CHAPTER III.

THE NATURAL DIVISIONS OF THE STATE.—*Continued.*

THE HIGHLANDS, OR HIGHLAND RIM, OF MIDDLE TENNESSEE.—THE CENTRAL BASIN.—THE WESTERN TENNESSEE RIVER VALLEY.—THE WEST TENNESSEE SLOPE, OR PLAIN.—THE MISSISSIPPI BOTTOMS.

206. These, the remaining natural divisions of the State, are like the others, well defined. They differ from those described, in wanting that *marked* parallelism, and northeasterly and southwesterly direction of parts so characteristic of the latter. They show, nevertheless, in their general outlines, traces of these features. The divisions of the last chapter are mostly within the Appalachian Region proper ; (§§ 40, 18 ;) hence the prominence of the features referred to. The divisions about to be considered, I have regarded as without this region, although in some of them, its peculiar geological structure, to some limited extent, exists, and has influenced, more or less, their formation, and the direction of their outlines. (§ 20, and note.)

207. In reference to general geological character, the divisions to be described may be divided into two groups.

The *first three,* constituting the *first group,* have (excepting the western border of the third) a rocky basis, their formations below the soil being always hard rocks, which are either limestones, silicious beds, or slates. These, too, with the exception of certain western parts included within the counties of Perry, Hardin, Decatur, Benton and Henry, belong to *the political division* of the State known as *Middle Tennessee.** The others

*The counties referred to are regarded *politically* as parts of West Tennessee. Perry, however, as well as the eastern part of Hardin, belong naturally to Middle Tennessee.

The middle part of Hardin, and the eastern parts of Decatur, Benton and Henry, (but little of the latter, however,) are included within the limits of the third natural division, and of course, belong to the first, or *rocky group* mentioned.

constituting the *second group,* have a basis made up of beds of sand and laminated clays. They form, too, the greater part of *the political division, West Tennessee.*

IV. THE HIGHLANDS, OR HIGHLAND RIM, OF MIDDLE TENNESSEE.

208. *General Configuration, Limits and Area.*—The general surface of all Middle Tennessee, excluding the Cumberland Table-land, may be compared to an oval basin, or to a shallow plate, with a broad, flat rim. Murfreesboro' is near its center. In traveling from this point, in any direction, we pass from twenty to fifty miles, as the case may be, over rolling, blue limestone land; and, finally, ascending a more or less abrupt flinty "ridge," from three to five hundred feet high, find ourselves on an elevated plain. Such is the case, for instance, in going from Murfreesboro' to any of the following towns: Springfield, Lafayette, Smithville, Manchester, Tullahoma, Lawrenceburg, or Charlotte. In every instance, we pass over and leave the same limestone land, ascend the same flinty ridge, and reach the same flat plain. These elevated flat lands constitute the *Highlands,* or *Highland Rim,* to be considered; while the blue limestone area, below and within, is called the *Central Basin.* (§ 25, (4.).

209. Could the reader be elevated 2000 or 3000 feet above Nashville, or rather above Murfreesboro', he would see, below and around him, the latter area—the Basin—oval in form, lying within the limits of Tennessee, yet reaching a little obliquely nearly across the State. He would see, too, further off, the Highland Rim, rising up first in bold walls—terrace-like—all around the Basin, and then extending oft; in every direction, in great plains.

Far to the east and southeast, would be seen the western escarpment of the Cumberland Table-land, presenting the appearance, at this distance, of a long, straight, uniform bank or ridge, resting upon the Highlands, but in every other direction the eye would roam over the plains, with nothing to limit the view.

210. Commencing along the base of the Cumberland Table-land, the Highlands spread out westward, run around the northern and southern extremities of the Basin in narrow arms, and then wholly encompassing the latter, extend to the vicinity of the Tennessee River, where they break off, finally, in

long fingers, or ridges. The entire distance is not far from 120 miles. The whole region, from the western base of the Table-land to the breaks of the highlands, near the Tennessee, is, in fact, one great plain, out of the center of which by unknown agencies, the basin referred to has been excavated. This plain has an *average* elevation, as will be seen, (§ 220,) of from 900 to 1000 feet above the sea. Its northwestern part, however, is considerably below this.

211. Looking beyond the State, the Highlands have a much greater extent than that indicated above. They extend northward into Kentucky, forming the high plains of the southern part of that State, and southward, into Alabama. In the latter State, at the Muscle Shoals, the Tennessee River may be regarded as passing from off the Highlands.

212. The Highland Rim is the largest natural division of Tennessee. Its area is approximately 9,300 square miles, which is nearly two-ninths of the State. It includes the following counties and parts of counties: Robertson, Montgomery, Dickson, Hickman. Lewis, Lawrence, Wayne; the greater parts of Overton, Putnam, White, DeKalb, Warren, Coffee, Franklin, Perry, Humphreys, Stewart, Macon; considerable parts of Jackson, Cannon, Lincoln, Giles, Hardin, Williamson, Cheatham, Sumner; and small parts of Smith, Van Buren, Grundy, Bedford, Maury and Davidson.

213. *Continuity, Rivers, and Water-falls.*—The continuity of the Rim may be regarded as nearly complete, there being no wide or important valley to break it. The Cumberland, Duck, and Elk rivers, in their escape from the Basin, break through its western and southern sides, but they do so in narrow valleys, bounded on both sides by high hills. The Cumberland in entering the Basin, cuts the Rim in the same manner. The lower part of the Caney Fork has a deep and ragged valley—a narrow arm of the Basin—which runs up many miles into the Highlands, making next to the Cumberland, the most serious interruption, or gash upon the eastern side. (See Map.)

214. Many of the smaller streams, which flow from off the Rim, form beautiful water-falls from forty to one hundred feet high, as they pass down into the gorges, or valleys, which open into the Basin. This is more especially true of those streams—tributaries of the Cumberland, of Caney Fork, and of Duck and Elk Rivers—which flow from off the eastern side.

CUL CAR MAC
THE FALLS OF FALL CREEK NEAR SMITHVILLE TENN.

The accompanying plate presents one of these falls, and will serve to show their general features, as they are all very much alike.

215. The one presented is that of Fall Creek, a tributary of Caney Fork. This romantic water-fall is about two miles east of Smithville, in DeKalb County. In addition to the main fall, a cascade, from a greater height, is seen to the right, belonging to a much smaller and different stream. The waters of both streams meet at the bottom, in the same pool. The larger body of water falls ninety-three feet. The gorge below the falls is exceedingly wild and picturesque. Steep slopes rising from the narrow valley are surmounted by precipitous cliffs from one to two hundred feet in height, towering, in all, three hundred feet or more above the creek.*

Several other tributaries of Caney Fork, for instance, Falling Water, and also its branch, Taylor's Creek, furnish water-falls as interesting as that just mentioned.

216. *Subdivisions, the Barrens and Fertile Portions ; "Sinkholes ;" Summer Retreats.*—In reference mainly to agricultural features, this division may be divided into the "*barrens"* and the more *fertile portions.* Immediately around the Basin at many points, extensive tracts occur which are known by the significant name of "the barrens." In these, the soil is generally thin and greatly deficient in calcareous matter. They are, in great part, level and thinly wooded. At some points “shrub-oaks" occupy whole square miles. In these regions the valleys only, and the hill-sides along the streams are, at present, cultivated.

217. Further back, however, and beyond the barrens, limestone begins to be seen. The country is more rolling, and the soil becomes red and fertile. This red land is characteristic, and furnishes numerous fine agricultural regions. A wide belt of it runs along the western base of the Cumberland Tableland, within which are the towns of Livingston, Sparta, McMinnville and Winchester. It Occurs too, around the base of the Short Mountains. (§ 191.) In the counties which lie between the Basin and the Valley of the Tennessee River to the west, there is much of the same red land, especially in the

*This water-fall, and the region immediately around it, bears the name of *Cul-car-mac*—a name given to it several years ago, and suggestive of the names of the joint owners of the property at the time—the Hon. Wm. Cullom, Judge Ab. Caruthers, and Col. Wm. McClain.

The geological section presented at this place, will be given in the Second Part of the Report.

counties of Robertson, Montgomery, Dickson, Hickman, and Lawrence.

In approaching the western limits of this division, the red arable land gives place, more or less, to " barrens."

218. A traveler, in passing over the Highland Rim, and especially the fertile portions just spoken of, cannot fail to notice the great number of hopper-shaped cavities, or *"sinkholes,"* with which the surface is indented. These constitute a characteristic feature of the limestone portions of this division. Sinkholes occur in all the limestone regions of Tennessee, but in none, excepting perhaps the limestone slopes of the Cumberland Table-land, so frequently, and of such large size, as in the regions under consideration.

These cavities are, across the top, from ten to one hundred (and even more) yards in diameter. Large fields are sometimes seen made up entirely of the slopes of a number of them. Their presence indicates the existence of underground streams and caverns; and it is, by the sinking or running of surface-water into these streams and caverns through fissures in the rocks, together with the caving in, and greater wear of the upper edges of the fissures, that the sinkholes have been formed. When the openings at their bottoms become stopped up with stiff mud, or otherwise, little lakes or ponds are formed. In Tennessee and Kentucky, they have been converted into artificial ponds by feeding hogs in them, the cobs from ears of corn, the offal and clay packed down by the tramping of the animals in time, closing up the fissures.

In some cases, these cavities slope down to a basin of cool water, connected directly with an underground stream, and in which sometimes small fish may be caught.

219. This division, especially the inner portion—that around the Basin—is noted for its sulphur and free-stone waters. The small streams of the barrens are generally beautifully clear. The springs tbat feed them furnish water nearly as pure as that from the clouds.

The "sulphur springs" are numerous, and are generally found around the slopes, or in the valleys.

The springs, the cool air, and retirement of the Highlands, although, in the main, less inviting than the corresponding features of the Table-land, (§ 197,) are, nevertheless, highly grateful, in July or August, to the invalid or visitor. A score of cool, and desirable summer retreats may be found, at different points, around and just outside the Basin, to which the inhabitants of the latter can escape from the hot sun and the cares of the city, or of the corn and cotton fields. (§ 223.)

220. *Elevation above the Sea.*—The general elevation of this division has been already spoken of, (§ 210.) It is nearly that of the horizontal plain, to which, in general, the surface of the State has been referred. (§ 3.) The following tables present more particular information.

As most of the railroad lines, from which the heights of characteristic points have been obtained, extend continuously from this division into the Basin, (the division next to be described,) or conversely from out the latter, upon the high plains of this, it has been thought best, in order not to break the lines, or profiles, to include also in these tables, the heights of points in the Basin. By this arrangement, in addition, the difference in the general elevation of the two divisions will be better exhibited. The names and the heights of points upon the Highlands, or Rim, are printed in Roman characters, and those within the basin, in *Italics.* This will serve to distinguish those of the respective divisions. The heights are in feet, and above low tide of Mobile Bay. (See note, p. 87.)

(1.) The points, the heights of which are given in the following series, are all upon the Highland Rim. They occur along the connected lines of the *McMinnville and Manchester* and the *Southwestern Railroads.** The first point, Tullahoma, is the junction of the McM. & M. R. R. with the Nashville and Chattanooga Road.

Tullahoma	1070	(Grade)	McM. & M. R.R.	
Point 2, 5 miles from T.,	1039	(Surface)	"	"
" 4 " "	1067	do.	"	"
" 6 " "	992	do.	"	"
" 9 " "	1085	do.	"	"
Average of four miles, between points 7 and 11 miles from T.	1072	do.	"	"
Creek at Manchester, 12 miles.	996	do.	"	"
Point 13 miles from T.,	1090	do.	"	"
" 15, 25 " "	1135	do.	"	"
" 20 " "	1124	do.	"	"
Average between last two points	1114	do.	"	"
Point 21, 5 miles from T.	1042	do.	"	"
" 24, 6 " "	1107	do.	"	"
" 28 " "	1037	do.	"	"
" 30 " "	1000	do.	"	"

*I am not quite certain that the profile of the McM. & M. line, used in determining the heights of the first part of this series, is, at all points, the same as that of the constructed road. It is possible that some changes in location may have been made. At the most, however, the changes have been small. It is the same at all important points, and, moreover, the profile used, is in itself complete.

