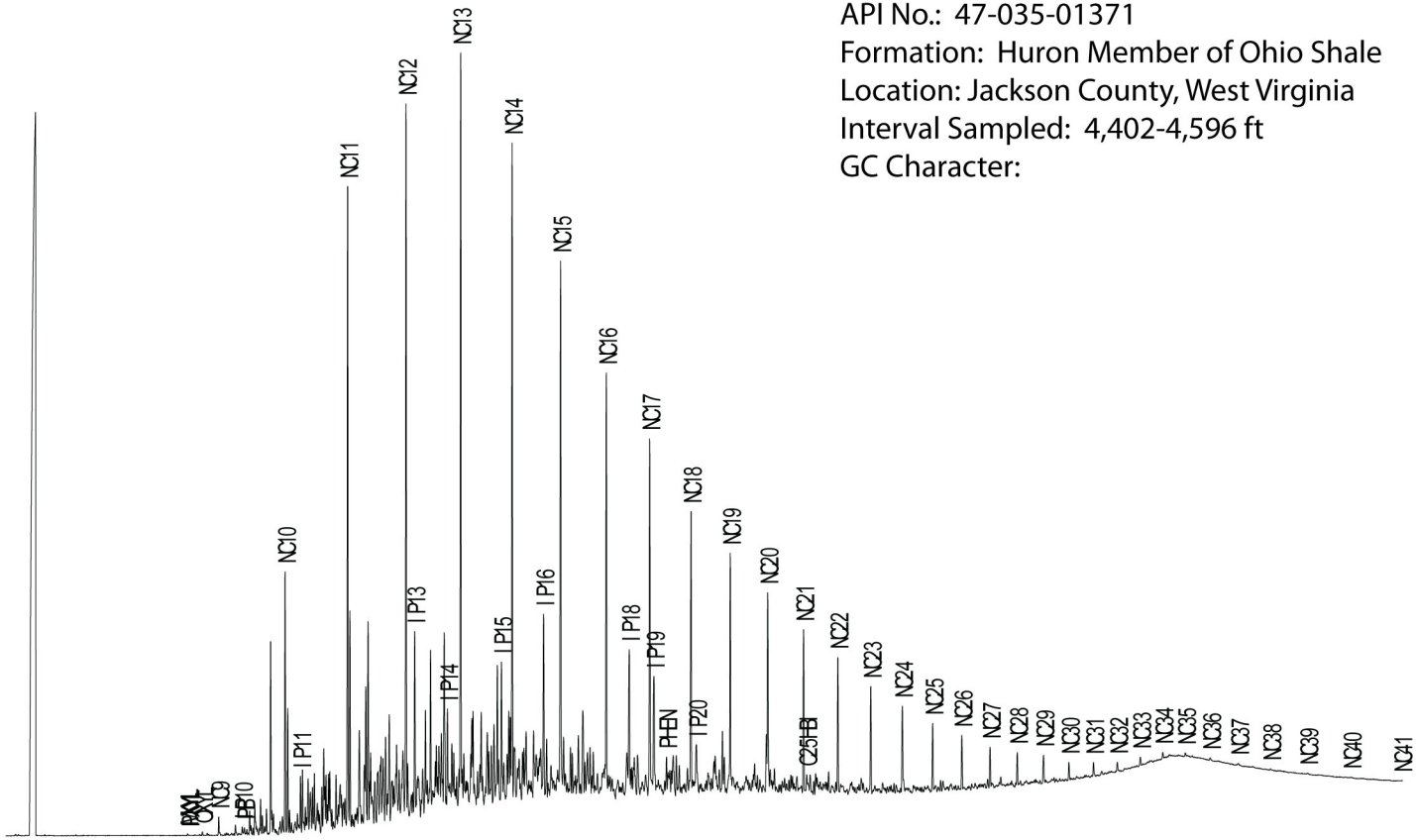
Sample Number: C3
Well Name: Kappel
API No.: 34-073-20497
Formation: Huron Member of Ohio Shale
Location: Hocking County, Ohio
Interval Sampled: 1,995-2,070 ft
GC Character:



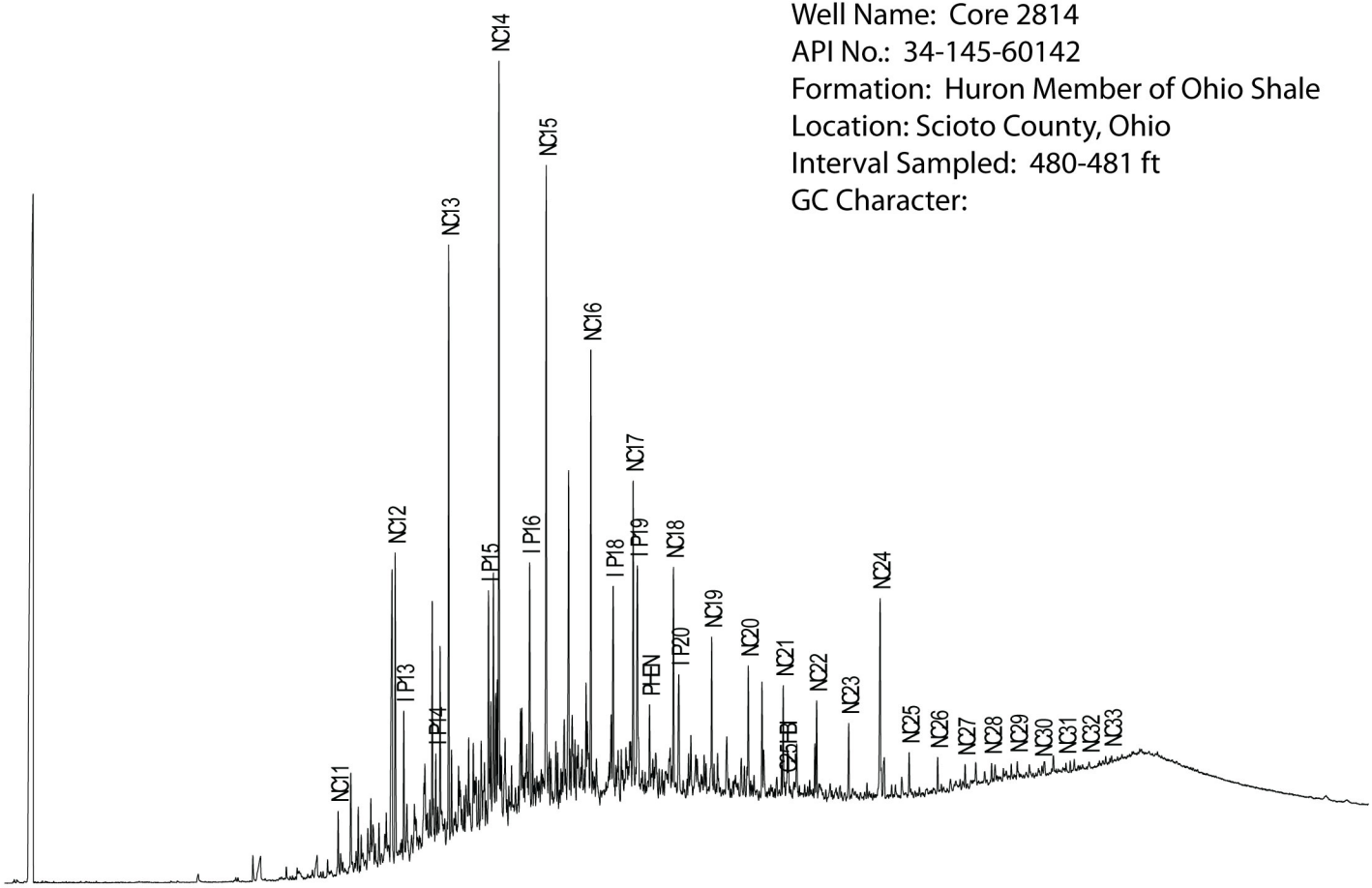
Sample Number: C4
Well Name: Newell (OH-9)
API No.: 34-105-22058
Formation: Huron Member of Ohio Shale
Location: Meigs County, Ohio
Interval Sampled: 3,300-3,301 ft
GC Character:



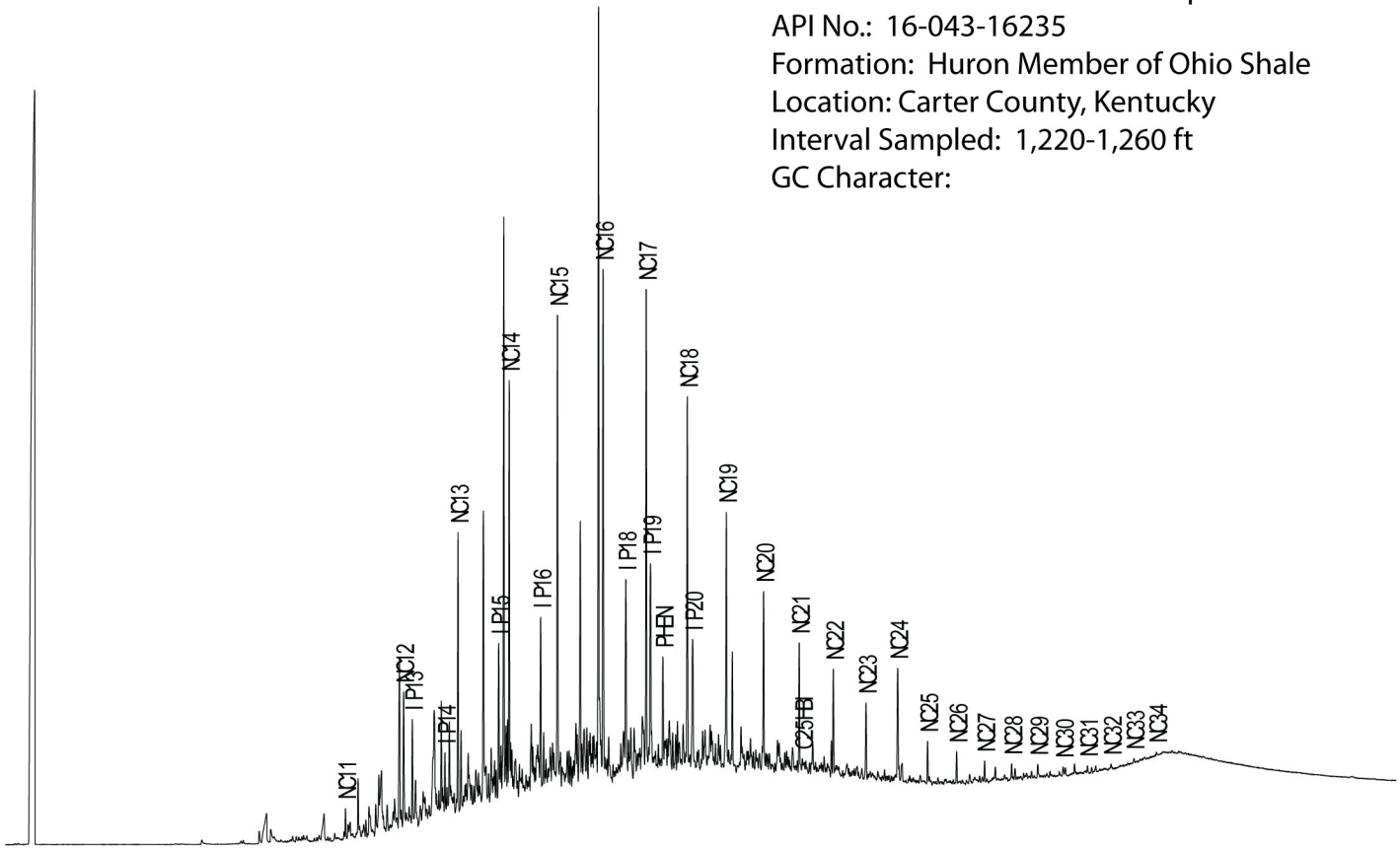
Sample Number: C5
Well Name: No. 12041 W. L. Pinnell (WV-2)
API No.: 47-035-01371
Formation: Huron Member of Ohio Shale
Location: Jackson County, West Virginia
Interval Sampled: 4,402-4,596 ft
GC Character:



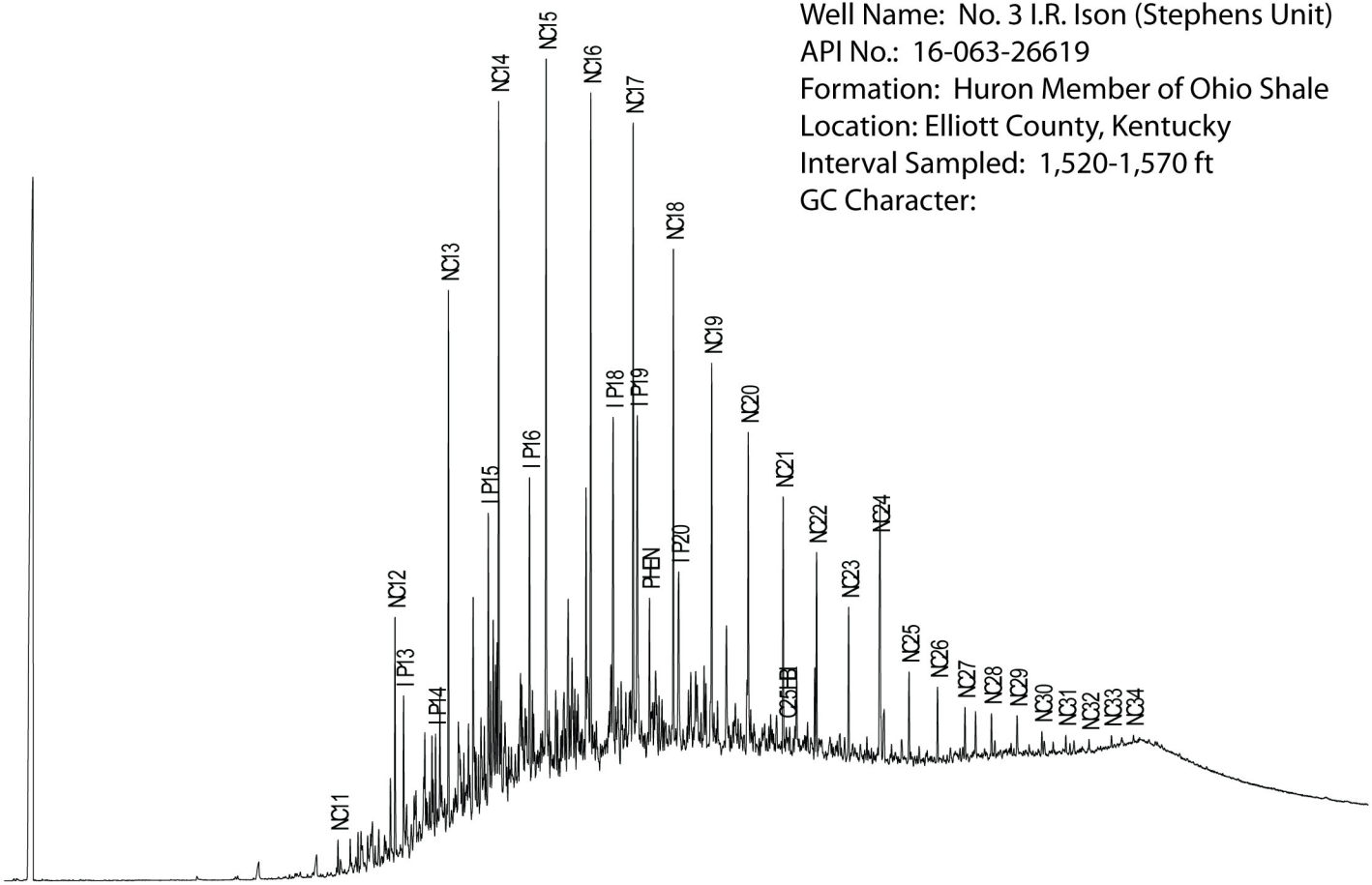
Sample Number: D_1
Well Name: Core 2814
API No.: 34-145-60142
Formation: Huron Member of Ohio Shale
Location: Scioto County, Ohio
Interval Sampled: 480-481 ft
GC Character:

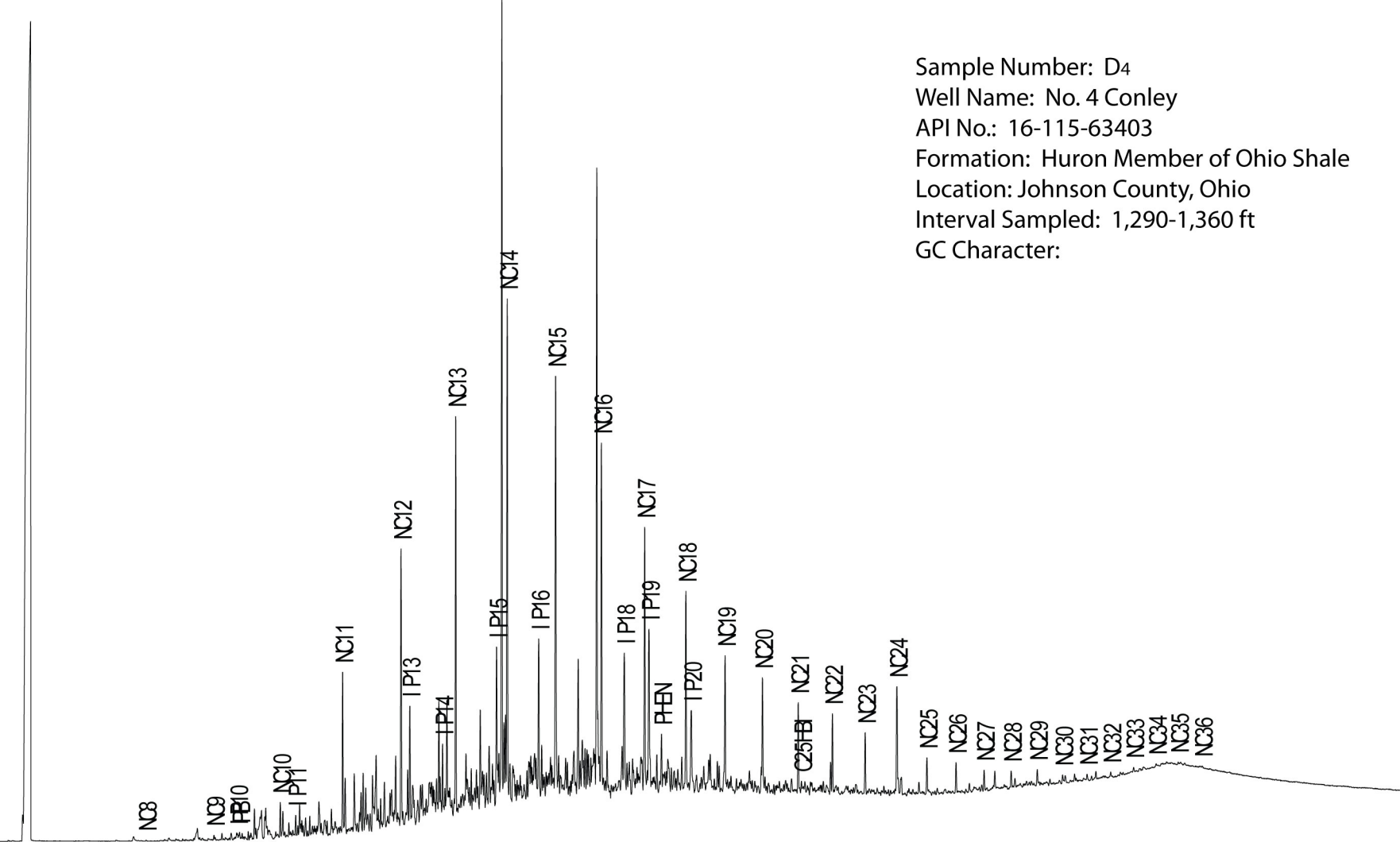


Sample Number: D_2
Well Name: No. 11-1 Warnie Stapleton
API No.: 16-043-16235
Formation: Huron Member of Ohio Shale
Location: Carter County, Kentucky
Interval Sampled: 1,220-1,260 ft
GC Character:

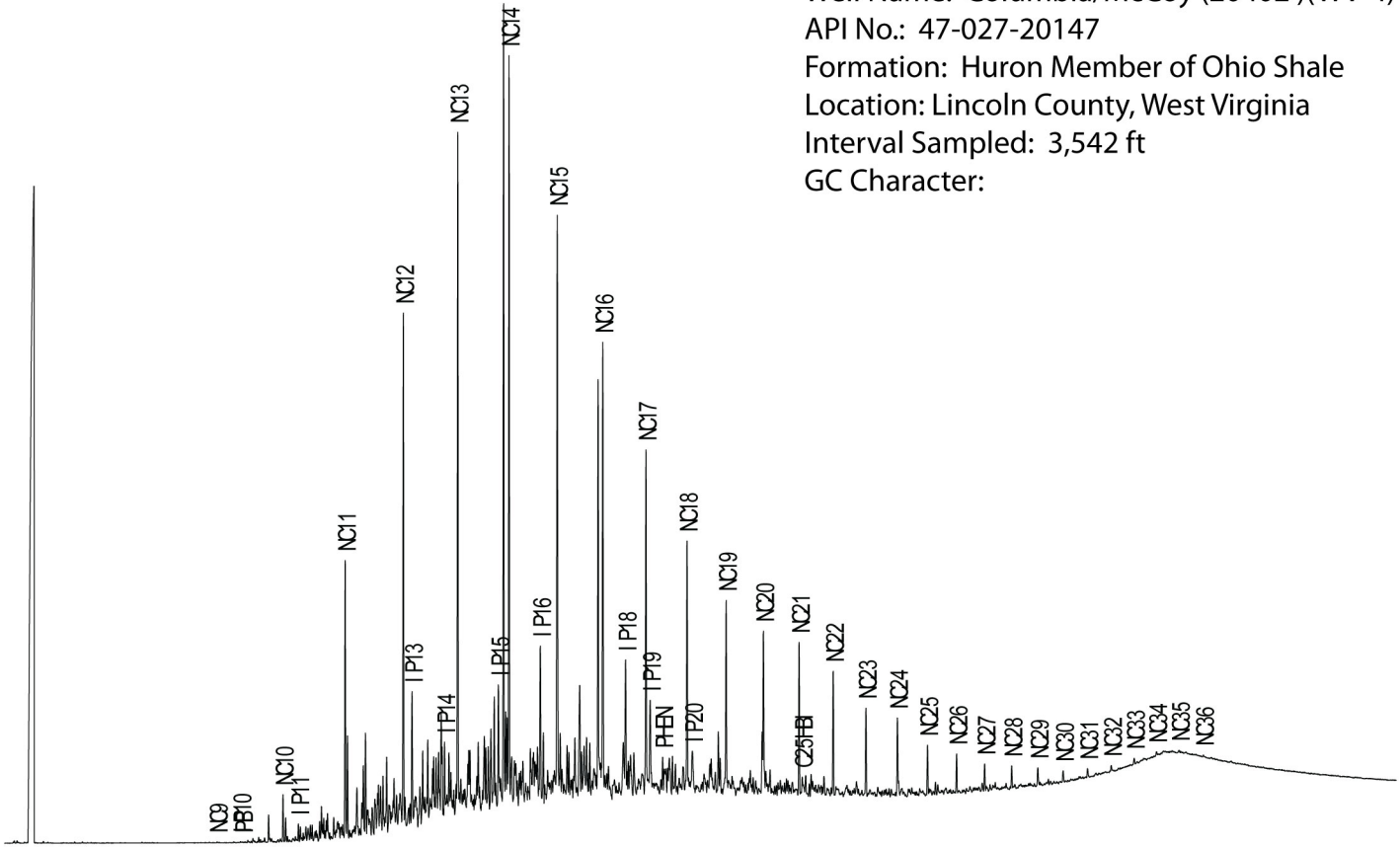


Sample Number: D3
Well Name: No. 3 I.R. Ison (Stephens Unit)
API No.: 16-063-26619
Formation: Huron Member of Ohio Shale
Location: Elliott County, Kentucky
Interval Sampled: 1,520-1,570 ft
GC Character:

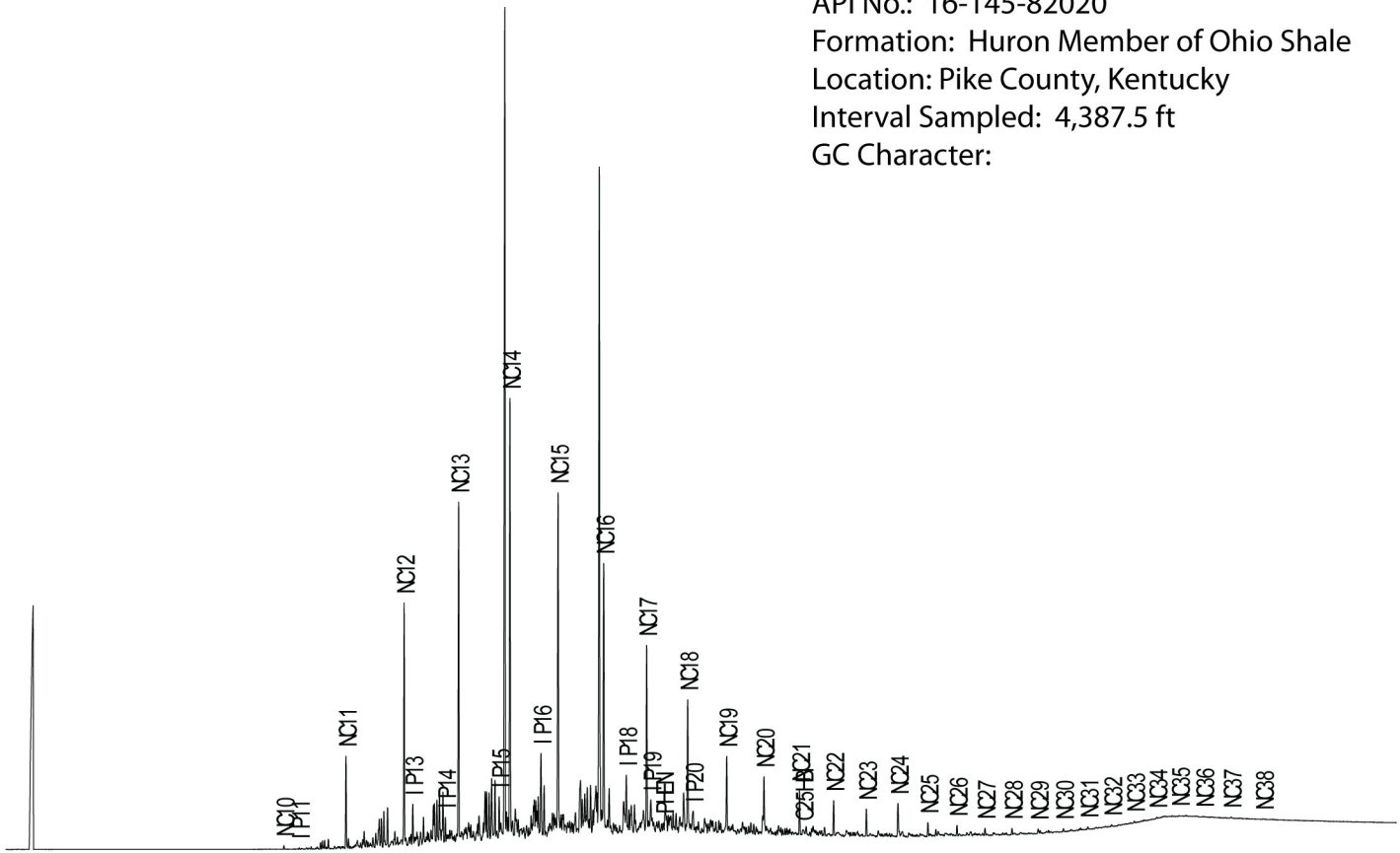


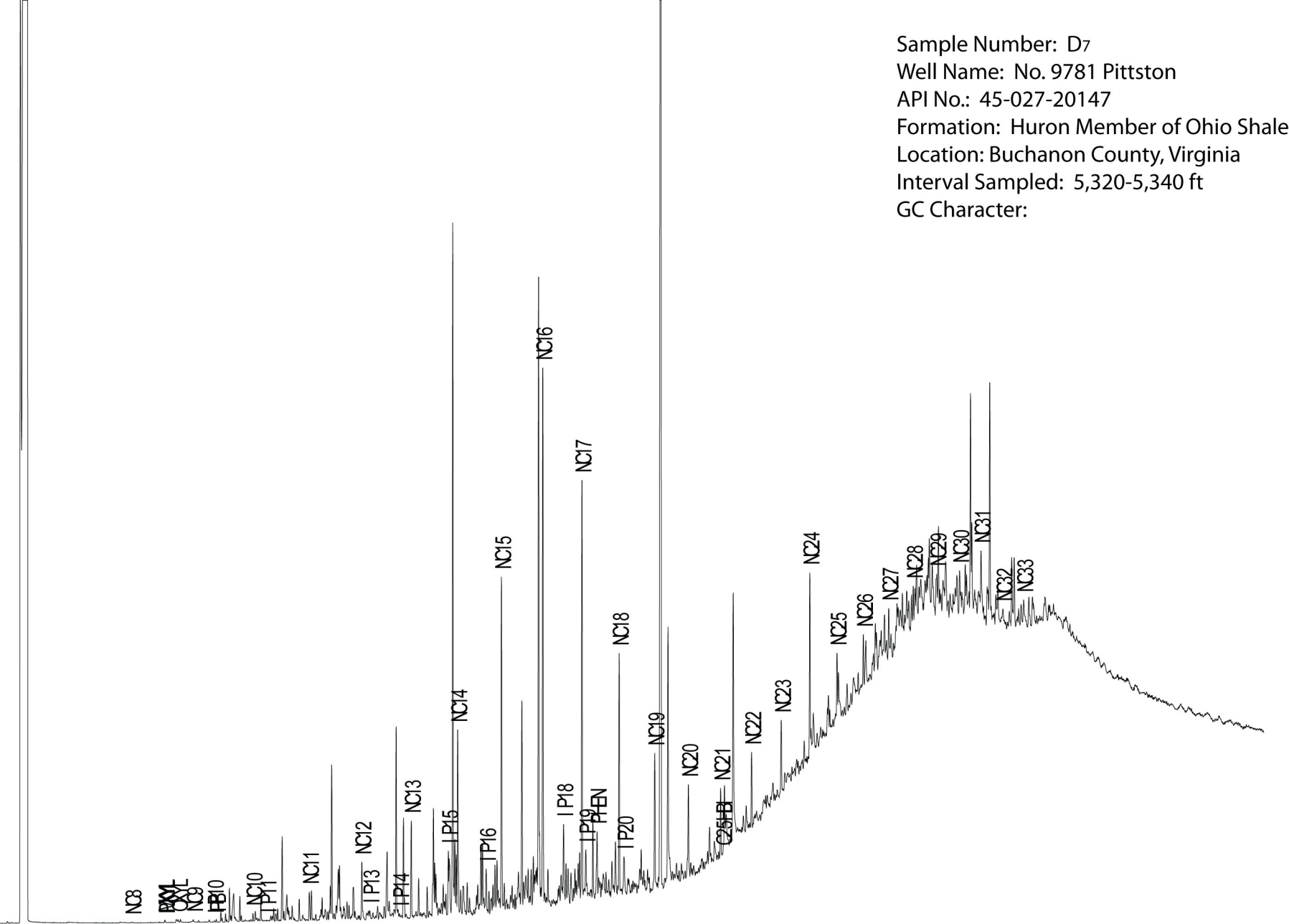

Sample Number: D4
Well Name: No. 4 Conley
API No.: 16-115-63403
Formation: Huron Member of Ohio Shale
Location: Johnson County, Ohio
Interval Sampled: 1,290-1,360 ft
GC Character:
NC8
NC9
NC10
NC11
NC12
NC13
NC14
NC15
NC16
NC17
NC18
NC19
NC20
NC21
NC22
NC23
NC24
NC25
NC26
NC27
NC28
NC29
NC30
NC31
NC32
NC33
NC34
NC35
NC36
IP13
IP14
IP15
IP16
IP18
IP19
IP20
PHEN

Sample Number: D5
Well Name: Columbia/McCoy (20402)(WV-4)
API No.: 47-027-20147
Formation: Huron Member of Ohio Shale
Location: Lincoln County, West Virginia
Interval Sampled: 3,542 ft
GC Character:



Sample Number: D6
Well Name: No. 69 Ford Motor Company
API No.: 16-145-82020
Formation: Huron Member of Ohio Shale
Location: Pike County, Kentucky
Interval Sampled: 4,387.5 ft
GC Character:

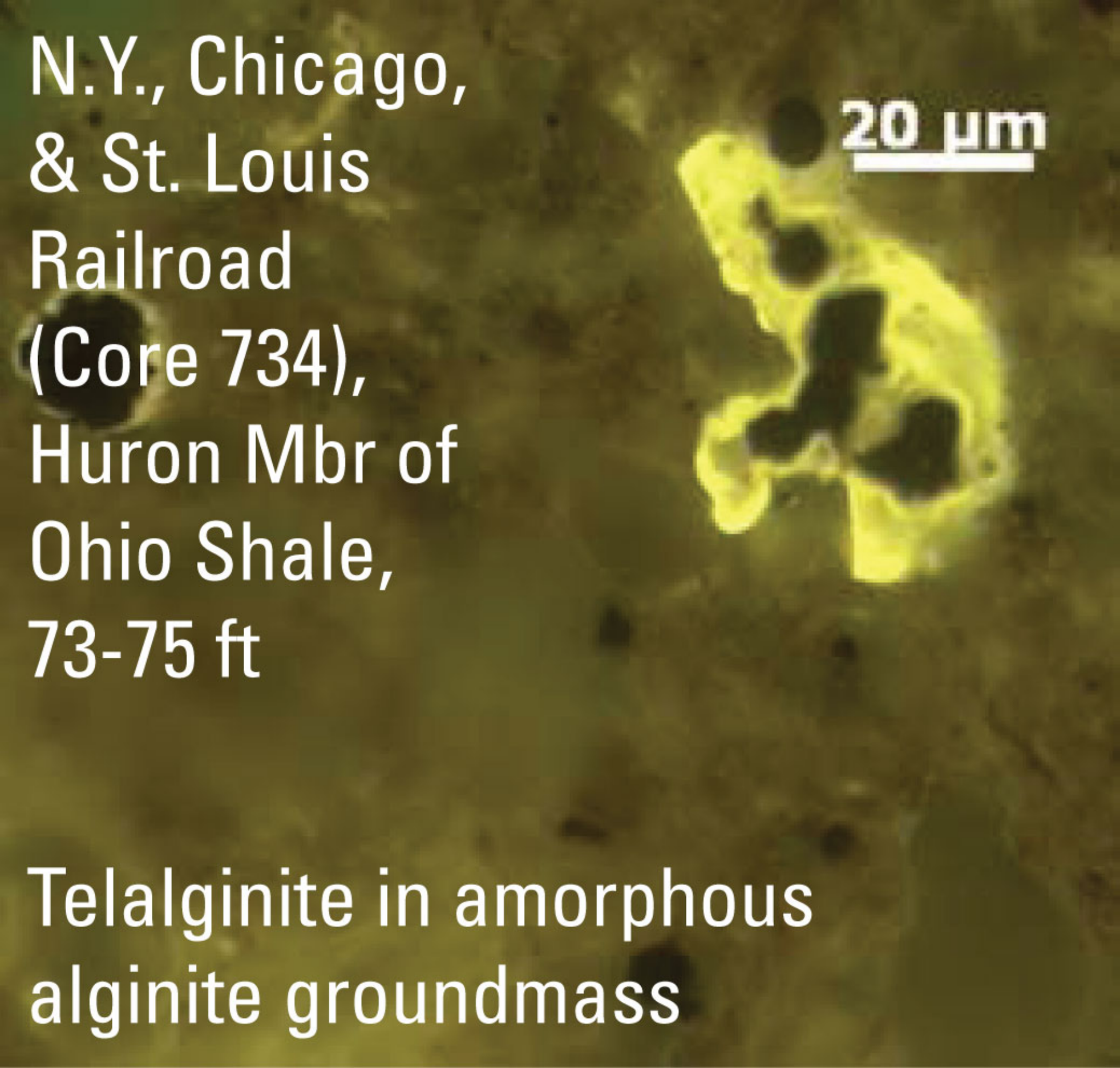



Sample Number: D7
Well Name: No. 9781 Pittston
API No.: 45-027-20147
Formation: Huron Member of Ohio Shale
Location: Buchanon County, Virginia
Interval Sampled: 5,320-5,340 ft
GC Character:
NC8
NC10
NC11
NC12
NC13
NC14
NC15
NC16
NC17
NC18
NC19
NC20
NC21
NC22
NC23
NC24
NC25
NC26
NC27
NC28
NC29
NC30
NC31
NC32
NC33
IP15
IP16
IP18
IP19
IP20

Click to view Part 1

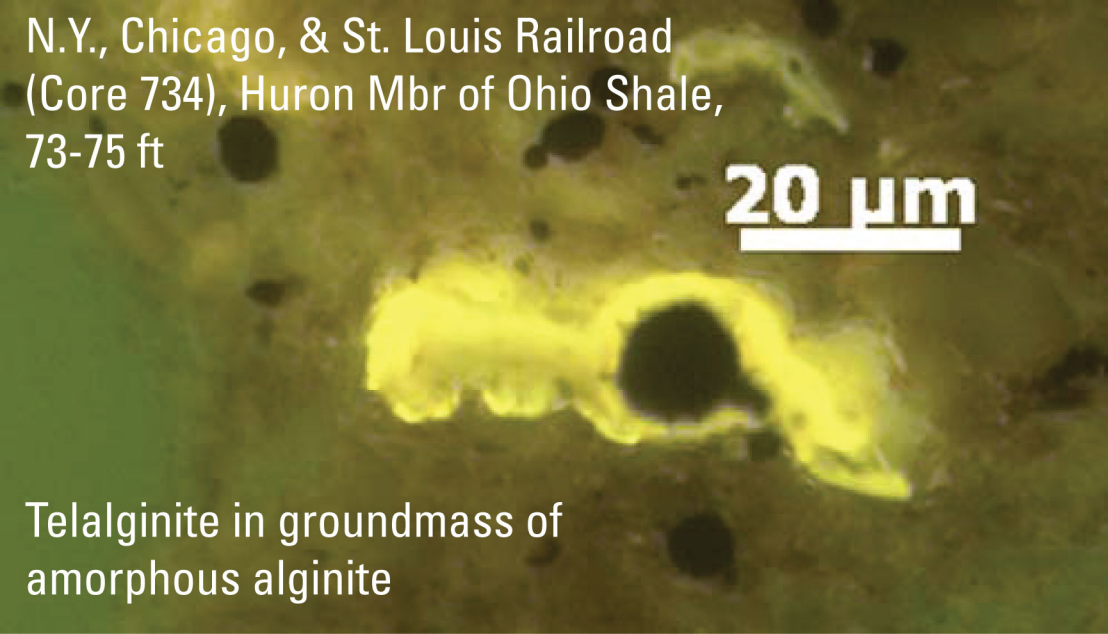
Appendix 6. Maceral Photomicrographs

Photomicrographs of samples from the following wells and cores are presented on pages 72 to 178:
Beckholt, Bessemer, Brown, Columbia, Conley, Core510, Core855, Core859, Core2770, Core2814, Ench&Pyles, Ford, Gordon, Ison, Kappel, McGuire, Meleski, Merckle, Newell, NYCentral, NYChicagoStLouis, Pinell, Pittston, Shockling, Stapleton, Walls, Winegardner

