

REPORT

ON THE

COTTON PRODUCTION OF THE STATE OF TENNESSEE,

WITH A DISCUSSION OF

ITS GENERAL AGRICULTURAL FEATURES,

AND A NOTE ON

COTTON PRODUCTION IN THE STATE OF KENTUCKY.

BY

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SPECIAL CENSUS AGENT.

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## LETTERS OF TRANSMITTAL.

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BERKELEY, CALIFORNIA, *June 1, 1883.*

The SUPERINTENDENT OF CENSUS.

DEAR SIR: I have the honor to transmit herewith a report on the cotton production and agricultural features of the state of Tennessee by Professor James M. Safford, of Vanderbilt University, and state geologist, acting as special agent for the census.

Professor Safford's previous publications and reports on the geology and agriculture of Tennessee are well known to the public, and his labors in that connection have rendered his co-operation in the present series of reports doubly important and acceptable. While much of the subject-matter may be found in former publications, the compact form in which it is here presented, in connection with the predominant productive industry of the western slope, renders it interesting and available to a wider circle of readers, and will convey even to the specialist a more graphic conception of the varied features of the state than he has heretofore been enabled to compile from data scattered through various works. Agriculturally, politically, and geologically, the cross-section of the eastern valley of the Mississippi here afforded by Tennessee is extremely interesting and instructive.

Very respectfully,

E. W. HILGARD,  
*Special Agent in charge of Cotton Production.*

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NASHVILLE, TENNESSEE, *May 1, 1883.*

Professor EUGENE W. HILGARD,  
*Special Agent in charge of Cotton Production.*

SIR: I have the honor to submit herewith a report on cotton production in the state of Tennessee, with a discussion of the general natural features of the state, so far as they may be related to cotton culture; also a note on cotton production in Kentucky. I have endeavored, in the preparation of the report, to follow out your instructions as to plan and matter, and trust you may find its contents, for the most part at least, in accordance therewith. Had it been allowed to give the report greater length, much more might have been said, omissions supplied, and some of the more practical parts expanded. It may be better, however, as it is.

So little of Kentucky is within the cotton region proper that it has not been considered desirable or pertinent to give any extended notice of that state as a whole in its relation to cotton culture. Such notice would be quite appropriate were tobacco the subject-matter in question. A narrow area, however, in the southwestern part of the state, contiguous to Tennessee, and forming the extreme northern limit of the cotton-growing region of the eastern Mississippi valley, has received due attention.

In the preparation of the report, the chief sources of information, besides the data supplied by the Census Office and the answers and notes of correspondents in the returned schedules, have been my own reports on the geology of Tennessee and personal knowledge of the state outside of these, the geological reports of Kentucky, and your own reports and papers on the geology of Mississippi and neighboring states.

In conclusion, I desire to express my obligations to yourself, Dr. R. H. Loughridge, Dr. Eugene A. Smith, of the University of Alabama, and Messrs. John R. Proctor and W. M. Linney, of the Kentucky geological survey, for special favors received.

Very respectfully, your obedient servant,

JAMES M. SAFFORD.

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# TABULATED RESULTS OF THE ENUMERATION.

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TABLE I.—AREA, POPULATION, TILLED LAND, AND COTTON PRODUCTION.

TABLE II.—ACREAGE AND PRODUCTION OF LEADING CROPS.

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TABULATED RESULTS OF THE ENUMERATION.

TABLE I.—AREA, POPULATION, TILLED LAND, AND COTTON PRODUCTION.

Counties.	Land area. <i>Sq. mts.</i>	POPULATION.						TILLED LAND.		COTTON PRODUCTION.						
		Total.	Male.	Female.	White.	Color'd.	Average per square mile.	Acres.	Percentage of area.	Percentage of tilled lands devoted to cotton.	Acres.	Bales.	Average per acre.			Cotton acreage per square mile.
													Bale.	Seed-cotton.	Lint.	
												<i>Lbs.</i>	<i>Lbs.</i>			
The State.....	41,750	1,542,350	769,277	773,082	1,188,831	403,523	36.9	7,700,041	28.82	9.38	722,562	330,621	0.46	651	217	17.3
<b>ALLUVIAL PLAIN OF THE MISSISSIPPI RIVER.</b>																
Lake.....	210	3,968	2,145	1,823	3,274	694	18.9	34,666	25.79	9.37	3,240	2,412	0.74	1,059	353	15.5
<b>ALLUVIAL PLAIN OF THE MISSISSIPPI RIVER AND PLATEAU SLOPE OF WEST TENNESSEE.</b>																
<i>a. Alluvial plain and bluff.</i>																
Dyer.....	570	15,118	7,774	7,344	11,206	3,012	26.5	176,194	20.89	19.21	14,637	8,504	0.59	834	278	25.7
Lauderdale.....	410	14,918	7,027	7,291	9,081	5,837	66.4	58,010	22.11	41.52	24,083	13,250	0.55	783	261	58.7
Tipton.....	330	21,033	10,816	10,217	10,482	10,551	63.7	100,666	47.06	38.17	38,429	21,415	0.56	795	265	116.5
Shelby.....	690	78,430	38,856	39,574	84,568	43,922	113.7	195,726	44.32	47.32	92,620	46,888	0.50	714	238	134.2
Obion.....	540	22,012	11,875	11,037	18,841	4,071	42.4	109,857	31.79	6.61	7,259	4,225	0.58	823	276	13.4
Total.....	2,540	152,411	76,948	75,463	84,118	63,293	60.0	540,453	33.25	32.76	177,028	93,842	0.53	756	252	69.7
<i>b. Brown-loom table-lands, midland counties.</i>																
Fayette.....	640	31,871	15,941	15,930	9,633	22,238	40.8	197,516	48.22	46.70	92,231	30,221	0.43	606	202	144.1
Hardeman.....	610	22,021	11,401	11,420	13,813	9,608	37.6	120,437	30.85	37.27	44,885	18,937	0.42	600	200	73.6
Haywood.....	570	20,053	12,914	13,139	8,497	17,556	45.7	137,155	37.60	36.40	49,919	23,092	0.46	660	220	87.6
Madison.....	580	30,874	15,355	15,519	15,406	15,468	53.2	125,693	33.86	36.40	45,825	19,257	0.42	600	200	70.0
Crockett.....	200	14,109	7,081	7,028	10,493	3,616	54.3	65,428	30.32	27.22	17,897	9,320	0.52	747	249	68.5
Gibson.....	550	32,685	16,071	16,614	23,540	9,145	59.4	146,163	41.52	25.19	36,820	19,272	0.52	747	240	66.9
Wentley.....	620	24,538	12,454	12,084	20,125	4,413	39.0	129,075	32.53	11.94	15,466	7,570	0.49	702	234	24.8
Total.....	3,830	183,051	91,907	91,144	101,007	82,044	47.8	921,467	37.59	32.87	302,893	136,675	0.45	642	214	79.1
<i>c. Summit region of watershed.</i>																
Henry.....	550	22,142	11,018	11,124	15,488	6,654	40.3	133,302	37.90	9.89	13,186	5,516	0.42	597	199	24.0
Carrroll.....	550	22,103	11,014	11,089	16,524	5,579	40.2	120,231	34.16	20.55	24,711	10,505	0.43	606	202	44.9
Henderson.....	580	17,430	8,671	8,759	14,414	3,016	30.1	93,241	25.12	23.96	22,344	9,419	0.42	600	200	38.5
McNairy.....	690	17,271	8,605	8,666	14,845	2,426	25.0	78,800	17.84	20.36	23,185	9,413	0.41	579	193	33.5
Total.....	2,370	78,946	39,808	39,638	61,271	17,675	33.3	425,664	28.06	19.59	83,376	34,859	0.42	597	199	35.2
<b>WESTERN VALLEY OF TENNESSEE RIVER.</b>																
Benton.....	380	9,780	4,880	4,900	9,147	633	25.7	46,425	19.09	10.00	4,923	1,801	0.37	522	174	13.0
Decatur.....	310	8,498	4,171	4,327	7,276	1,222	27.4	37,861	19.08	14.77	5,501	2,169	0.39	552	184	18.0
Hardin.....	610	14,703	7,334	7,469	12,775	2,018	24.3	72,446	18.56	17.75	12,859	5,345	0.42	591	197	21.1
Perry.....	400	7,174	3,680	3,544	6,609	565	17.9	35,422	13.84	1.28	452	196	0.43	618	206	1.1
Humphreys.....	450	11,379	5,746	5,633	9,708	1,671	25.3	53,938	18.73	0.29	155	90	0.58	823	276	0.3
Houston.....	260	4,295	2,181	2,114	3,487	808	16.5	21,253	12.77	0.40	8	4	0.50	711	237	.....
Stewart.....	500	12,690	6,552	6,138	9,933	2,757	25.4	53,934	16.85	0.08	45	15	0.33	474	158	0.1
Total.....	2,910	68,609	34,404	34,115	58,935	9,074	23.6	321,279	17.25	7.48	24,033	9,620	0.40	570	190	8.3
<b>THE HIGHLANDS, OR HIGHLAND RIM OF MIDDLE TENNESSEE.</b>																
<i>a. Western subdivision.</i>																
Montgomery.....	540	28,481	14,103	14,378	14,736	13,695	52.7	135,668	39.26	.....	2	2	1.00	1,425	475	.....
Robertson.....	500	18,861	9,565	9,296	13,242	5,619	37.7	157,644	49.26	.....	5	2	0.40	570	190	.....
Cheatham.....	370	7,956	4,073	3,883	6,295	1,661	21.5	42,395	17.90	0.01	5	2	0.40	570	190	.....
Dickson.....	630	12,480	6,365	6,095	10,220	2,231	19.8	59,651	14.79	0.05	31	18	0.42	597	199	.....
Hickman.....	610	12,095	6,047	6,048	9,849	2,246	19.8	71,970	18.43	4.35	3,128	1,302	0.42	594	198	5.1
Lewis.....	360	2,181	1,082	1,099	1,963	213	6.1	11,654	5.06	1.96	229	102	0.45	636	212	0.6
Wayne.....	710	11,301	5,543	5,758	10,232	1,069	15.9	56,456	12.42	5.78	3,265	1,207	0.37	528	176	4.6
Lawrence.....	590	10,393	5,188	5,195	9,599	784	17.6	47,855	12.87	3.82	1,330	702	0.38	546	182	3.1
Total.....	4,310	103,718	51,966	51,752	76,195	27,523	24.1	533,293	21.15	1.46	8,490	3,330	0.39	558	186	2.0

COTTON PRODUCTION IN TENNESSEE.

TABLE I.—AREA, POPULATION, TILLED LAND, AND COTTON PRODUCTION—Continued.

Counties.	Land area.	POPULATION.						TILLED LAND.		COTTON PRODUCTION.						Cotton acreage per square mile.
		Total.	Male.	Female.	White.	Color'd.	Average per square mile.	Acres.	Percentage of area.	Percentage of tilled lands devoted to cotton.	Acres.	Bales.	Average per acre.			
													Bale.	Seed-cotton.	Lint.	
<b>THE HIGHLANDS, OR HIGHLAND RIM OF MIDDLE TENNESSEE—continued.</b>																
<i>b. Eastern subdivision.</i>																
	<i>Sq. mls.</i>												<i>Lbs.</i>	<i>Lbs.</i>		
Macon .....	280	9,321	4,687	4,634	8,429	892	33.3	53,438	29.82	0.01	4	1	0.25	357	119	
Clay .....	260	6,987	3,508	3,479	6,988	399	26.9	41,880	25.17	.....	2	1	0.50	711	237	
Overton .....	540	12,153	5,980	6,173	11,811	342	25.5	73,022	21.13	0.13	95	41	0.43	615	205	
Jackson .....	280	12,008	5,980	6,028	11,575	433	42.9	56,132	31.32	0.10	56	28	0.50	711	237	
Futnam .....	460	11,501	5,744	5,757	10,903	598	25.0	60,817	20.66	0.02	14	4	0.29	408	136	
De Kalb .....	300	14,819	7,438	7,375	13,060	1,153	49.4	67,866	35.36	0.01	26	12	0.40	657	219	
White .....	440	11,176	5,520	5,656	10,173	1,003	25.4	69,343	24.03	0.40	338	139	0.41	585	195	
Warren .....	440	14,079	6,915	7,164	11,801	2,278	32.0	85,884	30.50	0.24	206	96	0.47	603	221	
Coffee .....	300	12,894	6,337	6,557	11,104	1,730	43.0	71,051	37.01	0.08	55	20	0.36	519	173	
Franklin .....	590	17,178	8,551	8,627	13,646	3,592	29.1	92,753	24.56	0.45	414	171	0.41	588	196	
Total .....	3,890	122,110	60,660	61,450	109,750	12,860	31.4	672,212	27.00	0.18	1,210	513	0.42	603	201	
<b>CENTRAL BASIN.</b>																
Giles .....	590	36,014	18,030	17,975	21,324	14,190	61.0	170,599	45.18	18.42	31,416	13,802	0.44	627	209	
Lincoln .....	540	26,900	13,462	13,438	20,643	6,317	49.9	146,326	42.34	6.06	8,868	3,486	0.39	561	187	
Moore .....	270	6,293	3,169	3,064	5,448	785	23.1	38,937	22.53	0.05	20	7	0.35	408	166	
Bedford .....	520	26,025	12,994	13,091	18,536	7,489	50.0	164,800	49.52	1.36	2,239	940	0.42	597	199	
Marshall .....	360	19,259	9,652	9,607	14,420	4,830	55.0	117,005	52.23	4.01	4,697	1,721	0.37	522	174	
Maury .....	590	39,904	19,960	20,214	21,731	18,173	67.6	216,066	57.22	10.07	21,748	8,912	0.41	585	195	
Williamson .....	540	28,313	14,065	14,248	15,022	12,391	52.4	158,970	46.00	7.46	11,859	4,538	0.38	546	182	
Rutherford .....	590	36,741	18,136	18,605	20,248	16,493	62.3	200,049	52.98	16.32	32,657	12,414	0.38	543	181	
Cannon .....	220	11,859	5,905	5,954	10,690	1,163	53.9	64,965	46.14	0.12	77	35	0.45	648	216	
Davidson .....	500	79,026	38,923	40,103	47,678	31,348	158.1	139,166	43.49	2.31	3,224	1,333	0.41	588	190	
Wilson .....	410	28,747	14,221	14,526	20,292	8,455	70.1	170,229	64.87	1.87	3,191	1,272	0.40	507	180	
Smith .....	360	17,799	8,971	8,828	14,215	3,584	40.4	100,355	43.77	.....	.....	.....	.....	.....	.....	
Sumner .....	590	23,625	11,751	11,874	16,294	7,331	44.6	139,980	41.27	0.52	732	317	0.43	618	206	
Tronesdale .....	180	6,646	3,334	3,312	4,505	2,141	36.9	35,817	31.00	.....	1	1	1.00	1,425	475	
Total .....	6,190	387,151	192,252	194,899	252,461	134,090	62.5	1,863,764	47.05	6.48	120,729	48,778	0.40	576	192	
<b>CUMBERLAND TABLE-LAND.</b>																
Fentress .....	500	5,941	3,017	2,924	5,838	103	11.9	35,967	11.24	6.02	6	2	0.33	474	158	
Scott .....	640	6,021	3,081	2,940	5,864	157	9.4	28,946	7.07	0.01	3	2	0.67	951	317	
Morgan .....	400	5,156	2,722	2,434	4,867	289	12.9	19,845	7.75	0.02	4	1	0.25	357	119	
Cumberland .....	690	4,538	2,291	2,247	4,496	42	0.6	15,198	3.44	.....	.....	.....	.....	.....	.....	
Van Buren .....	340	2,933	1,481	1,452	2,747	186	8.6	17,976	8.26	0.40	88	29	0.33	471	157	
Grundy .....	400	4,592	2,518	2,074	4,154	438	11.5	14,830	5.80	0.22	82	21	0.66	936	312	
Total .....	2,970	29,181	15,110	14,071	27,966	1,215	9.8	132,771	6.99	0.10	133	55	0.41	586	196	
<b>CUMBERLAND TABLE-LAND, VALLEY OF EAST TENNESSEE, AND UNAKA MOUNTAIN REGION.</b>																
<i>a. Table-land and valley.</i>																
Marion .....	500	10,910	5,485	5,425	9,541	1,369	21.8	47,649	14.89	0.19	89	35	0.39	561	187	
Sequatchie .....	220	2,565	1,296	1,269	2,509	56	11.7	17,637	12.14	.....	.....	.....	.....	.....	.....	
Bledsoe .....	280	5,617	2,848	2,769	4,838	779	20.1	40,915	22.83	.....	.....	.....	.....	.....	.....	
Hamilton .....	370	23,642	12,025	11,617	18,239	7,403	63.9	52,020	21.97	0.93	486	143	0.29	420	140	
Rhea .....	340	7,073	3,550	3,514	6,300	773	20.8	40,956	18.82	0.02	9	4	0.44	633	211	
Anderson .....	440	10,820	5,441	5,379	9,917	903	24.6	58,823	20.82	0.10	60	38	0.63	903	301	
Campbell .....	400	10,005	4,989	5,016	9,574	434	25.0	53,730	20.90	0.01	4	1	0.25	357	119	
Claiborne .....	340	13,373	6,684	6,689	12,524	739	36.3	64,420	29.60	0.02	13	5	0.38	549	183	
Total .....	2,890	84,005	42,327	41,678	71,499	12,506	29.1	375,400	20.30	0.18	661	226	0.34	486	162	
<i>b. Valley.</i>																
James .....	200	5,187	2,580	2,607	4,478	709	25.9	32,505	25.39	.....	.....	.....	.....	.....	.....	
Bradley .....	340	12,124	5,894	6,230	10,258	1,866	35.7	71,286	32.76	0.07	51	15	0.29	420	140	
McMinn .....	480	15,004	7,261	7,803	12,718	2,346	31.4	104,174	33.91	0.08	80	22	0.27	393	131	

TABULATED RESULTS OF THE ENUMERATION.

TABLE I.—AREA, POPULATION, TILLED LAND, AND COTTON PRODUCTION—Continued.

Counties.	Land area.	POPULATION.						TILLED LAND.			COTTON PRODUCTION.					Cotton acreage per square mile.	
		Total.	Male.	Female.	White.	Color'd.	Average persquare mile.	Acres.	Percentage of area.	Percentage of tilled lands devoted to cotton.	Average per acre.						
											Acres.	Bales.	Bale.	Seed-cotton.	Lint.		
CUMBERLAND TABLE-LAND, ETC.—continued.																	
b. Valley—continued.		<i>Sq. mls.</i>															
Meigs .....	300	7,117	3,584	3,533	6,803	814	23.7	49,124	25.59	0.07	36	14	0.39	555	185	0.1	
Loudon .....	230	9,148	4,504	4,584	7,382	1,706	39.8	68,523	46.55	0.01	8	4	0.50	711	237	.....	
Roane .....	450	15,237	7,049	7,588	13,310	1,927	33.9	72,596	25.21	0.05	35	18	0.51	732	244	8.1	
Knox .....	500	30,124	19,099	20,025	31,880	7,244	78.2	154,188	48.18	0.01	11	7	0.64	906	302	.....	
Jefferson .....	320	15,846	7,781	8,065	13,339	2,507	49.5	89,704	43.83	.....	.....	.....	.....	.....	.....	.....	
Union .....	220	10,200	5,087	5,173	10,042	218	46.6	54,311	38.57	.....	2	1	0.50	711	237	.....	
Grainger .....	320	12,384	6,043	6,341	11,555	820	33.7	76,399	37.30	0.08	59	36	0.61	870	290	0.2	
Hamblen .....	150	10,187	4,990	5,197	8,481	1,706	67.9	45,872	47.78	0.03	12	2	0.17	237	79	0.1	
Hancock .....	340	9,098	4,466	4,632	8,616	482	26.8	46,847	21.53	.....	.....	.....	.....	.....	.....	.....	
Hawkins .....	570	20,610	10,066	10,544	17,956	2,654	36.2	124,295	34.07	.....	2	2	1.00	1,425	475	.....	
Washington .....	350	16,181	7,921	8,200	14,604	1,577	46.2	109,500	48.88	.....	.....	.....	.....	.....	.....	.....	
Sullivan .....	400	18,321	9,015	9,306	17,011	1,310	45.8	112,567	43.95	.....	.....	.....	.....	.....	.....	.....	
Total .....	5,170	215,888	106,000	109,888	187,933	27,955	41.7	1,211,911	36.63	0.02	296	121	0.40	562	194	0.1	
c. Valley and Unaka.																	
Polk .....	400	7,209	3,525	3,744	6,893	376	18.2	36,316	14.19	0.32	116	36	0.31	441	147	0.3	
Monroe .....	500	14,283	7,080	7,293	12,991	1,292	28.6	94,211	29.44	0.14	129	72	0.56	795	265	0.3	
Blount .....	770	15,985	8,030	7,946	14,273	1,712	20.8	92,860	18.84	0.21	198	70	0.35	304	168	0.3	
Sevier .....	520	15,541	7,707	7,834	14,848	693	29.9	79,463	23.88	0.01	10	6	0.60	855	285	.....	
Cocke .....	540	14,808	7,278	7,530	13,361	1,447	27.4	70,189	20.31	0.01	8	5	0.62	801	297	.....	
Greene .....	530	24,005	11,808	12,197	21,850	2,155	45.3	148,665	43.83	.....	3	1	0.33	474	158	.....	
Unicoi .....	480	3,645	1,826	1,819	3,526	119	7.0	16,269	5.30	.....	.....	.....	.....	.....	.....	.....	
Carter .....	340	10,019	5,013	5,006	9,885	634	29.5	42,970	19.75	.....	.....	.....	.....	.....	.....	.....	
Johnson .....	390	7,766	3,884	3,882	7,295	471	19.9	36,218	14.51	.....	.....	.....	.....	.....	.....	.....	
Total .....	4,470	118,321	56,160	57,161	104,422	8,899	25.4	617,161	21.57	0.08	464	190	0.41	585	195	0.1	

## COTTON PRODUCTION IN TENNESSEE.

TABLE II.—ACREAGE AND PRODUCTION OF THE LEADING CROPS.

Counties.	COTTON.		INDIAN CORN.		OATS.		WHBAT.	
	Acres.	Bales.	Acres.	Bushels.	Acres.	Bushels.	Acres.	Bushels.
The State.....	722,562	330,621	2,904,873	62,764,429	468,506	4,722,190	1,190,563	7,331,353
ALLUVIAL PLAIN OF THE MISSISSIPPI RIVER.								
Lake.....	3,240	2,412	14,730	536,265	108	4,266	1,008	24,293
ALLUVIAL PLAIN OF THE MISSISSIPPI RIVER AND PLATEAU SLOPE OF WEST TENNESSEE.								
<i>a. Alluvial plain and bluff.</i>								
Dyer.....	14,637	8,564	27,820	900,726	1,961	37,371	11,820	101,523
Lauderdale.....	24,083	13,250	22,580	580,797	1,375	17,908	3,889	24,053
Tipton.....	38,429	21,415	32,379	762,731	2,431	34,096	7,303	56,137
Shelby.....	92,020	46,888	55,260	998,210	5,216	72,074	3,504	23,437
Obion.....	7,259	4,225	45,005	1,501,381	2,105	35,098	25,308	230,243
Total.....	177,028	93,842	183,044	4,742,345	13,088	196,637	62,004	436,293
<i>b. Brown-loam table-lands, midland counties.</i>								
Fayette.....	92,231	39,221	68,419	1,030,505	3,661	38,120	3,737	18,004
Hardeman.....	44,885	18,937	45,207	707,324	2,554	20,807	4,768	23,901
Haywood.....	49,919	23,092	39,878	730,940	2,976	29,290	5,326	39,278
Madison.....	45,825	19,257	46,885	906,255	3,157	31,542	9,623	50,918
Crockett.....	17,807	9,320	25,650	626,762	1,501	16,171	9,883	54,431
Gibson.....	36,820	19,272	57,838	1,440,633	3,378	44,282	26,016	192,477
Weakley.....	15,466	7,576	50,001	1,307,873	1,795	22,583	25,470	171,835
Total.....	302,893	136,675	328,878	6,819,301	19,022	202,813	84,822	510,334
<i>c. Summit region of water-shed.</i>								
Henry.....	13,186	5,516	51,852	1,128,680	3,171	35,407	20,853	124,537
Carroll.....	24,711	10,565	46,076	1,018,415	3,413	37,694	17,354	88,396
Henderson.....	22,344	9,419	37,734	892,249	4,543	42,176	9,791	46,911
McNairy.....	23,135	9,419	33,501	678,059	5,093	47,559	6,726	36,678
Total.....	83,376	34,859	169,163	3,687,383	16,220	162,836	54,724	290,532
WESTERN VALLEY OF TENNESSEE RIVER.								
Benton.....	4,923	1,801	24,788	582,354	2,368	20,832	4,600	19,785
Decatur.....	5,591	2,169	19,985	473,924	2,701	20,360	3,829	14,611
Hardin.....	12,859	5,345	30,909	799,739	3,387	35,020	5,445	29,238
Perry.....	492	196	15,007	423,461	1,461	23,874	3,113	10,651
Humphreys.....	155	90	26,387	826,941	1,988	24,521	5,420	25,371
Houston.....	8	4	8,974	231,311	841	13,840	1,864	9,092
Stewart.....	45	15	28,957	778,404	2,070	20,029	5,620	34,855
Total.....	24,083	9,620	155,007	4,096,134	14,816	177,721	29,897	149,283
THE HIGHLANDS, OR HIGHLAND RIM OF MIDDLE TENNESSEE.								
<i>a. Western subdivision.</i>								
Montgomery.....	2	2	49,892	1,236,561	7,263	36,020	17,122	148,534
Robertson.....			45,408	793,702	9,373	115,678	21,012	134,426
Cheatham.....	5	2	19,719	457,189	3,309	42,297	3,368	18,036
Dickson.....	31	13	26,351	616,422	4,200	59,735	8,518	45,318
Hickman.....	3,128	1,302	39,716	828,117	2,896	42,488	7,874	37,491
Lewis.....	229	102	5,272	114,010	339	4,808	1,189	4,824
Wayne.....	3,265	1,207	25,674	583,305	2,109	27,442	8,791	40,038
Lawrence.....	1,830	792	24,673	434,215	2,812	39,097	8,059	43,331
Total.....	8,490	3,330	224,645	5,063,521	32,891	399,571	76,777	471,908
<i>b. Eastern subdivision.</i>								
Macon.....	4	1	21,286	436,804	3,376	34,581	6,461	31,495
Clay.....	2	1	20,010	412,287	1,955	15,205	4,700	24,424
Overton.....	95	41	30,336	550,091	4,193	32,953	9,000	40,015
Jackson.....	56	28	27,448	683,019	2,598	28,714	6,825	40,294
Putnam.....	14	4	25,510	511,610	2,919	24,160	8,720	42,033
De Kalb.....	26	12	31,004	863,297	2,275	21,292	13,416	75,893
White.....			34,639	637,143	2,775	24,811	11,354	44,659
	378	139						

TABULATED RESULTS OF THE ENUMERATION.

TABLE II.—ACREAGE AND PRODUCTION OF THE LEADING CROPS—Continued.