The Southwestern Railroad is, as yet, in an unfinished condition. The Special data made use of in determining the heights along this line were obtained from a report made in 1858, by Mr. E. F. Falconnet, at that time Chief Engineer of the road.

Point 31 miles from T.,	957	do.	McM. & M.	R. R.
Bottom of Hickory Creek	886	do.	"	"
Summit	972	do.	"	"
Barren Fork of Collins' River,	870	(Bottom)	"	"
McMinnville, Depot	912	(Grade)	"	"
" Depot	981	do.	S. W.	R. R.
Bed of Collins' River	831		"	"
Mud Creek Station	916		"	"
Summit between Collins' River and Caney Fork	1006		"	"
Bed of Caney Fork*	751		"	"
Rock Island Station	906		"	"
Summit near Gumspring Mt.	990		"	"
Sparta Station	945		"	"
Huddleston's, or Cookeville Sta.	1116		"	"
Summit near Algood's	1150		"	"
Marchbank's Summit	1162		"	"
Summit between Spring Creek and Sulphur Lick	1139		"	"
Livingston Station	966		"	"

(2.) The following are points along an experimental line from Decherd, on the N. & C. R. R., to McMinnville. It connects with the McM. &. M. Road just before the latter crosses Hickory Creek. The distances are reckoned from Decherd:

Decherd, on N. & C. R. R	965
Summit, 4 miles	1053
Point, 7 miles	1023
Bottom of Elk River, 8 miles	950
Summit, 12 miles	1056
Bottom of Bradley's Cr., 12.5 miles	996
Point half-mile east of Hillsboro', 15 miles	1091
Point, 18 miles	1155
Point, 21 miles	1165
General elevation between last two points	1142
Head Spring of Hickory Cr., 21.3 miles	1113

*The Falls of Caney Fork are but a short distance below the point at which the railroad crosses the river. The water at these Falls descends impetuously in a series of rapids and cascades, falling altogether 94 feet, and furnishing great water power. The top of the Falls, at low water, is 391½ feet (389½ plus 2) 'above low water of the Cumberland at Nashville, or 756 feet above the sea. The following are elevations, above the sea, of several points in this vicinity. I am indebted to Mr. Wm. Bosson for information as to the heights of the first three above Nashville:

Foot of Falls	662 feet
Top of Falls	756 "
Surface in front of Judge Bosson's house	876 "
Average of general surface back from gorge of river, about	900 "
Top of Hickory-nut Mt., (§ 192,) about	1400 "

Point, 24 miles	1077
Bottom of Hickory Cr., 28.5 miles	972
Point, 30.6 miles	1027
Bottom of Hickory Cr., on McM. & M. R. R., 34.5 miles	886

(3.) The table following presents a long series running from the *Tunnel* on the N. & C. R. R., (page 62,) through Nashville to the *Kentucky State line*, on the Edgefield & Kentucky Railroad. It extends entirely across two opposite sides of the Highland Rim, as well as through the included Basin. Points within the latter are printed in *Italics.** The distances are reckoned from Nashville.

TUNNEL	89	miles	1153 (Grade)	N. & C. R. R.
Cowan	87	"	973 "	" "
Summit	84.5	"	1036 (Surface)	" "
Wagner's Cr	82.2	"	944 "	" "
Decherd	82	"	965 (Grade)	" "
Elk River	78	"	865 (Surface)	" "
Point	72	"	1087 "	" "
Point	70	"	1097 "	" "
Tullahoma	69	"	1070 (Grade)	" "
Point	67	"	1079 (Surface)	" "
Average between points at 72 and 67 miles (" barrens,") about			1070 "	" "
Norman's Cr	62.2	*miles*	814 "	" "

*I take this opportunity of acknowledging my indebtedness, for profiles and maps pertaining to the different railroads in Middle Tennessee, and, in several cases, for personal assistance, to the kindness of Messrs. A. Anderson, Chief Engineer of Tenn. & Ala., Edg. & Ky., and Cen. Southern Railroads; J. H. Devereux, City Engineer of Nashville, and Resident Engineer of Tenn. & Ala. R. R.; G. Trafton, Assistant City Engineer of Nashville, and Assistant Engineer Tenn. and Ky. State line boundary; E. F. Falconnet, Chief Engineer of Nashville & N. W. R R.; J. C. Wrenshall, of the L. & N. R. R.; W. F. Foster, Assistant Engineer in charge Cumb. R. Railroad Bridge; and R. C. Morris, Chief Engineer of Nash. & Chat. R. R., formerly of the East Tenn. & Ga, R. R.

To Mr. Devereux, I am under especial obligations. The heights above low tide, at Mobile, of the *base-lines* of all the railroads meeting at Nashville, and of the Cumberland River Railroad Bridge, were made out, for the most part, by him.

These base-lines were connected by means of the surveys of the Tennessee & Alabama Railroad, with the levels of the Mobile and Ohio road. As a check upon the results, it may be stated that the height of the Tunnel-grade, at Montgomery's Gap, on the N. & C. R R, was found to be 1153 feet above low tide at Mobile, while, according to the levels brought from an opposite direction (from the Atlantic) it is 1156, a difference of only three feet. (See p. 62.)

The following table presents the heights of the base-lines mentioned above low tide at Mobile:

Base of Tenn. & Ala. Railroad	256.5	feet
" " Cumb. River R. R. Bridge	256.5	"
" " Edg. & Ky. Railroad	313.5	"
" " L. & N. "	351.25	"
" " N. & N. W. "	362.0	"
" " N. & C. "	366.5	"
" " Cen. Southern "	418.0	"

Normandy	62 miles	834	(*Grade*)	N. & C. R. R.	
Duck River	59.5 "	777	(*Surface*)	"	"
Summit	56.5 "	864	"	"	"
Garrison Fork	56 "	778	"	"	"
Wartrace Creek	52.5 "	800	"	"	"
Bell Buckle Summit	47 "	916	"	"	"
Christmas Cr	41 "	695	"	"	"
Stone's River	35 "	598	"	"	"
Summit	33.5 "	643	"	"	"
Murfreesboro' Depot	32 "	583	(*Grade*)	"	"
Stone's River	30.5 "	538	(*Surface*)	"	"
Top of banks of do	30.5 "	579	"	"	"
Overall's Cr	25.5 "	513	"	"	"
Summit	23 "	597	"	"	"
Stewart's Cr	21.5 "	494	"	"	"
A summit	17 "	599	"	"	"
Hurricane Cr	15 "	539	"	"	"
Summit	13 "	640	"	"	"
Mill Creek	5 "	440	"	"	"
Summit between Mill Cr. and Brown's Cr	2 "	541	"	"	"
NASHVILLE—					
" *Depot*		435	(*Grade*)	"	"
" *Depot*		438	"	L. & N. R. R.	
" *Low water of Cumb. R.**		365			
" *High water of Cumb. R.**		422			
Edgefield Depot	0.5 *miles*	428	(*Grade*)	L. & N. R. R.	
Summit	4 "	562	"	"	"
Dry Creek	9.5 "	406	(*Bottom*)	"	"
Junction	9.5 "	438	(*Grade*)	E. & Ky. R. R.	
Summit	11.3 *miles*	517	(*Grade*)	"	"
Goodlettsville	12.5 "	457	"	"	"
Mansker's Cr	13.5 "	441	(*Surface*)	"	"
" "	14.6 "	468	"	"	"
Foot of "Ridge"	17 "	563	"	"	"
Summit of "Ridge"	18.5 "	895	"	"	"
" " "	18.6 "	877	(Grade)	"	"
Point	22 "	822	"	"	"
Point	25.3 "	748	"	"	"
Springfield	29 "	659	"	"	"
Sulphur Fork	30.5 "	570	"	"	"
" "	30.5 "	512	(Surface)	"	"
Point	32 "	672	(Grade)	"	"

*According to low water of 1854 and high water of 1847, these heights were determined to be 364.5 and 421.5, respectively. For the sake of avoiding decimals, they are made as above.

Point	36	*miles*	681	(Grade)	E. & Ky. R. R.
Red River	41.5	"	484	"	" "
" "	41.5	"	399	(Bottom)	" "
Point	45.5	"	592	(Grade)	" "
TENN. & KY. LINE	46.7	"	554	"	" "

(4.) The following are the heights (according to a profile kindly furnished me by Mr. J. C. Wrenshall) of characteristic points along the line of the Louisville & Nashville Railroad, from its junction with the Edgefield & Kentucky road, to the State line:

Junction	9.5	*miles*	438	(*Grade*)	*L. & N. R. R.*
Mansker's Cr	11.5	"	389	(*Bottom*)	" "
Summit	13	"	528	(*Surface*)	" "
Drake's Cr	15.5	"	449	"	" "
Summit	18	"	593	"	" "
W. Station Camp Cr	20.5	"	445	"	" "
Station Camp Cr	23.5	"	441	"	" "
Gallatin	26	"	528	"	" "
Summit	27	"	573	"	" "
E. Station Camp Cr.	27,7	"	503	"	" "
Point, about foot of "Ridge,"	30.7	"	694	"	" "
Margin of Highlands	31.7	"	951	"	" "
Summit of grade at end of Tunnel	32.3	"	833	(About)	" "
Valley, Drakes's Cr	33.4	"	800	(Surface)	" "
W. Fork " "	36.5	"	708	"	" "
Summit	39	"	853	"	" "
State Line	45	"	755	"	" "

An experimental line from Gallatin, by the way of Bledsoe Creek towards Scottsville, in Kentucky, etc., presents a profile much like that of the surface passed over by the constructed road. By this route, the margin of the Highlands is reached about seventeen and a half miles from Gallatin, and has here an elevation of 1000 feet above the sea.

(5.) The following table presents the heights of characteristic points along the line of the Tennessee and Alabama Railroad from Nashville to Mount Pleasant, and, from the latter point, along a surveyed line across the Highlands to Hamburg, on the Tennessee River. By these lines the railroads of Middle Tennessee have been connected with the levels of the Mobile and Ohio road. As before, points within the Basin are printed in Italics. Those marked with an asterisk, thus (*), are within the *Western Valley of the Tennessee River*. (§25.) The distances given are the approximate distances of the points from Broad street in Nashville.

NASHVILLE, *old Terminus, Cherry St*.....			469	(*Grade*)	.....	*Tenn. & Ala. R.R.*	
Brown's Creek.....	2.5	miles.....	475	"	.....	"	"
Overton's Gap.....	6	"	621	"	.....	"	"
Atkinson's Gap	9	"	737	"	.....	"	"
Little Harpeth River...	11.5	"	649	(*Bottom*)	....	"	"
" " " ...		"	668	(*Grade*)	.....	"	"
Summit.....	13.5	"	763	"	.....	"	"
Harpeth River.....	18.3	"	602	(*Bottom*)	.....	"	"
Franklin Depot.....	18.6	"	642	(*Grade*)	.....	"	"
Summit.....	23	"	759	"	.....	"	"
West Harpeth River.....	25	"	682	(*Bottom*)	.....	"	"
Summit, (Duck River Bridge)	29	"	841	(*Grade*)	.....	"	"
*Spring Hill Station** ...	31.5	"	770	"	.....	"	"
Carter's Creek.....	35	"	621	(*Bottom*)	.....	R. R. Survey.	
Duck River.....	42.5	"	528	"	.....	"	"
" *High Water*.....	"	"	571	.....	.....	"	"
Summit	46	"	709	(*Surface*)	.....	"	"
Lick Creek.....	47.5	"	626	"	.....	"	"
Summit.....	49.5	"	707	"	.....	"	"
E. Branch of Bigby...	53	"	602	"	.....	"	"
Mt. Pleasant, Sugar Fork of Bigby.....	54	"	625	"	.....	"	"
Bigby Creek.....	58	"	660	"	.....	"	"
Foot of Ridge.....	59.5	"	702	"	.....	"	"
Top of Ridge commencement of Highlands.	65	"	1019	"	.....	"	"
Top of Ridge, Tunnel.	"	"	968	(Grade)	.....	"	"
Buffalo Creek.	71	"	862	(Surface)	.....	"	"
Point.....	75.5	"	1035	"	.....	"	"
Br. of Little Buffalo..	79	"	862	(Bottom)	.....	"	"
Palo Alto P. O.....	82	"	1025	(Surface)	.....	"	"
Point.....	92.5	"	1021	"	.....	"	"
Average elevation beteen the last two points, about.....			1000	"	.....	"	"
Point.....	96.5	"	1069	"	.....	"	"
"	100.5	"	1087	"	.....	"	"
"	103.5	"	1056	"	.....	"	"
Point, between waters of Indian & Cypress Creeks....	113.5	"	973	"	.....	"	"

*From this point on to Mount Pleasant, the profile from which the heights were taken, is not, in the main, the actual profile of the road as finally located. It runs, however, very nearly over the same ground, so that the heights of corresponding points on the two will not differ essentially.

