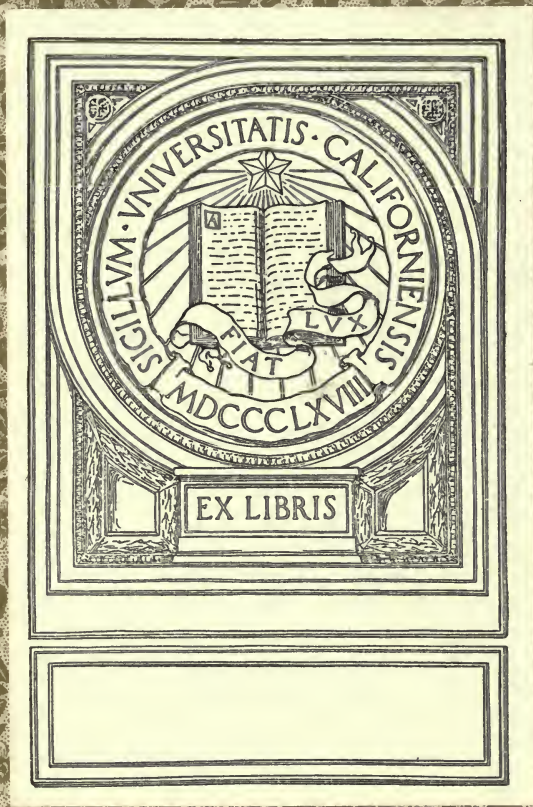
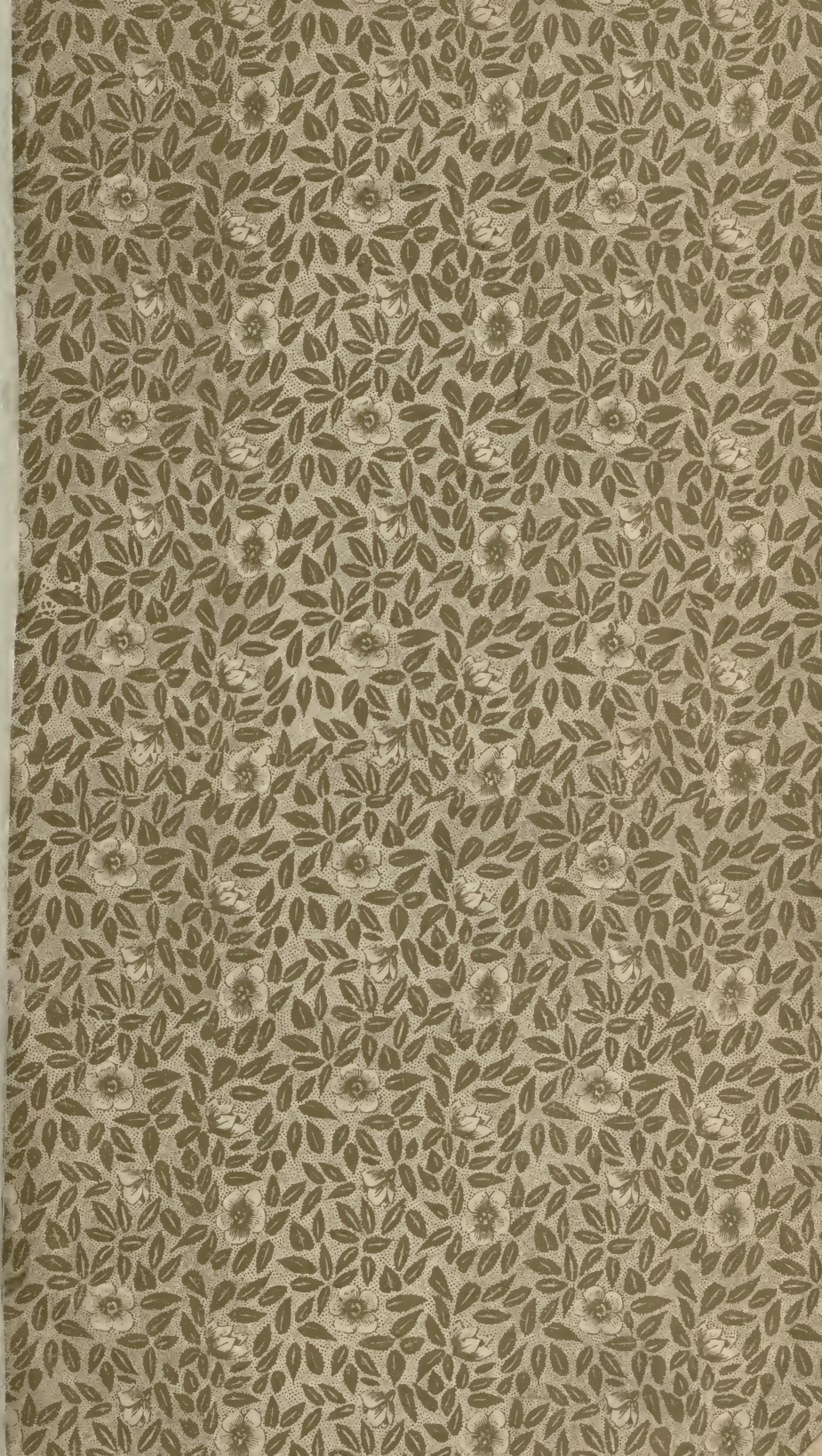


THE  
NEW SOUTH

ITS RESOURCES  
AND  
ATTRACTIVEIONS







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# THE NEW SOUTH.

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A DESCRIPTION OF THE SOUTHERN STATES, NOTING EACH STATE SEPARATELY,  
AND GIVING THEIR DISTINCTIVE FEATURES AND MOST  
SALIENT CHARACTERISTICS.

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BY M. B. HILLYARD.

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## PREFACE.

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This book represents, in a measure, aspirations long cherished by the author to do something of service for the South—his adopted, loved home.

The name "New South" is one as much my own as it is that of any one, as it was used by me in a pamphlet published some eight years ago of much more limited scope than this work. So much as to my right to use a title quite hackneyed of late.

It is a friendly criticism of this book, that so little of it is my own, and so much that of others; but the intention of the book was to convict and persuade, and not merely to furnish a vehicle for my thoughts. The labor has lain much in research and selection. There are some great results certain to be accomplished by the use of the subject-matter of others.

It will be observed that much of the material is taken from the reports of the last (tenth) census of the United States. There are two facts about this report. It is a work of experts, is thorough, and commends itself to the scientific. Following it, one is sure to be correct, or, at any rate, to have for the topic the best judgment of the day. In the next place, the United States Government has set the seal of its approbation upon its pages. This makes it, to the last degree, authoritative and current with the world. No higher sanctions are to be expected. Foreign peoples can desire nothing more. The people, outside the South, of the United States cannot consider the views as sectional and biased in favor of the South. As to the use of material gathered from the books issued by some of the Southern States, there is this advantage: I cannot be said to have misstated matters as to anything or section I have noticed.

In quoting I have constantly felt embarrassed by the difficulty in selecting how little to insert. Doubtless my sense of proportion at times (and may be often) has been at fault. There is more said about one locality than ought to be, and too little or nothing about another. This last state of affairs (which inheres in the magnitude of the subject) has been a source of pain all the way through the preparation of the book. But there was nothing sinister about this, and it must pass with the above explanation.

Another difficulty has been in the necessity for compression. The material has swollen far beyond any expectation; the use of it beyond the original design. In my appreciation of the style and subject-matter of those I have quoted, I have often been beguiled beyond limits compatible with a just allotment of space. Some States have not had the same space as is given to others. I have often failed, through lack of space, to quote from authors who have given much to the world, of value about one and another Southern State.

In the handling of the geological features of some of the States, I have followed, or at least tried to follow, the work of eminent geologists.

Throughout the book, wherever has been found any subject-matter which could be used, I have preferred to give it, rather than to write of the topic myself. But there can really be no good excuse for a bad book; and I can only hope that

my good intentions may make this not utterly contemned by the critics, if any one should condescend to notice it.

To be sure, I would fain plead many excuses; but what has the world to do with that? I have dared to print a book. It has no excuse for being but in the fact that it *is* something.

Certainly no one will be apt to find in it as many defects as I. As I have gone along, the disproportion between my conception and execution has caused many regrets. But, in one sense, I owe no apology or excuse for this business. My intention has been to do "the State some service." It is my hope that I have done it. This aspiration for usefulness sanctions and even dignifies the work.

This book had much of its suggestion in my own wants. Having studied the South for a number of years, and having traveled over much of it, I was constantly reminded how little I knew of it. Often wishing to know of one and another thing in the South, I found that I had to hunt it up. This was suggestive. I thought that if I, who was somewhat conversant with the South, had to study in order to discover thus and so, how must it be with those who had never studied the South at all? Who had never even thought of it as a field for capital or enterprise, a home, a resort for health? Then I was struck with the fact that there was no one book (according to my information) treating of the South as a whole. Here, it seemed, was an opportunity to serve the South, and meet what I regard as the great need of the time—accurate, unbiased information about the whole South.

Any one appreciating the largeness of the aim, the pressing needs of the occasion, can see how poorly the work has been performed. But I have given the cue to book-makers, and think I have said *something* that the world wishes to know.

The South is now exciting more interest than any other quarter of the globe as to its mineral resources. It has other claims upon the world's attention, and I have tried to portray some of them. The aim of this book is to show what the South is, how she has progressed, and to conjecture somewhat what she may be.

The introduction is mostly my own. Most of the matter about the States is a compilation. I have always tried to give due credit to all from whom I have quoted; always aimed to give their sense; have never garbled.

It is my offering of love to the South.

## INTRODUCTION.

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At the close of the late civil war the South was crushed as hardly any country in the world's history ever was. In all other wars, no matter what devastations ensued, the labor element was not paralyzed. With the return of peace, rudimentary and fundamental industries resumed their sway. The farmer returned to his plow; the artisan to his trade. At the South, the enfranchised negro, in the wild ferment of his spirits, and the most emotional of races, uneducated, utterly improvident, with no conception of the meaning of his intoxicating boon, reveled in coarse and giddy idleness. Slavery had meant to him work and subjection to the will of another. Freedom must mean idleness and the pursuit of his whims! Hence, the fields were largely deserted; and the negro, naturally very gregarious, crowded to the cities and towns. Agriculture, the true power and beneficence of which is never so well demonstrated as after the close of greatly devastating wars, did not allure back to the fields its old denizens. This disinclination to the field was intensified in the negro by the creation of the Freedman's Bureau, an institution inaugurated by the Federal Government for the support of the indigent. To this the negroes flocked in great numbers, and finding a support there, declined for some time to work.

The close of the war found the white man generally not only not inured to field labor, but ignorant of it. During the existence of slavery the professions were the walks of the young men, or lives of extravagant ease or luxurious idleness. Those who were not busy in their professions or had none, led such a holiday life as would be difficult to furnish an adequate description of. Some traveled; some spent their time between the library and the parlor; many led a life of revelry—fun, frolic, dissipation; they were great riders and fine shots; they had their kennels and their thoroughbred horses. The softer aspects of this gay and sumptuous life could furnish some beautiful matter for the poet and novelist.

The war came. The young men and the old flocked to it as to a festival. It was a sort of carnival of patriotism. Many fell in battle; many came wounded or dismembered home. Had these known how to work, they could not. They knew nothing of agriculture. The negro was hard to persuade to the fields, and many would not go. Another difficulty was that the war had swept away the horses and mules. These had to be supplied and bought on credit at extravagant prices. Breadstuffs were exceedingly high, and must be bought on credit. Another phase was, that, under slavery, the credit of planters was very high, and they very generally had expended the value of the year's crop before it was made. This indebtedness caught them behindhand with merchants at the inception of the war. Generally, the merchants, from patriotic motives, forbore pressing their claims.

At the close of the war the soldiers found themselves, very generally, heavily in debt to merchants; fences in ruin; implements of agriculture gone, useless or only semi-serviceable; mules and horses killed, half starved or gone; labor disor-

## INTRODUCTION.

ganized, with the rank must of freedom fermenting in the blood and turning the brain of former slaves.

Cotton was high in price. Almost every one turned to making cotton on high-priced hay, pork, mules, corn, etc. Cotton fell so enormously in price that it brought utter ruin to many, and loaded the South with a burden of indebtedness to the merchants that is still weighing her down. Had there been little or no cotton raised that awful year, the South would long ago have been on her feet; but the old indebtedness of *ante bellum* days, and the added indebtedness of the great losses by cotton-raising, tightened the manacles upon the Southern planter, and many are yet in the bonds.

The merchant, virtually owning the land of the planter, has been enabled to dictate his methods. The planter must raise cotton, and buy pork, corn, hay, etc. These breadstuffs the planter has been compelled to pay high prices for to the merchants who have liens upon the land.

Between the fatuity of the planter in raising cotton and buying pork, corn, hay, etc., voluntarily, and the enforced raising of cotton and buying of breadstuffs in the manner above stated, lie the explanation of the depressed condition of the South so long after the war. Along with these reasons, and subordinate to them, are questions of lien law, modes of wages, etc., which cannot here be elaborated.

It is said above that the abolition of slavery, in connection with other conditions consequent upon the war, paralyzed the South; but in parts of the South there were notable exceptions to the effects of the abolition of slavery. These exceptions were with the poor white men who either owned no slaves or very few. These people were generally poor, uneducated and industrious. They worked in the field and taught their children to work. If they owned a few slaves, they went to the field and worked with them. They owned small farms, and generally lived rather remote from centres of trade. They raised their own corn and pork, "made" some oats and wheat, made their own molasses. They kept a few cattle. The wife and daughters made some butter, raised poultry, and, in many instances, spun and wove the wool clipped from the sheep raised at home. The home was "homely," and made of logs, perhaps. Father and sons were good shots; and the wild turkey, the deer, squirrel and bear frequently fell beneath their rifle. These people were self-supporting. If they raised a little cotton, instead of paying the merchants bills for advances to them, the money from its sale, after buying some coffee and clothing, went back to the home, to be put in the family bank, (the home-knit stocking,) or to be buried in the garden or forest.