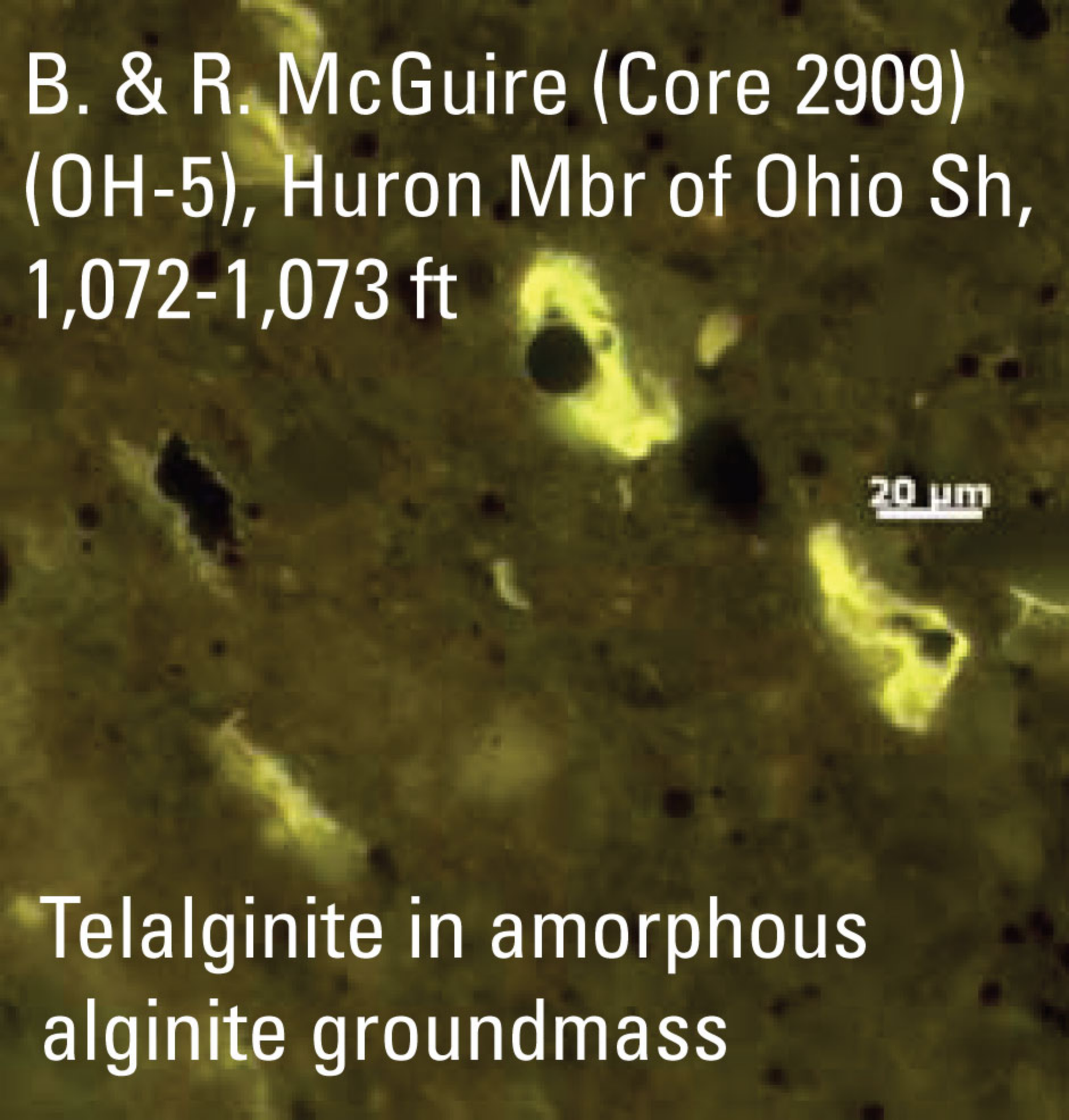


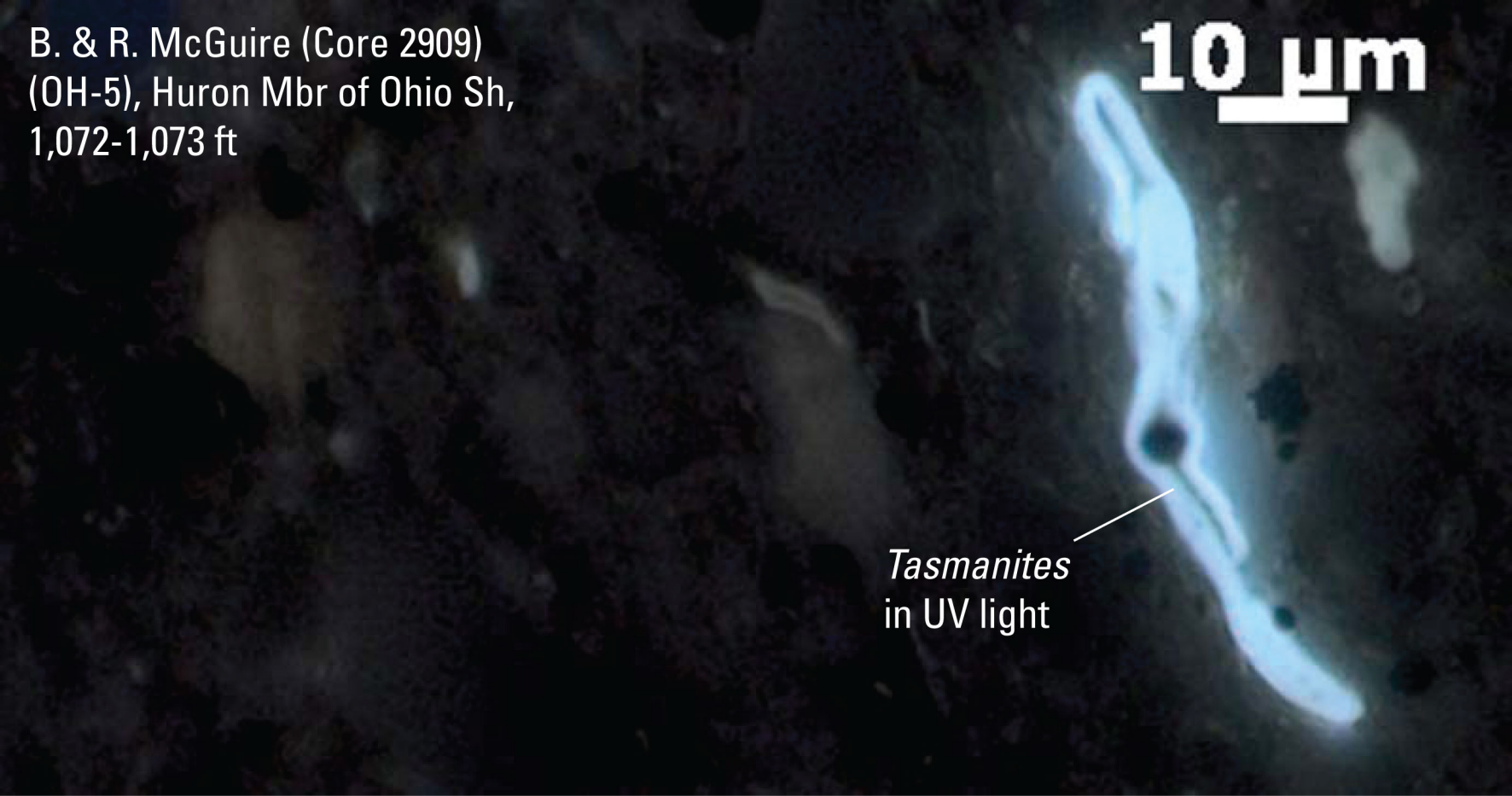
N.Y., Chicago, & St. Louis Railroad (Core 734), Huron Mbr of Ohio Shale, 73-75 ft

Telalginite in amorphous alginite groundmass


N.Y., Chicago, & St. Louis Railroad
(Core 734), Huron Mbr of Ohio Shale,
73-75 ft
20 µm
Telalginite in groundmass of
amorphous alginite

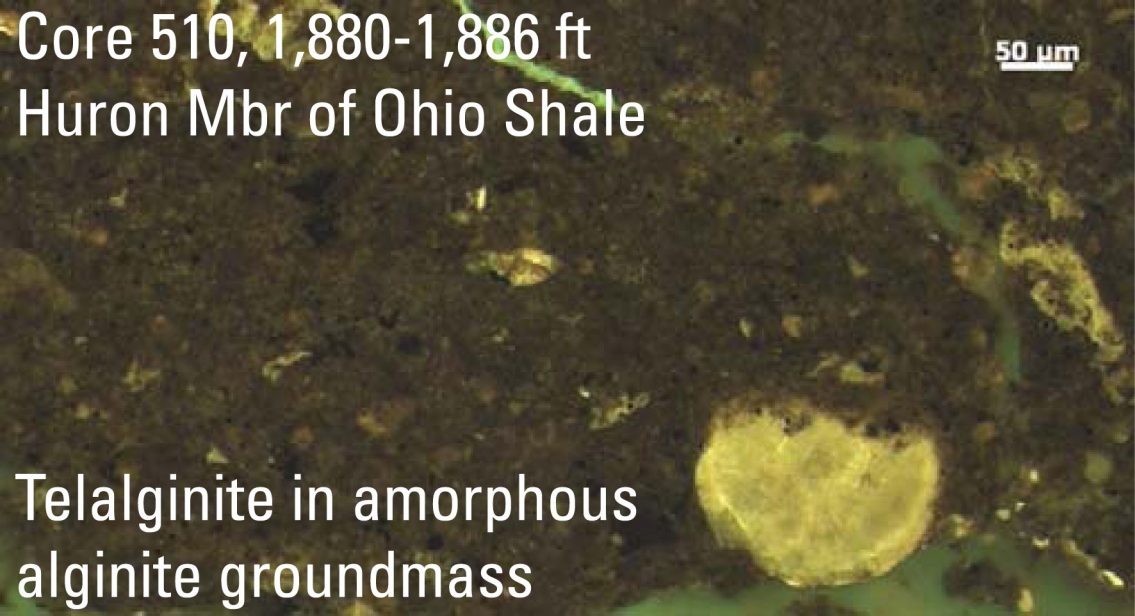
N.Y., Chicago, & St. Louis Railroad (Core 734), Huron Mbr of Ohio Shale, 73-75 ft


B. & R. McGuire (Core 2909)
(OH-5), Huron Mbr of Ohio Sh,
1,072-1,073 ft
20 µm
Telalginite in amorphous
alginite groundmass

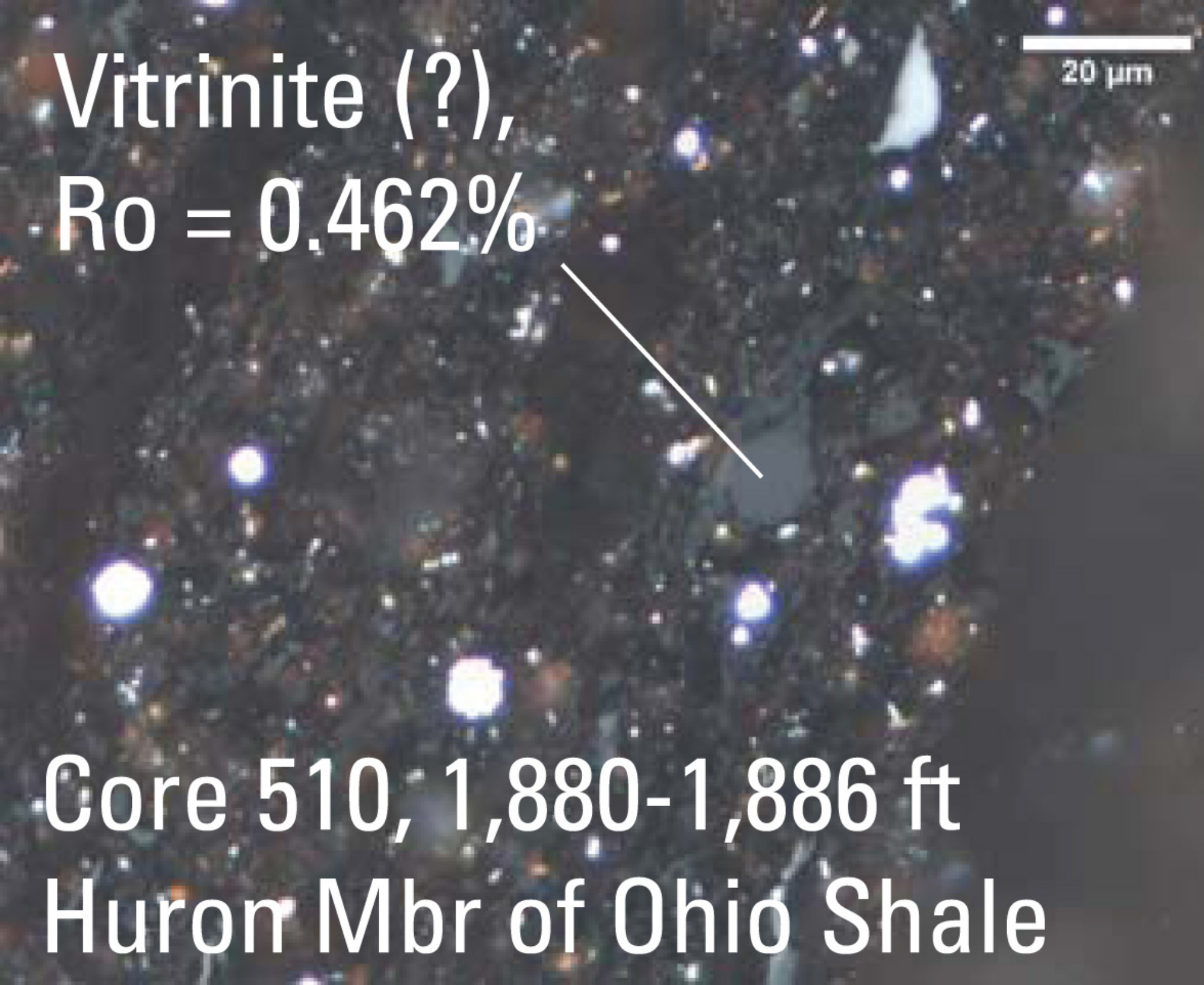

B. & R. McGuire (Core 2909)
(OH-5), Huron Mbr of Ohio Sh,
1,072-1,073 ft
10 µm
Tasmanites
in UV light

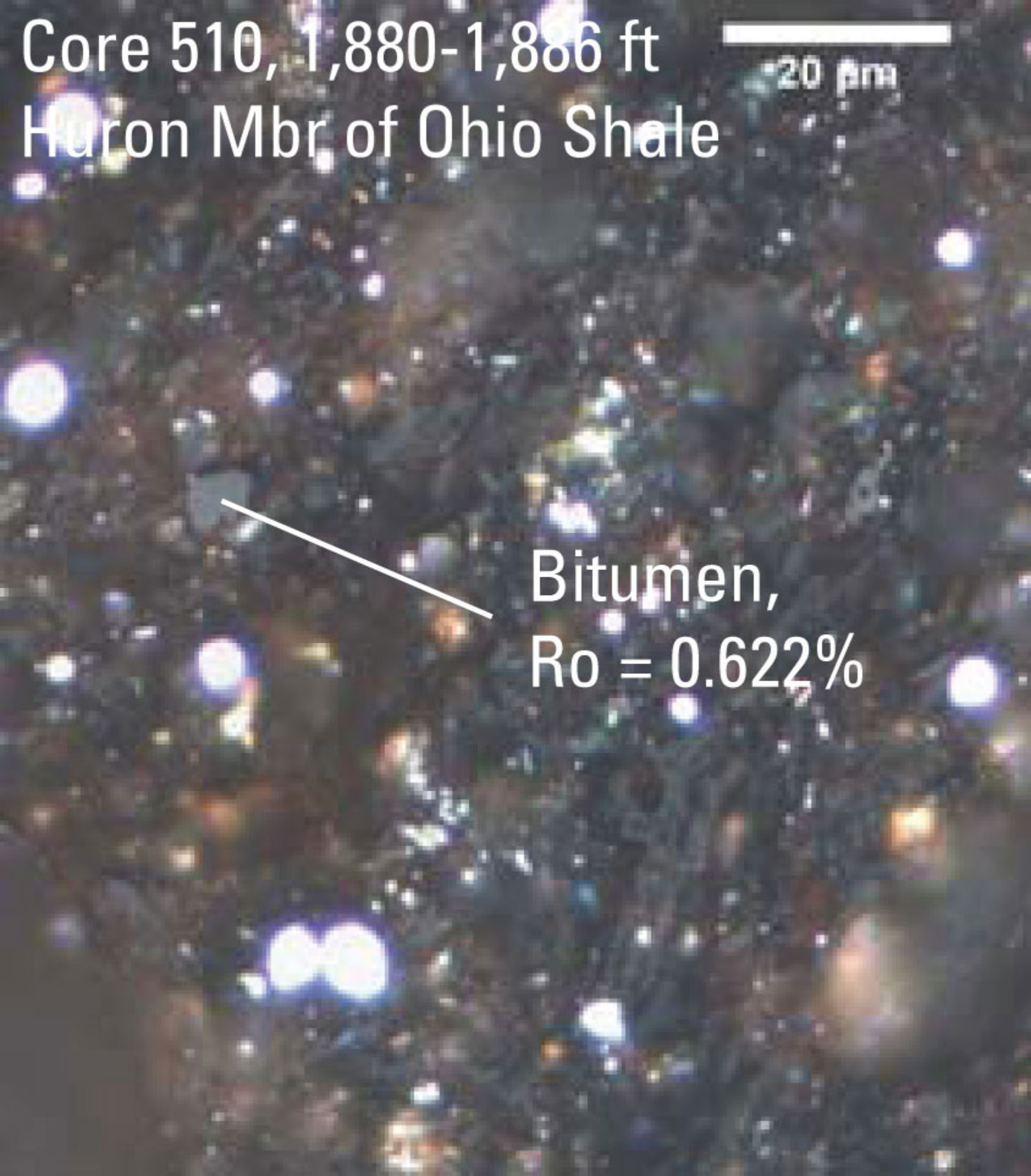

B. & R. McGuire (Core 2909)
(OH-5), Huron Mbr of Ohio Sh,
1,072-1,073 ft
20 µm
Vitrinite (?),
Ro = 0.518%

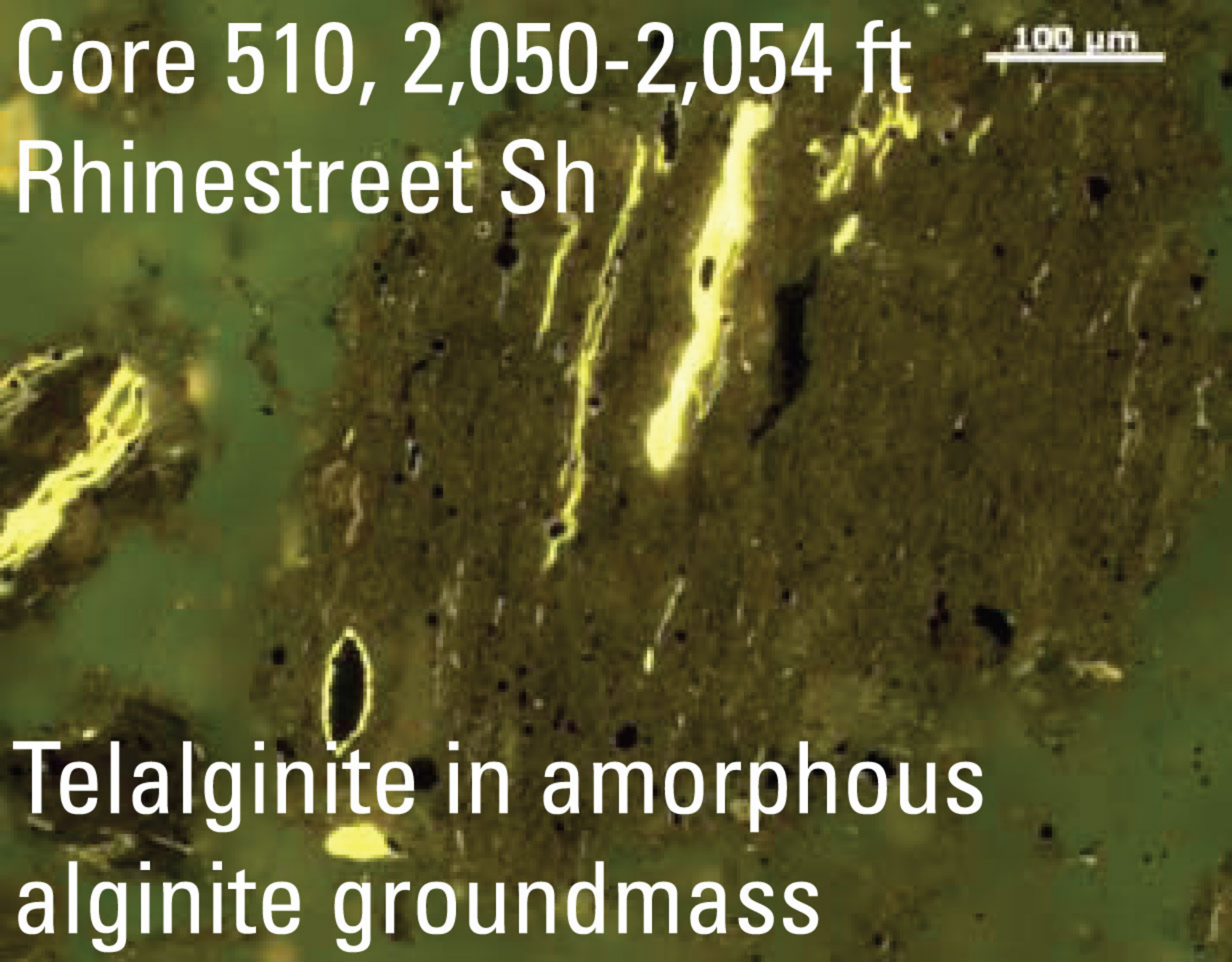
B. & R. McGuire (Core 2909) (OH-5), Huron Mbr of Ohio Sh, 1,072-1,073 ft


Core 510, 1,880-1,886 ft
Huron Mbr of Ohio Shale
50 µm
Telalginite in amorphous
alginite groundmass

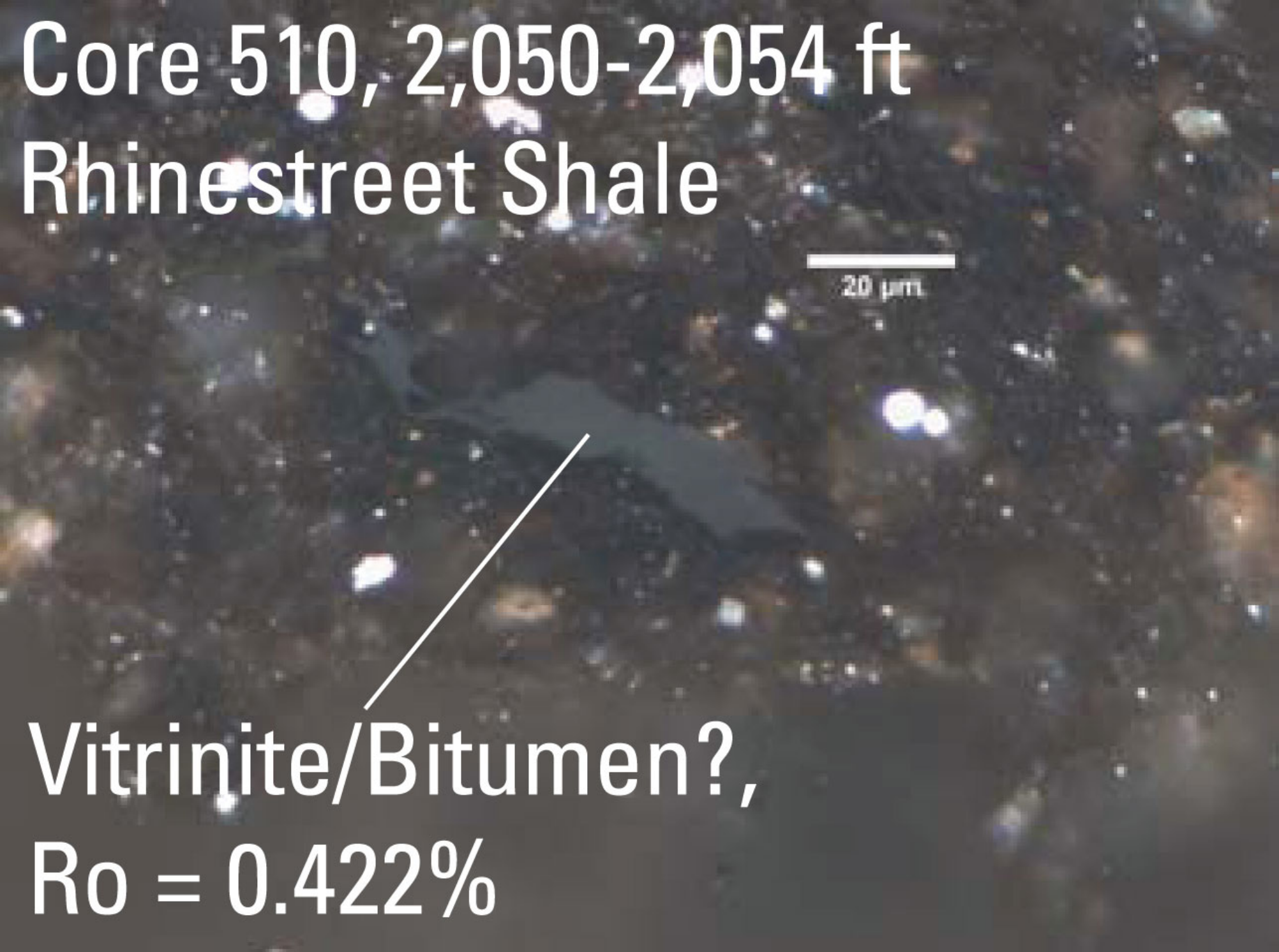

Tasmanites
in UV light
20 µm
Core 510, 1,880-1,886 ft
Huron Mbr of Ohio Shale

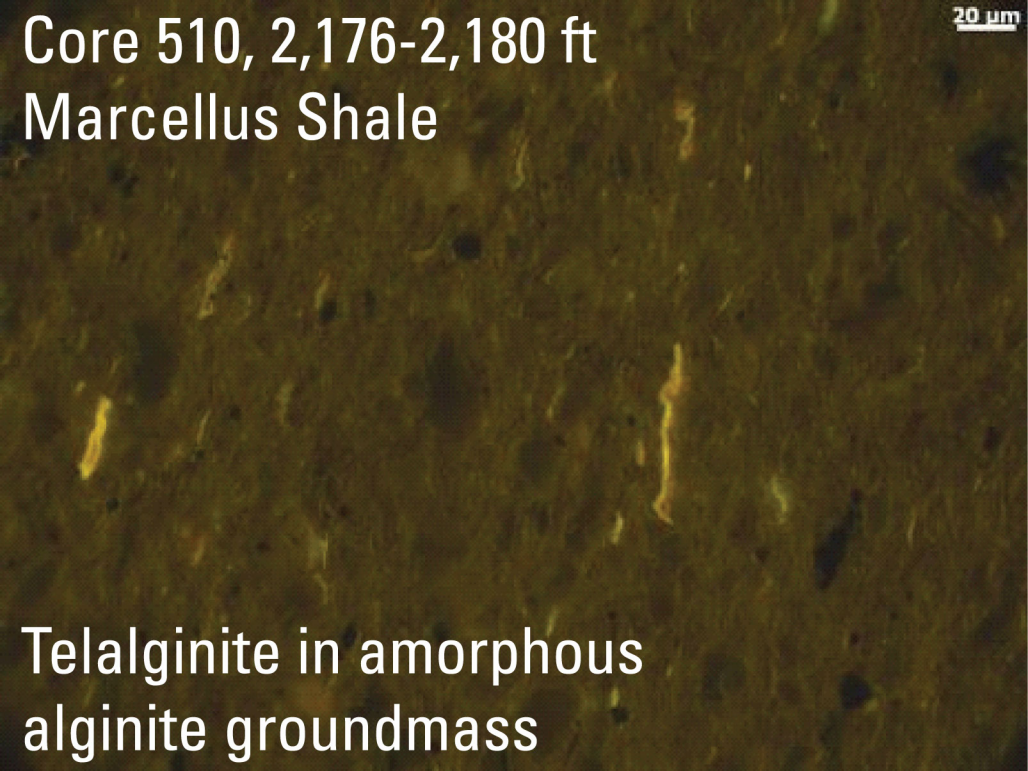

Vitrinite (?),
Ro = 0.462%
20 µm
Core 510, 1,880-1,886 ft
Huron Mbr of Ohio Shale

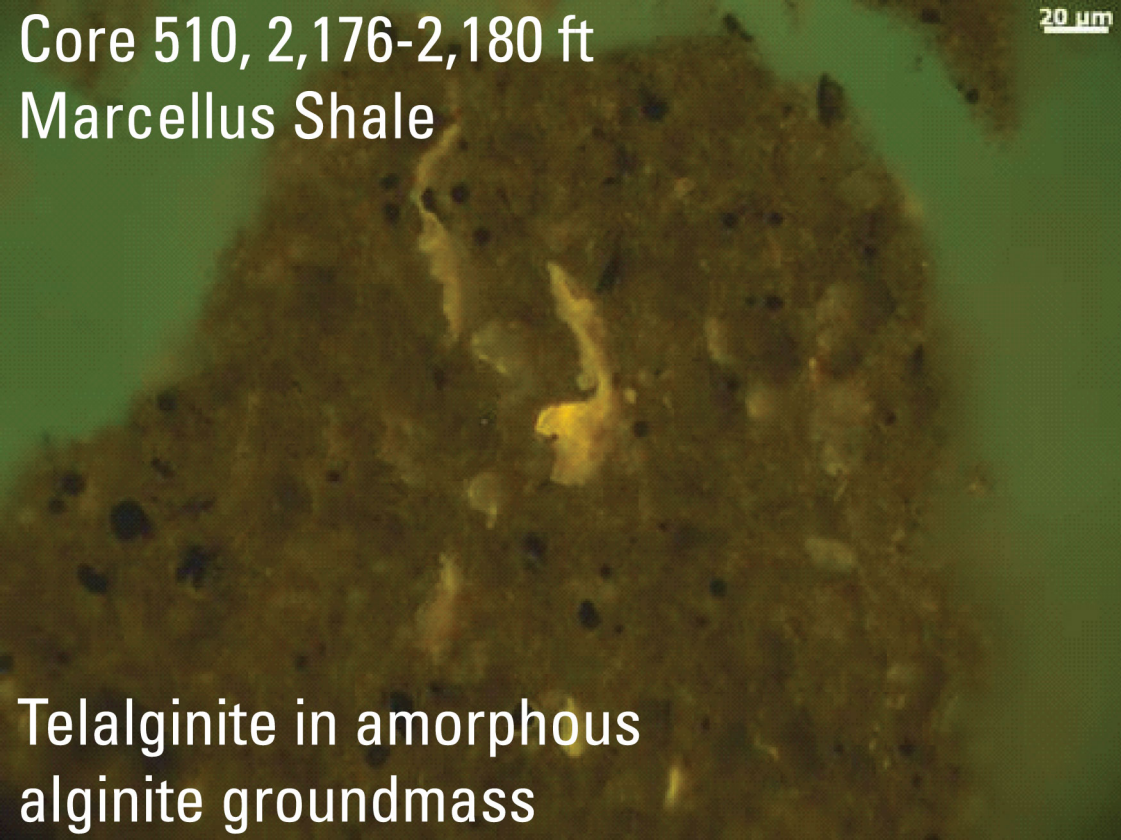

Core 510, 1,880-1,886 ft
Huron Mbr of Ohio Shale
20 µm
Bitumen,
Ro = 0.622%

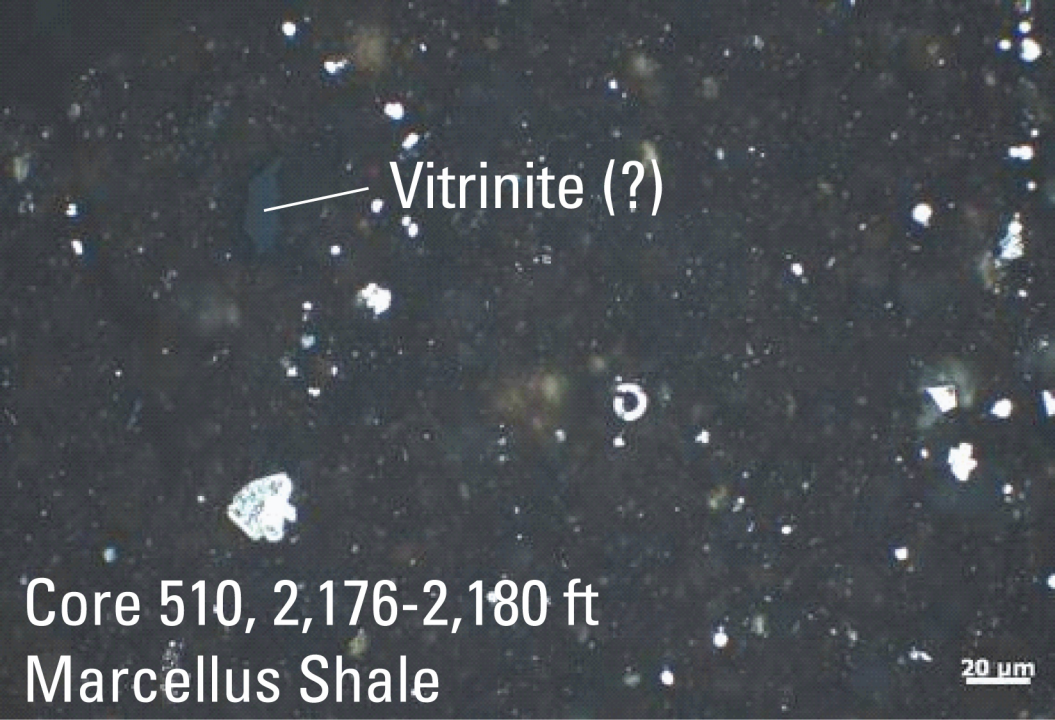

Core 510, 2,050-2,054 ft
Rhinestreet Sh
100 µm
Telalginite in amorphous
alginite groundmass

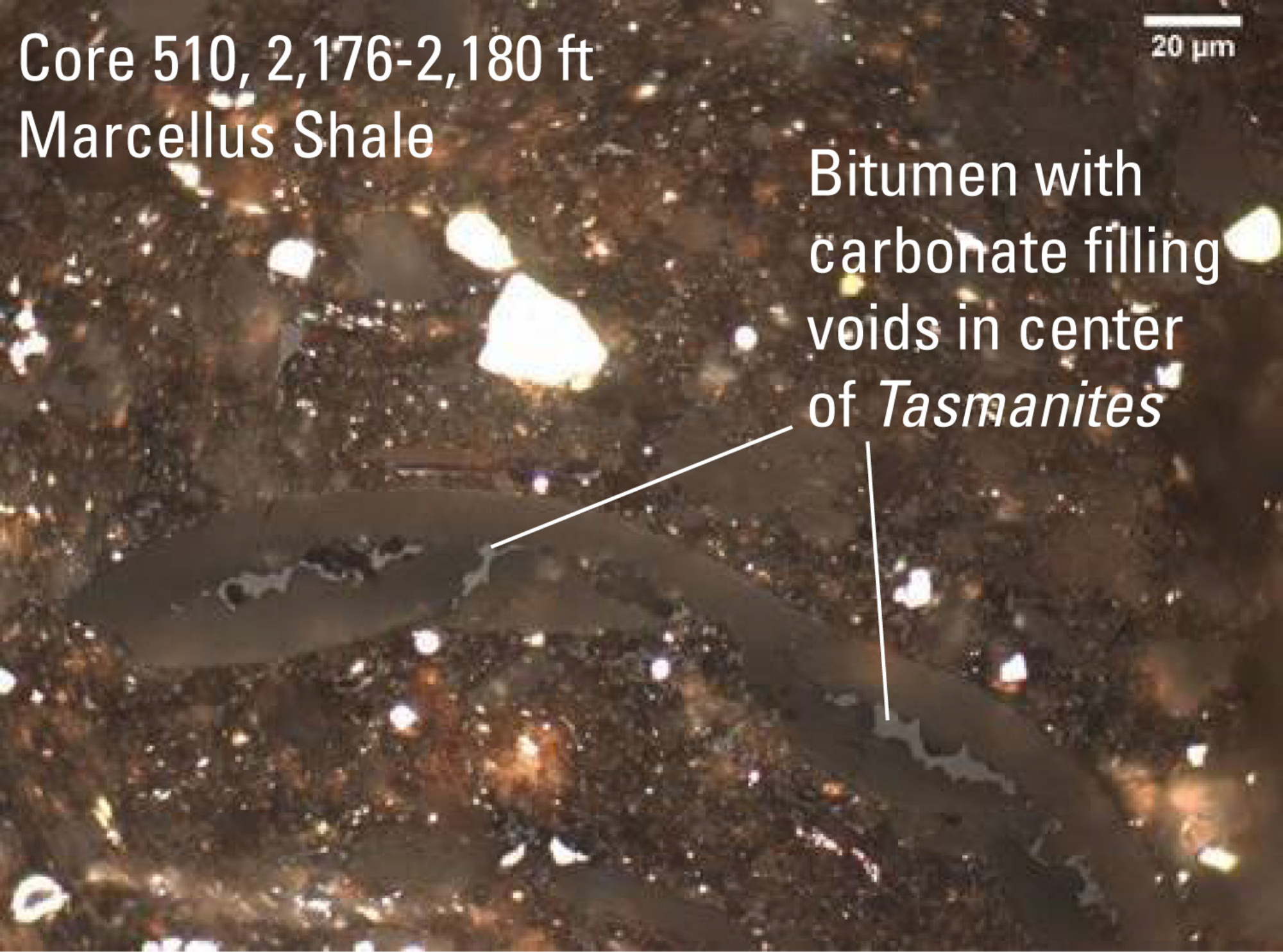

20 µm
Tasmanites
in UV light
Core 510, 2,050-2,054 ft
Rhinestreet Shale


Core 510, 2,050-2,054 ft
Rhinestreet Shale
20 µm
Vitrinite/Bitumen?,
Ro = 0.422%

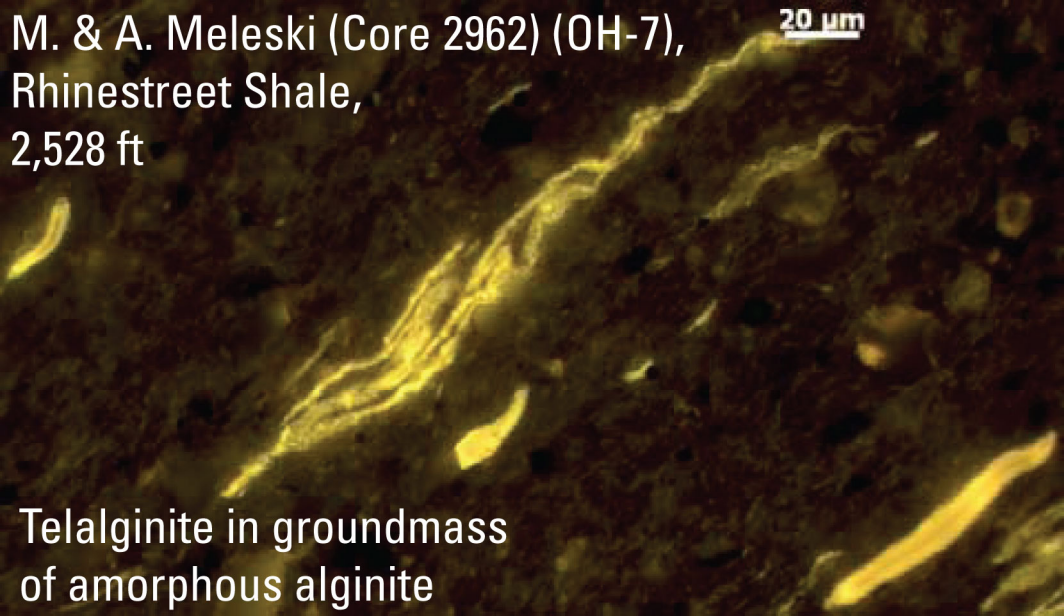

Core 510, 2,176-2,180 ft
Marcellus Shale
20 µm
Telalginite in amorphous
alginite groundmass


Core 510, 2,176-2,180 ft
Marcellus Shale
20 µm
Telalginite in amorphous
alginite groundmass

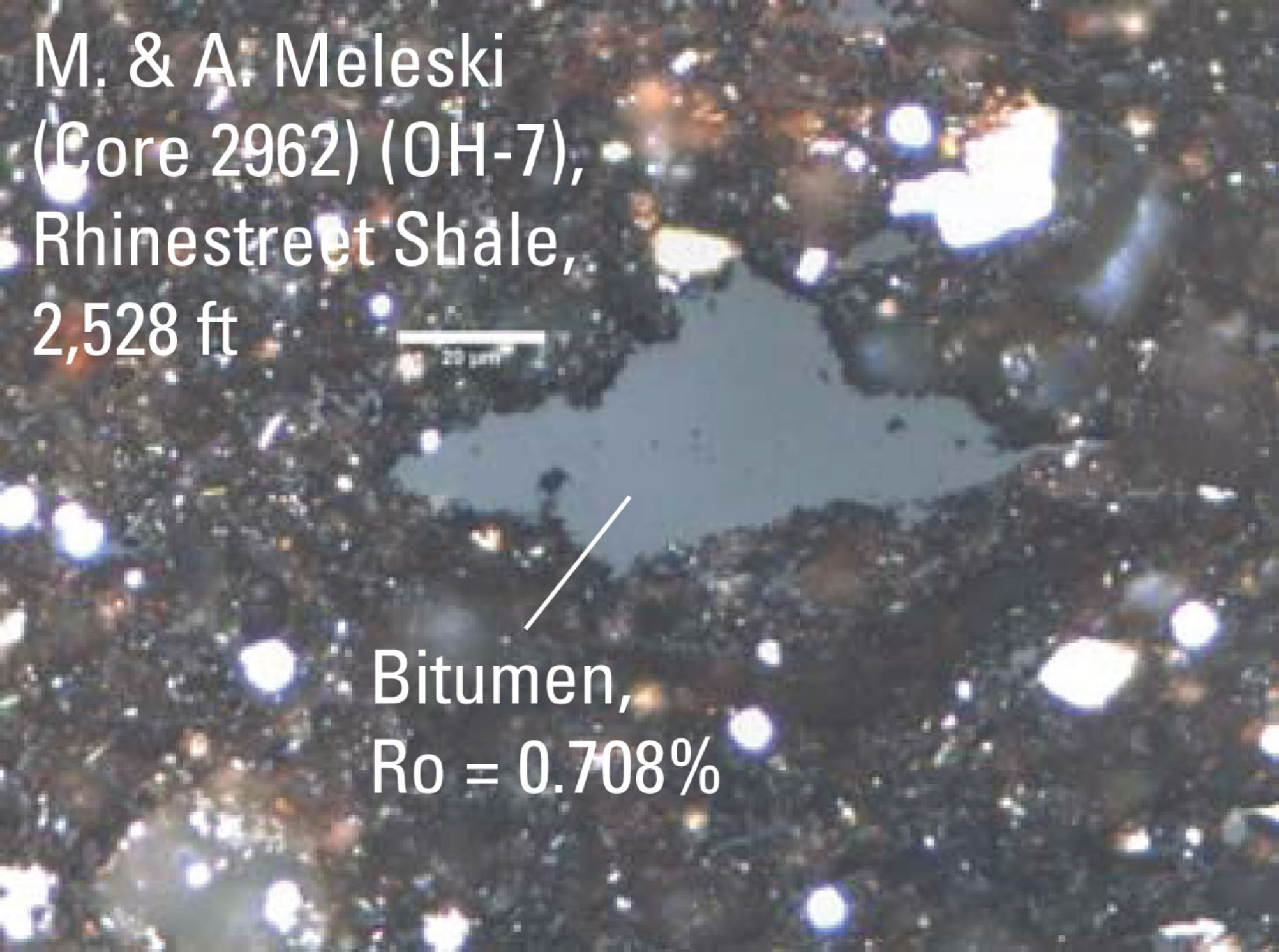

Vitrinite (?)
Core 510, 2,176-2,180 ft
Marcellus Shale
20 µm

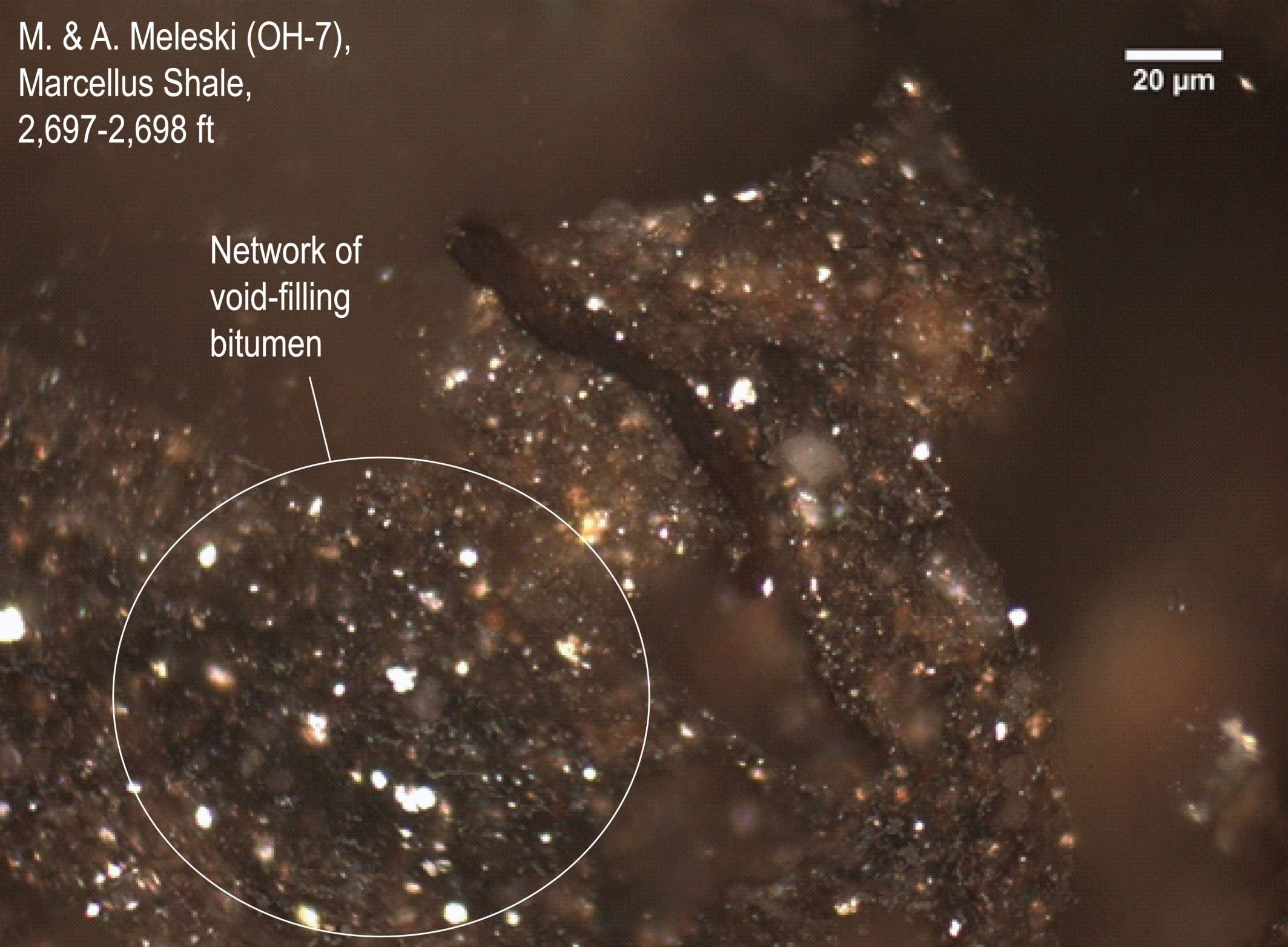

Core 510, 2,176-2,180 ft
Marcellus Shale
20 µm
Bitumen with carbonate filling voids in center of *Tasmanites*