Counties.	COTTON.		INDIAN CORN.		OATS.		WHEAT.	
	Acres.	Bales.	Acres.	Bushels.	Acres.	Bushels.	Acres.	Bushels.
<b>THE HIGHLANDS, OR HIGHLAND RIM OF MIDDLE TENNESSEE—continued.</b>								
<i>b. Eastern subdivision—continued.</i>								
Warren.....	206	90	30,450	670,848	5,012	51,013	15,888	60,163
Coffee.....	55	20	27,002	658,203	3,127	34,160	9,574	58,155
Franklin.....	414	171	41,500	745,293	5,959	71,980	20,178	135,316
Total.....	1,210	513	298,211	6,168,595	35,289	399,379	106,821	558,851
<b>CENTRAL BASIN.</b>								
Giles.....	31,416	13,802	67,768	1,545,605	2,592	33,289	30,795	190,205
Lincoln.....	8,868	3,486	57,400	1,252,015	2,093	37,309	37,279	275,453
Moore.....	20	7	14,889	327,950	1,050	14,739	8,659	60,860
Bedford.....	2,230	940	68,492	1,682,358	6,270	87,408	39,589	257,425
Marshall.....	4,697	1,721	47,927	1,170,536	4,675	59,567	30,484	172,584
Maury.....	21,748	8,012	85,496	2,177,071	6,068	91,452	43,510	271,592
Williamson.....	11,850	4,538	61,122	1,499,445	5,012	85,522	39,685	315,960
Rutherford.....	32,057	12,414	75,753	1,590,855	6,482	74,794	29,250	172,907
Cannon.....	77	35	27,812	821,012	1,952	22,802	12,991	94,150
Davidson.....	3,224	1,333	62,764	1,436,582	8,141	139,807	18,651	157,530
Wilson.....	3,191	1,272	68,468	1,800,262	9,978	132,506	32,933	183,540
Smith.....			37,100	1,071,050	3,724	47,240	17,645	104,945
Sumner.....	732	317	40,245	917,940	9,188	95,031	20,445	140,895
Triondale.....	1	1	15,873	390,384	2,297	26,107	6,829	37,284
Total.....	120,720	48,778	729,225	17,641,071	71,322	941,718	368,595	2,446,432
<b>CUMBERLAND TABLE-LAND.</b>								
Fentress.....	6	2	14,591	210,416	2,482	15,524	2,705	11,092
Scott.....	3	2	12,536	185,646	3,606	23,060	447	2,297
Morgan.....	4	1	7,889	115,327	2,860	19,490	666	2,832
Cumberland.....			8,452	127,636	1,366	10,826	517	2,797
Van Buren.....	88	20	7,771	139,070	764	6,008	2,954	13,007
Grundy.....	32	21	6,364	114,758	839	8,507	1,753	7,855
Total.....	133	55	57,653	892,853	11,767	83,415	9,042	36,880
<b>CUMBERLAND TABLE-LAND, VALLEY OF EAST TENNESSEE, AND UNAKA MOUNTAIN REGION.</b>								
<i>a. Table-land and valley.</i>								
Marion.....	89	35	21,985	474,115	4,240	54,532	2,334	18,275
Sequatchie.....			8,267	145,532	709	6,337	1,068	6,735
Bledsoe.....			17,474	342,240	2,748	21,282	3,546	18,106
Hamilton.....	486	143	23,337	461,070	4,771	45,373	7,618	45,925
Rhea.....	9	4	16,453	362,801	3,343	38,650	4,764	31,290
Anderson.....	60	38	21,047	309,958	10,230	86,198	7,343	44,609
Campbell.....	4	1	22,138	341,945	8,100	63,334	4,513	25,549
Claiborne.....	13	5	28,475	496,262	9,130	74,921	9,128	44,192
Total.....	661	226	159,176	2,908,923	43,782	390,132	40,819	234,681
<i>b. Valley.</i>								
James.....			14,413	223,701	2,310	15,143	6,638	34,657
Bradley.....	51	15	23,794	337,446	4,652	25,672	16,608	88,961
McMinn.....	80	22	35,313	430,308	9,865	78,372	20,796	119,873
Meigs.....	36	14	21,812	444,103	5,267	45,124	8,141	47,797
Loudon.....	8	4	22,512	318,233	10,037	91,298	14,490	90,555
Roane.....	35	18	33,261	697,787	13,305	130,821	10,416	54,276
Knox.....	11	7	44,129	752,559	23,068	228,786	34,417	227,705
Jefferson.....			29,317	506,592	9,448	83,035	21,261	125,849
Union.....	2	1	19,844	318,702	7,524	62,233	8,015	39,208
Gwininger.....	59	36	25,832	356,123	10,568	83,073	12,895	61,563
Hamblen.....	12	2	16,143	231,134	6,731	51,270	11,085	66,057
Hancock.....			17,132	292,195	5,678	41,625	6,162	32,139
Hawkins.....	2	2	35,791	706,899	12,688	117,573	20,143	115,636
Washington.....			20,154	407,633	11,394	109,579	23,740	153,204
Sullivan.....			25,477	550,374	13,473	111,662	21,330	131,319
Total.....	296	121	384,924	6,926,484	146,514	1,275,281	236,037	1,388,349

## COTTON PRODUCTION IN TENNESSEE.

TABLE II.—ACREAGE AND PRODUCTION OF THE LEADING CROPS—Continued.

Counties.	COTTON.		INDIAN CORN.		OATS.		WHEAT.	
	Acres.	Bales.	Acres.	Bushels.	Acres.	Bushels.	Acres.	Bushels.
CUMBERLAND TABLE-LAND, VALLEY OF EAST TENNESSEE, AND UNAKA MOUNTAIN REGION—continued.								
<i>c. Valley and Unaka.</i>								
Polk .....	116	36	16,000	239,224	1,827	10,505	7,133	37,126
Monroe .....	129	72	33,928	566,356	10,116	80,793	19,773	114,884
Blount .....	198	70	31,680	450,011	12,888	95,367	20,588	110,196
Sevier .....	10	6	27,701	493,885	5,923	53,274	17,450	89,400
Cooke .....	8	5	28,368	553,507	5,767	50,165	16,660	94,793
Greene .....	3	1	39,464	719,465	16,507	139,134	30,259	237,302
Unicoi .....			5,040	81,852	2,309	22,501	1,840	9,365
Carter .....			12,403	243,906	5,046	51,141	8,226	55,150
Johnson .....			7,555	147,388	3,864	30,496	4,488	31,023
Total .....	464	190	202,217	3,495,654	68,887	542,376	135,417	779,307

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PART I.

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PHYSICO-GEOGRAPHICAL AND AGRICULTURAL FEATURES

OF THE

STATE OF TENNESSEE.

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# AGRICULTURAL MAP OF KENTUCKY & TENNESSEE

COMPILED FROM MAPS  
PUBLISHED REPORTS AND MS. NOTES

BY  
JAMES M. SAFFORD, PH. D., M. D.  
SPECIAL AGENT.

1883.

Scale  
0 10 20 30 MILES

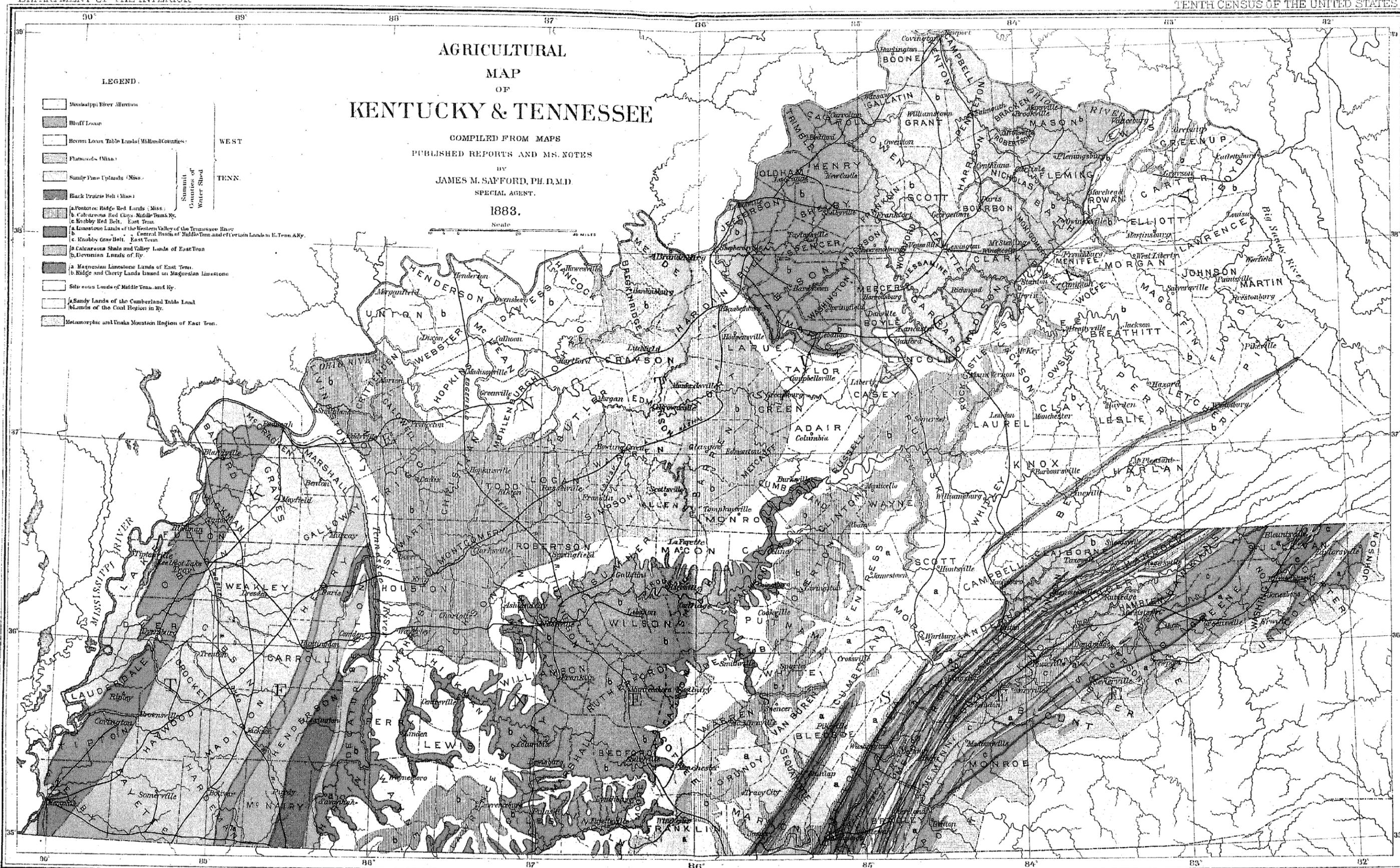
### LEGEND.

- Mississippi River Alluvium
- Bluff Loam
- Heavy Loam Table Lands (Middle Counties)
- Flatwoods (Miss.)
- Sandy Pine Uplands (Miss.)
- Black Prairie Belt (Miss.)
- a. Post-oc Ridge Red Lands (Miss.)  
b. Calcareous Red Clays (Middle Tenn. Ky.)  
c. Knobby Red Belt, East Tenn.
- a. Limestone Lands of the Western Valley of the Tennessee River  
b. Central Basin of Middle Tenn. and certain Lands in E. Tenn. & Ky.  
c. Knobby Gray Belt, East Tenn.
- a. Calcareous Shale and Valley Lands of East Tenn.  
b. Devonian Lands of Ky.
- a. Magnesian Limestone Lands of East Tenn.  
b. Ridge and Cherty Lands based on Magnesian limestone
- Site-cous Lands of Middle Tenn. and Ky.
- a. Sandy Lands of the Cumberland Table Land  
b. Islands of the Coal Region in Ky.
- Metamorphic and Unksa Mountain Region of East Tenn.

WEST

TENN.

Summit  
Contours of  
Water Shed



# OUTLINES OF THE PHYSICAL GEOGRAPHY

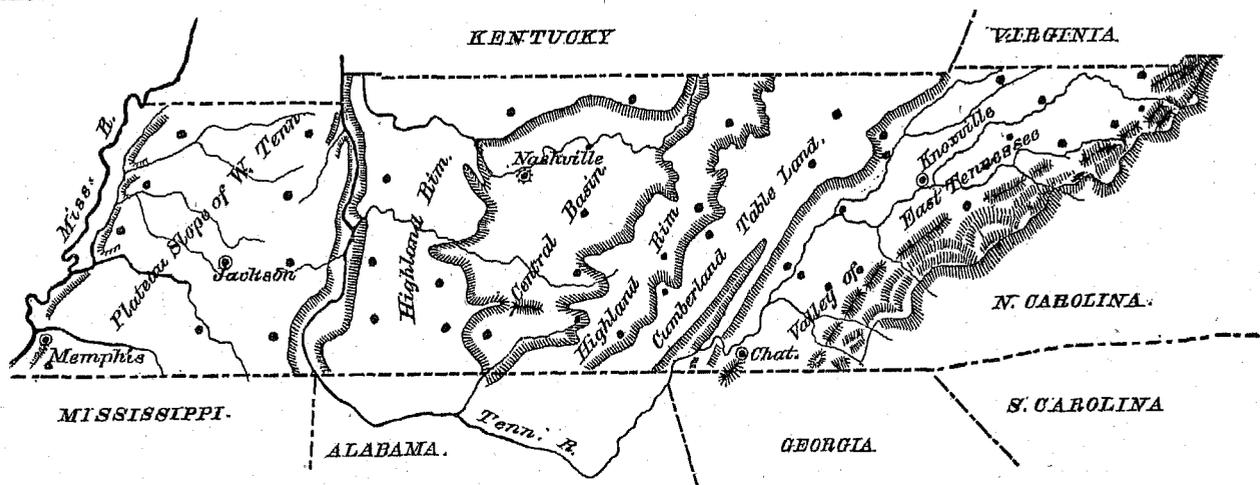
## OF THE

## STATE OF TENNESSEE.

The southern boundary of Tennessee coincides mostly with the parallel of latitude 35° north; its northern limit is a broken line lying between the parallels of 36° 29' and 36° 41'. In general outline the state has approximately the figure of a long rhomboid. Its mean length from east to west is about 385 miles, while its mean breadth cannot be much over 109 miles. Its land area is estimated to be 41,750 square miles; its water surface, 300 square miles.

**VARIETY IN NATURAL FEATURES.**—The length of the state, and the fact that it reaches, in its ribbon-like form, from the crest of a great mountain range on the east to the very low alluvial plain of the Mississippi on the west, through a varied territory, gives to Tennessee its most prominent characteristic, to wit, *great variety*. This is seen in its topography, geology, soil, climate, agriculture, and we may say in the character and habits of its population. As I have said elsewhere, (a) nearly all the important physical and geological features of the states around it are represented more or less (grouped as if for contrast) within its borders. Tennessee has, for example, on the one hand, some of the greatest mountain ridges of the Appalachians, with their “bald” summits and ancient rocks; on the other, the low land, cypress swamps, and alluvial beds of the Mississippi river. It has also well represented the singular parallel valleys and ridges of middle Virginia, the highlands, the “barrens”, and the rich limestone lands of Kentucky, and the orange-colored sand-hills, the Cretaceous beds, and cotton soils of northern Mississippi. The same variety and contrasts exist in the matter of climate, especially as to summer temperatures.

**GENERAL TOPOGRAPHY AND ELEVATION.**—To aid in understanding the topography of the state it will be well to assume and have in mind a great horizontal plane, having an elevation of 900 feet above the sea, with which to compare the *general surface*. Throwing out of view for the moment some of the local geographical features, that is to say, the mountain ranges of the eastern portion and the basins and valleys of the western, the general surface coincides more or less with this plane. I say more or less, for the surface is in a degree a warped one, coinciding at very many points with the plane, but at others either rising above or sinking below it. Reference may here be made to the diagram below, which is intended to show the great natural divisions of the state, there being eight of them:



The following divisions are not named in the diagram: The *Unaka Mountain region*, in the extreme eastern part of the state; the *Western Valley*, through which the Tennessee river flows northerly into Kentucky; and the *Mississippi Bottom region*, in the extreme western part of the state.

The parts of the state approximately coinciding with our assumed plane of 900 feet elevation, or at least directly referable to it, are the great divisions named: the *plateau slope of West Tennessee*, the *highland rim of Middle Tennessee*, and the *valley of East Tennessee*.

The valley of East Tennessee is in its upper or northern part a few hundred feet above the plane, while in its central and southern parts it at first coincides and then very gradually falls below it. The highlands of Middle Tennessee in some counties, as in Lawrence and Wayne, present a flat surface 100 feet higher than our assumed reference plane, while in Montgomery and adjoining counties the corresponding highlands are considerably lower. The "ridge" in West Tennessee dividing the waters of the Tennessee and the Mississippi rivers, and including the summit-line of the great plateau slope, must at some points be nearly, if not quite, as high as the plane. Westward, however, the general surface sloping off toward the Mississippi falls considerably below, and may be regarded as terminating at an average elevation of not far from 400 feet along the edge of the bluff escarpment which faces the alluvial plane of the great river.

Upon the surface, as described, rest the mountains of the state, the most important being the great ranges of the Unaka region and the Cumberland table-land. Out out of it and below it are the central basin of Middle Tennessee, the western valley of the Tennessee river, and the Mississippi bottom region.

Politically, the state is divided into three large divisions, namely, West Tennessee, Middle Tennessee, and East Tennessee. The first embraces all the counties between the Mississippi and Tennessee rivers, including the whole of Hardin county, altogether less than one-third of the state; the second the counties between the Tennessee river and a line approximately dividing longitudinally the Cumberland table-land, the largest division; and the third all the remaining counties in the eastern end of the state.

CLIMATE.—As already stated, in climate, as in other natural features, the state presents a marked variety. This is especially true of summer temperatures. The valley lands of upper East Tennessee have the summers of Ohio and New Jersey; the lowlands of Middle Tennessee have the summers of the northern part of Georgia; while West Tennessee is warmed by the summer of the central parts of Georgia and South Carolina. And further, there is, as will be seen hereafter, an extended line of high points on the eastern border of the state which have the cool breezes of a Canadian summer, and are, to some extent, clothed with a Canadian flora.

The climate of the state, exclusive of its mountains, is in general midway in character between that of a temperate and that of a subtropical region, or rather it combines the milder features of the two. In common with a large part of the valley of the Mississippi, the climate is subject to comparatively great extremes; yet these extremes never reach the excessive cold of the northern states or the highest temperature of the tropics.

Herbage is often green throughout the year, and cattle can generally graze, with but little interruption from cold or snow, during all the months of winter. Many shrubs which in states farther north lose their leaves during the winter, here not unfrequently retain them the year round. The daily changes of temperature are considerable, and, in common with a large area of the Mississippi valley, the state has a full share of humidity and sufficient rains. It is a part of the region of which it is said "cotton, Indian corn, and the cane find their natural climate here, but not elsewhere in any considerable degree beyond the tropics".

The annual mean temperature along a parallel running longitudinally through the middle of the state is, according to the best observations and estimates, about 60.5° for West Tennessee, 58.5° for Middle Tennessee on the meridian of Nashville, and 57.5° for the valley of East Tennessee, the range being 3°. For the annual means of parts of West and Middle Tennessee near the northern boundary of the state one degree may be subtracted from each of the above numbers respectively, and for parts near the southern boundary one degree added. In East Tennessee two degrees must be added and subtracted respectively for the northern and southern means. These approximations are the best that can be made at present. In making them, the temperatures of the mountain divisions, namely, the Cumberland table-land and the Unaka region, have not been considered.

The length of the period between the last killing frost of spring and the first killing frost of autumn is to the agriculturist an important element of climate. It is the measure of the growing season, at least so far as the cotton-plant is concerned. Not including the mountains, the average time for the last killing frost of spring is the middle of April in the northern counties of the state, excepting in those of upper East Tennessee, where it occurs a few days later. In the southern part of the state it is a week sooner. The average time of the first killing frost of autumn in the northern counties is the middle of October. It occurs a few days earlier in upper East Tennessee, and a week later in the southern counties of the state. The number of days between these frosts, that of spring and that of autumn, averages 189 for the northern part of the state and 203 for the southern. Frosts of course may occur respectively before or after the times specified, but the probabilities are against it. Early frosts begin to be a source of apprehension before the last of September, especially in the more northern portions of the state, and the cotton crop often suffers more or less from them.

The latitude of Tennessee is such that a fall of two degrees of temperature in the northern part of the state might cause a killing frost, resulting in the destruction of the cotton-plants, while the same fall in the southern part would leave them intact. The length of the growing season for cotton is, at the best, short enough in the southern part of the state, and where so slight a change of temperature produces such results we can readily see how, in the

northern part, it may be generally too short for full crops, which in reality it is. It amounts nearly to the same thing to say that the margin of the cotton-growing section of the country runs through Tennessee.

In an inspection of the map showing percentage of aggregate areas in cotton, as compared with the entire area of any given region, it is seen that the counties in Tennessee which plant and produce the most cotton are strikingly the most southerly ones, and that from these the production decreases almost uniformly as we go north. This is especially so in West Tennessee. Now, in explanation of this, in great part at least, it is to be noted that the isotherms, or lines of equal temperature, for spring and fall extend west-northwest through the state, say parallel with a line running through Chattanooga and Trenton or thereabout. This shows the southwestern corner to be the warmest, and here is our greatest center of cotton culture. The greater warmth stimulates the cotton, and by throwing back the killing frosts increases the length of the growing season. The soils have their influence, but that they are not dominant in this distribution of percentage culture is shown by the fact that as we go north the decrease occurs, though the soils and elevation remain essentially the same. It is also noteworthy that as we go eastward from each of the two centers of cotton culture (the southwesterly corner of the state and the southern part of the central basin) the percentage of cotton culture rapidly decreases. The temperature and higher elevation obviously have much to do with this decrease.

The rainfall for seven years (1873-1879) was: at Memphis, 54.40 inches; at Nashville, 51.98 inches; and at Knoxville, 54.52 inches, giving a mean of 53.60 inches. Our data indicate that we have the least rain in autumn and the most in winter and spring, yet so distributed through the months as to prevent any marked distinction into wet and dry seasons. The most favorable seasons are those in which the rainfall is about a mean, provided it is suitably distributed among the months. It is more frequently too dry than too wet during the summer.

THE ROCKS AND SOILS IN GENERAL.—The varied character of the natural features of Tennessee, both geological and agricultural, have already been referred to. As to the latter, this variety is marked, and will appear farther on. From the North Carolina boundary to a line nearly coincident with that part of the Tennessee river which flows northwestward across the state from Mississippi to Kentucky the strata underlying the soils, excepting the limited river bottoms, are everywhere *hard rocks* of many varieties: gneissoid and half metamorphic conglomerates, slates, and sandstones of the mountains to begin with; then calcareous shales, dolomites, and limestones of the valleys and calcareo-siliceous rocks of certain flat highlands. Much the greater part of the state, including the whole of Middle and East Tennessee, is made up of these hard rocks. Passing the line referred to, a wonderful change takes place. The hard rocks suddenly disappear, beveled off as if it was once a coast-line washed by the waves, and abutting against their beveled edges begin strata, little indurated, of clays, sands, and other material, which spread over nearly the whole of West Tennessee. The latter strata, which we call, by way of contrast, *soft rocks*, are of much later geological age than the former, and give to West Tennessee characteristic features.

The strata of the state, be they soft or hard rocks, are approximately horizontal in position, excepting those of the valley of East Tennessee and the Unaka mountains, which are generally tilted, dipping to the southwest, often at a high angle, with their edges outcropping at the surface in long lines running northeast and southwest. The position of the strata has much to do with the topography of a country and with the extent and shape of its agricultural areas. Owing to the outcropping of the tilted strata of East Tennessee in long lines, it is a *striped* country, made up of closely packed long and narrow valleys and ridges, all running in straight courses to the northeast and southwest. Its best soils and agricultural areas occur, therefore, in long, narrow strips or belts separated by ridges. No such parallelism of valley and ridge is to be seen in the other parts of the state.

The soils are classified for the most part by the rocks, and it is the decay and disintegration of the latter which supply the inorganic materials. In Middle and East Tennessee, where, with unimportant exceptions, superficial drift formations are absent, the connection between the limestones, sandstones, shales, etc., and the overlying soils is very apparent. There being many kinds of rocks, there will be many kinds of soil, and the most important in the divisions just named are the calcareous soils; that is, those of the limestones, dolomites, and calcareous shales. With the exception of the limited alluvial areas of certain streams the cotton of Middle and East Tennessee is produced, substantially, on calcareous soils.

The most important cotton soils of Middle Tennessee belong to two horizons of the Trenton limestone period, namely, the upper part of the Hudson river (Nashville) rocks, and certain beds of the lower part (the Central or Murfreesborough limestone).

In East Tennessee the little cotton cultivated is mostly found on the calcareous shale and dolomites of the Quebec (Knox) division of the Canadian period.

In West Tennessee the soils are chiefly based on sands, sandy clays, loess (calcareo-siliceous earths), and alluvial deposits. They are for the most part mellow, warm, and well adapted to the growth of corn, cotton, and tobacco.

THE NATURAL DIVISIONS OF THE STATE.—These have already been referred to, and are here briefly characterized. They are well defined, and will be taken as a basis in the arrangement of the matter of this report.

1. *The Mississippi bottom region*, embracing the Tennessee portion of the great alluvial and low plain in which the Mississippi river has its tortuous bed; area, approximately, 900 square miles; average elevation above tide, about 260 feet.

2. *The upland or plateau slope of West Tennessee*, including the entire area between the low bottoms of the Mississippi and the Tennessee valley next mentioned. It begins with the line of bold bluffs or escarpments overlooking the bottoms, and gradually ascends eastward, embracing the ridge dividing the waters of the Mississippi and the Tennessee rivers, respectively, and the highlands immediately beyond. Average elevation, 500 feet; area, 8,850 square miles, equal to one-fifth of the state.

3. *The western valley of the Tennessee river*, a comparatively narrow, broken area, through which the Tennessee river flows in its direct northward course from the state of Mississippi to Kentucky. The valley is crowded between the breaks and slopes of two plateaus, the one just mentioned and the Highland Rim, lying next to the east. Average elevation, 360 feet; area, 1,200 square miles.

4. *The highland rim, or rim highlands* of Middle Tennessee, encircling, terrace-like, a basin of rich lowlands in the very center of the state. From the valley last mentioned eastward to the western foot of the Cumberland table-land, a distance of more than 100 miles, there lies a nearly square portion of the state. This area is a plateau having an average elevation of 1,000 feet above tide, out of the middle of which has been excavated a basin, named below the *central basin*. The part left intact is the rim, a complete circle of flat highlands, with an area of 9,320 square miles, nearly two-ninths of the state.

5. *The central basin*.—The basin surrounded by the rim is thus designated. It is the central part of Tennessee, supplies the site for its capital, and is the garden of the state. It is oval in form, with longer and shorter diameters, respectively, of about 120 and 55 miles. Average elevation above the sea, 600 feet; area, 5,450 square miles, more than one-eighth of the state.

6. *The Cumberland table-land, usually known as Cumberland mountain*, is a plateau with broad and generally level top, and stands in bold relief above the lowlands on each side. It is capped with sandstone, and is the Tennessee coal-field. Elevation, 2,000 feet; area, 5,100 square miles.

7. *The valley of East Tennessee*.—The great valley of which Knoxville is the metropolis is a fluted region or succession of parallel minor valleys and ridges, and is one of the most beautiful and populous portions of Tennessee. It extends obliquely through the state, and is bounded on the west and northwest by the eastern escarpment of the Cumberland table-land, and on the southeast by the Unaka chain. Average elevation, 1,000 feet; area, 9,200 square miles, exceeding one-fifth of the surface of the state.

8. *The Unaka region* comprises an area of bold mountain ridges, more or less parallel, having a general northeast and southwest trend and inclosing many valleys and coves, and is the eastern mountain border of the state. The line separating Tennessee from North Carolina is, for the most part, the crest of the most easterly and highest ridge. Average elevation of summit, 5,000 feet above the sea; area, excluding the interlocked valleys and coves, about 2,000 square miles.

#### THE MISSISSIPPI BOTTOM REGION.

That portion of the great alluvial plain of the Mississippi river pertaining to Tennessee, or, I might say, to Kentucky and Tennessee, is comparatively small. The course of the river is such on the western border of these states as to divide the plain very unequally, throwing much the greater part, popularly known as the Saint Francis bottom, into Missouri and Arkansas, and leaving a narrow interrupted strip in Kentucky and Tennessee.

In the latter states, as indeed farther south, the alluvial plain is bounded on the east by a sharply defined line of bold bluffs, or a bluff escarpment, the edge of the flat uplands which extend off eastward. This bluff escarpment, or edge, reaches in a nearly straight line from Kentucky, through Tennessee, to Mississippi. We shall call it the bluff. The strip of the great plain belonging to Kentucky and Tennessee is interrupted and cut into a number of sections by the repeated bending in of the river to the bluff. The river thus strikes the uplands at the following points: Columbus and Hickman, in Kentucky, and Fulton, Randolph, and Memphis, in Tennessee. (a) The largest of the sections, and the most important so far as Tennessee is concerned, lies between Hickman and Fulton. This includes Madrid bend and an area in Kentucky south of Hickman, but the main part is in Tennessee. The next most important section stretches from Randolph to Memphis. The section between Randolph and Fulton is inconsiderable, the points being but a few miles apart. Below Memphis begins the large division of the great plain known in Mississippi as the "Yazoo bottom". This belongs to the latter state, excepting the extreme northern end, which is in Tennessee. It is to be added that there is a number of cultivated islands in the Mississippi river which must be included in the Kentucky and Tennessee portion of the plain.