Point, between waters of Indian, Horse and Second Creeks	117.5 miles		902	(Surface)		R. R. Survey.	
(*) Valley of Horse Cr. (off the Highlands	124.5	"	599	"		"	"
(*) Bed of do.	137	"	425	"		"	"
(*) Lick Cr. Summit.	139.5	"	616	"		"	"
" " Tunnel.	"	"	541	(Grade)		"	"
(*) Tennessee River at Hamburgh	145	"					
" High Water			392			M. & O. R. R. Sur.	
" Low Water			352			"	"

(6.) The following are heights of points along the Central Southern Railroad. Two of these points, the first at Dodson's Gap, the other the summit of Madry's Hill, may be regarded as being upon the spurs of the Highlands. All the others are within the Basin. The distances are reckoned from Columbia.

					C. S. R. R.
Columbia Depot		657	(*Grade*)		" "
Point	1.6 miles	696	(*Surface*)		" "
Lytle's Creek	2.5 "	624	"		" "
Point	3.5 "	710	"		" "
"	6 "	624	"		" "
"	8.5 "	766	"		" "
Pleasant Grove	9.8 "	739	(*Grade*)		" "
Adam's Fork	12.7 "	693	(*Surface*)		" "
Elk Ridge, Dodson's Gap	15.8 "	937	"		" "
" "	" "	898	(*Grade*)		" "
Robertson's Fork	18.5 "	716	(*Surface*)		" "
Richland Creek	26.5 "	691	(*Grade*)		" "
Pulaski	33.5 "	648	"		" "
Richland Creek	39.5 "	630	"		" "
" "	" "	93	(*Surface*)		" "
Madry Hill	42.5 "	924	(Top)		" "
" " *Tunnel*	" "	736	(*Grade*)		" "
Elk River	46.5 "	598	"		" "
" "	" "	553	(*Surface*)		" "
Tenn. & Ala. Line	47.8 "	654.5	"		" "

(7.) Below we have a series along the portion of the Nashville and Northwestern Railroad that extends from Nashville to the Tennessee River. It presents a complete section of the Western side of the Highland Rim. The road, however, it must be remembered, following the valley of Harpeth

River, passes some distance in among the ridges and detached portions of the Highlands before it ascends and gets upon them. The place of ascent is then within the general limits of the division. The valley of the Harpeth may be regarded as a ramification of the Basin. The course and position of this river are such as to detach a small block of the Highlands from the main body of the division. (See Map.) In the table, as before, the points in Italics are within the Basin, and those marked with an asterisk, thus (*), within the Western Tennessee River Valley.

Nashville, Bridge, Summer Street		429.5	(*Grade.*)
Summit	3.2 *miles*	558	"
Richland Creek	5 "	449	"
Point	7.7 "	507	"
Summit	10.2 "	681	"
"	10.2 "	709	(*Surface.*)
Harpeth River	14 "	556	(*Grade.*)
" "	15.7 "	548	"
Point	20 "	573	"
Harpeth River	22 "	504	"
Kingston Station	25 "	506	"
Turnbull Creek	25.6 "	459	(*Bottom.*)
Sullivan Br	26.7 "	473	"
Point	27 "	524	(*Grade*)
Top of Highlands	31 "	819	"
" "	31 "	841	(Surface.)
Point	34 8 "	842	(Grade)
"	37 "	754	"
"	39.2 "	862	"
"	39.2 "	885	(Surface.)
"	41.7 "	791	(Grade.)
Highest Point	45 "	915	"
" "	45 "	922	(Surface.)
Gordon's Branch	48 "	736	"
" "	48 "	795	(Grade.)
Point	50.5 "	839	"
"	50.5 "	854	(Surface.)
Hurricane Creek	54 "	626	"
" "	54 "	643	(Grade.)
Summit	57.5 "	837	"
(*) Point	61.7 "	632	"
(*) Trace Creek	64 "	575	(Surface.)
" "	64 "	587	(Grade.)
(*) Point	70 "	482	"
(*) Trace Creek	74.7 "	394	"
" "	74.7 "	374	(Surface.)
(*) Tennessee River	78 "	368	(Grade.)
" "	78 "	357	(High Water.)

(8.) Mr. Lea, from whose Report I have before quoted, (page 73,) gives us interesting information as to the elevation and general character of that portion of the Highland Rim lying between Perryville, on the Tennessee River, and Columbia; and of that part intersected by the deep and narrow valley of Duck River. He refers, also, to the fact that, all Middle Tennessee west of the Cumberland Table-land, may be regarded as an elevated plain, out of which has been excavated the great Central Basin, or, as he has it, the "basins" formed by the different rivers within the central part of the State—the group, or great basin, that these constitute, not being very clearly recognized. The following are remarks of his bearing upon these points. It will be recollected that Mr. Lea is speaking with reference to a route for a "Central Railroad."

"All that country lying between the western base of the Cumberland Mountain and the Tennessee River, may be regarded as a bench of the Mountain itself, and is elevated from seven to eight hundred feet above the Tennessee River. The geological formation of this region, being of the *secondary* order, the strata lie horizontally upon each other; and, at the depth of three to five hundred feet below the common surface, which is poor, gravelly and sandy, lies a stratum of limestone rock.* In various places the strata superior to this limestone are pretermitted, and exhibit the appearance of having been removed by some mechanical action; and thus, in many places, valleys or basins are formed, presenting all the richness incident to the horizontal limestone formations, of which the valley of Duck River is a remarkable instance. If you follow up Duck River from its mouth, for a distance of fifty miles, (measured in its general direction,) you will find it hemmed closely in by high and precipitous hills; but at the end of the fifty miles you emerge from the gorge, and enter upon a wide-spread and fertile valley, interspersed here and there with gently sloping hills, and presenting an appearance of unbounded wealth and beauty. But push your journey a few miles to either hand, across this valley, and you will find it surrounded by a high and rugged barrier, composed chiefly of sandstone; and, on ascending this barrier, you will find yourself upon the general level of the bench of Cumberland Mountain."

In this last statement, if Mr. Lea means that the valley of Duck River after leaving "the gorge"—say east of Columbia and within the counties of Maury, Marshall and Bedford—is limited on both sides by a high "sandstone" barrier, what he says needs some qualification. There is such a barrier on the

* I quote Mr. Lea's own words. Compare what is said of the geology of this region in the Second Part of this Report.

south side of the valley, separating it from the main and tributary valleys of Elk River. This is *Elk Ridge,* and will be noticed when I come to speak of the Basin. On the north side, however, there is no such barrier. The crest of the watershed separating the Duck River Valley from the subordinate valleys of the tributaries of the Cumberland is mostly a limestone ridge, which is much broken, and presents but very few points high enough to be capped with the stratum or formation, which Mr. Lea calls sandstone. Passing eastward, however, across the Basin, we find in Coffee County the valleys of the head-branches of Duck River, running up between spurs of the Highlands. (§ 214.)

After thus speaking of the valley of Duck River Mr. Lea refers to the "similar valleys or basins" of the Elk and Cumberland rivers, and of their tributaries, and then adds:

"It is a singular feature of the country, that these basins are generally at a considerable distance from the main river, and that there is a large body of high table-land along the Tennessee, which is only interrupted by the streams which drain these basins."

"When we cast our eyes on either side of Duck River, we find the minor streams, at every few miles, cutting chasms in the Table-land from three to five hundred feet deep, and thus presenting almost impassable gulfs. Perhaps there is not a more broken country in the world than that around about the lower part of Duck River."

"Having crossed the Tennessee, (at Perryville,) the route is very favorable up the valley of Cypress Creek, for a distance of seven miles, when it begins to run along the sides of the hills in order to ascend more rapidly than the natural rise of the valley. Rising about three miles, at the rate of sixty feet per mile, the road attains an extreme elevation of about 356 feet above high water in Tennessee River," (or about 730 above the sea,) "and passes the Buffalo Ridge at a gap one or two hundred feet below its general level." This makes the general level from 830 to 930 above tide water.

"Having passed the gap in the ridge, the road winds along on a bench of the mountain for about three and a-half miles, descending at the rate of sixty feet per mile." . . . This part of the road will be very expensive, as it leads across many ravines in the side of the ridge, and requires high embankments, or bridges, to cross them. . . . . Still no other route has been found across the ridge at all competing with this in aggregate advantages.

"Passing Buffalo River without difficulty, the road runs on favorable ground up Hurricane Creek, about seven miles further, to the forks of the creek at Tom. Barber's, where the valley begins to rise more rapidly, but still continues smooth and open.

"From Tom. Barber's, the road rises sixty feet per mile, in the first mile, and 120 feet per mile for two miles further, when it attains the summit of the ridge, dividing the waters which fall into the Buffalo River from those which fall into Duck River, directly. This ridge has been appropriately named by Col. S. H. Long, after the lamented Lewis, the renowned traveler, who lies interred on its summit." (This is a flat-topped ridge, and its summit, the elevation of which is at least 1000 feet above the sea, may be regarded as a point of the top of the Highlands.)

"Having attained the summit of Lewis's Ridge, the road has a very favorable location for twenty-four miles along its crest, to the head of Big Bigby Creek, where it commences its descent with a deep cut, and then falls at the rate of sixty feet per mile, for five miles, along a rough and crooked ravine, before it attains the level of the flat grounds on the creek below the Factory.

"This division involves more difficulty than any other upon the whole route, except that over Cumberland Mountain."

221. The tables given in connection with the remarks made, will enable the reader to form a correct idea of the elevation of the entire Rim above tide-water. The height of its flat surface above the Basin, which it encloses, will be spoken of hereafter. The general level of the northwestern side of the Rim, that is to say, the part in the counties of Dickson, Robertson, Montgomery, Stewart, etc., the part, too, through which the Cumberland River breaks, is considerably lower than the part upon the opposite side in Franklin, Coffee, and Warren. Taking the Rim and Basin together, it may be said that the whole area dips (or the great dish is tilted) to the northwest. Passing beyond the limits of Tennessee, in North Alabama, the Highlands dip southward. These dips, or waves, conform generally, as will be seen hereafter, to the geological structure of the region.

222. It may be noticed, also, that the surface of the Rim, or Highlands, on the eastern and southeastern side, slopes gently at many points, eastward, toward the base of the Cumberland Table-land, so that the border of the division near the Basin has the greater elevation. At numerous points around the Basin, the high border or margin of the Rim is a dividing ridge between the low-bedded creeks of the former division, and the high-bedded ones of the latter.

223. *Climate*.—The features of climate already given, for the State in general, apply, in the main, to this large division. Owing to higher elevation, however, its mean temperature is a little less than that of the Basin. For points on the same par-

allel, the difference between the annual means is from one to two degrees; between the summer means, it is, doubtless, considerably greater. Immediately around and outside of the Basin, that is to say, upon the circular interior border of the Highlands, the difference in temperature is quite noticeable, especially in summer. For this reason, in connection with its freestone and sulphur springs, and its retired, open-wooded groves, this border, and in fact much of the division, has become noted for its summer retreats. (§ 219.)