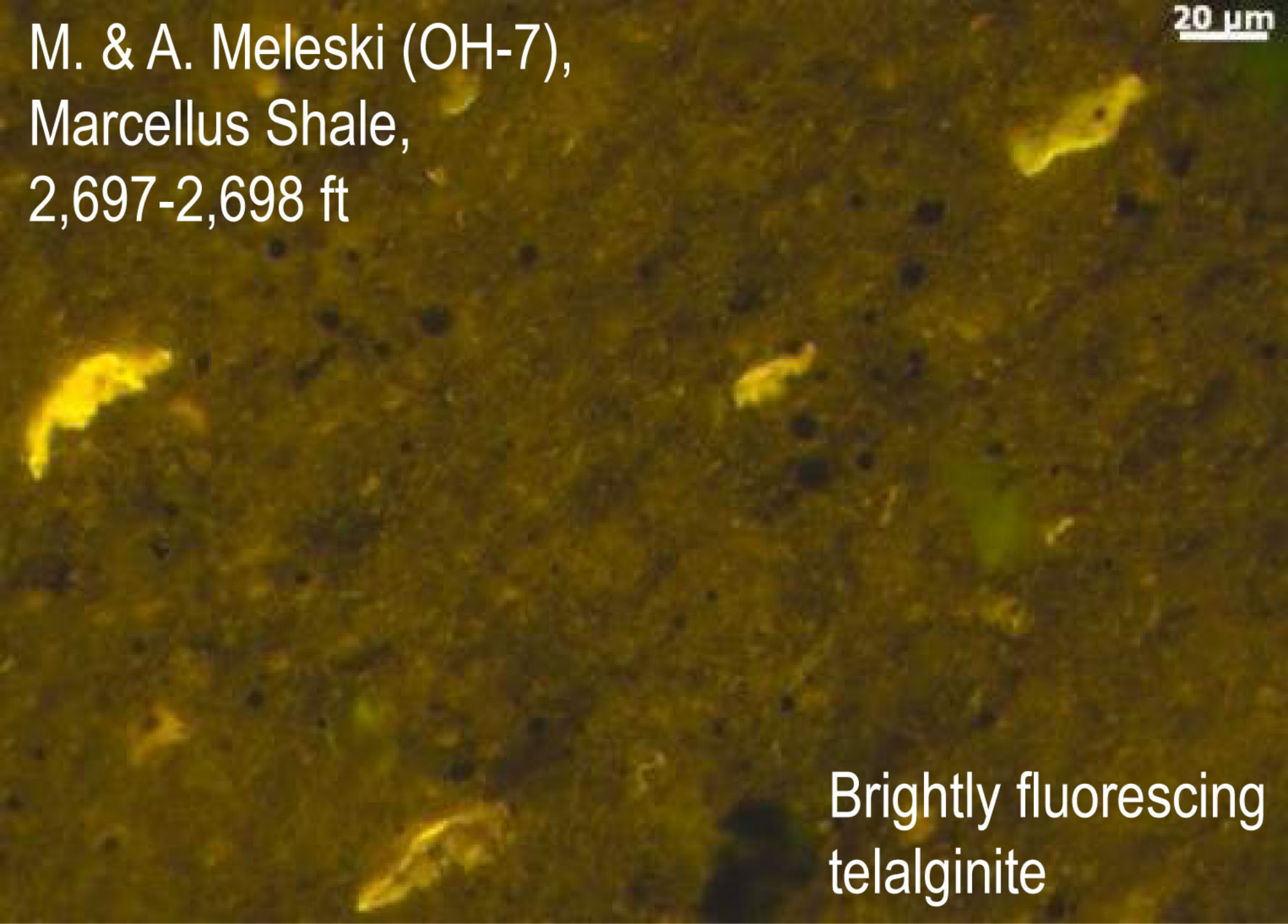

Core 510, 2,176-2,180 ft
Marcellus Shale
20 µm
Bitumen
filling
voids

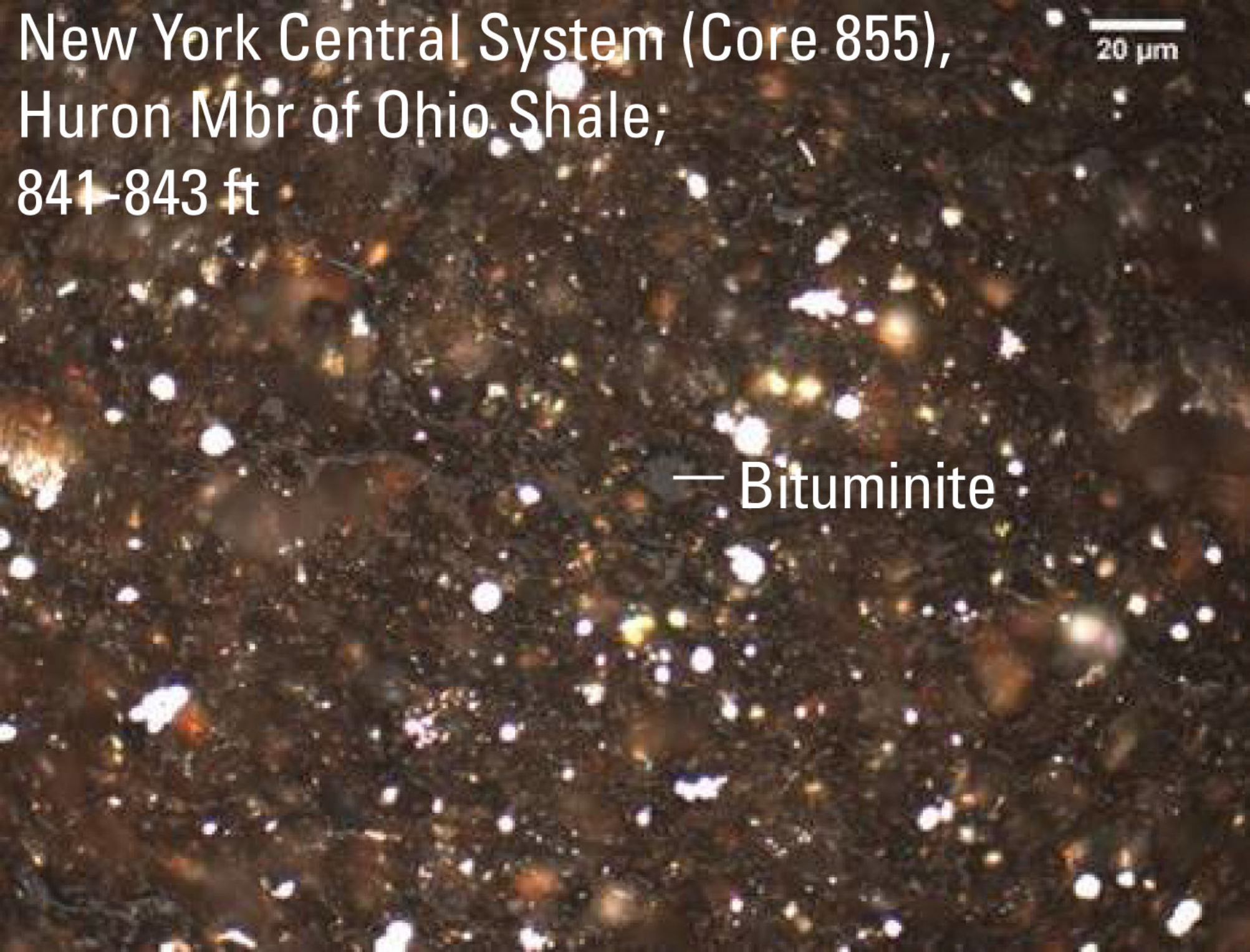

M. & A. Meleski (Core 2962) (OH-7),
Rhinestreet Shale,
2,528 ft
20 µm
Telalginite in groundmass
of amorphous alginite

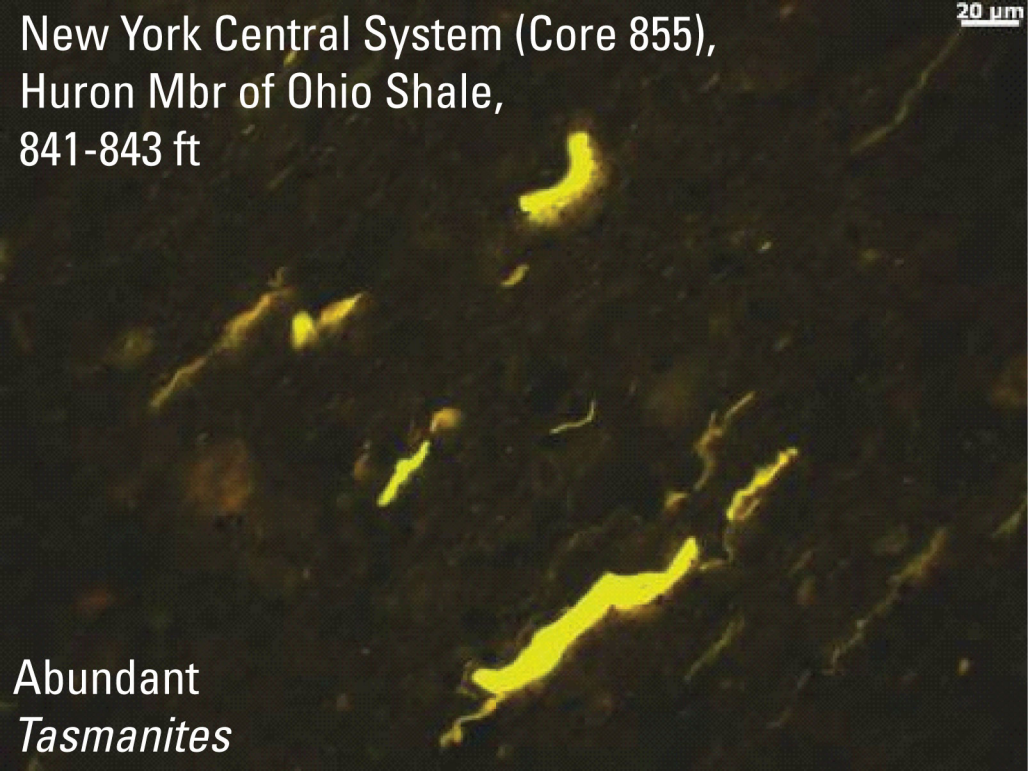

M. & A. Meleski
(Core 2962) (OH-7),
Rhinestreet Shale,
2,528 ft
20 µm
Vitrinite (?),
Ro = 0.471%

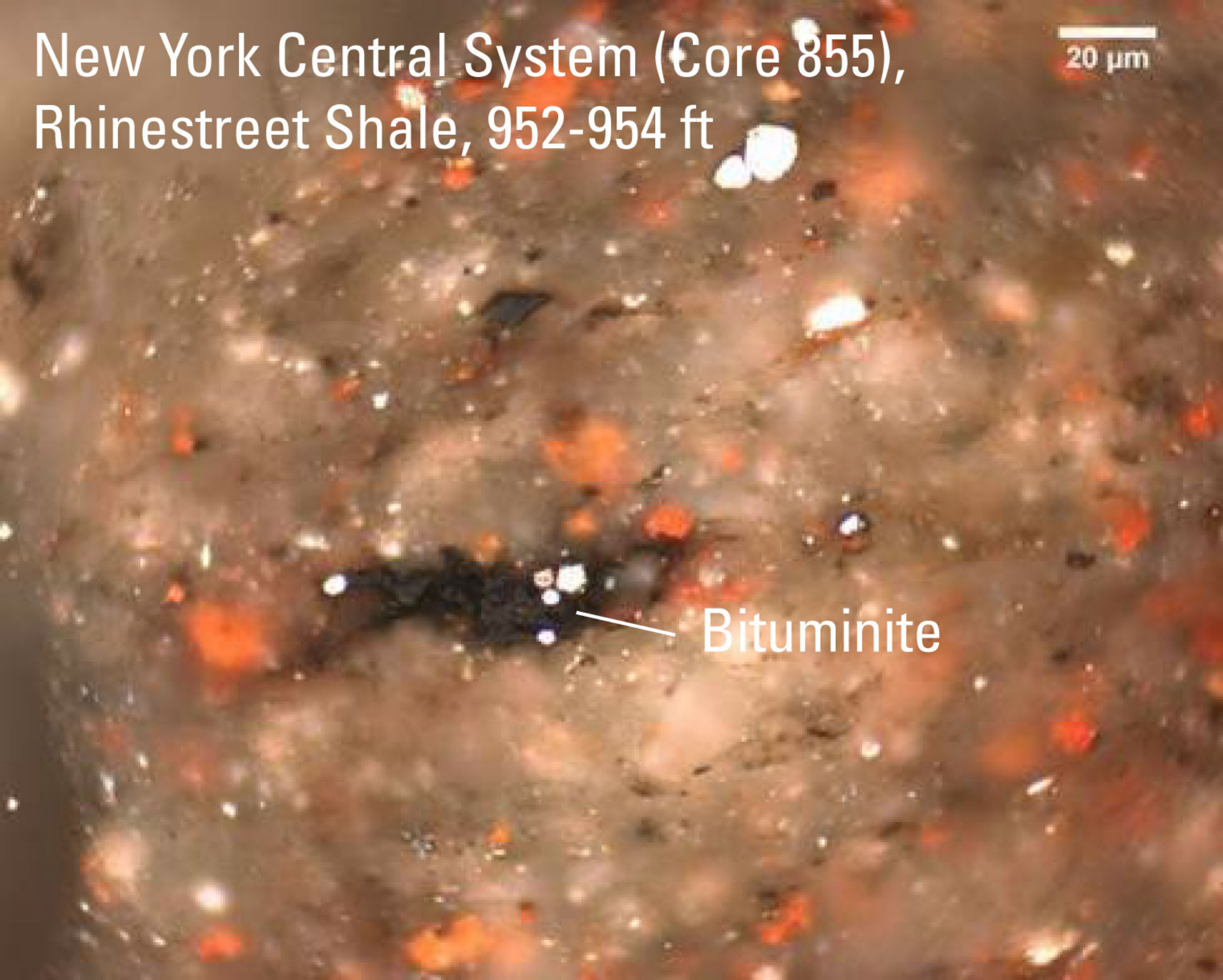

M. & A. Meleski
(Core 2962) (OH-7),
Rhinestreet Shale,
2,528 ft
Bitumen,
Ro = 0.708%

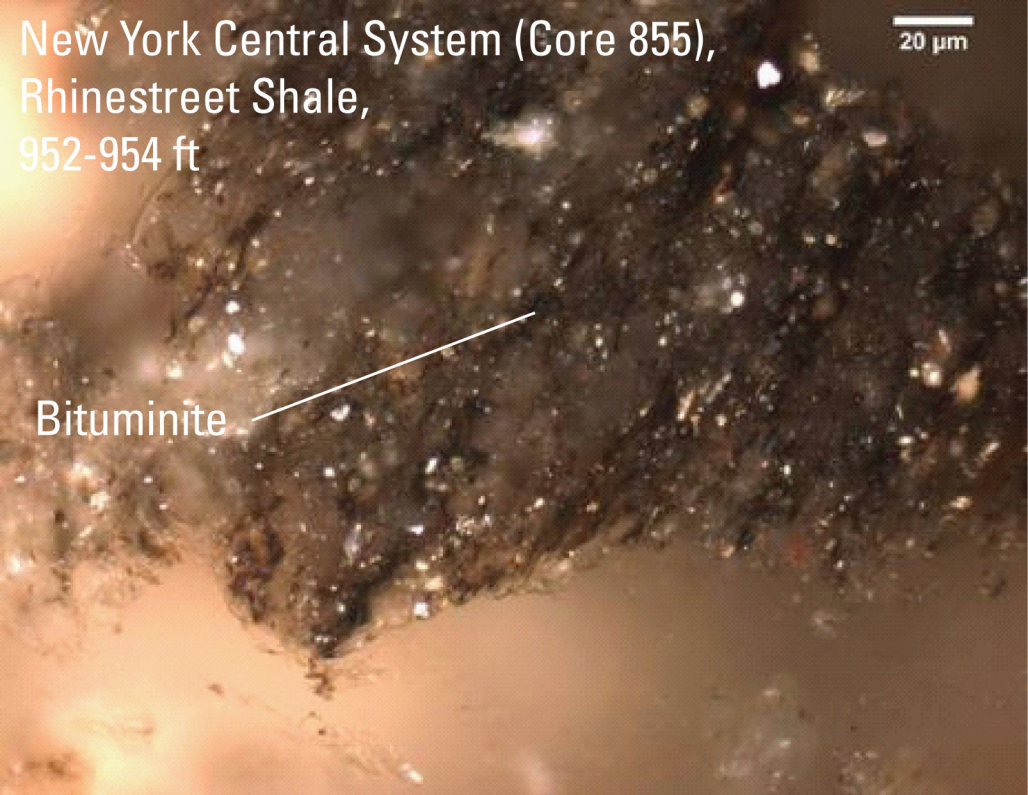

M. & A. Meleski (OH-7),
Marcellus Shale,
2,697-2,698 ft
20 µm
Network of
void-filling
bitumen

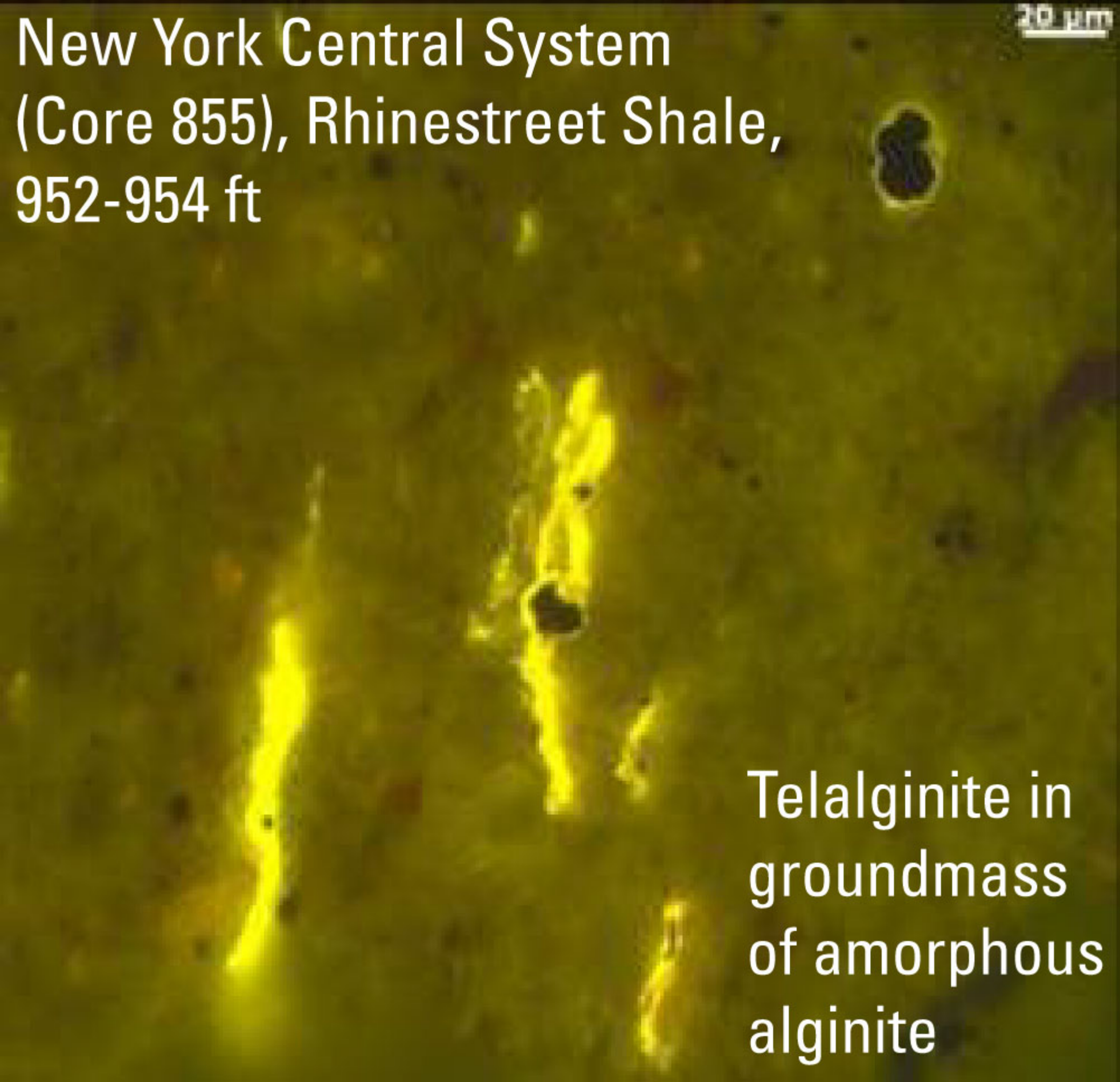

M. & A. Meleski (OH-7),
Marcellus Shale,
2,697-2,698 ft
20 µm
Brightly fluorescing
telalginite


New York Central System (Core 855),
Huron Mbr of Ohio Shale,
841-843 ft
20 µm
Bituminite

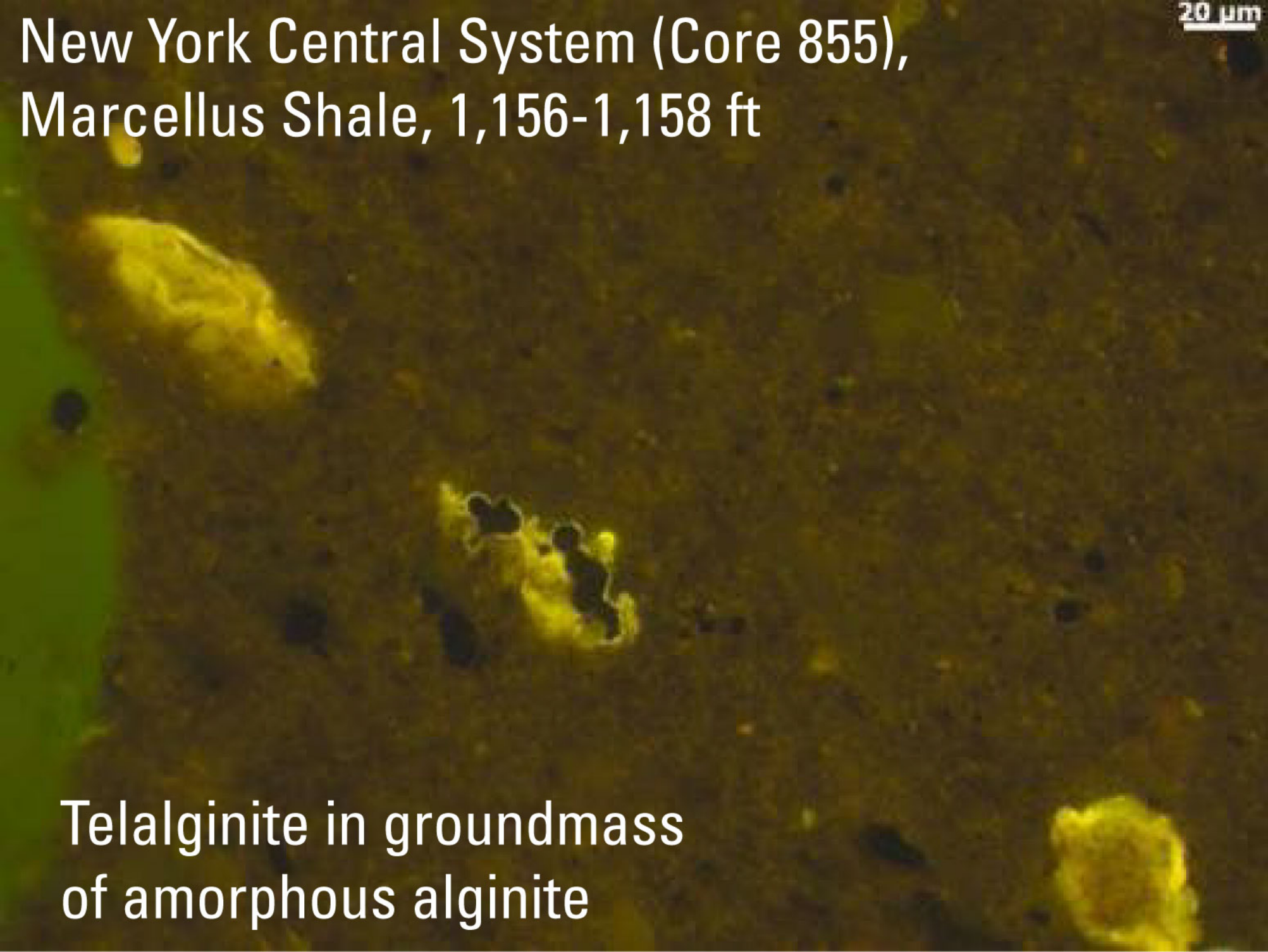

New York Central System (Core 855),
Huron Mbr of Ohio Shale,
841-843 ft
20 µm
Abundant
Tasmanites


New York Central System (Core 855),
Rhinestreet Shale, 952-954 ft
20 µm
Bituminite

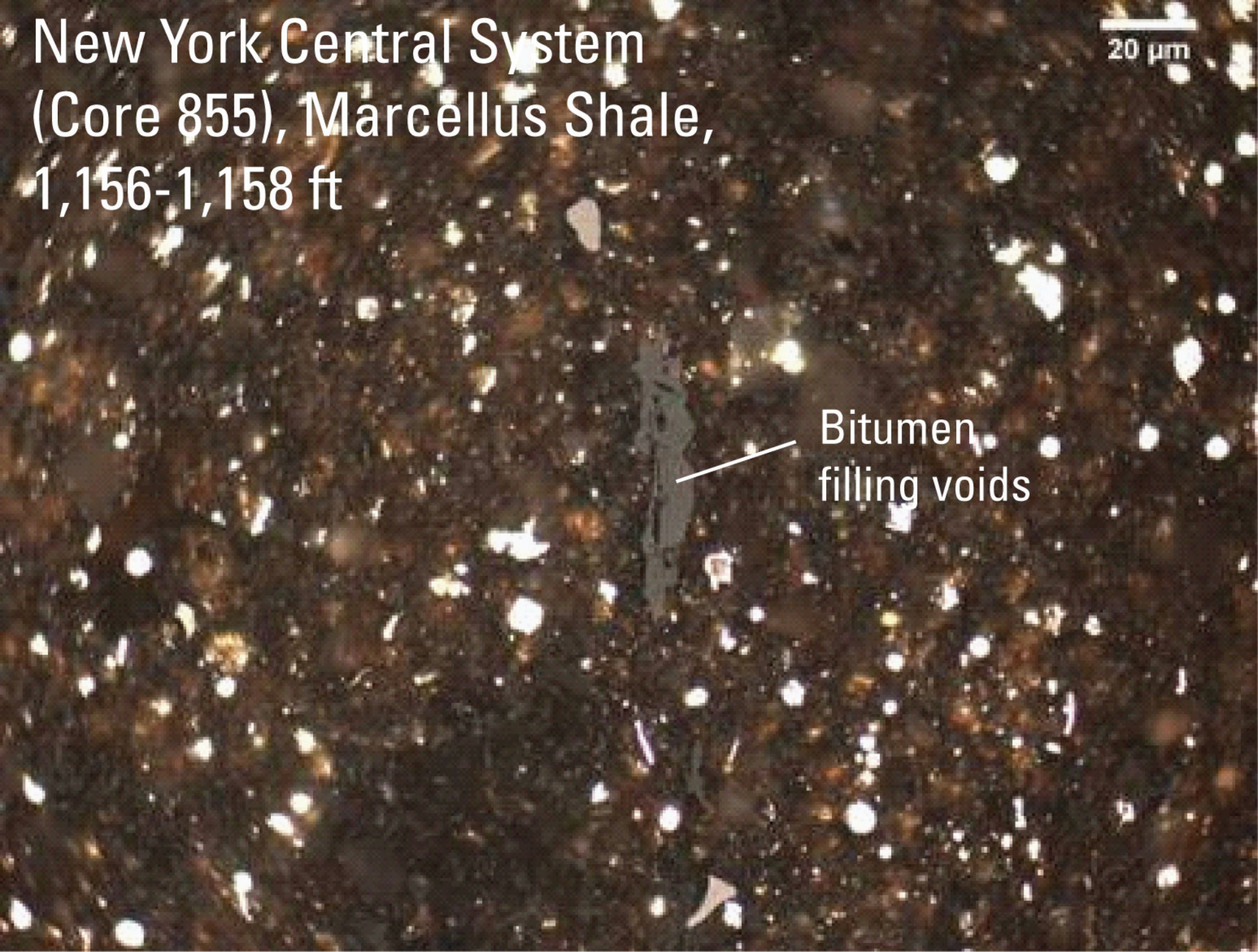

New York Central System (Core 855),
Rhinestreet Shale,
952-954 ft
20 µm
Bituminite


20 µm
New York Central System
(Core 855), Rhinestreet Shale,
952-954 ft
Telalginite in
groundmass
of amorphous
alginite

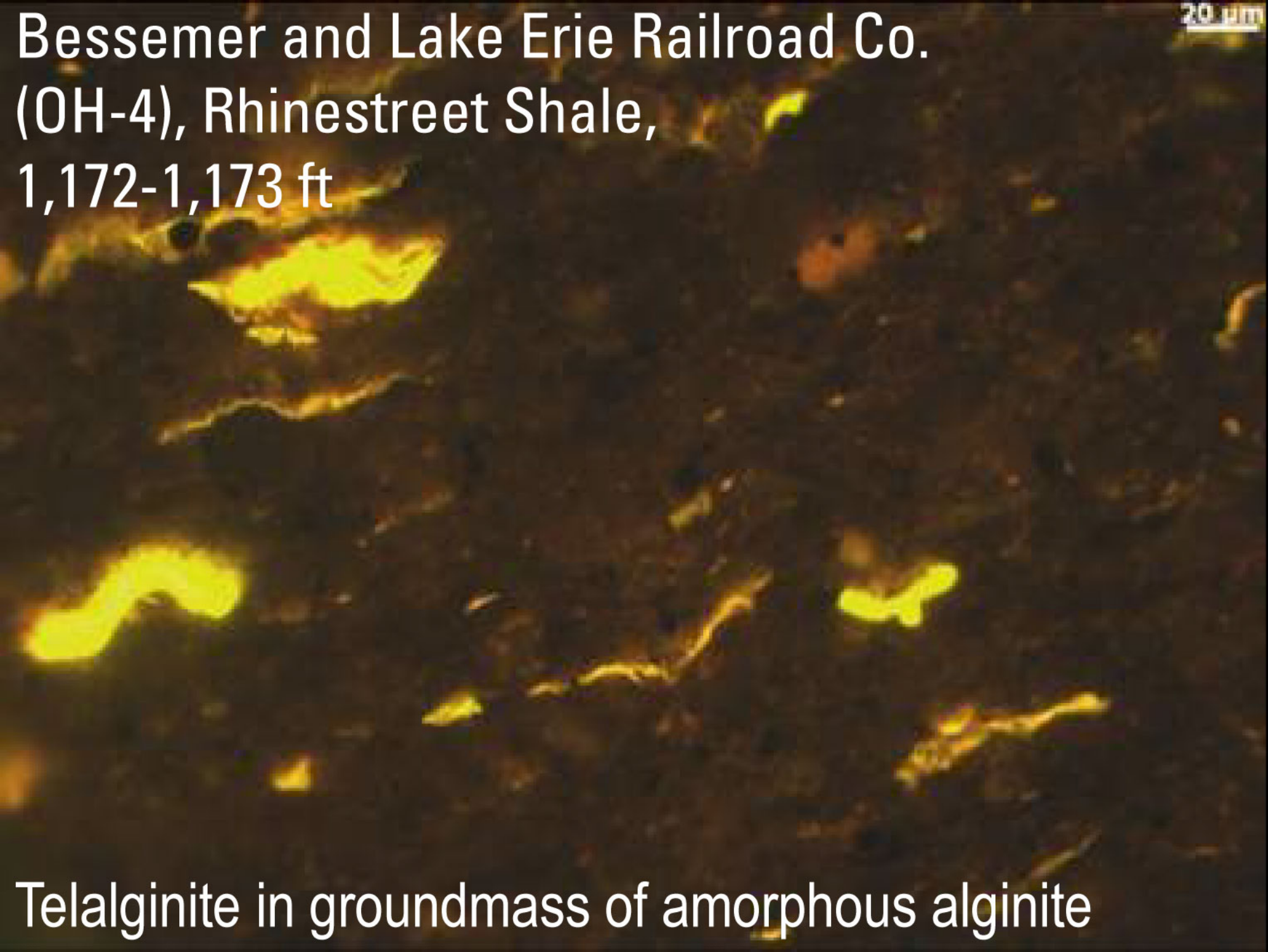

New York Central System (Core 855),
Rhinestreet Shale, 952-954 ft
20 µm
Recycled
vitrinite (?)


20 µm
New York Central System (Core 855),
Marcellus Shale, 1,156-1,158 ft
Telalginite in groundmass
of amorphous alginite

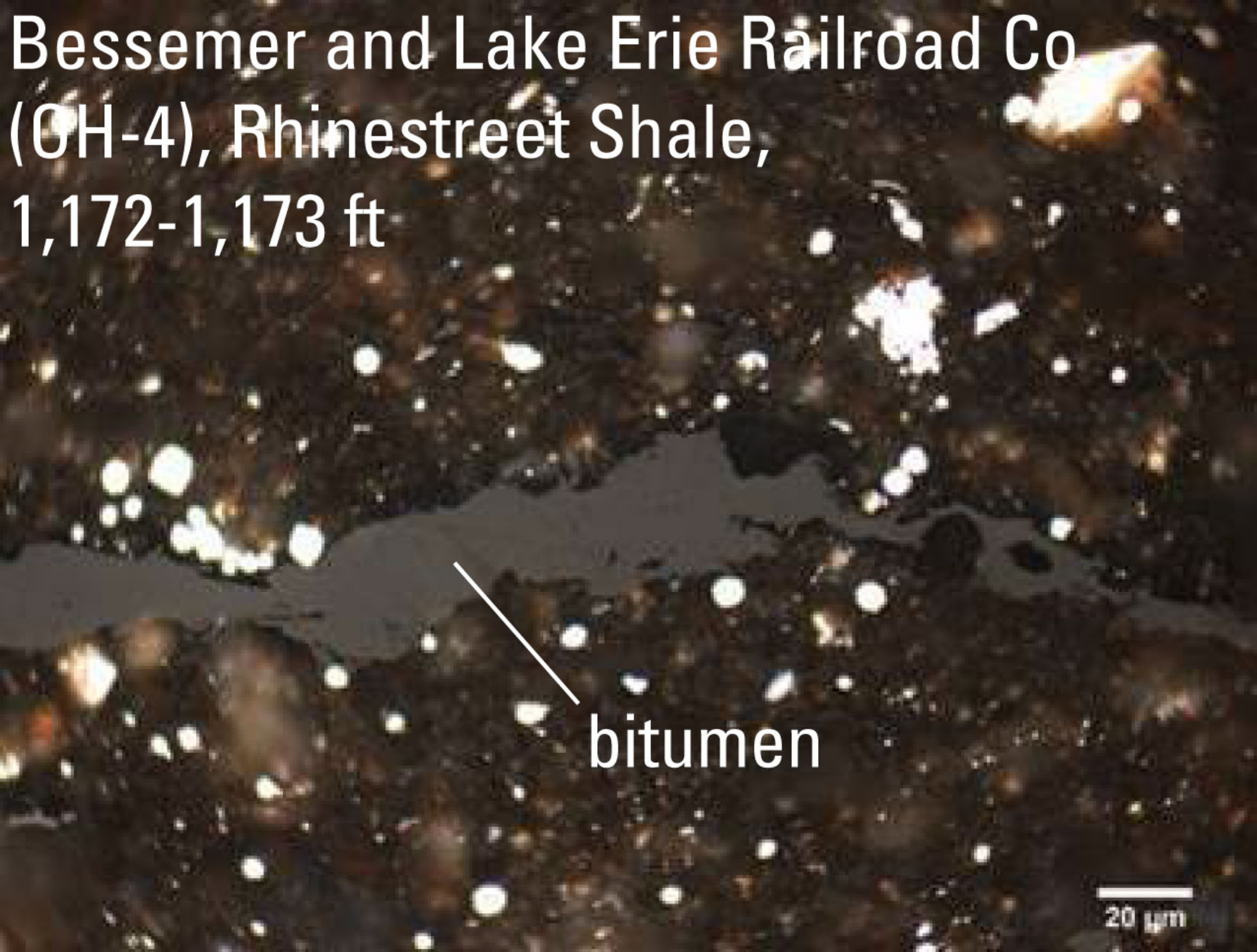

20 µm
New York Central System
(Core 855), Marcellus Shale,
1,156-1,158 ft
Tasmanites

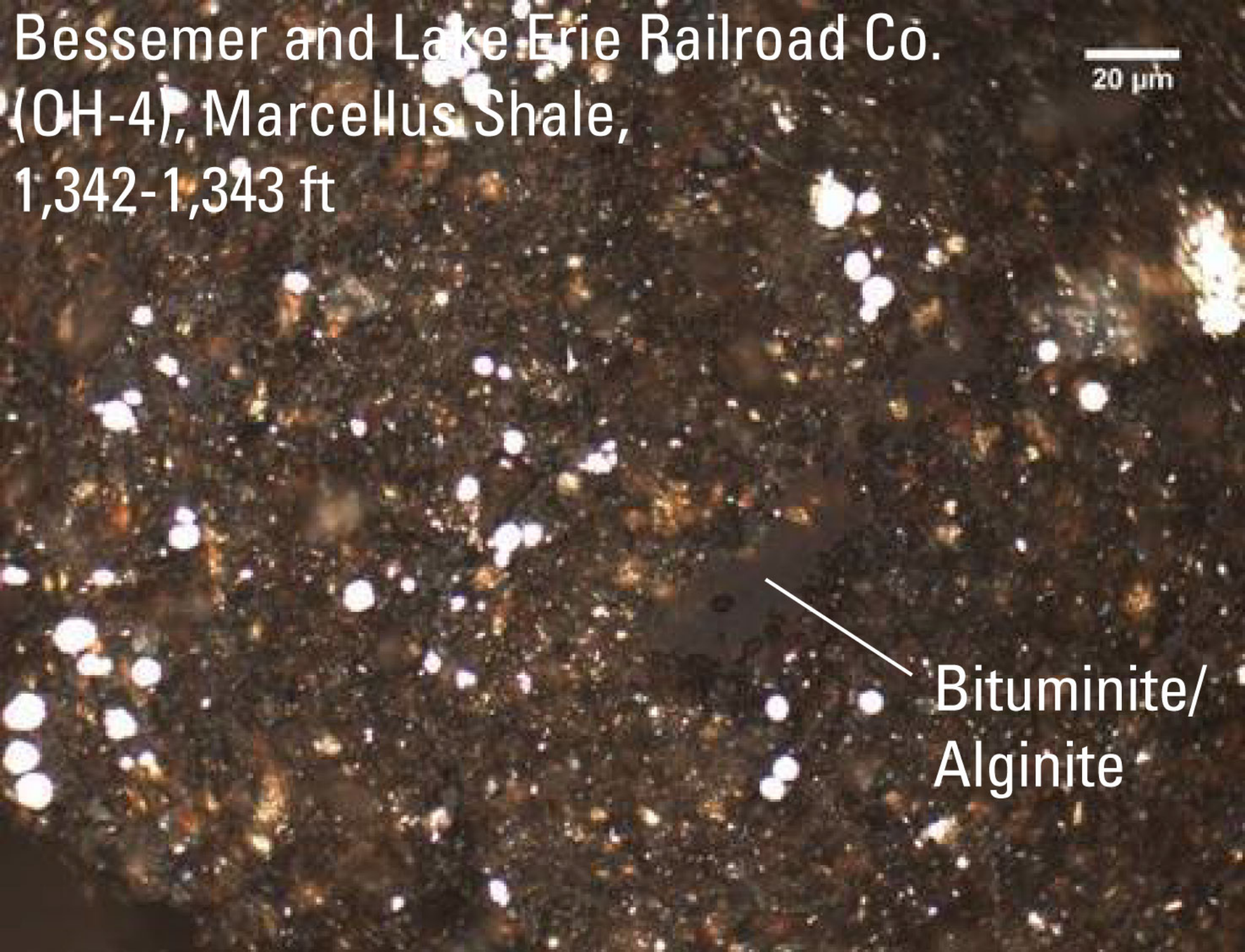

New York Central System
(Core 855), Marcellus Shale,
1,156-1,158 ft
20 µm
Bitumen
filling voids

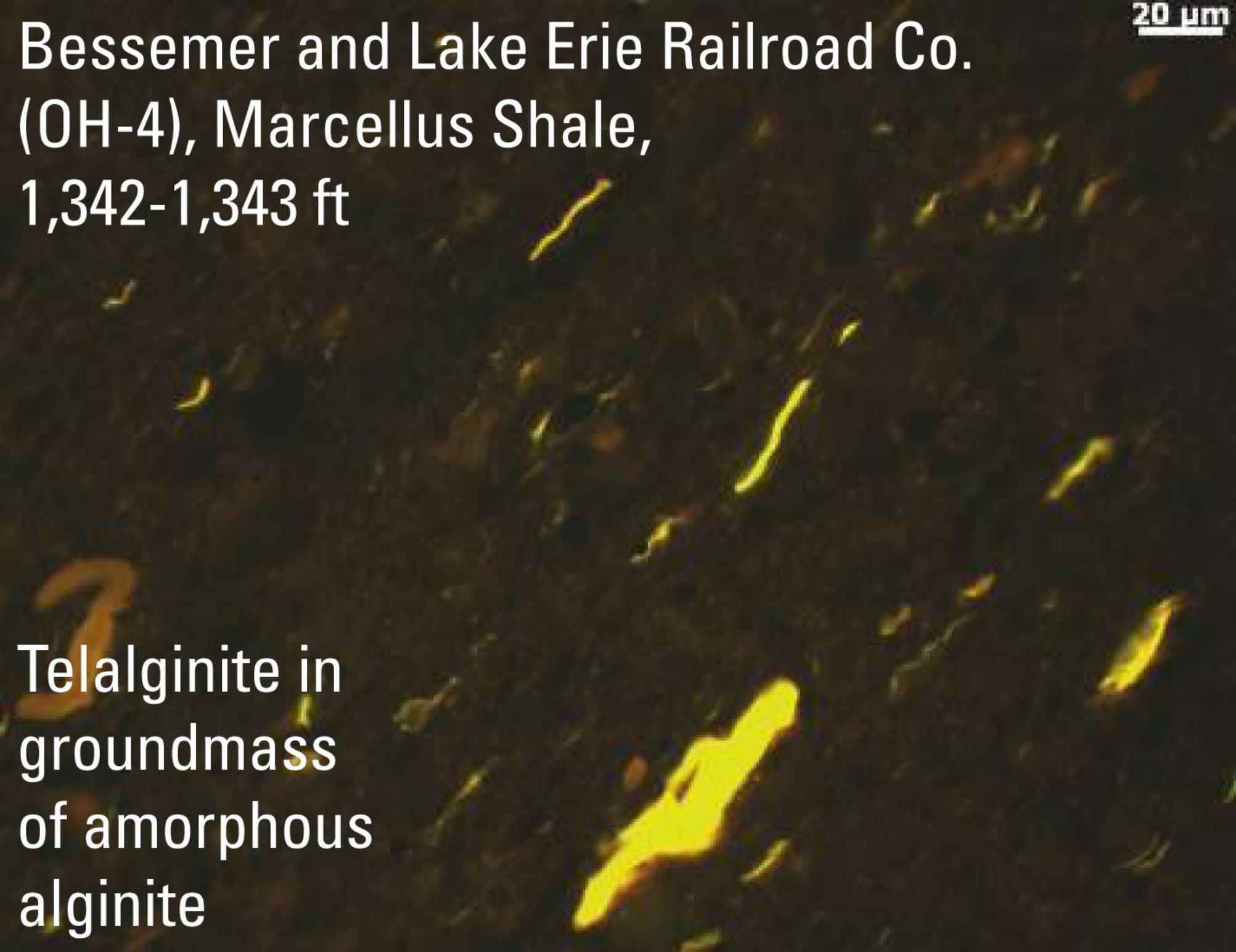

Bessemer and Lake Erie Railroad Co. (OH-4), Rhinestreet Shale, 1,172-1,173 ft
20 µm
Bituminite


20 µm
Bessemer and Lake Erie Railroad Co.
(OH-4), Rhinestreet Shale,
1,172-1,173 ft
Telalginite in groundmass of amorphous alginite


Bessemer and Lake Erie Railroad Co.
(OH-4), Rhinestreet Shale,
1,172-1,173 ft
20 µm
vitrinite (?)