The lives of these people had two great lessons for the world and the South. They were living refutations of the old dogma that white people could not stand labor in the field. Despite bad houses, indifferent food, too free use of tobacco by both sexes, large potations of black coffee, and great disregard of weather in work or play, no people could well be more healthy than they. The children were chubby, rosy, robust, and with constitutions like a wild cat. The women were fecund beyond belief. The staple argument in defense of slavery was that the negro was a necessity to the South, because no one but the negro could stand the hot suns in the field. Here, now, was this white man, with his children, working from sunrise to sunset. He was there in the mountains of Virginia, North and South Carolina, Georgia; in the hills of Alabama; the pine woods of Mississippi, Florida, Louisiana, and the other States above named. He was too poor to own rich lands. Strange that the world has not learned that there were tens of thousands of white workers in the field before the war who did just as good and rather better work than the slave, and at the same work!

Somewhat before and much since the war, this poor white man had another great lesson for the world—that the South need not go to the West for bread-

stuffs. What could be bought of the latter at the far-off town that he did not raise at home? His hogs did not even cost him corn, as they do West. They ranged in the woods all the year, and in winter were fat on the mast of oak, beech, chestnut, hickory, etc. He did not even have to fence them in; they ranged on his neighbor. If he wished to improve his lard, he fed them on corn a few weeks before killing them. That's how much his pork cost. As to corn, he had it early and late. He planted, in some parts of the country in question, in February, and he could plant in June and make a crop. He ate "roasting ears" long after the cold weather had set in North and West. Everybody raised corn. Even many of the richest planters would scorn to buy corn. In many places it was not worth twenty-five cents a bushel, and, indeed, there was no market for it. It was a drug. Why then should Western farmers still believe that because the South has been long (since the war) buying their corn at high prices, she cannot raise it? As to wheat, barley, rye and oats, almost every farmer had a patch of one or more of these. The wheat was to be ground into flour at the mill near by. The rye or barley was for winter pasture for his calves and milch cows. The patch had been "cow-penned" for a year or so before breaking up, so as to enrich it. Some of the rye would be kept to be parched and mixed with the coffee. The oats might "rust," but anyhow they were to be tried. (They have an oat now that don't rust, and it is one of the best and heaviest known—the "red rust-proof.") Near by was his patch of cane. From that he would make his molasses (delicious, too, and pure,) and his brown sugar. The latter would do good service in preserving the plums that grew wild in such profusion, and for the same service to the apples and delicious seedling peaches, strawberries and blackberries wild on the farm.

These are a few features of a poor picture of tens of thousands of families, in the Southern States before and after the war. I have gone about in travel considerably, and I never saw a man who raised his own corn and pork that was not doing well. Rich he might not be; but he was almost always out of debt, and a little ahead. I have seen people in my rambles who never bought a bushel of corn or wheat or a pound of flour or bacon; they always raised these. These men were mostly the poor men we have been speaking of. To most of them the abolition of slavery meant no loss, for they never owned a slave. It did mean rather better social conditions for them, for it gave them contacts and associations they never had before. They have become to be more respected and much endeared now, in the new and greater labor-respecting spirit of the South. The best work these men have done for the South is not only in preserving the sacred fire of industry, but by the lessons almost unconsciously learned by the South from their teachings of self-support. Year by year the South has seen these patient, industrious fellows, with no aspirations of getting rich in a year or two, gradually adding to their acres; raising all they consume; selling a surplus of cotton or sugar or tobacco, and laying by the money. The rich men or the large land-owners have caught the hint, and they, too, are raising their own supplies. The merchants, in many instances, are encouraging this; and so, a new system is growing up. I repeat it, that I think the spirit of home production; the enlarging habit of self-support, ever widening and deepening in the South, owe their inception and restoration and most forcible commendation to these poor whites. To demonstrate this position, it could be shown how the counties in the States where this class lived, raised, through all the latter years, the large proportion of breadstuffs. But, howsoever these things be, the fact is undeniable that the South,

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\*The seat of corn production was formerly in the South. \* \* \* In 1849, fifteen Southern States produced 59 per cent. of the crop.—*Report of the Statistician, page 584, in Agricultural Report for 1881 and 1882.*

year by year, is increasing the quantity of her breadstuffs. This will be shown; and the facts will surprise others, as they have me, notwithstanding some concensancy with Southern progress. Let us, however, not go on with this topic until we look, in a very general and cursory way, at some aspects of life after the war that should not be forgotten.

It were a conscious and almost criminal dereliction to pass by, without a word of comment and reprobation, some of the enormities that disgraced that *regime* and afflicted the South. "Law," instead of being "beneficence acting according to rule," was enthroned corruption, caprice, vindictiveness or ignorance—one or more. Some judges, ignorant of everything like law, and informed only to subserve the ends of their appointment or their own aggrandizement, were installed. Not only could—

"Offense's gilded hand shove by justice,"—

but "the wicked prize" could "buy out the law." *Ex parte* processes issued outside legal forums and in infamous privacies, marked some proceedings. Decisions were delivered that overthrew established law, and still continue, as the comment upon their authors, upon the records.

No better service could be performed to future ages than a collection of the judicial decisions of that time—decisions often the dictates of the grossest ignorance; oftener, perhaps, of corruption. Their authors should be forever pilloried in public contempt by the publication of a *collectanea juridica*, and so be rescued from their perishable infamy and made immortal.

Many of the creatures in the halls of legislation were past belief and description. A troop of gibbering apes tricked in the paraphernalia of power, and playing at kings, would be a mild mockery of state, compared to the grotesque and groveling saturnalia of that wild and hideous rabble in those dark and direful days. No legislation could be procured without bribery, except such as inured to the corrupt or vindictive purposes of dominant partisanship. Enormous taxes were laid, not for the furtherance of material development, but with predeterminations to constitute a fund of corruption and plunder. Legislatures were overthrown by a hostile soldiery at the bidding of mercenary, partisan governors—an anachronism of usurpation. Thieves, speculators and murderers were impeached as grand jurors by corrupt sheriffs, to protect themselves from indictment. Professional bribe-takers in platoons of lazy, ignorant men, hung about the courts of justice—tried and trusty mercenaries—a thoroughly drilled band to decide upon the lives and fortunes of the people. Perjury was a pastime, and bribery their "bread and meat." These wretches reveled in their infamy—capable of any degradation; glad to fulfill the behests of their employers, and bidding for use by ever enlarging capabilities of diabolism. The vast debts foisted upon the commonwealths, the peculations of public officials, the perversions of power, the prostitutions of the appliances and forms of law, the terrors of the national military, the incredible and numerous infamies of that direful day, beggar invective. The heroic ages of plunder and infamy in any civilization never furnished a parallel; and nothing but an elaborate and specific enumeration of the flagrant enormities will suffice to vindicate to the impartial reader our strictures, because the age would have seemed to forbid such capabilities of atrocious rascality.

In so large a theme as an attempt to depict Southern conditions, progress, possibilities, some system is necessary to even a semblance of portraying the most salient features of her development and possibilities. I shall, therefore, make my points as distinct as possible, and show the South under different aspects. It will be necessary to assume more or less, partly from lack of space; partly because, from the very nature of the case, it is impossible to offer demonstration. As, for instance, if it is claimed that the South must become the home

of such and such an industry which does not yet exist, it manifestly is impossible to demonstrate it. But I think these assumptions will commend themselves to the common sense or reasoning of most readers. If, however, they be scouted, I must leave them to time for corroboration. Certain assumptions a few years ago of what the South would soon become were flouted as preposterous. They are facts of terrible meaning now to those within the sphere of her competitions.

One of the most striking improvements in the South is her progress in agriculture. This is very noticeable in the increased production of staples, but it is also very notable for new agricultural methods, use of new appliances, and the productions from the soil entirely unknown to her a few years back. In cereals, as the following table will show, the South has regained and even surpassed her production before the war. This means, at least, keeping home the money that she has been paying to the West until of late. It probably means more, of which something hereafter, perhaps. But always let it be borne in mind that the measure of the South's supply of food for cattle is not to be gauged by a consideration of her product of corn and hay, whenever an estimate is to be made as to what she will need for home consumption, or as to how much she may hereafter compete with the North and West in their own markets with her production of corn, oats and hay; for the utilization of the hitherto neglected cotton seed is a powerful factor which it is very difficult to estimate; and the fields of the South, hereafter to be green most of the winter, for pasture for cattle, through the use of clover, Kentucky blue-grass, etc., is an element of competition with the North and West (by allowing the South to sell corn, hay and oats,) which is absolutely imponderable. But to the facts giving some aspects of cereal production in the South. As illustrating the rapid increase in this direction, I have compiled, from the official reports of the United States Agricultural Department, the statistics of the grain crops produced in the Southern States in 1868 and 1885. The reports of the Agricultural Department unfortunately do not cover the production of rice, sugar-cane, fruits, and some other crops which form a very important feature of Southern agriculture. The yield of wheat, corn and oats in the South in 1868 and 1885 compare as follows, (the statistics of wheat being for 1886):

MARYLAND.		1885.	1868.	MISSISSIPPI.		1885.	1868.
Indian Corn, bus..	15,999,000		12,349,000	Indian Corn, bus..	25,765,000		35,519,000
Wheat, " ..	7,337,000		5,706,000	Wheat, " ..	173,000		242,000
Oats, " ..	2,475,000		6,096,000	Oats, " ..	3,962,000		110,000
VIRGINIA.				LOUISIANA.			
Indian Corn, bus..	31,838,000		19,969,000	Indian Corn, bus..	15,410,000		17,397,000
Wheat, " ..	6,153,000		6,914,000	Wheat, " ..	.....		50,000
Oats, " ..	8,664,000		8,671,000	Oats, " ..	420,000		57,000
NORTH CAROLINA.				TEXAS.			
Indian Corn, bus..	25,199,000		23,366,000	Indian Corn, bus..	84,406,000		21,337,000
Wheat, " ..	3,487,000		2,971,000	Wheat, " ..	6,112,000		389,000
Oats, " ..	4,483,000		3,479,000	Oats, " ..	14,211,000		861,000
SOUTH CAROLINA.				ARKANSAS.			
Indian Corn, bus..	13,453,000		9,870,000	Indian Corn, bus..	38,309,000		32,449,000
Wheat, " ..	838,000		717,000	Wheat, " ..	1,878,000		1,000,000
Oats, " ..	3,510,000		629,000	Oats, " ..	5,313,000		439,000
GEORGIA.				TENNESSEE.			
Indian Corn, bus..	32,162,000		27,294,000	Indian Corn, bus..	75,581,000		54,772,000
Wheat, " ..	1,621,000		1,832,000	Wheat, " ..	8,749,000		6,137,000
Oats, " ..	6,395,000		1,132,000	Oats, " ..	10,752,000		2,881,000
FLORIDA.				WEST VIRGINIA.			
Indian Corn, bus..	3,799,000		2,950,000	Indian Corn, bus..	15,827,000		7,695,000
Wheat, " ..	.....		.....	Wheat, " ..	3,321,000		2,185,000
Oats, " ..	519,000		.....	Oats, " ..	2,831,000		1,755,000
ALABAMA				KENTUCKY.			
Indian Corn, bus..	31,405,000		31,240,000	Indian Corn, bus..	90,569,000		58,187,000
Wheat, " ..	1,072,000		829,000	Wheat, " ..	12,785,000		2,850,000
Oats, " ..	4,915,000		567,000	Oats, " ..	10,225,000		5,906,000

Summing up these statistics, the production of cereals in the South in 1885 is shown to be as follows, (wheat statistics being for 1886):

	CORN.	WHEAT.	OATS.
Maryland.....	15,999,000	7,337,000	2,475,000
Virginia.....	31,838,000	6,153,000	8,664,000
North Carolina.....	25,199,000	3,487,000	4,483,000
South Carolina.....	13,453,000	838,000	3,510,000
Georgia.....	3,216,000	1,621,000	6,395,000
Florida.....	3,799,000	.....	519,000
Alabama.....	31,495,000	1,072,000	4,015,000
Mississippi.....	25,765,000	173,000	3,962,000
Louisiana.....	15,410,000	.....	420,000
Texas.....	84,406,000	6,112,000	14,211,000
Arkansas.....	38,309,000	1,878,000	5,313,000
Tennessee.....	75,581,000	8,749,000	10,752,000
Kentucky.....	90,569,000	12,785,000	10,225,000
West Virginia.....	15,827,000	3,321,000	2,831,000
Total, 1885.....	470,776,000	53,526,000	78,675,000
"    1868.....	354,124,000	31,822,000	32,583,000
Increase.....	116,652,000	21,704,000	46,092,000

Thus, despite the many disadvantages under which Southern agriculture has labored, and which are now beginning to give way, the South increased its production of grain from 1868 to 1885 by 116,652,000 bushels of corn, 21,704,000 bushels of wheat and 46,092,000 bushels of oats, or an aggregate increase of the three of over 184,448,000 bushels—a stupendous gain that gives promise of what may be expected in the future, now that Southern farmers are turning their attention more and more to diversified agriculture, finding in that much better success than in the all-cotton system.

It is quite noteworthy, as shown by the preceding statistics, how the product of the oat has increased in the cotton-raising States. This is one reason why corn-raising has not increased more. The oat crop is one of the most popular and most easily produced in the South—being sown in the fall, generally, and plowed in in the roughest manner. After it is cut, the young “crab” (crop) grass (*paspalum sanguinale*) comes on, and gives fine pasture until frost.