224. We have climatological data from two points of this division, the Falls of Caney Fork and Glenwood. (See table, p. 14.) The latter point, the residence of Prof. W. M. Stewart, where he made (and is making) his excellent observations, is located upon the depressed portion of highland division, the elevation being here but 486 feet above the sea. This fact must be borne in mind should the Glenwood data be used in estimating the temperature, etc., of the higher and characteristic portions of the Highlands.

225. The observations made at the Falls may be compared with Mr. Tavel's at Nashville, since the hours of observation were, in both cases, about the same. According to these the annual mean temperature for 1855 and 1856, at Nashville, is 58°.80, and that, at the Falls, for the same years, (Jan., 1855 excepted,) is 58°.48. The former place has, however, a higher latitude than the latter. Allowing for this, the difference becomes nearly equal to one degree.

226. Between the summer means of the two places, and for the same years, the difference is much greater; it is, without correction for latitude, 3.33, the mean at Nashville being 77.99, while at the Falls it is but 74.66. Referring the points to the same parallel, it may be placed at four degrees.

V.—THE CENTRAL BASIN.

227. This unique division occupies the very centre of the State. It is truly the garden of Tennessee. Excepting great alluvial bottoms, it would be difficult to meet with a region of' the same extent anywhere, possessing naturally the elements of prosperity and agricultural wealth in a greater degree. Although the fourth division in size, yet it is, at this time, the first in population, wealth, and political influence.

228. The description of the Basin, has necessarily been, in good part, anticipated in speaking of the Highland Rim encircling it. And here, it may be well to remark, that the latter division has been named with reference to the relation it sustains to the Basin. Aside from this relation, the name would not be appropriate. (§§ 25, 208 and 209.)

229. *Form, Outlines, and Area.**—The Basin has approximately the form of an ellipse. Its length, or greater diameter, is about 121 miles, and its average breadth, or shorter diameter, from 55 to 60. It lies within the limits of Tennessee, reaching, however, lengthwise, in a north-northeasterly and south-southwesterly direction, nearly across the State. At its extreme end, to the northeast, it has a narrow gateway, or outlet, into Kentucky, through the contracted and ascending valley of the Cumberland River. To the south west, it has a similar outlet into Alabama, down the valley of the Elk. Besides these, the Basin has but two other outlets—a very narrow one to the west, through the gorge of Duck River, (p. 93,) and a more open one to the northwest, down the valley of the Cumberland.†

280. As to traveling and commercial intercourse, these gateways, or outlets, as such, (except, so far as river navigation is concerned, and that is confined to the Cumberland,) are of little service. The valleys that furnish them, are so narrow and broken, that none of the railroads, turnpikes, or other leading roads radiating from the capital of the State—whose site is very suitably within the Basin—pass through them. All these, when they reach the foot of the escarpment bounding the division, ascend at once, by steep grades, to the top of the Highlands or Rim. To get out of the Basin, is the first and most serious difficulty that the railroads running from Nash-

* The form, position, extent, etc., of this division, are well seen upon the large Map. To this the reader should, by no means, neglect to refe~.

†The narrow outlets, or valleys, have already been referred to in connection with the continuity of the Rim. See §§ 213 and 214.

ville meet with.* To attain the margin of the Highlands they have a *direct* elevation of from 250 to 350 feet to overcome.

231. In tracing out the general outlines, or contour, of this division, we may commence with the "Ridge" in Sumner County.† This so-called ridge presents a steep face to the southeast, forming a well-marked portion of the northwestern side of the Basin. The general outline, or high edge of the Basin coinciding with the top of the Ridge, pursues at first, a general northeasterly course, then bending around to the east, it passes through the southern part of Macon County, into Jackson. Here it is cut by the valley of the Cumberland, presenting one of the outlets mentioned. (§ 229.) On the southeastern side of the Cumberland, it extends from Jackson County in a general southwesterly direction, passing approximately between Smith and Putnam ; through the western part of DeKalb; through Cannon, east of Woodbury ; on through the western parts of Coffee and Franklin, to the southern part of Lincoln south of the Elk. From this region, without quite reaching Alabama, the outline runs westward, gradually curving around to the northwest in Giles County, crossing in the meantime, Elk River, the narrow valley of which presents another of its outlets. From Giles, it runs in a northerly direction, through the western parts of Maury and Williamson; through Cheatham, and the western part of Davidson, to the "Ridge" in Sumner. In this last course, the remaining outlets of the Basin are presented in the valleys of the Duck and Cumberland Rivers.

232. The outlines of the Basin, in particular, are, at most points, rough, being broken more or less, by the fringing, or finger-like spurs which run from the Highlands within its general limits. These spurs, which are generally water-sheds between creeks, often retain, for several miles, the characteristic elevation of the Highlands.

*The Central Southern Railroad meets with two high spurs of the Highlands, namely, Elk Ridge (§ 233) and Madry Hill, before finally leaving the Basin. South of Elk River, the line continuing this road, gets upon the Alabama extension of the Highlands.

†The word ridge, as here applied, is in some degree, unfortunate. It must be recollected, that this ridge is the margin of highlands that extend off to the northwest, and constitute a portion of the Rim already described, It is true, that this margin is the dividing line between the waters of the Cumberland and those of Red River; but while the slope to the southeast is steep and sudden, that to the northwest is very gentle, and, in fact, out of the immediate beds of the streams, not noticeable to the traveler.

233. The most remarkable spur, is that known as *"Elk Ridge."* This is, in fact, an almost unbroken, though narrow arm, running entirely across from one side of the Rim to the other, and cutting off, as a well-marked subdivision, the southern end of the Basin. In the main, it has about the elevation of the Highlands, and presents, in its course, but very few low gaps. It is the water-shed between Duck and Elk Rivers. Several branches run out from its southern side, separating the valleys of creeks in Giles and Lincoln Counties.

234. From another point of view, we may look upon the outlines of this division as being notched by the valleys opening into it. These valleys are narrow ramifications, or arms of the Basin. Most of the smaller streams from the Highlands, falling into the Basin, present, for a greater or less number of miles, before reaching the general outlines of the latter, deep and narrow valleys, or gorges. Passing up these gorges, we find them generally terminated abruptly by water-falls, or cascades. Here, too, they terminate as ramifications of the Basin. Above the water-falls, the valleys and streams pertain to the Highlands, or Rim. (§ 214.)

235. The outlets before spoken of, (§ 229,) are ramifications of the Basin but they extend entirely through the Rim. Next to these, the narrow valley of Caney Fork presents the longest and most important arm of the Basin, (§ 213,) ending, as such, with the noted falls of this stream. (Note, p.86.)

Duck River presents, in the portion of its valley in Coffee County, a ramification comparatively short, which, at the "Old Stone Fort," near Manchester, bifurcates, each fork terminating very soon, with a beautiful water-fall.

The valley of Elk River, in Franklin County, and below Winchester, presents a narrow arm, of considerable length.

The lower part of the valley of Harpeth River, in Cheatham and Dickson Counties, is a ramification, which, with the valley of the Cumberland, entirely detaches a block of the Rim. These are the most important examples. (See Map.)

236. The following counties, wholly, or in part, lie within the Basin: all of Wilson, Rutherford, and Marshall; nearly all of Smith, Davidson, and Bedford; the greater parts of Sumner, Williamson, Maury, Giles, and Lincoln; large parts of Jackson, Cheatham, and Cannon; and, finally, small parts of Macon, DeKalb, Putnam, and Coffee.

The entire area of the division, is about 5450 square miles, which is more than one-eighth of the State.

237. *Subdivisions; Surface; "Cedar Glades."*—The Basin is comparatively simple in structure and parts. There is but one portion that may be regarded as a well-defined subdivision, and that is the southern end, cut off by Elk Ridge, to which reference has already been made. (§ 233.)

This subdivision embraces that portion of the valley of the Elk and its tributaries, lying in Giles and Lincoln Counties. The most important of the tributaries, is Richland Creek.

238. The remainder of the Basin might be divided into four sections, corresponding, respectively, to the valleys of Duck River, Harpeth, and its Forks, Stone's River, and the Cumberland. The ridges, however, that divide these, are, by no means, well defined, being at many points, low and broken, and hardly existing as continuous ridges.

239. Occasionally, aside from the ridges and spurs that have been mentioned, and within the body of the Basin, isolated peaks, and short ridges, or groups of these, are met with, which mount up to the level of the Rim.

In the main, however, the general surface of the Basin, is moderately rolling. Large and valuable tracts occur, which are nearly level, or but gently undulating. Excepting the "cedar glades," to be spoken of, there is very little waste land. The soil, based on impure, blue limestone, is generally of an excellent quality, and, in its native state, supported heavy forests, and, in many places, thick canebrakes.

240. The *cedar glades* constitute a characteristic surface-feature of the Basin. These are rocky places, generally flat, covered more or less, with red cedar, *(Juniperus Virginiana.)* They abound in many parts of the division.

241. A circular range of such glades is found in Rutherford County, enclosing a large area of fine, brownish-red lands. Murfreesboro' lies a short distance east of the center of this area.

In Wilson County, and along Duck River, in Bedford, Marshall, and Maury Counties, are many glades, covering large tracts.

The cedar timber of the glades is, or has been, of excellent quality. A vast amount of it has been cut for building purposes, cross-ties, fence rails, fire-wood, etc. Much of it has been carried out of the State. (§ 262.)

242. It has been suggested, that the Basin was once the bed of a lake. Without committing ourselves to such an opinion, it may, nevertheless, be well, as we pass, to regard the division from this point of view, as thereby our conception of it as a *basin* may be made clearer.

If the outlets mentioned, through which the Cumberland, Duck, and Elk Rivers escape, (§ 229,) were closed, by the filling up of the valleys, to the level of the highest points of the adjacent highlands, the back-waters of these rivers would accumulate, and finally, nearly fill the Basin, rising until high enough to run over the lowest part of the Rim.

There would thus be formed a large fresh-water lake, having the outlines, (§ 231,) form, and dimensions (§ 229) of this division.

243. The shores on opposite sides of this lake, would not differ very much in height—not more, generally, than from 100 to 200 feet. On the northwestern side, they would be lowest, being, however, nearly, or quite, 900 feet above the sea. Here the waters would first run over.

The margin of the lake, all around, to a greater or less extent, would be fringed by low headlands, and notched by narrow inlets, (§§ 232 and 234.) In its southern part, a group of narrow, and long islands would be seen. One line of these, arranged end to end, (Elk Ridge, § 233,) would extend from shore to shore, and partially cut off the extreme southern end of the lake. Islands, too, would be seen at different points, all around its margin. One of considerable size, or, perhaps a group, would appear in Cheatham County, corresponding to the Harpeth hills, between Harpeth and the Cumberland. (§ 235.) And here and there, within the body of the lake, sparsely scattered over its surface, small isolated islands, or groups of islands, would be met with. (§ 239.)

The water of the lake, would be deep in its northwestern part, especially over the bed of the Cumberland, and shallow in its eastern and southeastern parts. This would result from the tilting of the Basin and its Rim to the northwest, of which I have spoken. (§ 221.) At a point over Nashville, measured down to the track on the Railroad Bridge, the depth would be about 460 feet.

244. Judge Haywood, the author of a work already cited,* imperfectly recognized, the basin-like character of the part of Tennessee we are considering. He makes very properly, the "highlands, or ridges," west of Columbia, Franklin, and Nashville, and north of the Cumberland, in Sumner and Macon, the western and northwestern limits of the basin-like area. On

* See note, page 21. The full title of this work is "The Natural and Aboriginal History of Tennessee, up to the First Settlements therein, by the White People, in the year 1768. By John Haywood, of the County of Davidson, in the State of Tennessee. Nashville: 1823."

This work is certainly one of the curiosities of the early science and literature of Tennessee. The author has left us, among many curious speculations and statements, much useful matter. He was among the first to notice many of the interesting minerals and some of the "geological phenomena" of the State. I shall have frequent occasion to refer to his work.

the other hand, however, he appears to regard the "Cumberland Mountains," as the eastern and southeastern side. The area, thus included, with a portion of Northern Alabama, is also, according to his view, divided into two subordinate basins by Duck River Ridge, to which ridge, he gives undue importance.