The alluvial plain in Tennessee has about the same general features as elsewhere. It is, or has been, forest-covered, much of it heavily so, and many parts are subject to overflow. It has its bayous, lakes, and cypress swamps. The highest land, and that chiefly under cultivation, often called "front-land", is generally a raised, wide bank or belt bordering the river, and formed by the deposition of alluvial matter in great overflows of the past, the overflowing water having lost the bulk of its earthy load as it first escaped from the deep and swift channel

a Formerly the river washed the uplands at another point, "Old river," as now known by some, in the southern part of Tipton county. The four points, Fulton, Randolph, "Old river," and Memphis, were once known as the four "Chickasaw bluffs", Fulton being the first and Memphis the fourth.

current. Going from the river and this higher land, the surface generally slopes off into lower "back-lands", with "buckshot" clays and soils, finally ending, it may be, in a lake or a cypress swamp. Such at least are the typical features. This division embraces the whole of Lake county, about one-third each of Dyer and Lauderdale counties, and a fraction each of Tipton and Shelby. It also embraces Reelfoot lake and limited lands in Obion county. The entire area has been estimated to be 900 square miles, but this is probably an overestimate. The blue tint on the colored map indicates this division. The cultivated land forms for the most part an interrupted belt along the Mississippi river, and has a width ranging from the fraction of a mile to two miles or more. The greatest single body of such land lies in the middle and northern parts of Lake county, where the proportion in cultivation is estimated to be at least two-thirds of the area. In the southern part of Lake the proportion is not more than one-fourth; half of which is along the river. There is much timber land, and large bodies are subject to overflow. South of Lake county the proportion of land in cultivation is still less. In Dyer county the cleared land is a more or less broken strip bordering the river from half a mile to 2 miles wide, with an average width of 1 mile. There are, however, in this county many thousand acres fit for farming purposes as yet uncleared.

The following extracts from letters of correspondents refer to the Mississippi bottom region in Lauderdale county. The characteristics given, however, may in the main be taken as illustrative of the general features of the entire division in Tennessee. Mr. J. L. Lea, of Fulton, writes:

A slip of cultivated land runs along the Mississippi river, and but little lies back from the river. The best and highest land is always along the river. The bottom about the mouth of the Hatchie is small. Hatchie bottom proper is about 1 mile or 2 miles wide, and has a slough of cypress timber and some tupelo-gum swamps. There is not much cultivation until you strike the second bottom along the foot of the hills.

The main Mississippi bottom region of this county is the area lying between Coal creek, Forked Deer river, and Mississippi river, an area, say, 8 to 10 miles wide and 15 or 20 long, and including 100,000 acres. I believe that in extreme high water every spot of this has been covered, unless it be certain Indian mounds.

There are farms in the bottom bordering the Mississippi river, but not along Coal creek or Forked Deer river. It is 3 or 4 miles above the mouth of Coal creek before the farms begin. I suppose 6,000 or 8,000 acres would cover all the cultivated land of the bottom. Cypress swamps exist all through the area, say 25 per cent. of the whole. I do not know that there are any tupelo-gum swamps in it; do not remember to have seen or heard of any. This bottom would be a magnificent tract of land were it not for the interference of the water. There is a disposition to bring it into use notwithstanding, and some persons are clearing more deeply overflowed lands than had been thought available. I have cleared some land having 10 or 12 feet overflow and make corn on it almost every year. I plant in June, and secure 40 or 50 bushels of hard corn per acre. It is safer from overflow in summer than any creek or river bottom in hilly or mountainous countries. I suppose 25 per cent. of this bottom overflows 2 feet or less, 25 per cent. 5 feet or less, 25 per cent. 10 feet deep or less, and the balance is made up of lakes and sloughs. Two-thirds of the cultivated land is in cotton. There is no road along the bank of the Mississippi river across the mouth of Coal creek, and none, I think, across the mouth of old Forked Deer river, except perhaps in low water. Roads are found in all the farming areas. These statements are necessarily imperfect, and in some points may be incorrect.

Mr. J. C. Marley, of Ripley, writes:

According to the best statements I can make, there are about 100,000 acres of land between the bluff and the Mississippi river termed bottom or overflowed land. This is equal to about one-third of the area of the county. Of this there is in cultivation about 8,000 acres, of which about 5,000 are in cotton. Most of the cultivated land is near the river, and lies in a broken belt along its banks. There are a few patches of cultivated land out back from the river; and other land is also susceptible of improvement, some near the bluff or highlands. Very little of this bottom land is entirely above extreme high water, but there is much of it on which the overflow is slight. I would estimate that on one-third of the land the water never gets more than 2 feet deep, and that on one-half it never exceeds 4 feet. It is thought by our best farmers on the river that a slight overflow is advantageous. The difficulty in cultivating land subjected to deep overflows is that the fences float away. There is no land in our county that produces so well as this bottom. A friend of mine near Hale's Point tells me that he has for the last eight years cultivated about 50 acres in cotton, and that it averaged each year 500 pounds of lint to the acre.

The bottom in Tipton is estimated to average 4 miles in width. Farms occur at intervals all along the river, but none back until the bluff is reached. This country includes also four islands, containing in the aggregate 17,000 acres, 2,500 of which are under cultivation. The bottom continues into Shelby, with the same general features as heretofore described.

The soils may be grouped into two classes, the loams and the "buckshot" clays. The loams prevail, and are dark and exceedingly fertile, at times clayey and stiff, and then sandy and mellow, sometimes becoming too sandy. The buckshot soils are subordinate. Mr. Lea says:

The term "buckshot" is applied to certain stiff black soils which break up into small fragments when cultivated. These soils are not uniform in kind, and vary a little in color and in other characteristics. They are not generally found in very large bodies, as the overflows deposit sandy and loamy lighter soils at intervals upon them.

These buckshot soils are derived from a stratum of dark clay which extends throughout the bottom, and upon which, as a floor, the high waters deposit their alluvial load.

No analyses have been made of samples of the soils of this division taken from Tennessee. Analyses, however, have been made of the corresponding soils in other parts of the Mississippi plain which fairly represent the composition of those of Tennessee.

We select as typical the following analyses, the soil being found in the Yazoo bottom in Mississippi. They are extracted from Professor E. W. Hilgard's report on the cotton production of Mississippi:

No. 354. *Dark-colored, rather light loam*, from Tallahatchie county, Mississippi, a good representative of the "front-land" soils.

No. 376. *Grayish, rather sandy soil*, from Sunflower county, Mississippi. This land is reported as not much esteemed by farmers.

No. 394. *Stiff, pale gray loam*, with yellowish or orange flecks, so that when worked up the soil is somewhat yellow. This soil is from Issaquena county, Mississippi.

No. 396. *Light "buckshot" clay*, taken from the edge of a depression or pond, Coahoma county, Mississippi.

No. 390. *"Buckshot" soil* of Deer Creek back-land, Issaquena county, Mississippi. It is a stiff, dark-colored clay soil, traversed by numerous cracks, and mottled with spots of ferruginous matter. Upon drying, it breaks up into little angular fragments. It is exceedingly fertile.

*Mississippi river bottom soils, Mississippi.*

	TALLAHATCHIE COUNTY.	SUNFLOWER COUNTY.	ISSAQUENA COUNTY.	COAHOMA COUNTY.	ISSAQUENA COUNTY.
	Tallahatchie bottom soil.	Indian Bayou front-land soil.	Sunflower River front-land soil.	Light colored buckshot clay.	Deer Creek buckshot soil.
	No. 354.	No. 376.	No. 394.	No. 396.	No. 390.
Insoluble matter.....	87.146 } 91.944	87.898 } 91.934	71.164 } 84.070	75.513 } 86.408	51.068 } 71.787
Soluble silica.....	4.798 }	4.036 }	12.506 }	10.895 }	20.704 }
Potash.....	0.361	0.226	0.401	0.606	1.104
Soda.....	0.084	0.116	0.191	0.146	0.325
Lime.....	0.301	0.153	0.406	0.386	1.349
Magnesia.....	0.385	0.256	0.696	0.973	1.665
Brown oxide of manganese.....	0.158	0.048	0.011	0.133	0.119
Peroxide of iron.....	2.120	1.848	3.845	2.804	5.818
Alumina.....	2.151	2.565	0.889	4.457	10.530
Phosphoric acid.....	0.112	0.162	0.165	0.278	0.304
Sulphuric acid.....	0.605	0.042	0.016	0.007	0.024
Water and organic matter.....	2.644	3.013	2.748	4.401	7.369
Total.....	100.205.	100.363	100.038	100.598	100.383
Hygroscopic moisture.....	4.79	4.07	7.39	6.04	14.31
absorbed at.....	22 C.°	14 C.°	15 C.°	12 C.°	15 C.°

In giving these analyses, Professor Hilgard makes the following remarks:

These soils are types of the prominent soil-varieties occurring equally on both sides of the Mississippi north of the mouth of Red river. Without entering into a detailed discussion of these soils in this place, it is important to call attention to the fact that in its store of plant-food of all kinds the "buckshot" soil stands pre-eminent above all the rest, and well justifies its reputation of being the most productive and durable soil of the great bottom. Unlike most other clay soils, it may be tilled at almost any time when the plow can be propelled through it, because, on drying, it crumbles spontaneously into a loose mass of better tilth than many an elaborately tilled upland soil. It is of such depth that the deepest tillage, even by the steam-plow, would not reach beyond the true soil material, and its high absorptive power secures crops against injury from drought. At the same time (owing doubtless to its being traversed by innumerable fine cracks and being underlaid by gravel and sand) it drains quite readily. In good seasons a large part of the cotton crop grown on this soil has often been left unpicked for want of labor after taking off from 1,500 to 1,800 pounds of seed-cotton to the acre. Two bales of lint per acre can undoubtedly be produced on such soils with fair culture and good seasons.

THE UPLAND OR PLATEAU SLOPE OF WEST TENNESSEE.

This large and important division is pre-eminently the cotton region of the state. Leaving the great bottom at any point, we ascend the bluff to an average elevation of about 130 feet and find ourselves upon a flat and wide-spreading plateau. From the bluff the plateau extends eastward, gradually rising to the Tennessee ridge, by which name the high belt of country which lies on both sides of the actual summit of the water-shed dividing, respectively, the waters of the Mississippi and Tennessee rivers, and chiefly within the counties of Henry, Carroll, Henderson, and McNairy, has been designated. The plateau, or plateau slope, has from its western to its eastern limit a mean length of about 84 miles. Its form is nearly rhombic, and its area 8,850 square miles. It is a section of a greater plateau lying in Kentucky, Tennessee, and northern Mississippi, between the bottoms of the Mississippi river on the one hand and the valley of the Tennessee on the other, and embraces in its area the following counties and parts of counties: All of Weakley, Gibson, Carroll, Crockett, Haywood, Madison, Henderson, Fayette, and Hardeman; much the greater parts of Henry, McNairy, Shelby, Tipton, Lauderdale, and Obion, and smaller parts of Hardin, Decatur, Benton, and Dyer.

The division is well supplied with water-courses. The summit of the water-shed is so near the Tennessee river that much the longer slope is on the Mississippi side. On this side, therefore, the rivers are most characteristic. They are numerous and long for their water volume, and run in nearly parallel courses, from the Tennessee ridge northwestward, until they intersect or nearly reach the line of the bluff, when they turn southwestward through the bottoms of the Mississippi river. These rivers have sluggish currents, and usually a wide flat bottom on both sides, bearing a heavy forest growth, and are often swampy and subject to overflow. Back from the immediate bottoms the surface often rises in "second bottoms", supplying arable lands of good quality.

The following data indicate the general elevation of the plateau slope. The Tennessee ridge, or belt of highlands referred to, has in the southeastern part of the division, in McNairy and Henderson counties, an elevation above tide of from 500 to 600 feet. Some points exceed this, probably reaching as much as 800 feet. From Jackson northward the elevation ranges from 400 to 500 feet, and going toward Memphis the elevation falls considerably below 400 feet. The bluff has a mean elevation of about 400 feet. At Memphis its height is below the average both as to the sea and as to the Mississippi; at Randolph its height above both is an average. Passing northward, its elevation above tide becomes greater, but remains about the same as to the Mississippi.

We divide the plateau slope into three subdivisions, as follows:

1. *The bluff region.*
2. *The brown-loam table-lands.*
3. *The summit region of the water-shed.*

#### THE BLUFF REGION.

The bluff region (orange color on map) includes nearly the whole of Obion county and the larger parts of Dyer, Lauderdale, Tipton, and Shelby counties. It is a belt of country from 20 to 25 miles wide extending from Kentucky to the state of Mississippi, and lies east of and adjoining the Mississippi bottom. Its eastern limit is approximately coincident with that of the tier of counties mentioned. Its soil is a calcareo-siliceous loam, often called clay, based on yellowish-gray or often an ashen-colored loess, more or less calcareous. (a) The loess itself rests on a bed of gravel and orange sand, which sometimes appears at the surface, especially near the eastern margin of the belt, in washed places and road-cuts. The upland soil is the prevalent one, and varies in color from a gray or ashen to a brown or dark loam, is deep and mellow, in fine pulverulent condition, easily tilled, contains more calcareous matter than is ordinarily met with in the soils of this part of the state, and is altogether a superior upland soil. It is easily washed, and needs judicious tillage. It is remarkable for its forest growth. In some sections it supplies the largest trees to be found in the state, great "poplars" (tulip-trees), oaks, sweet gums, elms, hickories, walnuts, sassafras (growing up like great pine trees, with long trunks), beeches, and other trees reaching dimensions much above the average. In favorable seasons from 1,500 to 1,800 pounds of seed-cotton are often raised per acre upon the best of this land. Shelby, the most southerly county of the belt, produced in the main upon this soil in the census year more cotton than any other county of the state, besides making good crops of Indian corn and oats. Owing to long or improvident culture the soil in some sections is more or less exhausted. It and its substratum, however, are strong in the elements of fertility, so much so that, unless badly cut up by washes, it is susceptible, when impoverished, of great improvement, or even restoration.

In addition to the uplands, the second bottoms of the streams, both of creeks and rivers, supply a large aggregate of arable land of good quality, the soils being strong loams or mixed soils composed of ingredients from the loess and subjacent strata. And further, the alluvial dark bottom lands of the creeks, if escaping ordinary overflows, are often very fertile and durable. As a general thing, the bottoms of the rivers are clayey and cold, but they sometimes present areas prized for their fertility.

The following analyses are given of a representative soil and subsoil and loess of this region. The specimens were taken and averaged with care in accordance with directions given by Professor E. W. Hilgard:

No. 15. *Upland soil* from a poplar grove at Gill's station, 2½ miles east from Memphis, Shelby county. Depth, 6.2 inches; timber growth, chiefly "poplar" (tulip-tree), sweet gum, and hickory; also sugar maple, red, and other oaks, red-bud, and dogwood. The soil, after drying, has a light brownish-gray or ashen color.

No. 16. *Upland subsoil*, taken below the above soil. Its appearance, with the exception of a yellowish cast, does not differ very much from the soil.

These analyses have representative value, but it will require the analysis of many such specimens, selected from all the counties of the belt, to give true averages of the composition of this upland soil and of its most important varieties.

No. 17. *Loess* from the river bluff at Memphis, Shelby county, taken at 12 inches. This specimen was selected by J. G. Snedecor, esq., of Memphis.

a This formation, the loess, can be satisfactorily studied in the bluff at Memphis. All the material of the bluff here above high-water mark belongs to it. The cuts made for the streets and railroads expose it well. The gravel and sands underlying the loess at this point can only be seen at low water.

## COTTON PRODUCTION IN TENNESSEE.

*Lands of the bluff and loess region, Shelby county.*

	GILL'S STATION.		MEMPHIS BLUFF.
	Upland soil.	Upland subsoil.	Loess.
	No. 15.	No. 16.	No. 17.
Insoluble matter.....	84.646 } 80.112	83.128 } 86.981	73.113 } 70.508
Soluble silica.....	4.409 }	3.858 }	3.300 }
Potash.....	0.332	0.300	0.438
Soda.....	0.085	0.181	0.180
Lime.....	0.248	0.243	3.967
Magnesia.....	0.677	0.438	3.201
Brown oxide of manganese.....	0.030	0.042	0.094
Ferric oxide.....	2.416	3.064	4.687
Alumina.....	2.333	5.026	3.102
Phosphoric acid.....	0.083	0.004	0.319
Sulphuric acid.....	0.080	0.010	0.000
Carbonic acid.....			5.561
Water and organic matter.....	4.159	2.620	1.730
Total.....	99.555	99.668	99.927
Hygroscopic moisture.....	5.00	6.31	4.07
absorbed at.....	16 C.°	17 C.°	16 C.°
Humus.....	1.062		
Inorganic matter.....	0.972		
Available silica.....	0.473		
Available phosphoric acid.....	0.049		

[The soil and subsoil from Gill's station, while having a fair amount of potash and lime, are deficient in phosphoric acid. More than one-half of the latter is in an available form in the soil, as shown in the humus determination. The loess, much less sandy than the other soil, is also richer in potash, and contains large percentages of lime and phosphoric acid, as well as of magnesia. Its organic matter is low.—R. H. L.]

The following abstracts from the reports of correspondents bear more or less upon the features of the subdivision in general, and will be in place here. The name and the county of the correspondent are given in each case: (a)

JOHN H. McDOWELL, OBION COUNTY: The kinds of soils cultivated in cotton are: (1) Light, easily tilled, easily drained blackish uplands, having very little sand and a clay subsoil; (2) black, loamy lowlands, with heavy gray and cold subsoils; (3) light-brown surface soil, with a yellow subsoil. The chief soil is the blackish level upland. It comprises one-fourth of the land in this region, and extends 12 miles north and south and 10 miles east and west, with the exception of the small intervening creek bottoms. The native growth is hickory, oak, ash, linden, sugar-maple, beech, gum, walnut, "poplar," box-elder, hornbeam, and others.

E. W. HERRING, OBION COUNTY: The soils put in cotton are: (1) That of the uplands, which is best and most used, light clay, mixed with some sand, ashen colored or gray; (2) waxy bottom lands. Three-fourths of the land is of the first kind. The growth is oak, hickory, poplar, ash, and walnut.

LOUIS M. WILLIAMS, DYER COUNTY: The soils are: (1) Rolling or hilly land, a clay loam with yellow clay subsoil; (2) valley and creek bottom, black loam land; (3) flat land, crawfishy or whitish-gray. The best is the clay loam, comprising about two-thirds of this region, and embracing all rolling land; its depth is from 6 to 24 inches, and it extends east 10 miles, west 8, north 4, and south 7 miles. The soil to the east becomes more sandy. The growth is principally poplar, intermixed with gum, white oak, maple, and sugar-tree. The subsoil is yellowish in most places, in others reddish and very tenacious. On being turned up to the sun and frost it pulverizes and becomes very fine, incorporating readily with the soil. It is impervious to water in many places. Underdraining remedies many evils to which our soil is subject. Rounded pebbles occur at a depth of from 16 to 18 feet; also sand and thin sand-rock at from 20 to 25 feet.

FRANK T. RICE, LAUDERDALE COUNTY: The soils used for cotton are: (1) Dark upland, much worn and turning rapidly to red clay; depth on the hills, 4 inches; (2) dark loam soil of Lagoon and Williams' creeks; (3) dark loam, occurring on the Hatchie river. The best is the hill or upland soil, covering three-fourths of this region, and extending 30 miles north, 40 south, 50 east, and 25 west. The growth is white, black, and red oaks, poplar, sweet and black gums, elm, maple, hickory, ash, dogwood, sassafras, and others. The subsoil is a tough red clay, baking hard when exposed. The soil is not very productive.

J. H. SHINAULT, TIPTON COUNTY: The soils cultivated in cotton are: (1) Black upland soil, lying mostly in patches of from 10 to 50 acres; (2) dark alluvial soil, lying near creeks and branches, of which there is but little; (3) heavy buckshot of mixed dark and light colors. The chief soil is the black upland, covering about half of the surface here, and extending north 10 miles, east 15, south 30, and west 8 miles. Thickness, 10 inches. There is now, however, a great difference in the productive qualities of this soil, some of it being worn out. The principal growth is oak, poplar, and gum, with ash, elm, and maple. The subsoil is a light mahogany, soft for subsoil, which becomes like the surface soil by cultivation; it is not entirely impervious to water when undisturbed, and is underlaid by red sand at 25 feet.

H. L. DOUGLASS, SHELBY COUNTY: Cotton is cultivated upon the following soils: (1) light gray, and (2) dark gray. The chief soil is the light gray, a fine silty loam, sometimes brownish, and from 3 to 8 inches thick. Cotton matures earlier upon it. This soil extends north 50 or 60 miles, west 6 or 8, south 20 or 25, and east 20 or 25 miles. The growth is white and red oaks, sweet and black gums, walnut, honey-locust, mulberry, and maple. The subsoil is a tough red or yellow clay, crumbling when exposed, underlaid by sand and blue clay at from 10 to 30 f

W. H. NELSON, SHELBY COUNTY: The cotton soils are: (1) a clay loam, and (2) alluvial bottom soil. The chief soil is the clay loam, which occurs over three-fourths of this region, and extends northward through two or more counties and southward into Mississippi, 8 miles west and 20 east. This soil is brown, becoming lighter after long cultivation; thickness, 5 inches. The growth is oak, hickory, "poplar," maple, gum, dogwood, elm, ash, walnut, beech, and cottonwood. The subsoil is a yellow brick clay about 25 feet in depth, without sand or gravel, except in some places along the brows of hills, not impervious to water, and contains hard, rounded pebbles and sand at 25 or 30 feet.

#### THE BROWN-LOAM TABLE-LANDS.

The region of the brown-loam table-lands (light orange color on map) constitutes the largest and most important agricultural subdivision of the plateau slope. These table-lands present a belt-like area, extending through the state, twice as broad as that of the bluff region, and embraces the following counties, which we may call the *midland counties* of the plateau slope: Fayette, Hardeman, Haywood, Madison, Crockett, Gibson, and Weakley, together with large parts of Carroll and Henry and small parts of other counties. Its area is about 4,450 square miles, or about half that of the entire plateau slope.

Of the counties mentioned, the first seven only are considered in the remarks immediately below, Carroll and Henry being included in the third subdivision and the fractional parts of the others in the first and third. The subdivision, as thus limited, supplies about five-twelfths of the entire cotton product of the state, besides being surpassed by only two sections in the yield, respectively, of Indian corn and tobacco (the central basin in corn and the western subdivision of the highland rim in tobacco, both sections of Middle Tennessee). On the map showing percentage of acres in cotton as compared with the whole number of acres in any given district it will be seen that the color area indicating the highest percentage lies, as already observed, in the southwestern corner of the state. This area is confined to the southern parts of the bluff region and the subdivision under consideration, and lies in the counties of Shelby, Tipton, Fayette, Haywood, Hardeman, and Madison, the first two being counties of the bluff region. From this, in every direction within the state, the relative proportion of cotton planted decreases, until, to the east only, we reach the central basin, in the southern part of which is a second but subordinate center of cotton culture.

The table-lands subdivision as shown upon the map, and including the counties and parts of counties first enumerated, is a plateau region of moderately rolling uplands cut into sections by the numerous rivers and their tributaries. The formation underlying the soils and subsoils is the orange sand of the drift. The orange, yellow, and sometimes gray sands of this formation are often seen in the railroad cuts, in gullies, and in bluffs on the rivers, at depths below the subsoil of from 3 to 10 feet or more. The soil of the uplands is, of course, the prevailing one. It is a brown, or, when moist, blackish, warm, siliceous loam, noted for its mellowness, and on slopes is easily washed, and therefore requires careful handling. The subsoil is reddish-brown and more clayey than the surface soil. The soil is well suited to the culture of cotton, especially in a region like that of West Tennessee, where the shortness of the growing season (the period between killing frosts) makes early maturity desirable. The same belt of country and soil extends far into Mississippi, where it contributes largely to the production of the best upland cotton in that state. The soil is tolerably uniform in character, though here and there sections occur which, by their more stunted natural growth, show them to be below the average fertility. (a) In many districts the soil has been more or less injured by bad or improvident culture, and can no longer yield as formerly. In this way lands once of first grade have been reduced to the second or even third grade. Where it is not too late it should be looked to that no further deterioration of this kind shall occur, and that the soils which have suffered shall be brought back to something like their primitive strength and fertility.

The characteristic native growth of the soil is oak—white, red, black, Spanish, post, and black-jack oaks. Hickories are common, with "poplars"; also some walnuts, maples, chestnuts, dogwood, hazel-nut, and many other trees and shrubs. Rarely patches of poorer sandy spots are met with having a growth of pine trees.

The soils of the second bottoms, though generally not the best for cotton, may be richer than those of the uplands. When mellow and gravelly, they are often in dry seasons the best for cotton. The bottoms above overflow have sometimes a very fertile soil. Then again, they are too clayey and crawfishy.

No analyses have been made of samples of soils from this subdivision in Tennessee. Fortunately, however, the belt extends into the state of Mississippi, and the analyses of its soils there will, doubtless, fairly represent their composition here. The following analyses are taken from Professor E. W. Hilgard's report on cotton culture in Mississippi:

No. 216. *Soil from the table-lands* on the divide between Coldwater and Wolf rivers, near Lamar, Benton county, from a level tract below Summit ridge. Timber, black-jack, post oak, and hickory, with some sweet gum and a few Spanish oaks. Depth taken, 10 inches; quite mellow, and of a "mulatto" tint.

No. 235. *Subsoil* of the above, 10 to 20 inches.

No. 219. *Subsoil* from same section of land, but taken on the Summit ridge itself; resembles the last.

a It may be remarked here that the upland soil of this subdivision merges insensibly into that of the bluff region. Both are mellow, siliceous soils, and in their best condition are very fertile. The line separating them has not been accurately traced out, and the one on the map is simply an approximation. Many of the correspondents treat the soils of the two subdivisions as one, and so speak of them in their reports. The underlying loess of the bluff thins out eastwardly to a feather edge overlapping the orange sand, the two often, doubtless, contributing to the formation of the same subsoil.

*Brown-loam table-lands of Mississippi.*

	Soil.	Subsoil.	Ridge subsoil.
	No. 216.	No. 235.	No. 219.
Insoluble matter.....	83.347	83.993	82.830
Potash.....	0.549	0.700	0.630
Soda.....	0.082	0.041	0.090
Lime.....	0.245	0.130	0.270
Magnesia.....	0.479	0.507	0.450
Brown oxide of manganese.....	0.700	0.332	0.060
Peroxide of iron.....	4.798	3.862	5.110
Alumina.....	0.282	7.729	8.090
Phosphoric acid.....	0.068	0.236	0.210
Sulphuric acid.....	0.002	0.054	0.020
Water and organic matter.....	4.195	2.716	3.140
Total.....	100.867	100.399	100.000
Humus.....	0.787	.....	.....
Available inorganic.....	0.068	.....	.....
Hygroscopic moisture.....	6.84	7.42	.....
absorbed at.....	17 C. <sup>o</sup>	17 C. <sup>o</sup>	.....

Professor Hilgard thus discusses these analyses:

The common chemical characteristics of these soils, and especially of their subsoils, are high percentages of potash and lime, with usually a large supply of phosphoric acid in the subsoil, at least of the heavier lands. Potash is not likely to become deficient in the subsoils at least; but the supply of humus is not large (as in fact is evident from inspection), and green-manuring is one of the most important improvements indicated. Originally this was not the case, for the surface soils were, and in protected spots still are, dark-colored to almost black when wet; but the washing away of the surface and the burning of the woods have served to deplete the surface of this and other important ingredients, so that over a large portion of the region it is the subsoil, and not the surface soil, as given in the analysis, that the farmer has to deal with. In this case the addition of vegetable matter is, of course, doubly important; and green-manuring of denuded tracts with cowpease is one of the most convenient, as it has proved to be one of the best, means of improvement. The analyses show that so long as the subsoil remains the question of restoration of a "tired" soil is simply one of time and judicious management.

The following are abstracts from the reports of correspondents bearing upon the features of this subdivision:

**GILBERT PATTERSON, WEAKLEY COUNTY:** Cotton grows well on any of our heavy clay loams. The second bottoms are better for cotton, excepting that while fresh it grows too rank. On the partly black, hilly lands cotton grows well. The black level or rolling upland soil, covering three-fourths of the county, is the chief one. It extends from the south line of this county to the Kentucky line, and from the east line of Weakley county to the Mississippi bottom. Its growth is white and black oak, "poplar," beech, hickory, and black and white gum.

**JOHN C. LIPSCOMB, WEAKLEY COUNTY:** The soil cultivated in cotton is the black upland, lying mostly in good-sized bodies of level land. It is a fine silty and clay loam about 12 inches thick, and is found on one-half the area of the county. No cotton is raised on second-class lands. The growth is beech, "poplar," ash, oak, and some walnut.

**E. T. BOHANNON, CARROLL COUNTY:** The soils cultivated in cotton are: (1) good upland with black sandy soil; (2) bottom land with black sandy soil; (3) hill land with a light gray soil. The black sandy upland is the best, and embraces about one-half of the lands here. It extends north 30 miles, west 50, and south 35 miles. To the east the country is broken and varied to the Tennessee river. The growth is oak, hickory, "poplar," gum, ash, and walnut. The soil has a clay foundation, which is underlaid by sand at from 15 to 30 feet.

**Z. BRYANT, SR., GIBSON COUNTY:** The cotton soils are largely upland. Here and for 40 miles north, 100 miles south, as far as the Tennessee river east, and for 50 miles west the soil is inclined to be sandy, with some gravel. The native growth is white, red, and black-jack oaks, hickory, gum, dogwood, walnut, poplar, beech, ash, chestnut, etc.