The use of the field pea in the South has increased very greatly of late. It is equivalent to a considerable production of corn, as it feeds both man and beast, and, indeed, is a very rich food for cattle. Indeed, the use of the pea and cotton seed—the latter becoming pretty common—gives to the corn production very much greater reach and scope than will be estimated easily. The truth is, that between the uses of the oat, the pea and cotton seed, and increased corn production, foreign hay and corn are about banished from most of the South.

Some ten or fifteen years ago, timothy hay (rather indifferent, too, sometimes.) was selling in country towns in Mississippi at from forty to sixty dollars per ton. Fine timothy hay raised near can now be bought at fifteen dollars per ton in the same towns. Johnson grass hay, in place, has entirely displaced all Northern hay.

Western corn, only a few years ago, (in 1881,) was selling in places in the South at one dollar and a-half on credit, and a dollar cash. Thousands of car-loads were brought in. Now, and for two years, corn has been worth in the same localities only from thirty-five to fifty cents per bushel. It may seem queer to say that this is a blessing; but it effectually prevents the ingress of Western corn, and enables the farmer to make cheap cotton; for everything south of North Carolina seems subordinated, as yet, to cotton-raising.

Mention was made a little back of the improvement in agricultural methods South. Every one at all conversant with Southern agriculture has observed the growth of what is known in parts of the South as “intensive farming.” Mr. Furman, of Georgia, worthily made a great reputation in this regard. In the article on Georgia, his method will be given in his own language. In parts of the South, lands have been made to treble their former product in one and another



staple; and cotton, of late, has been produced, by the use of fertilizers, in areas theretofore considered unavailable for this plant. Deep ploughing, drainage, subsoiling and ditching are coming more and more into vogue, and their effects are seen in improved health, improved lands and larger crops. New appliances, too, are playing their part in the new agriculture of the South. The number of reapers and mowers, sulky cultivators, riding plows, steel plows, seeders, improved harrows, manure distributors, corn and cotton planters, threshers, and other improved farming utensils, is wonderful. There are districts where, only three or four years ago, nothing but the wooden mould-board plow was found, and where there were no sulky cultivators or steel plows, where now hardly an old-fashioned plow is to be found. Even clover hullers are being introduced here and there. The popularity of all these new implements and others not mentioned is the sure forerunner of agricultural-implement factories, in which the cheap iron and unequalled Southern hard woods are sure to find a place. The inauguration of these factories at eligible points South offers one of the most commanding opportunities to Northern enterprise and capital.

The new products from, or in connection with, the soil at the South within a few years will defy enumeration. The most painstaking reflection, the most elaborate enumeration, would be sure to leave something unnoted. It will greatly assist to a better view if they are divided into classifications, as stock raising, fruit raising, vegetable raising, the cultivation of grasses, and miscellaneous—the latter to cover poultry raising, bee culture, silk culture, jute culture, rice culture, the culture of the cane, tobacco, mint culture, broom corn, floriculture, etc.

Stock raising in parts of the South has long been in vogue. The fine sheep and cattle of Virginia the Northern cities more contiguous to her have long known; and Kentucky, in her "blue-grass region," has a reputation the world over, and has been for many years without a rival or peer in raising short-horn cattle and thoroughbred horses. Thither the world has long resorted for the best of these. Other parts of the State have eclipsed her in mule raising, and some of the New England States have certainly divided honors with her in the production of the finest sheep. But the South, as a whole, has never been considered, is not yet regarded, as a stock-raising country. Before the war the census showed some very surprising facts about her ascendancy in raising hogs and common cattle; but this is not to be designated "stock raising." What is written is meant to apply, in this connection, to the raising of thoroughbred stock, pedigreed and registered. Within a few years, and even within five years, the introduction of registered short-horn and Jersey cattle, and their increase, has been most marked. Tennessee has progressed very rapidly, and other States are falling into line. In Jerseys, there are one or two districts in the South where, to the same number of breeders, there are to be found nowhere in the United States, perhaps, as many registered animals owned. East Mississippi and Mobile, Alabama, are particularly conspicuous.

In a recent trip, made with the special purpose of seeing the breeders of registered cattle in Georgia, Alabama and Mississippi, I was greatly surprised at the magnitude of the business of breeding registered Jerseys. The breeders of these States are to be numbered by scores, and their cattle by hundreds. One breeder has over two hundred head, and numbers are to be found who own upwards of fifty; and some of the best herds in the country are to be found South. In short-horns the number is far less, especially south and east of Kentucky and Tennessee; and North and South Carolina are very noticeably embarked in breeding these cattle. But it is quite certain that this breed is a success South, notwithstanding the opinion of one or more eminent stock-raisers in the South to the contrary. There are several parties in the South who have

some choice herds of registered short-horns. It ought to be taken as almost conclusive, that one of the most celebrated short-horns in this country or the world—The Duke of Noxubee—once owned by one of the Hamiltons, of Mt. Sterling, Kentucky—which speaks volumes as to the animal's merits—was bred and raised in Noxubee County, Mississippi, by Simeon Orr, of that county—a gentleman who bred and raised many other short-horns, and was considered a very great visionary by some of the very, very, wise men of his day in the vicinity. It is quite certain that this breed of cattle cannot live on the quantity of food, and make flesh, that a "scrub" can, and this for a time will militate against the breed; but it is also quite certain that there are lands in the South capable of producing such crops of clover, Kentucky blue-grass, etc., that it taxes severely the credulity of any one not thoroughly possessed of the credibility of the thing to believe. On such lands, in the future stock-raising reign in the South, as fine short-horns as ever lived will be seen, and probably an improvement will be made on the year-long pasture on the most nutritious grasses, to which access can be had in parts of the South. Herds of Holsteins and Devons are becoming more frequent, although as yet comparatively small; and thinly scattered over the South is a breeder here and there of other thoroughbred registered cattle.

To show, for illustration, how the stock-raising spirit is spreading in parts of the South, there are four cattle-breeders' associations in Mississippi—Jersey, Holstein, Short-horn and Devon. In East Mississippi there is hardly any town, however small, that has not from one to a half-dozen breeders of thoroughbred registered cattle of some breed; while all through the country they are scattered more or less thickly.

Because particular mention is made of some States in the South as raising certain breeds of registered cattle, it is not to be inferred that the other States cannot or do not raise registered cattle. There is probably not a Southern State in which there are not one or more herds of thoroughbred registered Jerseys. As to grade cattle, they are numbered among the tens of thousands, of various breeds in the South. Look at the immense number of high-grade short-horns in Kentucky, Tennessee and Virginia, and the large number of grades, but not so high, of the same breed in Texas and Mississippi, more particularly. See the number of grade Jerseys in Mississippi, Alabama, Georgia, Tennessee, and, in less numbers, in all the Southern States. Holsteins, Devons, Galloways and other breeds have not so strongly made their impression, being of very recent introduction.

Almost every breed of sheep has been tried in the South, and, with proper selection for lands, all breeds do well. Further South, and on the slovenly attention generally paid them, or the utter neglect, more common still, Merinos and Southdowns are best, and the grades of both. One cannot—at least, ought not to—expect a Cotswold or Leicestershire to earn his own living; nor ought such a sheep, nor, indeed, any, be put upon the stiff, sticky, heavy soils of the prairies of East Mississippi, or the prairie belt of Alabama or Texas, in winter, without a thorough Bermuda sod under foot, and rolling land. Sheep must have a "dry foot." The fecundity and health of sheep South is a marvel. I cannot longer dwell here upon the topic. If the reader wants to know what the South offers in the way of sheep raising, and the leading aspects of the outlook South in this regard, let him read Mr. John L. Hays' bulletin on sheep raising South. No authority is more eminent than Mr. Hays.

The breeding of Angora goats is an industry full of promise to the South. There are some exceedingly choice animals of this breed South, and some very celebrated flocks. The manufactories using their hair for the fabrics of the loom are increasing; and it is a matter of surprise that Southern men are not realizing the situation better, and taking a firmer grip upon the business of breeding these

animals. They really do not cost a penny to any Southern breeder; and their health and fecundity—why use words on the goat?

The South, for the years since the war, has paid immense sums of money for mules. A few years ago, as the result of a calculation, it was found that at least one hundred thousand dollars had been paid by one county, by no means the largest, in a Southern State, in one year for this animal. It is certainly not an overstatement to say that the South has paid hundreds of millions of dollars for mules since the war. In many instances, Kentucky and Tennessee received a goodly share of this money; but some of the States west of the Ohio River have got a good deal of it. But the South is having a mind to stop this. Ten years ago—even less—few jacks were to be found South. Within five years, many jacks, some of them superb animals, have been imported, and parties are making a regular business of raising mules, having their own jacks for their own service. This is a very safe business, and has nothing but success before it; for the South will always need mules, and need them more and more. The average life of a mule, under the care and control of a negro, no one can measure; but every Southern man knows that, between beating, hard riding and scant feed, it is very short. Then, mules cost virtually nothing to a raiser in the more Southern States, if the fields are at all in the shape they should be—that is, set to clover, blue-grass and other grasses. It would be a pleasure, although a little curious, to tell how free from certain diseases and ailments home-bred mules are, compared to those raised West.

The veterinarians South claim that the South is one of the best countries in the world to raise the best horses. They give good reasons—in longer season of green food or such food the year round, milder climate, and exemption from lung and throat troubles, etc., etc. At any rate, every sporting man well knows that the breeding of trotting horses and thoroughbreds is on the increase. While Kentucky holds the first rank, other States are "showing up" well; and there are but few places in the South where there are not to be found some highly-bred stallions that are at the service of the community at reasonable prices; and more and more are stables of thoroughbreds springing up at one and another town and city in the South. Let any judge of horse flesh look at the number of fine carriage horses South, and he will see many home-bred as fine as those imported. Still, by far the larger proportion of our fine horses South are not raised here. There is the very finest field for breeders to come in, and keep home the money now going into the Western and Eastern States for fine carriage horses. The South is rapidly getting able to have fine horses; and her people are free livers, and will have the good things of life if they have either the money or credit to procure them. There are few, if any, of the larger breeds, and there is an opportunity for their introduction. It is quite certain that the very stiff lands in parts of the South—as in the prairie country of East Mississippi—cannot be broken by a riding plow (as a thorough Western farmer would want it done,) by any three horses such as one could pick up South, without considerable selection. The need in that country and other similar places South is for an animal the "get" of the large stallions upon the mares of the country.

Within ten years, hog raising in the South has been revolutionized. A decade ago, one could hardly see anything but the unmitigated "razor-back." If a thoroughbred boar was to be found, it was a rare sight.\* The best that could be looked for was a little group of grades. But now this is all changed. In many parts of the South you will have to get into the "off country" before you can find the fleet-footed, long-nosed animal found so common everywhere a few

\*This remark must not be supposed to apply to some localities—as parts of Kentucky, for instance.

years ago. In the towns, wherever we travel, we see nothing but grades or thoroughbreds. The Irish graziers and the Chester whites are very generally discarded. The former is not a good ranger; the latter does not stand the climate well, most particularly as a sty-hog. This remark will certainly apply to the Gulf States, and may be no doubt applied to the entire South, omitting possibly Virginia. The favorites are Poland Chinas, Berkshires, Essexes and Jersey reds. The first two are thoroughly disseminated and tried, and there are quite a number of registered Berkshires with us. The Essex is a comparatively late acquisition, thoroughly commended, first-rate, and winning friends wherever known. The Jersey red is a safe hog and suited to the South, but it is such a late acquaintance, there is little can be said about it.

Grass raising is a corollary of stock raising. They are, as it were, correlatives. We must have grass to raise stock, if our efforts as a section are to rise to the dignity of a stock-breeding country; and we will have stock if we raise grass. For many years I have been a most watchful observer of the grasses South. In many places I have sown the seeds of one species and another, carrying them in the pocket, and scattering often only a pinch here and there. My views about grasses will be found under that caption in the article on Mississippi. It is only desired here to give some facts there not referred to.

Some three years ago I was urging upon the stock-breeders about Mobile the policy of sowing orchard, red top, blue, white clover and other grasses on their sandy lands, assuring them they would do tolerably well—not, of course, like richer, stiffer lands, with considerable lime in them, but far better than nothing. These entreaties had no effect, so far as was known; so I bought a pound or two of lawn grass seed one day, and scattered them, under cover of the night, in the public square in Mobile, between Saint Francis and Dauphine streets. Recently while on a visit to Mobile, happening by there, I went into the square to look for results. I had not been there since sowing—say three years anterior. I found some beautiful “catches” of blue-grass and orchard, particularly the former; and last season was very dry. There was a little blue-grass in the lawn before; but I aimed to scatter my seed where there was no grass.

The other was an experience had on a trip in November, 1884, in visiting the various prominent breeders of cattle in the Gulf States; in Georgia, about Rome, Cohutta, Atlanta, Calhoun, etc. In all these places and others blue-grass was found “taking” the roadsides and farms—in almost every place coming in without seeding. On some farms it had been seeded—as at Mr. Richard Peters’, and Mr. J. B. Wade’s, the owner of Tenella. On the farm of Mr. B. Woodward, at Cohutta, Ga., it had not been seeded; nor had it been seeded, probably, anywhere in all the numberless roadside places it was seen. Indeed, it is the common grass on all the outlying lots about Atlanta, and one can see persons sodding the lawns with this sod taken from the vacant lots around the city. This surely ought to settle the question about blue-grass, (*poa pratensis*.) It is mentioned here for its curiousness, that in a long fight between alfalfa and blue-grass on Mr. Richard Peters’ farm, the blue-grass is gradually winning. The fight has been going on many years. There was seen in many places, also, some superb orchard grass; but this had been seeded, of course.