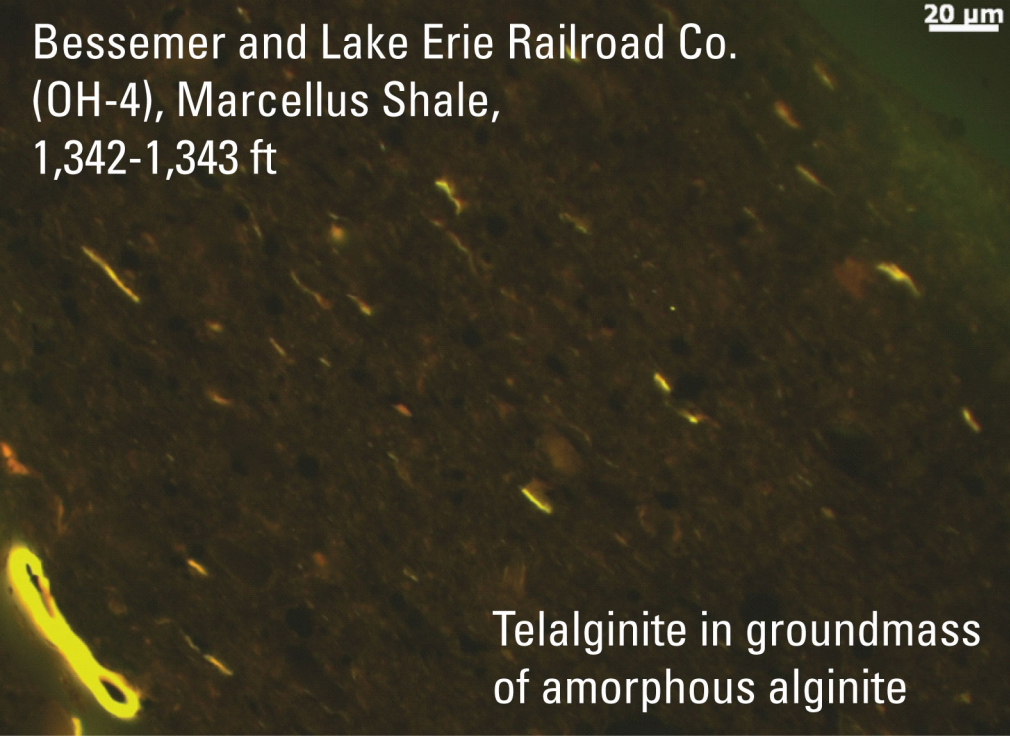

Bessemer and Lake Erie Railroad Co (OH-4), Rhinestreet Shale, 1,172-1,173 ft
bitumen
20 µm

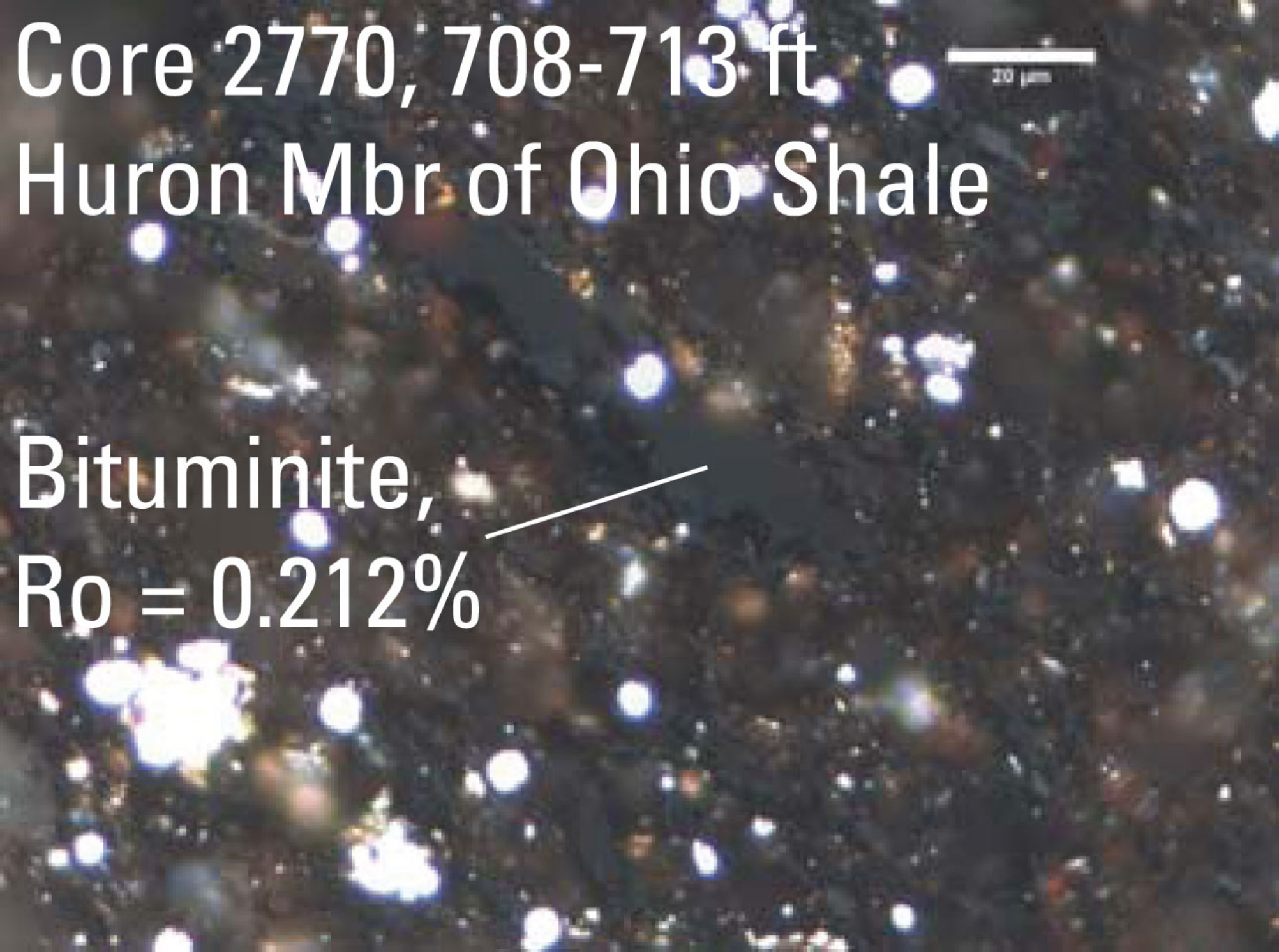

Bessemer and Lake Erie Railroad Co.
(OH-4), Marcellus Shale,
1,342-1,343 ft
20 µm
Bituminite/
Alginite

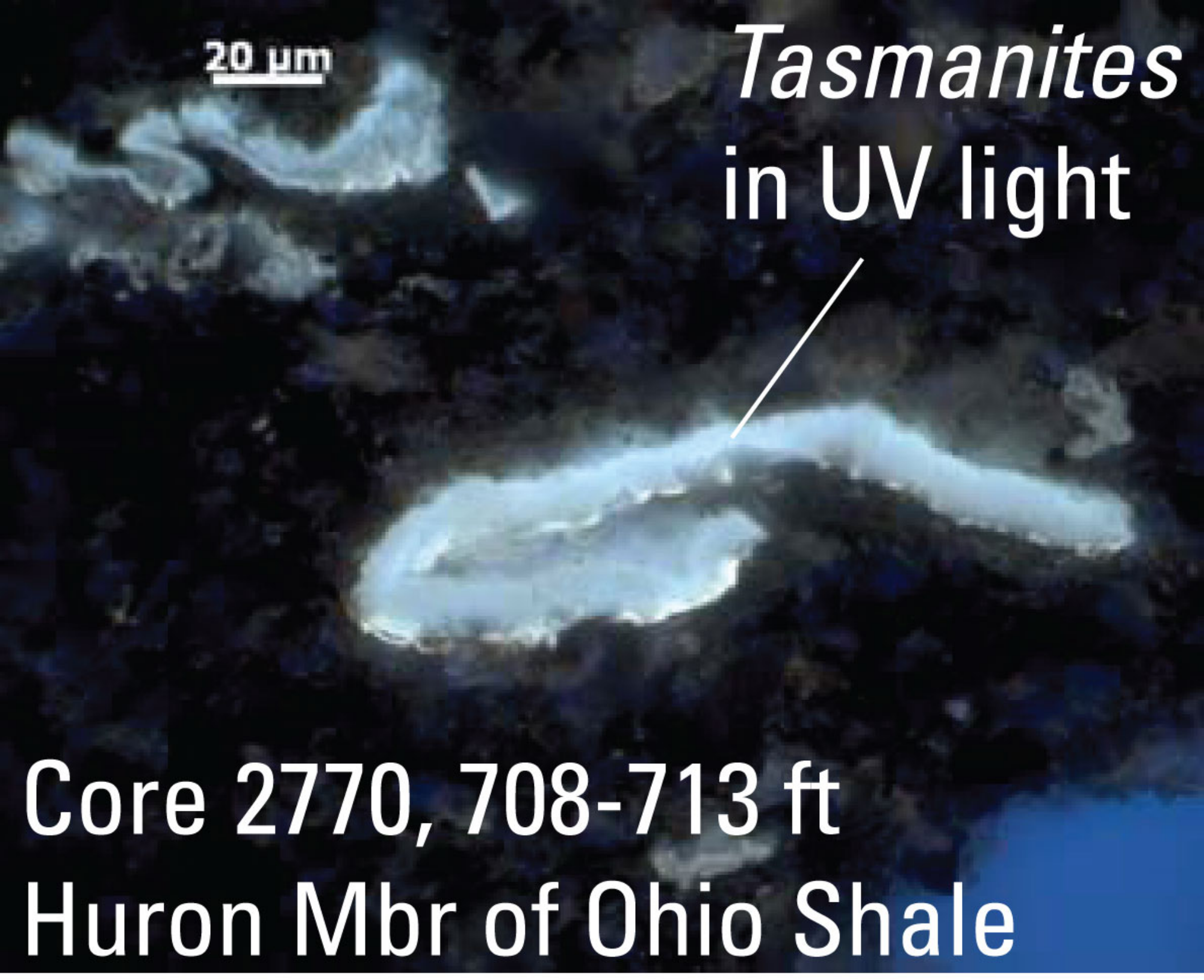


Bessemer and Lake Erie Railroad Co. (OH-4), Marcellus Shale, 1,342-1,343 ft

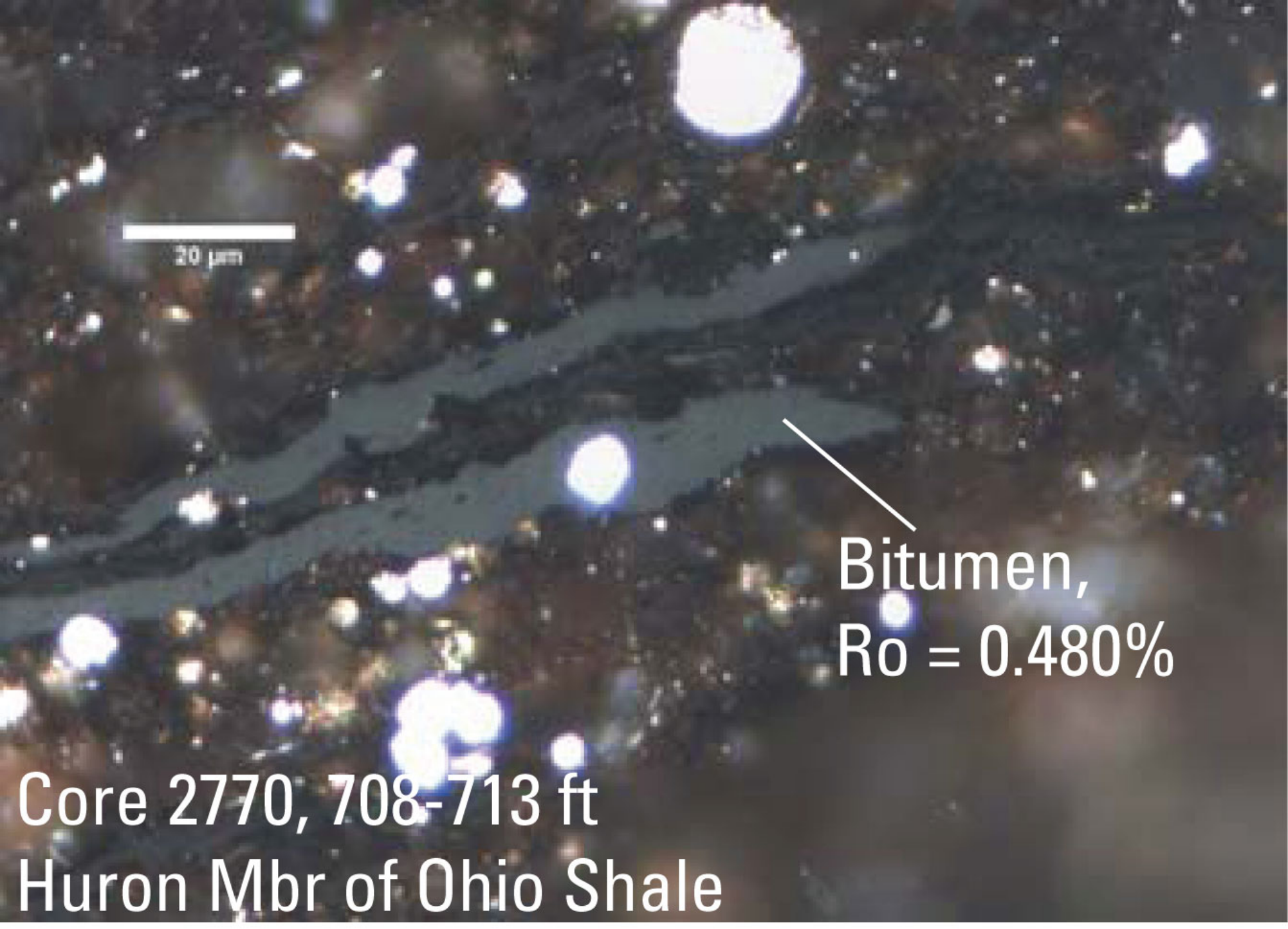
Telalginite in groundmass of amorphous alginite

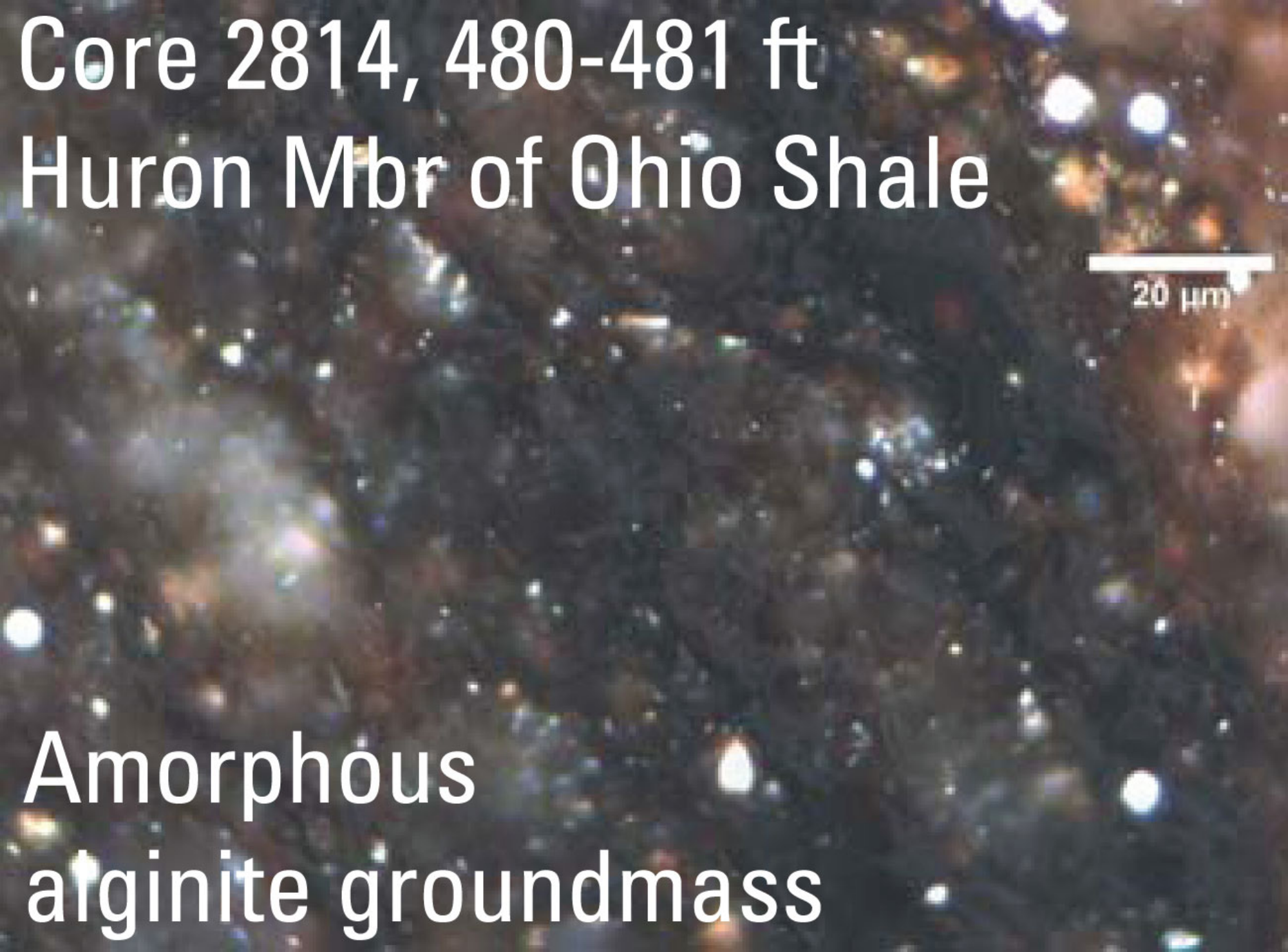

20 µm
Bessemer and Lake Erie Railroad Co.
(OH-4), Marcellus Shale,
1,342-1,343 ft
Telalginite in groundmass
of amorphous alginite

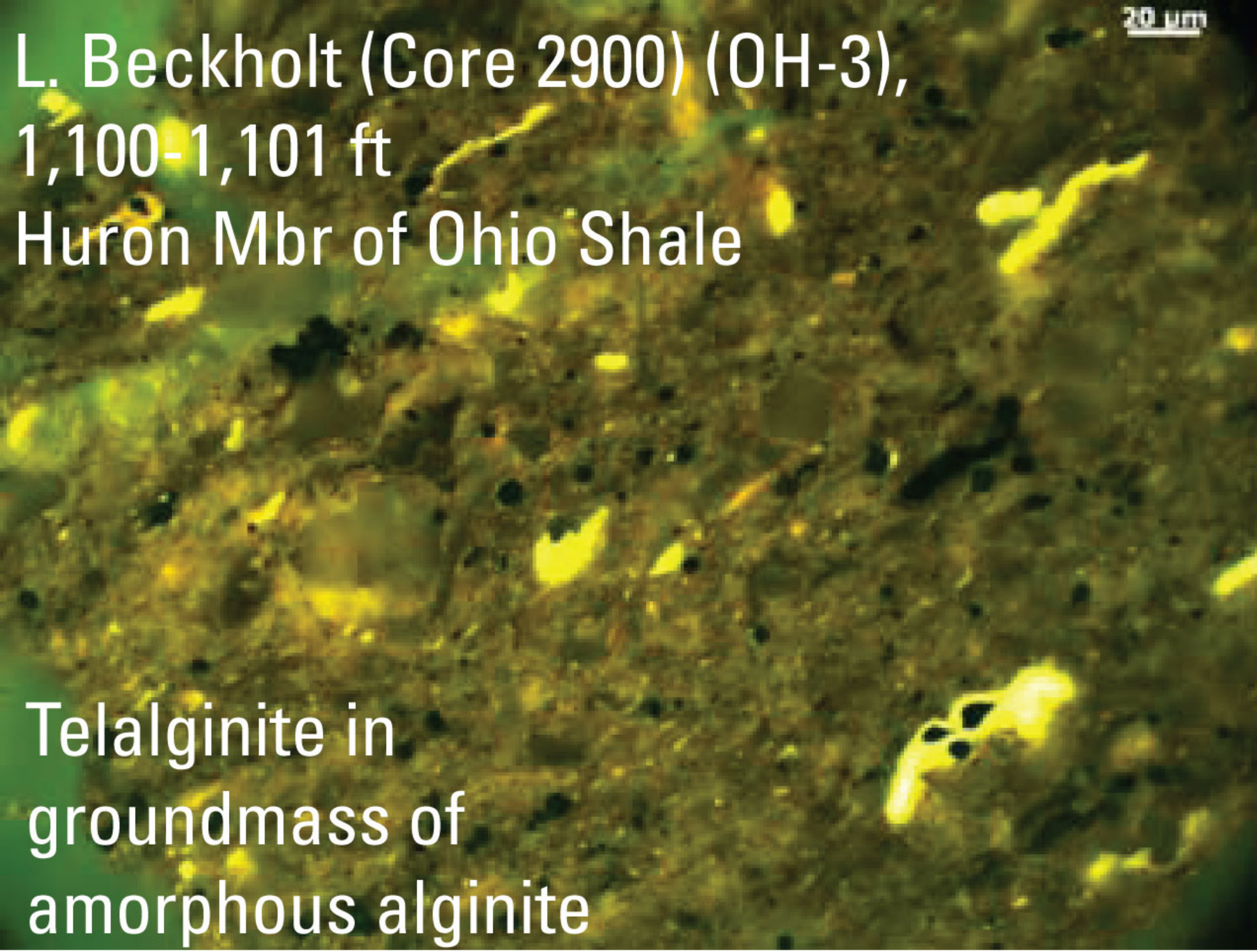

Core 2770, 708-713 ft
Huron Mbr of Ohio Shale
20 µm
Bituminite,
Ro = 0.212%

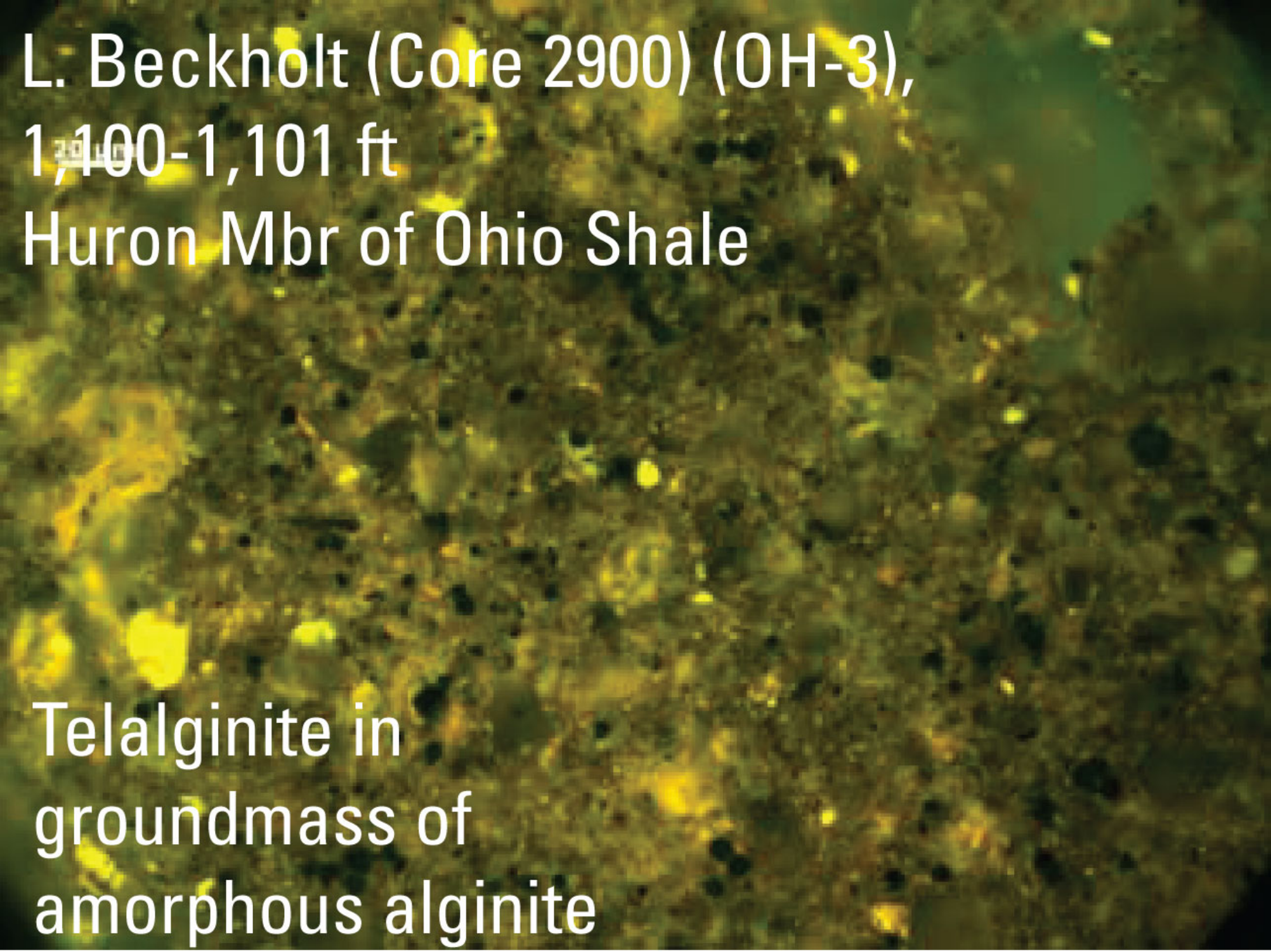

20 µm
Tasmanites
in UV light
Core 2770, 708-713 ft
Huron Mbr of Ohio Shale

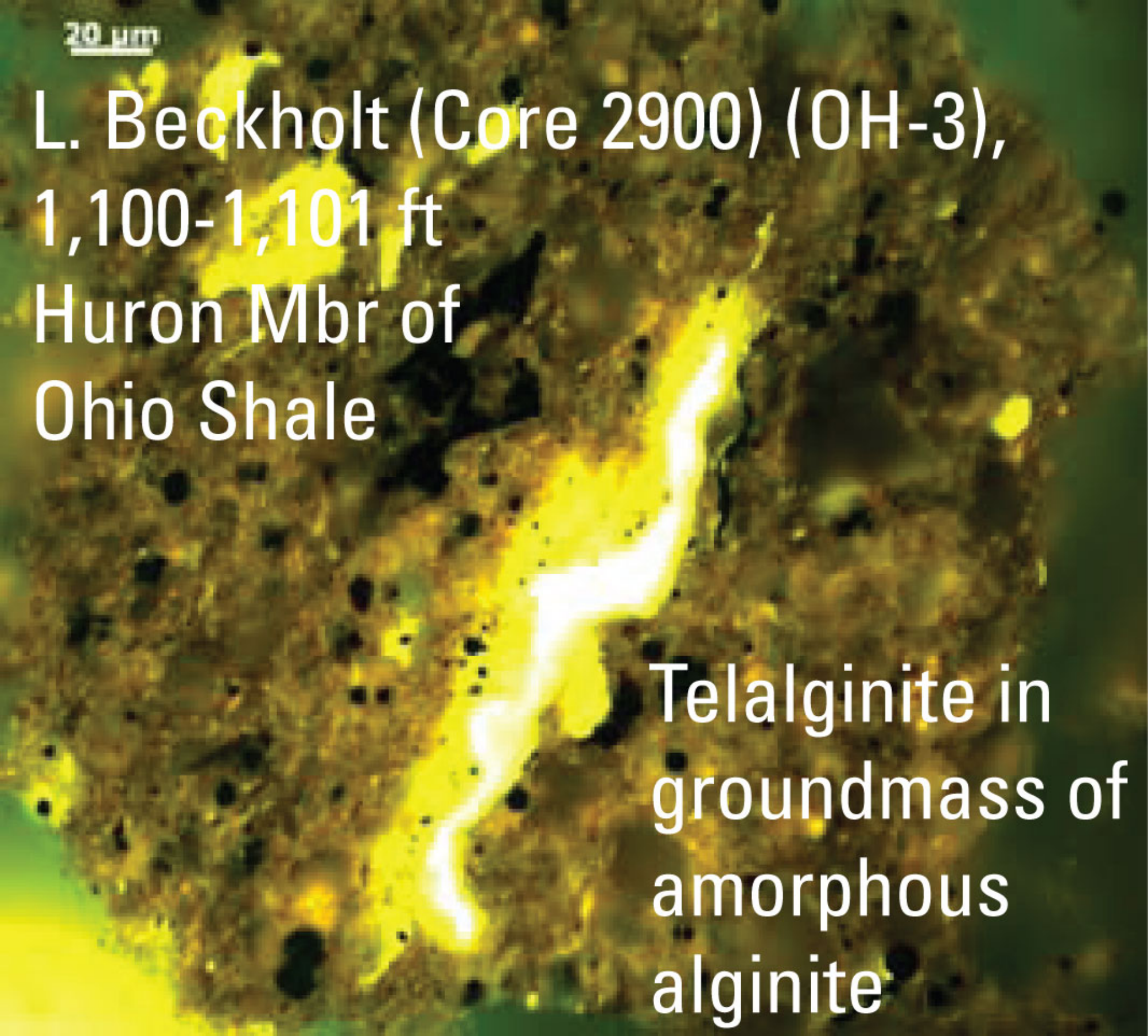

Core 2770, 708-713 ft
Huron Mbr of Ohio Shale
20 µm
Vitrinite/Bitumen?,
Ro = 0.517%

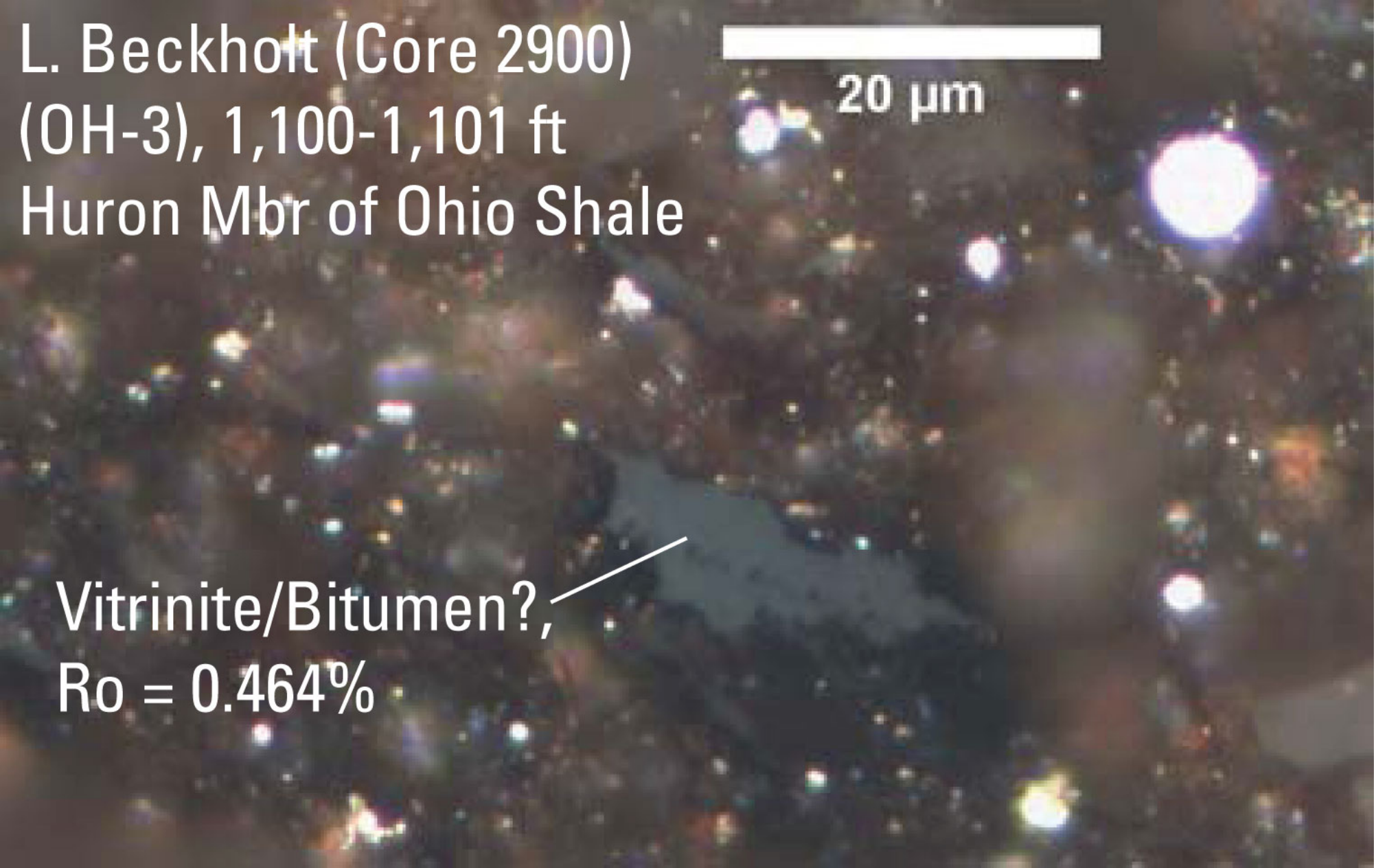

20 µm
Bitumen,
Ro = 0.480%
Core 2770, 708-713 ft
Huron Mbr of Ohio Shale

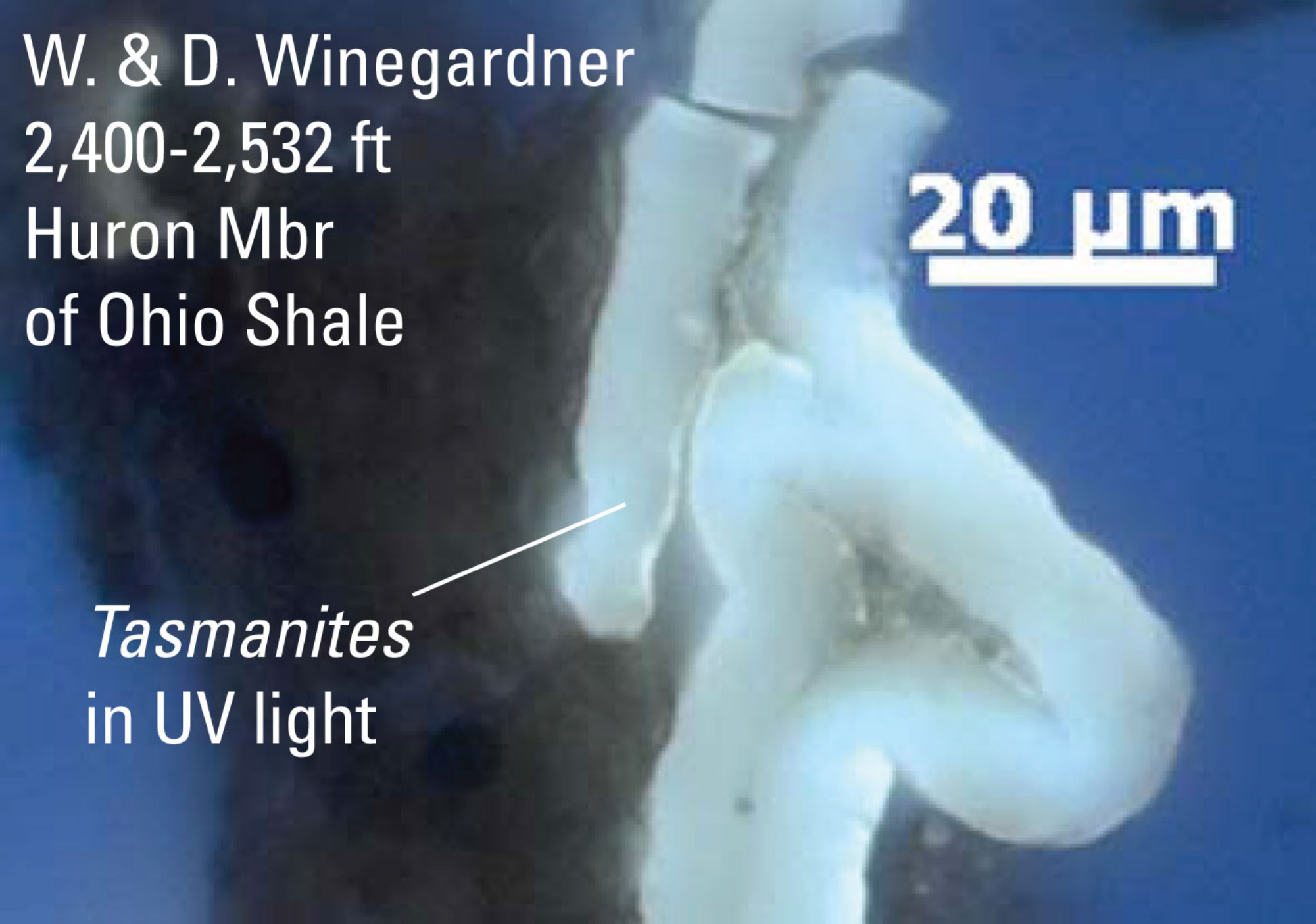

Core 2814, 480-481 ft
Huron Mbr of Ohio Shale
20 µm
Amorphous
alginite groundmass