**A. D. HURT, MADISON COUNTY:** The kinds of soils cultivated in cotton are: (1) dark sandy upland and second bottom; (2) black-jack oak land or light sandy ridges, requiring constant attention to prevent washing; (3) buckshot, containing small whitish gravel. The chief soil is the upland or table-land. It covers perhaps three-fifths of this county, and extends west many miles and north to the state line. The growth is hickory, mulberry, ash, white and red oak, papaw, walnut, and "poplar." The subsoil is a red clay with very little sand, impervious when undisturbed, and underlaid by sand at from 6 to 12 feet.

**J. B. BRANTLY, HAYWOOD COUNTY:** The kinds of soils are: (1) level or gently rolling upland and second bottom—a dark brown soil with some sand; (2) soil similar, of less depth and more rolling; (3) that of overflowed bottom land, greenbrier land, and cypress swamps. The chief soil is the first, the dark brown sandy. One-half of this region is of this kind. It occurs over the entire county, and on the west and south into the adjoining counties. Its native growth is oak of different varieties, hickory, poplar, ash, walnut, dogwood, papaw, hazel-nut, and sumac. The subsoil is mostly a red or yellow clay, with some little sand; also some white clay, which is occasionally gravelly, underlaid by sand and gravel, or pipe-clay, at from 6 to 15 feet.

**AARON WALKER, HAYWOOD COUNTY:** The soils cultivated in cotton are: (1) Black upland loam in large bodies when properly cared for and not exhausted; (2) soils somewhat worn and mixed with clay; (3) worn soil, washed and exhausted. The land here before being worn is all of the first class, and is reduced to the second and third classes by bad cultivation. The character of the soil is only changed by being mixed with clay. I describe the land of Haywood county, which is all of the same character, excepting the overflowed or swamp lands of the river bottoms. All the soil, with the exceptions just stated, was originally black upland loam. Its extent was west 40 miles to the bottoms of the Mississippi, north to Kentucky, east 20 miles, and south 20 miles to the sandy soil of Fayette county. Its growth is poplar (*Liriodendron*), black oak, hickory, and gum. Thickness, from 4 to 6 inches usually. The subsoil is a tough red clay, baking hard when first exposed to the sun, but gradually becoming like the surface soil, underlaid by sand at from 20 to 30 feet.

H. M. POLK, HARDEMAN COUNTY: The kinds of soils cultivated in cotton are: (1) The siliceous and dark ashen-colored soil of the uplands, lying in long rolling slopes and in level plateaus, extending to many hundred acres in one body; (2) the somewhat heavier soils of Spring and Pleasant creeks; (3) the heavy soil of Hatchie river, mostly above overflow. With the exception of some pine land on the north of Hatchie river and in a portion of the southeastern corner of the county, the dark ashen-colored upland extends over nearly the whole county. Beyond this the soil spreads over Fayette, Haywood, Madison, Gibson, and Weakley, and parts of Shelby, Tipton, and Henderson counties. Its native growth is red, post, and white oaks, hickory, dogwood, red-bud, walnut, sassafras, and wild cherry. Average thickness, about 12 inches. The subsoil in Hardeman is a deep red rich clay, extending down from 10 to 18 feet. When turned up to the action of the sun and frosts it produces well. It contains no gravel, and water does not percolate easily through it. The soil yields from 1,000 to 1,800 pounds of seed-cotton on fresh land, or from 800 to 1,000 pounds after 20 years' cultivation.

#### THE SUMMIT REGION OF THE WATER-SHED.

This is the part of the upland or plateau slope through which the Tennessee ridge extends in its nearly south and north course from the state of Mississippi to Kentucky. The summit line of this ridge, dividing the waters of the Mississippi from those of the Tennessee, passes through the counties of McNairy, Henderson, Carroll, and Henry, and the region is made to include the counties of McNairy and Henderson, the eastern parts of Henry and Carroll, and the western parts of Hardin, Decatur, and Benton. On the west it merges gradually into the second subdivision, the brown-loam table-lands, and on the east reaches the breaks of the highlands, finally sinking away into the western valley of the Tennessee river. Its breadth along the Mississippi state line is 35 or 40 miles; but it grows narrower as we go north, until along the Kentucky line the breadth is reduced to 8 or 10 miles. The area is about 2,830 square miles. Though containing tracts of level lands, it is, as a whole, very broken. In some of the counties, as in McNairy and Henderson, the ridges are high and bold, presenting many wild and picturesque sections. In the northern part of the area the valley of the Big Sandy traverses it longitudinally and modifies to some extent the roughness of its features. The mean elevation of the water-shed and the heights of the ridges were referred to in discussing the elevation of the entire plateau slope.

The streams are generally small, those on the western side of the summit-line being merely headwaters of rivers flowing into the Mississippi, while those on the eastern side are necessarily small, on account of the proximity of the summit to the Tennessee river. The Big Sandy has such a course as to make it exceptionally large and long. Beech river, rising in Henderson and crossing Decatur county, is the next most important stream. The other streams consist of creeks and branches, some of the former being of noteworthy size.

The soil most frequently met with is a sandy loam derived from both the orange sand and older sandy strata. There is, however, a great variety of soils, the subdivision embracing, to a great extent provisionally, belts of country having different soils with different formations underlying them. Approaching the Mississippi state line, this variety is more marked, the area becoming easily separable into belts, each with a soil and a surface more or less distinct. Just within Mississippi, where they have been much more thoroughly studied than in Tennessee, they are named as follows, commencing with the most westerly: The *Flatwoods belt*, the *Pontotoc ridge*, the *Short-leaf pine and oak sandy uplands*, the *Black prairie belt*, and lastly the *Short-leaf pine and oak sandy uplands* again.

**FLATWOODS BELT.**—The *Flatwoods belt* extends through Tennessee, though its name is not especially descriptive of its surface or topography here, for it is often broken and hilly. Its characteristic underlying strata are beds of laminated or slaty clays, of dark color when wet, but light gray when dry, and varying in thickness from an inch to a hundred feet or more. With these are interstratified more or less sand. Often, however, these strata are covered and concealed from view by the deposits of the orange-sand formation. The soils are of two general classes, the clayey and heavy and the sandy and light, in accordance with the character of the strata upon which they rest. The superficial orange sand contributes a large proportion of its mellow light soil.

**SANDY PINE AND OAK UPLANDS.**—The *sandy pine and oak uplands* occur in two belts. We consider the more westerly first. The *Pontotoc ridge* area extends from Mississippi into Tennessee, but soon runs out, and is lost in the sandy pine and oak uplands. This area brings with it calcareous strata, limestone even, while a little to the west of it occurs "green (glaucous) sand", much like the "greensand" of the black prairie belt, to be described. Such formations exist in the southeastern corner of Hardeman county. With them, however, are many beds of interstratified sand, showing often interlaminated clayey leaves. Going north, the calcareous and glaucous materials disappear and give place to laminated sands; but as with the flatwoods, so here the orange sand has spread its material over a great part of the belt, concealing the older beds, and in many sections giving character to the agricultural features of the surface. As provisionally given upon the map, including the area made by the projection of the Pontotoc ridge belt into the state, the sandy pine and oak uplands form the largest of the belts of the summit region, reaching throughout the state. On the Mississippi state line it is 15 miles wide, but has a less average width, and it is exceedingly varied in agricultural features. It has areas of poor pine uplands, but these make in the aggregate little of its surface; it is in the main rough and broken, yet there are numerous large bodies of arable land, which lie well and are productive. Some of these are uplands, others valley lands, of which those of the Big Sandy are to be noted.

**BLACK PRAIRIE BELT.**—The *black prairie belt* adjoins on the east the region just described. It is well known in Tennessee as a distinct area, but the designation *black prairie* is more generally applicable in Mississippi than

in Tennessee. The characteristic underlying formation is known as "greensand", and farther south as "rotten limestone". It is a great bed, at some points 300 feet deep, of clayey sand, highly calcareous, containing green grains of a soft substance (glauconite), and at many points abounds in fossil sea-shells, among which are huge oyster shells. The belt thus characterized has, commencing with the Mississippi line, an average width of about 8 miles for at least half way through the state. Farther north it becomes inconspicuous, and its limits in this direction have not been satisfactorily made out. It extends through the eastern parts of McNairy and Henderson counties and the northwestern corners of Hardin and Decatur. Much of it is very hilly and rough.

The soils of the belt, where resting upon the greensand, and normally formed from them, are more clayey and calcareous than is usual in West Tennessee. We would naturally look also for a greater percentage of potash in them, as the substance of the "green grains" contains this constituent in its composition. Where the land lies well this soil is often strong and fertile, and on ridges it is usually sandy and thin. The subsoil derived from the greensand is from 2 or 3 to 20 feet in depth. It is a grayish or dirty buff, tenacious material, locally called "joint clay", from its tendency to cleave when drying in irregular block-like masses.

At numerous points in McNairy and Henderson counties the greensand comes to the surface, forming "glades" or "bald places", spotted over with a stunted growth of trees or shrubs. In these places the formation often presents a gray marly surface, with little or no depth of soil or subsoil.

It is to be observed, however, that a large proportion of the soils of the belt are not those of the greensand. As in the belts described, over much of the area the orange sand covers and conceals all else, supplying on level or rolling spots its mellow, fertile soil, or on rugged places a sandy and gravelly one, of little or no fertility.

**EASTERN SANDY PINE AND OAK UPLANDS.**—The last belt of the summit region is the eastern belt of the *sandy pine and oak uplands*. This in its underlying formations and soils is much like the first belt of this name. Much of it is covered with the orange sand, which here often includes beds of gravel. It occupies a belt of country varying from 2 to 8 miles in width, and extends northward more than half way through the state. In Hardin county it reaches the Tennessee river, and here forms a part of the immediate valley of the river. This part is only included in the plateau slope of West Tennessee, for the reason that its formation, a sandy one, naturally belongs to this division of the state; and the same may be said of that part of the black prairie belt lying in the western part of Hardin and the eastern part of McNairy counties.

The following abstracts from reports of correspondents illustrate the features of the summit region:

**W. P. SMALLWOOD, HENRY COUNTY:** The cotton soils in this county are as follows: (1) Dark upland clay loam; (2) whitish clay of flat lands away from water-courses; (3) sandy loam of hazel hollows and branch bottoms. The chief soil is the dark upland loam, which constitutes about one-fifth of all, occurring sometimes in bodies of 1,000 acres or more. Its thickness is from 6 to 8 inches. The growth is black oak, hickory, black gum, grape-vine, etc. The subsoil is a red clay, mixed with white sand, is slightly leachy, usually well drained, and is underlaid by sand at from 8 to 10 feet.

**D. L. WILLETT, HENRY COUNTY:** The lands of the waters of the Big Sandy and the West Sandy rivers are referred to. The soils cultivated in cotton are: (1) Fine sandy loam of uplands, gray or dark, and in some places gravelly; (2) black sandy soil of lowlands, rather heavy, and in places rather wet, comprising the bottom soils of the territory between the Big Sandy and the West Sandy rivers; (3) second bottom rolling lands, clayey and gravelly. The chief soil is that of the uplands, extending to the bottoms and bordering the rivers, and has a depth of 6 inches. The growth is "poplar", hickory, grape-vine, chestnut, white oak, some ash and walnut, with some "post-oak glades" in the eastern part of the twenty-fourth civil district. The subsoil is a heavy red sand, containing soft black gravel, but not much rock, and is underlaid by sand at from 6 to 10 feet. The growth of soil No. 2 is beech, white oak, red gum, maple, poplar, and "water oak". The growth of soil No. 3 is like the last, excepting beech and adding papaw. There is less of soil No. 3 than of No. 2.

**J. H. JORDAN, CARROLL COUNTY:** The first and second bottoms of Hollow Rock creek, and also the hilly, rolling, and level uplands, are referred to. The following are the soils cultivated in cotton: (1) Coarse sandy clay loam, with red clay subsoil, of flat portions of the uplands; (2) black sandy soil, with clay subsoil, on hilly lands; (3) blackish soil of bottom land. The most important is the first-named, of which the proportion is one-third. It is 8 inches thick, and extends north 8 miles, east 4 miles, south 20 miles, and west 2 miles. The principal growth is red, white, and post oak, poplar, cherry, and hickory.

**W. C. TRICE, HENDERSON COUNTY:** The uplands, or the hilly, rolling, and level table-lands of the waters of Forked Deer river, are referred to. The chief soil is a sandy loam, with some red-clay loam. Three-fourths of the soils are of this kind. It is a fine sandy loam of a mahogany and orange-red color, is 4 inches thick, and extends 10 miles east, 100 west, 50 north, and 100 south. The growth is chiefly black, red, and post oak, and hickory. The subsoil is leachy.

**E. W. CUNNINGHAM, HENDERSON COUNTY:** The region, which includes the waters of Beech, Big Sandy, and Forked Deer rivers, is considered. The soils cultivated in cotton are: (1) That of second bottoms, mixed clay and sand, above overflow; (2) dark sandy soils of hilly and rolling uplands; these vary greatly, the south sides of slopes being sandy, the north sides usually a clay with little sand; (3) soil of lowlands, liable to overflow, which yield well in some seasons when frost is late. The chief kind is that of the second bottoms. It is one-fifth of the whole, and is from 12 to 24 inches thick. This soil extends back from the overflowed area for a distance of from 100 yards to 1 mile or more. In its growth are found red oak, poplar, dogwood, sumac, and hazel. The subsoil is generally a yellow or reddish-yellow and leachy clay. It contains gravel, and sometimes pebbles. Soil No. 2 forms about two-thirds of the whole, and lies one-tenth of the whole, and lines the rivers on both sides, with widths varying from 100 yards to half a mile or more. Its growth is generally white oak, poplar, gum, and elm, and sometimes beech.

**T. M. STUBBLEFIELD, HENDERSON COUNTY:** Refers to the southeastern part of the county, including the first and second bottoms of Cane, Flat, and Middleton creeks, which are waters of the Beech and Tennessee rivers, as well as to the hilly, rolling, and level table-lands between them. The soils cultivated in cotton are: (1) Black soil, mixed with sand, in the valleys; (2) gray sandy soils, on flat highlands, with sand or gravel underneath; (3) clay lands, with very little soil on the hills, having a "joint-clay" foundation. The first and third soils lie over a heavy stratum of "black dirt" (greensand) filled with shells and from 6 to 100 feet in depth, which extends north and south through the county, and is in some places 15 miles wide. The unchanged black dirt is about 15 feet below the surface,

and is a good fertilizer. The changed part (the subsoil) is called "joint-clay". The chief soil is the first given—the black, mixed with sand. It forms about one-eighth of all, is 6 inches deep, and extends north 20 miles, east 4 miles, south 10 miles, and west 4 miles. Its growth is poplar, beech, hickory, white and black oak, gum, and some walnut. In addition to this soil, there is a stiff land on the hills that produces cotton very well.

SYDNEY PLUNK AND F. E. MILLER, McNAIRY COUNTY: Our location is near the dividing ridge of the Mississippi and Tennessee rivers, on the waters of Sweet Lips creek, a tributary of the Forked Deer river. The chief soils cultivated in cotton are: (1) Black, fine sandy loam, found principally in small valleys; (2) well-drained second bottom or branch bottom lands, a black, loose sandy loam; (3) fresh uplands, with clay subsoil. The first named is the chief soil, a black sandy loam, which includes one-half the land in cultivation. The growth in the bottoms is hickory, dogwood, maple, gum, and white oak; in the second and branch bottoms, red, post, black, and white oaks, poplar, beech, red-bud, papaw, and buckeye; on the high uplands, black-jack, red, black, post, and Spanish oaks, and scrubby hickories. There are three kinds of land in this county, which change but little in different localities, namely, the black sand, the yellow sand, and the gray clay land.

W. J. SUTTON, McNAIRY COUNTY: The locality is on the waters of Owl creek, of the Tennessee river, and on the east side of the watershed of West Tennessee. The soils cultivated in cotton are: (1) Soils of the first and second bottoms, black and mixed with calcareous matter, the subsoil being a marl or "joint-clay"; (2) second bottom black loam, with some sand, much like No. 1, and subsoil the same; (3) quite a variety, mostly upland, yellow, sticky clay, some as dark as the bottoms; also the "bald knobs" and shell beds. The first and second bottoms make up about one-fourth of this region, and extend north to Owl creek, and then, interspersed with shells and sand, far north and south, east nearly to the Tennessee river, and west to the top of the water-shed. The timber on the bottom lands is poplar, gum, hickory, elm, walnut, box-elder, etc. The soil is a fine sandy loam, some of it putty-like, and called beeswax, of a blackish color, and averages from 4 to 9 inches, though sometimes 2 feet deep. The subsoil includes the jointed clay, which reaches down to the marl or greensand. The soil is easily tilled in wet or dry weather, but more easily when moderately wet or dry. The third class of soils makes up about one-half this region. Their growth is black-jack, post, red, and Spanish oak, dogwood, and hickory. The thickness is from 2 to 4 inches, and when the subsoil is present it is a sticky, yellow clay. The underlying formation is "greensand".

#### THE WESTERN VALLEY OF THE TENNESSEE RIVER.

This division has been briefly characterized before. As compared with the plateau slope just described, it shows a marked falling off in the percentage of land in cotton. (See map showing relations between area and cotton acreage.) The northeastern part of the division, that east of the Tennessee and north of Duck river, is in the "penumbral region" of cotton culture, very little cotton being produced. Passing from this to the southwestern part, the percentage rises, until in the western portion of Hardin county and on the eastern border of McNairy it reaches the maximum for this division.

The Western valley, as already stated, is a long, narrow, and comparatively broken area crowded between the spurs and breaks of two plateaus, one on the west and the other on the east side of the Tennessee river. Its limits on both sides may be taken to be the lines respectively along which the highlands for the most part break away. As thus limited, it has an average width of not more than 10 or 11 miles, with an area, say, of 1,200 square miles (a small portion of the state), and embraces the greater parts each of Benton, Decatur, and Hardin counties, much of Henry, a little of McNairy, the western portions of Stewart, Houston, Humphreys, and Perry, and the northwestern corner of Wayne. The bounding highlands on both sides are fringed with numerous spurs, many of which run within 2 or 3 miles of the river, and some quite to it. Interlocked with the spurs, the valley sends out many ramifications, among which are the narrow valleys of the tributaries of the Tennessee river, not a few of which ran back 10 or 15 miles and some 20 or more before they terminate. Some of the creek valleys of Hardin and Wayne are among the longest ramifications. These are serpentine and narrow, averaging not more than a mile in width, but at many points are very fertile. The spurs separating them are high, flat-topped arms of the highlands, like most of the spurs on this side of the valley. Buffalo river, with the lower part of Duck river, in Wayne, Perry, and Humphreys counties, presents in its valley an important ramification. This, however, and the upper parts of the long creek valleys mentioned, are to be regarded as deep cuts in the division next considered, the Highland Rim. The valley of the Big Sandy is a ramification on the western side of the division.

Taking the high-water elevation of the Tennessee river as the floor of the valley under consideration, its average elevation above tide is about 360 feet. The depth of the valley below the highlands that bound it on the east is, say, 500 feet, and below those on the west not far from 350 or 400 feet.

The formations of the division are of many kinds. We have, in our progress eastward, the last of the sandy and clayey strata of West Tennessee and the first of the solid strata, the limestones and siliceo-calcareous strata of Middle Tennessee. It thus includes the junction of the soft rocks of the one with the hard rocks of the other—a junction which appears to mark the position of the ancient coast-line referred to on a previous page. Here and there also, overlying the formations on each side of the junction, and indeed on both sides of the Tennessee river, are patches of sandy material and gravel pertaining to the eastern margin of the orange-sand drift.

In the more southern counties (Decatur, Perry, and the eastern part of Hardin and Wayne) numerous "glades" are met with—gravelly, marly places, resulting from the appearance at the surface of a gray, often shaly, limestone, with but little or no covering of soil. With the exception of patches of bushes or shrubby cedars, these places are nearly naked. These glades are sometimes several acres in extent, and make in the aggregate a large area, occurring usually on hillsides and slopes, but often forming the surface of isolated and low knobs, and are wholly different from those before spoken of as characteristic of the "black prairie belt". In another section of the

valley, however, the western part of Hardin and the eastern part of McNairy, many of the glades of the black prairie belt do occur, which have been already noticed in connection with the belt to which they belong.

Alluvial bottoms occur alternately on the two sides of the river. These are not often more than a mile wide; yet their aggregate area is very considerable. The bottoms usually have high "front-land" along the river and lower "back-land" away from it, the latter sometimes running into swamps, often cypress swamps. The bottoms of the tributary creeks also are to be taken into account, as they make an important addition to the agricultural capabilities of the valley.

This variety in formation gives a great variety of surface and soil. The alluvial lands are generally very productive, and yield abundant crops of Indian corn, the chief product. Much of the second bottom and arable sloping lands of this division and of the ramifications running out from it, especially on the eastern side of the river, are made gravelly by the angular flinty *débris* from the siliceous rocks of the ridges, and where not worn too much are generally very mellow, productive lands. Some of the limestone lands also are gravelly, from the liberation and shivering of the flinty seams contained in the underlying rocks. To these may be added patches of gravelly land resting on the water-worn gravel of the drift. Areas of flatwoods land occasionally occur, as in Hardin county.

The chief products of the valley are, in the order of greatest importance, Indian corn, wheat, cotton, oats and tobacco. With these also must be given peanuts, a crop of no little importance in some sections. While most of the cotton is the product of the southern part of the division, most of the tobacco comes from the northern part.

The following abstracts from the reports of correspondents refer chiefly to lands in the western valley:

A. C. PRESSON, BENTON COUNTY: For 40 miles along the eastern boundary of the county the river has a line of bottoms averaging about 1 mile in width, the soil of which is excellent for cotton. The bottoms are overflowed in very high freshets, making it sometimes too late for planting. The Tennessee river hills, back of the bottoms, are rocky, and generally do not produce cotton well. There is a dividing ridge between the waters of the Tennessee and Sandy rivers for three-fourths of the length of the county, the eastern side of which is mostly rocky and gravelly, and is not so good for cotton; but the western side is mostly sandy, and is good cotton land. Nearly all the lands of Sandy river in this county produce the staple well, excepting its first bottoms, which are too wet. Some of the hilly lands of Sandy river wash badly. The bottoms of the county, when not too wet, average more per acre than the uplands; yet there is more cotton grown on the uplands, for the reason that they are more easily worked. The kinds of soil cultivated in cotton are: (1) Bottom lands, black sandy soils with clay subsoils, such as those of the Tennessee river and of Birdsong, Cypress, and Rushings creeks; (2) uplands, also black sandy soils with clay subsoils; (3) yellow sandy soil. The chief soils are those of the bottoms. They form one-ninth or one-tenth of the whole, and are found on creeks and along the whole length of the Tennessee river; thickness, about 12 inches. The growth is elm, poplar, hickory, hackberry, sugar-maple, oaks, cypress, etc. The clay subsoil is at first yellow and hard, but upon cultivation becomes more like the soil, and is underlaid by sand or rock at various depths. Soils of the second class are found on the uplands, and make about 5 per cent. of the whole, extending pretty much through the length and breadth of the county. The growth is oak, hickory, poplar, chestnut, etc. The third class includes rolling sandy lands, which aggregate one-third or more of the whole, with a thickness of soil of about 5 inches. These lands within the county extend 10 miles north from Camden, south 20, east 5, and west 3 miles, but within the state 60 miles both south and west. Growth, much the same as that of the second class. The soil is from 3 to 5 inches deep, and is easily cultivated, whether wet or dry.

JOHN McMILLAN, DECATUR COUNTY: There is a variety of lands in this county, the most of which are cultivated in cotton, excepting those that are low and marshy. They comprise: (1) Fresh sandy lands; (2) clay lands, manured; (3) common flat lands. The chief soil is the fresh sandy land. One-third of the county has a sandy soil, and this is true of the country as far west as the Mississippi river. The growth is various, but is chiefly of species of oaks. The chief crops are corn, cotton, wheat, oats, and peanuts. The land is apparently best adapted to the first two. Cotton comprises about one-fourth of the crops.

JOHN H. PEARCY, DECATUR: The lands of the waters of Turkey creek and Beech river cultivated in cotton are principally: (1) The second bottom and ridge lands, and (2) the common ridge lands. The chief lands are the first mentioned, and about two-thirds in this region are of this kind. They extend in each direction from 5 to 10 miles, and their growth is beech, walnut, hickory, and various oaks. They are generally blackish gravelly loams with a thickness of 8 or 10 inches. The subsoil is yellow or red, and is underlaid by sand, gravel, or rock at 5 feet. The chief crops are corn, cotton, oats, wheat, potatoes, and sorghum-cane. This land is best suited to corn and cotton, and about one-third is planted in the latter. The land of the second class, the common ridge land, forms about one-third of the cultivated land, and extends 10 or 12 miles in each direction. Upon it grow hickory, dogwood, post, and other oaks. Its soil is about 4 inches thick, resting upon a subsoil, which is underlaid by sand and gravel, and is best adapted to cotton and small grain. About one-half of the tilled land is in cotton.

L. D. CRAWLEY AND J. G. YARBOROUGH, DECATUR COUNTY: This report refers to the lands of White's creek and the Tennessee river. The bottoms of the Tennessee are tolerably wide, and the lands on the west side, in Decatur county, are much better for cotton than those on the opposite side, in Perry. Fronting the river the soil is black and sandy, but back of it the soil has a mahogany color. The soils cultivated in cotton are as follows: (1) Yellowish sandy soils of the second bottom of the Tennessee river lying in ridges or swells parallel with the course of the river; (2) upland dark soil, with clay subsoil; (3) dark gravelly slopes or points of hills that approach the bottoms. Cotton on the lowlands matures as early as it does on the higher lands, excepting in some very low flats lying between the swells or ridges in the bottoms. In these the cotton is later and liable to be caught by frost, but when frost is late the flats yield well. The upland soils are good, excepting portions including limestone breaks. The chief of these, the yellowish sandy soils of the higher parts of the bottoms, are fine sandy loams from 8 to 10 inches thick. In this vicinity they make a strip half a mile wide and 10 miles long. Similar strips are met with at intervals for 10 miles down the river. The growth is beech, poplar, sugar-tree, sweet and black gum, hickory, white oak, elm, and ash. The subsoil is light clay with a good deal of sand, and sometimes hard-pan with no sand, and is underlaid by sand and gravel at 50 feet. Cotton and corn are the chief crops, the proportion in cotton being about two-thirds. On the uplands the subsoil is a deep red clay, which becomes lighter on exposure.

J. C. MITCHELL, HARDIN COUNTY (west of the Tennessee river): The remarks apply to the region drained by White Oak creek and its tributary, Hurricane creek, the Tennessee river lying on the east, and includes first and second bottoms and hilly and rolling uplands. The upland soil is generally in small bodies, and produces well for a few years, but soon washes into gullies, and is abandoned. The soil is

pretty uniformly good in the valleys, but poor on the hills. The overflows from the Tennessee river in the spring back the water over the creek bottoms, often delaying planting, so that cotton does not mature before frost. With late frosts fine crops are made in the bottoms, especially if the season is rather dry. The uplands are, upon the whole, much more reliable than the bottoms. The cotton soils are: (1) Black upland soil, lying mostly on the hillsides and branch bottoms; (2) dark-loam soil of the Tennessee river bottom, generally subject to overflow; (3) rich sandy bottom near the river bank. The chief soil is the black-hazel upland, which forms one-half of the cultivated land, and extends west 15 miles, north and south 25 or 30 miles, and east but a few miles. There is little of such land east of the Tennessee river. Its average thickness is 12 inches in the bottoms and 3 on the hillsides, and its natural timber is white and black oak, hickory, ash, walnut, red elm, sweet gum, and post oak. The subsoil in the bottoms is a tough, yellow clay; on the hillsides it is mixed with gravel. The land is difficult to till in wet weather, but easy in dry, and is early when well drained. The chief crops are cotton and corn, the soil being best adapted to the latter. At least one-half of this land is put in cotton. Soil No. 2 belongs to a narrow belt from 1 mile to 5 miles wide, running along the river and through the county. It is, however, not continuous, being interrupted at intervals by the higher lands coming in to the river. Upon this flourish poplar, gum, elm, ash, walnut, red-bud, linden, and dogwood. It is a fine sandy and clay loam with a thickness of from 2 to 3 inches. Its subsoil is underlaid by rock at from 12 to 20 feet. Very little cotton is planted upon it, corn being the principal crop. Soil No. 3, sandy bottom, lies in very narrow strips along the river, so far as I am acquainted, say 30 or 40 miles. Its timber is cottonwood, ash, red-bud, birch, and walnut. This soil is a coarse sandy loam, and is easily tilled at all times. Its subsoil is a clay, generally dark, but sometimes bluish, underlaid by rock at 12 feet, and is best adapted to cotton, with which three-fourths of it is planted.