As a matter of experience, valuable to all who may think of Georgia as a future home, it may be stated that Mr. Wade, of Atlanta, has no silo. His cattle are on his blue-grass, orchard grass, etc., summer and winter, and have been all these years. Of course, he has hay for rainy and cold days.

Is it necessary to say how the grasses here spoken of seem perfectly at home in the mountains and valleys of East and Central Tennessee, of Western North and South Carolina, of Virginia, and of Kentucky? If the reader wants elabo-

rate proof, he is referred to the article on Mississippi, where enough is given, it is hoped, on the topic to convince the most skeptical, and that, too, with relation to a different country, mainly. What is here given is a short chapter out of a new experience.

Fruit raising as a vocation was hardly known South until after the war. Before the war many had their orchards of one fruit and another; but it would have been considered then utterly petty and contemptible to have raised fruit and sold it—as beneath any gentleman! Thirty-five years ago this was precisely the view in Delaware. But immediately after the war, fruit raising began as a business South. The influence wave broke across the narrow boundary of sea between the peninsula on which Delaware and the Eastern Shores of Maryland and Virginia are situated, and Norfolk, Virginia, and deluged the latter locality with a fruit-raising sentiment. Small fruit was “set” in large quantities, and soon grew to large proportions. Before the war some other fruit had been planted; and one gentleman had secured both wealth and eminence from a pear orchard of his planting that had an almost national reputation. Delaware and Maryland soon felt the influence of the competition of Norfolk in the decreased prices brought by their fruit. (The writer, then living in Dover, Delaware, and raising fruit largely, well remembers this.) Very quickly, wide-awake Delawareans strove to get ahead of Norfolk, and moved further South—even as far down as Wilmington, North Carolina—and “set” strawberries. So the spirit grew.

About the close of the war, possibly in the fall of 1865, Dr Clayton A. Cowgill, of Dover, Delaware, moved on the Saint John's River, in Florida, and went at once largely into the business of orange raising. It is stated that while numberless persons had raised oranges for fruit and as a pastime, he was the first who did it as a scheme for money-making. About the same time, Mrs. Harriet Beecher Stowe went down on the Saint John's River, in Florida, and began writing those letters in its praise which set the whole North in a blaze of enthusiasm, and soon drew thither the capital and immigration with an ever-swelling flood since. Except Mr. Charles Nordhoff's letters and book on Southern California, there has been no approximation, in the building up of a State by a single pen, to the influence of Mrs. Stowe's literary work in behalf of Florida. Who shall tell of the development of Florida in fruit culture? Who can fix its boundaries? Who can depict the transformation scenes of the trackless pine woods into orange bowers, citron groves, pineapple plantations, banana farms, and what not? Let the reader turn to the article on Florida for a bewildering list of strange and tropical fruits there grown.

But while Florida is great, not only on account of the magnitude of her business in fruit culture, and especially in the magnitude of a fruit culture possible to only a limited area of the country, she is by no means the only State far South which is conspicuous by fruit culture. Georgia, greatly through the influence of her celebrated citizen, Mr. P. J. Berckmans, is raising a great deal of fruit, pears especially, and a goodly quantity of peaches and apples and small fruits, and is a leader among Southern States. Along the Jackson Railroad, (Southern Branch of the Illinois Central,) in the pine woods of Mississippi, and about and above Canton, there is a very considerably developed fruit-raising interest; and Southwestern Tennessee is well advanced, too. But it is impossible to particularize in full. It may be stated in brief, that there is no Southern State in which fruit raising is not more or less prosecuted as a vocation; that in some States it is a very considerable interest and quite a source of revenue, and that all fruit raising South as a vocation or with a view to money-making has obtained since the war. For further information on fruits, the reader is referred to the article on Mississippi, where the topic is treated at some length.

The growth of melon raising has attained such dimensions within the last year or two as to be astounding, particularly in Georgia; and in Arkansas it is quite a large business. This, too, as a business, is a new thing to the South, and when not overdone, proves lucrative.

Vegetable raising or "trucking" is an immense business South, and it stretches from Norfolk to the Gulf of Mexico, well down into Florida. A very long and interesting chapter might be written on its growth, and figures might be given to prove its magnitude. At Norfolk, Va., it takes a large steamer per day to transport what that vicinity sends to New York City alone. All along the Atlantic coast to and in Florida, trains and steamers are well laden for months with early vegetables. From New Orleans, La., go great quantities. Mississippi, along the Illinois Central Railroad, sends considerable quantities, as does South-western Tennessee. Mobile, Ala., has become the most considerable vegetable raising area in the South, with, perhaps, one or two exceptions. There the business amounts to millions of dollars per annum. Years ago, hundreds of car-loads were sent every season over the Mobile and Ohio Railroad alone. Ten years ago, only two or three were engaged in this business about Mobile, and only one gentleman at all considerably—one who still holds a most prominent position there in trucking. Mobile used to import cabbages, because it was supposed that they could not be raised there. Now she sends off every year to Western markets from one to three hundred or more car-loads of early cabbages. What a revolution in ideas and business! Almost every vegetable possible to the climate is grown. No enumeration can be made of all the more considerable localities where "trucking" is a vocation. Suffice it to say, that all this business of raising vegetables for the early market North and West is a new thing to the South—as to anything considerable, the growth of the last decade. Even a very small proportion of the vegetables consumed at home was ever raised South until of late. Even now there is a large field for raising late vegetables for home consumption South. Many erroneous notions exist, and must be combated. It would be entirely conjectural to estimate the magnitude of the vegetable business in the South, but every one conversant with it knows that it is one of the most considerable and lucrative of the new enterprises South; that the returns for sales are well into the millions of dollars; that many thousands of acres are devoted to the crop, and that thousands of gardeners find employment in it.

Having briefly considered as new industries South, stock raising, grass raising, the raising of fruits and vegetables, I pass to a very cursory consideration of those products enumerated under the title "miscellaneous."

Taking the topics up in their order, it may be said of poultry that the raising of various breeds for sale is affording vocations to a few people in the various Southern States. This aspect is new and has been profitable, but is quickly overdone. It is hardly necessary to attempt an enumeration of the breeds raised. The list is very large. Poultry raising South ought to be and is profitable. The cost is almost nothing, generally—chickens finding food by ranging. If parties would sow, as they ought, grass, cost of feed would be merely nominal the year round in most of the South, as Northern grasses grow most of the winter, and in summer the Southern grasses are almost always green. Poultry are generally healthy. They need watching in summer, occasionally, to be relieved of the red bug. Setting fowls need to be attended to sometimes, to be saved from lice, and in very hot weather, the eggs need an occasional sprinkling. But, all told, all the year through, the South is unexcelled as a poultry-raising country. Chickens, well South, will lay most of the year, with proper food or range. The broods come off early. Eggs are higher in price, on an average, than North. The expense is next to nothing of raising. There will probably be some day a

considerable business in raising early chickens for Northern markets. Turkeys are remarkable for health and beauty. Geese, it is manifest, will yield much more profitable crops of feathers South than North. The beauty of plumage of Southern fowls and birds is commonly remarked by all attentive observers.

Bee culture is quite a little business in parts of the South. The length of season in much of the area gives much longer time for increase in numbers and collection of honey. In the extreme South there is hardly any time when some plant or flower is not in bloom from which a bee can extract honey; and in much of Georgia, Florida, Alabama, Mississippi, Louisiana and Texas, there are few bright days in winter in which the bee is not in pursuit of his "balmy spoils;" and if he be gifted with discrimination, he must be a happy reveler; for into what flowers he dips! The white clover (*trifolium repens*) is indigenous, or, at least, spontaneous, many places South, and blooms early and during much of the year, and this is a fine field for honey gathering. Honey seldom sells at less than twenty-five cents per pound anywhere.

Silk culture is rather a revived, than a new, industry South. Before the Revolutionary War, Georgia and South Carolina had made quite a growth in the business, but the war discontinued it, and cotton soon overshadowed and smothered it South. The *Morus Multicaulis* craze and the *fiasco* of about forty years ago disgusted everybody, and silk culture has slept until late. In the articles on Mississippi and North Carolina will be found matter more at large—one from the pen of Mr. Fasnach—particularly in the article on the latter State. It is the judgment of the best informed that no part of the world surpasses, if it equals, much of the South. The mulberry suits the climate admirably. One or more species are indigenous in parts of the South. The worm is very healthy here. Almost every inducement any country can offer, the South affords. The fallacy that the South can't raise silk in competition with the very cheap labor of Japan and China is easily refuted by the answer that Southern women and children, who could earn money from silk culture, can compete, because any earnings are better than nothing. If there were a demand for their labor at prices similar to the worth of similar labor North, the argument would be good; but these women and children who could earn money from silk culture now earn nothing. There are various organizations South which seek to develop silk culture. One in New Orleans, La., called the "Southern Silk Industrial Association," has been agitating the matter some time. Its president is Mr. Theophile Harang; secretary, Miss Caroline Hubbard; general manager and superintendent, Mrs. Emma B. Johnson—the last of whom has written a book on the subject, which can be had for fifty cents. In and about this city last year and this, considerable silk has been reeled and dyed and many thousands of worms raised. There ought to be a large filature here and silk manufactories. The silk business finds a most congenial population here. At Corinth, Mississippi, Mrs. Docke has a filature, and purchases cocoons. Her silk and cocoons on exhibition in the Government Building in the World's Industrial and Cotton Centennial Exposition, in the Mississippi Department, are well worth seeing. Every judge can see that the size and quality of cocoons improves in this country, in comparison with much of Europe.

Jute raising has passed the stage of experimentation. Mr. C. Menelas, of Brookhaven, Miss., on his farm there, has raised it successfully, and growers elsewhere in Mississippi and Louisiana have tested it. The belief in it is so thorough that a jute growers' association was organized a year or two ago, with Gen'l S. D. Lee as president. The only need is a perfect machine to decorticate the fibre. One or more have been tried and commended. But I advise no one to

raise the plant, except in a small way, yet. In the article on Mississippi the reader may find something more on jute.

Rice culture, before the war, was almost monopolized by South Carolina. Her swamp lands were at their best. Since the war Louisiana has raised considerable lowland rice. These two States raise the most of the rice of that species; but upland rice is to be found in many parts of the South, and is giving great satisfaction. Georgia is giving considerable attention to it. In Mississippi, too, the culture is spreading. We see it along the gulf coast, too, in Alabama. As rice is a staple, the South has acquired a new good in the production of it; especially is upland rice a new product.

The cultivation of the sugar-cane, although not new as to a part of the South, is new as to much of it. Louisiana used to be almost the exclusive producer of it. But considerable Louisiana sugar-cane, so called, is produced in other Southern States. Very little sugar is made from it, except for home use; but considerable molasses of most delicious quality is produced in the aggregate. Good pine lands will produce, in southern parts of Georgia, Alabama and Mississippi, from two hundred and fifty to three hundred gallons of molasses per acre. In Louisiana, some lands will produce four thousand pounds of sugar per acre, and quantities of land, three thousand.

Mint culture is an entirely new business South. It is a success. The pioneer only needs some capital to make it a very lucrative business. Tansey and horebound will prove quite as successful, probably; and in a few years one may look to see farms "set" in these herbs and others at various places in the South, and a profitable business done, on a limited scale, in distilling essential oils from them.

Broom-corn growing offers, in parts of the South, good inducements. Some years ago I thoroughly inspected this matter, with reference to the eligibility of the prairies of East Mississippi, with a celebrated raiser—Mr. Bogardus, of Champaign, Ill. He found that the quality would be as good as the Kansas broom corn, and the quantity per acre raised equal, if not superior, to any place of which he knew. This industry and the manufacturing of brooms ought to progress rapidly, and some day will have adequate consideration by those who are looking South for openings.

Floriculture as a vocation is only beginning to command attention from adepts here and there. It is difficult to see why the South cannot sell a good many more tube-roses, camellias, roses and other flowers than she does to the North and West. We are not so far off; and as we can have these flowers in the open air and on cheap lands, I hope to see more of it. Near the large cities in the South quite a business is being done for home supply; and it is an unspeakable charm to meet on all our crowded thoroughfares, in winter, the colors and perfumes of flowers.

Raising ramie is next to nothing South. Some twelve years ago I first saw it raised by some gentleman in Mississippi whose name has been forgotten. As it is a plant very little known, the following information concerning it from Col. Daniel Dennett, in the New Orleans Picayune of January 12, 1885, will be of interest:

"The New York Dry Goods Bulletin and Textile Manufacturer of December 20 contains an interesting article from the pen of Henry Sandford Bergman on 'Practical Results of Ramie Culture,' from which we copy the following encouraging paragraphs:

"For several years the farmers in the northern part of France have raised ramie as a better paying culture than that of wine.

"Three crops can be raised in a year—in the middle of the months of June, August and October.



“The three crops will amount, in a good season, to 90,000 kilograms per acre, worth \$475

“The cost of roots, planting and labor amounts to about 6,000 francs per acre in the first year. In the following years no cost, except for labor, will be incurred, as the ramie plant is perennial.

“The decorticating and baling of the fibres is generally done on the spot, under a shed. The stalks are sold for 8 francs per 100 kilograms.”

“Mr. Roetzel, soon after the war, brought ramie roots from Mexico to Louisiana, and planted and sold many roots. Mr. A. B. Bacon, of the New Orleans Picayune, took a lively interest in the enterprise, and ventilated it freely in the columns of this journal. At that time the belief was general that ramie would be more profitable on the rich lands of Southern Louisiana than either sugar or cotton. Ramie will grow in this soil as well as in the best soil of France or Algeria. Nobody ever questioned either the value of the fibre or the wonderful yield which may be obtained from the alluvial lands of the Gulf States. The machine to prepare the fibre for market is all that has been wanting, and we have not quite got hold of that machine up to the present time. T. Albee Smith, I think, has come closer up to the mark than any other; and he has a mechanical, matter-of-fact talent which, it appears to me, must lead to ultimate success. There is nothing visionary about him; he is cool and calculating; he searches for bottom facts; has a thorough knowledge of fibres in all latitudes, and has none of the lofty notions of Col. Sellers, that ‘there’s millions in it.’ He will have a machine at the great Industrial Exhibition in this city. He is here, and will remain here, to help solve the question in regard to the fibre interests of this country.