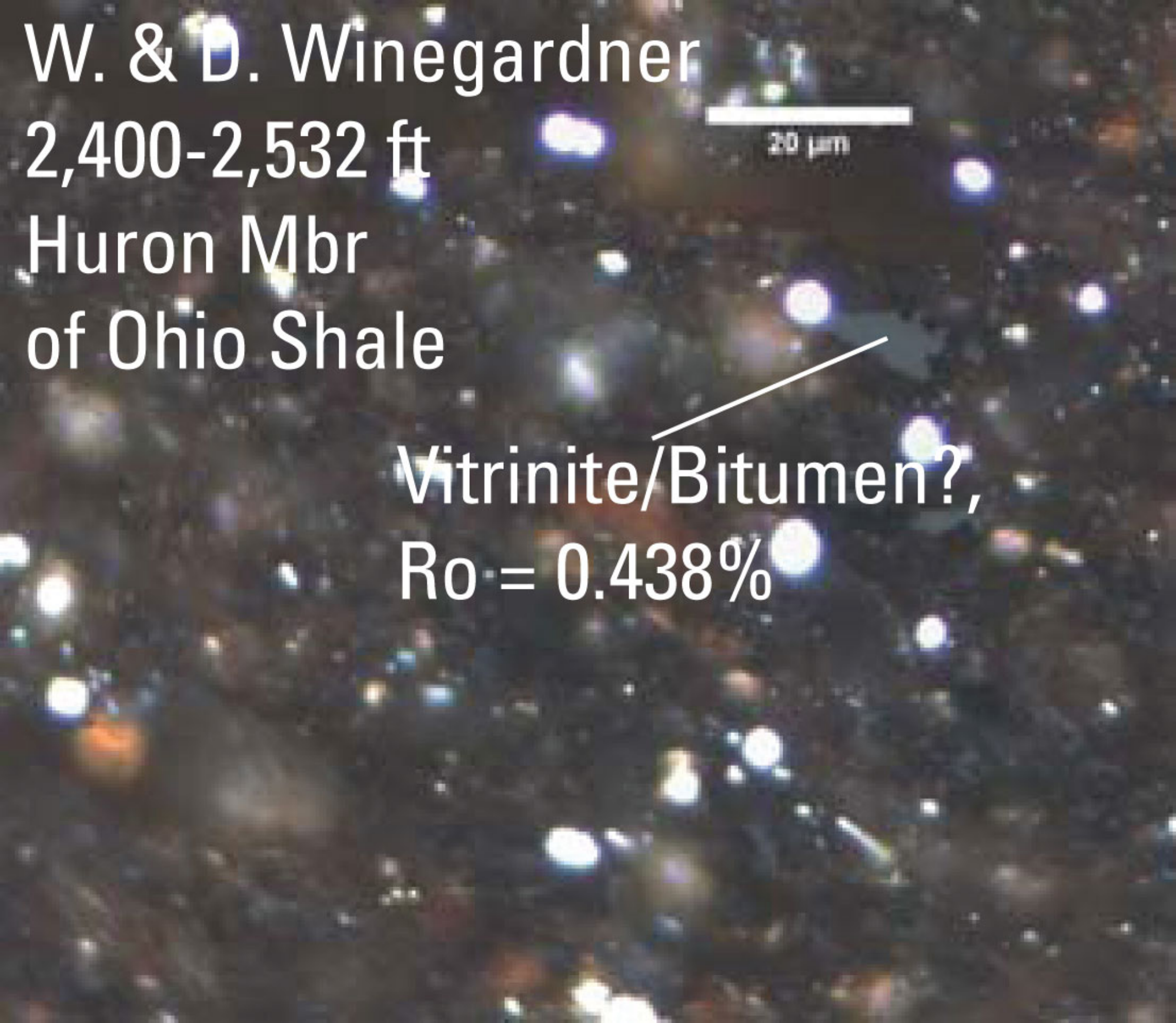

20 µm
L. Beckholt (Core 2900) (OH-3),
1,100-1,101 ft
Huron Mbr of Ohio Shale
Telalginite in
groundmass of
amorphous alginite

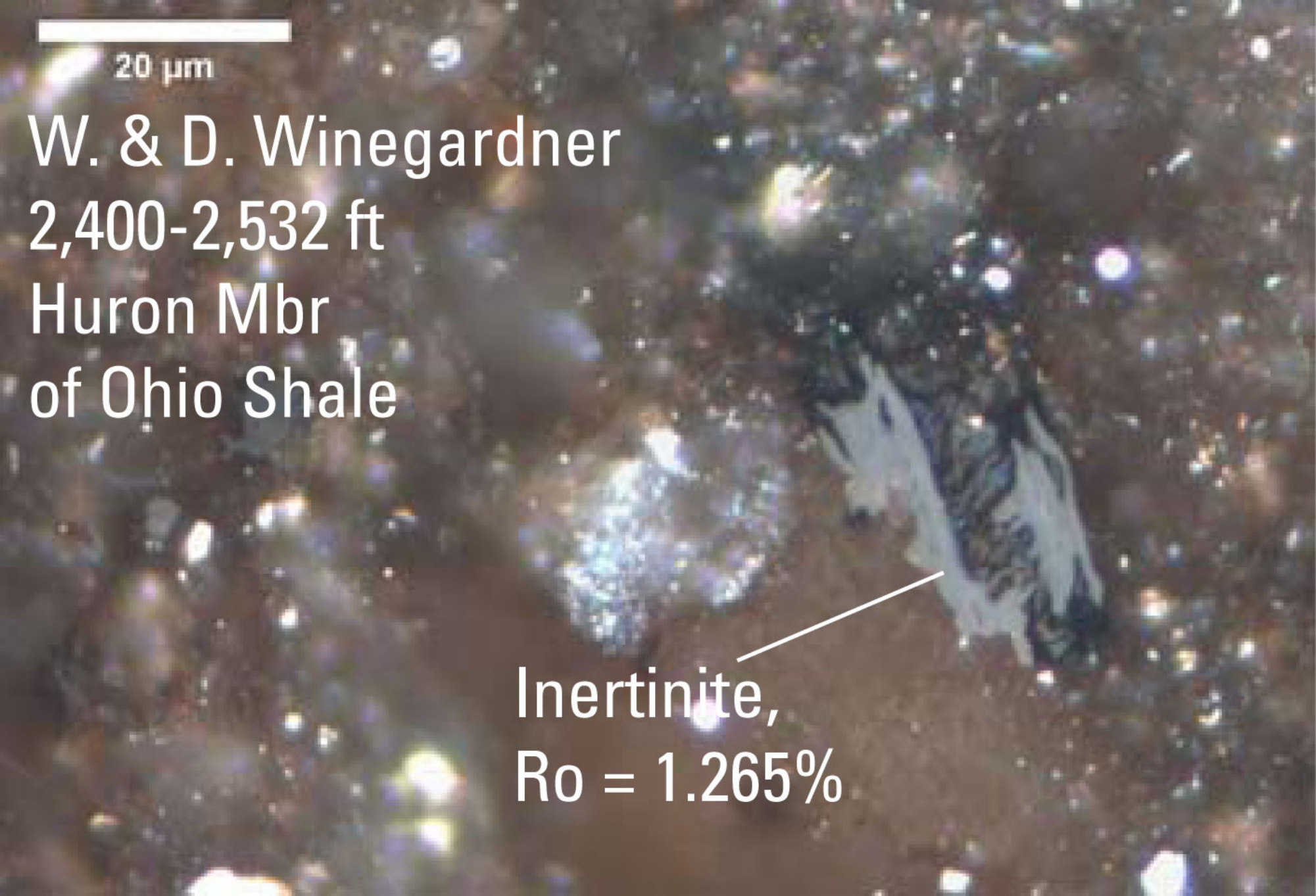

L. Beckholt (Core 2900) (OH-3),
1,100-1,101 ft
Huron Mbr of Ohio Shale
Telalginite in
groundmass of
amorphous alginite

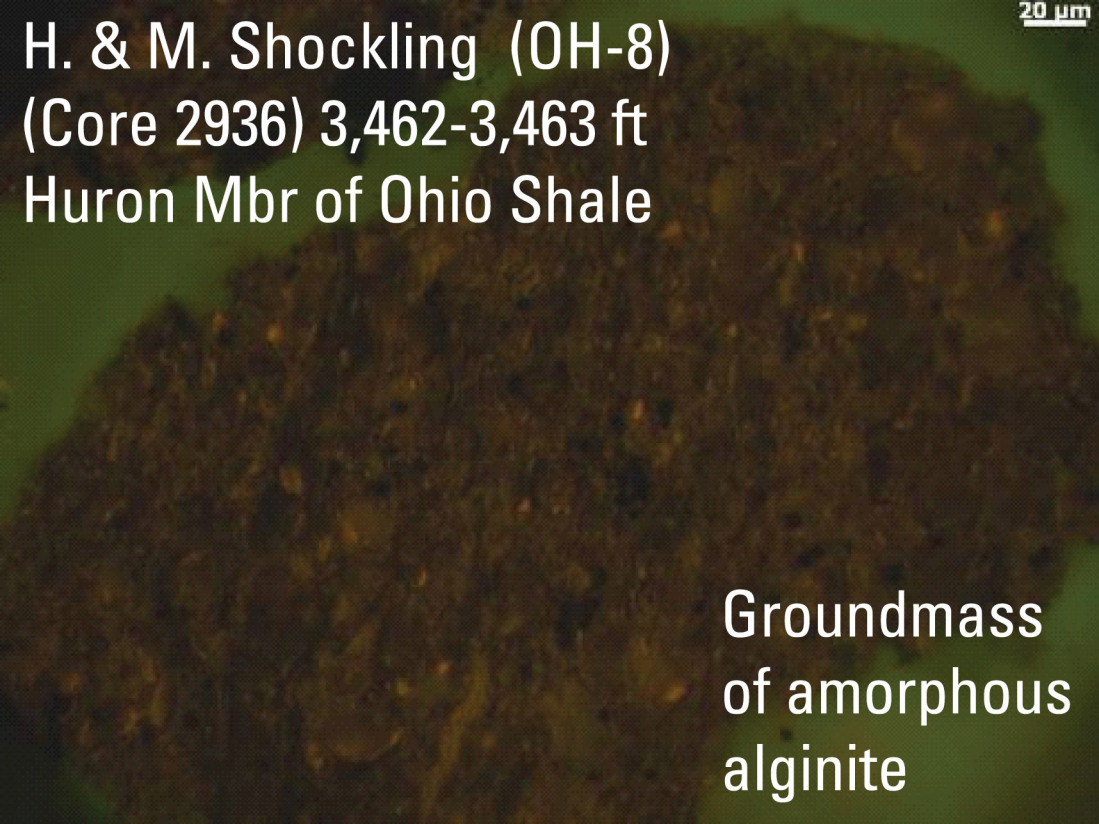

20 µm
L. Beckholt (Core 2900) (OH-3),
1,100-1,101 ft
Huron Mbr of
Ohio Shale
Telalginite in
groundmass of
amorphous
alginite

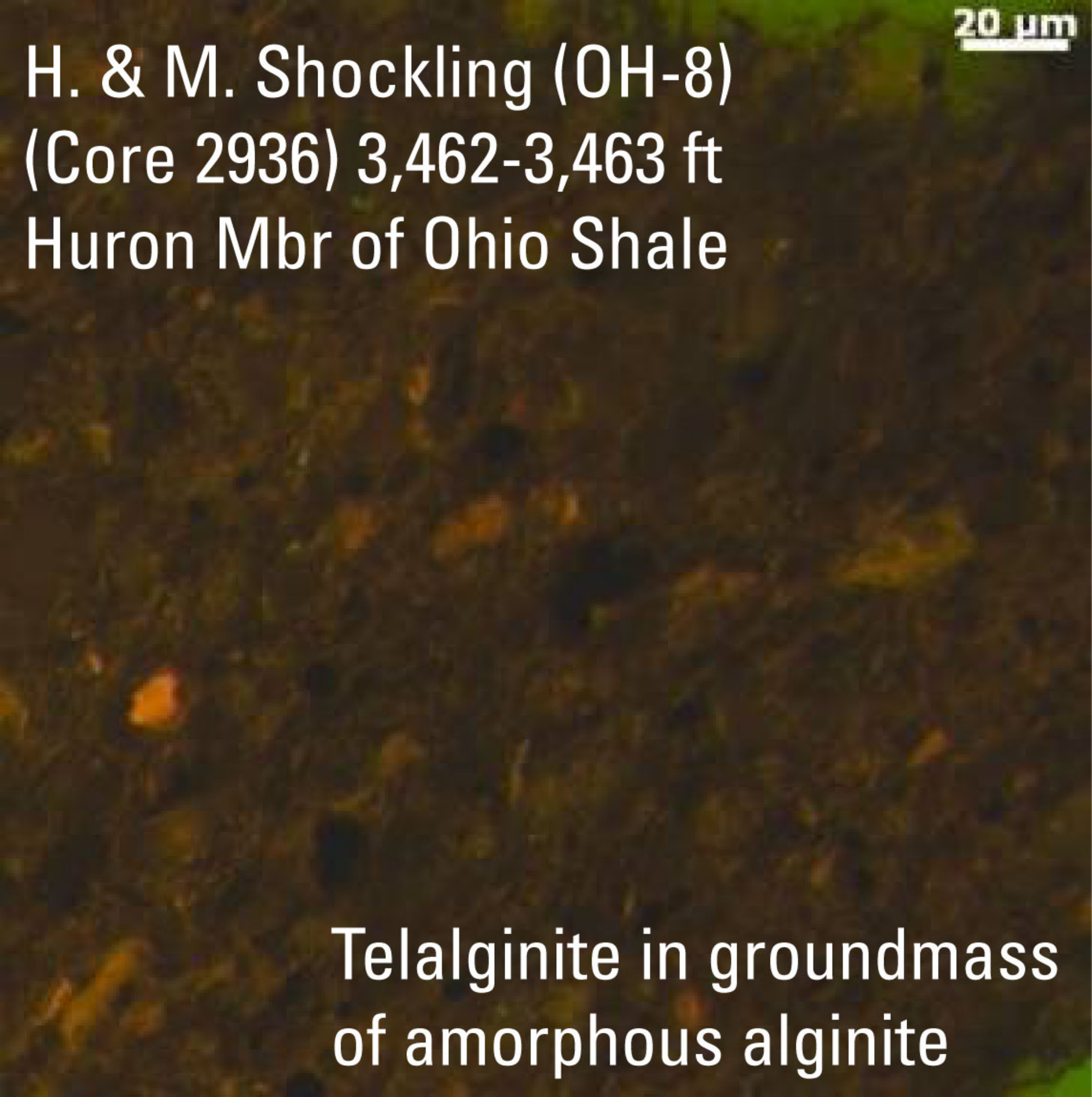

L. Beckholt (Core 2900)
(OH-3), 1,100-1,101 ft
Huron Mbr of Ohio Shale
20 µm
Vitrinite/Bitumen?,
Ro = 0.464%

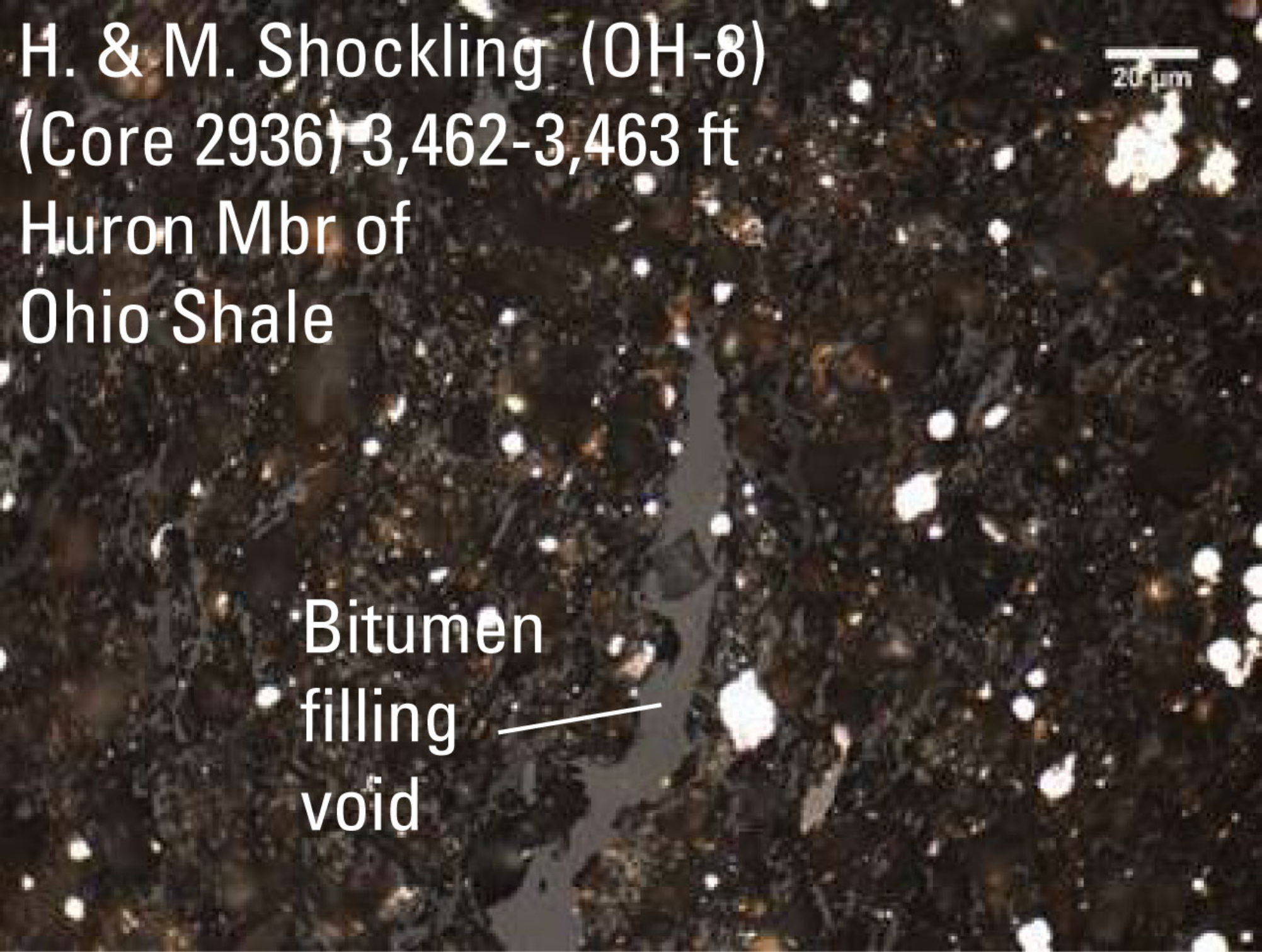

W. & D. Winegardner
2,400-2,532 ft
Huron Mbr
of Ohio Shale
20 µm
Tasmanites
in UV light

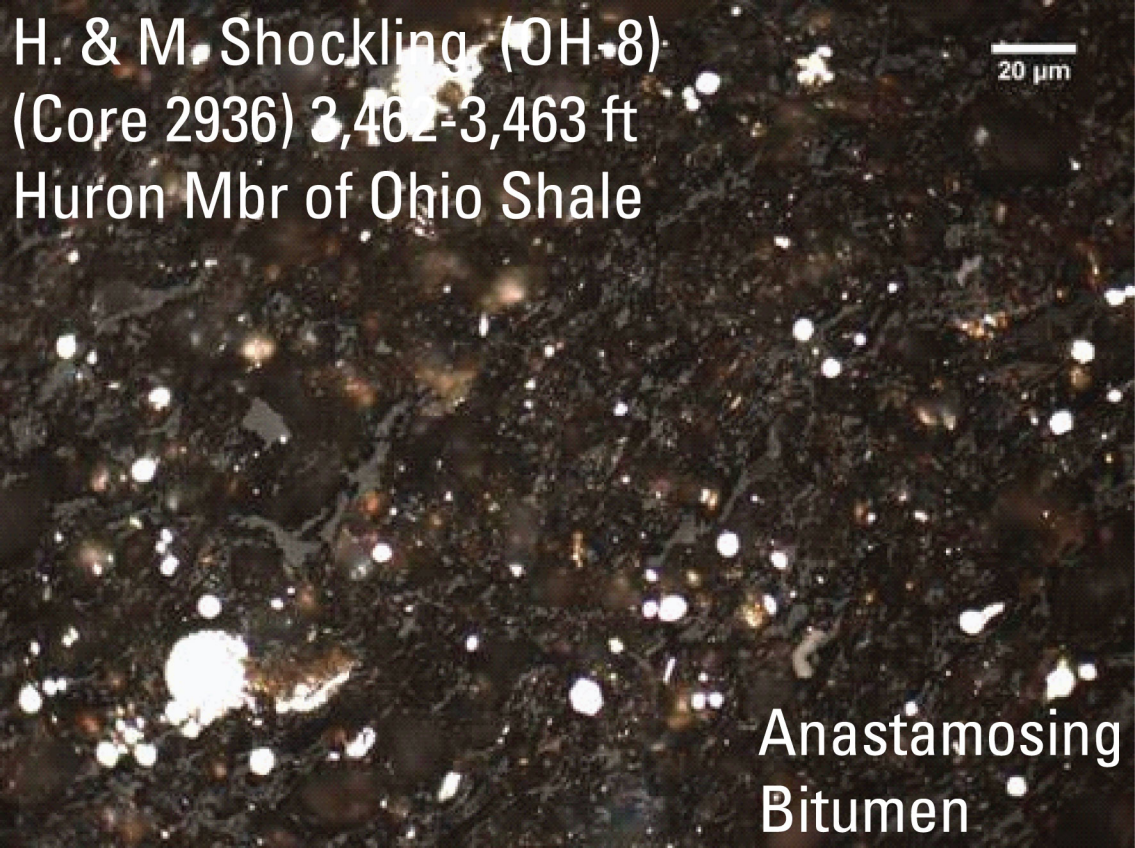

W. & D. Winegardner
2,400-2,532 ft
Huron Mbr
of Ohio Shale
20 µm
Vitrinite/Bitumen?,
Ro = 0.438%

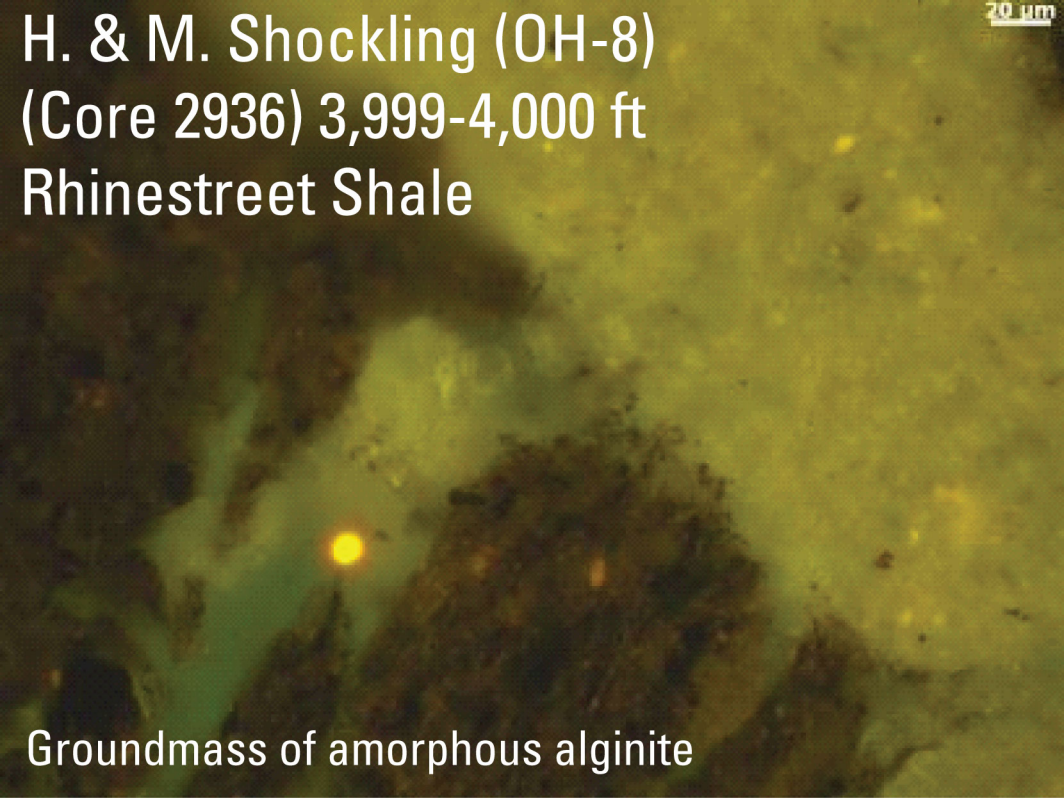

20 µm
W. & D. Winegardner
2,400-2,532 ft
Huron Mbr
of Ohio Shale
Inertinite,
Ro = 1.265%

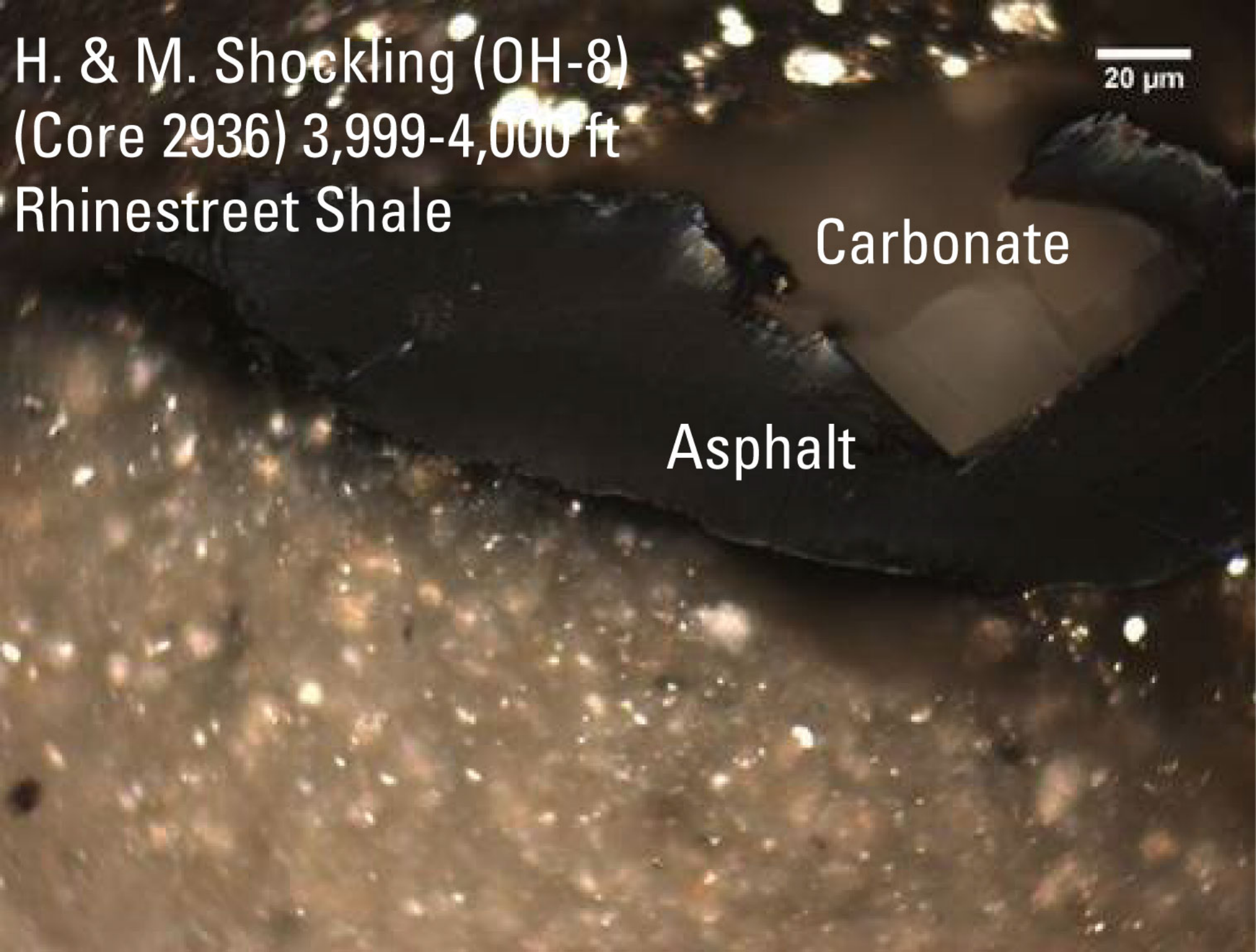

20 µm
H. & M. Shockling (OH-8)
(Core 2936) 3,462-3,463 ft
Huron Mbr of Ohio Shale
Groundmass
of amorphous
alginite

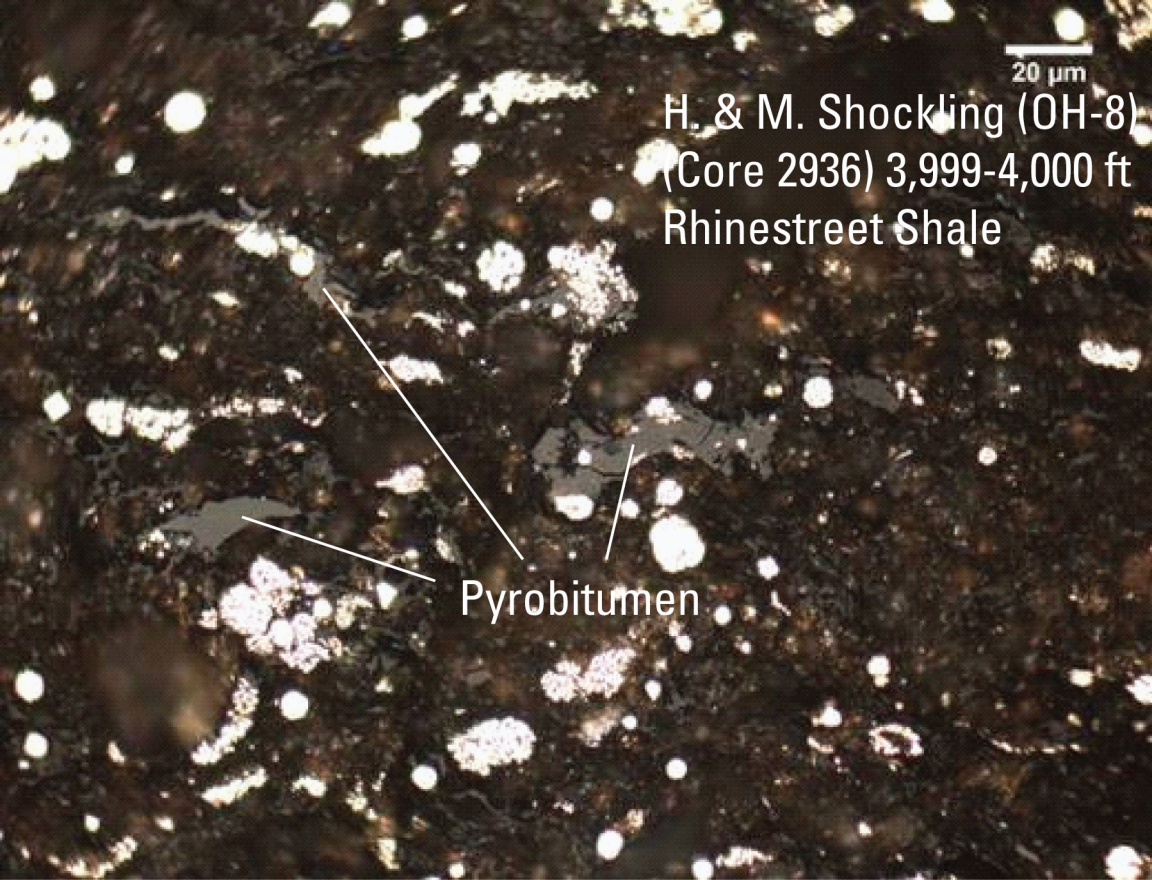

20 µm
H. & M. Shockling (OH-8)
(Core 2936) 3,462-3,463 ft
Huron Mbr of Ohio Shale
Telalginite in groundmass
of amorphous alginite

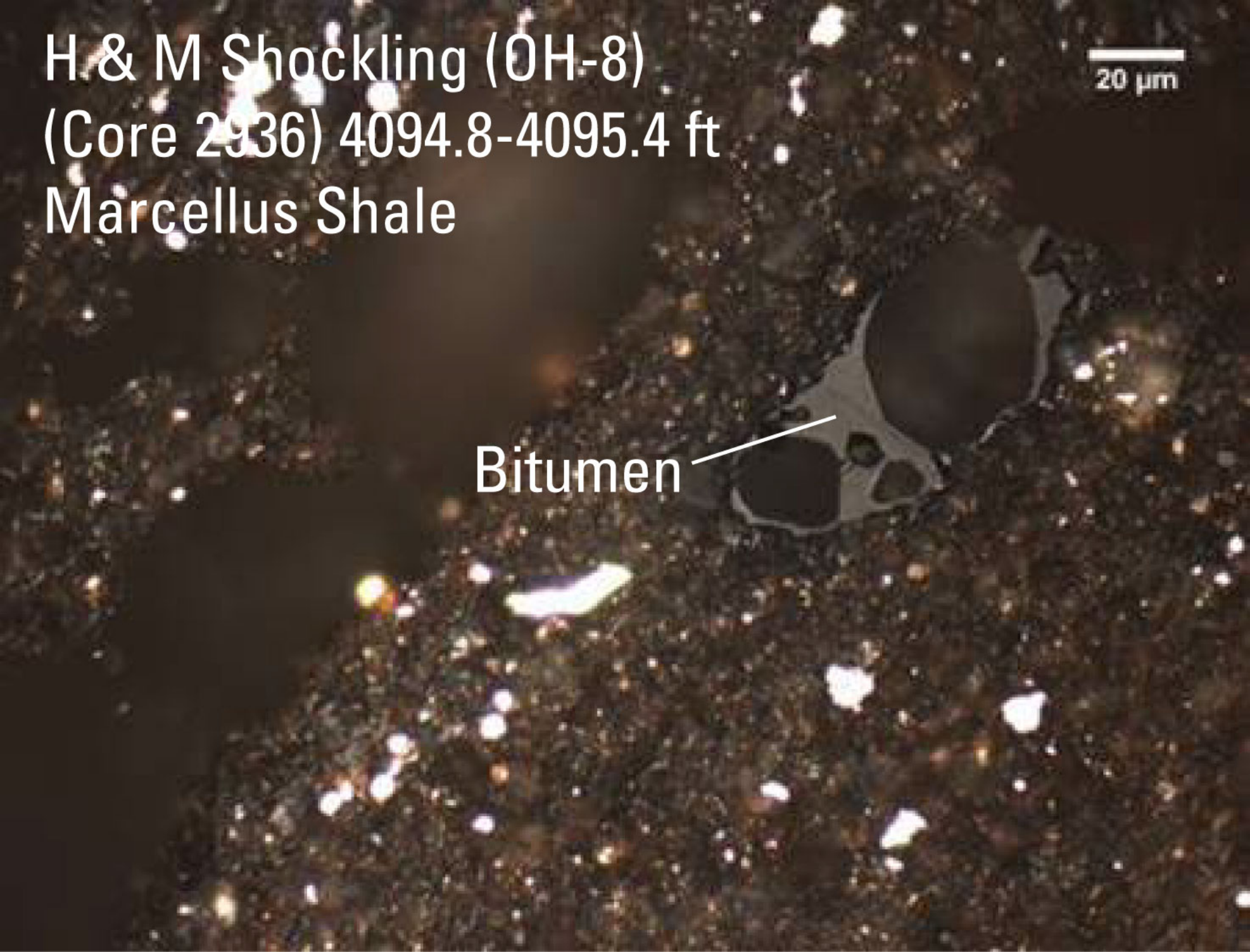

H. & M. Shockling (OH-8)
(Core 2936) 3,462-3,463 ft
Huron Mbr of
Ohio Shale
20 µm
Bitumen
filling
void

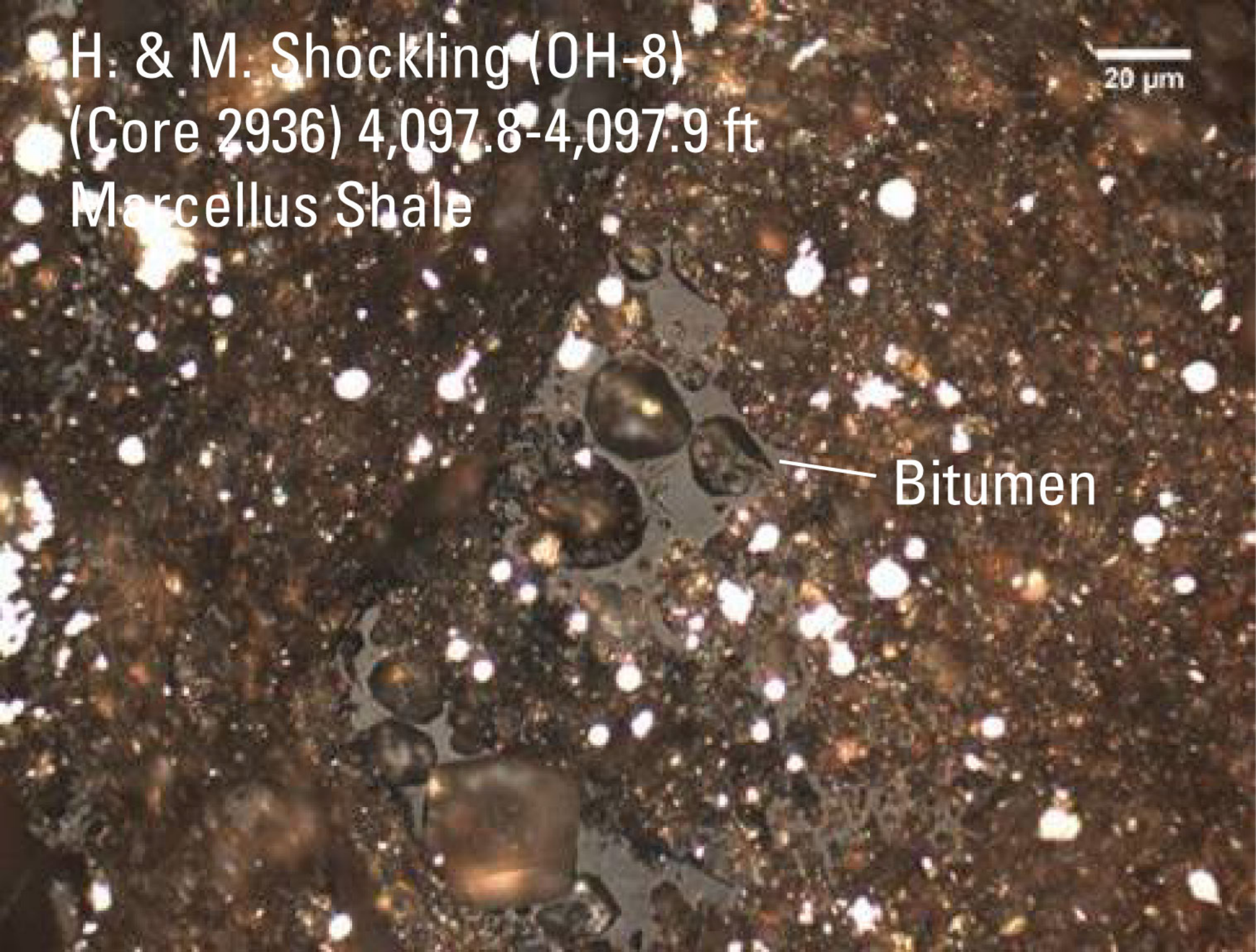

H. & M. Shockling (OH-8)
(Core 2936) 3,462-3,463 ft
Huron Mbr of Ohio Shale
20 µm
Anastamosing
Bitumen


H. & M. Shockling (OH-8)
(Core 2936) 3,999-4,000 ft
Rhinestreet Shale
20 µm
Groundmass of amorphous alginite

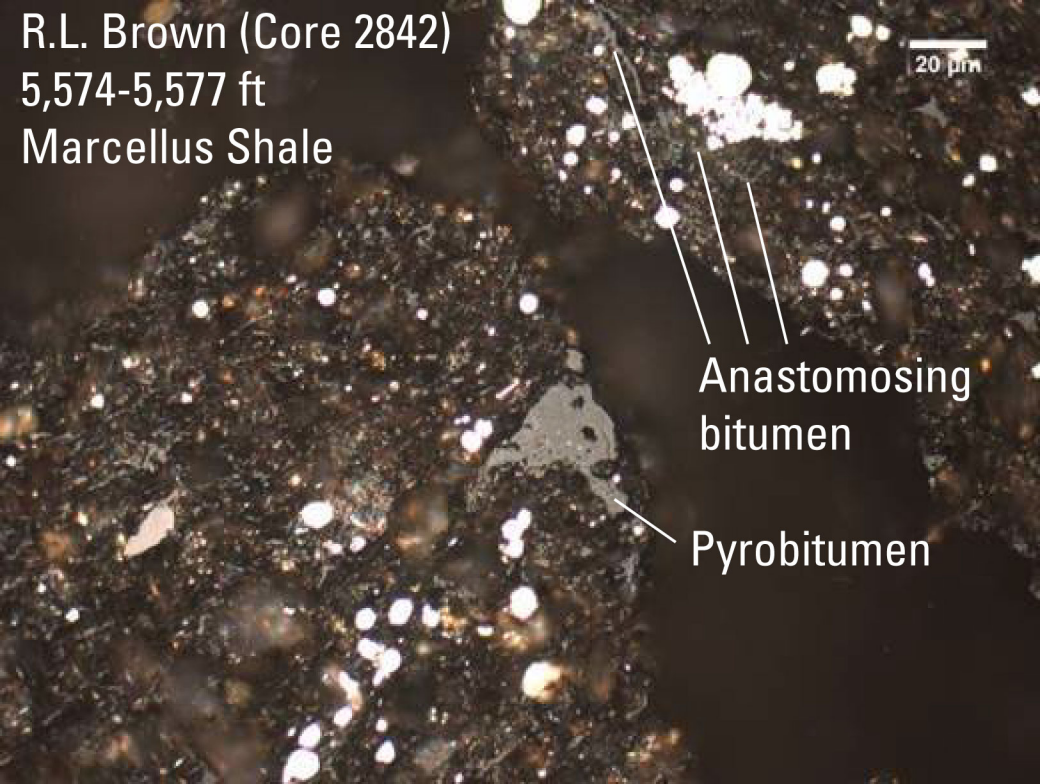

H. & M. Shockling (OH-8)
(Core 2936) 3,999-4,000 ft
Rhinestreet Shale
20 µm
Carbonate
Asphalt

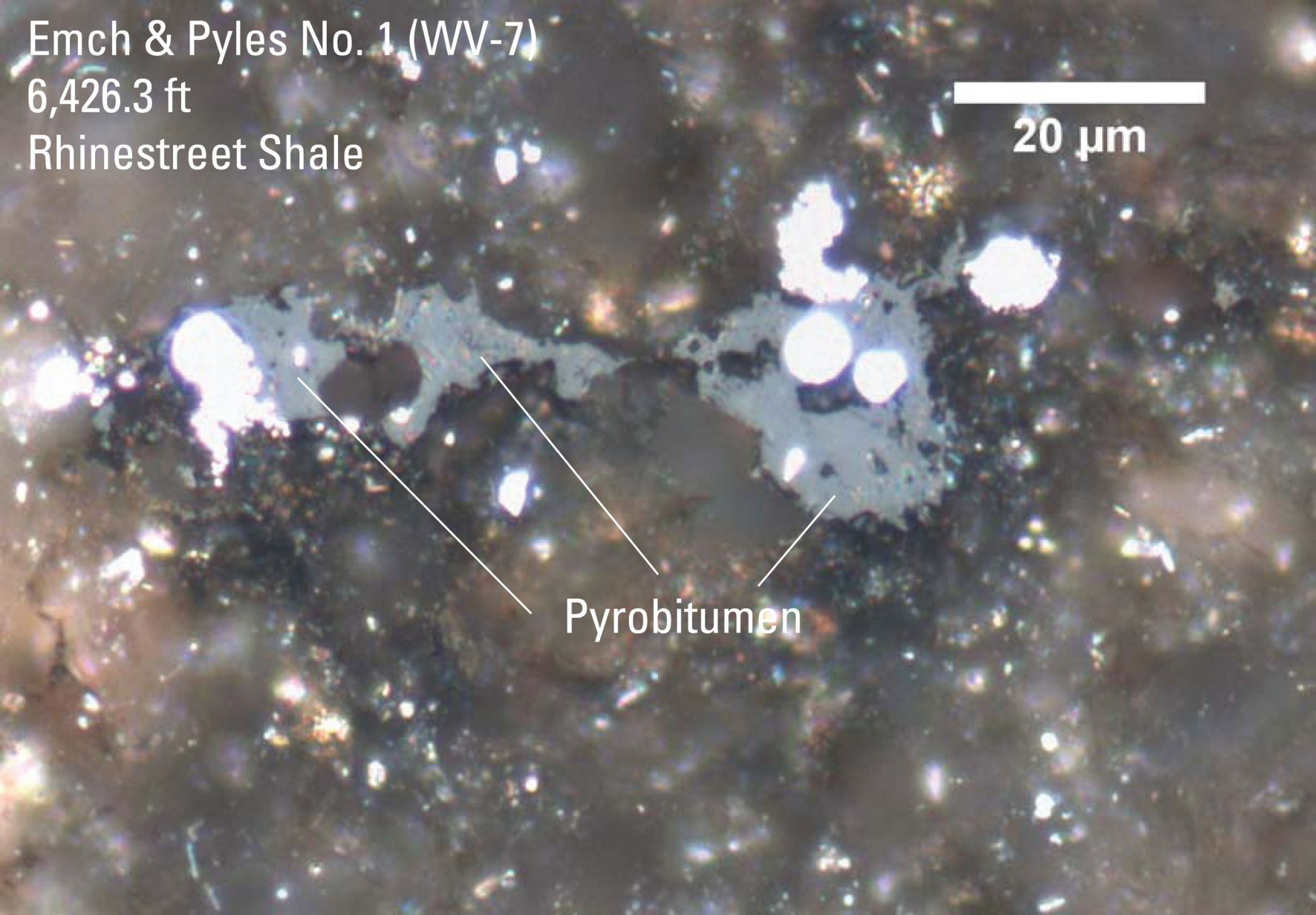

20 µm
H. & M. Shockling (OH-8)
(Core 2936) 3,999-4,000 ft
Rhinestreet Shale
Pyrobitumen