J. W. IRWIN (east side of the river): The region is drained by the waters of Horse and Turkey creeks, with the Tennessee river on the west. It includes first and second bottoms and varied uplands of the creeks, with the bottoms of the river, and embraces front- and back-lands and cypress swamps.

In this district are uplands and some ridges, but principally level lands, susceptible of cultivation, and flatwoods. The soils planted in cotton are: (1) The black sandy soil of the creek and river bottoms; (2) second bottoms and highlands contiguous to creeks; (3) flatwoods. The chief soil is the black sandy loam with a grayish clay foundation. About one-fourth of the land is of this kind, and occurs in an area of 8 by 2 miles in this district. The timber is white oak, scaly-bark hickory, box-elder, ash, hackberry, mulberry, gum, poplar, and other kinds. The soil is dark silt and sandy loam, and near the river it is 3 feet thick, but 2 miles back it is reduced to 1 foot. It contains no pebbles of any kind, is easily tilled when seasonable, but becomes too hard to plow when very dry. The soil is early when well drained. The chief crops produced are corn and cotton, yielding from 40 to 60 bushels of corn, or from 800 to 1,500 pounds of seed-cotton per acre. About a fifth part of the river bottom is put in cotton. Soil No. 2 is designated "ridge land", although much of it is level. There is about one-fifth of this. Its growth includes red, white, and post oaks, hickory, and dogwood. It is a fine sandy, gravelly, and blackish loam with a clay foundation, and has an average thickness of from 4 to 8 inches.

The subsoil in second bottoms is a grayish clay; on upland, a red clay. It contains gravel and pebbles, and is underlaid by sand and gravel, and at some places by limestone, at a depth of from 2 to 4 feet. The soil is easily tilled in dry seasons, and is warm, producing early crops if well drained. It is best adapted to cotton, corn, and vegetables. About one-fifth of it is in cotton. Soil No. 3 is that of the flatwoods, and about three-fifths of the land is of this kind. Its extent is about 8 by 2 miles. The timber is post and red oaks, with black and red oak undergrowth. It is a fine sandy loam, grayish and mahogany colored, and has a thickness of from 2 to 6 inches. The subsoil is gravelly, and is underlaid by sand and gravel at from 3 to 20 feet. It tills easily in dry seasons, is warm when well drained, and is best adapted to corn and vegetables. About one-tenth part is put in cotton.

W. J. WHITE, HUMPHREYS COUNTY (southwestern part): The region includes the first and second bottoms and highlands of the Buffalo and Tennessee rivers. Most of the cotton produced last year (1879) was cultivated in the valley of the Buffalo river. There is but little cotton raised, the season being rather short. The Tennessee river bottoms, when put in cotton, yield generally 1,000 pounds of seed-cotton to the acre. The land of the creeks making into the Tennessee river is well suited to the culture of peanuts, and this is the most profitable crop; it is also very good for corn. The Duck river lands equal the best for corn. The Buffalo river lands have a rich soil, 3 to 4 inches deep, with a clay foundation, and are adapted to the raising of most any kind of crop. The valleys are broad and level, and the Buffalo is a beautifully clear stream. The soils may be classified as follows: (1) Sandy; (2) black land; (3) soil with a clay foundation. The river lands have mostly black soil; that of the creeks are gravelly and clayey. The subsoils generally rest upon limestone or flinty rocks, and often upon a soft weathered rock that can be cut with an ax and is used for building chimneys. Upon the best of the soils the growth is poplar, walnut, gum, hickory, white, red, and black oaks, with other timber.

#### THE HIGHLAND RIM.

The general topographical characteristics and the limits and area of the Highland Rim have been briefly given (see also diagram). It is a great rim of flat highlands, within which lies the Central Basin. I have divided the area, for convenience, into two subdivisions: the western and the eastern. The first includes the following counties and parts of counties: Montgomery, Robertson, Dickson, Hickman, Lewis, Wayne, Lawrence, the greater parts of Perry, Humphreys, and Stewart, considerable portions of Giles, Hardin, Williamson, Cheatham, and Sumner, and small parts of Maury and Davidson. The second includes the greater parts of Macon, Clay, Overton, Putnam, De Kalb, White, Warren, Coffee, and Franklin, considerable parts of Jackson, Cannon, Moore, and Lincoln, and small portions of Smith, Bedford, Van Buren, and Grundy.

As a cotton area the Highland Rim is of little importance, the most of it being referable to the "penumbral" region of cotton culture. It did not in all produce in 1879 more than 4,000 bales, and of this five-sixths was reported as the product of three counties, Hickman, Wayne, and Lawrence. The cotton yield of the entire division was not during the same year a third of that of Rutherford, a county of the Central Basin. And further, most of the cotton accredited to the three counties mentioned was not raised upon the highlands, but in the deep valleys traversing them—valleys which, with their soils and rocks (those at least of Hickman and Wayne), can be regarded as ramifications either of the Central Basin on the one hand or of the Western Tennessee valley on the other. Thus, but little cotton came from the highlands proper. The exceptions are certain southern parts of Wayne and Lawrence and the cotton-producing land of the eastern subdivision, most of the latter being on the highlands. An inspection of the cotton percentage map will give information as to where cotton is cultivated in this division, and in what relative proportion. It may be observed that the low percentage colors separating the two chief cotton regions of Tennessee lie in the western subdivision of the rim.

In this large division the depth of the soils, together with the underlying earth or *débris* down to the rocks, is often very great. This is seen in digging wells, in the railroad cuts, and in the great excavations made at the iron-ore banks, nearly all of which west of the Cumberland table-land are within the area of the rim. For the most part, the soils and all the earthy matter below them have been derived from the decay of the underlying solid rocks in place. The exceptions are due to the occurrence here and there, often on the highest flats or summits, of spots in which the soils rest upon water-worn gravel, the latter being outlying patches of the orange-sand drift. Often the worn gravel is mixed with the angular cherty *débris* which has never been transported.

There are two chief soils in this division, as shown on the agricultural map, the *siliceous* (No. 11 of the map) and the *calcareous red clay* (No. 7b).

**SILICEOUS LANDS.**—The siliceous soil is thin, often light-colored, and rests upon a yellowish, sometimes reddish clay-subsoil. It is, as a rule, gravelly, made so by the angular flinty *débris* of layers of the underlying formation, the latter in general a siliceo-calcareous rock, but often varying from a limestone in one locality to beds of massive chert in another. So far as the rocks and soils are concerned, extensive portions of the area of the siliceous soils, especially portions bordering the Central Basin, may be said to be "leached" sections of country; that is to say, sections more or less deprived of calcareous matter by the action of water. They are now regions of freestone water, and as such, in connection with their elevation and the fact that they often supply springs of sparkling sulphur water, present acceptable sites for summer retreats, both for invalids and for pleasure-seekers. The leached condition is indicated by the freestone water, the poverty of the soil, and the frequent occurrence of massive layers and bluffs of chert once interstratified with or containing calcareous matter.

The land in general is arable, yet sparsely cultivated, most of that in cultivation pertaining properly to the area of this soil lying in the shallow valleys of the smaller streams. The chief products are Indian corn, wheat, oats, and tobacco. Much of the area is in woods, presenting, indeed, in many parts, extensive flatwoods with open growth, chiefly oaks of moderate size. Many such sections are known as "the barrens". In dry places black-jack and scrubby red, Spanish, and black oaks are met with; in swampy areas, willow and water oaks; then again a better class of timber occurs, especially on slopes, such as white oaks, hickories, chestnut, poplar, and sourwood.

It may be added that within the limits of the siliceous soil, as given upon the map, there are certain regions of variable extent whose soils approach in agricultural characteristics the calcareous red clay next described, and make indeed a transition from the siliceous to the red clay. In these transition areas the rocks making the red clay soil begin to appear. The areas may be found in both subdivisions of the rim, but occur most extensively on the midway highlands between the Central Basin and the western valley of the Tennessee river. But in these, as elsewhere within the limits of the siliceous soil, the lands mostly in cultivation are those of the valleys.

**CALCAREOUS RED CLAY.**—The calcareous red clay is one of the strong, fertile, and durable soils of the state, ranking in many sections next to the blue-grass soils of Kentucky and Tennessee. It is a great tobacco, corn and wheat soil in both the states mentioned and a good cotton soil in Alabama, and nearly one-third of the entire tobacco crop of Kentucky was produced in 1879 upon this soil. Montgomery and Robertson, the leading tobacco counties of Tennessee, have this for their chief soil. It is warm, mellow, and easily tilled, much of which is due to its being tempered with the fine gravel and siliceous grains of crumbling chert. When first broken it is a brown loam from 4 to 6 inches deep, which changes to red by cultivation, becoming mixed with the red clay subsoil.

The rocks underlying the red clay soil belong to the Saint Louis group of geologists. They are generally pale-blue fossiliferous limestones, containing often cherty layers or nodules. By disintegration and decay these rocks supply, more or less abundantly, masses of leached spongy fossiliferous chert, which are scattered over the surface and through the earthy matter below, becoming, indeed, everywhere characteristic of this soil area. The red color of the subsoil is due to iron oxide liberated by the halfway decay or leaching of the chert layers or of flints, which originally in the limestones were rich in iron.

A marked feature of the area of the calcareous red clay, and one well-nigh universal, is the presence at the surface of hopper-shaped sink-holes. These are very numerous in the rim and highland regions of both Tennessee and Kentucky. They communicate with caves below, through which flow subterranean streams, the whole making an underground system of drainage of great extent.

The geographical range of the red clay is best seen upon the map. A large section lies in Kentucky and Tennessee, chiefly within the great bend of the Cumberland river. Much of this in the southwestern part of Kentucky, and reaching a little way into Tennessee, was formerly known as the "Barrens", and has a curious history. The following is from the first volume of Owen's *Geological Report of Kentucky* :

In the early settlement of Kentucky the belt of country over which it [the red clay soil] extended was shunned and stamped with the appellation of "Barrens". This arose in part from the numerous cherty masses which locally incumbered the ground, in part from the absence of timber over large tracts, and in consequence of the few trees which here and there sprung up, being altogether a stunted growth of black-jack oak [black], red and white oaks. The value of the red calcareous soil of the "Barrens" is now (1856) beginning to be appreciated, so that lands which formerly were considered hardly worth locating are now held at \$25, \$30, and, in the neighborhood of some towns, even as high as \$50 an acre. At the present time the so-called "Barrens" of Kentucky are, to a considerable extent, timbered with the above varieties of oak, hickory, and occasionally butternut, black walnut, dogwood, and sugar-tree. The old inhabitants of that part of Kentucky all declare that, when the country was first settled, it was for the most part an open prairie district, with hardly a stick of timber sufficient to make a rail, as far as the eye could reach, where now forests exist of trees of medium growth obstructing entirely the view.

Another large and important section lies in a belt immediately west of the Cumberland table-land. This belt extends in both directions through Tennessee, northward into Kentucky and southward into Alabama. A limited and isolated area in Cannon and De Kalb counties occurs around the base of the Short mountains.

The growth of the red soil is chiefly oak; that of the "Barrens" is spoken of in the quotation given. Omitting the black-jack oak, many flat portions of the area of this soil in Tennessee, outside of the region referred to, have a similar growth. In sections with a rolling surface, on slopes and in the valleys, the timber is often heavy. Good-sized oaks, white, black, and red, abound, with more or less poplar, ash, black gum, walnut, and in places wild-cherry and sugar-tree.

As in the case of the other divisions, we append here for further illustration the following abstracts from reports of correspondents:

**J. M. GRAHAM, HICKMAN COUNTY:** The first and second bottoms of Piney creek and Duck river, as well as the hilly, gravelly uplands of the same streams, are referred to. The hills planted in cotton are those running up from the second bottoms to the tops of ridges. Cotton is liable to be caught by early frosts, especially in the bottoms and on the most fertile lands. A dry September is preferred, as it hastens the plant to maturity. The soils cultivated in cotton are: (1) Bench or second bottom lands, a grayish or gravelly loam; (2) hillside lands, when fresh, also grayish and gravelly; (3) lands on the tops of ridges. The chief soil is that of the second bottoms, which comprises about one-fiftieth of the lands, and occurs throughout the county. Its growth is black walnut, ash, poplar, white oak, elm, beech, and ironwood. It is a fine sandy loam with an average thickness of 10 inches, and has a stiff red clay subsoil, which indeed is true of all the lands excepting those of the first bottoms. The whole is underlaid by gravel and gray limestone at from 3 to 20 feet. This soil is cold and late as compared with the black limestone lands of the Central Basin. Its crops are Indian corn, peanuts, cotton, wheat, oats, rye, cow-pease, sorghum, clover, and grasses, but it is best adapted to corn, cotton, and peanuts. The proportion of cotton planted is about one-twentieth.

The hillside lands or uplands constitute about three-fourths of all and extend throughout the county. Its timber is poplar, different oaks, dogwood, and hickory, with occasionally ash and walnut. The soil is a gravelly, brown clay loam, 2 inches thick, and lies either upon red clay or red clay mixed with gravel. The underlying rock is limestone. This land is easily tilled in wet or dry seasons, and has a good surface drainage, but is late and cold. It is best adapted to the cereals. I estimate one-thirtieth of the crops to be cotton.

The ridge lands constitute about one-fifth of all, and are also found in all parts of the county. Their timber is black, white, red, post, chestnut, and black-jack oaks, dogwood, hickory, and occasionally poplar. The soil, about 2 inches thick, is a light gravelly or a heavy clay loam. The subsoil is usually clay, but may be red, whitish, or yellow, in the latter two cases being leachy, in the other impervious. It contains white gravel and rounded pebbles in places, and rests upon gravel at from 1 to 4 feet. The soil is not easily tilled in wet weather. Like the others, it is late and cold, but is usually well drained, and is best suited to peanuts and cereals. Cotton comprises not more than a twenty-fifth part of the crops planted.

**N. M. HOLLISS, LAWRENCE COUNTY:** The county has a number of creeks which are tributaries of Shoal and other creeks and of Buffalo river, streams which empty into the Tennessee river. The lands may be classed under six heads, as follows: first bottoms, second bottoms, rich hills near the creeks, the less productive hills further back, the first quality of table-land, and the second quality of table-land, or the "barrens". Neither climate nor soils in this county are so adapted to cotton as to make it a profitable crop, though there is about one-tenth of the land, in the southern half of the county, devoted to this staple. The soils in cotton are: (1) Second bottoms; (2) southeast and west hillsides, or third bottoms; (3) tops of hills or highlands. The chief soil, a gravelly blackish loam, making about one-tenth of the lands, has no great extent in any one body. The numerous creeks run nearly parallel with each other, and the hills and table-lands between them cut up the lands into the different varieties enumerated. The natural timber is hickory, walnut, poplar, chestnut, five or six kinds of oak, beech, persimmon, sugar-tree, gum, elm, and hackberry. The soil is a gravelly and clay loam of a brown and yellowish color, having a thickness of from 4 to 24 inches. The subsoils in the county are gray, yellow, and orange-red, containing angular gravel, and underlaid by rock at 3 feet. The land is easily tilled in suitable seasons, producing corn, wheat, oats, rye, and cotton, the latter forming about one-tenth part of the crops. The soil is best adapted to corn and vegetables, and clover and grasses grow well. The second soil, that of the hillsides, makes a small part of the area. Its growth is poplar, chestnut, hickory, persimmon, and sassafras, and several kinds of oak. The soil is a gravelly clay loam from 3 to 12 inches deep, and the subsoil is underlaid by rock at 3 feet. The land is easily tilled, and about one-tenth of the crops is cotton. The soil or soils of the highland make more than half the area of the county, spreading widely out in all directions, with a native growth of chestnut, several kinds of oak, poplar, hickory, dogwood, and black gum. It is a gray and yellow clay loam, its subsoil containing angular and sometimes rounded gravel, with the rock at 2 feet below. The soil is early and warm, is naturally well drained, and is best adapted to wheat and corn. About one-fifteenth part is planted in cotton.

**M. F. WEST, MACON COUNTY:** The lowlands and the rolling and level uplands referred to are drained by the waters of the Barren river. Cotton with us is liable to be damaged by frosts in the fall; in fact, it is only raised in the county in patches for domestic purposes. No baling is done. Our soils may be described as gravelly soils, brown when fresh and yellow when worn, with a yellow and sometimes red clay subsoil, which work freely. The subsoil is often close, more or less impervious, and is underlaid by clay at 18 or 20 inches. The lands are early and warm when well drained and fertilized, producing as chief crops corn, wheat, oats, and rye; but they are, perhaps, best adapted to wheat and rye.

**R. S. CLARK, GRUNDY COUNTY:** Our lands are on Prairie creek, a tributary of Elk river, and consist of first and second bottoms and uplands. Cotton is cultivated only to a limited extent. I have a gin which is patronized from parts of three counties, Franklin, Coffee, and Grundy. The soils vary considerably in this locality. The chief one is the upland soil, which makes the greater part of the lands in this region. Its growth is hickory, walnut, and black and post oaks. In the creek bottom we find elm, ash, sweet and black gum, and white oak. The thickness of the soil of the uplands is from 4 to 12 inches; that of the bottoms 24 inches. The chief crops of the region are corn, wheat, oats, and potatoes, the soil being best adapted to the first three. The proportion of cotton planted is about 2½ per cent.

**JOHN F. ANDERSON, FRANKLIN COUNTY:** The report is confined to the valley of Crow creek, a tributary of the Tennessee river, which is hemmed in on both sides by high ridges or arms of the Cumberland table-land. Occasionally cotton is injured by late northwest winds and cold rains, the latter giving it the rust or sore-shin. We are, however, so well protected by the mountains that cotton is seldom damaged. Vegetation is two weeks earlier here than elsewhere in the county. The soils cultivated in cotton are: (1) The alluvial soil lying on each side of Crow creek, which differs greatly in character along the creek; (2) a fertile yellowish or sometimes brown soil, which is calcareous, like the underlying formation; (3) the soil of the mountain side, very rocky, thin, and not much cultivated. The chief land is the alluvial soil along the creek, constituting two-thirds of the lands in this region, and extending north and south from 12 to 14 miles, with a width of from one-fourth to half a mile. Its growth is sycamore, willow, beech, sugar-tree, black walnut, ash, hackberry,

red elm, and linden. This soil is a dark clay loam. That immediately on the creek is somewhat sandy, and has a thickness of from 3 to 24 inches. The subsoil is yellowish, compact, coarse, gravelly, rocky, and rests mostly on limestone at a depth of from 2 to 24 feet. Its tilling qualities are usually good. The chief crops are corn and cotton, the soil being best adapted to the first; but one-fourth of the total acreage is planted in cotton. The second or calcareous soil makes about one-third of our lands, and extends in narrow strips, like the alluvial lands, lengthwise through the valley. These strips average hardly a half mile in width. The timber is cedar, white oak, beech, yellow poplar, hickory, black walnut, elm, linden, and hackberry. The soil is clay loam, very fertile, 9 inches thick, brown when fresh, but sometimes becoming reddish. The subsoil contains sand, gravel, and pebbles, and is underlaid by limestone at from 1 foot to 10 feet. The soil is easily tilled and is well adapted to cotton. The third soil, or that of the mountain side, is thin and light, but does not here occur in bodies to any extent. The rocky mountain sides make fully one-half the lands, and are covered with all kinds of timber. The soil is well adapted to corn, vegetables, and fruit. No cotton is planted.

#### THE CENTRAL BASIN.

The form and area of this important division, as well as its relation to the Highland Rim, have been given on page 14. Its contour and central position are shown both in the diagram on page 11 and on the agricultural map, the color area, *Sb*, of the latter indicating the extent and place of the basin as well as its soil. This division is the most populous portion of Tennessee, and is the center of wealth and political influence, and in its varied agricultural capabilities is the garden spot of the state. It supplies, as before stated (page 19), one of the centers of cotton production; a fact well brought out on the map showing percentages of area in cotton. The soils are suited to the production of all the great leading crops. Indian corn is the chief product, and in this the basin is much ahead of any other division. Then, in the order of acreage cultivated, follow wheat, cotton, oats, rye, and tobacco. Furthermore, in many sections pasture-lands abound, carpeted richly with "blue-grass" (*Poa pratensis*) and other nutritive grasses, on which live-stock of all kinds graze and mature.

The basin is mostly well defined on all sides by the steep escarpments of the highlands which surround it and rise from 300 to 500 feet above its floor. Their tops reach approximately the same general elevation, that of the Highland Rim making a high border, which, from favorable points within the basin, presents itself to the eye as a level wide-reaching horizon. The border, however, is a fringed one, made so by the multitude of ridges and spurs jutting in from the encircling rim.

The division is crossed by three rivers, the Cumberland, the Duck, and the Elk, which descend from the eastern side of the rim, flow in a more or less westerly direction, and finally escape from the basin through comparatively narrow and often rugged valleys cut severally through the northwestern, western, and southwestern sides of the rim.

It will aid in understanding the topography of the basin to state that if the narrow valleys or outlets through which the three rivers mentioned make their escape were filled up to the general level of the highlands the entire basin would fill with water and become a lake 120 miles long and 50 miles wide. At Nashville the water would be 300 or 400 feet deep, and one might sail over the city and never recognize its site. The summits of the highest hills in the basin would appear above the water as low, scattered islands.

The following counties and parts of counties lie within the division: All of Trousdale, Wilson, Rutherford, and Marshall; nearly all of Smith, Davidson, and Bedford; the greater parts of Sumner, Williamson, Maury, Giles, Lincoln, and Moore; large parts of Jackson, Cheatham, and Cannon, and small parts of Macon, De Kalb, Putnam, and Coffee.

The surface of the basin is in the main rolling, but level tracts abound. Here and there, especially as summit lines, separating the areas drained respectively by the different rivers and creeks, ridges more or less conspicuous start up, whose slopes are green with grasses, or, when in the wild state, are heavy with timber. Then again, limited sections are met with which are hilly or made wild with groups of interlocking ridges. There is one great ridge, known as Elk ridge, which is remarkable, and merits notice. It is, in fact, an almost unbroken though narrow arm, running entirely across from one side of the Highland Rim to the other, and cutting off, as a well-marked division, the southern end of the basin. In general, it has about the elevation of the highlands, and presents in its course but very few low gaps. It is the summit of the water-shed between the Duck and Elk rivers. On its northern side Elk ridge has but few spurs, and these are short. Its northern aspect faces the level or gently rolling regions of Maury, Marshall, and Bedford, regions checkered with alternating cotton lands and cedar glades. On its southern side, however, it is different. Here, running out southerly toward Elk river and southwesterly toward Richland creek for 5, 10, and 20 miles, are grand sprays of bold ridges, which have exceedingly rich slopes, and were covered originally with heavy forests. The valleys between the ridges, like the greater valleys of the two streams mentioned, are noted for the strength and fertility of their soils. The subdivision south of Elk ridge embraces all of Giles, Lincoln, and Moore counties within the basin, together with the southern end of Marshall. This whole region (not omitting the south and west sides respectively of the valleys of Elk river and Richland creek) is remarkable for the multiplicity of its ridges and for its fertile and beautiful valleys, the latter often wide and open, supplying great bodies of first-class land.

Originally most of the area of the basin was covered with cane, and even now this grows spontaneously in open woods when protected from cattle. Large oaks, poplar, sweet gum, walnut, hickories, hackberry, black locust, honeylocust, ash, elms, beech, sugar-maple, linden, dogwood, and red-bud abound. The "cedar glades", a characteristic feature of the basin, are areas more or less detached or scattered, upon which grow or have grown great cedar

forests. They may be estimated to have covered in the aggregate 300 square miles. The soil of the glades is often black or dark colored, with a reddish-yellow subsoil, frequently thin and much mixed with fragments of thin flaggy limestone, or the soil may be confined to the joint fissures (widened by erosion) of outcropping limestone in place, the bare rock making most of the surface. The true glades uniformly occur upon the outcrops of a particular bed of rock known as the "glade limestone", a thin-bedded, flaggy limestone with clay partings having a maximum thickness of 120 feet and belonging to the Trenton period. Where the soil is of sufficient depth the cedars grow tall, straight, and of great size for the species (*Juniperus Virginiana*), now and then reaching 80 or 90 feet in height, with a diameter of 3 or 3½ feet, and fair trees grow in soil among the loose rocks or in the earth of the fissures. Cedar timber standing in the woods has often been sold for \$100 per acre. The trade in cedar logs and lumber has been for many years, and is now, one of great interest in the Central Basin.

A great ring or belt of the cedar glades is found in Rutherford county. This belt incloses an oval area of red cotton lands which is 24 miles long and 12 miles wide. The line of the Nashville and Chattanooga railway lies nearly lengthwise across this oval, cutting the belt of glades on opposite sides. Murfreesborough is in the included area a short distance east of the center. In Wilson county, and along Duck river in Bedford, Marshall, and Maury counties, are many glades, which cover large tracts. These occur also in Williamson and Davidson counties. The glades very generally either surround or lie contiguous to one of two kinds of cotton lands, sometimes, indeed, lying between bodies of the two kinds. One of these is represented by the red soil of Rutherford. Both will be considered hereafter.

The soils of the Central Basin, and the earthy layer of *débris* upon which they rest, have been in the main derived from the decay and disintegration of underlying rocks in place. The chief exceptions are the alluvial soils, which, however, may not aggregate the thousandth part of the whole. Exceptions also are found in the case of certain steep slopes, where *débris* from above has been washed or otherwise brought down upon the lower lands; but the exceptions are inconsiderable, and may here be passed over. The rocks underlying and giving origin to the soils (limestone of the Trenton period) are rich in fossil remains of plants and animals and in the materials of fertile soils. Locally, the strata appear to be horizontal or undulating; but complete sections across the basin show that they rise or swell up in a great dome, the top of which is in the central region of Rutherford county. From this central region the strata have been removed by denudation and the dome has been decapitated, thus exposing the lowest rocks (limestones) of the basin. Here, then, the latter are to be seen and studied. Passing from this central area in any direction the approximately concentric belts of other outcropping limestones are successfully encountered.

The limestones of the basin have in the aggregate a thickness of 1,000 feet, but the strata differ in certain particulars. All have impurities; some have an excess of sandy, others of clayey material in their composition; some abound in flints or chert, or in organic remains; one is thick-bedded, another thin-bedded; some disintegrate slowly, others rapidly. They are therefore grouped into subdivisions or kinds, each kind supplying a more or less characteristic soil. The kinds are enumerated below, beginning with the lowest, with notes.

1. CENTRAL LIMESTONE DIVISION.—A series of limestones, 225 feet thick, chiefly heavy-bedded. They are light-blue or dove-colored rocks, fossiliferous, containing black or dark flints, especially the lower ones. The soil formed is a warm clay loam, brown when fresh, but becoming red (chocolate or copper-colored), like the subsoil, after several years' cultivation, and is known as a red soil. The subsoil is generally deep, and rests often upon a gray, clayey bed, the rock following below at depths varying from 1 foot to 20 feet, with an average depth of about 10 feet. All the earthy matter above the limestone very generally contains fragments of decomposing flints. The soil and subsoil are mellowed by siliceous grains and gravel from this source, their color being derived from the iron of the flints. The native growth, representing well that of the entire basin, indicates strong land, this red soil being one of the best in Middle Tennessee for the culture of cotton. Lands having it, which we may call the "central lands", occur chiefly in Rutherford, Bedford, and Marshall, and to a limited extent in Wilson and Maury counties, and generally lie well. The largest single body of such land is in Rutherford, and is the oval area inclosed in a belt of cedar glades already spoken of. Fine level areas, the lands alternating with cedar glades, are found throughout Marshall and in the northwesterly part of Bedford. The following analyses are given of samples of soils of the central limestones that were never in cultivation. The region from which they were taken is gently rolling, and, where trees do not interfere, a slight elevation is sufficient to give the eye a range over a great extent of country. The depth of soils in this region varies from nothing, on rocky spots, to 15 or 20 feet, with an average depth of about 10 feet (C. F. Vanderford). The red subsoil varies from 2 to 5 feet in thickness. Under this we have a bottom bed of a more plastic light yellow or gray clay containing more or less angular flinty gravel or decaying chert, often easily cut with the spade.

No. 1. *Red clay soil*, taken from a wood-lot near Florence station, Nashville and Chattanooga railroad, a little less than 7 miles northwest of Murfreesborough, Rutherford county. Depth taken, 7 inches; growth, species of hickory, red, white, and post oaks, elms, ash, honey-locust, black walnut, wild-cherry, sugar-trees, poplar, hackberry, red-bud, dogwood, and papaw. Originally covered with cane.

No. 2. *Subsoil* of the above, taken at a depth of from 7 to 15 inches.

Nos. 3 and 4 are a *soil* and *subsoil* from near the same locality.

No. 7. *Red clay soil* from J. W. Burton's place, 3 miles north of Murfreesborough, Rutherford county, taken 7 inches deep. The vegetation is about as that given above.