“Not many years after ramie was brought to this city from Mexico, Dr. Knapp planted a large surface, and had a field at one time of more than fifty acres, near New Orleans, if I remember correctly. He was very hopeful for many years that this would become one of the leading agricultural interests of the State and of the South. The yield per acre was bountiful and entirely satisfactory. A machine was all that was needed to make this industry very successful. After Dr. Knapp’s death, his son, a dentist of this city, kept up the cultivation to some extent, and still cultivates this crop, believing that the much needed machine will soon make its appearance.

“Mr. Emile Lefranc, of this city, invented a ramie machine many years ago; others in the State invented machines, but none of them have proved successful. Mr. Lefranc afterward experimented with chemicals in separating the pure ramie fibre from all gummy and foreign matter, with considerable success. He now lives in Philadelphia.”

I have been shown some of the fabrics of the loom made from this plant. They are exceedingly soft and beautiful, and such close imitations of sealskin as to deceive almost any one at a little distance.

### IRON INTERESTS.

Let us look a little now at the South with reference to some of her minerals, of which iron is among those of the first importance. As this book is for the trans-Atlantic reader as well as the American, I shall give some views from English authorities as to competition of the United States with Great Britain. I quote from a pamphlet entitled “The Hill Country of Alabama, U. S. A.; or, The Land of Rest.” This is a work devoted to showing the resources of Alabama, but, incidentally, it contains much interesting collateral matter. On page 2, *et seq.*, we find a statement of the aims of the work as follows:

“It is desired to address some distinct prefatory remarks to two classes of readers, namely:

“(a.) To those interested in the iron and coal industries of Great Britain.

“The testimony collected from impartial and reliable sources in the first two chapters of the following pages proves beyond possibility of doubt that the present period of depression in these important industries in Great Britain is not due to a mere monetary crisis, but to causes far more deeply seated. An actual revolution has taken place, and the results may be shortly stated as follows:

“1. The entire loss of the American market for both crude and manufactured iron.

“2. The growth of American metallurgy, enabling it to compete with Great Britain in many of her best markets.

"3. The supersession of iron by steel—the latter being universally recognized as the 'metal of the future'—and as a necessary consequence, disturbance and disorganization in the chief centres of industry within Great Britain itself.

"4. The enforced introduction of new processes and enlarged works, in sheer self-defence, by all old-established works.

"5. A struggle for existence, which has already resulted in more than one-third of the English and Scotch furnaces being out of blast, with an agitation for a diminished output by the remainder.

"6. An increasing export from the Cleveland district to foreign countries, especially Germany, thereby forcing their smelting furnaces out of blast, and constituting them makers of cheap finished iron in successful competition with our more expensive articles of manufacture.

"The foregoing drawbacks are further attended with a strife between British capital and labor, which, in the opinion of many competent authorities, can only be successfully met by the introduction of Chinese or Japanese workmen.

"In such a state of affairs, three things are unmistakably clear:

"1st. That an immense amount of capital and labor, both skilled and unskilled, has been rendered unproductive by reason of a reckless disregard of the laws which regulate sound progress in trade and healthy competition.

"2d. That things have come to such a pass, that it is not merely the ill-conditioned and badly-managed works which must succumb in favor of those possessing superior advantages, but that even the latter, in view of the altered condition of the trade, are threatened with a severe struggle for continued existence.

"3d. That there is nothing left but to submit to the inevitable, and acknowledge the inexorable law of 'the survival of the fittest.' Any attempt to prolong by any temporary expedient, such as a general reduction of output, the existence of works unequal to the crisis, must end in their entire extinction, instead of simple elimination.

"For capital and labor so situated there can be no alternative but to realize while there is a chance of getting free, and to seek another chance of successful competition by occupying new fields of enterprise where the conditions of employment are more favorable.

"The causes (above enumerated) which have led to the present condition of these British industries point to the United States as the sphere where such new fields exist; and it is also plain, from the weighty testimony of the eminent geologists and men of science here quoted, that these are to be found, in a measure, unequalled even on the American Continent, in that region of Alabama to which we desire to direct public attention."

The author then proceeds to support his assertions. Treating of "The Rapid Development of the Coal and Iron Industries in the United States," he says:

"Without endorsing entirely the opinion expressed by Professor Boyd Dawkins on the 18th of December last, at the Manchester Geological Society, 'that inasmuch as the United States have by far the largest supply of coal of any country in the world, we must look upon that country as the centre to which all British industrial enterprise must ultimately converge,' we ask our readers to accept implicitly the argument of another eminent professor, (Professor Prichard at the last Brighton Congress,) that the co-existence of all the essentially independent existences, viz: stores of iron and coal and sulphur and silica ready for the use of man in any particular region, such as is here shown to co-exist in Alabama, is the evidence of a pre-established harmony, the result of a prescient will, and that, sooner or later, it is destined to be the seat of a large population equal to any which the same existences have called into being."

Passing on, we come to where Mr. Lowthian Bell is quoted:

"In area of coal-bearing strata, the United States, according to present information, rank far above every other nation—the estimated superficial contents of its coal fields being about 200,000 square miles, against 8,000 in Great Britain; the fuel contained in those fields being quite as pure and quite as suitable for iron purposes as the average of the produce of our British collieries; whilst the facilities for working bituminous seams, owing to the stratification and the intersection of the surface of the country by valleys, admitting of the coal being worked by adits or drifts, enable the seams to be reached at very little cost—2,000l. in many cases sufficing for an opening capable of affording 300 to 400 tons per day. I heard of bituminous obtained so easily that, delivered at the pit's mouth, its cost did not exceed 3s. per ton; but looking over the long series of figures I

collected, I feel that an average of 5s. will amply represent all expenses, including say 6d. per ton for royalty, of working bituminous coal in the United States. No one with any acquaintance with the cost of coal in Great Britain will be disposed to consider that we enjoy any advantage in this important element, of which something like thirty-five to forty millions of tons are at present required in our iron works.”

The above is from Mr. Bell's report as president of group No. 1, at the Philadelphia (Centennial) Exhibition in 1876.

Omitting an interesting review of the “Iron and Steel Trade of America,” I pass to where he speaks of the United States in “competition with Great Britain in all the markets of the world for manufactured iron.” On page 16 the author says:

“In the year 1875 Mr. Lowthian Bell, after his first visit to the United States, read a paper before the Iron and Steel Institute of Great Britain, in which he described exhaustively not only the existing iron works in the United States, but also the geographical position and general nature of the fuel, ores, and other materials required in the manufacture of iron. Little as the mineral resources of the South, and especially of Alabama, were then known, they came in for a large share of his attention, and so much impressed was he with their extraordinary extent and character that, whilst stating his then conclusion, ‘that it is a physical impossibility that iron can be made more cheaply in the United States than it can in England,’ he thought it necessary to qualify the statement by the following saving clause: ‘So far I am taking no account of the comparatively undeveloped resources of Tennessee, Georgia and Alabama, which will, as I have already indicated, prove a match for any part of the world in the production of cheap iron. But Mr. Bell goes on further, ‘there seems every reason for believing that pig iron can now be laid down in the Southern States mentioned above, at little above half the cost of that made in the North,’ and he subsequently adds the following warning to the iron-masters of the Northern States: ‘In a political point of view no argument can be, as I believe none will be, advanced by the North against the development of the iron resources of the Southern States, and yet it is by no means impossible that some less favorably situated works in the former may suffer more by the competition which, before long, may spring up nearer, than from any that we in this country (Great Britain) are able to offer.’ \* \* \*

“Mr. Lowthian Bell, having again visited the United States in May, 1876, as the British Judge in the department of Minerals, Mining and Metallurgy, including Machinery, at the Philadelphia Exhibition, has since made to the British Government a still more elaborate report on the iron manufacture of the United States, and a comparison of it with that of Great Britain, in which he now makes the following comparisons as to the relative richness and purity of ores of the United States and of Great Britain: ‘The average production of iron in the latter, will be a trifle under 35 per cent., whereas, the produce of the mines of the United States will be about 56 per cent., which means that for each ton of iron made, there is 20 per cent. less ore to be dealt with by the American iron master than by ourselves. Less than 12½ per cent. of the total quantity of ore raised in Great Britain is fit for the Bessemer works, equal to about 17 per cent. of the annual value of pig iron; whereas, in the United States almost one-third of the produce of its mines is sufficiently free from phosphorus to furnish iron fit for Bessemer purposes,’ and he further records his unhesitating opinion that the American manufacturers are as fully alive as ourselves to the importance of careful study of the natural laws which influence their various processes and affect the quality of the products, and that every improvement which experience had mastered in this country was carefully noted by American metallurgists, and any defect in existing arrangements was corrected in the magnificent steel works and rail mills, which since then have been constructed in the United States.

“The general conclusions which this eminent authority arrives at in this report to the British Government, are:

“That the powers of iron production in the United States are already equal to any possible requirements of the country itself.

“That although markets may be opened for American iron in countries contiguous to the United States, he does not expect that the continent of Europe, much less Great Britain, will ever be purchasers of the metal, in any of its unmanufactured forms, produced in the interior of America, regard being had to present prices and to the position of the present known sources of supply of the raw materials there.’

"The admission here made that articles of iron and steel of American manufacture may probably find a market in Europe, ought to satisfy every reasonable American iron-master, but the saving clause at the end requires to be specially noted as going to the root of the whole matter, which it is the object of these pages to enforce, namely, that successful competition, whether local or international, can only be secured in these days by every iron-master, whether smelter or malleable iron manufacturer, being the owner of all or some of the raw materials so as to place himself beyond the reach of those causes which, as Mr. Bell demonstrates, have reacted on the value of the raw material, and, in conjunction with the increased demands of labor, have produced the recent crisis in the United States as well as in Great Britain. These causes are investigated most minutely by Mr. Bell in the body of his report, and may be shortly stated to be as follows:

"Owing to the fact that furnace owners in America, as a rule, did not possess their own collieries and mines, they were at the mercy of the owners of coal and iron ore. The former being the coal producing and coal transporting companies, raised coal to a famine price, and the mines of the latter proved wholly inadequate to meet the increased demand from the new furnaces, which, under the influence of high prices, had come into existence."

I have quoted from this English book, addressed to English readers. Its arguments in favor of an American state, Alabama, are taken from the highest authorities among English writers and scientists. For these reasons they are used. They are above suspicion. They are not the vaunts of a citizen of the United States about his country, but the hardly wrung concessions of patriotic Englishmen as to the United States. In one sense it would be more to my purpose to quote later authorities as to the *status* of the United States and Great Britain and their present antagonisms, and the probabilities of future competitions; but in another sense my purpose is better served by quoting what, in view of the marvellous development the United States, in the regard in question has made within ten years, appear very antiquated views. The fact that some of Mr. Bell's prophecies have not only been fulfilled, but surpassed, gives to his unfulfilled predictions an authority that must command great deference. Another advantage gained in quoting these old previews of Americanism is, that there can be no questionings in the most conservative or even skeptical of trans-Atlantic readers, as to what the United States now is. Every reader, at all informed as to the matter in question, knows that as to what has been fulfilled, Mr. Bell's predictions are understatements.

And now the argument is, that if the United States is to become, or has become, such a competitor of Great Britain, mainly through the development of the coal and iron industries North, *a fortiori* will the South become her competitor and that of the world; since she has, even at this early stage of her development, become the competitor of the North in the production of pig iron and its sale in the very markets of the North.

The growth of the iron interests of the South during the last few years has been the marvel of the age, attracting the attention of the entire business world. History records no such stupendous developments in the o'd world or in the North in iron making as we have seen in the Southern States since 1880, or more correctly since 1884. Prior to 1884 the iron masters of the North affected to despise the possibilities of iron making in the South. Even when Southern iron commenced to invade the markets of Philadelphia, New York, Boston, Pittsburgh, and other Eastern and Western cities that had been monopolized by Northern iron, they claimed to be indifferent, saying that the "competition" from Southern iron was due solely to the contraction of the natural market therefor, aided by exceptionally low freight rates; that both causes would disappear with the revival of trade, and that the receipts were due to the pressure on Southern makers to dispose of surplus production. The South and Southwest, it was explained, were scantily supplied with foundries and mills; that existing depression in trade had

shut down many of those that had been the steady customers of Southern furnaces, and that the surplus output was therefore obliged to seek other outlets; that the trade stagnation had its effect on the railways, steamboats (coasting) and sailing vessels, and reduced their charges for freight; that Southern pig-iron makers were thereby enabled to send iron North when they would not otherwise be able so to do, but that they could not when consumption of products generally became more active and produced an advance in freights. Southern furnaces, they said, and how often did the writer hear this, were losing money on every ton of pig iron they shipped North. In less than two years there has been a revolution in the feelings of Northern iron men as regards the iron interests of the South. It has been seen that instead of furnace owners losing money, as was claimed, they were steadily becoming richer and as rapidly as possible enlarging their productive capacity by building new furnaces. As one company after another commenced the erection of additional furnaces, and as the shipments of pig iron North steadily increased, Northern iron makers were forced to admit that they had underestimated the iron possibilities of the South. Mr. Samuel Thomas, of the great Thomas Iron Company, of Pennsylvania, after thoroughly investigating the advantages of Alabama for the cheap production of iron, concluded to build furnaces near Birmingham, and he and his associates organized a \$1,000,000 company which is now putting up one furnace, with the plant so arranged that others can be added after this is finished. This move attracted wide attention, for it was the strongest possible endorsement of what the press and the people of the South had so persistently claimed. During 1886 new companies organized to build furnaces were formed so rapidly as to fairly bewilder one who attempts to keep the run of new enterprises, and at this writing there are no indications of any let-up in the stupendous developments that each day brings forth in the South. The center of the greatest activity has been in Alabama and Tennessee, but in Virginia plans are being matured for gigantic iron enterprises that promise to make the Southwestern part of that State, so rich in mineral resources, rival to some extent the first two States in the manufacture of iron and steel.