245. Our author, it will be seen, is wrong, in placing the greatly more elevated Cumberland Table-land, ("Mountains") in opposition to the western highlands mentioned. The latter have their opposite and corresponding equivalents in the highlands running through DeKalb, Cannon, Coffee, etc., the Basin proper, lying between. (§§ 208 and 231.)

The basin-like area has, therefore, by no means, the extent he would give it; and the subordinate basins, as he points them out, do not exist. The western escarpment of the Cumberland Table-land, excepting a few outliers, of which the Short Mountains (§ 191) are the most conspicuous, has nothing equally elevated, to face it, until we get far beyond the Mississippi River.

246. The following extracts will serve to indicate the views advanced by Judge Haywood:

"On the eastern side of the rich lands of West [Middle] Tennessee, are the Cumberland Mountains, running northeast and southwest. On the western side of them are other parallel highlands, or ridges, at the distance of about one hundred and ten miles from the Cumberland Mountains. The traveler crosses the western ridge at Paradice's, going from Nashville to Clarksville; and at Robertson's, ten or twelve miles south of the former, in going from Nashville to Charlotte.

"In a northwardly direction, the ridge traverses the counties of Robertson, Sumner and Smith; and, approaching the Cumberland River, crosses the Kentucky line, ... and probably afterwards joins some spur of the Cumberland Mountains.

" Towards the south, it extends to the Duck River Ridge, which lies in the southern part of Dickson County; and also in the southern part of Williamson, and in the southern part of Rutherford, and through a part of Warren; and terminates west of Collin's River, near to a spur on the east side, which connects with the main mountain nearly west from Pikeville. . . . . .

"The country between the highlands and transverse ridges, of which there are others more to the south, ... as far as the Muscle Shoals, are the rich lands of West [Middle] Tennessee; the surface of which is everywhere covered with great numbers of limestone rocks. . . . . .

That billows once rolled over this large plain, is too evident to admit of denial.* . . . . .

"The western ridge, before described, it is probable, was opposed, for some time after the recession of the waters below, to the passage of the Cumberland River and its tributaries, which were probably elongated after the waters withdrew. This opposition probably continued till the waters of *the lake,* made by the supplies of the Cumberland, rose high enough to find the lowest part of the ridge, and proceeded through that passage, continually widening, and sinking deeper, as the waters rushed over it, and carried off the constituent particles of the ridge, from the bottom and sides of the opening. The level of the water in the lake lowered in proportion, till coming to the falls, as we now see them, near the mouth of Big Harpeth and Sycamore Creek, the whole lake was finally carried off . . . .

"Similar remarks to those above made, apply to *the great lake,* once formed between the Duck River Ridge, on the one side, and the Cumberland Mountain on the other; extending as far as the Muscle Shoals, and connected by a transverse ridge, which served to dam up the waters, till a passage was made by the workings of the Tennessee, and the whole lake was carried off."

247. *Elevation above the sea; Depth.*—For reasons that have been stated, (§ 220,) the elevations of characteristic points within the Basin, have already been given.†

The margin of the Rim around the Basin—that is to say, the high edge of the Basin—has, with the exception of a small part to the northwest, a general elevation of more than 1000 feet; and the average of the part excepted, is but little less than 900. (§§ 221 and 222.)

248. From the margin, the steep slopes fall at once from 250 to 350 feet. (§ 230.) At some points, however, especially in Cannon and DeKalb Counties, the descent is greater. At Snow's Hill, the point where the Lebanon and Sparta Turnpike leaves the Basin and ascends to the top of the Rim, or Highlands, the fall is very nearly 500 feet. The average depth of the bottom of the Basin below its margin, is, perhaps, between 300 and 400 feet. The greatest depression is along the bed of the Cumberland. (§ 243.)

* These" billows" were those of *the deluge,* as our author would have it. It was his opinion, that the whole continent was flooded, at the time of the Noachian deluge, by a rush of waters from the South, and that afterwards these waters receded. "They carried with them to the northern regions, the equatorial and tropical plants, animals, weeds and trees, depositing them as far as the fiftieth degree of north latitude, where their remains are now every day found."

†See the tables on pages 87 to 92 inclusive. The *Italics* distinguish the points within the Basin.

249. *Climate*.—The climatological data, obtained at Nashville and Lebanon, that have been given in the first chapter, and the remarks founded thereon, apply, especially, to this division, as these places are within its limits. To these data and remarks the reader is referred.

I will add, however, that the summer of the Central Basin—the mean temperature of which may be placed at 76°.5, or 77°, (p. 15,) for the middle part, but ranging from about 75°.5 to 77°.5, in passing from the northern to the southern portions—is the same as that of Northern Georgia, and middle part of South Carolina.

The other seasons, however, are colder, than in the regions mentioned. A good portion of the Basin, as we shall see hereafter, is included in the cotton region.

VI.-THE WESTERN VALLEY OF THE TENNESSEE RIVER, OR THE WESTERN VALLEY.

250. *General Character*. —The Tennessee River, in its reflex course northward, from Alabama to Kentucky, flows through a comparatively narrow valley, remarkable for its broken and varied surface.

This area has, at many points, both in its main part and in its minor tributary valleys, tracts of excellent, alluvial, and valuable limestone land. Numerous landings, or shipping-points, are found within it along the river, which command, to a great extent, the trade, not only of the valley, but of several adjacent counties. Among many articles of export that might be mentioned, a special ono is pig-iron, the product of numerous furnaces, some of which are within its limits.

251. The valley has, therefore, considerable agricultural and commercial importance. Nevertheless, in general, its bottoms are mostly narrow, and its surface rocky, abounding in "glades," and gravelly knobs and ridges. It has a much more limited agricultural value than we would look for in the valley of so large and beautiful a stream as the Tennessee.

In some of its geological features, as we will see hereafter, it is both unique and interesting.

252. *Geographical Relations and Limits; Area*.—This di-

vision separates the flat Highlands, or the western side of the Rim of Middle Tennessee from the elevated plain, or slope, of West Tennessee, next to be described. (Page 11.) The highlands, on both sides of the valley, are fringed by numerous spurs, many of which, run within two or three miles of the river, and some of them quite to it.

253. Between these spurs, the main valley sends out numerous ramifications—the narrow valleys of the tributaries of the Tennessee—many of which run back from ten to fifteen miles, and a few twenty, or twenty-five, before they terminate. Near their heads, many of them, those especially on the eastern side, branch off in closely hemmed gorges, which often terminate in cascades. In this, as well as in other respects, they are like the ramifications of the Central Basin. (§ 234.) The cascades, however, are, in general, by no means as prominent and interesting as those of the division referred to.

254. The creek-valleys of Hardin and Wayne Counties—for example, those of Indian and Hardin's Creeks—are among the longest ramifications. These valleys are serpentine and narrow, averaging, perhaps, not more than a mile in width, but at many points, very fertile. The land within them is generally occupied, and in a good state of cultivation. The spurs separating them are high, flat-topped arms of the Highlands. Such, in fact, are most of the spurs running into the Western Valley, especially on its eastern side.

255. Buffalo River presents, in Wayne and Perry Counties, a valley much like those just mentioned. This, with the lower part of the valley of Duck River, may be regarded as a ramification of this division, or perhaps, better alone, as a deep cut within the limits of the Highland Rim. It is separated from the Tennessee River by a long, well-defined arm of the Highlands. (See Map.)

256. The valley of the Big Sandy is a ramification of some importance. It will be convenient to refer the part northeast of Carroll County only to this division.

257. The Western Valley, as understood here, does not include the entire area drained by all the tributaries of the Tennessee, in this part of the State. Its *general* limits are the lines along which the highlands, on both sides, for the most part, break away. As thus limited, it has perhaps, an average width of not more than ten or eleven miles. Its area may be placed approximately, at 1,200 square miles—a small portion of the State.

The following parts of counties are included in the valley proper: the middle part of Hardin, the northeastern corner of Wayne, the western parts of Perry, Humphreys, and Stewart, and, finally, the eastern parts of Decatur, Benton, and Henry.

258. *Elevation above Tide-water; Slope and Depth.*—The high-water level of the Tennessee, may be taken as the bottom of this valley. This, at Hamburg, (page 91,) is 392 feet above the sea, and, at the point where the Nashville and Northwestern Railroad crosses the river, it is 357. (Page 92.)

The difference between these elevations—thirty-five feet—indicates the rate at which the valley slopes. According to this, it is a little more than one-third of a foot (0.38) per mile, by the river. It is to be noted, that the slope is towards the north, and in a direction nearly opposite to that in which the Mississippi River descends.

259. The depth of the valley, below the highlands that bound it on the east, may be taken in general, at about 500 feet. It ranges, however, from 400 to 600. The general depth, regarded from the highlands, on the west, is less. What it is, I am not able, for want of proper data, to state, with confidence. It cannot be, however, very far from 350, or 400 feet. At some points, these highlands are bold and high, and nearly equal in elevation, *apparently*, to those on the western side. (§ 3.)

The elevations of certain points, that properly pertain to this valley and its ramifications, have already been given.* It may be added, that the level of low-water in the Tennessee, is about forty feet below that of high-water. At its highest stages, the river overflows large areas of its bottoms.

260. *"Glades;" Artesian Wells.*—The *glades* of the Western Valley, like the "Cedar Glades" of the Central Basin, (§ 240,) constitute a characteristic feature. These are gravelly, and marly places, mostly naked, but presenting here and there patches of bushes, or shrubby cedars. They are sometimes several acres in extent, and occur usually upon hill-sides, but often entirely cover isolated and low knobs. The counties of Decatur, Perry, Hardin and Wayne, abound in them. They may be found, also, in the other counties of the valley.

261. These glades result from the disintegration of gray, and

* See the tables on pages 91 and 92. The points referred to are indicated thus (*).

sometimes reddish marly limestones, which contain, occasionally, interstratified, thin cherty layers. Their surfaces are made up of the debris from these rocks, and consist of marly matter, mixed with angular, calcareous, and flinty gravel. It is common for those upon hill-sides to present, at intervals, ledges of rock, forming two or three successive, more or less perfect, terraces. Fossil shells, crinoids, corals, and sponges, from the limestones, are found in comparative abundance, mixed with the debris, and have made this region of glades classic ground to paleontologists. Thousands of these fossils, have been collected by our foreign scientific friends, and carried to Europe, to say nothing of the numbers that have found their way into the cabinets of American Geologists, outside of Tennessee. Dr. G. Troost, my venerable predecessor, delighted in roaming over these glades, collecting, and studying its fossil treasures.

262. The glades under consideration, differ from those of the Central Basin in being, for the most part, destitute of trees, and in the marly character of the debris forming them. The glades of the Basin, are remarkable for the fine, large cedar trees, that grow in the crevices of the rocks. Their surfaces, too, are made up of hard, thin-bedded (sometimes thick-bedded) limestones, more or less broken into blocks, or coarse gravel, often mixed with soil, but with no marl.

263. It may be well to notice here, a third class of glades, belonging in common, to this and the succeeding division. These are found in Hardin, McNairy, and Henderson Counties, and are known as the *"bald hills,"* or *"bald places."* They have long attracted attention, mostly on account of the great numbers of oyster-like shells, that are found strewed over their surfaces. Like the marly limestone glades, they are often destitute of vegetation, with the exception of occasional thickets.

264. These glades are not associated with any solid rocks, but result from the weathering of a peculiar formation, called *"green sand,"* and by some *"marl,"* that will be described hereafter. A meagre growth of grass, sometimes covers them. Where not relieved by this, they have a grayish, or ashen aspect.

The shells are always conspicuous, and many of them very large, and heavy, weighing sometimes, three or four pounds.

They all belong to extinct species. At some points, they have been collected by cart-loads, and burned into lime, a good quality of which they furnish.