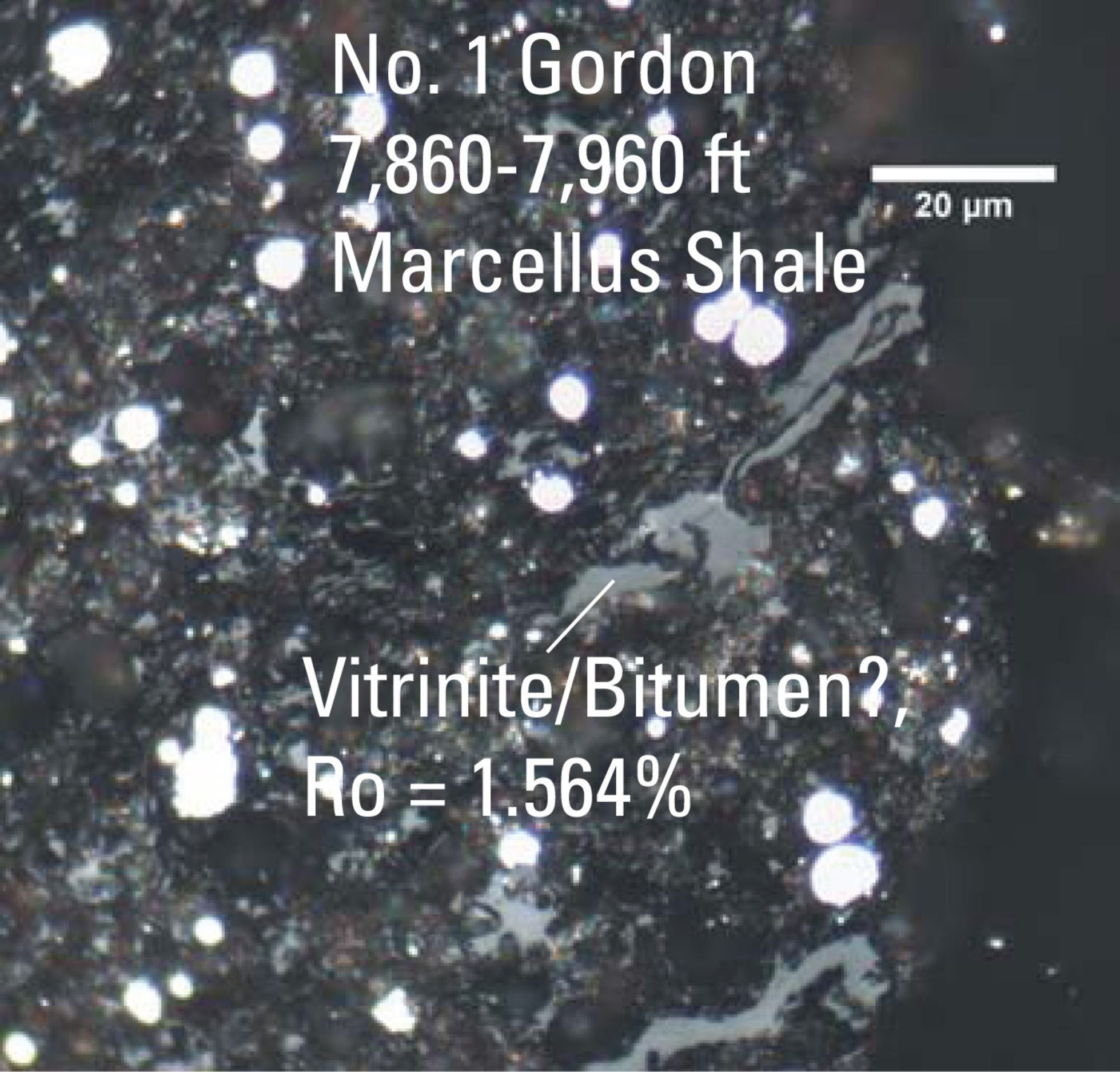

H & M Shockling (OH-8)
(Core 2936) 4094.8-4095.4 ft
Marcellus Shale
20 µm
Bitumen

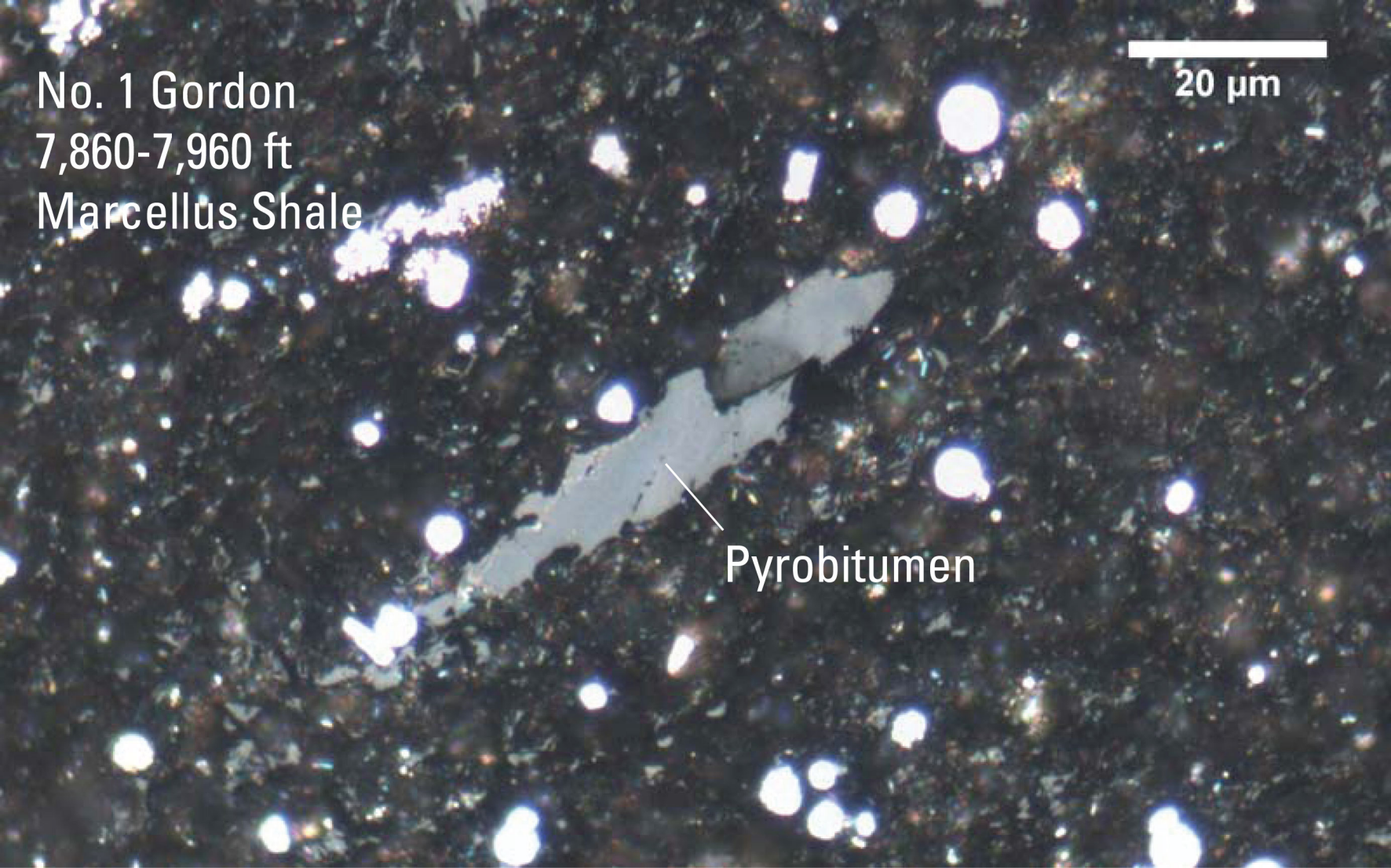

H. & M. Shockling (OH-8)
(Core 2936) 4,097.8-4,097.9 ft
Marcellus Shale
20 µm
Bitumen

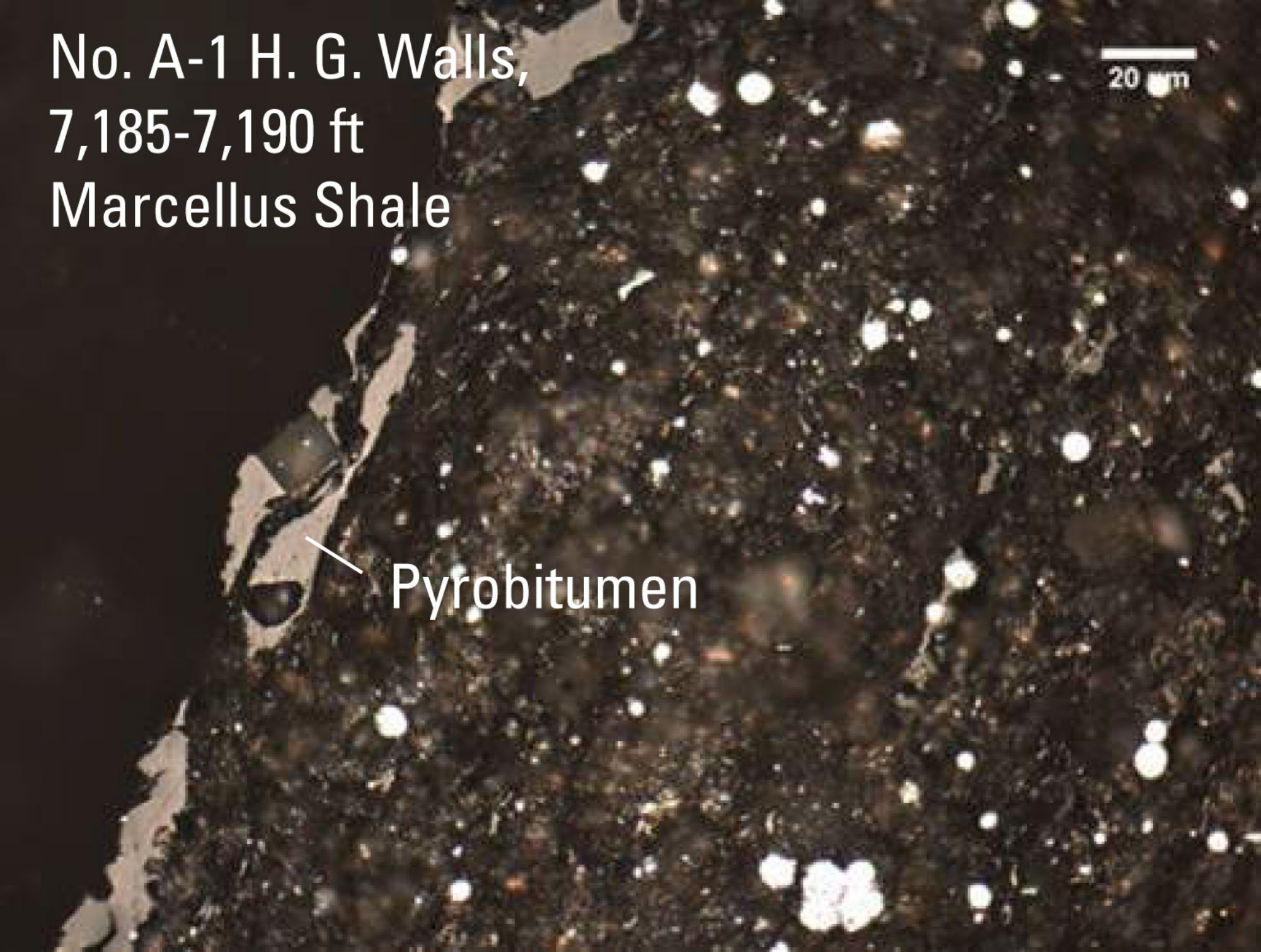

20 µm
R.L. Brown (Core 2842)
5,574-5,577 ft
Marcellus Shale
Telalginite in groundmass of amorphous alginite

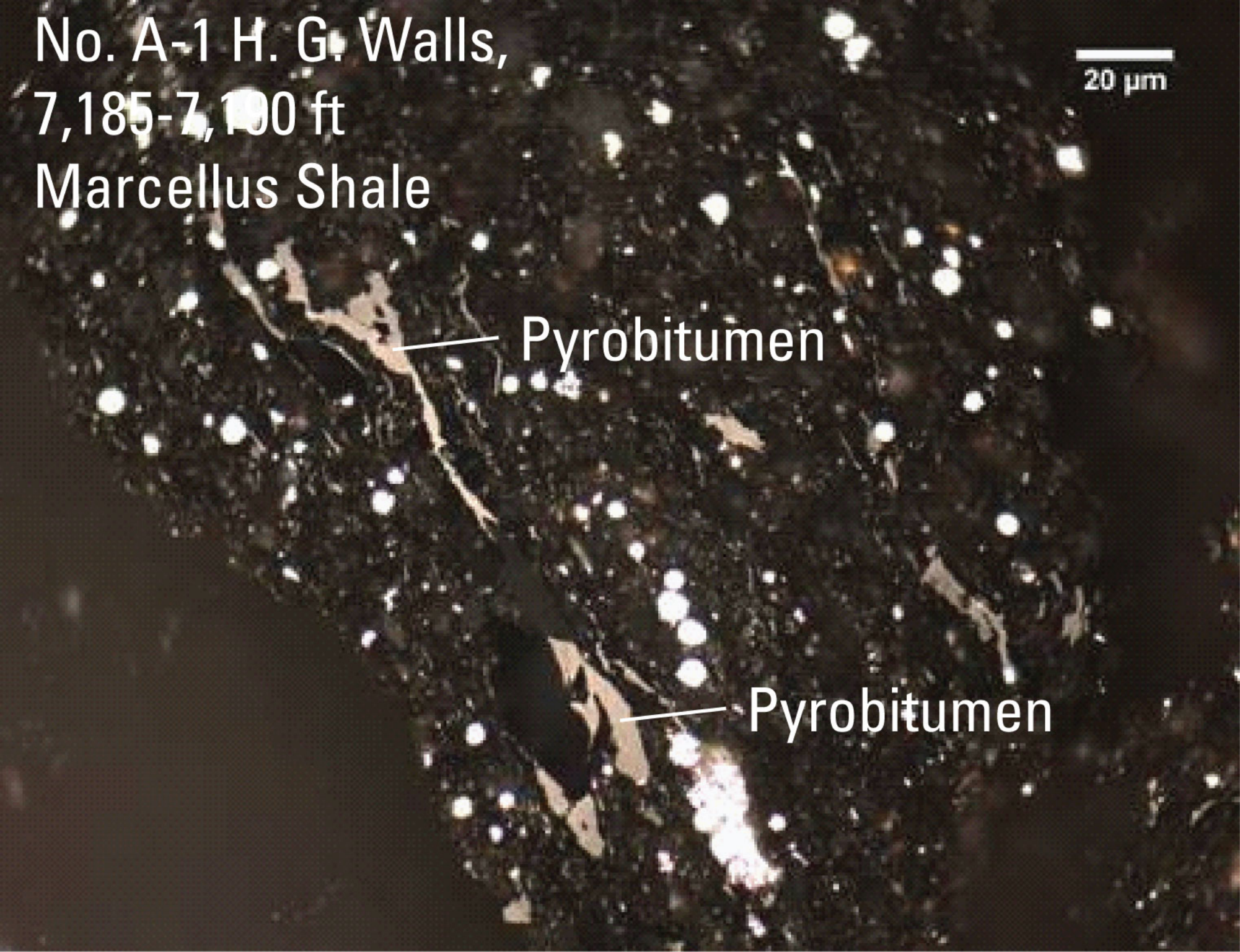

R.L. Brown (Core 2842)
5,574-5,577 ft
Marcellus Shale
20 µm
Anastomosing bitumen
Pyrobitumen


Emch & Pyles No. 1 (WV-7)
6,426.3 ft
Rhinestreet Shale
20 µm
Pyrobitumen

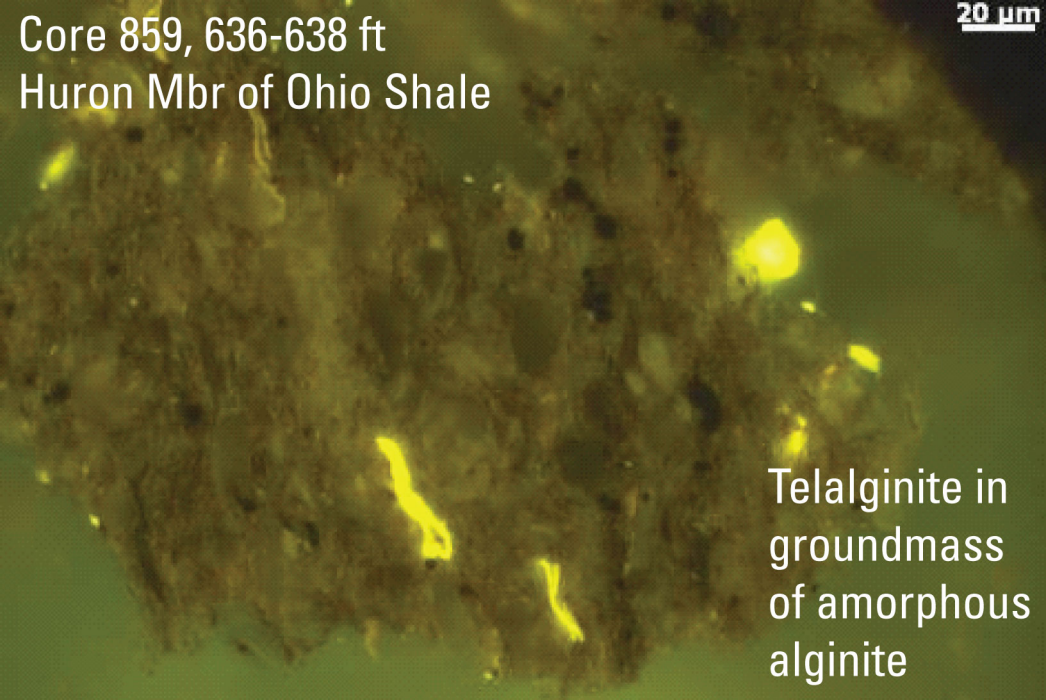

No. 1 Gordon
7,860-7,960 ft
Marcellus Shale
20 µm
Vitrinite/Bitumen?,
Ro = 1.564%


No. 1 Gordon
7,860-7,960 ft
Marcellus Shale
20 µm
Pyrobitumen


No. A-1 H. G. Walls,
7,185-7,190 ft
Marcellus Shale
20 µm
Pyrobitumen

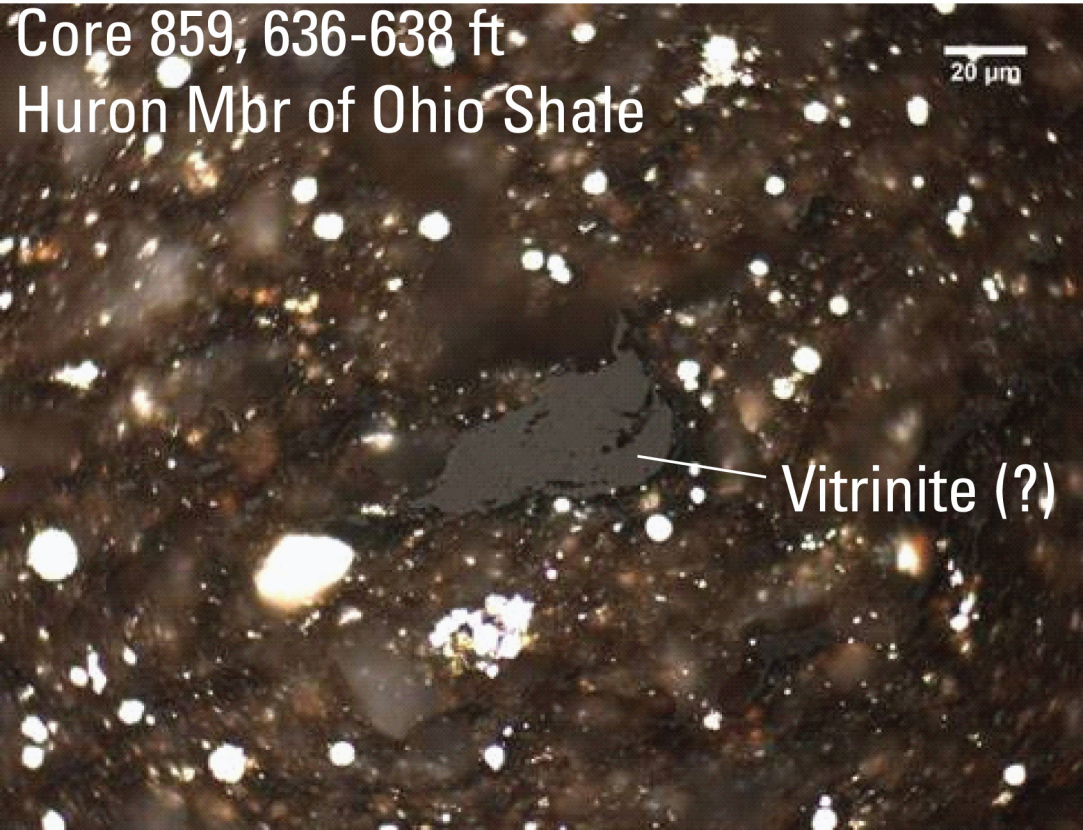

No. A-1 H. G. Walls,
7,185-7,190 ft
Marcellus Shale
20 µm
Pyrobitumen
Pyrobitumen

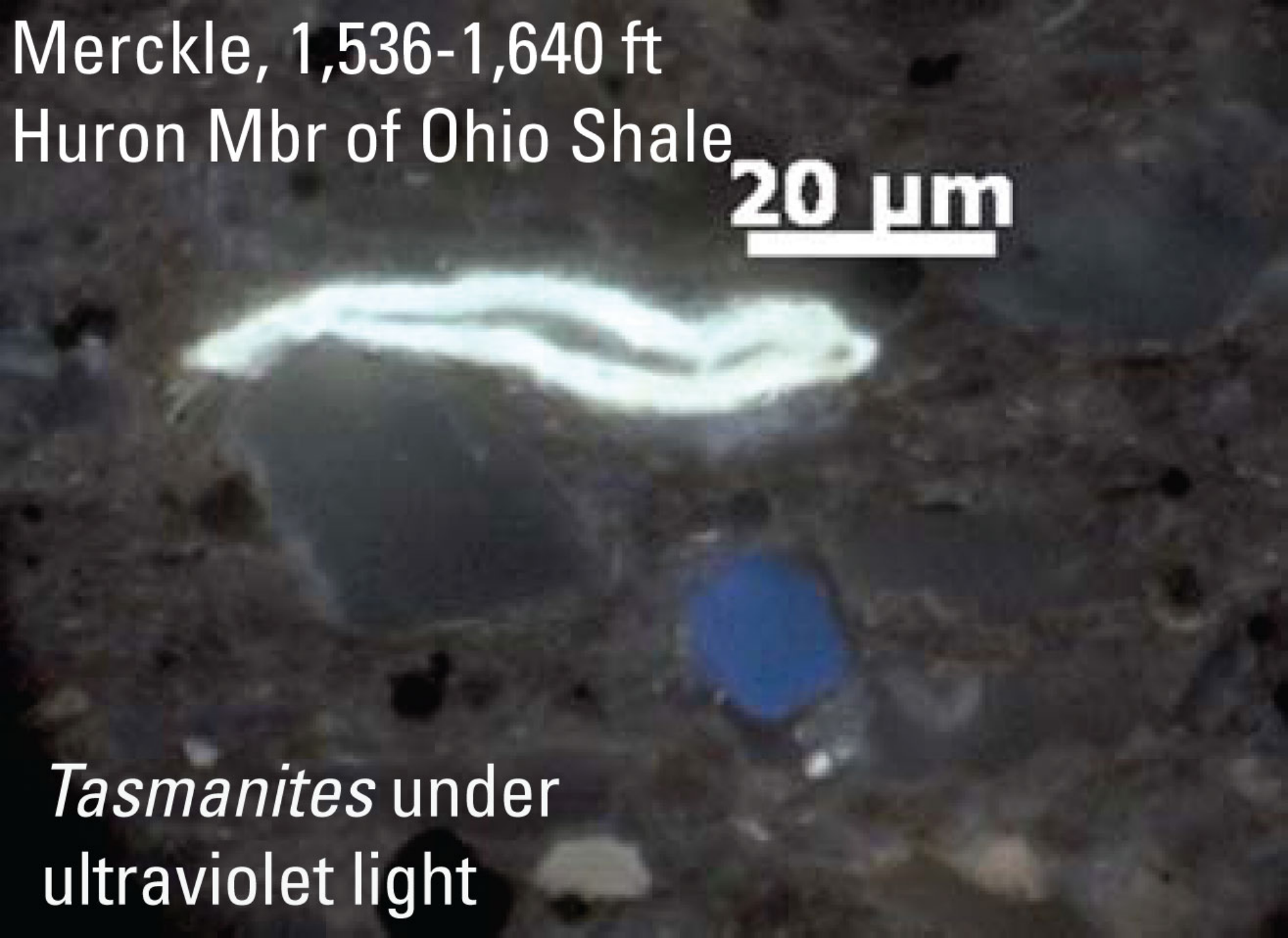

No. A-1 H. G. Walls,
7,185-7,190 ft
Marcellus Shale
20 µm
Pyrite
framboids

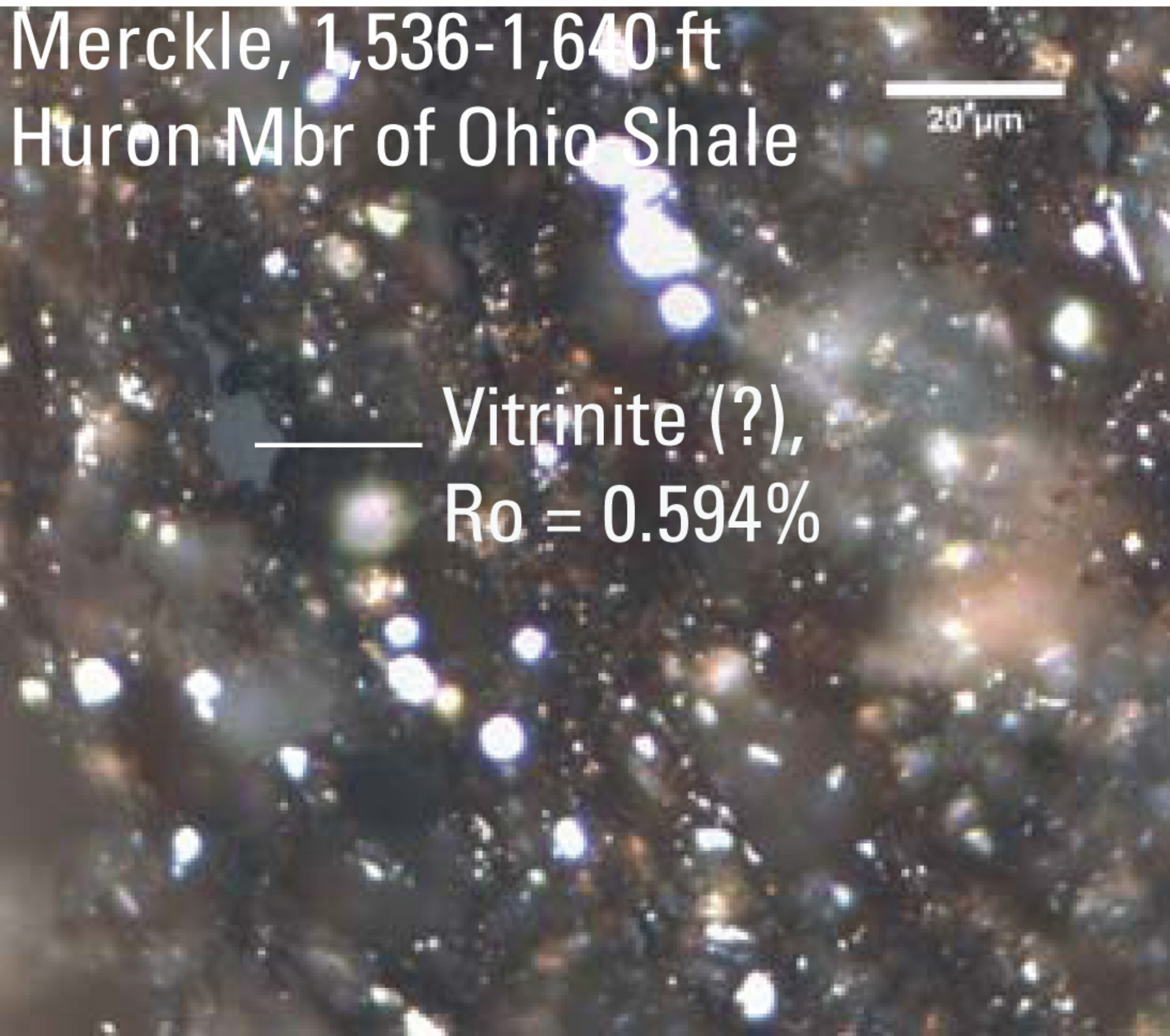

Core 859, 636-638 ft
Huron Mbr of Ohio Shale
20 µm
Telalginite in groundmass of amorphous alginite

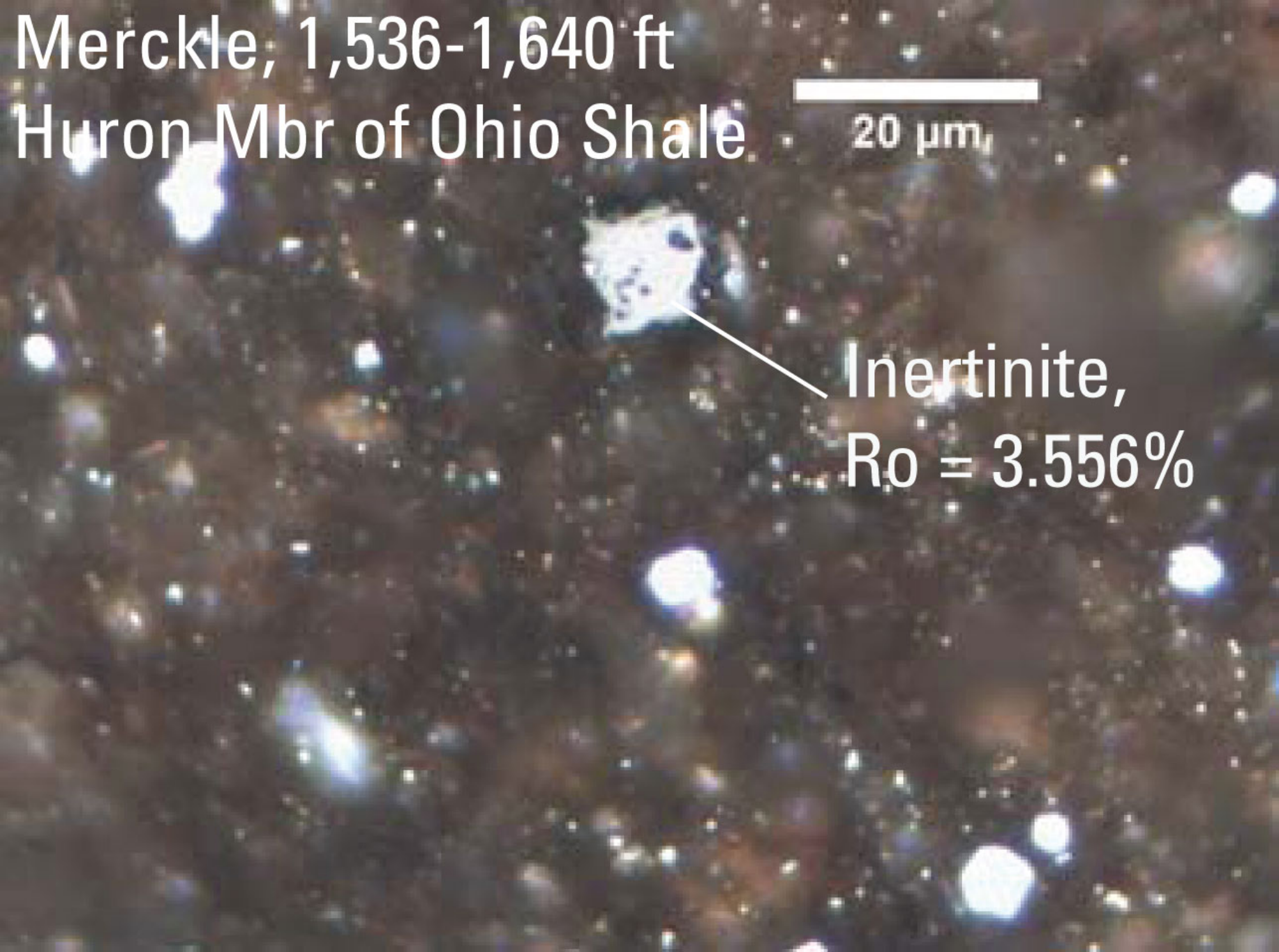

Core 859, 636-638 ft
Huron Mbr of Ohio Shale
Tasmanites under
blue fluorescent light

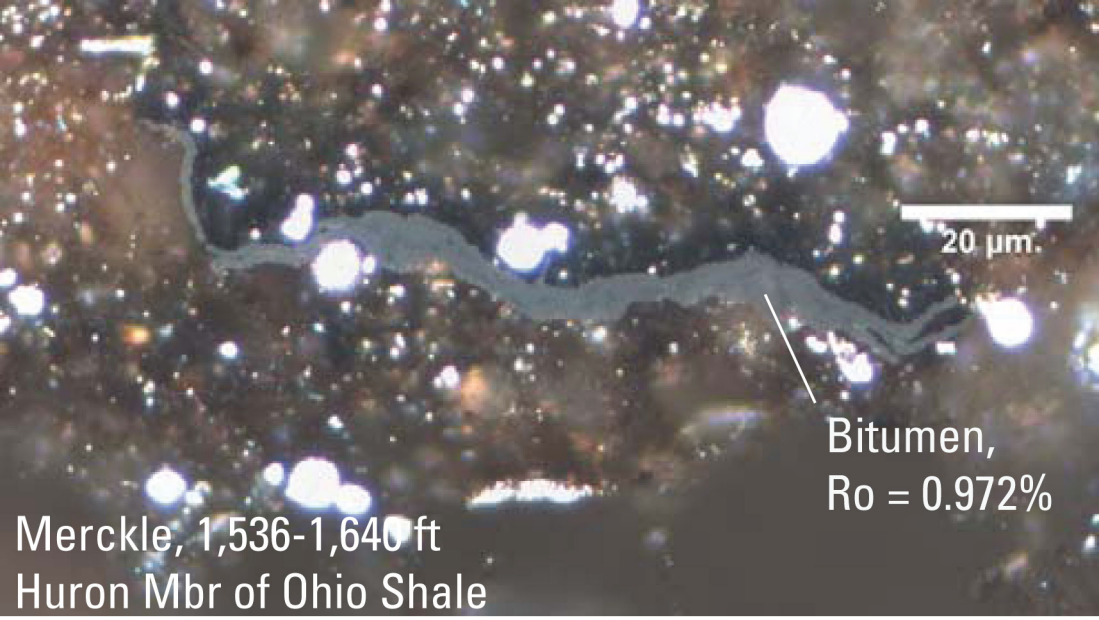

Core 859, 636-638 ft
Huron Mbr of Ohio Shale
20 µm
Tasmanites
under ultra-
violet light

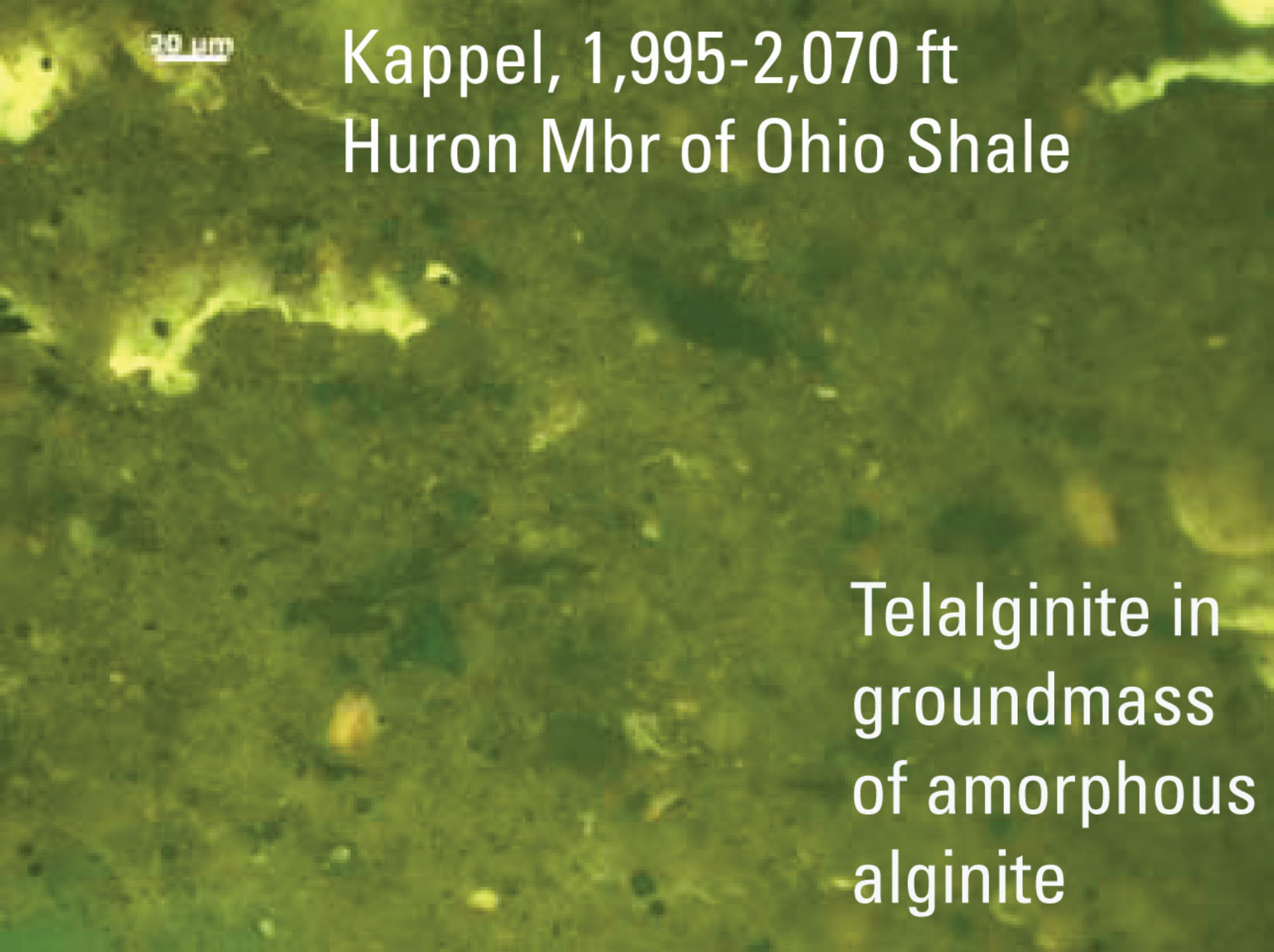

Core 859, 636-638 ft
Huron Mbr of Ohio Shale
20 µm
Vitrinite (?)