The vast developments that are now being made in the iron interests of the South will be best appreciated by a summary of some of the most important enterprises now under way. The Pratt Coal & Iron Company, and the Tennessee Coal, Iron & Railroad Company, which were consolidated in 1886 with a capital stock of \$10,000,000, have five furnaces in operation, are now building five more, and will also erect steel works. Four of these furnaces and the steel works will be located at the new town of Ensley, near Birmingham, and one will be added to the three owned by this company at South Pittsburgh. The magnitude of the business carried on by this great corporation is seen from a recent letter from the manager to the *Manufacturers' Record*, in which it is stated that with their five furnaces they are now turning out more iron than the Thomas Iron Company, of Pennsylvania, with its twelve, and that they are shipping iron to Canada, Connecticut, Massachusetts, Rhode Island, New York, New Jersey, Pennsylvania, California, Utah, Nevada, Montana, Texas, and all the intervening States and Territories. The Sloss Furnace Company, of Birmingham, having a capital stock of \$500,000, lately sold out their entire property for \$2,000,000 to the Sloss Iron & Steel Company, which has a capital, including bonds, of \$5,000,000. This company now has two furnaces, and has contracted for the building of two more, besides a steel plant. A well-known Pennsylvania iron maker, who a few months ago, as he stood on one of the mountains of iron at Birmingham, was forced to exclaim in view of what he saw, "it costs me in Pennsylvania \$15 to \$16 to make a ton of iron, while I can make it here for \$7.50," has lately headed a company with a capital of \$1,500,000 to build two furnaces, coke ovens, &c., just where he stood

when making this remark. The De Bardeleben Coal & Iron Company, with a capital of \$2,000,000, is building two furnaces and will probably erect a steel plant at the new town of Bessemer. The Coalburg Coal & Coke Company has increased its capital from \$500,000 to \$700,000 for the purpose of building a furnace. A \$3,000,000 company has decided to build three furnaces at Florence, Alabama, and develop other industries, while at Sheffield five furnaces of 125 tons capacity are under contract to be built; and at South Pittsburgh, Tennessee, two 120-ton furnaces, besides one included in the five to be built by the Tennessee Coal, Iron & Railroad Company, are to be put up. Plans are being formed for building a number of furnaces at Decatur, Alabama. The Williamson Iron Company has just built one furnace at Birmingham. The Woodwards, of Wheeling, Alabama, have added another to their plant, and one has lately been completed at Aetna, Tennessee. A \$200,000 Chattanooga company will build a 100-ton furnace; one is under construction at Ashland, Kentucky, and one in Virginia, and two are to be built at Nashville, while a number of other companies, with capital ranging from \$500,000 up to \$5,000,000 in one case, have been organized in Southwest Virginia, Tennessee and Alabama to develop coal and iron ore property, build furnaces, &c., which have not yet fully matured their plans. At Anniston, Alabama, which has been aptly called the "Model City of the South," so perfect is it in all its appointments, gigantic enterprises are taking shape. Of this beautiful town Hon. Wm. D. Kelley, of Pennsylvania, in his recent article in the *Manufacturers' Record* upon the industrial progress of the South, as seen during his visit to Alabama and Tennessee, in December, 1886, wrote: "I venture the prediction that though Anniston has never had a 'boom,' and its planting and development have been managed so quietly that its name is hardly recognized by the popular ear, it will, before two decades shall have passed, be one of the most remarkable centers of iron, steel and kindred industries to be found in those wonderfully endowed States, Georgia, Alabama and Tennessee." Already this prediction seems sure of fulfillment. The Woodstock Iron & Steel Company, which founded this town, built its furnaces and factories, its magnificent Anniston Inn, widely known as one of the most beautiful and perfect hotels to be found in the country, its electric light and water works, laid out its streets and encouraged the development of many industries, has made arrangements for the immediate construction of two coke furnaces of 1,000 tons weekly capacity each, which will be the largest in the South, and the building of a direct rail line to Gadsden. Several other companies have been organized to erect furnaces at the same place, and at one bound Anniston has sprung into the widest notoriety, and gives promise now of fully rivalling, within a year or two, the tremendous industrial progress that has made Birmingham known throughout the world. It is reported that arrangements are being made for the erection of large locomotive works in Anniston, and should they go into operation that place will have the distinction of being the only city in the South, if not in the country, where a complete train, from the locomotive to the cars, can be turned out of its shops, using only the raw material produced within its limits. Its furnaces make a high grade of car-wheel iron which is turned into wheels at the large car wheel works there. The axles are made at the same place. The cars, complete, are produced at the car shops there, and now it is proposed to build locomotives.

Of Birmingham and its remarkable growth it is scarcely necessary to say much, as this town has been more widely advertised through the letters of prominent men who have visited it than any other place in the South. For several years it was looked upon as the center of all the developments in the iron interests of the South, and on this account it has attracted world wide attention, resulting in a growth in population and wealth that is indeed marvellous. In addition to

the many furnaces in operation in and around the town, a large number are now under construction. At Chattanooga the progress in iron industries has likewise been wonderful, and this city has the credit of being the first point in the central South where Bessemer steel was made. South Pittsburgh, Sheffield and other towns that are rapidly springing up are building furnaces and other iron works with a rapidity that is startling.

The progress that the South has already made in the manufacture of pig iron is strikingly shown in a recent article in the Manufacturers' Record, in which it was stated that in 1880 the South made 397,301 tons of pig iron; in 1885 it made 712,835 tons—a gain of 315,534. Three States—Virginia, Alabama and Tennessee—that in 1880 produced 178,006 tons of pig iron, in 1885 produced 552,419 tons—an increase of 374,413 tons, or 139,958 tons more than the net increase in the United States, the production in the whole country outside of these three States being 234,455 tons less in 1885 than in 1880. In 1886 the production in the South was still larger, and in 1888, when many of the furnaces now under construction have been completed, the South's output of pig iron will, it is estimated, be over 1,500,000 tons. Taking the three Southern States that are now the largest iron producers in that section, the production for each year from 1880 to 1885, both inclusive, was as follows:

	1880.	1881.	1882.	1883.	1884.	1885.
Virginia.....	29,934	83,711	87,731	152,907	157,483	163,782
Alabama.....	77,100	98,081	112,765	172,465	189,664	227,438
Tennessee.....	70,873	87,406	137,602	133,963	134,597	161,199
Total.....	177,997	269,198	338,098	459,335	487,744	553,419

With the increase in the production of Southern iron the shipments North have steadily enlarged, notwithstanding the rapid growth of diversified industries that use pig iron as a raw material. Bradstreet's, which has made a study of this matter for several years, shows the shipments to have been as follows:

	1883		1884		1885		1886	
	No. furnaces sending East.	No. tons sent East.	No. furnaces sending East.	No. tons sent East.	No. furnaces sending East.	No. tons sent East.	No. furnaces sending East.	No. tons sent East.
Maryland.....	4	7,577	4	3,772	1	250	1	1,186
Virginia.....	9	32,027	11	72,374	9	71,150	8	81,851
Georgia.....	2	1,375	2	5,540	1	508	0	.....
Alabama.....	3	2,665	8	10,250	7	22,814	6	25,000
Tennessee.....	4	700	7	4,333	3	4,000	7	22,175
Kentucky.....	1	4,364	2	3,800	2	336	1	4,000
West Virginia.....	2	10,101	1	2,500	0	....	2	5,500
Totals.....	25	58,809	36	102,566	23	99,058	25	139,712

The significance of the gain of 40,000 tons in 1886 over 1885 is found in the fact that it has taken place in the face of the extraordinarily increased demand for pig iron from recently established foundries and mills in the South, as well as from those located north of the Ohio and west of the Mississippi rivers. Illustrative of the growth in the demand for pig iron from local Southern establishments, it is noted that eight Southern furnaces, which shipped 42,000 tons of iron north of the Ohio river in 1885, have but 37,500 tons in 1886. Of these, Virginia furnaces sent one-third, Kentucky one-third and Tennessee one-quarter of the quantity mentioned. Of Eastern pig iron shipments from the South, those from Virginia increased from 71,000 to nearly 82,000 tons, or 15½ per cent. The most conspicuous gain, however, was from Tennessee. In 1884 seven furnaces shipped East some 4,330 tons, while in 1886 the total increased (all from Nashville and Chattanooga) to 22,175 tons, over 500 per cent. Kentucky is not sending East as much pig iron now as in 1883, and West Virginia only one-half as much.

One of the most gratifying features of the wonderful growth of the iron industries of the South is the wide diversity of new enterprises that are coming into existence for the production of finished iron goods. Machine shops, foundries, rolling mills, stove works, agricultural implement factories and other industries are being established all through the South; thus a home market for Southern pig iron is rapidly being developed that will require a very large part of the entire production, even when the new furnaces now under way get into operation. While the Southern people themselves are displaying the greatest energy in building up these new industries, the manufacturers of the North, now fully alive to the advantages of the South, are rapidly transferring their capital and energy to this new field. This drift towards the South is well illustrated in the case of Messrs. Perry & Co., the extensive stove makers of Albany, New York. Seeing that it would be impossible to retain their Southern trade much longer at their old works, they have commenced the erection of a stove foundry in South Pittsburgh, where they will give employment to 500 or more hands. In making an announcement of this change they stated that they had occasionally been buying iron from the South and shipping it back in the shape of stoves, which involved an expense of \$20 per ton on stoves that could be saved by building works in the South. It is this enormous saving in the cost of production that is so rapidly transferring Northern capital to the South.

The manufacture of steel has been commenced in the South under very favorable auspices, and the outlook for this industry is very bright. It was claimed for a long time that the South had no ores suitable for making Bessemer steel, but an experimental plant erected at Chattanooga proved the falsity of this. This plant is now in successful operation in connection with a nail mill. In 1886 the Roane Iron Company, of Chattanooga, whose works had been shut down for some time, decided to equip their establishment with the best machinery for making Bessemer steel rails. This plant has been nearly completed, and will probably be in operation early in March. At Richmond a Bessemer steel plant is under construction, and arrangements are being perfected for building at least one, and possibly more, at Ashland, Ky. The Tennessee Coal, Iron & Railroad Company will build a steel plant, as has already been stated, at Ensley; the De Bardeleben Coal & Iron Company promise one at Bessemer; the Sloss Iron & Steel Company write that they will erect a steel plant, and last year, when the Woodstock Iron Company changed its name to the Woodstock Iron & Steel Company, it was understood that steel works would be built at Anniston, and it is probable that this will now be done.

The immense deposits of Bessemer ore at Cranberry, North Carolina, really it may be said the immense mountain of solid ore, furnishes an inexhaustible supply of fine Bessemer ore. It is only within the last year or two that this ore has been mined on a large scale, but with the building of a railroad to connect these mines with the East Tennessee, Virginia & Georgia road at Johnston City, Tennessee, it became possible to ship Cranberry ore. Since then mining has been pushed very vigorously. A new road is now in course of construction, and when finished it will open this mountain of ore to even more direct connection with the outside world, and will no doubt result in more extensive developments of the iron interests of that whole section, including parts of Tennessee, Western North Carolina, Southwest Virginia and Kentucky. In Southwest Virginia, tributary to the Norfolk & Western Railroad, there are also large deposits of Bessemer ores, and Northern capitalists are preparing to locate a town on the Cripple Creek branch of this road, and to build very extensive iron and steel works. The abundance and cheapness of fine ores, good coking coals and limestone, assure a rapid growth of the iron interests of that section, now that this country has been penetrated by a railroad.



The question of the cost of making pig iron in the South has been much discussed, but in a work of this kind it is hardly advisable to enter into any argument as to how cheaply it can be produced. It may, however, be well to give some statements put forth by others. Mr. R. P. Rothwell, C. E., M. E., of New York, editor of the *Engineering and Mining Journal*, a high authority in metallurgical matters, recently made a personal investigation of the iron districts of Alabama and Tennessee. From a statement made by him, the following, as to the cost of making iron in parts of Alabama, is taken :

"100 of iron, at 2 cents a unit.....	\$2 00
Fuel, 1½ tons .....	3.50
Limestone .....	.30
Labor .....	1.50
	<hr/>
	\$7.30
Renewals and incidentals .....	1.00
	<hr/>
Total cost, exclusive of interest on capital or profit on mining.....	\$8.30

"Though these figures are not to be applied to any particular works, yet they are 'absolute figures of cost,' and nothing is 'assumed,' except the two items of renewals and incidentals.

Each of the principal items given above is 'bettered' at one or the other of the works. \* \* \* Enough has been done to show what can be done continuously, and to justify the statement that pig iron can be made at certain points in the Birmingham district at a figure not exceeding \$8 a ton, every expense included, even to that indefinite and mysterious item that makes its appearance when stock is taken at the end of the year.