No. 8. *Subsoil* of the above, taken at a depth of from 7 to 15 inches.

*Red clay lands of the Central Basin, Rutherford county.*

	SEVEN MILES NORTHWEST OF MURFREESBOROUGH.				THREE MILES NORTH OF MURFREESBOROUGH.	
	Soil.	Subsoil.	Soil.	Subsoil.	Soil.	Subsoil.
	No. 1.	No. 2.	No. 3.	No. 4.	No. 7.	No. 8.
Insoluble matter.....	79.580 } 83.208	66.092 } 77.789	80.850 } 86.116	81.070 } 87.750	75.350 } 82.600	76.470 } 82.480
Soluble silica.....	3.028	11.607	5.200	6.080	7.310	0.010
Potash.....	0.150	0.508	0.140	0.211	0.255	0.251
Soda.....	0.065	0.083	0.034	0.033	0.258	0.050
Lime.....	3.054	0.119	0.510	0.161	0.340	0.142
Magnesia.....	0.029	0.204	0.024	0.301	0.200	0.074
Brown oxide of manganese.....	0.195	0.272	0.175	0.157	0.088	0.140
Peroxide of iron.....	3.420	6.837	3.708	3.013	5.184	4.773
Alumina.....	4.988	10.599	4.173	6.220	5.507	7.774
Phosphoric acid.....	0.242	0.305	0.207	0.056	0.070	0.056
Sulphuric acid.....	0.089	0.079	0.102	0.008	0.070	0.072
Water and organic matter.....	4.962	3.728	4.784	1.966	4.962	4.230
Total.....	100.402	100.228	99.973	100.476	99.718	100.051
Hygroscopic moisture.....	8.64	8.84	7.23	5.59	7.29	7.03
absorbed at.....	23.9 C.°	17.2 C.°	23.9 C.°	17.2 C.°	22.2 C.°	22.2 C.°

[In the above analyses the first two soils (Nos. 1 and 3) resemble each other very strongly in every regard except their large lime percentages, which may be due in the case of No. 1 to some local circumstance, such as undecomposed particles of limestone, the country rock. Both soils may be considered as being fairly supplied with potash and heavily so with phosphoric acid, and, in the presence of so much lime, should be exceedingly thrifty. There is, however, a great difference in their subsoils, soil No. 1 being supported by a heavy clay, rich in phosphoric acid, extremely so in potash, though having a small and insufficient amount of lime. Soil No. 3, on the other hand, rests upon a subsoil less clayey in character, containing a fair percentage of potash, but very deficient in phosphoric acid, an unusual thing for clay subsoils. The deficiency in lime in both subsoils is accompanied by increased percentages of magnesia, which, in the surface soils, is extraordinarily low. In volatile matter and hygroscopic moisture the difference between the two subsoils is due to their clayeyness, and throughout are satisfactory. The soil and subsoil from nearer Murfreesborough both fall very short in their percentages of phosphoric acid, though they are fairly supplied with other necessary constituents.—E. W. H.]

2. CEDAR GLADE LANDS.—Next above the central limestones follow the thin-bedded flaggy limestones, making the *cedar glades* already spoken of. The soils of this division have been noticed. Where these are deep enough, and the cedar stumps and loose flags permit it, the land in the middle and southern portions of the basin is often cultivated in cotton. In general, however, comparatively little of it is produced upon the areas of the "glade limestones".

3. CARTER'S CREEK LIMESTONE LANDS.—Resting upon the flaggy limestones next comes a heavy-bedded rock, which, owing to its conspicuous outcrops on Carter's creek, in Maury county, I have called the *Carter's Creek limestone*. It is also known as the *Woodbury limestone*, this county town being built upon it. The rock is light blue in color, containing siliceous fossils and more or less chert, and is in all nearly 100 feet in thickness. Where the surface lies well, and is level or gently rolling or sloping, this rock often supplies a good agricultural country. Areas underlaid by it occur in all the counties within the basin, and it underlies much of the surface outside of the "cedar glades" in the counties of Wilson, Rutherford, Bedford, Marshall, Maury, and Williamson. Excepting a few limited and unimportant spots, it is the lowest rock appearing at the surface in Smith, Trousdale, Sumner, Davidson, De Kalb, Cannon, Lincoln, and Giles counties. The soil above it is, when fresh, brown or dark; the subsoil is yellowish or reddish-yellow, rather clayey, and contains gravelly chert. It has not the markedly red color of the subsoils and warm soils of the central limestones. In the main, the lands of the Carter's Creek limestones, as compared with the central limestones, are second class. They do not generally lie so well, are often hilly, and are more frequently broken by rough, rocky places ("rocky roughs"), upon some of which cedars grow, making outliers of the true glades. Yet there are many sections where, topography being equal, they are little inferior to the central lands in tilling qualities and fertility. Both kinds of lands are often confounded with the true glade lands, all being designated "cedar lands". This is due to the fact that the central and Carter's creek areas adjoin the glades, the first concentrically within and the second without, or are locally and irregularly interlocked with them. A considerable proportion of the best of them, commencing with Wilson county and going southward, are cultivated in cotton with fair results.

4. *ORTHIS* LIMESTONE LANDS.—A series of sandy limestones from 70 to 100 feet in thickness, which we shall call the *Orthis bed*, follows in ascending order. In certain sections of the basin, as about Nashville, the upper portion of this series is a remarkably laminated current-formed rock of about 25 feet in thickness, made up in general of comminuted shells or “shell sand”. The grains are generally calcareous, but are much mixed with siliceous grains. This portion has been named the *Capitol limestone*, as it supplied the stone for the capitol at Nashville. The lower and much the greater portion, as well as the persistent portion (being found in its geological horizon throughout the basin), is the *Orthis bed proper*, so named because at most points it is well filled with individuals of a fossil shell having about the diameter of a dime, known to geologists as *Orthis testudinaria*. The bed is, in general, a sandy or siliceous, often shaly, calcareous rock, and when freshly quarried is light blue in color; but upon thorough weathering it becomes a yellowish sandy shale or a porous sandstone, and blocks of the latter are often met with on slopes. Sometimes these blocks, when broken, show a blue unchanged nucleus within. The usual thickness is from 50 to 75 feet. In the eastern part of Williamson county, however, as about Triune, there is a local thickening of the bed, it becoming 150 feet thick or more. Owing to its sandy or siliceous nature, the rock has a degree of weather-resisting power, and hence contributes local plateaus and terrace and level lands to the topography of the basin. These local features are best seen west of the central areas of the basin in Wilson, Sumner, Davidson, Williamson, and Maury counties, and include some of the fairest and best farming tracts in Middle Tennessee. The soil, when first cultivated, is a rich brown loam, with a subsoil usually yellow, but sometimes reddish-yellow. The latter also is often made more or less gravelly by thin, sandy fragments, the *débris* of the disintegrated rocks. This soil is mellow, warm, well drained, and easily cultivated—characteristics which make it a favorite cotton soil—and its areas are generally known as poplar lands, the so-called “poplar” (*Liriodendron*) being, or having been, a very characteristic tree of its forests. Its growth, besides poplar, includes beech in places, especially on the slopes and in the heads of hollows, ash, sugar-tree, oaks, elms, dogwood, hickories, hackberry, black walnut, linden, box-elder, and other species, the variety being remarkably great. It must be stated, however, that the lands of this bed are not uniformly good, for tracts occur, especially on the slopes and ridges, where the soil has been washed or leached or otherwise impoverished, and the lands reduced to third rate, supporting an uninviting native growth. In cultivated fields in rolling or hilly regions, especially if old, it is no uncommon thing to see naked, badly washed, and “scalded” places with soil all gone, spotting at intervals along the slopes the horizontal line of the outcrop of the bed. These bare places are made so by careless cultivation and inattention.

The following analyses are given of lands of this region, the samples being obtained from localities lying well, and among the best and most beautiful agricultural sections in the state:

No. 11. “Poplar” land soil from Vanleer Polk’s place, Maury county. Depth taken, 11 inches; timber growth, “poplar”, sweet gum, walnut, oak, ash, elm, hackberry, honey-locust, and dogwood. Originally covered with cane.

No. 12. Subsoil of the above, taken at a depth of from 11 to 23 inches.

No. 13. “Poplar” land soil from the Hermitage, Davidson county. Depth taken, 10 inches; timber growth about the same as that of soil No. 11.

No. 14. Subsoil of the above, taken at a depth of from 10 to 22 inches.

*Poplar lands of the Central Basin.*

	MAURY COUNTY.		DAVIDSON COUNTY.	
	VANLEER POLK'S PLACE.		HERMITAGE.	
	Soil.	Subsoil.	Soil.	Subsoil.
	No. 11.	No. 12.	No. 13.	No. 14.
Insoluble matter .....	70.270 } 84.742	73.340 } 81.871	78.800 } 85.760	75.100 } 84.080
Soluble silica .....	5.472 }	8.531 }	6.900 }	8.030 }
Potash .....	0.310	0.327	0.238	0.584
Soda .....	0.059	0.080	0.047	0.114
Lime .....	0.515	0.547	0.378	0.468
Magnesia .....	0.342	0.358	0.368	0.444
Brown oxide of manganese .....	0.040	0.088	0.093	0.054
Peroxide of iron .....	3.683	5.285	2.627	3.693
Alumina .....	5.294	7.120	6.066	6.979
Phosphoric acid .....	0.340	0.342	0.255	0.318
Sulphuric acid .....	0.192	0.107	0.085	0.056
Water and organic matter .....	4.540	3.372	4.408	2.483
Total .....	100.084	99.497	100.415	99.223
Hygroscopic moisture .....	8.62	11.43	10.02	10.00
absorbed at .....	29 C.°	20 C.°	28.2 C.°	28.2 C.°

## COTTON PRODUCTION IN TENNESSEE.

[The common and prominent characteristics of all of these poplar soils is a very unusually high percentage of phosphoric acid, accompanied by a large supply of lime—two prime conditions of thriftiness and durability. The supply of potash also is ample, and with a high hygroscopic power and easy tillage shows them to be altogether excellent soils.—E. W. H.]

5. MULATTO LANDS OF THE NASHVILLE SERIES.—In this subdivision we include all the remaining Silurian limestones above the *Orthis* bed. The series in the northern part of the basin is from 400 to 500 feet in thickness, but in the southern and southwestern part its thickness is much reduced. Here, too, its lowest layers often contribute to the topmost of the *Orthis* bed in making the underlying rock of many nearly level and superior agricultural tracts. It is in the main a sandy or earthy highly fossiliferous limestone, containing in its composition all the inorganic and some of the organic elements of exceedingly fertile and mellow soils. It is named, by way of distinction, the *Nashville series*, being well displayed about the city, especially on the higher grounds. The area of the outcrop of these rocks, and hence the area of the soils derived from them, sweeps around the basin in a ring or circular belt outside of the concentric outcrops and soils of the limestones already mentioned. This ring is much the wider on the western and southern sides, and supplies large and valuable tracts of land in the counties of Trousdale, Sumner, Davidson, Williamson, Maury, Giles, Lincoln, and Moore. The surface is in places level or gently rolling; then it becomes hilly, especially as we go westward toward the limit of the basin. On the eastern side, in Smith, De Kalb, the southeastern part of Wilson, Cannon, the southern part of Rutherford, and the eastern part of Bedford, the ring is not so wide. Here, however, numerous beautiful valleys and tracts occur, many of which, as we approach the eastern side of the basin, are separated by high ridges with exceedingly rich and fertile slopes. In fact, the sides of the basin all around are fringed with bold spurs, whose limestone slopes have unsurpassed fertility of soil. With these may be included the slopes of such high knobs and ridges as exist within the basin. Of the latter, Elk ridge, already spoken of, with its northern face and declivities in the southern parts of Maury, Marshall, and Bedford, and its southern ramifications in Giles, Lincoln, and Moore, is a noted example. Altogether, the aggregate area of the lands of the Nashville series must be one-half or more of the entire area of the basin. The soils are mulatto-colored loams with yellow subsoils, the latter tempered with cherty gravel and siliceous remains of fossils. Approaching the spurs and ridges, we often find the soils and subsoils of the slopes much mixed with gravelly *débris* that has been washed down or otherwise brought down from the siliceous sub-Carboniferous rocks that cap these jetting arms of the highlands. The growth presents a rich flora, including many species, among which may be mentioned great bur or overcup oaks, elms, ash, hickories, linden, black walnut, cucumber-tree, mulberry, cherry, and, on hill sides, yellow wood, coffee trees, butternut, and black locusts. Excepting in the more southern counties of the basin, the soils of the series are not considered as among the best for cotton, as the plant grows too luxuriantly, and does not mature in season. In Giles and Lincoln, however, they are, with the creek and river bottoms, chiefly relied upon for the production of cotton. In the southern part of Marshall, and in some parts of Maury and Williamson also, a good share of their areas is devoted to cotton culture. The following analyses are given of samples of this land:

No. 9. *Mulatto clay soil* from Belle Meade, a few miles west of Nashville, Davidson county. Depth taken, 8 inches; timber growth, oaks, elm, hickory, ash, linden, sugar maple, hornbeam, walnut, cherry, dogwood, and red-bud. Originally with an undergrowth of cane.

No. 10. *Subsoil* of the above. Depth taken, 8 to 20 inches.

No. 6. *Subsoil* from near the above. Depth taken, 8 to 20 inches.

*Mulatto clay lands of Nashville, Davidson county.*

	Soil.	Subsoil.	Subsoil.
	No. 9.	No. 10.	No. 6.
Insoluble matter.....	56.540	47.950	54.982
Soluble silica.....	8.840	11.010	10.540
Potash.....	0.468	0.752	0.242
Soda.....	0.108	0.174	0.054
Lime.....	6.540	8.382	3.015
Magnesia.....	0.569	0.615	0.675
Brown oxide of manganese.....	0.187	0.091	0.152
Peroxide of iron.....	7.286	9.584	9.761
Alumina.....	12.419	17.303	16.272
Phosphoric acid.....	0.563	0.355	0.175
Sulphuric acid.....	0.156	0.188	0.119
Water and organic matter.....	6.318	3.591	4.208
Total.....	99.994	99.995	100.145
Humus.....	1.670		
Available phosphoric acid.....	0.179		
Hygroscopic moisture.....	10.55	11.01	9.70
absorbed at.....	26.6 C.°	26.6 C.°	17.8 C.°

[The extraordinary percentage of phosphoric acid in soil No. 9 and its subsoil (the former exceeding all others heretofore analyzed), together with the unusual predominance of lime and large supply of potash, shows sufficient cause for the high estimate placed upon their productiveness, and gives promise of almost indefinite durability.—E. W. H.]

The following mechanical analysis has been made of the mulatto clay subsoil No. 10, of Belle Meade, near Nashville, by M. E. Jaffa, of the University of California:

	Per cent.
Clay .....	27.930
Sediment of < 0.25 <sup>mm</sup> by hydraulic value .....	29.203
Sediment of < 0.25 <sup>mm</sup> by hydraulic value .....	4.315
Sediment of < 0.50 <sup>mm</sup> by hydraulic value .....	6.799
Sediment of < 1.00 <sup>mm</sup> by hydraulic value .....	5.802
Sediment of < 2.00 <sup>mm</sup> by hydraulic value .....	3.390
Sediment of < 4.00 <sup>mm</sup> by hydraulic value .....	2.994
Sediment of < 8.00 <sup>mm</sup> by hydraulic value .....	6.967
Sediment of < 16.00 <sup>mm</sup> by hydraulic value .....	3.936
Sediment of < 32.00 <sup>mm</sup> by hydraulic value .....	5.096
Sediment of < 64.00 <sup>mm</sup> by hydraulic value .....	0.495
Total .....	96.327

The following abstracts are given in further illustration of the general features of the basin:

CHARLES F. VANDERFORD, RUTHERFORD COUNTY (central limestone area): The country around Florence station is referred to, which includes the first and second bottoms of Overall creek and Stone's river, together with the more extensive moderately rolling uplands. The region is nearly or quite surrounded by ridges and knobs from 50 to 100 feet high, which are mostly covered with a forest growth of cedar ("glades"). These cedar-covered ridges influence the winds and give us a local climate nearly as equable and quite as warm as that of the Tennessee valley in Madison and Limestone counties of Alabama. The kinds of soil cultivated in cotton are: (1) Red clay loam (brown when fresh) on uplands and slopes; (2) second bottoms, found at the bases of slopes; (3) river or creek bottoms, excellent for cotton when well drained. The chief soil is the brown or red clay loam, about three-fifths of the land being of this kind, which extends over an area embracing something more than 110 square miles. The native growth is white, black, red, and post oaks, elms, poplar, black walnut, hickories, wild cherry, black locust, and honey-locust. The soil is from 6 to 20 inches in thickness; the subsoil is a rather stiff clay, for the most part mixed with rotten and comminuted limestone and chert, which changes by weathering so as to become nearly as fertile as the surface soil. Clay thrown from railroad cuts or from wells, after exposure for a few months, will produce almost any crop, and such clays are used with very satisfactory results as a top-dressing for certain of our black soils. The subsoil is underlaid by limestone at from 8 to 20 feet. Our cotton lands are very retentive, and are easily worked when in proper condition; but they are much injured if worked when too wet, for then in dry weather they become very hard and difficult to manage. Properly handled, however, the most retentive soils work easily and withstand drought as well as if thoroughly underdrained. This peculiarity is due to the large proportion of fragmentary chert which is found intermixed with all the undersoils of this region. The chief crops are cotton, corn, wheat, oats, and clover, the uplands and second bottoms being best for cotton, wheat, and oats, and the second and first bottoms for corn and cotton. About one-third of the land is put in cotton.

DR. J. W. DAVIS, RUTHERFORD COUNTY (central limestone area): The region of Stewart's creek and lands thereabout, embracing a part of Stone's river, includes first and second bottoms and uplands. The upland soil is generally good. In the bottoms cotton is late and is sometimes injured by frost. After several years' cultivation, however, and in dry seasons, the bottoms make the heaviest crops. The soils cultivated in cotton are: (1) Brown upland, with red clay subsoil; (2) dark sandy land of Stewart's creek bottom above overflow; (3) light sandy bottoms of Stone's river. Of these the brown upland is the chief, making three-fourths of the whole. The extent of this soil is, across the streams, from 4 to 6 miles; with them, from 20 to 30 miles. Its growth is poplar, ash, walnut, oak, elm, sugar-tree, dogwood, and ironwood. Its depth ranges from 4 to 12 inches. Under the best lands the subsoil is a fine red clay, containing sometimes flinty gravel, and is underlaid by limestone at from 1 foot to 20 feet. The land is tilled with difficulty in wet weather, but easily in dry weather if not too dry. The chief crops are cotton, corn, oats, rye, wheat, and clover. The soil is best adapted to corn and cotton, though clover and wheat do well. From one-third to one-half is planted in cotton.

REV. M. F. THOMPSON AND B. F. RANSOM, BEDFORD COUNTY (central limestone area): The lands are those of Fall creek and the north fork of Duck river. They are in bodies of from 5 to 50 acres or more. The only circumstance of "local climate" influencing cotton growing is the shortness of the season, as the cotton is liable to be late and prematurely frost-bitten. The chief soil is the red upland, lying in level or rolling bodies, known as red land, and forms about one-fifth of the area of the region referred to. It extends 10 miles east and west, and as many miles north and south, and has a growth of hickory, dogwood, and walnut. It is a light clay loam with an average thickness of about 8 inches. The subsoil is a tough red clay, which bakes hard when exposed, but generally becomes by cultivation like the surface soil. It is not impervious, contains small angular gravel, and is underlaid by limestone at from 5 to 10 feet. In tilling qualities the soil is fair, and is early when well drained. Its chief crops are corn, grass, and wheat, being apparently best adapted to the first two. A small proportion of cotton is planted. The uplands are, however, variable, their bodies of cultivated soil alternating with "cedar roughs", or rocky, glady places. Bedford, as a whole, cannot be considered a cotton-growing area, all the cotton produced being raised in the northwestern quarter of the county. We have no cotton plantations proper. With the exception of one crop of 60 acres, I know of no other crop of over 20 acres. Two-thirds of the cotton raised is from patches of less than 5 acres.

J. B. EZELL, MARSHALL COUNTY: The first and second bottoms and the generally level uplands of Spring creek and Duck river are the lands reported upon. The soils cultivated in cotton are brown and black upland soils, occurring mostly in fields of from 10 to 30 acres. Three-fourths of the lands in this region are of this kind, and extend 10 miles to the east, west, and south, and 4 miles north. The growth is red and black oak, ash, elm, and dogwood. The soils are a clay loam from 4 to 6 inches thick; the subsoils are gravelly. Limestone lies from 2 to 5 feet from the surface. The soils are very difficult to till in wet seasons, but easy in dry. Their crops are corn, oats, wheat, and cotton, but they are best suited to the first two. Cotton makes about 20 per cent. of the crops. There is very little difference in our upland soils.

E. H. THORNTON, WILSON COUNTY: The lands cultivated in cotton in Wilson are mostly on Hurricane, Sugg's, and Sinking creeks. Some is also raised near Laguardo, and on Barton's and Cedar creeks. None is raised in the eastern part of the county. The lowlands are creek bottoms, generally with a black loam soil; and some lands on the banks of the Cumberland river are sandy. The uplands consist of the lands of Poplar ridge, and also of red cedar lands in the southern part of the county. The season is hardly long enough for cotton

to mature, the greatest danger being the autumn frost. The soils cultivated in cotton are: (1) The poplar ridge lands (chiefly soils of the *Orthis* bed) in the middle part of the county; (2) the red cedar lands (of the central, glade, and Carter's Creek limestones) in the southern part of the county. These include all our cotton lands. The poplar ridge lands extend 10 miles in a northern and southern direction, and 20 miles in an eastern and western direction. The red cedar lands extend 12 miles in a northern and southern direction, and 10 or 12 miles east and west. The growth of the first kind is poplar, hickory, and oak; that of the second, oak, hickory, ash, and cedar, the latter chiefly in the glades. The crops produced are principally corn, oats, wheat, cotton, tobacco, and vegetables. The soil is apparently best adapted to corn and hay. The cotton planted forms about 4 per cent. of the crops.

**S. R. DOXEY, SUMNER COUNTY** (*Orthis* bed): Lands of the waters of Drake's creek and Cumberland river: The first and second bottoms are cultivated principally in corn. The uplands only are used for cotton. It will not open in the lowlands before frost. Soil No. 1 is about two weeks earlier than No. 2. The former is sandy and warm; the latter, more clayey, retains water longer, and is cooler. The soils are: (1) Yellow poplar land, lying on plains, ridges, and slopes; (2) dark loam, known as blue-grass land. There is but little of the yellow poplar land, which lies not far from the creek and river and runs along the north side of the latter in a strip for 5 miles or more. Its growth is poplar, gum, hickory, maple, ash, elm, walnut, some beech, dogwood, and ironwood. The soil is a fine sandy friable loam, brown and yellow, with a thickness of from 6 to 20 inches; the subsoil a deep yellow clay, containing more or less small gravel, underlaid by clay and rock at from 2 to 10 feet. It is not worked in wet weather, and is easily tilled in dry. The chief crops produced are cotton, corn, wheat, oats, potatoes, and grasses. In the particular region described the proportion of cotton planted is from one-fourth to one-half of all.

**B. GRAY, DAVIDSON COUNTY**: Hilly and level uplands of Hurricane creek, a tributary of Stone's river. The soils cultivated in cotton are: (1) Red clay lands, strongly calcareous, reaching from this point eastward and extensively into Rutherford county; (2) black loam, with yellowish clay subsoil, extending west, and also south into Williamson and north into Wilson county. The chief soils are the red clay lands. These are gently undulating, not hilly, and make about one-third of the lands in this region. The growth is poplar, oak, ash, some sugar-tree, elm, and hickory. These lands adjoin or alternate with "cedar glades". The soil is from 8 to 10 inches thick, and is early, warm, and naturally well drained. The chief crops are cotton, corn, and wheat, with also German millet for seed. Over one-half of the land is devoted to cotton, the lands appearing best adapted to this staple. The black loam, amounting to about two-thirds of the lands, extends north, south, and west for at least 15 miles. Its growth is poplar, oak, elm, ash, sugar-tree, beech, walnut, ironwood, dogwood, with here and there a patch of cedar on rocky places. The soil is from 8 to 12 inches thick, is easily tilled in dry weather, and is best adapted to corn. About one-sixth is planted in cotton.

**J. M. TURNER, EDGEFIELD JUNCTION, DAVIDSON COUNTY**: The first and second bottoms of the Cumberland river have a freestone (*Orthis* bed) soil, generally sandy, with, say, one-sixth part of a blackish mucky nature. These are the cotton soils: the first mahogany and gravelly, and the second sandy. The yellow mahogany is the chief soil, and forms three-fourths of the lands of this region. It extends northward about 15 miles, eastward 4 miles, southward 20 miles or more, and westward 4 miles. Its growth is elm, ash, poplar, hackberry, walnut, and sugar-tree. This soil has a depth of from 2 to 6 inches, a subsoil of yellow, heavy, stiff clay, often impervious to water, and is underlaid by limestone at from 1 foot to 20 feet. The land is easily tilled, and is early, warm, and well drained. It is not so well adapted to cotton as to other crops, though farmers raise more cotton than anything else, because it brings more ready money. About one-half is planted in cotton. The second or sandy soil forms about one-eighth of our lands, and has limited extent. Among its trees are sweet and black gum, oak, poplar, and beech. It is a fine sandy loam, 12 inches thick. The land is warm, easily tilled, and is best adapted to cotton, two-thirds of it being planted with this staple.

**JOHN S. CLAYBROOKE AND S. A. POINTER, WILLIAMSON COUNTY**: The lands of Aemon, Wilson's, and Harpeth creeks and the bottoms of Duck and Big Harpeth rivers are referred to. Duck River ridge, dividing the waters of Duck river from those of Big Harpeth, runs northeastward and southwestward through my place, "Wheatland." The uplands are rolling and level on the waters of the creeks mentioned. The shortness of the growing season forces us to put our best lands in cotton and work well, so as to push the plant and make it mature and open early. The writer has contended for many years that Williamson, Maury, and Giles counties afford, perhaps, the best cotton land in the south, and that, taking a number of years together, it would produce (not being subject to overflows, etc.) more to the acre than any section south of us. The cotton soils are: (1) Mulatto soil, on which grow white oak and white poplar, and, as we approach the hills, black soil with yellow poplar, large beech, and gum; (2) light sandy, white-oak soil, washing badly; (3) red soil (of Carter's Creek limestone) near and in the cedars. The chief one is the white poplar mulatto soil, embracing, while confined to Williamson and Maury counties, nearly all the lands for several miles on both sides of Duck and Big Harpeth rivers. In general, they extend from Brentwood to Mount Pleasant, an area of 50 miles in length and 10 miles in breadth. The mulatto soil is about 1 foot deep, with a clay foundation; the black from 1 foot to 3 feet, without clay foundation, the soil generally extending down to the rock. This is superior corn land. The mulatto and black soils contain but little gravel, and are underlaid by limestone at from 2 to 10 feet. We frequently cultivate from 8 to 10 acres to the hand. As to crops, wheat predominates; but cotton and corn are raised largely, with some barley and oats. The land is best adapted to cotton and wheat. About one-third of the land is put in cotton. The second kind of soil, the light sandy, occurs in small proportion in this region, and is met with for 6 or 7 miles east of the Columbia pike. A strip 30 miles long and 5 miles wide lies in the eastern part of Williamson and Maury. Much of this land is second rate, and produces little cotton. The third kind, red soil, near or in the cedars, occurs in large areas in the eastern parts of Maury and Williamson, and extends into Marshall and Rutherford counties. Like the last mentioned, much of it is second rate.

**W. O. GORDON, MAURY COUNTY**: The lands of the waters of Carter's creek embrace rich bottoms, second bottoms, rolling and hilly uplands, with respectively black, mulatto, and gravelly soils. The lands cultivated in cotton are: (1) The mulatto or poplar lands, supplying the best and surest yield; (2) the high gravelly hills or ridges, which are next preferred; (3) bottom lands, good if the fall is late, but not so reliable. The chief kind is the poplar uplands with mulatto soil. About one-third of the land is of this kind. They extend 30 miles northward and southward, but the best quality predominates from Ewell's southward to Mount Pleasant. It is a light sandy clay loam, about 9 inches deep, with a clay subsoil of stronger color, mixed more or less with gravel, and resting on rock at 4 feet. The soil is easily tilled in dry weather, and is early, warm, and well drained. It produces chiefly corn, wheat, and cotton; also oats, rye, and Irish and sweet potatoes, but is best suited to corn. About 30 per cent. of cotton is planted. Of the second kind, high gravelly lands, we have about 25 per cent., which lie on the tops and slopes of the highest ridges, the spurs of the highlands west of us, and the dividing ridges, like Elk ridge. The soil is gravelly, light, and loose, with gravelly subsoil. It is more easily tilled in wet weather, is early, warm, and well drained, and is best adapted to corn, cotton, and wheat. Allowing for roughness, these lands are the surest for the crops just mentioned. About 5 per cent. of cotton is planted, but more would be were it not for the rough hoeing. Of the third kind, bottom lands, we have about 40 per cent. They are best adapted to corn and hay. The cotton cultivated amounts to about 10 per cent. of the crops.