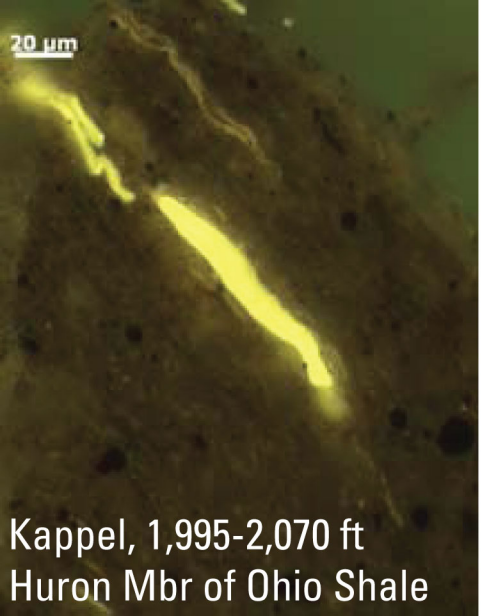

Merckle, 1,536-1,640 ft
Huron Mbr of Ohio Shale
20 µm
Tasmanites under
ultraviolet light


Merckle, 1,536-1,640 ft
Huron Mbr of Ohio Shale
20 µm
Vitrinite (?),
Ro = 0.594%


Merckle, 1,536-1,640 ft
Huron Mbr of Ohio Shale
20 µm
Inertinite,
Ro = 3.556%

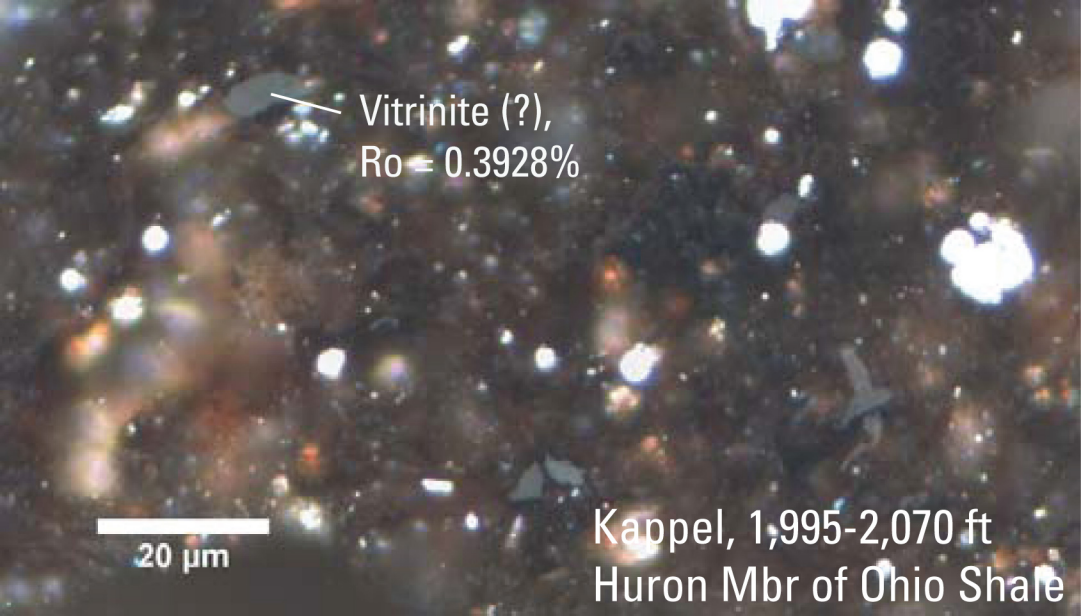

20 µm.
Bitumen,
Ro = 0.972%
Merckle, 1,536-1,640 ft
Huron Mbr of Ohio Shale


30 µm
Kappel, 1,995-2,070 ft
Huron Mbr of Ohio Shale
Telalginite in
groundmass
of amorphous
alginite

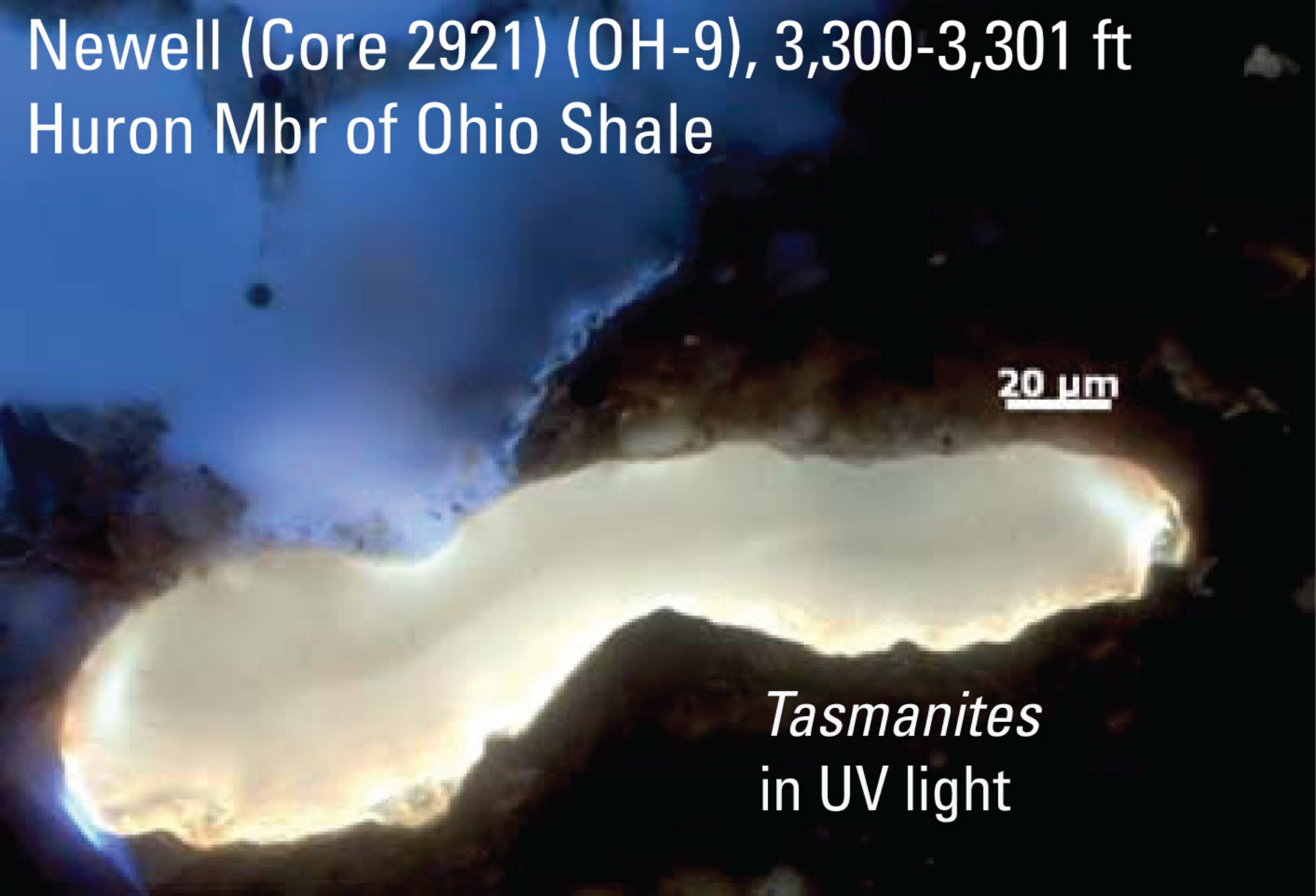


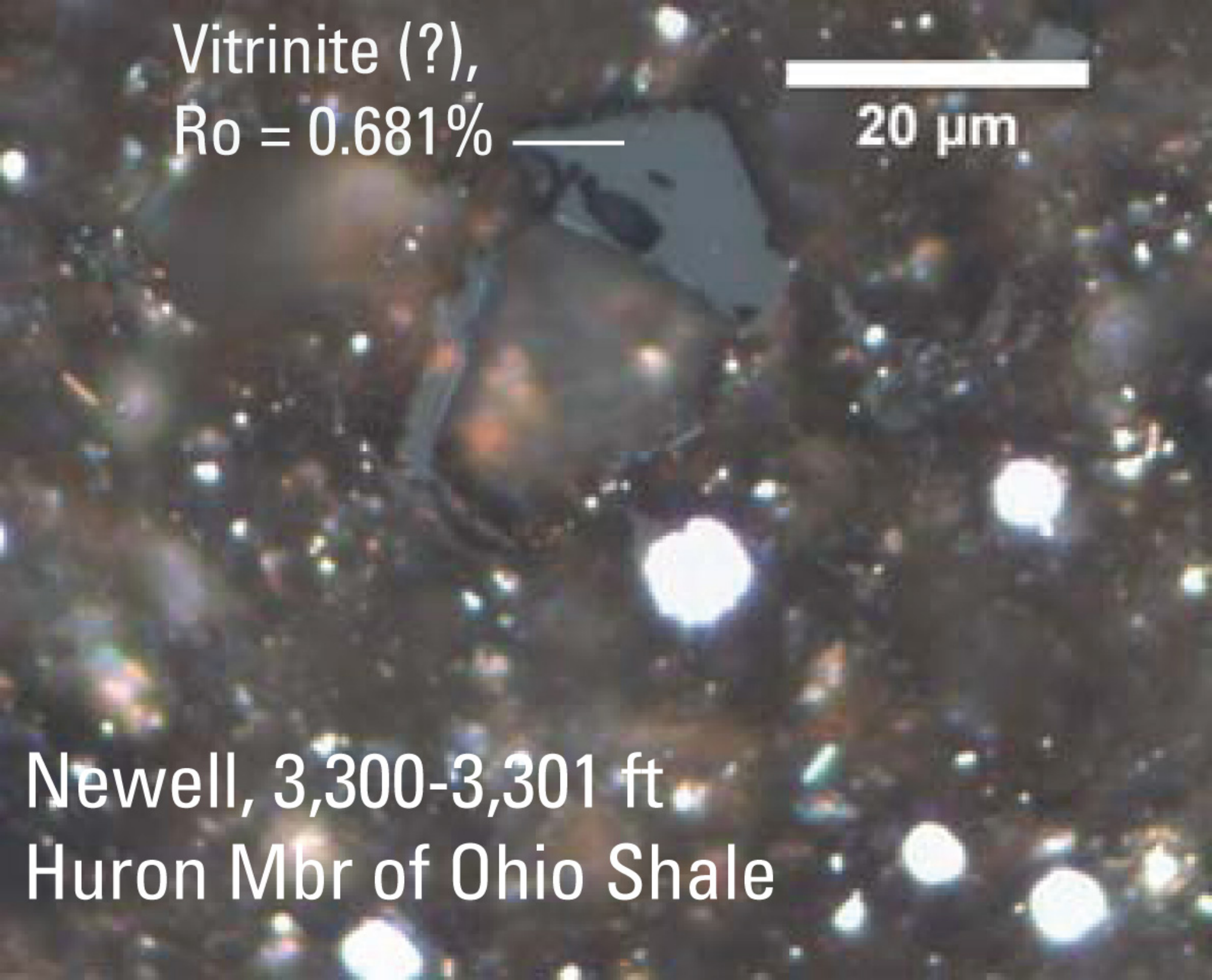
Kappel, 1,995-2,070 ft
Huron Mbr of Ohio Shale

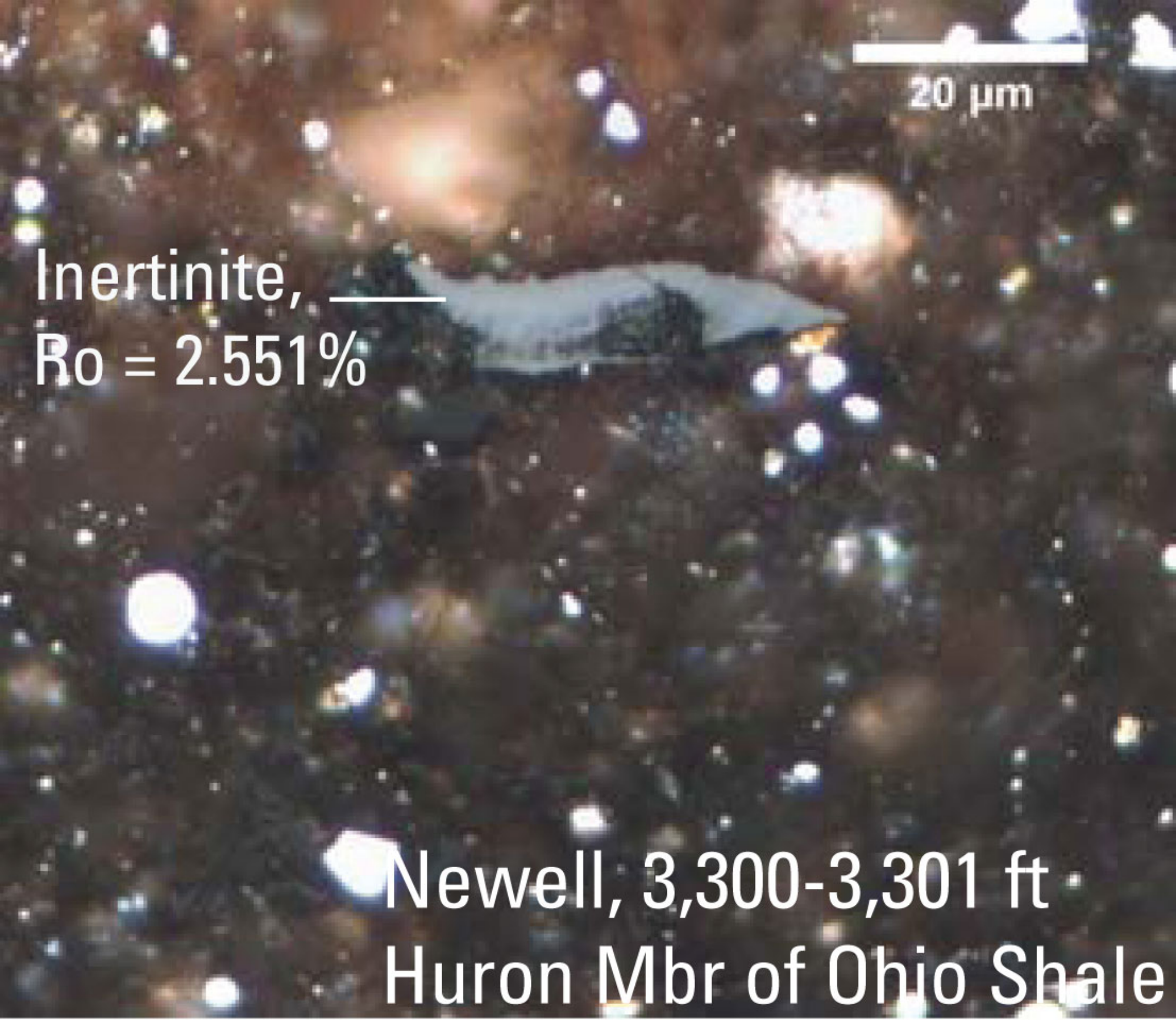
Telalginite in
groundmass
of amorphous
alginite

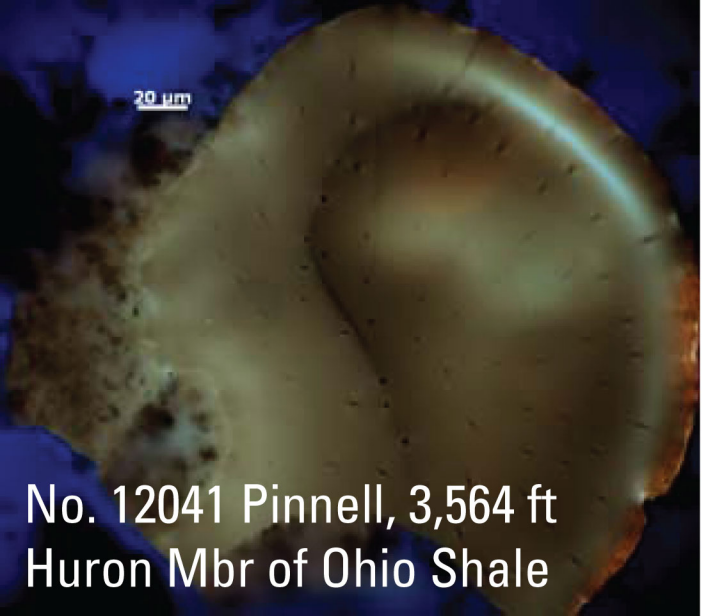

Vitrinite (?),
Ro = 0.3928%
20 µm
Kappel, 1,995-2,070 ft
Huron Mbr of Ohio Shale

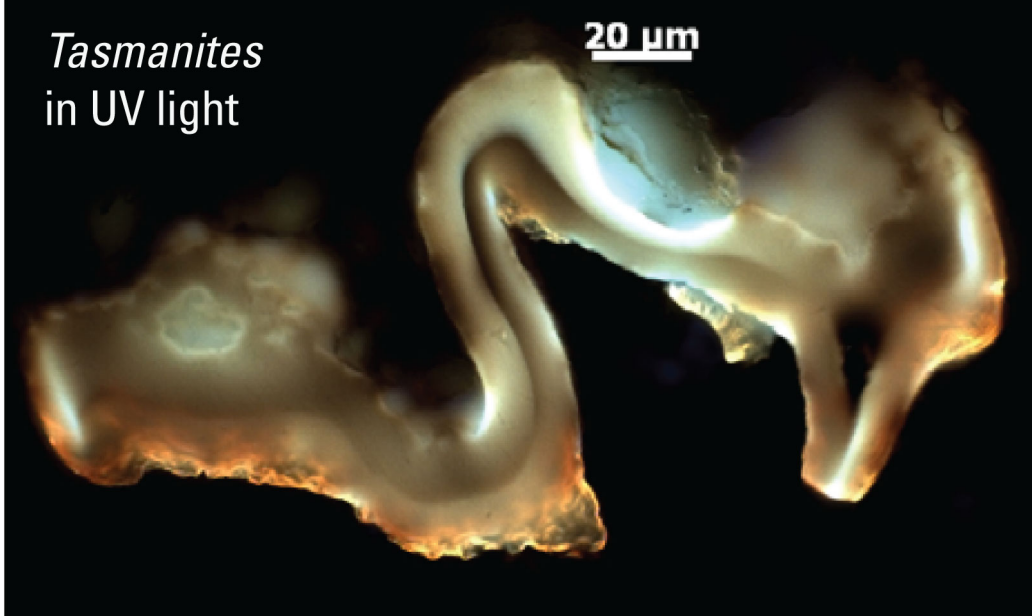

Bitumen,
Ro = 0.833%
20 µm
Kappel, 1,995-2,070 ft
Huron Mbr of Ohio Shale

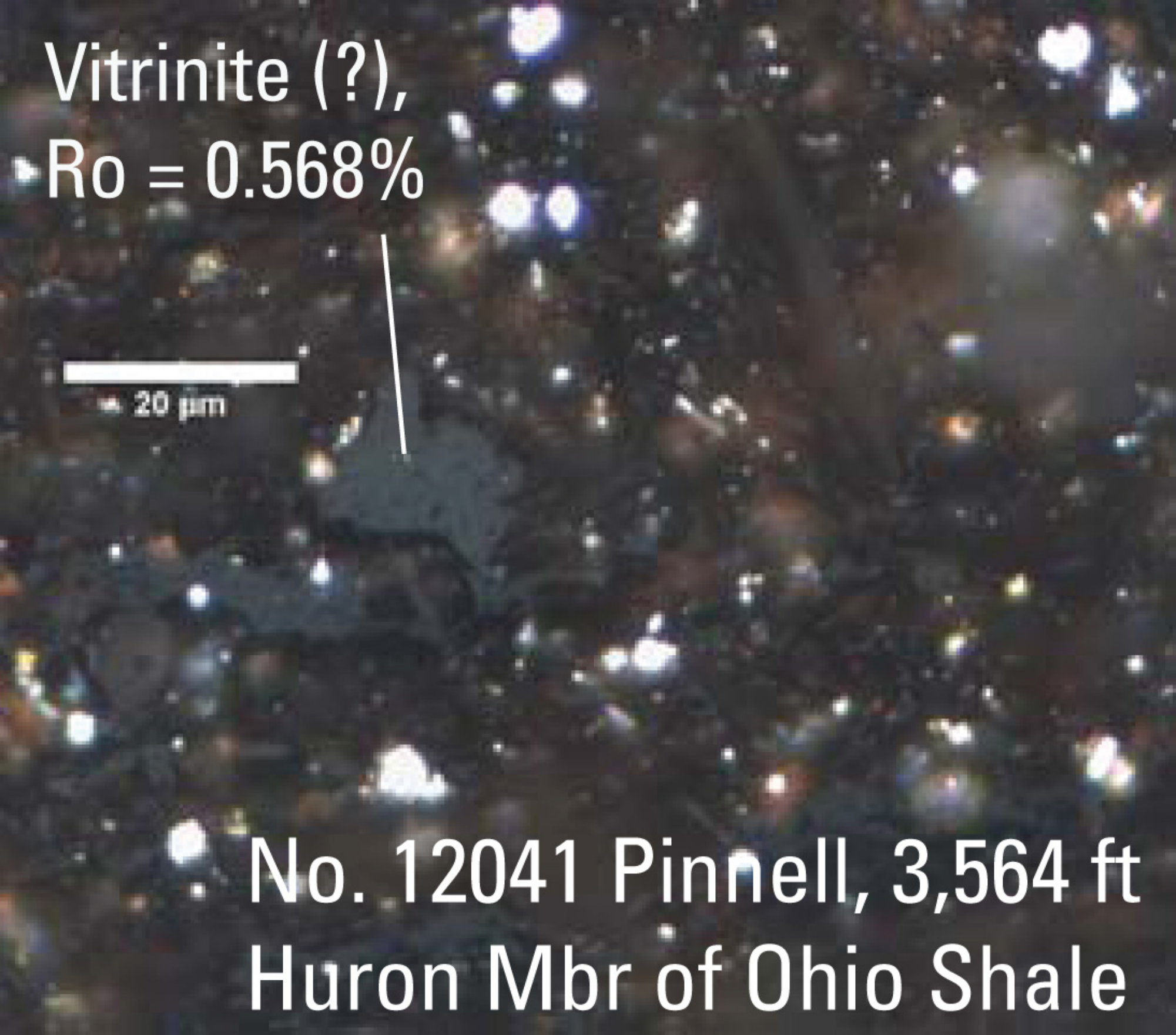

Newell (Core 2921) (OH-9), 3,300-3,301 ft
Huron Mbr of Ohio Shale
20 µm
Tasmanites
in UV light


Vitrinite (?),
Ro = 0.681%
20 µm
Newell, 3,300-3,301 ft
Huron Mbr of Ohio Shale

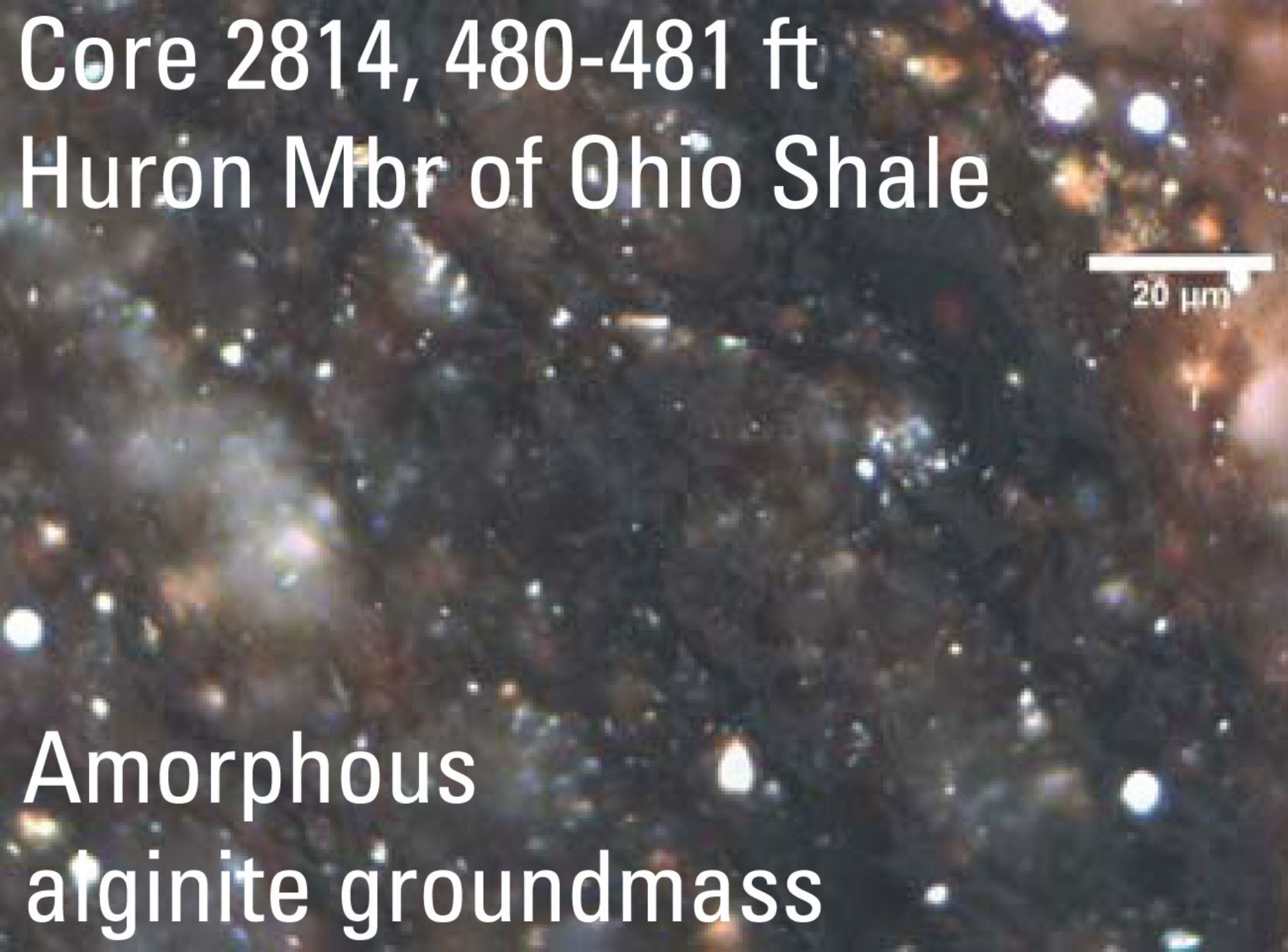

20 µm
Inertinite,
Ro = 2.551%
Newell, 3,300-3,301 ft
Huron Mbr of Ohio Shale

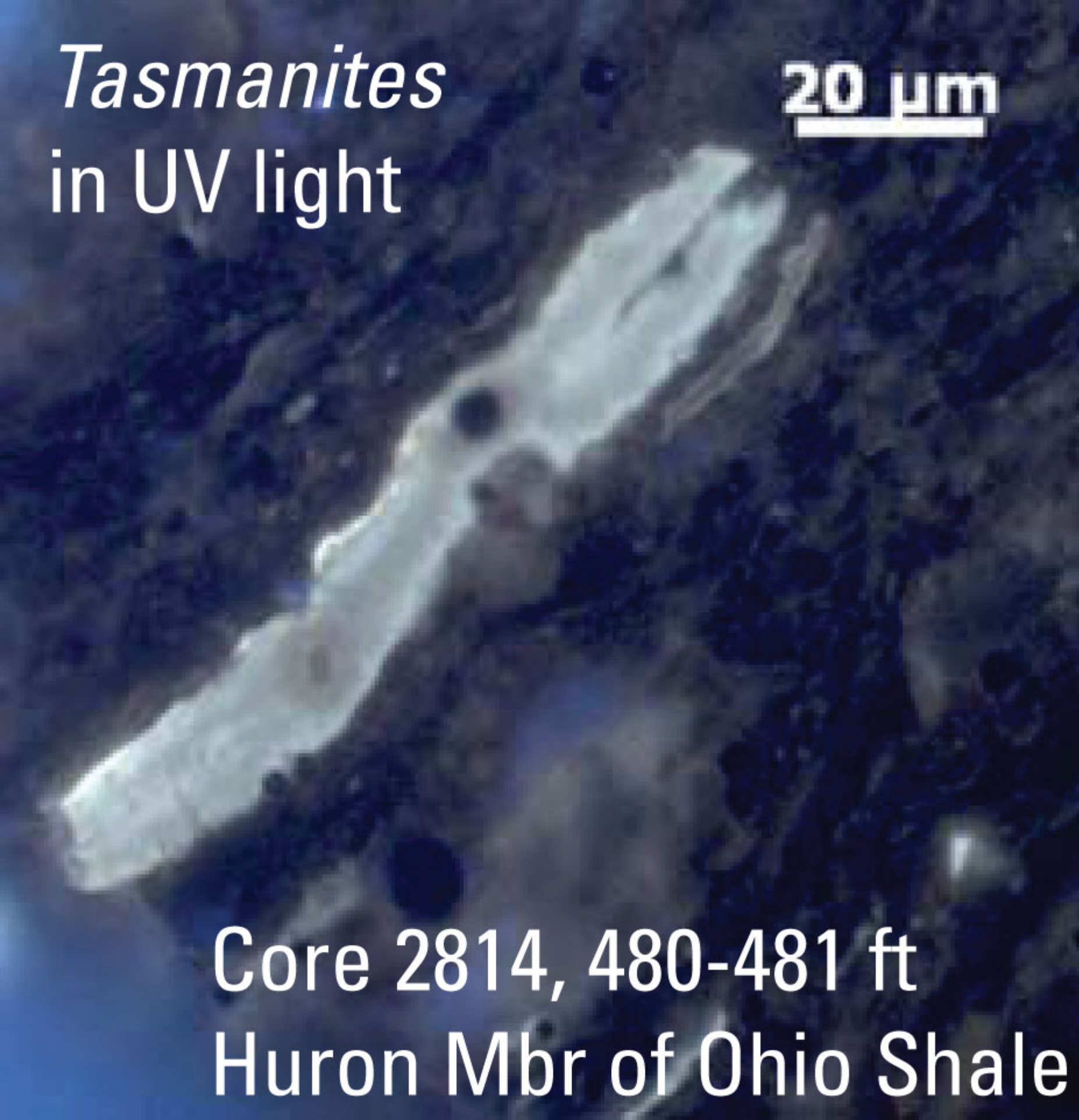

20 µm
No. 12041 Pinnell, 3,564 ft
Huron Mbr of Ohio Shale

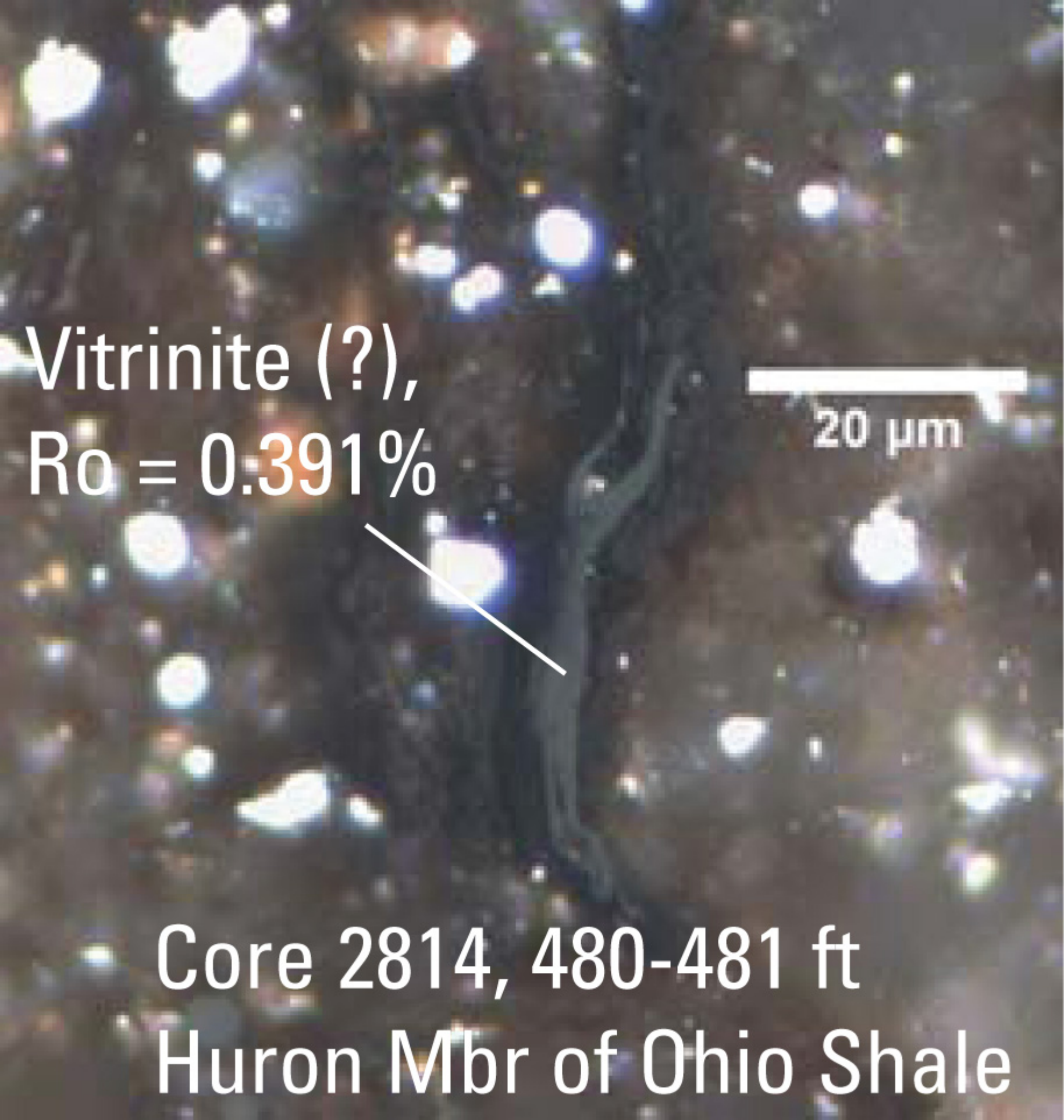

Tasmanites
in UV light
20 µm



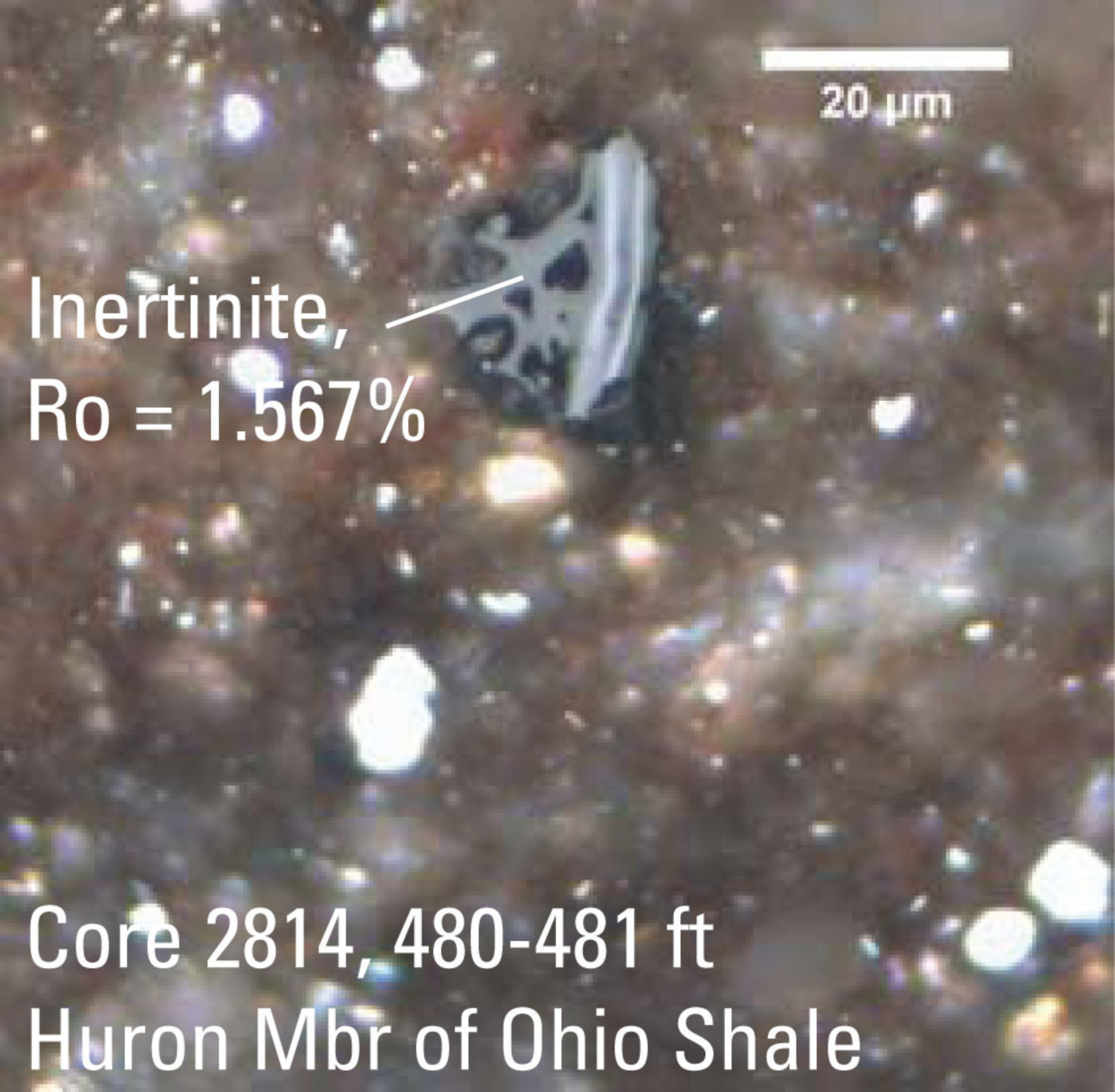
No. 12041 Pinnell, 3,564 ft
Huron Mbr of Ohio Shale

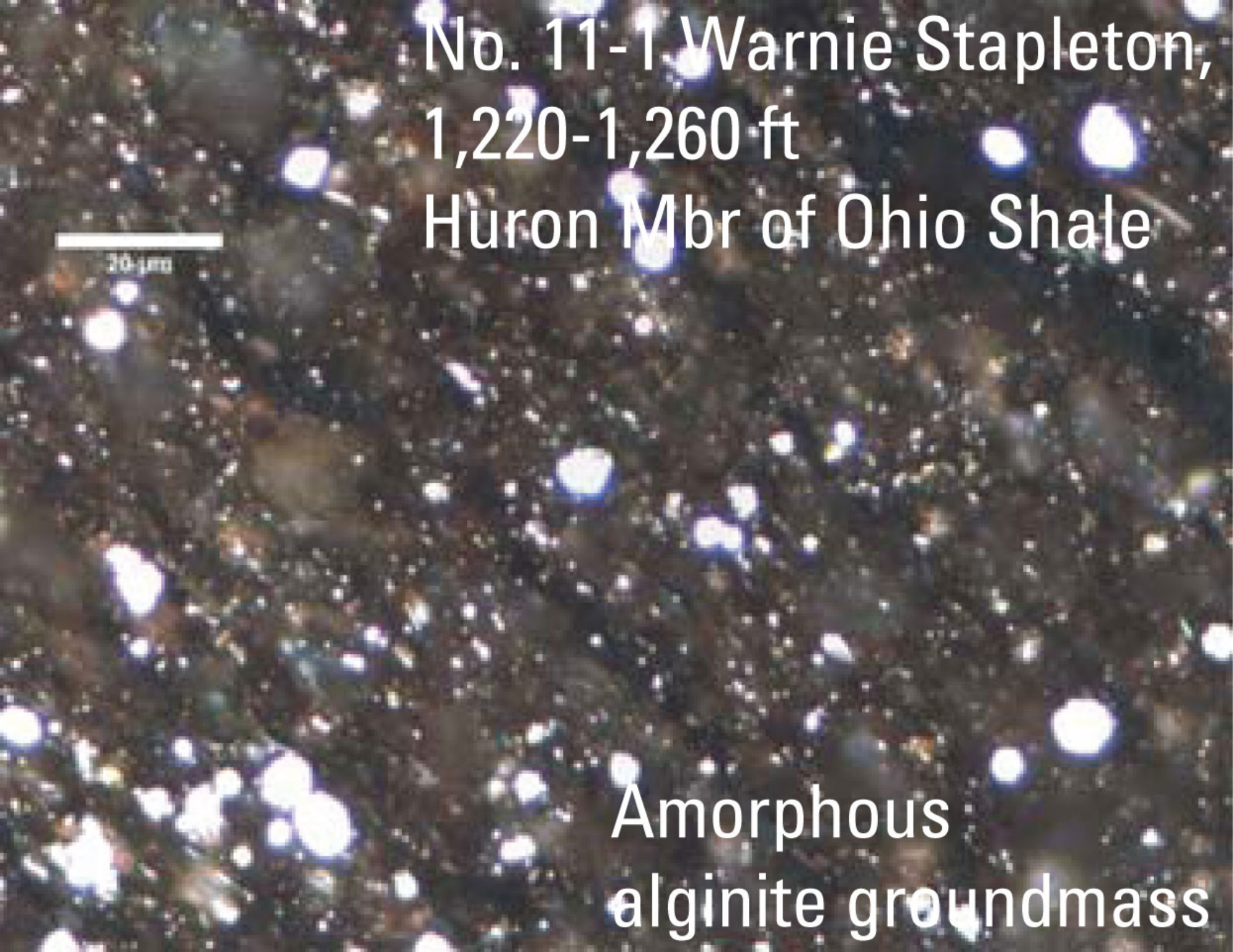

Core 2814, 480-481 ft
Huron Mbr of Ohio Shale
20 µm
Amorphous
alginite groundmass