The cost of making Bessemer pig in the Birmingham district is dependent solely on the distance from which Bessemer ores have to be brought. If Cartersville, with 150 miles haul, can supply the ore of desired quality, and yielding even 55 per cent. of iron, the increased cost of transportation over native ores would not exceed \$1.75 per ton of pig iron, and the greater cost of mining, if any, would be more than balanced by the lower fuel and labor items; so that, if we can assume that good Bessemer ores can be procured in quantity and in convenient location within 150 or even within 200 miles of Birmingham, it is possible to make Bessemer pig there at \$10.50 a ton, and possibly even at \$10.

These figures not only assure the prosperity of the iron-making industry in Alabama, giving it beyond question the Southern markets, but they are sufficiently far below the cost at a large number of Northern furnaces to enable Alabama to make the prices, if need be, in some of our large Northern markets."

Coming as these statements do from such an unquestioned authority, they prove that the wonderful advantages of the South for making cheap pig iron have not been exaggerated, but rather that they have been underestimated. Very few, even of the strongest advocates of Alabama's iron interests, have claimed that pig iron could be made in that State at \$8 a ton, and yet the proof that this can be done comes from a Northern source.

A writer in the *Manufacturers' Record* of November 27, discussing the same subject, makes the following quotation from a private letter as to the cost of iron making in East Tennessee:

"Much has been written and said of late as to the probabilities of the South taking the lead in the production of good and cheap iron. Let us look at the facts, for facts do not lie.

In East Tennessee we can put 60 per cent. ore, almost practically free from phosphorus, on cars at 50 cents per ton, or less in some localities. The percentage of phosphorus in a majority of the ores of East Tennessee does not average 3-110 tenths of 1 per cent., and this will be understood by those in the trade.

We can contract for coke as good, if not superior, to the Connellsville, Pennsylvania, coke at \$3 per ton. On the East Tennessee, Virginia & Georgia Railroad limestone is everywhere to be obtained, which is excellent flux, at 25 cents per ton. Here we have the whole matter in a nut shell, for the production of pig iron is not a matter of speculation, but one of calculation only. Let me give you simple facts in my estimate of production, and if any one can pick holes in such statements I shall be glad to learn :

## COST OF PRODUCTION OF PIG IRON IN EAST TENNESSEE.

Iron ore, say 2 tons, at 50 cents .....	\$1.00
Coke, 1½ tons, at \$3 .....	4.16
Limestone, 10%, say .....	.25
Labor, management and office expenses .....	2.59
	<hr/>
	\$8.00

It may be remarked that my estimate for coke is below the average in the South. I admit this, but in reply I can only state that I had the management of large works in Cleveland, Yorkshire, in England, where we always considered we were doing badly if our coke exceeded 27 cwt., and this with 40 per cent. ore. I will, for illustration's sake, copy from the report of a well-known firm at Middlesboro, Yorkshire, the following: "Our ore has cost us, by the foregoing statement, 4s. 3½d. per ton, and coke 12s. 4d."

Now, if we take these facts into consideration, and always remember that in Cleveland, England, they are dealing with a 40 per cent. ore, whilst we are dealing with a 60 per cent. ore, it will strike the practical mind that Tennessee possesses great advantages, for which time alone is required to put before the iron masters not only of the North, but of England. I am intimately conversant with every detail of the manufacture of iron in this State, in Cleveland, England, Yorkshire, in Wales, G. B., and in the Northern States, and managed the largest works in Canada, and I say, without fear of contradiction, that my figures are a true and correct representation of the state of affairs."

In Southwest Virginia, on the Cripple Creek Branch of the Norfolk & Western Railroad, where extensive iron industries are to be established by Philadelphia capitalists, the writer is assured on the best authority, that is, the actual results of a furnace in operation there, that high grade ore, much of which is suitable for Bessemer iron without any admixture, while the run of the mines only requires a very small percentage of Cranberry ore to produce Bessemer iron, can be put in the furnace at considerably less than \$1 a ton. Pocahontas coke can be delivered at \$2.50 per ton, and possibly less, while limestone is abundant and needs to be carted only a few hundred yards.

In an interview published in the New York Tribune during the latter part of December, 1886, Gen. Willard Warner, of Nashville, made the following statements regarding pig iron manufacture in the South:

"The pioneer in the manufacture of coke-iron in the South was Gen. J. W. Wilder, of Chattanooga, formerly of Indiana, who built the first coke furnace at Rockwood, Tennessee, in 1867, and the second in 1872 for the Roane Iron Company. These furnaces have been successfully and profitably run ever since, the Roane Iron Company paying regular six per cent. dividends on a capital of \$1,000,000. The most important single factor in the iron trade of this section is the Tennessee Coal, Iron & Railroad Company, which lately absorbed the Pratt Coal & Iron Company, of Birmingham, Alabama. The capital of this company is \$10,000,000, and it now has in operation five large furnaces—two at Birmingham, Alabama, two at South Pittsburgh, and one at Cowan, Tennessee, and is building four large new furnaces at Ensley City, near Birmingham, and one at South Pittsburgh. It owns 300,000 acres of ore and coal lands in Alabama and Tennessee, including the famous Pratt and Suwanee seams. This company in 1888 will make 1,200 tons of pig iron a day. Enoch Ensley is president; T. T. Hillman, vice-president, and Mr. Shook here is the general manager.

The Alabama & Tennessee Coal & Iron Company, of which A. S. Colyar, of Nashville, is president and I am vice-president, owns 70,000 acres of valuable coal and iron lands in Alabama, and has contracted for three coke furnaces at Sheffield, with a daily capacity for each of 125 tons. Messrs. Ensley, Parish, Shook and their associates are also building one large furnace at Sheffield, and the Sheffield Company the fifth. The South Pittsburgh Coal & Iron Company is also preparing to build two large coke furnaces at South Pittsburgh, with a daily capacity of 120 tons each.

The first furnace was built at Birmingham by T. T. Hillman in 1879-80. I saw the site of Birmingham in 1870 as a cotton field, and could have bought the land for \$10 an acre. Now the city has a population of 35,000 and lots are selling for \$1,000 a front foot. Col. J. W. Sloss built two large furnaces at Birmingham in 1881-82; Messrs. De Bardeleben and Underwood built the Mary Pratt furnace in 1882, and the Messrs. Underwood the Wheeling furnace, near Birmingham, in

1881-82. The Eureka Company, of which J. D. Farris, of Cincinnati, is president, built the two furnaces at Oxmoor, six miles from Birmingham, in 1876-77.

Citico furnace, Chattanooga. This was built by the Citico Furnace Company, H. S. Chamberlain, president, in 1874. This furnace and the two Rockwood furnaces are now making Bessemer pig iron from the Cranberry ore on the line of the East Tennessee, Virginia & Georgia Railroad. This iron will be used by the Roane Iron Company, at its mill in Chattanooga, for making Bessemer steel rails, beginning in February. This will be the inception of the manufacture of steel rails in the South. Capt. H. S. Chamberlain is also president of this company.

There are now building in this region eighteen new furnaces of large size and best modern type, as follows: Nine at or near Birmingham, five at Sheffield, three at South Pittsburgh, and one at Chattanooga. In 1888 there will be forty-one coke and seventeen charcoal furnaces in the region, not counting some small charcoal furnaces, which may be regarded as abandoned, with a total assured production, as I have already told you, of 1,500,000 gross tons."

In this statement Gen. Warner omits the two large furnaces definitely decided upon for Anniston, and several others, for the construction of which companies have been organized, in addition to a large number of furnaces projected at other places, such as Decatur, Selma, Montgomery, &c.

It is as certain that the South is to be the manufacturing center of this country in iron as it is that she is to be in cotton. The rapid increase in the production of pig iron is being followed by a diversification of iron manufactures, and the South has already commenced on a large scale to manufacture its own car wheels, stoves, agricultural implements, engines, sugar machinery, iron ships, locomotives, etc., etc. The first effect of this will be to supply the South with articles the South needs. Then the manufacturers will invade the West; and the East will lose that market. So many rivers pierce the South, giving such cheap highways to the West, forever erecting a barrier against exorbitant railroad rates; so many hard woods so superb, abundant and cheap, are found, to combine with iron in implements; labor is so cheap and free from strikes; mineral lands are so cheap; so that iron manufacturers can at once own coal, iron and iron ore, forbidding combinations against manufacturers—these and more surely foretell the great future for iron manufacture in the South.

In view of the great progress that the iron interests of the South are now making, it is of interest to quote the prediction of Hon. Abram S. Hewitt, of New York, one of the largest iron manufacturers of the North. Referring to Alabama, he said:

"I think this will be a region of coke-made iron on a scale grander than has ever been witnessed on the habitable globe."

Who will now question this in the light of recent events?

While the iron interests, as I have already said, and their kindred industries have attracted the greatest share of attention, it must not be understood that other lines of industrial growth are not making good progress.

In the building of lumber mills of all kinds, from the small portable saw mill to the mill costing \$50,000 to \$100,000, the erection of ice factories, flour mills, &c., there is great activity. In fact, while the iron interests have attracted the greatest attention, the growth of manufactures covers a wide range of industries, including foundries, machine shops, steel works, cotton and woolen mills, cotton-seed oil mills, cotton compresses, fruit canning factories, carriage and wagon factories, agricultural implement factories, flour mills, grist mills, saw mills, planing mills, sash, door and blind factories, shuttle factories, handle and spoke factories, barrel factories, shingle mills, furniture factories, tobacco factories, brick yards, ice factories, fertilizer factories, stove foundries, wire fence factories, lime works, soap factories, tanneries, glass works, gas works, whiting factories, distilleries, potteries, electric light works, marble and slate quarrying companies, and companies to mine coal, iron ore, gold, silver, mica, natural gas, oil, &c. It is a

healthy growth. Instead of all interest being centered in the establishment of a few big enterprises, the South has realized the importance of the small factory and workshop, and so we see springing up everywhere small factories, requiring but a few hands and a little capital, for producing the many articles of manufacture needed everywhere. Finding at first a local market for their goods, these factories will gradually extend their facilities and widen the scope of their trade, until they develop by a natural process into extensive enterprises.

Included in the list of new enterprises reported by the *Manufacturers' Record* in the South during 1886 were: 28 iron furnaces, 50 ice factories, 68 foundries and machine shops, many of them of large size, 1 Bessemer steel rail mill, 26 miscellaneous iron works, including iron pipe works, bridge and bolt works, &c.; 8 stove foundries, 24 gas works, 34 electric light companies, 11 agricultural implement factories, 174 mining and quarrying enterprises, 16 carriage and wagon factories, 9 cotton mills, 23 furniture factories, 42 water works, 58 tobacco factories, 92 flour mills, 448 lumber mills, (not counting small portable saw mills), including saw and planing mills, sash and door factories, stave, handle, shingle, hub and spoke, shuttle block factories, &c., in addition to which there was a large number of miscellaneous enterprises.

### COAL.

The magnitude of the coal resources of the South is utterly beyond computation. The entire coal area of Great Britain covers only 11,900 square miles, while West Virginia alone has 16,000 square miles of coal fields, Alabama 10,680 square miles, Kentucky nearly 13,000, Tennessee 5,100, Arkansas over 9,000, and Texas estimated at over 30,000 square miles. Moreover, the coal is easily and cheaply mined, and is of the best quality. Some idea of how absolutely inexhaustible are the coal beds of the South may be gained from a few statistics regarding the Warrior coal fields, of Alabama, which is simply one of the coal fields of one State. Regarding the Warrior field, Prof. Henry McCalley, in his late geological report, says that it "contains about 7,800 square miles, and is about two-thirds as large as the entire coal territory of Great Britain. Its coal measures are over three thousand feet thick, containing fifty-three seams of coal, being from a few inches to fourteen feet thick, having a combined thickness of over 125 feet of pure coal. It is estimated that they contain not less than 113,119,000,000 tons, of which about 108,394,000,000 tons would be available. The coal is valued now at about \$150,000,000,000 at the mines of which \$30,000,000,000 would be profit, being about 200 times the present total assessed value of the property in Alabama, and would buy every foot of Alabama territory at \$900 per acre. These coals, like those of other fields in Alabama, are especially enhanced in value, owing to the proximity of vast deposits of red and brown iron ores and limestones."

In Maryland, Virginia, West Virginia, Kentucky, Tennessee, Alabama and Georgia, the coal-mining interests are of great extent and value, but are very insignificant as compared with what they will be in a few years. In several of these States extensive coal-mining operations are of comparatively recent origin, but it is in them that the most rapid progress is being made in the opening of new mines, and the enlargement of the output of those already at work. Maryland, Alabama and West Virginia are at present the leading coal-producing States in the South, the output in the first two being about 2,500,000 tons, and in the last about 3,500,000 tons annually, with the certainty of a large increase in West Virginia and Alabama during the next few years, as many new coal mines are being opened and worked on a very large scale. The coal mined in Maryland and West Virginia is largely shipped North, reaching Tidewater at Baltimore by the Baltimore & Ohio Railroad, at Washington and Georgetown by the Chesapeake & Ohio Canal, and at Newport News by the Chesapeake & Ohio Railroad. Newport News is the

tidewater terminus of this road, and, during the last few years, since the road was extended to that point, the coal shipments North, as well as the supplying of coal to ocean steamers, have rapidly increased. Virginia has not figured very prominently as a coal producer until within the last year or two—the yield in that State in 1880 being less than 46,000 tons. Very extensive mining operations are, however, now being carried on, mainly through the instrumentality of the Norfolk & Western Railroad, which has lately built at Norfolk, Virginia, one of the largest coal-shipping piers in the world, with a view to making that city a great coaling port. The coal-mining interests of the southwestern part of that State have been developed very rapidly during the last two years, and in 1886 the output of the mines in that section was nearly 900,000 tons. This coal is admirably adapted for coke making, and a large number of ovens are now under construction there.