Haywood, in his History, (§ 244,) did not fail to notice these shells. He says: "The country on the south side of the Tennessee, near where that river crosses the southern boundary line of this State, and for many miles to the northwest and south, is quite uneven, and exhibits the appearance of the ocean when agitated by a storm. To the south, in many places, are to be found immense banks of oyster-shells, some of which are petrified. And in many places, oyster-shells are to be found upon the surface of the earth. These shells are much larger than any live oyster now to be taken."

Upon another page, under the head of *Marine Apearances on the Surface*, he adds: "Between the Tennessee and Mississippi Rivers, is a ridge of oyster-shells, running in a northwardly and southwardly direction, and extending as far northwardly as the head-waters of the Forked Deer River, thirty or forty miles north of the southern boundary of the State of Tennessee. . . . . How much further north the bank extends, at present, is unknown to the writer. The ridge, or bank, is above the head of the rivers which run into the Tennessee, on the one side, and into the Mississippi, on the other."

265. The Artesian wells of this division, are worthy of notice. And, first, two such wells exist west of the Tennessee, but near enough to be overflowed by the back-water of the river, when at its highest stage. One of these is in the northern part of Hardin County, half-a-mile north of White Oak River, and about a mile and-a-half west of the Tennessee. The other is in the northern part of the State, in the bottom of the Big Sandy, and nine or ten miles from its mouth.

266. These wells were originally bored for salt-water. Both run down several hundred feet, but to what exact distance, I am not informed. From both of these borings, large streams of *sulphur-water* now flow out with considerable force. The amount of water discharged from the Big Sandy well, is greater than that from the other. The water of both is used, to some extent, by invalids.

267. It may be well to add, that numerous springs in this valley, in addition to the wells mentioned, furnish sulphur-water. A few have had improvements attached to them, and they have become the sites of pleasant watering-places, or summer retreats. Such are the "Hardin County Springs," two distinct, but neighboring establishments, situated near the Tennessee River, on its western side, and but little north of the Mississippi line. The more northern is known as the "White Sulphur;" the other as the "Red Sulphur."

268. "Bath Springs," in the southern part of Decatur, is another point well known for its sulphur-water. This place is about seven miles north-west of Clifton, on the road leading to Lexington and Jackson.

269. In the second place, we have, in this division, or rather in a region common to this and the succeeding division, many artesian wells, different in character from those mentioned. These are met with in McNairy, Henderson, and Hardin Counties. Wells of the same kind occur, too, south of the Tennessee line, in Mississippi. They have been bored through the formation (“green sand" that forms upon its out-cropping surface, the "bald hills" of which I have spoken, §§ 263, and 264,) for the purpose of obtaining good water, for domestic use. The depth of these wells, in Tennessee, varies from fifty to three hundred and fifty feet. The water rises in them to within a few feet of the top, rarely running over. For this reason, they may be said to be semi-artesian.

270. Ordinary wells, sunk in the green-sand, furnish, at many points, an impure water, too disagreeable to be used. By boring, however, entirely through this formation, water of good quality is obtained. In boring, a large auger, with a blade, or bit, five or six inches in diameter, is driven down through the mass until, finally, perforating a hard, gritty layer at the base of the latter, it reaches suddenly a bed of white, or gray quick-sand. As soon as this is done, the water rises. The perforation thus made, excepting a few feet at the top, needs no protection, the green-sand being compact enough to furnish a permanent wall.

The construction of buckets used in these wells, is peculiar. They are, in fact, mere tubes, made of tin, or wood, adapted to the bore of the well, being often three or four feet in length, and but a few inches in diameter. The closed end, or bottom, is provided with a valve, which opens upward, and admits the water freely as the bucket sinks, but closes, and retains it as the latter rises.

The success attending the boring of these wells, has, at some points in the green-sand regions, nearly, or quite doubled the price of land.

The general method of boring is much like that spoken of and illustrated in "Wailes' Agriculture and Geology of Mississippi,"* page 265.

271. *Climate*.—No climatological observations, so far as the writer knows, have been made within this division. Owing to its less elevation, it is, doubtless, to a small extent, warmer,

*Report on the Agriculture and Geology of Mississippi, embracing a Sketch of the Social and Natural History of the State; by B. L. C. Wailes, Geologist of Mississippi 1854.

especially in summer, than the Central Basin. In the main, however, its features of climate must be much like those of the division just mentioned.

VII.—THE PLATEAU, OR SLOPE, OF WEST TENNESSEE.

272. This division, including all the uplands in West Tennessee, is one of the leading natural divisions of the State. In many of its physical features it is very different from the divisions we have considered. Here very few, or no regular strata of *hard rocks,* that is to say, of limestone, slate and sandstone,* like those we have in Middle Tennessee, are to be found. These disappear within the valley we have just left, and mostly in a great beveled slope facing the west. In their places, we find principally, great beds of sands associated, more or less, with clays and loams. (§ 207.)

273. The latter beds, along their eastern margin, abut against the hard rocks, or rather, like these, present a beveled slope—the counterpart of the one mentioned—that faces the east, and overlaps the former along its lower edge. It is between these slopes that the Western Valley of the Tennessee River, for the most part, lies.

274. The special geological character of this division gives to it a surface and an agricultural aspect very different from what is found elsewhere in the State. In entering it from the east, the traveler finds himself at once in a new country. The soil, at many points, is excellent; at others, thin and unproductive; generally it is mellow and good, susceptible either of the highest state of cultivation, or, in the hands of a careless farmer, on account of its very mellowness, of being soon made waste and worthless.

The entire area is to be regarded as a great plain or plateau, veined with peculiar river valleys, and sloping to the west. It might, in a more general point of view, be regarded as a part of the greater plateau lying in Kentucky, Tennessee, and Northern Mississippi; between the Valley of the Tennessee River on the one hand, and the bottoms of the Mississippi on the other.

* There are a few layers of limestone and sandstone occurring with the sands and clays of this division, but they are of very limited extent, and have only a local interest. In a general view, they are of no consequence. They will be specially noticed hereafter.

275. *Limits; the Eastern "Ridge," and the Mississippi Bluff.*—To speak more in detail, the plateau or slope, under consideration, includes and commences with the fringed edge of the highlands overlooking and limiting on the west, the valley last described. (§ 252.) Thence, more or less furrowed with river valleys, it extends to the west for an average distance of about 84 miles, when it abruptly terminates, falling off in the long and steep escarpment or *line of "bluffs,"* that overlook the great alluvial low plain, or the "*bottoms"* of the Mississippi.

276. The eastern limit is nearly coincident with the ridge dividing the waters of the Tennessee River from those flowing into the Mississippi. This ridge is the line along which the eastern side of the plateau begins to break up into fringing spurs. Running through the counties of Henry, Carroll, Henderson, and the eastern part of McNairy, it lies comparatively close, and parallel to the Tennessee, and thus throws the great body of the uplands in West Tennessee, on the Mississippi side of the water-shed. It is, therefore, nearly the eastern margin of the plateau. The division, however, extends eastward beyond this line, including the broken highlands, until the latter, for the most part, sink away and give place to the Valley of the Tennessee. The name *slope* or *Mississippi slope,* as well as plateau, may be given properly to this division, since the preeminently greater part forms a plain inclined toward the Mississippi.

277. The highlands that constitute the ridge just mentioned, and the eastern margin of the plateau, are, at many points, high and rough. They have already-been spoken of with reference to their height, as compared with that of the general plain to which the surface of the State, as a whole, has been referred. (§ 3.) Their elevation above the Tennessee Valley has been estimated, in general, at from 350 to 400 feet, at some points being apparently considerably higher. (§ 259.)

278. In the middle and northern parts of McNairy County, and through Henderson, the ridges are high and bold, presenting many wild and picturesque regions. In the southern part of McNairy, along the line dividing the waters of the Tennessee from those flowing to the west, the ridges are more broken.

What Judge Haywood thought of this region—it being included in the" country" of which he speaks—may be seen in the quotation made on a previous page. (§ 264.)

279. The western escarpment of the plateau, or the line of "bluffs" in which it terminates, deserves especial notice. This constitutes a striking feature in the topography of the western part of the State. The escarpment, like the plateau, is cut by the river valleys into sections, but the sections run lengthwise nearly in the same line, and for present purposes, may be regarded as continuous. The whole line may be called the *Mississippi Bluff.* From its base the bottoms of the Mississippi extend to the west, while from its summit, the flat uplands extend eastward. Its steep face is greatly in contrast with the bottoms, one of the principal circumstances that give it interest.

280. Coming out of the State of Mississippi, the Bluff runs in a nearly direct course from Memphis through Tennessee, to and beyond Hickman, in Kentucky.

Within the limits of Tennessee, the Mississippi River now washes its base at four different points; one of which, however, in low water, is deserted and left inland. The highlands at these points, being conspicuous objects from the river, and relieving the continued sameness of its low banks, are familiar landmarks to boatmen, and have been called by them the "Chickasaw Bluffs." The first is at Fulton; the second, at Randolph; the third—no longer seen from the navigable channels—at" Old River," in the lower part of Tipton; the fourth, and last, is at Memphis—and hence the appropriate appellation of the "Bluff City."

281. The Bluff rises, at different points, from 50 to 180 feet above the bottoms. The average elevation is perhaps about 130 feet. Some of the highest points command extensive views of the wild, heavily timbered plains below. A view of this kind (the forests not concealing the Mississippi) is most beautiful. The writer has gazed upon this wild flat world, and its rolling, moving sea, with wonder and delight.

282. The view from the Bluff at Randolph, looking down the river, is among the best. It is not as wild as some, much of the bottom within sight being in cultivation. The presentation of the face of the Bluff and

of the river is, however, very fine. The portion of the Bluff at Memphis, as seen from the river, especially when low, is bold and interesting, but not so much so as that at Randolph, where the height of the Bluff is greater.

283. From the southern part of Kentucky, down at least half-way through Tennessee, the Bluff and the western margin of the plateau has been much cracked or fissured, by the well known earthquakes of 1811-12. At many points in Obion and Dyer counties, the Bluff has been greatly shattered. The traveler, in passing along its summit, frequently meets with "earth-cracks," or groups of these often several hundred yards long, and occasionally, traceable for half-a-mile or even a mile. The cracks or fissures, vary in width from two or three to twenty feet. Many of them originally were deep, but are now more or less filled up, and, in some cases, look like artificial canal beds, with a depth varying from three to fifteen feet. This is especially the case where the earth has sunk between two parallel fissures. Sunken belts of this kind, a hundred feet wide, are sometimes seen. The fissures often occur in complicated groups, the individual members of each group extending in the same general direction, and, in any given cross section, from two or three to fifty and more feet apart, but when followed out, separating in branches, and curiously interlocking with each other. The belts of earth between the fissures are often inclined at considerable and various angles to the general surface.

At many points within the region that has been thus disturbed, sand, fine gravel, and fragments of lignite ("coal") were "blown up" through the fissures, and are now found in little ridges or hillocks. The fine white sand of these hillocks is now sought for, at some points, for building purposes.

284. *Area and General Surface; Rivers.*—The area of the entire division is approximately 8850 square miles, considerably more than one-fifth of the State. The counties and parts of counties included within its limits, are as follows: all of Weakley, Gibson, Carroll, Haywood, Madison, Henderson, Fayette and Hardeman; much the greater parts of Henry, McNairy, Shelby, Tipton and Lauderdale; and finally, large parts of Decatur, Benton, Dyer and Obion.

285. The parts of Henry. Benton, Decatur and McNairy, not included, are within the Western Tennessee Valley, (§ 257;) and the parts of Obion, Dyer, Lauderdale, Tipton and Shelby, not in this division, pertain to the Mississippi bottoms.

286. The character of the eastern margin of the plateau has already been spoken of. (§§ 276 and 277.) Passing westward from the ridge, the surface, in general, becomes less broken, and soon presents, between the river valleys, extensive level

and gently rolling areas, the soil of which is, for the most part, mellow and fertile. Thus it continues many miles to the west.