**L. E. POLK, MAURY COUNTY**: The lands referred to are the rolling and level uplands of the waters of Duck river. The soils cultivated in cotton are: (1) The yellow-poplar soil, or highlands, with chocolate-colored soil and yellow subsoil; (2) black sandy soil. The first is the chief soil, and 85 per cent. of the lands are of this kind. They have a wide extent within the basin of Middle

Tennessee. The growth is remarkable for its variety. Among the trees we have the large elm, oaks, poplar, sugar-tree, ash, beech in places, hickories, walnut, cherry, linden, box-elder, hackberry, and the black locust. The soil is a gravelly loam, alternating with a clay loam. The subsoil is gravelly, with good drainage capacity, and when exposed to the sun and air produces well. It is underlain by limestone at from 6 to 20 feet. The soil is easily tilled in wet or dry seasons. The crops produced are corn, wheat, oats, and cotton, but the soil is apparently best adapted to corn and grass. About 15 per cent. of the tilled land is put in cotton. The second kind, the black sandy soil, making about 15 per cent. of the lands, alternates with the other over much of the basin. Its growth is much like that of the first, excepting that poplar is rarely seen. It is a deep soil in low places and branch bottoms with gravelly subsoil, which rests upon gravel and rock at from 2 to 6 feet from the surface. It is early, warm, and well drained. Cotton is cultivated upon 25 per cent. of this land.

LEON FRIERSON, MAURY COUNTY: First and second bottoms and rolling uplands of the Big Bigby river. The rolling land was originally rich brown loam, interspersed with black spots, but is now in many places much worn. We have, strictly speaking, no uplands, as this portion of the county lies within the Central Basin; so we use the term relatively. The soils cultivated in cotton are: (1) "Mulatto lands," or dark loam; (2) black porous soil, very loose (corn planted in it "frenches"); (3) gravelly soil, of which there is very little. The mulatto or dark loam lands are the chief, three-fourths being of this kind. The soil is from 12 to 18 inches thick, with a stiff clay subsoil, which changes to soil after it freezes and thaws. In some places the soil is mixed with coarse gravel. Limestone is met with at from 5 to 10 feet from the surface. The soil is best adapted to cotton and corn. One-third is planted in cotton. The second, the black, porous soil, forms a fourth of our lands. It is generally interspersed with the first all through this section of country, is 24 inches thick, and has a yellow, sticky clay for its subsoil, which is impervious to water if undisturbed. It contains gravel, and is underlain by limestone at a depth of from 3 to 6 feet from the surface. This land is best adapted to wheat and oats. But little cotton is planted.

J. E. ABERNATHY, W. RIVERS, AND D. T. REYNOLDS, GILES COUNTY: These lands comprise the first and second bottoms and the rolling and hilly uplands of Big and Richland creeks. The uplands to a certain altitude are underlain by limestone; above that by a flinty rock. All are rich and productive. Cotton in the lowlands is liable to be late and to be killed by frost, and is also more subject to rust. These lands, when fresh, with abundant vegetable matter and in favorable seasons, are very productive. We now prefer the uplands. The lands cultivated in cotton are: (1) Second bottoms above overflow; (2) uplands below the level of the flint formation; (3) uplands on the flint formation. The chief soil is that of the second bottoms, forming one-fourth of our soil and extending over a good part of the basin of Middle Tennessee. It is a mahogany colored clay loam with a hard clay subsoil, pulverizing readily. It is easily cultivated when well drained, is early and warm, and produces cotton, corn, and wheat, but is best adapted to corn, though all grow well. The cotton planted is about one-third of the crops. The second kind, uplands below the flints, comprise about one-third of the lands. These occur on the slopes of the ridges throughout the county, and are in native growth, color of soil, character of crops, and proportion of cotton planted much like the second bottoms. The third kind, the uplands on the flint, occur near and on the summits of the ridges throughout the county. Their timber is yellow and white poplar, beech, oaks, chestnut, hickory, ash, sassafras, and elm. It is a gravelly clay loam, but flint and gravel make it dark gray. Its subsoil is yellow clay, mixed with gravel. It is best for corn, though all crops grow well. Very little cotton is planted. Cultivation is more difficult than in the case of other lands, on account of the excess of coarse gravel present.

J. D. TILLMAN, LINCOLN COUNTY: The first and second bottoms of Elk river are considered. Cotton is liable to be killed by frost. The lands cultivated in cotton are: (1) The alluvial bottoms of Elk river, containing sand; (2) uplands of mellow formation, breaking up without clods or lumps. The chief kinds are called "cotton lands", which form about one-twentieth of our tillable areas, and extend from the headwaters of the Elk river to its mouth. Their growth is hickory, oak, poplar, sycamore, black locust, and honey-locust. The soil is fine silt and sandy, gravelly loam of a brown or dark color, with a clay subsoil; sand, gravel, or limestone lie below at from 3 to 20 feet. This soil is easily tilled in dry weather, and produces corn, oats, clover, wheat, and cotton, but is best adapted to the first three. About one-twentieth of all the land planted is in cotton.

#### THE CUMBERLAND TABLE-LAND.

Leaving the Central Basin, and crossing the eastern division of the Highland Rim, we reach the foot of the western escarpment of the Cumberland table-land, an elevated and sharply outlined division of the state. This is usually called Cumberland mountain, but it is better designated as table-land. It is, as already said, a plateau with broad and generally level top, standing in bold relief above the lowlands on each side, the rim lands on the west and the East Tennessee valley lands on the east rising up, in round numbers, 1,000 feet above these and 2,000 feet above the sea. It is the Tennessee coal-field, and embraces an area of 5,100 square miles—about one-eighth of the state. The form, relative size, and oblique northeasterly and southwesterly position of the table-land are seen upon the agricultural map, and is the portion marked 12a, and colored. (See also diagram.) Within its limits are included Scott, Morgan, and Cumberland counties, and the greater parts, severally, of Fentress, Van Buren, Grundy, Bledsoe, Sequatchie, and Marion, with considerable portions of Overton, Putnam, White, Warren, Coffee, and Franklin on the west, and of Claiborne, Campbell, Anderson, Rhea, and Hamilton on the east. The western edge of the division is notched and scalloped by deep coves and valleys, which are separated by finger-like spurs pointing westward, while its eastern edge is a nearly direct or gracefully curving line. At almost all points, on both sides, the surface suddenly breaks off in sandstone cliffs from 20 to 200 feet in height, giving everywhere a sharp and prominent margin or brow to the division. Commencing in the very body of the division, near the middle of the state, and extending southwestward into Alabama, the table-land is completely split longitudinally in two by the deep Sequatchie valley, a narrow, straight trough, 60 miles long, and averaging not more than 4 miles in width, if as much. Of the two arms thus formed, that to the west of the valley mentioned retains the name Cumberland, while that to the east is known as Walden's ridge.

The surface of the table-land is often flat for miles, with an open growth, mostly of oaks; then again it is rolling and diversified with hills and shallow valleys. In the northeastern part are high ridges, which may be regarded as mountains on the table-land. The division is very generally capped with sandstone, and shales are sometimes met with. The soils are thin, sandy, and porous, and are decidedly poor as compared with the limestone regions we have considered. In some sections they afford a pasturage of wild grasses. Apples and grapes often do well, and so do garden vegetables and Irish potatoes with plenty of manure. Here and there, on slopes at the foot of knobs

or ridges and along streams, more fertile areas are found, where land is cultivated, but in the aggregate farming operations on the table-land amount to very little. In general, the population is sparse, and wide regions without an inhabitant are traversed. The mountain, however, has attractions outside of its agricultural features which have drawn to certain localities many enterprising men, resulting in the building up of towns and intelligent communities. A very great accession is the establishment of the University of the South at Sewanee. By reference to the percentage map of acreage in cotton it will be seen that this division has no value as a cotton-producing area. Now and then little patches are seen in which some cotton is raised for domestic purposes, but the cotton reported in Table I as produced by this division was almost wholly raised on the lowland portions of the counties enumerated. Very little, in any case, is to be referred to the table-land proper.

We pass now from the sandy top of the table-land to the rich limestone declivities which make its sides. Below the great cap of the mountain—a cap made up of sandstones, shales, and coal-beds interstratified—there is everywhere a great limestone bed, known as “mountain limestone”, whose strata outcrop on all sides. The outcrops along the western side or slopes, which have more agricultural importance than the eastern, make at least two-thirds of the ascent from the base up. The surface is generally rocky, with very little soil. At intervals, however, bodies of land are met with which are rich and fertile. Not much of this land has been brought into cultivation, but now and then a small farm or a field shows itself as an open spot among the trees on the face of the ascent as one travels the lowland roads parallel with the mountain. The slopes are in the main covered with heavy forests, the trees, often of large size—poplar, black and white walnut, white oak, linden, mulberry, hackberry, species of ash, cherry-tree, together with the cucumber-tree, the great-leaf magnolia, papaw, and others—making a rich forest flora.

North of McMinnville a bench or terrace is very generally to be seen running along the slopes of the table-land and about half-way up. This comes from a thin sandstone, which in this region is interpolated in the series of mountain limestones. Immediately west of the main mountain and its outliers are many flat-topped ridges and “little mountains”, which have the same height as the benches, and are capped with the same sandstone. The flat summits of all of these have a rich, mellow soil, often sandy, upon which corn and wheat grow luxuriantly, and present favorite areas for orchards. Cotton, which is now occasionally seen in “patches”, would, in a more southern climate, do well upon them. We add that at the foot of the main mountain, as well as around the outliers, there is often much good land. This is especially true of the coves, some of which are noted for rich and beautiful farming areas. Going westward, these soils soon run into the red clay soils of the Highland Rim; in fact, they, as well as the soils of the steep mountain slopes, might have been considered consecutively after the red soils of the rim, since their underlying limestones belong to the same group, the sub-Carboniferous. In the southern part of the state cotton was formerly cultivated to a considerable extent in the coves and elsewhere along the base of the mountain, but now but little of it is raised. Below is an abstract from a report on lands in a mountain-hemmed valley, which may be regarded as a long cove in the table-land, having the same limestones as those referred to for its floor, and bearing the same relation to the mountain sides:

JOHN F. ANDERSON, FRANKLIN COUNTY: The district is bounded on the south by the Alabama line. The first and second bottoms of Crow creek, a tributary of the Tennessee river, are considered, together with the mountain slopes on each side of the Crow Creek valley. Occasionally cotton is injured by late northwest winds, and cold rains cause rust or “sore-shin”; but we are so protected by the mountains that such damage is rare. I consider this the best part of Franklin for cotton. All vegetables are two weeks earlier here than elsewhere in the county. The kinds of soil cultivated in cotton are: (1) Alluvial soils, differing greatly in character along the creek; (2) yellowish or reddish lands, sometimes black, based on limestone, and fertile; (3) mountain side, very rocky, soil thin, and not much cultivated. The chief lands are the alluvial or bottom lands. Two-thirds of the cultivated areas are of this kind, and extend along the valley for 12 or 14 miles with a width of from a fourth to half a mile. The growth is sycamore, willow, beech, sugar-tree, black walnut, ash, hackberry, elm, and linden. The soil is 24 to 30 inches deep. The subsoil is compact, coarse, gravelly, and rests upon limestone, the latter lying at from 2 to 24 feet below the surface. The land is usually tilled with little trouble, is early when well drained, and produces as chief crops corn and cotton; but it is best adapted to corn. One-fourth of the total acreage is put in cotton. The second kind of soil, the yellowish or reddish land, makes a third of our tillable areas, and extends through the valley in narrow strips outside of the alluvial lands. Its growth is cedar, white oak, beech, yellow poplar, hickory, black walnut, elm, linden, and hackberry. The subsoil contains much flinty gravel. The limestone lies below the surface at from 1 foot to 10 feet. The soil is easy to cultivate and produces well, and is best adapted to cotton, which forms about a fourth of the crops. The lands of the mountain sides are fully equal in area to the tillable lands below. The growth is made up of a great variety of timber. It is best adapted to corn, vegetables, and fruits. No cotton is raised upon it. The lands on the top of the mountain are good for tobacco, Irish potatoes, and fruit of all kinds.

### THE VALLEY OF EAST TENNESSEE.

Passing in our course eastward the Cumberland table-land, with its flat areas, oak woods, and sandy soils, we find ourselves in the great and populous valley of East Tennessee, with its diversified rocks, soil, and scenery. (a) This division has been briefly characterized on a former page. Within it is embraced nearly all the

<sup>a</sup> It may be noted that the Cumberland table-land, rising so boldly above the general level of the state, separates two of the great sections of Tennessee—sections great in area, wealth, and population: the Central Basin, with the best of the rim uplands around it, on the west, and the valley of East Tennessee on the east. The comparatively barren table-land has always been a serious obstacle in the way of free intercourse between these sections. Even now no railroad crosses it within the state. To pass from Nashville to Knoxville it is necessary to make a great detour to the south through Alabama.

agricultural wealth which is usually accredited to the civil division we call East Tennessee. Its oblique position relative to the northern and southern boundaries of the state and its shape are seen in the cut on page 11, as well as on the agricultural map. Its area extends through the state from Virginia to Georgia, and is included between the Cumberland table-land on the west and the Unaka mountains on the east or southeast, its lateral limits being clearly defined by these mountains. (a) It includes the following counties and parts of counties: The whole of James, Bradley, McMinn, Meigs, Loudon, Roane, Knox, Jefferson, Union, Grainger, Hamblen, Hancock, Hawkins, Washington, and Sullivan, parts of Marion, Sequatchie, Bledsoe, Hamilton, Rhea, Anderson, Campbell, and Claiborne (the other parts of these being on the table-land), and parts of Polk, Monroe, Blount, Sevier, Cocke, Greene, Unicoi, Carter, and Johnson (the remaining portions of the latter making up the area of the Unakas). Measured directly across in the northern part of the state, the area is 55 miles wide or thereabout. Toward the south the mountain barriers approach each other, and the width is reduced approximately to 34 miles, not including the outlier, Sequatchie valley. As seen from the high points of the Unaka mountains the valley of East Tennessee presents a wide-spreading floor—a vast, nearly level plain, limited on the west in the distance by the wall-like eastern escarpment of the Cumberland, and having but a few isolated ridges, like long narrow islands, projecting above the general surface. But when we descend from the mountains and travel across this floor it is anything but a level plain, the whole becoming an area fluted with a multitude of smaller valleys and ridges—a furrowed field on a Titanic scale. The valleys and ridges are crowded together, and extend in parallel lines to the northeast and southwest, the prevailing directions in the valley of East Tennessee. The smaller streams take, in the main, either the one or the other course. The rivers flow to the southwest, or, in the case of those from North Carolina, make their way across the country by the shortest routes through gaps and breaks of the ridges to those that flow to the southwest. The railroads and other chief lines of travel and commerce run with the valleys. This northeasterly and southwesterly striation, if I may use the word, of the great valley, so far as its natural and many of its artificial characteristics are concerned, is strikingly seen on the geological and topographical as well as agricultural maps of the state. This is all due primarily to the fact that the rocky strata are greatly inclined or tilted so that their edges outcrop along the surface, which they do in northeasterly and southwesterly lines. Thus the rocks present themselves at the surface in long, narrow, parallel strips or belts with the trend indicated. The hard strata-like sandstones and cherty dolomites make the ridges; the soft, like limestones and shales, the valleys. The several soils of the valleys and ridges necessarily occur in strips as represented on the agricultural map. Some of the valleys, or valley ranges, though averaging hardly a mile in width, may be traced, or indeed traveled in, from Virginia to Georgia, a distance of 150 miles, to say nothing of their extension either way beyond the limits of the state. Certain ridges, straight or slightly curving, are equally long, and most of them may be followed for scores of miles. Some ridges are narrow and sharp, like a steep roof; others are wide, broadly rounded on top, and of far greater importance, of which Copper, Chestnut, and Missionary ridges are types. These are dolomite ridges, and their surfaces are strewn with cherty masses and gravel. The ridge upon which Knoxville is built is one of the latter, a range originating in the northern part of Knox county and traceable into the state of Georgia. Ridges of this type occasionally flatten out, giving us plateau areas of great agricultural value, such, for example, as the body of land traversed by the East Tennessee and Virginia railroad in Jefferson and Hamblen counties, or break up more or less into wide belts of cherty knobs, as those in Hamilton and Rhea, between the Tennessee river and the Cincinnati railroad, or those in Hamilton and James east of Missionary ridge, and crossed by the Chattanooga and Cleveland railroad. But these cherty dolomite knobs are not the only ones. The kinds of knobs characterizing the two areas designated respectively as the "red belt" (7c) and the "gray belt" (8c) on the map differ materially from those mentioned, and differ in a degree from each other. The *red belt* begins in Jefferson county, has its greatest width in Knox and Blount, and continues southwestward through other counties to the Georgia state line. (See map.) This area is remarkable for its long lines of red knobs and red lands. With the lines of knobs are intervening broken valleys. The soils are based upon calcareous shales, with which are interstratified very ferruginous sandy limestones, flaggy limestones, and red marbles. They are often very mellow and fertile, as upon the slopes of the knobs. The *gray belt*, so named from the prevalence of gray lands and earthy gray rocks, lies further to the eastward. It is a great club-shaped area commencing on the Virginia line and extending southwestward to the Hiwassee river, reaching, indeed, nearly through the state. (See map.) Its characteristic feature is found in its isolated and often crowded knobs, which beset the surface like monster ant-hills. Many portions of the belt are spoken of locally as "the knobs". These are conical hills of all heights, from 100 to 500 feet, and sometimes they are more or less elongated, forming short ridges; and in some regions, where closely set, they make a wild country traversed by narrow labyrinthine valleys. The formation of the area is a heavy body of sky-blue, calcareous, and often sandy shales, weathering to yellowish-gray or buff, and containing occasionally thin

a I include in this division, as outliers, the interesting valleys and coves which are more or less interlocked with the ridges of the mountains on each side. One of these, Sequatchie valley, splitting the southern portion of the table-land, has been spoken of. On the eastern side there are many, some of them noted for the attractiveness of their natural features. The cultivated part of one county, Johnson, in the northeastern part of the state, is a mountain-hemmed cove, with no way of getting in or out except by scaling mountains or by passing through dark and rocky water-gaps. Other interesting coves are Wear's, in Sevier county, and Tuckaleechee and Cagle's, in Blount county.

flaggy limestones, and at some points thin sandstones. The belt often possesses a dark rich soil, supporting a growth of white oak, poplar, and hickory, and some portions abound in small farms between the knobs and on their slopes. In such regions we have what has been called "the poor man's rich land".

If we draw a line from Virginia to Georgia lengthwise through the middle of the great valley, splitting it into halves, the knobby belts we have just described will lie in the eastern or southeastern half. Besides these, there are in this part many ridges and valleys based on other rocks. It is, however, in the other half of the valley, on the northwestern side of the median line, that we have the most characteristic display of the wonderfully long, yet narrow, parallel, and alternating valleys and ridges. The length of these has already been referred to. I add a word more as to the valleys. These are troughs between the ridges, and are wide or narrow in proportion to the separation of the latter. They vary in width from the fraction of a mile to 1 mile or 2 miles, not often more than this, and most of them are attractive and fertile. Some of the narrow ones are cold and unproductive. There are two principal classes, as will be hereafter noticed, the limestone valleys and the shale valleys, and both kinds in general are amply watered by streams abundantly supplied with free-flowing springs, well populated, abounding in arable fields. Each valley is a kingdom in itself, communities being separated from each other by the intervening ridges. Most of the population live in the valleys, though houses and farms are occasionally seen upon some of the ridges of the Copper Ridge type. For the most part, the ridges are the wooded portions of the country. Seen from a distance, they are marked out by lines of forests crowning the summits, which heighten the contrast between ridge and valley. The fields of the valleys often creep a long way up the slopes to the line of the trees.

For present purposes enough has been said as to the general character of the valley of East Tennessee. To go into detail, enumerating and describing all its numerous and varied features of structure and surface, would carry us far beyond reasonable limits.<sup>(a)</sup> Such detail can be dispensed with the better since the valley is not a cotton region proper. It belongs at most to the *penumbral region* of cotton culture. The whole yield reported for the census year, including also the little cotton raised in the mountain parts of such of its counties as reach out, respectively, upon the table-land and the Unakas, is only 537 bales, and of this more than 400 bales were raised in the valley portions of counties south of the latitude of Knoxville. (See percentage map of cotton culture.) In nearly all the counties quarter-acre or half-acre patches are occasionally met with, in which a little cotton is cultivated for home use.

The soils indicated upon the map and named in the legend have in part been noticed. The "*red belt*" (7c) and the "*gray belt*" (8c) have been sufficiently spoken of. The "*limestone lands of certain valleys in East Tennessee*" (8b) make some of the best agricultural belts of the division. They have blue limestone soils, the equivalents of the soils in the Central Basin, and nearly all the important valley ranges on the western or northwestern side of the median line of the division have these soils. Such are the valleys known as Powell's, Beaver creek, Raccoon, Hickory, Savannah, and others. They make the long valley ranges to which attention has been called, and are everywhere in cultivation and dotted with farm-houses. Toward the south, and before reaching the Georgia line, most of these valleys are pinched out, giving way to shale valley ranges or to ridges. On the east or southeast side of the median line there are very few of these, and they are unimportant. The "*calcareous shale and valley lands*" (9a) belong to a group of valleys equal in importance to those just mentioned. The rocks which supply the soils are variegated, chestnut-colored, greenish and buff shales, generally calcareous, and show now and then an interstratified layer of dolomite or limestone. This series is called the *Knox shale*. Many of the valleys are very desirable agricultural belts. In the southern part of the division especially a number of them are wide, gently rolling or level, and afford tracts of highly fertile land, often in a good state of cultivation. It is one of the important soils upon which cotton is cultivated. The soils are clayey, but are mellowed by the *débris* of thin sandy layers and by calcareous matter. On the west side of the median line the shale valleys, or valley ranges, when followed northeastward up the country, become very much narrowed, losing their importance. This is also the case to some extent on the eastern side of the valley. The "*magnesian limestone lands*" (10a) are those of level or rolling plateau belts, or of moderate slopes based on dolomites, and such as that above-mentioned traversed by the railroad in Jefferson and Hamblen counties. There are but few of these areas, and these are chiefly in the upper end of the valley. These soils are strong and fertile, and under cultivation. The subsoils are deep yellowish or reddish, and contain cherty gravel and masses of chert. These areas I have spoken of as dolomite ridges flattened out into plateau land. The "*ridge and cherty lands*" (10b) are those of many wide and rounded dolomite ridges in the valley, of which Copper, Chestnut, and Missionary ridges, before mentioned, are good examples. In these the rocky strata are usually concealed by a great depth of clayey, reddish subsoil, in which there is much chert and cherty gravel intermixed. The surface of the ridges is often so covered with flinty gravel as to supply natural macadam road-beds, over which it is pleasant to drive. The wooded summits, the encroachments of the cultivated fields upon the slopes, and the presence occasionally of houses and farms upon the ridges, have been referred to. In regard to alluvial lands, bottoms occur at intervals along the streams, there being noted ones on the French Broad, the Holston, Tennessee, and other rivers. The aggregate of such land, however, though very considerable, is limited in this division as compared with what we have in the western part of the state.

<sup>a</sup> For further information as to the physical and agricultural features of this division, see the writer's *Geology of Tennessee*.

Sequatchie valley is the most important outlier of the valley of East Tennessee. Its relation to the Cumberland table-land or mountain has been given in Part I under the head of that division. As there stated, it is a narrow, straight trough, 60 miles long, with an average width of not more than 4 miles, and lies compressed between the steep and parallel walls or edges of the table-land, which rise on both sides to an elevation of 1,000 feet and overshadow its area. Looking from these heights down upon the valley below, we see first a central, depressed, wide, and wooded ridge, running as far as the eye can reach lengthwise through the valley, and constituting the greater part of its surface, and then two cultivated valleys, one on each side of the ridge, between it and the foot of the mountain slopes. The rocks of the central ridge are dolomites, like those of Copper and Chestnut ridges in the main valley to the east, to which class of ridges it belongs, the cherty lands, native growth, etc., being similar. The valleys have strong soils based on blue limestones, and give a large aggregate of good farming lands. That on the eastern side, in its rocks and soils, is to be referred to the class of valleys, including Powell's, Beaver creek, Raccoon, and others, before mentioned. That on the west side has frequently more cherty limestones (mountain or Saint Louis) for its underlying rocks. The Tennessee river, breaking through the eastern arm of the mountain, enters the southern end of the valley and then flows in the extended course of the latter far into Alabama. Sequatchie river runs through the whole length of the valley, winding along for the most part, very curiously, in the ridge area, breaking up the latter here and there into hills and knobs.

But three reports have been received from counties in the valley of East Tennessee, abstracts of which are given in Part II, on page 92. As to the first, it may be noted that Chickamauga is near the Georgia line. Dolomite cherty ranges, as well as a valley of the Knox shales, pass through this region.

#### THE UNAKA MOUNTAIN REGION.

We have now reached the last of the eight natural divisions of Tennessee, the *Unaka Mountain region*. The general character of the division, its position, elevation, and area, are briefly given on page 14. It embraces the mountainous parts of Polk, Monroe, Blount, Sevier, Cocke, Greene, Unicoi, Carter, and Johnson counties. Including interlocked valleys and coves, the region is a long belt, with a width of about 13 miles, lying contiguous to the state of North Carolina, and reaching from Virginia to Georgia. (See 13 on the agricultural map.) It gives to the eastern end of Tennessee a greatly raised, cloud-capped border, strikingly in contrast with the low and often flooded plains of the western end. The included valleys and coves having been referred to and treated as outliers of the division last described, we are concerned here mainly with the mountains proper. The great ridges embraced in the division, and often named the Unakas, are arranged approximately in two principal chains, which are more or less crowded together in parallel lines. The chains are not continuous. The main one, the axis of the group (of which Catface mountain, the Yellow, the Roan, the various "Balds", the Great Smoky, and the Frog are some of the prominent points), is cut directly across by rivers, seven in number, which flow from the western slope of the Blue Ridge in North Carolina northwestward into Tennessee, passing the great axis in deep and magnificent water-gaps. The most westerly chain, of less average height (to which belong Star's, Chilhowee, English's, Meadow Creek, Holston, and other mountains), was elevated by the original geological forces in detached ridges, often many miles apart, but arranged lengthwise, end facing end. Nevertheless, some of the isolated mountains—Star's and Chilhowee, for example—are cut in two by water-gaps. The portion of the main axis between the French Broad and Little Tennessee presents in its length of 65 miles a series of peaks but a few feet lower than the highest of the Black mountains in North Carolina. Many of these exceed 6,000 feet. Altogether, we have here without exception the boldest and greatest mountain mass to be found anywhere east of the Mississippi river, known as the Great Smoky. Farther to the northeast, in the section between the Watauga and Nolichucky, are several great ridges, among which we may mention the Roan. This, though not having the highest peaks, is in some respects the grandest mountain of the Unakas. Its summit, presenting a number of peaks more than 6,000 feet high, is in many places destitute of trees, owing to the low temperature of the heights. These are called "balds". On the Roan there is a succession of them, giving the broad summit at intervals a meadow-like aspect. Such places we have seen in the summer time alive with stock of all kinds, feeding and fattening upon the rich herbage. The "balds" are not confined to the Roan, but occur at many points along the summits of the main Unakas. As a rule, the ridges are clothed with forests. When, however, a height of about 5,000 feet above tide is reached, the deciduous trees—beeches, oaks, and maples—become more or less dwarfed, and often in ascending farther entirely disappear, the summit then becoming a "bald". Some of the highest points, instead of being bald, are dark, with a heavy balsam and evergreen growth.

The rocks of the Unakas are micaceous and hornblendic gneisses, granites, slates, semi-metamorphic conglomerates, and sandstones, the strata of which are upturned and dip at high angles. The ridges are cold, steep, and rocky, and, in the main, have thin, sandy soils. Nevertheless, on the tops of the highest ridges are tracts, like those of the "balds", prairie-like, black, and rich. Places of considerable fertility are rarely met with on wooded slopes supporting a growth of walnut, beech, poplar, wild cherry, and the like, but at long intervals a cleared spot may be discerned. The mountains proper can hardly be said to be inhabited, and it is rare to meet with a true mountaineer. The chief settlements are below in the valleys and coves. Occasionally, cabins and small

cultivated fields may be found along a stream in a depression of the high mountains. But we have already dwelt longer than necessary upon the characteristics of this division. As a section for the growing of cotton it has no interest. Of that reported in Table II as the product of certain counties partly pertaining to the division perhaps not as much as a bale was raised upon the Unaka ridges proper. The mountains, so far as utilized, have been in the main grazing grounds for cattle.