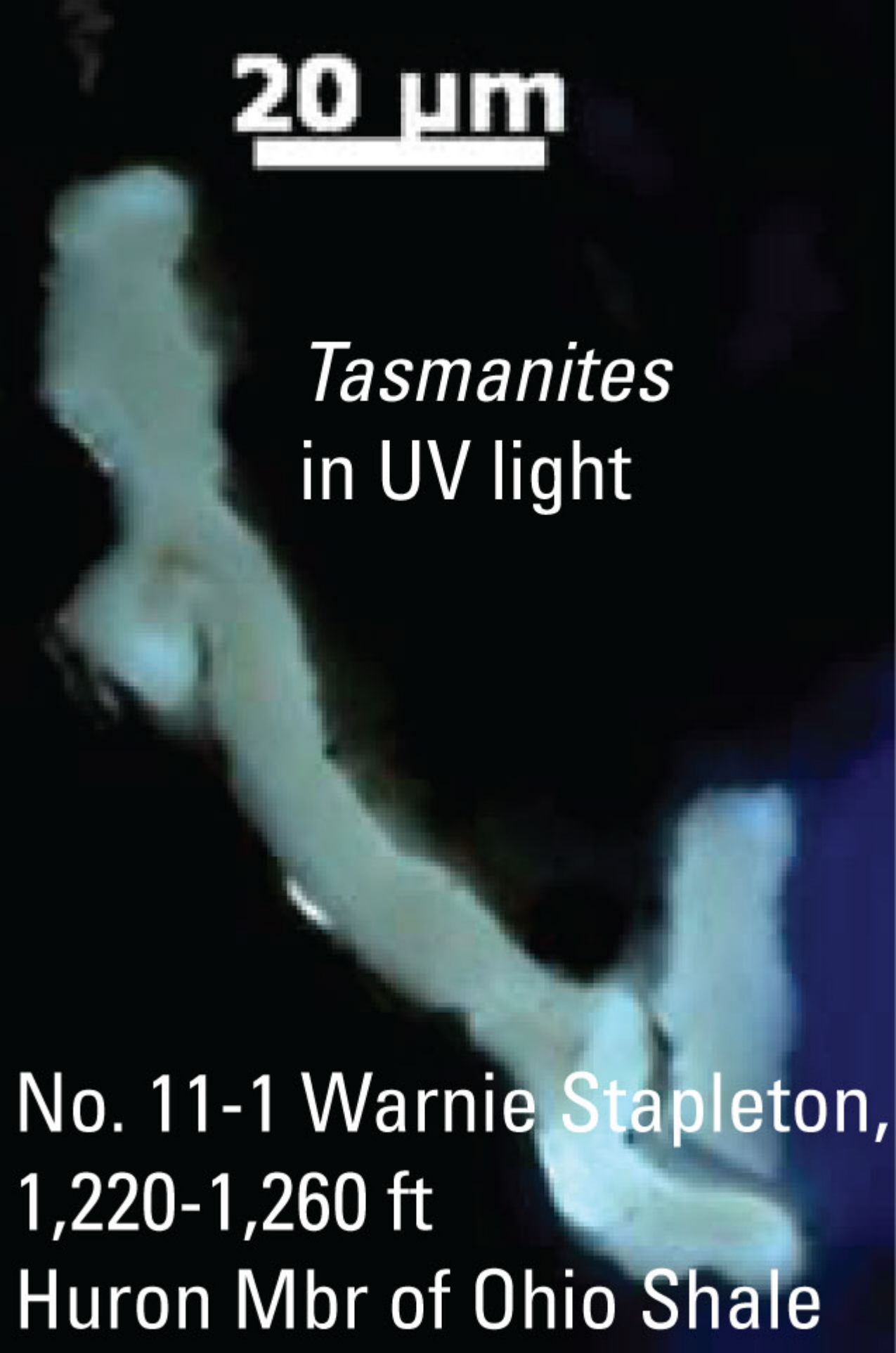

Tasmanites
in UV light
20 µm
Core 2814, 480-481 ft
Huron Mbr of Ohio Shale

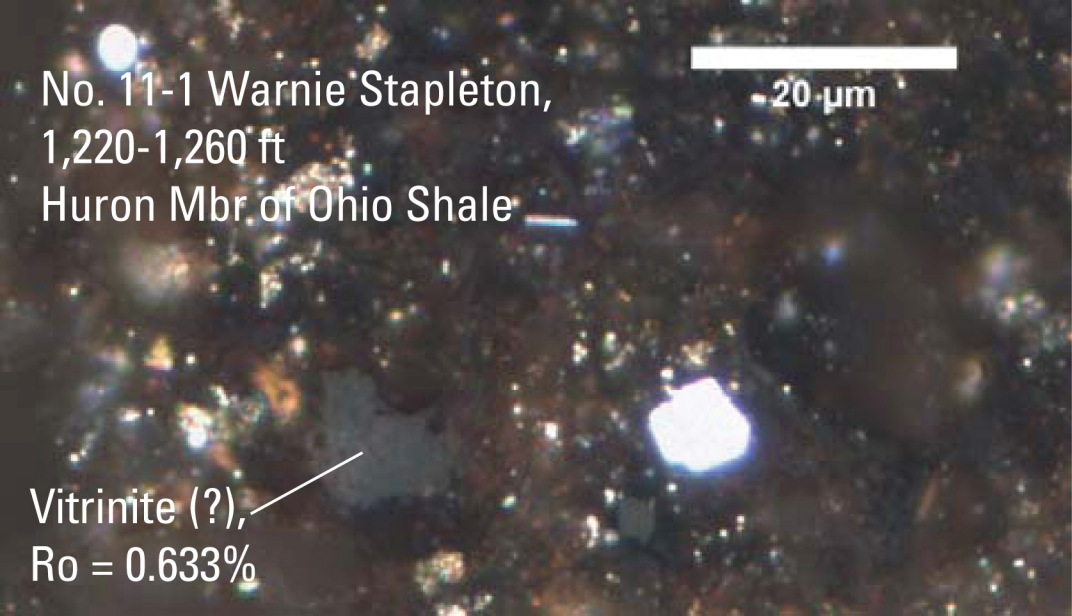


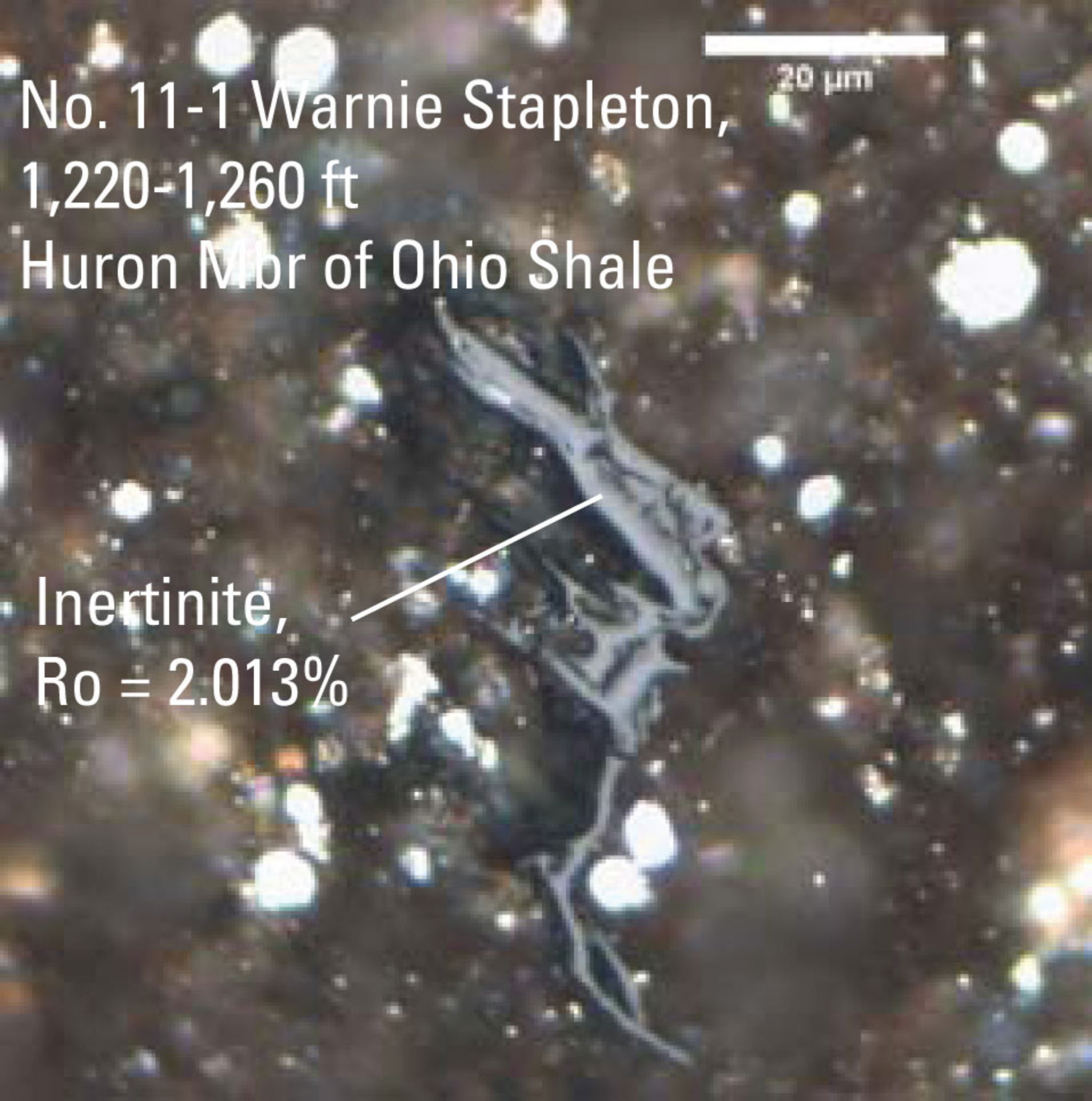
Core 2814, 480-481 ft
Huron Mbr of Ohio Shale

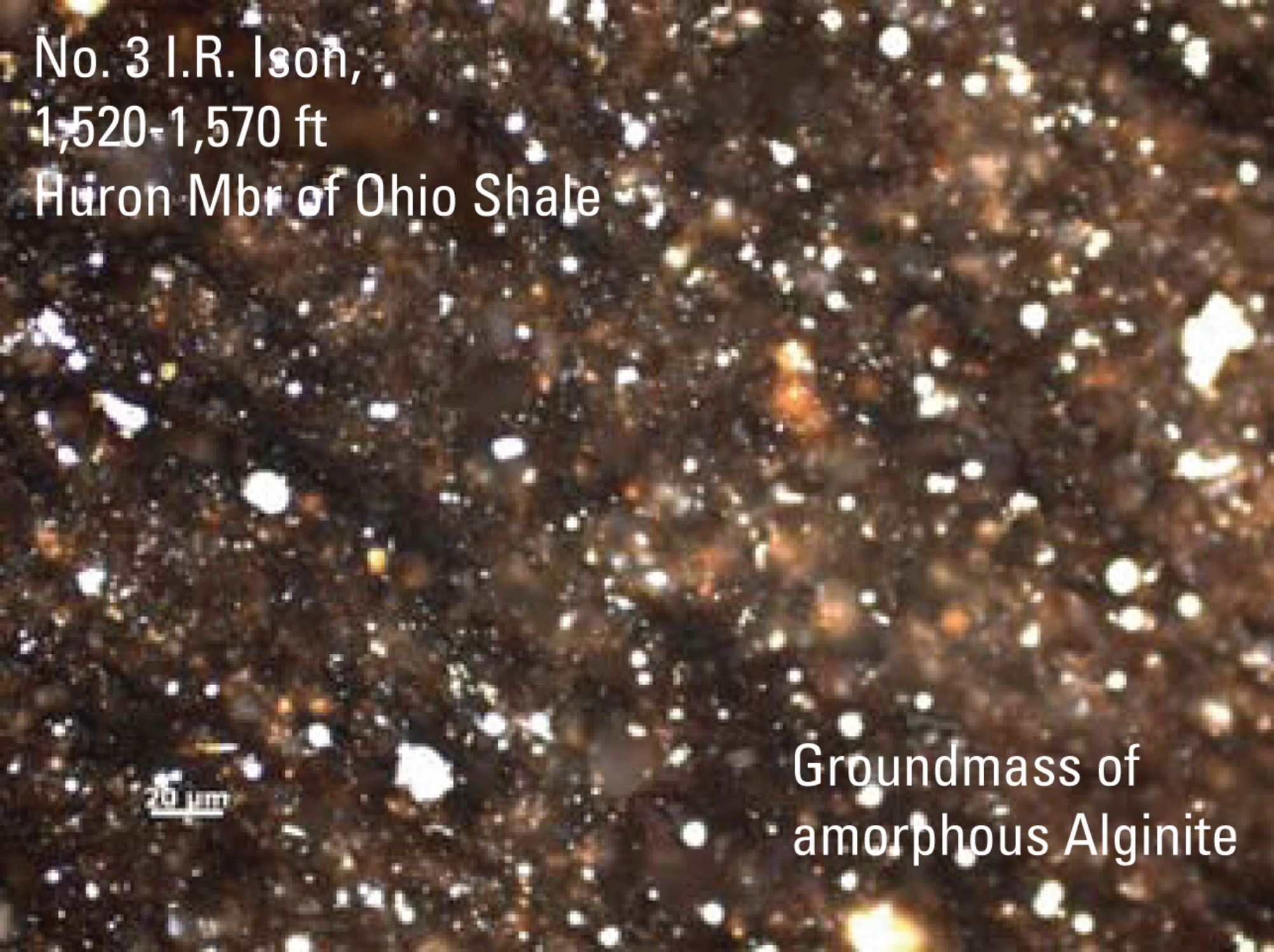

20 µm
Inertinite,
Ro = 1.567%
Core 2814, 480-481 ft
Huron Mbr of Ohio Shale

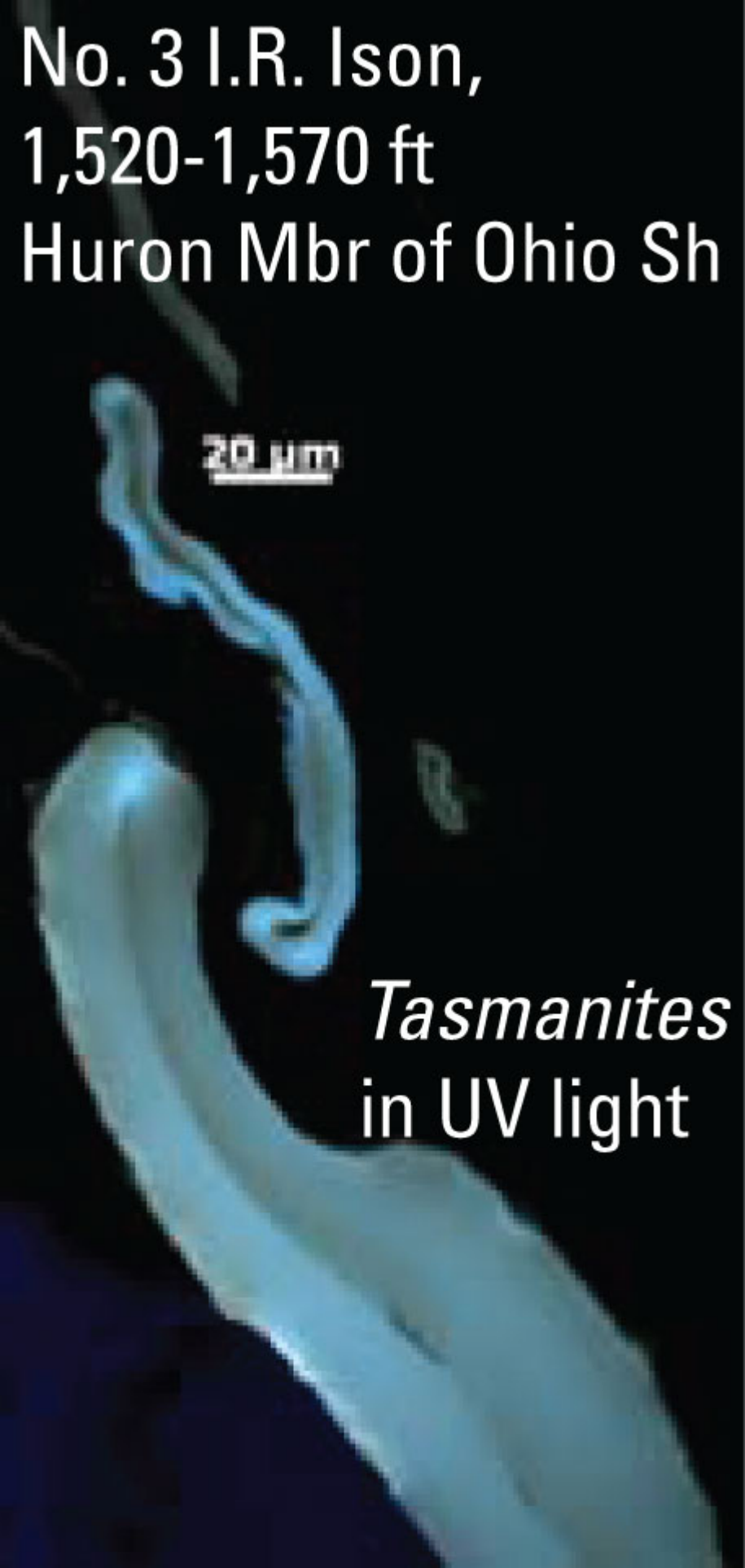

No. 11-1 Warnie Stapleton,
1,220-1,260 ft
Huron Mbr of Ohio Shale
20 µm
Amorphous
alginite groundmass

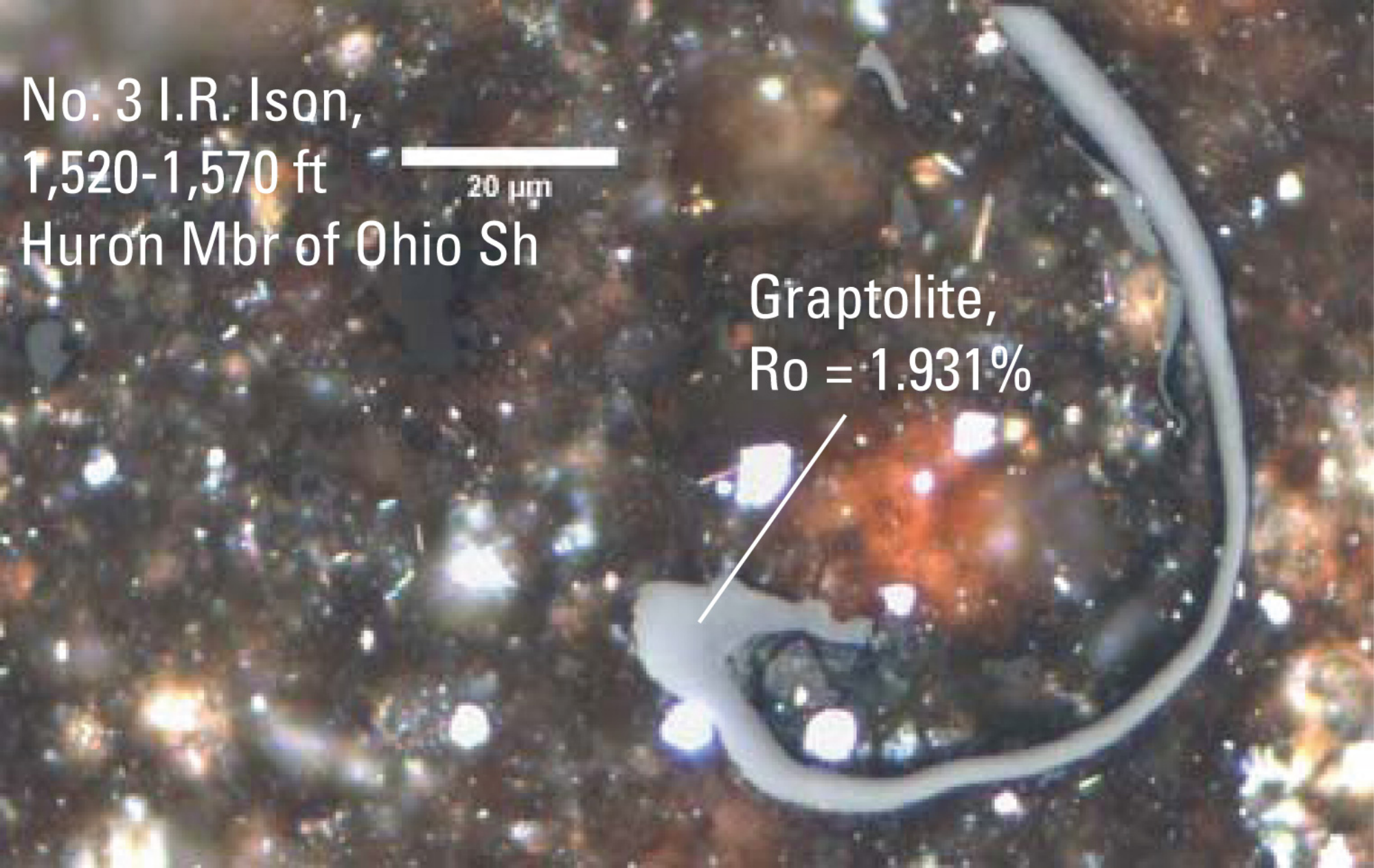

20 µm
Tasmanites
in UV light
No. 11-1 Warnie Stapleton,
1,220-1,260 ft
Huron Mbr of Ohio Shale


No. 11-1 Warnie Stapleton,
1,220-1,260 ft
Huron Mbr of Ohio Shale
20 µm
Vitrinite (?),
Ro = 0.633%

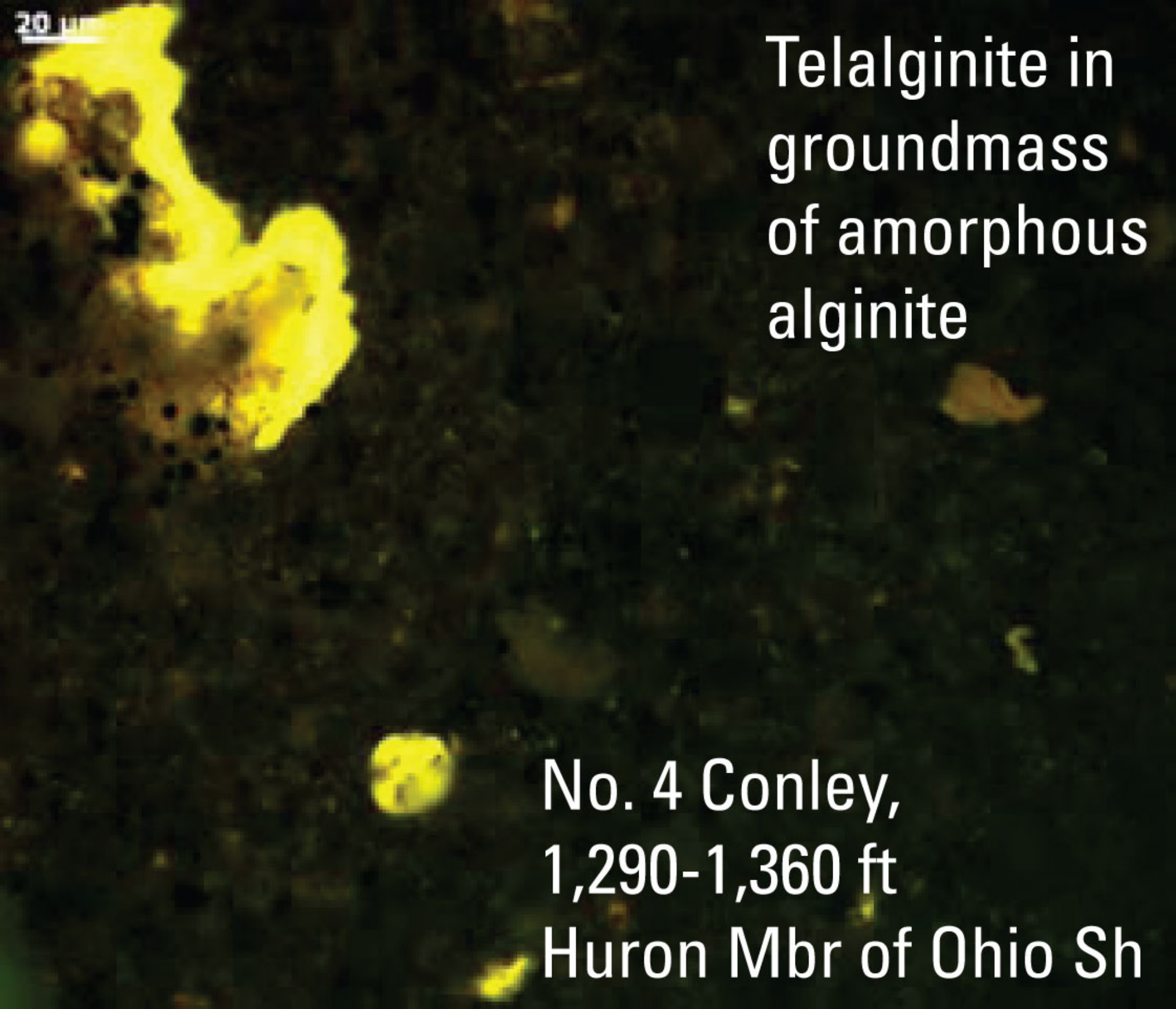

20 µm
No. 11-1 Warnie Stapleton,
1,220-1,260 ft
Huron Mbr of Ohio Shale
Inertinite,
Ro = 2.013%

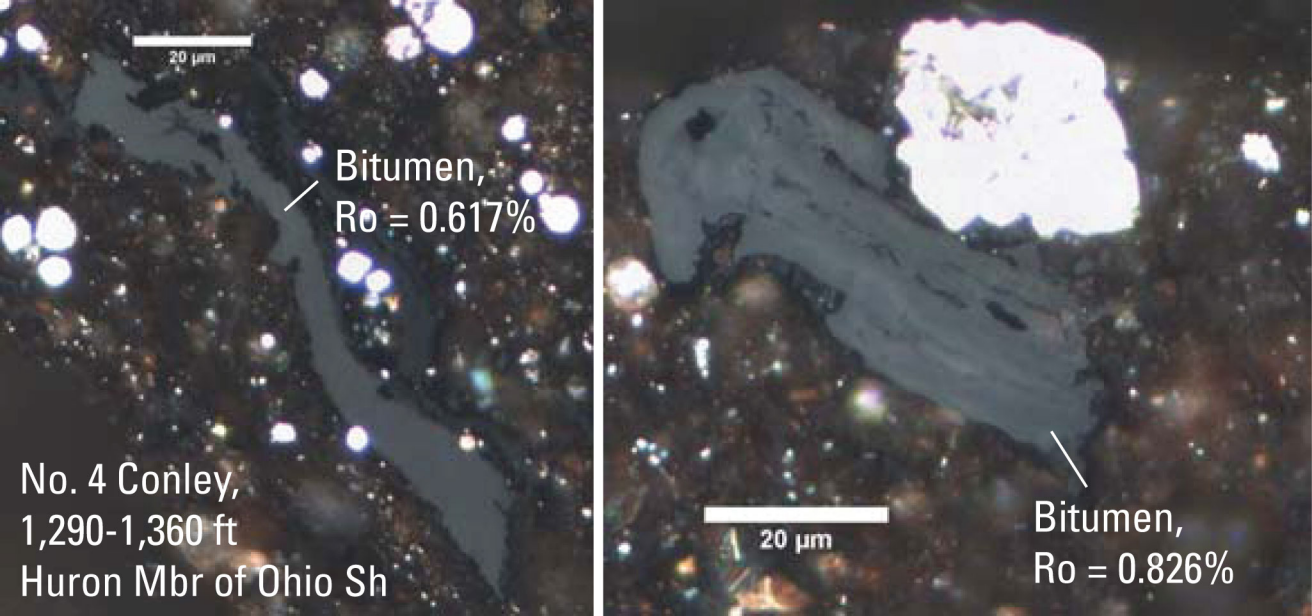

No. 3 I.R. Ison,
1,520-1,570 ft
Huron Mbr of Ohio Shale
20 µm
Groundmass of
amorphous Alginite


No. 3 I.R. Ison,
1,520-1,570 ft
Huron Mbr of Ohio Sh
20 µm
Tasmanites
in UV light

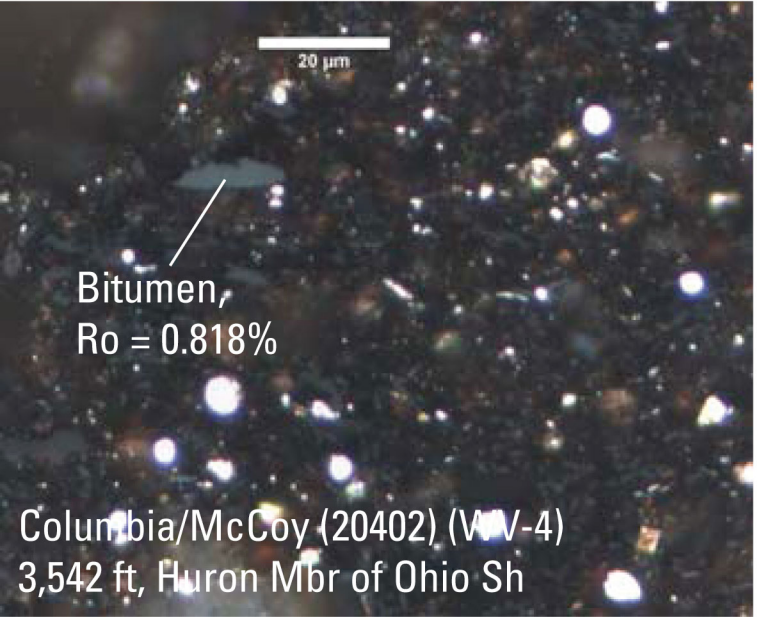

No. 3 I.R. Ison,
1,520-1,570 ft
Huron Mbr of Ohio Sh
20 µm
Graptolite,
Ro = 1.931%

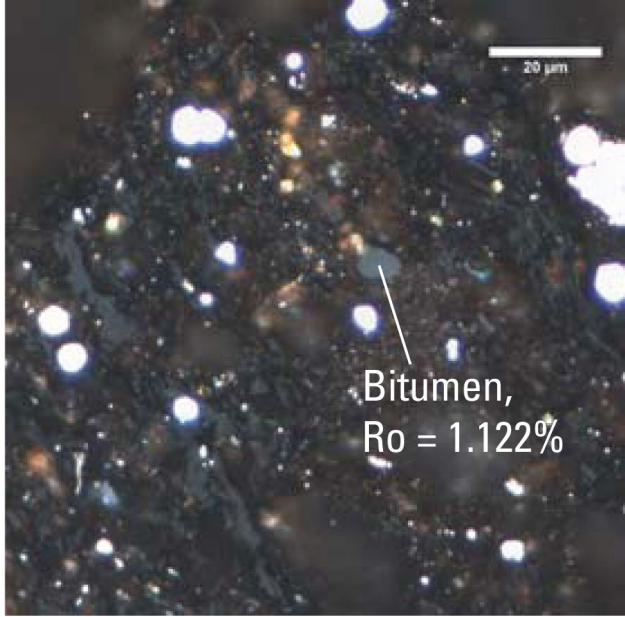

20 µm
Bitumen,
Ro = 0.533%
No. 3 I.R. Ison,
1,520–1,570 ft
Huron Mbr of Ohio Sh

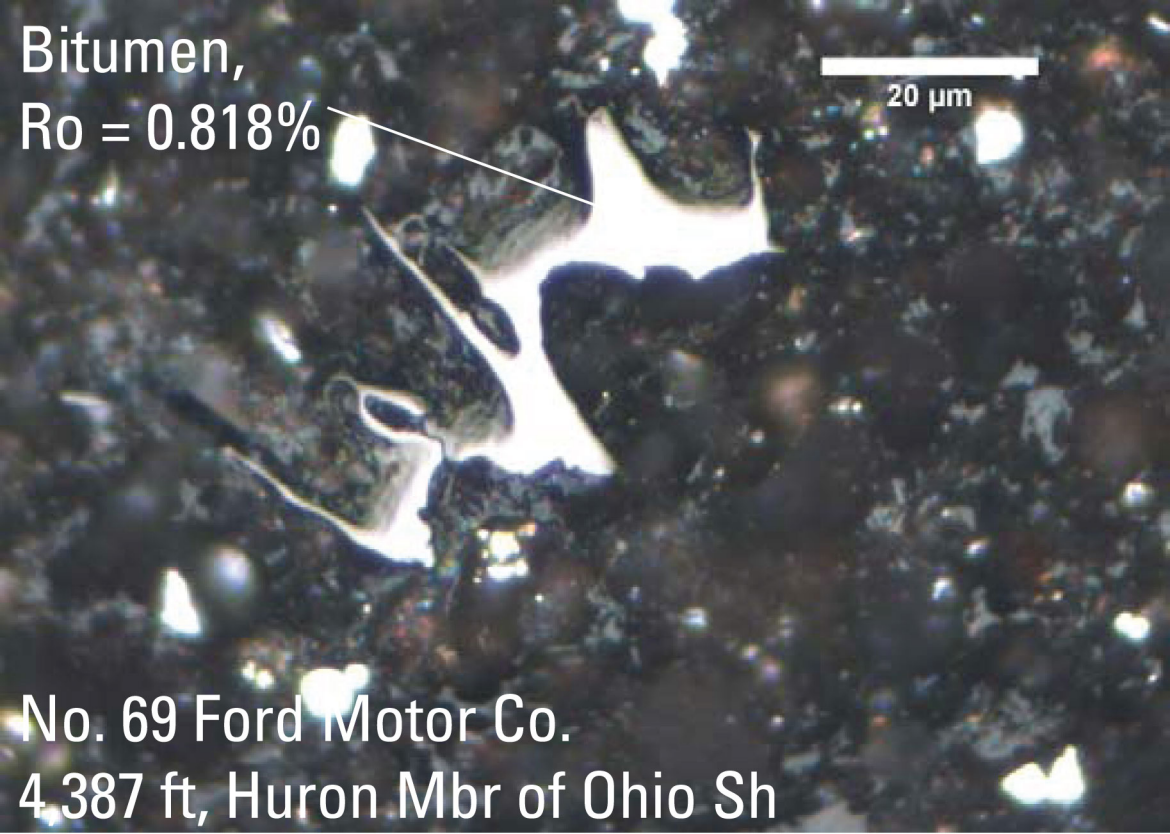

20 µm
Telalginite in groundmass of amorphous alginite
No. 4 Conley,
1,290-1,360 ft
Huron Mbr of Ohio Sh

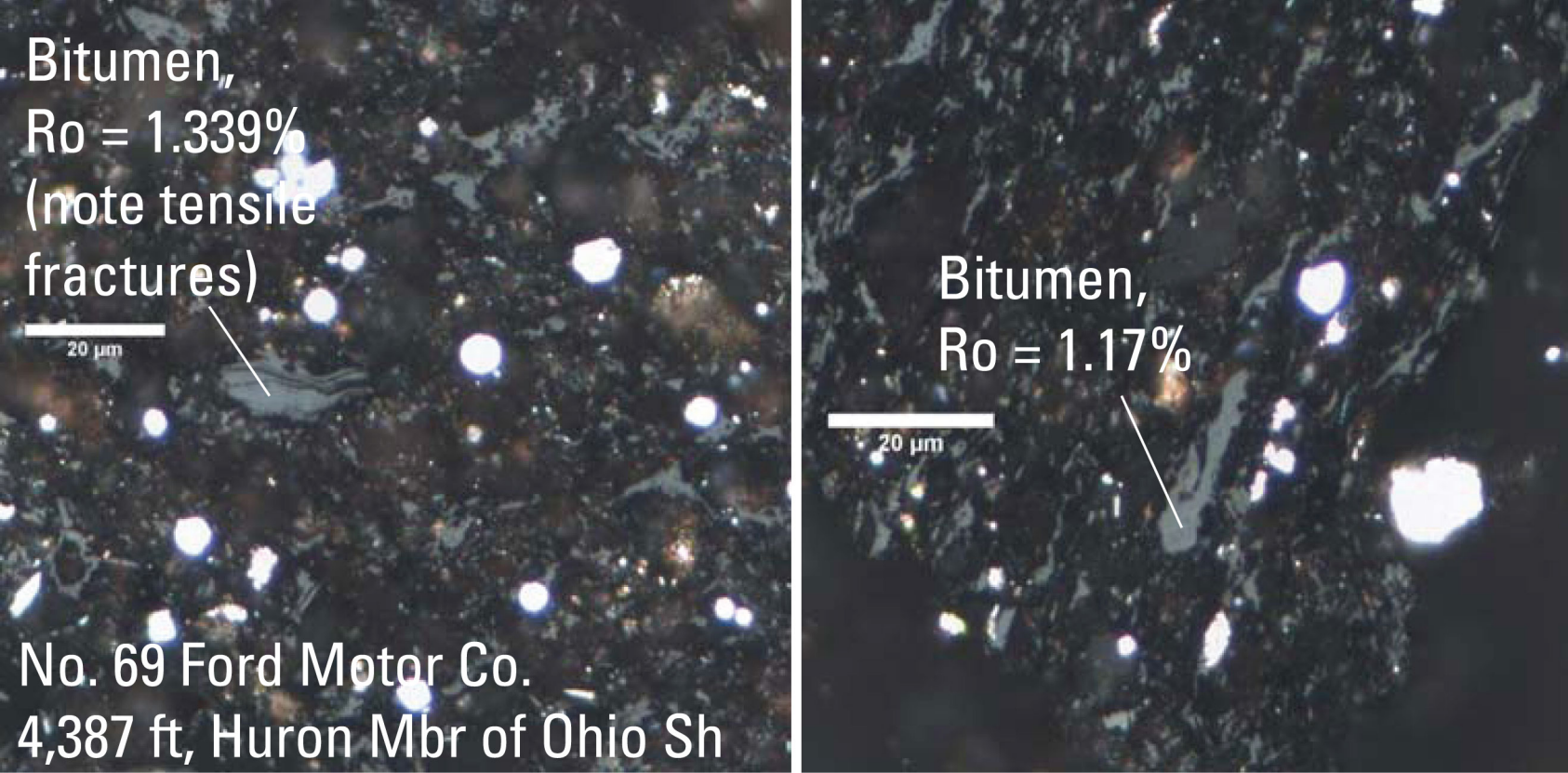

20 µm
Bitumen,
Ro = 0.617%
No. 4 Conley,
1,290-1,360 ft
Huron Mbr of Ohio Sh
20 µm
Bitumen,
Ro = 0.826%

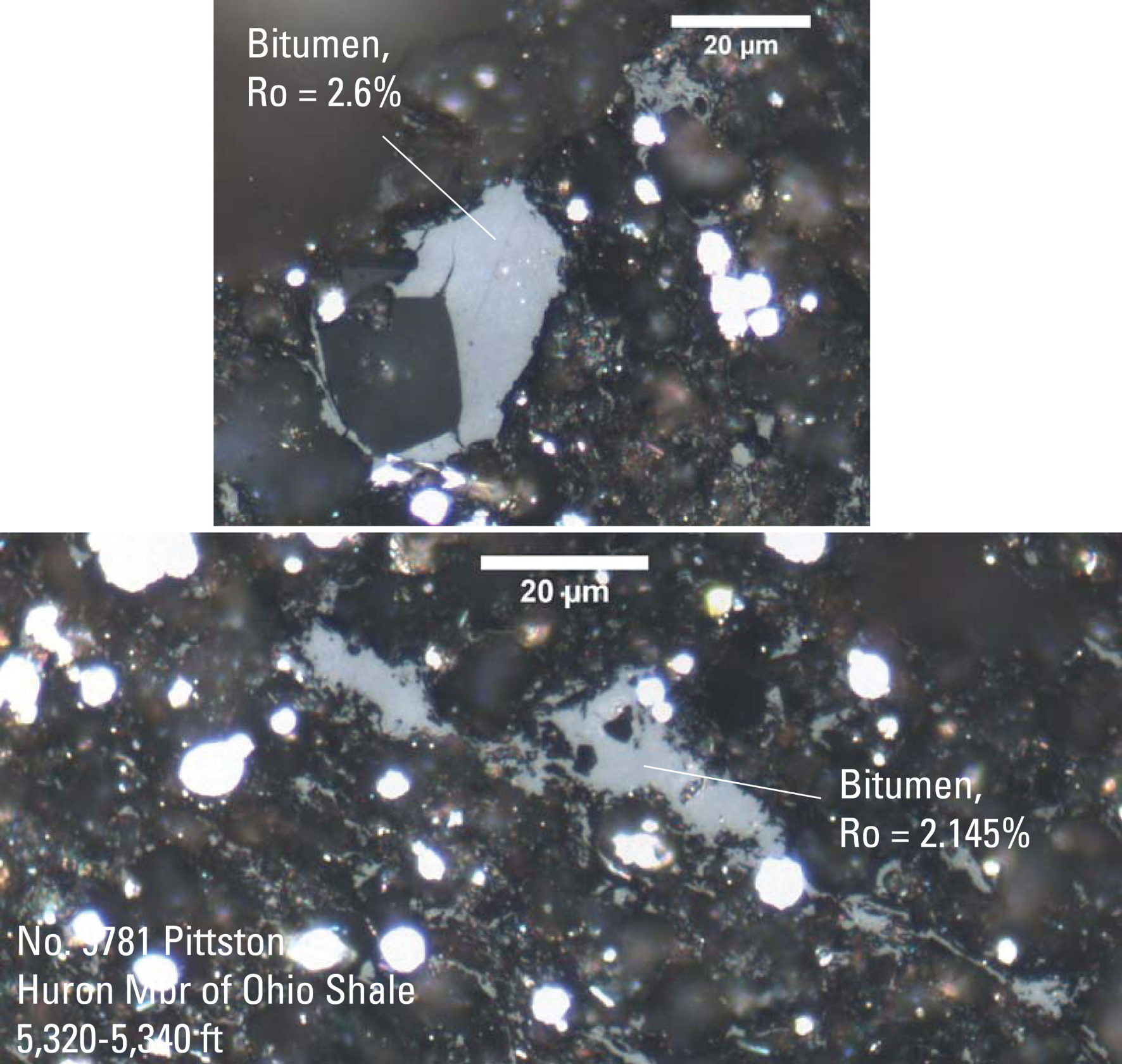

Columbia/McCoy (20402) (WV-4)
3,542 ft, Huron Mbr of Ohio Sh
20 µm
Tasmanites
20 µm
Tasmanites


20 µm
Bitumen,
Ro = 0.818%
Columbia/McCoy (20402) (WV-4)
3,542 ft, Huron Mbr of Ohio Sh


20 µm
Bitumen,
Ro = 1.122%


Bitumen,
Ro = 0.818%
20 µm
No. 69 Ford Motor Co.
4,387 ft, Huron Mbr of Ohio Sh


Bitumen,
Ro = 1.339%
(note tensile
fractures)
20 µm
No. 69 Ford Motor Co.
4,387 ft, Huron Mbr of Ohio Sh
Bitumen,
Ro = 1.17%
20 µm


Bitumen,
Ro = 2.6%
20 µm
20 µm
Bitumen,
Ro = 2.145%
No. 3781 Pittston
Huron Mbr of Ohio Shale
5,320-5,340 ft


20 µm
No. 9781 Pittston
Huron Mbr of Ohio Sh
5,320-5,340 ft
Rutilated
Quartz
Click to view Part 1