287. Within twenty or twenty-five miles of the Bluff, however, although the division, as a plateau, extends on uniformly much the same, a different geological formation, and, to some extent a different soil, are met with. These are confined to the western side of the Plateau. They form a belt contiguous to the Bluff that runs through the State. The superior formation of this portion of the Plateau, is a great bed of light-yellowish ashen earth, or a fine silicious loam, furnishing a strong and fertile soil. It may not be too much to assert, that Obion and Dyer, the uplands of which belong to this belt, are naturally the richest counties in the State. Here, at any rate, may be seen a growth of great poplars, walnuts, beeches, white-oaks, &c., unsurpassed, I am sure, by anything elsewhere in Tennessee. The heavy timber has, to a considerable extent, retarded the settling of these lands.

288. So far as the soil, (including subsoil,) and surface-formation—that is to say, the formation or stratified bed next below the soil—are concerned, the belt just referred to is a well-marked, and the most important subdivision of the Plateau. Other less extensive subdivisions might have been mentioned. These are presented in the "green-sand" regions of McNairy and Henderson counties, (§§ 263-4,) and in the marly and clayey districts or belts of Hardeman, Madison, Carroll and Henry. All these will be particularly spoken of hereafter.

Excepting the subdivisions above, and the immediate river-valleys, or bottoms, the Plateau every-where presents much the same soil and geological character. The former is seen in the railroad cuts, in the freshly washed banks of streams, and wherever penetrated, to rest upon beds of orange and yellow sands, often brightly colored, and containing occasionally local beds of clay.

289. The entire division, as a plateau, is comparatively simple in its general features. Its form is nearly rhombic. The river-valleys cut it into subordinate sections, but these, as such, are of little importance.

290. The rivers are, in some respects, peculiar. Nearly all of them pursue a northwesterly course,* until they intersect or nearly reach the Bluff—that is to say, the western escarpment

*See page 5, where the direction of the rivers is spoken of in connection with the great Slope, of which the State is a part.

of the Plateau,(§ 289,)—when they turn in the bottoms of the Mississippi, to the southwest. They are long and sluggish, and have wide flat bottoms, filled with heavy timber. The Bald Cypress, *(Taxodium distichum,)* with its curious *knees*, is very common. The immediate valleys are generally from 100 to 200 feet deep, averaging however, nearly 200. The bottoms generally lie upon both sides of the streams. To render roads across them passable at all times, it has been found necessary, generally, to throw up "levees," or embankments, upon which the road may run. These levees are sometimes from one to two miles long.

291. *Elevation above the* Sea. —The tables following, present such special data, bearing upon the elevation of this division, as I have in my possession. The materials are not as complete as desirable. In reference to the eastern and higher portion of the Plateau they are especially deficient.

(1.) The first table presents the heights, in feet, of the stations of the Memphis and Charleston Railroad, above Mobile Bay. It has been taken from the "Seventh Annual Report of the Directors" (1857) of this road. The entire series has been copied, although but a portion is in Tennessee. The stations from Chawalla to Memphis, inclusive, pertain to the division under consideration. At Grand Junction and La Grange, the road is fairly upon the Plateau. The distances are reckoned from Memphis. The elevations of high and low water at Memphis are added:

Stevenson	Ala.	271.0	miles	602.80
Bellefonte	"	259.0	"	639.19
Scott's Mills	"	254.0	"	651.84
Larkin's	"	247.7	"	620.45
Woodville	"	237.3	"	600.68
Paint Rock	"	232.9	"	595.68
Brownsboro'	"	223.3	"	630.76
HUNTSVILLE	"	211.6	"	612.14
Madison	"	202.5	"	573.13
Moore's	"	192.5	"	601.32
Decatur	"	188.0	"	572.89
Trinity	"	182.0	"	633.61
Hillsboro'	"	176.5	"	598.61
Courtland	"	168.5	"	560.21
Jonesboro'	"	163.0	"	560.41
Leighton	"	155.5	"	562.71
Tuscumbia	"	145.0	"	468.25
Barton	"	133.3	"	497.79
Dickson	"	126.6	"	487.71

Iuka	Miss.	114 8	"		554.85
Burns	"	107.3	"		463.10
Glendale	"	99,0	"		494.61
Corinth	"	92.8	"		434.12
Chawalla	Tenn.	83.7	"		408.61
Pocahontas	"	74.4	"		394.31
Middleton	"	69.3	"		407.13
Saulsbury	"	57.6	"		535.51
Grand Junction	"	52.0	"		574.91
La Grange	"	49.0	"		530.74
Moscow	"	39.0	"		351.74
Lafayette	"	30.9	"		315.54
Collierville	"	23.8	"		378.54
Germantown	"	14.5	"		377.89
Buntyn	"	5.5	"		303.54
MEMPHIS	"	0.0	"		245.44
High water of the Mississippi at Memphis					220.44
Low water " " "					170.44?

(2.) The following elevations have been determined by the experimental surveys of the engineers of the Mobile and Ohio Railroad. They are copied from the Report of the "Proceedings of the Second Annual Meeting of Stockholders," 1850. The elevations are in feet above "low tide at Mobile:"

Snake Creek Summit, N. E. of Purdy	542	Grade,	583	Surface	
Huggins' Creek Summit, N. W. "	505.5	"	520.5	"	
Jackson Summit, between South and Middle Forks of Forked Deer River	487.5	"	499.5	"	
Middle Fork of Forked Deer	337	"	332	"	
Cane Creek Summit, between Middle and North Forks of Forked Deer	390.5	"	400.5	"	
North Fork of Forked Deer	304	"	310	"	
Four-mile Summit, between Obion River and North Fork of Forked Deer	375.5	"	402.5	"	
Obion River	287	"	282	"	
State line Summit, Tenn. and Ky	427	"	447	"	
Mississippi River, at mouth of the Ohio, low water					276.5
" " " " high water					320
" " at Columbus low water					269.5
" " " high water					308.5

(3.) The table following includes the elevations above Mobile Bay of a number of points on "The Mississippi Central and Tennessee Railroad." They were made out from data kindly furnished me by Mr. E. Laas, an engineer upon this road.

Wolf River, Mississippi	394
Mississippi and Tennessee Line	465

Grand Junction	574.91
Middleburg	537
Bolivar	430
Hatchee River	332
Medon	420
"Divide," between Forked Deer and Hatchee rivers	520
South Fork of Forked Deer	335
Jackson	459

In addition, it may be mentioned that the Bluff at Memphis, in front of the Gayoso Hotel, for example, has an elevation of about 100 feet above low water of the Mississippi, or 270 feet above Mobile Bay. At Randolph it is about 185 feet above low water of the Mississippi, and 378 above Mobile Bay, estimating low water at the river here at 193 feet above the latter level.

(4.) In 1839, by order of the General Assembly of the State, C. W. Nance, Esq., of Nashville, surveyed "a route for a Canal from the Tennessee to Hatchee River."* The lowest point of the ridge dividing the waters of the two rivers, was determined by this survey. It is in the southern part of McNairy County, between the head waters of Lick and Muddy creeks, the latter a tributary of Cypress. The route selected commences about two miles above Hamburg, on the Tennessee River, passes over the point mentioned, and terminates on the Hatchee, and at its junction with the Tuscumbia. The level of low water in the Hatchee, at the end of the line, proved to be the same as that of low water in the Tennessee at the beginning. The summit, or the low point of the ridge, was found to be 166 feet above this level. At the point of beginning, which is at the head of "Big Bend Shoals," the low water mark is about 354 feet above Mobile Bay, giving the summit an elevation above the same base, of 520 feet.

According to the levels and estimates of Mr. Nance, "the summit of the ridge at Purdy is 60 feet higher," or 580 feet above Mobile Bay.

292. From the data presented, we may assume that the elevation of the plateau, or of its top-surface, is, in the southeastern part of the division, between 500 and 600 feet above the sea, and that, in the central and northern part, from Jackson, northward, along the Mobile and Ohio Railroad, it becomes less, ranging from 400 to 500 feet. It also appears that, in going toward Memphis the elevation is reduced to a level considerably below 400.†

*"Report upon the Survey of the Route for the Tennessee and Hatchee Canal; by C. W. Nance, Civil Engineer. Nashville, 1840."

†It must be recollected that the data furnished by railroad lines are frequently not altogether characteristic of the general elevation of the country through which the roads pass. These lines often run from one valley over a "summit" into another.

293. The Bluff doubtless has a mean elevation of about 400 feet. In the vicinity of Memphis, its height above the sea, as well as above the river, for a well-marked portion, is less than usual. At Randolph it has nearly an average height above the Mississippi; but as we go northward, from this point, its height, with reference to the level of the sea, becomes greater, conforming in general, to the rise of the bed and bottoms of the river.

294. As to the elevation of the highlands along the eastern side of the Plateau in McNairy, Henderson and Carroll, it may be added to what has been said, (§§ 276-8,) that here the division has its highest part. The tops of the most elevated ridges can hardly be less than 700 feet above the sea, and some of them, perhaps, not less than 800. Snake Creek Summit, a point on one of the experimental lines of the Mobile and Ohio Railroad, and referable to this range of highlands, has an elevation of 583 feet. [Page 115, (2).] Having been selected as a suitable point for the passage of a railroad line, it is probably lower than other points in the same vicinity.

295. *Climate*.—The principal climatal features of this division, like those of the East Tennessee Valley and the Central Basin, are presented in the general and comparative view of the climate of the State already given. (§§ 30, 31, etc.) To this, the reader is referred. It may be well to remark, that of all the leading natural divisions, this, doubtless, has the highest yearly and summer temperatures. The differences amount, at the most, to a few degrees only, nevertheless, they are sufficient to lengthen the growing season, and so to modify the climate, as to throw a large part of the division into the cotton producing region.

The heights of the summits, or of the points most elevated, are in a district having a general plateau character, most characteristic of its elevation, and even these are often too low.

VIII.—THE MISSISSIPPI BOTTOMS, OR BOTTOM.

296. We have now reached in our course westward, the last natural division of the State. Entering this, we leave behind all the uplands of Tennessee, and find ourselves upon a low and great alluvial plain, which, at many points, is below highwater level of the Mississippi. The division is well characterized. It embraces all the bottom-lands of the Mississippi within Tennessee. It differs much, in its general features, from any other large section of the State. The bottoms of the Tennessee River in the Western Valley, and of the rivers within the division just described, present features to some extent similar, but they are comparatively on a small scale, and imperfectly foreshadow what is found here.

297. Much of the area to be considered is covered with swamps and lakes; much, too, is wild and dark with heavy forests, oven yet the retreat of deer and other wild animals. Other portions, confined for the most part, to a belt bordering the river, are in a good state of cultivation. The undeveloped agricultural resources of the division, as a whole, are great, and, in proportion to its area, may make it some day, when its lands shall have been reclaimed, the wealthiest part of the State.

298. *General Relations; The Great Valley-Plain of the Mississippi.*—This division is the Tennessee portion of the great alluvial plain lying within the immediate valley of the Mississippi.

This magnificent valley-plain (or bottom-valley) is altogether, including the delta of the river, which is but the extension of the plain into the Gulf of Mexico, about 600 miles long. Mr. G. W. R Bayley, a Civil Engineer of Louisiana, thus defines its limits:

"The head, or the alluvial plain, or delta, of the Mississippi, may be assumed as occurring where rock *in situ* forms both shores, or at a point some thirty miles above the mouth of the Ohio, known as 'The Chains.' The entire alluvion, extending thence to the sea, comprises an area of

about 40,000 square miles, and presents a front upon the Gulf of Mexico of 260 miles, 85 miles north, and 175 miles west of the river's mouth." (*The Missisippian.*)

Sir Charles Lyell, who has devoted much time to the study of the "valley-plain" and delta of the Mississippi, says of the former:

"It is very variable in width from east to west, being near its northern extremity, or at the mouth of the Ohio, 50 miles wide, at Memphis, 30, at the mouth of White River, 80, and contracting again further south, as at Grand Gulf, to 33 miles." *(Lyell's Second Visit to the United States.)*

299. Taking high-water level as that of the great plain, the latter attains, at the mouth of the Ohio, an elevation of 320 feet above the Gulf.* Considering the distance, the slope seaward is, therefore, very gradual.