## REMARKS ON COTTON ACREAGE AND PRODUCTION IN TENNESSEE.

An inspection of the map of relative acreage, as well as of the tables, shows at first glance that the cotton-producing areas of Tennessee lie substantially in the western half of the state. It is also seen that there are two chief regions of production, the one mostly within the great plateau slope of West Tennessee, and the other in the Central Basin; and furthermore that these regions are united by an area of low production lying within the limits of the highlands, in the western part of Middle Tennessee. The western chief region is much the more important of the two. Its area of greatest acreage in cotton, and the greatest occurring in Tennessee (15 per cent. and above), lies in the southwestern corner of the state. Passing from this outward, northerly to Kentucky or easterly toward the highlands before referred to, areas of less and less acreage are successively crossed. The eastern chief region, that in the basin, has no one center of greatest acreage. The highest reached is 10 to 15 per cent., and this is found in detached belts or sections in different parts of the basin inclosed by areas of lower acreage. We add that as in going northward the cotton product diminishes the tobacco product, in general, takes its place and increases.

It is to be noted that the northern edge of the cotton-producing portion of Tennessee and of a small strip of western Kentucky between the Mississippi and Tennessee rivers is, for the inland section east of the Mississippi river, the extreme northern limit of the cotton region of the south. (a)

The chief circumstance which determines this limit is the low temperature of the climate, or, as we may put it, the shortness of the growing season; that is to say, the season between frosts. This matter has already been discussed in this report (page 13). It is there shown that the isotherms, or lines of equal heat, of spring and fall for the non-mountainous parts extend diagonally through the state, or, say, parallel to a line running from its southeastern to its northwestern corner. In accordance therewith, the limit of the cotton region, as seen in Tennessee and Kentucky, is approximately parallel to such a line, or would be, excepting that at one point the exceptionally warm and mellow lands of the Central Basin prevail and carry the limit beyond the normal line. And further, in harmony with the direction of the isotherms, the extreme southwestern corner of the state is the warmest and has the longest growing season, and here we have the area of greatest production. Cultivators of cotton in all parts of the state, even in the warmest portion just referred to, fear the late frosts of spring and the first killing frosts of autumn, and are often driven from the rich but colder alluvial bottoms to the warmer, early-maturing uplands.

TABLE III.—POPULATION AND COTTON PRODUCTION IN EACH AGRICULTURAL REGION IN THE STATE.

Agricultural regions, arranged according to product per acre.	Land area.	POPULATION.			COTTON PRODUCTION.										
		Total.	White.	Colored.	Acres.	Bales.	Product per acre.			Total in tons.		Percentage of state's total production.	Cotton acreage per square mile.	Bales per square mile.	
							Bale.	Seed-cotton.	Lint.	Seed.	Lint.				Seed.
The State.....	Sq. mls. 41, 750	1, 542, 359	1, 138, 881	403, 528	722, 502	330, 621	0. 40	Lbs. 651	Lbs. 217	Lbs. 434	78, 522	167, 044	100. 0	17. 3	7. 0
Lake county (Mississippi river alluvium).	210	3, 968	3, 274	694	3, 249	2, 412	0. 74	1, 059	353	706	578	1, 140	0. 7	15. 5	11. 4
Mississippi river alluvial and bluff region.	2, 540	152, 411	84, 118	68, 293	177, 028	98, 842	0. 59	756	252	504	22, 287	44, 574	28. 4	60. 7	30. 0
Brown loam table-lands *	6, 200	201, 997	162, 278	99, 719	386, 269	171, 534	0. 44	621	207	414	40, 730	81, 478	51. 0	62. 3	27. 7
Western valley of Tennessee river.	2, 910	68, 609	58, 965	9, 674	24, 033	9, 620	0. 40	570	190	380	2, 285	4, 570	2. 9	8. 3	3. 3
Highland Rim.....	8, 200	225, 828	185, 945	39, 883	9, 700	3, 843	0. 41	582	194	388	913	1, 820	1. 2	1. 2	0. 5
Central Basin.....	6, 190	387, 151	262, 461	134, 690	120, 720	48, 778	0. 40	576	192	384	11, 585	23, 170	14. 7	10. 5	7. 9
Cumberland table-lands †.....	2, 970	29, 181	27, 966	1, 215	133	55	0. 41	588	196	392	13	26	.....	.....	.....
East Tennessee.....	12, 530	413, 214	363, 854	49, 360	1, 421	537	0. 35	552	184	368	127	264	0. 2	0. 1	.....

\* Including summit region of water-shed.

† Cotton produced mostly on rim lands or valley lands of the table-lands proper.

a We do not regard the penumbral regions of cotton culture in Tennessee and Kentucky. What we find there only proves that under unusually favorable circumstances, or in special cases, cotton may be cultivated out of its proper domain, within which only fair and constant mean results are attainable.

# MAP OF KENTUCKY & TENNESSEE

SHOWING  
IN THE DIFFERENT SECTIONS OF THE STATE  
THE RELATION BETWEEN THE  
AREA CULTIVATED IN COTTON  
AND THE TOTAL AREA

BY  
JAMES M. SAFFORD, PH.D.M.D.  
SPECIAL AGENT  
1883.

- LEGEND.
- Percentage of total area planted in Cotton in 1880.
- I 0 to 1
  - II 1 to 5
  - III 5 to 10
  - IV 10 to 15
  - V 15 to 20
  - VI 20 per cent and above

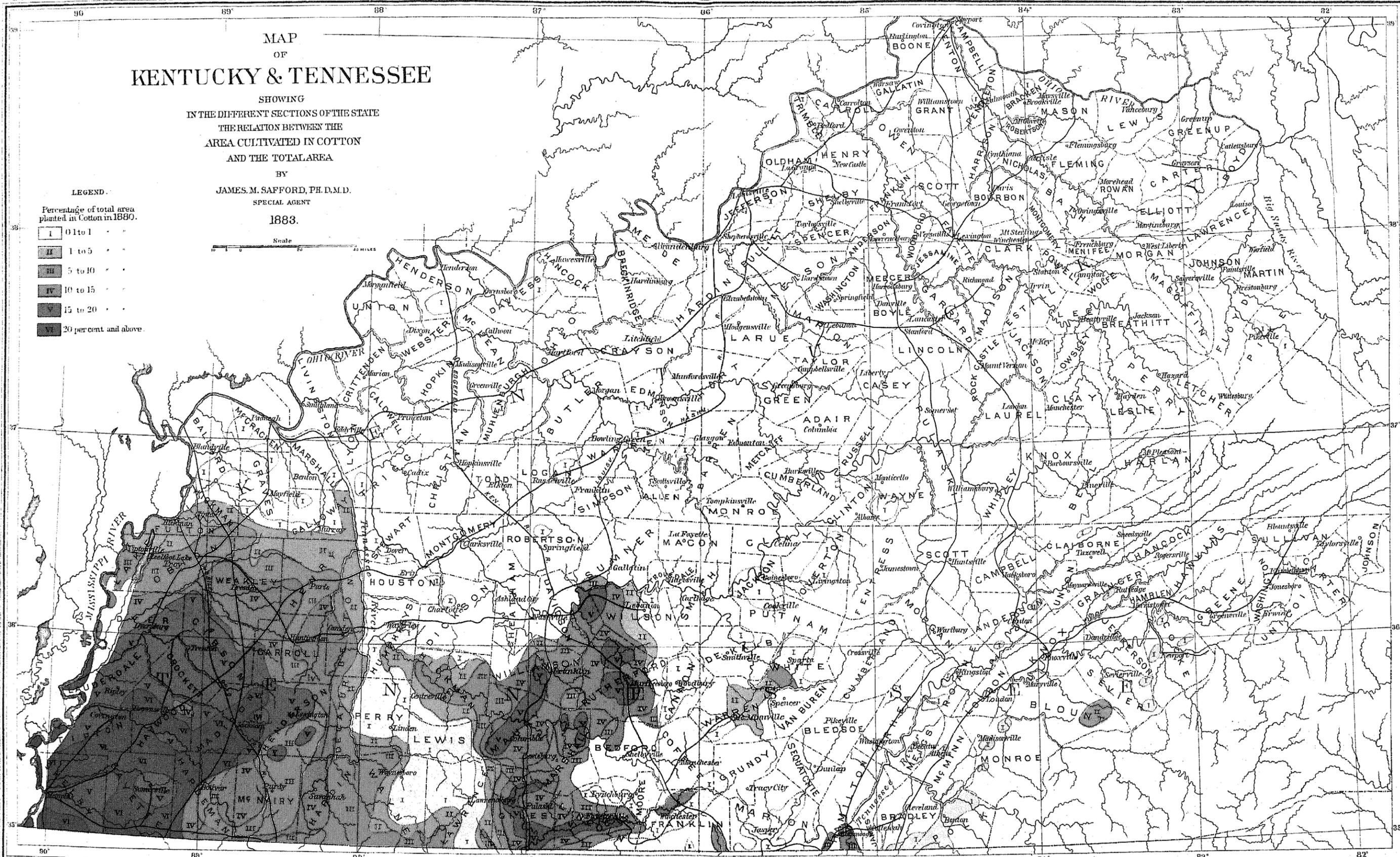


TABLE IV.—BANNER COUNTIES, AS REGARDS TOTAL PRODUCTION AND PRODUCT PER ACRE, IN EACH AGRICULTURAL REGION.

Regions according to product per acre.	Average product per acre.	COUNTY HAVING HIGHEST TOTAL PRODUCTION.					COUNTY HAVING HIGHEST PRODUCT PER ACRE.					
		Name.	Rank in product per acre in state.	Acres.	Bales.	Product per acre.	Name.	Rank in production in state.	Acres.	Bales.	Product per acre.	Rank in product per acre in state.*
Lake county (Mississippi river alluvium) .....	<i>Bale.</i> 0.74	Lake .....	1	3,240	2,412	0.74	Lake .....	23	3,240	2,412	0.74	1
Mississippi river alluvial and bluff region .....	0.53	Shelby .....	8	92,020	46,388	0.50	Dyer .....	16	14,037	8,564	0.59	2
Brown-loam table-lands † .....	0.44	Fayette .....	13	92,231	39,221	0.43	Obion .....	21	7,250	4,225	0.58	3
Cumberland table-lands † .....	0.41	Van Buren .....		88	29	0.33	Crockett .....	14	17,807	9,320	0.52	0
Western valley of Tennessee river .....	0.40	Hardin .....	23	12,859	5,845	0.42	Gibson .....	5	30,820	19,272	0.52	7
Highland Rim .....	0.40	Hickman .....	22	3,128	1,302	0.42	Scott .....	60	3	2	0.67	.....
Central Basin .....	0.40	Giles .....	12	31,416	13,802	0.44	Humphreys .....	40	155	90	0.58	.....
East Tennessee .....	0.38	Hamilton .....	33	486	143	0.29	Montgomery .....	60	2	2	1.00	.....
							Trousdale .....	75	1	1	1.00	.....
							Hawkins .....	74	2	2	1.00	.....

\* Omitting those whose production is less than 100 bales.  
 † Including summit region of water-shed.  
 ‡ Cotton produced mostly on rim lands or valley lands of the table-lands proper.

County in the state having highest total production, Shelby, 46,388 bales. County in the state having highest product per acre, Lake, 1,059 pounds of seed-cotton. County in the state having highest cotton acreage per square mile, Fayette, 144 acres. County in the state having highest percentage of tilled land in cotton, Shelby, 47.3 per cent.

In the tables the aggregate number of bales produced in each natural division is approximately given. Many counties have portions in two contiguous divisions, which circumstance has caused more or less embarrassment in the attempt to classify the counties with reference to the divisions. For this reason the aggregates are approximations only. The defect, however, has been rectified to a considerable extent in the descriptions of the divisions given in the report. The map of relative acreage also will serve as a check in this direction.

The *Mississippi bottom region*, the smallest of our natural divisions, has the distinction of containing lands which produce the most cotton to the acre. This, however, is only an inference based on general information, as, throwing out Lake county, which is wholly within the bottom, the data were not at hand necessary for the separation of the products of the bottoms from those of the uplands. Lake county reports less than 10 per cent. of its tilled land in cotton, which is much below the average of the river lands south of this county. The yield per acre in Lake was 0.74 of a bale of 475 pounds, the greatest yield recorded for any county.

The great *plateau-slope region of West Tennessee* stands pre-eminent within the state in cotton culture, its great expanse of level or gently undulating brown loams, together with the warmer climate, giving it this position. Its first subdivision (*a*) on the west, the bluff region, had in 1879 a fraction less than 33 per cent. of its tilled lands in cotton. The yield per acre was 0.53 of a 475-pound bale, the highest rate attained, excepting that for the single county of Lake. The latter result is doubtless attributable in part to the character of the plateau areas of fine siliceous and limy loess soils of the subdivision. The Mississippi lands within these counties may help to exalt the rate, but they are too limited, comparatively, to affect it materially. The second subdivision (*b*), the brown-loam table-lands, the largest subdivision of the plateau slope, had also a fraction less than 33 per cent. of its tilled lands in cotton, but its rate of yield per acre was less, being 0.45 of a 475-pound bale. If on the acreage map the color area of highest percentage of total area, a section lying in the southern parts of the two subdivisions (*a* and *b*), alone be taken, the percentage of tilled land in cotton was 41.5, the greatest proportion in this particular that has been reached, and the rate per acre 0.47 of the standard bale of 475 pounds. In the third subdivision, the summit region of the water-shed (*c*), there is a material falling off in the proportion of tilled land in cotton, it being 19.4 per cent. The yield per acre was 0.42 of the standard bale.

In the *western valley of the Tennessee river* the percentage of cotton production, as seen on the acreage map, is much reduced, especially in the northern part of the state. On the eastern side of the Tennessee, north of Duck river, it is, excepting a spot in Stewart county, practically nothing. Within the cotton-producing portion of this valley the percentage of tilled land in cotton was not quite 7 per cent. The yield per acre was 0.40 of a bale.

Next follows the *western subdivision of the great Highland Rim*. This high "barreny" belt of country, with areas of lowest production alternating, could they be shown, with areas of non-production, lies between the two chief regions of cotton culture, and almost makes a break in the continuity of the cotton-belt as a whole. What cotton is put to its credit was mostly raised in the deep valleys intersecting the belt.

The *Central Basin* as a cotton-producing area rates pretty well in the number of bales and in the percentage of the total acreage with that part of West Tennessee, nearly half, which embraces, with Benton, the two northern tiers of counties. Including as a part of the basin area the valley of Duck river, in Hickman, the West Tennessee fraction had the better of it by about 1,000 bales. In the basin, as a whole, the proportion of tilled lands in cotton was 6.4 per cent.; in a number of the northern counties, however, little or no cotton was planted, tobacco taking its place. If the non-cotton counties and parts of counties could be thrown out the proportion of tilled land in cotton would be much greater. For Giles county, as the case stands, it is 18 per cent.; for Rutherford, 16; for Maury, 10; for Williamson, 7. The yield per acre for the cotton area proper of the basin is 0.40 of a 475-pound bale. Giles goes above this, the yield being 0.44 of a bale. Rutherford and Williamson fall to 0.38 of a bale. It is not clear, from a study of the column of "bales per acre" in Table I, that there is any relation between the figures there given for the counties of the basin and the capacities of the soils concerned, though in the case of Giles the rate would appear to be significant.

East of the basin the two mountainous divisions, the *Cumberland table-land* and the *Unaka Mountain region*, are non-producing as to cotton. The remainder of this part of the state, the *eastern subdivision of the Highland Rim* and the *valley of East Tennessee*, is in the penumbral region of cotton-growing. It would appear that the culture of cotton in the valley of East Tennessee had been advancing to some extent northward for a few years previous to 1880.

RELATIONS OF COTTON PRODUCTION TO THE RACES.—As to the relations of whites and negroes to cotton culture and production, Table I authorizes the broad statement that where the greatest aggregate of cotton is produced there is, other things being equal, the greatest negro population; and, further, that as the one decreases in the several belts the other does also, though not necessarily at the same rate. Take, for example, the group of six counties in West Tennessee (Shelby, Fayette, Hardeman, Tipton, Haywood, and Madison), producing the most cotton and embracing on the acreage map the color area of the greatest acreage in cotton (15 per cent. and above), and we find that they contain nearly one-third (30 per cent.) of the entire negro population of the state, although their aggregate area is a little less than one-twelfth (about 8 per cent.) of the area of the state. And it makes little difference in this estimate if Shelby, with Memphis, be thrown out of the calculation. In this same group of counties the negro population is 57 per cent. of the total population. Similar calculations as to the production and population of the other color areas on the acreage map, especially in West Tennessee, will bear out, in general, both statements made. In the Central Basin the relations cannot be made so apparent, chiefly because the color areas are small and broken and the data are not at hand for making out the negro population of each separately. A real aberration, however, in the force of the statement is caused by the fact that some of the very rich counties, either in whole or in part, especially in the northern portion of the basin, find profitable employment for negro labor other than in the raising of cotton. Another circumstance to be considered, both as to West and to Middle Tennessee, is the presence of large and prosperous towns or cities in which negroes congregate, and which cannot always be eliminated in the calculations. We add that the negro population of the cotton region as a whole is approximately 68 per cent. of the entire negro population of the state, while its area is only about 48 per cent. of that of the state.

It must also be stated that while the greatest number of negroes are found in areas of greatest aggregate production, yet it does not follow that in such areas the most cotton is produced per acre. In the six counties referred to, in the southwestern corner of the state, we have, area for area, the most cotton produced and the highest percentage of negro population, with an average yield per acre of 0.46½ of a 475-pound bale, while in another group of counties in the northwestern corner of the state (Lake, Obion, Dyer, Lauderdale, Gibson, and Crockett), where the relative production and percentages of negro population are much less, we have an average yield per acre of 0.58½ of the standard bale—a wide difference. This is in the case before us due much, but not altogether, to the differences in the qualities of the soils concerned. How far the kind of labor as to race enters as a factor in such results is a question for consideration.

METHODS OF COTTON CULTURE.—A few general notes are appended as to the agricultural methods employed in the cultivation of cotton within the state.

Fallowing is practiced in all the divisions, but only to a limited extent, and rarely in the alluvial region of the Mississippi. Land lying fallow within the area of the plateau slope of West Tennessee and of the western valley of the Tennessee river is sometimes tilled, sometimes only turned out. Weeds are often turned under and the land sown in field-pease, or in grain in place of pease, or sometimes in clover or grass. In the Central Basin the land is in a majority of cases only turned out; sometimes sown in clover, grass, or wheat. The results in both cases are generally reported as good.

Rotation of crops is generally practiced, but with little system. Cotton, corn and wheat, or corn, cotton and wheat, are made to follow each other in courses of three to four and five years. In the place of wheat, oats or clover, or sometimes pease, sweet potatoes, or even in certain counties peanuts, are substituted. On strong land the courses are sometimes reduced to two years, cotton and corn alternating, wheat or oats occasionally taking the place of the latter. It is the rule perhaps to change yearly, but there are many exceptions to this, the same crop, as cotton or corn, being raised on the same land for a series of years, covering sometimes a period of five or even ten or more years. The general testimony is, as we might have anticipated, that rotation relieves the land and is of material benefit.

Fall plowing is done to a greater or less extent in all parts of the cotton region, more generally in the Mississippi bottom and the bluff region and in the Central Basin, and less so within the limits of the brown-loam table-lands of West Tennessee. It is often done for wheat alone, and the results are very generally reported as good. Subsoil plowing amounts to but little in any of the divisions. When done, a bull-tongue is generally run in the furrow after a turning-plow.

Outside of a scanty supply of stable manure the fertilizers used amount to but little. Land plaster to a small extent and less guano are applied in the midland counties of West Tennessee. Some plaster is likewise used in the Central Basin, together with a limited amount of manufactured fertilizers. Cotton-seed, especially away from cottonseed-oil mills, is thus in part disposed of. In addition, compost material, straw, cornstalks, ashes, etc., are utilized by provident cultivators. The lands are further often improved by the plowing under of clover, pease, and weeds. The cotton lands of Tennessee are in the main still quite productive as compared with many sections in other states, and there does not exist the same necessity for the use of fertilizers; nevertheless there are areas with us which would be greatly benefited by a judicious application of artificial or other fertilizers, and which, in truth, need them if good crops are to be expected.

Cotton-seed, in addition to its use as manure, is largely employed as a food for cattle, especially in regions remote from cottonseed-oil mills. When transportation to the mills is easy, much of it goes in that direction.

The most troublesome weed in all the cotton region is crab-grass. This is characterized as "most fatal", "great trouble," "pest," "worst enemy," etc. Cocklebur ranks second and careless-weed or smart-weed third as "pests" in all parts except the Central Basin, where careless-weed is second and cocklebur third. Other more prominent weeds are foxtail grass, rag-weed, purslane, and hog-weed.

The farms or plantations in the cotton region, as a whole, vary from 5 to 2,000 acres, rarely 3,000. The largest are in the alluvial region of the Mississippi, the midland counties of West Tennessee, and the Central Basin. It is impossible to make out the average size of farms from the answers in the schedules with even an approximation to correctness, either for the whole area or any of its leading subdivisions.

Mixed farming is general throughout the entire region.

Supplies are everywhere chiefly raised at home. In West Tennessee some are imported from Saint Louis, Memphis, Cincinnati, Louisville, and Nashville, the point from which they are imported depending upon the facility of transportation. The tendency of raising supplies at home is evidently increasing.

Taking the whole cotton region into consideration, the chief laborers are negroes, and landlords often express a decided preference for them. There are no Chinese, and but few foreigners of any kind. In some parts of the region the proportion of white as compared with negro laborers is considerable. In the extreme northwestern counties the proportion is large, more than half, and in the summit region of the water-shed it is about half; but in the western valley of the Tennessee river and in the western subdivision of the highlands the whites predominate.

The wages paid will average throughout the area about \$10 per month, including board. In the extreme western part the rates appear to be higher, averaging \$12. In most cases the wages are due at the end of the year, though money and provisions may be advanced at any time. Many are hired by the month, and even by the day. Farms are often worked on shares. In such cases the landlords furnish for the most part all implements and the means necessary for the support of hands and for carrying on the farm work. In general, the system gives satisfaction, though occasionally objections are recorded against it.

The proportion of negroes owning houses or land is small, approximately 5 per cent for the whole region. In the bluff and midland counties of West Tennessee and in the Central Basin the proportion is, according to reports, from 4 to 5 per cent. In the section lying between these, where the negro population is comparatively small (the Tennessee Ridge region, the western valley of the Tennessee, and the highlands), the proportion is greater, ranging from 8 to 13 per cent. The reports vary much as to the condition of the negroes, the general inference to be drawn being that the frugal and industrious—and there are not a few of this class—are prosperous, improving, and in general doing well, but that the improvident and indolent, of whom there are too many, are poor and uncomfortable, and likely to remain so. There is a general disposition to treat them fairly and kindly, though in rare cases doubtless they are imposed upon by selfish and designing men.

A remark further is added as to the increase in the total cotton product of 1879 over that of 1869, as shown by the census reports. Taking the whole state, and allowing for manifest errors in the report of 1870, and making the proper reductions, the total product of 1869 becomes 147,824 bales of 475 pounds each, and the total for 1879 is 330,621 bales, an increase of 124 per cent. over the product of 1869. The main increase was in West Tennessee. In the Central Basin it amounted to 47 per cent. In East Tennessee it was greater than elsewhere, though here but comparatively little cotton is raised.

Table of analyses of Tennessee soils and subsoils.

Number.	Name.	Locality.	County.	Vegetation.	Depth in inches.	Insoluble residue.	Soluble silica.	Total insoluble resi- due and silica.	Potash.	Soda.	lime.	Magnesia.	Brown oxide of man- ganese.	Ferric oxide.	Alumina.	Phosphoric acid.	Sulphuric acid.	Carbonic acid.	Volatle matter.	Total.	Hygrosopic moisture.	Temperature of ab- sorption Co.	Analyst.
1	Red clay soil.	Florence station	Rutherford	Species of hickory, red, white, and post- oaks, elm, ash, honey-locust, black wal- nut, wild cherry, sugar-tree, poplar, hackberry, red-bud, dogwood, and pu- paw. Originally covered with cane.	7 to 15	580	3,658	83,208	0.150	0.065	3.053	0.029	0.195	3.430	4.988	0.242	0.089	4.982	100.402	8.64	23.9	Durrett.	
2	Red clay subsoil.	do	do		7 to 15	66,092	11,697	77,789	0.508	0.088	0.110	0.204	0.272	0.897	10.209	0.305	0.079	8.728	100.238	8.84	17.2	McCauley.	
3	Red clay soil.	do	do		7 to 15	850	5,266	86,116	0.140	0.034	0.310	0.024	0.175	3.708	4.173	0.207	0.102	4.784	99.973	7.23	23.9	Durrett.	
4	Red clay subsoil.	do	do		7 to 15	81,670	6,080	87,750	0.211	0.033	0.161	0.301	0.187	0.613	6.220	0.056	0.008	1.966	100.476	5.59	17.2	Cory.	
7	Red clay soil.	J. W. Barton's (3 miles north of Murfrees- borough).	do	About as above.	8 to 15	350	7,310	82,600	0.255	0.258	0.340	0.286	0.038	5.184	5.567	0.079	0.079	4.962	99.718	7.29	22.2	Do.	
8	Red clay subsoil.	do	do	Oaks, elms, hickories, ash, hinden, sugar- maple, hornbeam, walnut, cherry, dog- wood, and red-bud. Originally in cane.	8 to 20	76,470	6,010	82,480	0.251	0.050	0.142	0.074	0.149	4.773	7.774	0.056	0.072	4.230	100.051	7.99	22.2	Do.	
9	Red clay soil.	W. G. Harding's (Belle Meade).	Davidson		8 to 20	540	8,840	65,380	0.468	0.108	0.540	0.569	0.187	7.286	12.419	0.563	0.136	6.318	99.994	10.55	26.6	Do.	
10	Red clay subsoil.	do	do	Poplar abundant; sweet gum also fre- quent; walnut, oaks, ash, elm, hack- berry, honey-locust, and dogwood. Originally covered with cane.	8 to 20	470,950	11,010	58,960	0.752	0.174	0.382	0.615	0.091	0.864	17.303	0.355	0.188	3.561	99.995	11.01	26.6	Do.	
6	Red clay subsoil.	do	do		8 to 20	84,832	10,440	65,472	0.245	0.054	0.015	0.075	0.152	0.761	16.272	0.175	0.110	4.208	100.145	9.70	17.8	Do.	
11	Poplar soil.	Vanleer Polk's.	Maury.	About the same as 11 and 12.	11 to 23	270	5,472	84,742	0.310	0.059	0.515	0.342	0.040	0.683	5.204	0.349	0.192	4.540	100.084	8.62	29.0	Do.	
12	Poplar subsoil.	do	do		11 to 23	340	8,531	81,871	0.327	0.080	0.547	0.388	0.088	5.285	7.120	0.342	0.107	3.372	99.497	11.43	29.0	Do.	
13	Poplar soil.	Hermitage.	Davidson	Poplar, sweet gum and hickories; oaks, red-bud, and dogwood. originally.	10 to 22	860	6,900	85,760	0.238	0.047	0.378	0.308	0.093	2.027	6.066	0.257	0.085	4.498	100.415	10.02	28.2	Do.	
14	Poplar subsoil.	do	do		10 to 22	1,001	8,930	84,030	0.584	0.114	0.468	0.444	0.054	3.693	6.079	0.318	0.056	2.483	99.223	10.00	28.2	Do.	
15	Upland soil.	Gill's station.	Shelby.	About the same as 11 and 12.	6 to 18	646	4,460	83,112	0.332	0.085	0.248	0.077	0.030	2.416	2.333	0.083	0.080	4.159	99.555	5.00	16.0	Colby.	
16	Upland subsoil.	do	do		6 to 18	1,228	3,853	86,981	0.399	0.181	0.243	0.438	0.042	3.664	5.026	0.064	0.010	2.620	99.668	6.31	17.0	Do.	
17	Loess soil.	Memphis Bluff.	do		73	113	3,390	76,503	0.433	0.180	0.967	0.094	4.687	3.102	0.319	0.060	5.561	1.730	99.927	4.67	16.0	Do.	

NOTE.—With the exception of Nos. 8, 4, 7, and 8, the soils and subsoils analyzed were each an average sample obtained by thoroughly mixing samples taken in the same lot from three excavations or holes dug for the purpose. Nos. 3 and 4 were obtained from a single hole, and are not averages. Nos. 7 and 8 are each an average of four samples from as many holes. In every case the lands supplying the samples have never been cultivated or entirely cleared. All are pasture grounds, with more or less of the native growth remaining.