300. The valley-plain proper is bounded on the east and west respectively, by two ranges of highlands, approximately parallel, and rising from 50 to 200 feet above the plain. These highlands generally present steep slopes, or faces toward the plain, but preserve, for the most part, their elevation in the opposite direction, extending off as table-lands. The eastern range, called in general the *Mississippi Bluff,* has already been referred to, mostly with reference to the part occurring in Tennessee. (§§ 279 and 280.)

301. The section of the plain, lying between the parallels of latitude that bound West Tennessee on the north and south respectively, the part also, with which we at present are most interested, is limited on the East by the Bluff, as stated, and on the west, in Arkansas, by Crowley's Ridge.† This ridge forms "the divide between the waters of the St. Francis and White rivers." It is the counterpart of the Bluff in Tennessee, and a portion of the western range of highlands bounding the great valley-plain.

The plain between these limits has, at Memphis, as already mentioned, a width of 30 miles. On the parallel of the northern boundary of West Tennessee it is wider, being here 45 miles across.

* According to the elevation of high water at Cairo, determined by the surveys of the Mobile and Ohio Railroad, see page 116.

†See First and Second Reports of a Geological Reconnoisance of Arkansas, made during the years 1857, '58, '59 and '60; by David Dale Owen. First Report, page 19, and second Report, p. 413.

302. Through this area, the Mississippi winds in its tortuous course. The general direction of the river is now such as to throw the greater part of the plain into Arkansas. Toward the south the river hugs the Tennessee highlands, striking them at several points, and forming the Chickasaw Bluffs already mentioned. (§ 280.)

303. The section of valley-plain designated, like all of its portions, abounds in bayous, lakes, and heavily timbered swamps. Some of the lakes are crescent-shaped, and are manifestly old river-bends. The Mississippi has probably, during past ages, occupied successively all parts of the area. At one day it may have washed the base, or portions of the base, of Crowley's Ridge.

304. The valley-plain, as a whole, is itself of great antiquity. It has apparently, however, been washed out of another more ancient and extensive alluvial plain, the remains of which are seen, at a higher elevation, in the slopes and cliffs of the highlands on each side, (as for example, in the bluffs of Tennessee, and in the slopes of Crowley's Ridge, in Arkansas.) These highlands have a corresponding elevation. They present, too, along their opposing faces, the same vertical succession of formations. The strata of loam, gravel, sand and clay, whose edges now crop out upon their slopes, once extended across from side to side in continuous layers, forming the more ancient and higher plain. It has been the work of the river to carve out of this greater plain its great valley of "bottoms." The eastern Bluff and the western Ridge are, at this day, the limits of its lateral movements, and remain, moreover, as monuments of the great changes that have occurred.*

305. It is the opinion of Sir Charles Lyell, that an extensive region, including the valley-plain of the Mississippi, has been subjected to a great oscillation of level. This at first depressed the region, or rather the more inland portion of it, about 200 feet below its present level, and then restored it again to its former position. During the first part of this oscillation, and at the period of greatest depression, the materials of strata, the remnants of which are now seen in the bluffs and slopes of the highlands, were deposited during overflows, very much as

• See section of the Bluff and of the valley plain in the Second Part of this Report.

alluvial matter is now. But when the movement was reversed and the region was slowly upraised, the river carved out its valley "through the horizontal and unconsolidated strata as they rose, sweeping away the greater portion of them, and leaving mere fragments, in the shape of terraces, skirting" the newly-formed alluvial plain, "as monuments" of the changes in level.*

According to this view, the water of the river, at the period of greatest depression, covered during overflows, a much greater area than that now occupied by the valley-plain.

306. *Area; Reelfoot Lake.*—The portion of the great valley-plain within the limits of Tennessee, constituting the division we are considering, has an area approximately of 900 square miles. It is, therefore, the smallest of the eight natural divisions into which the State is divided. The greater part of this area is in the northern part of the State, the Mississippi inclining towards the highlands in the southern part. (§ 302.)

307. The western and large parts of Obion, Dyer and Lauderdale counties, lie within the bottoms, and therefore belong to this division. Small parts of Tipton and Shelby, more of the latter, however, than the former, are also included. To this western tier of counties the division is confined. The eastern and larger parts of all these counties consist, for the most part, of uplands, and are embraced within the limits of the West Tennessee Plateau. (§ 284.)

The river, by striking the highlands at the different Chickasaw Bluffs, cuts the division into several unequal sections, which, however, as such, are of little consequence.

308. The bayous and lakes of this division, and of the section of the valley-plain of which it is a part, have been referred to. (§§ 297 and 303.) One of the latter, Reelfoot Lake, in Obion County, deserves notice. This lake had no existence previously to the "Shakes" of 1811-12. Its origin appears to have been due to the filling up of the old channel of Reelfoot Creek during the convulsions of that period. This dammed up the water, that before ran without obstruction into the Mississippi, until it overflowed a large area, and formed the lake as we now find it.

The waste-water of the lake now escapes southward, into Obion River, with a fall, according to information given me by an intelligent citizen of

*Lyell's Second Visit to the United States, Vol. II, Chapter XXXIV, and Manual of Geology, 5th Edition, pp. 121 and 122.

Dyer County, of "at least forty feet." In its course it passes through several smaller lakes. The northorn end of the lake projects a short distance into Kentucky. Its length is about eighteen miles. Its width varies from three-fourths of a mile to three miles.

309. When seen by the writer, a few years ago, there was much dead timber standing in the water around its shallow margin. This was cypress, ash, mulberry, beech, etc., but mostly cypress.

From different points of the Bluff, running, as it does, near the eastern side of the lake, (§ 280,) beautiful and extensive views of the wooded bottoms, and of the lake encircled by them, may be obtained. And when the latter is concealed by the forests, its outlines may often be distinctly traced out by the lines of dead cypress trunks and branches. The First Volume of the Report of the Kentucky Geological Survey (p. 117) favors us with a view of this lake, taken from a point in Tennessee.

The region of Reelfoot has, for many years, been a favorite resort for fishermen and hunters.

310. *The Earthquakes of* 1811-12.—I have before referred to some of the effects produced by these earthquakes. (§ 283.) As they were felt, to a greater or less extent throughout Tennessee, it may be well to add a few remarks with reference to them.

The region around New Madrid, on the Mississippi River, was the center of their most violent action. They were felt over a large area. Their effects in West Tennessee have been spoken of. (§ 283.) In Middle Tennessee they were sensible enough to cause considerable alarm. In South Carolina, too, they were observed. Humboldt, in his Cosmos, mentions these earthquakes as presenting one of the rare instances of tremblings felt almost every hour for months together, at a distance far from any volcano.

311. The violent earthquake that destroyed in March, 1812, the city of Caraccas, in South America, appears to have had some connection with the shocks felt at the same time in the Valley of the Mississippi. Lyell says:
"It is possible that these two points are parts of one subterranean volcanic region." In Carraccas "the surface undulated like a boiling liquid, and terrific sounds were heard underground. The whole city, with its splendid churches, was, in an instant, a heap of ruins, under which 10,000 of the inhabitants were buried."

312. An account of the earthquakes of New Madrid may be found in Lyell's Principles of Geology, Chapter XXVIII, (8th Ed,) Judge Haywood also presents us with a description published in 1823, a portion of which, as his work (note 100,) is out of print, I here reproduce.

"The earthquakes of 1811 commenced on the 16th of December, half past two o'clock in the morning, and have been felt at intervals up to 1819, and as late as July, 1822. For two or three months the shocks were frequent, almost every day. Then they gradually decreased in frequency, and took place at longer intervals, which continued to lengthen until they

finally ceased. In May, 1817, in Tennessee, they had come to be several months apart, and were but just perceptible.

"The next day but one, before the first earthquake, was darkened from morning to night by thick fog; and divers persons perceived a sulphureous scent. The wind ceased, and there was a dead calm, without the least breath of air, on the day of the earthquake. The like calm preceded all the shocks. A dull and heavy obscuration of the atmosphere also usually preceded them. The eflluvia which caused the dimness of the day, seemed to be neither cloud nor smoke, yet resembling both. It was too light for clouds, and too thin for common smoke, and of a lighter cast. It seldom terminated in condensation, as Tennessee vapors usually do."

"In the time of the earthquakes, lights were seen in the night, sometimes westwardly, like the light of the sun before it is closed by the darkness of the night; but shooting much further toward the east, and continuing much longer than the light of the sun after setting. And sometimes in the night, the heavens would seem to be tinged with a reddish color, supposed to be the effect of invisible eflluvia issuing through the pores of the earth, and collecting above us like smoke in the spring, which rises from log-heaps and brush-heaps, and shows itself like light at a distance."

"In the time of the earthquake, a murmuring noise, like that of fire disturbed by the blowing of a bellows, issued from the pores of the earth. A distant rumbling was heard, almost without intermission, and sometimes seemed to be in the air. Explosions, like the discharge of a cannon at a few miles distance, were heard; and at night flashes of lightning seemed sometimes to break from the earth."

"In some places west of the Mississippi, a troublesome warmth of the earth was perceptible to the naked feet."

"The motions of the earth were undulating. The parts agitated quivered like the flesh of a beef just killed. The motions in Tennessee progressed from west to east, and were sometimes, though seldom, perpendicular; resembling a house raised and suddenly let fall to the ground. When the shocks came on, the stones on the surface of the earth were agitated by a tremulous motion, like eggs in a frying-pan, altogether made a noise similar to that of the wheels of a wagon in a pebbly road. The ponds of water, where there was no wind, had a troubled surface the whole day preceding any great shock."

"The frightened horses ran snorting in the fields, the hogs squealed; the dogs barked; and the fowls descended from their roosts. In the time of the shocks, many persons experienced a nauseating sickness at the stomach, and a trembling of the knees."

"The first shocks, which were the most violent, had these effects. The water in the Mississippi near New Madrid, rose in a few minutes, twelve or fourteen feet, and then fell like a tide. Some lakes were elevated, and the bottom raised above the common surface of the earth in the neighborhood, and still remain so. The country near New Madrid was everywhere broken up in furrows six or eight feet wide, and as many deep."

"In many places in West Tennessee, old sulphur springs have commenced running again, which, some years before, were dried up. And in some places, new springs of sulphureous water broke out of the earth and still continue to run."

"The earth in the western parts of West Tennessee opened in several places, and white sand issued from the aperture. Near New Madrid hot water of a dark color and of a strong sulphureous smell, issued from the holes. Where the white sand was thrown up, it lay around the hole in a circular form. In some places, there issued from the earth something like wind from the tube of a bellows, passing through burning coal. In the Chickasaw country it cast up hillocks of white sand of the size of potatoe hills. These are all through the Chickasaw country."

"The agitations above exceeded those immediately upon the surface. On the west side of the Mississippi, trees were, in many places, split from the roots upward. In some instances the trees were broken off; the tops fell to the ground, and the trunks were left standing."

"Spouts of water, three or four inches in diameter, sprang from the Mississippi, and ascended to a great height. In some parts of the Mississippi the river was swallowed up, for some minutes, by the seeming descent of the water into some great opening of the earth at the bottom of the river. Boats with their crews were ingulfed, and never more heard of."

313. *Elevation above the Sea*.—The general surface of this division of the State, must coincide very nearly with the high water level of the Mississippi. (§ 299.) Referred to this level, its elevation, on the northern boundary of the State, may be placed approximately, at 295 feet above the Gulf, and on the southern boundary below Memphis, at about 215, the fall in this distance being, therefore, 80 feet. The division presents a belt along the river, that has in general, an elevation a little greater than other portions.

314. *Climate*.—It would be interesting to know the peculiarities of climate that belong to this division. Its low elevation, the presence of the great river, numerous bayous, swamps and lakes, with their vapors and fogs, must give rise to peculiar features, not a little in contrast with those of the plateau to the east. In the absence of the proper data, however, nothing that is very satisfactory can be given. So far as temperature is concerned, this division is, doubtless, the warmest region in the State.