Alabama, Tennessee, Kentucky, Virginia and West Virginia have all attracted great attention to their vast wealth of coal since 1880, and the increase of coal mining in these five States has been nothing less than wonderful. Twelve years ago the total coal product of Alabama was 10,000 tons, while in 1885 2,225,000 tons were produced. The increase in the South's coal production is very clearly brought out by comparing the amount mined in 1870 and 1880, as reported by the United States Census, with the output of 1882 and 1885, as given by Frederick E. Saward in his annual report entitled "The Coal Trade." The figures are:

STATES.	1870, TONS.	1880, TONS.	1882, TONS.	1885, TONS.
Maryland.....	2,345,153	2,228,917	1,294,316	2,462,485
Virginia.....	61,803	45,896	100,000	650,000
West Virginia.....	608,878	1,839,845	2,000,000	3,483,457
Georgia.....	.....	154,644	175,000	200,000
Alabama.....	11,000	323,972	800,000	2,225,000
Tennessee.....	133,418	495,131	850,000	1,440,597
Kentucky.....	32,038	946,288	1,300,000	1,700,000
Arkansas.....	.....	14,778	50,000	175,000
Texas.....	.....	.....	.....	175,000
Total.....	3,193,190	6,049,471	6,569,316	12,511,539

The rapid increase in the coal product of the South, as shown by these figures, will enable the reader to gain some idea of the progress of this industry; but the figures for 1885 will be much too small for 1887, as preparations have been made by new companies organized during 1886 for very extensive mining operations, which will probably make the yield of 1887 surprisingly large.

The growth of the coal and iron interests of the South has naturally caused a large increase in coke making, and in this line of industry the progress has been very great. A comparison of the production of coke in the South in 1880 and 1885 gives the following:

STATES.	1880, TONS.	1885, TONS.
Alabama.....	42,035	301,180
Georgia.....	70,000	70,669
Tennessee.....	91,675	218,842
West Virginia.....	95,720	260,571
Virginia.....	.....	49,139
Kentucky.....	.....	2,704
Total.....	299,430	903,105

During 1886 the increase over 1885 was very large, but the statistics of production are not yet available. In all the coking sections of the South new ovens are being constructed as rapidly as possible to meet the increasing demand for coke.

It is almost useless to attempt to make any predictions as to the future growth of coal mining in the South, so rapid is the progress now being made; but it may be accepted without any hesitancy, that the next ten years will witness a far greater development of this industry than the last five, for the South is really but on the threshold of its industrial era, and yet, in the last five years, the South's coal product has about doubled. Mr. Porter estimates that in ten years Alabama mines alone will produce 10,000,000 tons, nearly as much as the yield of the entire South in 1885.

## COTTON.

That the South is destined to be the center of the cotton manufacturing interests of this country admits of no questioning. Its natural advantages for this business are far superior to those to be found in any other section. The temporary depression in this industry is rapidly passing away with the return of prosperity to the country. During the great activity that preceded the late depression many cotton mills were erected in the South, some of them costing entirely too much in proportion to the number of their spindles, and some without sufficient commercial capital to have carried them through successfully even if business had continued prosperous. It was only natural that such mills should be seriously affected by the decline in values and the stagnation in trade that commenced just as they were about ready to begin operations. Taken as a whole, however, and considering the disadvantages of many mills, owing to the high cost of building, lack of sufficient capital and inexperienced management, the cotton manufacturing interests of the South stood the strain of the long depression remarkably well. They have, in fact, really emphasized the South's advantages for this industry.

Mr. Edward Atkinson, of Boston, in his report for the census upon the cotton manufacturing interests of the country, after showing the much greater advantages that New England possessed for this industry as compared with the most favored districts of England, wrote:

"It may be said that this proves too much, and that the cotton spinners of the Southern States will have the same relative advantage over New England. Let this be freely admitted. We are treating the question of the future supremacy of the United States in the manufacture as well as the growth of cotton, and if the future changes in population, wealth and condition of the different sections of this country shall cause the increase of spindles, especially in the coarse fabrics, to be planted in the healthy hill country of Northern Georgia, Eastern Tennessee and the Carolinas, it will simply be the greater evidence that natural laws are paramount. If Georgia has twice the advantages over Lancashire that New England now possesses, it will only be the fault of the people of Georgia if they do not reap the benefit of it."

The force of Mr. Atkinson's logic will assuredly be seen in the not very distant future. Not Georgia, the Carolinas and Tennessee only will be the seat of important cotton manufactures; the other Southern States will also share in this growth. As yet Texas has done almost nothing in this direction; but what a magnificent field for cotton manufacturing! Producing about 1,500,000 bales of cotton, and already having within her own borders 2,500,000 people, she exports her raw cotton and imports her dry goods. Besides supplying her own population that is so rapidly being added to, there is an immense field in the countries south of her for which she ought to manufacture large quantities of cotton goods. Too much, however, must not be expected immediately of the South in manufactures. Comparatively speaking, they are new, and it takes time to build up great industries with wide ramifications.

To show what has been done in the development of the cotton manufacturing interests of the South, the following comparisons, showing the number of mills, spindles and looms when the census was taken in 1880, and the number at the present time is given:

NUMBER OF COTTON MILLS IN THE SOUTH.

States.	1886.	1880.	Increase.
Alabama .....	31	16	15
Arkansas .....	3	2	1
Florida .....	2	1	1
Georgia .....	66	40	26
Kentucky .....	9	3	6
Louisiana .....	9	2	7
Maryland .....	26	19	7
Mississippi .....	14	8	6
North Carolina .....	97	49	48
South Carolina .....	34	14	20
Tennessee .....	43	16	27
Texas .....	5	2	3
Virginia .....	14	8	6
Total .....	353	180	173.

In the number of mills there has been an increase of nearly 100 per cent. The largest total increase, though not the largest percentage of increase, was in North Carolina. In that State the general disposition has been to build small mills and many of them, while in South Carolina and Georgia popular favor has been for large mills.

NUMBER OF SPINDLES AND LOOMS.

	1886.		1880.	
	No. of Spindles.	No. of Looms.	No. of Spindles.	No. of Looms.
Alabama .....	102,866	1,670	55,072	1,060
Arkansas .....	3,900	30	2,015	28
Florida .....	1,928	...	816	...
Georgia .....	385,613	8,648	200,974	4,713
Kentucky .....	29,704	671	9,022	73
Louisiana .....	45,644	936	6,097	120
Maryland .....	169,950	3,082	125,014	2,325
Mississippi .....	40,728	828	26,172	704
North Carolina .....	257,576	3,118	102,767	1,960
South Carolina .....	224,732	4,579	92,788	1,776
Tennessee .....	117,444	1,528	46,268	1,068
Texas .....	7,988	152	2,648	71
Virginia .....	72,624	1,762	44,336	1,324
Total .....	1,460,697	27,004	713,989	15,222

These figures show an increase of over 100 per cent. in the number of spindles, and an increase but slightly less in the number of looms. The States that show up most prominently in this increase are Alabama, Georgia, Kentucky, Louisiana, Maryland, North Carolina, South Carolina, Tennessee and Virginia. The increase in each State has been as follows:

	Spindles.	Looms.
Alabama .....	47,794	610
Arkansas .....	1,885	2
Florida .....	1,112	...
Georgia .....	184,639	3,935
Kentucky .....	20,682	598
Louisiana .....	39,547	816
Maryland .....	44,936	757
Mississippi .....	14,556	124
North Carolina .....	154,809	1,158
South Carolina .....	131,944	2,803
Tennessee .....	71,176	460
Texas .....	5,340	81
Virginia .....	28,288	438
Total .....	746,708	11,782

In the number of spindles and looms, Georgia has made the largest increase—184,639 of the former and 3,935 of the latter—while North Carolina is second in the increase of spindles, but is exceeded in the number of looms by South Carolina. These three States taken together show a very large gain:

	Spindles.	Looms.
Georgia .....	184,639	3,935
North Carolina .....	154,809	1,158
South Carolina .....	131,944	2,803
Total gain in three States .....	471,392	7,896

It may very truthfully be said that notwithstanding the increase in cotton mills in the South, that section has but a small percentage of the total number of spindles in the country. While this is true, yet everything must have a beginning. It is not so much to the aggregate number of spindles as to the percentage of increase in the different sections that we must look to rightly appreciate the position of this industry. In 1880 there were 10,653,435 spindles in the United States, of which the South had only 713,989, or 6.7 per cent.; while there are now 13,536,745 spindles, of which the South has 1,460,697, or 10.7 per cent. From 1880 to 1886 the increase in the number of spindles in the South was 104.5 per cent., while the increase in the balance of the country was only 21.3 per cent. It is this difference in the rate of increase more than the aggregate gain in the number of spindles that shows the progress of the South.

It seems quite obvious that in the future greater attention will be given to the manufacture of finer goods in all mills hereafter erected in the South. The hire for money will be less and less in the South, and is now from two to four per cent. less than it was only a few years ago. It is a reasonable inference that some of the manufacturers of machinery for textile fabrics will move South. Here are cheaper iron and woods. Here is to be in the future the great field of demand for textile machinery for cotton, and after awhile, no doubt, for wool. When the South shall get her cheaper home-made machinery for the purposes in question, and her lower rate of interest for the use of money, having her cheaper labor, her climate, etc., etc., it would seem that she ought almost to monopolize the cotton manufacturing of the world.

## COTTON SEED.

Another phase of development in the South since the war is that of manipulation of cotton seed, mainly for its oil, but also as a food for stock and a fertilizer. It is one of the most wonderful oversights of the South that cotton seed should have remained so long undiscovered, so to speak. They used to be regarded as a nuisance by planters, and were dumped into the rivers and bayous to be got rid of. It is only within a very few years that one could go on any plantation where there was a cotton gin, and not find large piles of the seed utterly unregarded. Now there is a demand for all that can be produced. This change has been brought about within three or four years for most of the South. Indeed, the precise merits of the seed as a food and fertilizer seem to have been unknown to science until very recently, according to Mr. John A. Myers, professor of chemistry in Mississippi Agricultural and Mechanical College, who, in an address some time ago, said: "Although the cotton plant has been cultivated in this country for almost a century, it is only within the last four years that the investigations of scientific men have been directed to it." According to his statement, "the first cotton-seed oil that entered the market came from Egypt to France in 1852. Since then there has been a gradual increase in the business; but there was no very great amount of it manufactured in this country until about ten or fifteen years ago. It has now become so general that there is a serious competition among the mills to secure as much seed as possible."

The development of the cotton-seed oil industry between 1880 and 1885 was something remarkable. In 1880 the South had 40 cotton-seed mills, employing \$3,504,500, while in 1885 the number had increased to 146, having a capital of \$10,792,450. The number of mills in the South, and the amount of capital invested in 1885, as compared with 1880, was as follows:

	1885.		1880.	
	No. of Mills.	Capital.	No. of Mills.	Capital.
Alabama .....	18	\$ 810,000	2	\$ 82,000
Arkansas .....	12	1,501,250	4	275,000
Florida .....	3	75,000	..	.....
Georgia .....	16	915,000	..	.....
Louisiana .....	16	1,840,000	12	1,557,500
Mississippi .....	21	1,217,000	8	450,000
North Carolina .....	9	275,000	..	.....
South Carolina .....	7	299,700	..	.....
Tennessee .....	17	1,731,500	9	935,000
Texas .....	27	2,128,000	4	202,000
Virginia .....	2	.....	1	3,000
Total .....	146	\$10,792,450	40	\$3,504,500

The preceding statistics show that in Florida, Georgia and North and South Carolina, this industry has been created since 1880, neither of these States having a single cotton-seed mill in that year. The greatest increase has been in Texas, where 23 mills and \$1,926,000 have been added. Arkansas is second in the increase in capital, but Alabama and Georgia are ahead of that State in the increase in the



number of mills. The aggregate increase in the business has been 106 mills and \$7,287,950. Prior to this large increase in the number of mills, the manufacture of cotton-seed oil yielded immense profits, well-managed mills, so it is stated, making as much as 50 per cent. profits a year, and often doing considerably better than that. These large profits naturally resulted in the building of many mills, and the production of oil increased more rapidly than the consumption, causing a decline in prices.

At the present time all interest in this business is centered in the American Cotton Oil Trust, an organization very similar to the Standard Oil Company. The Trust has succeeded in obtaining control of a large majority of the oil mills of the South, and there is much speculation as to the future of its operations. Many of the leading papers of the South have taken very strong ground against it, believing that it will work serious injury to the planters. Having the control of most of the mills, the Trust can dictate the prices of cotton seed throughout the greater part of the South. There has been some talk of the planters combining against this organization, but it hardly seems probable that this will be done. For awhile it was supposed that the Trust would secure possession of every cotton-seed mill in the South, and thus being able to regulate the price of the seed as well as of the oil, would be absolutely master of the situation. Lately, however, there has been some disposition on the part of one or two strong mills to fight this combination, and this has inspired others with rather more confidence.

Cotton-seed oil has entered so largely into so many articles, that it will be likely to enter more. It will, probably, largely supplant lard some day (when better refined) at the South, and possibly in other parts of the world. People are beginning to understand that they have been largely using it, while supposing they were using olive oil—the former being exported from the United States to Italy, and brought back labeled olive oil. So they have learned its merits, and can have a chance to be patriotic, at less cost, by its use under its true name. As a help to its further use, the following is given from Prof. Myers in the address above quoted:

“There is a great deal of poorly refined oil in the market which has seriously interfered with the ease with which it should find introduction. In refining, if the oil has not had the gummy and albuminous matter completely removed by the process, the oil has an extremely disagreeable cotton-seed oil odor and taste. If it has not been well washed or very carefully separated, it may have a portion of the soapy matters in it which is very disagreeable. If the cook who experiments with the oil for the first time strikes such a bad specimen, he is not likely to try another sample very soon. When properly refined, the oil may be applied to every use to which the non-drying oils are put. While the gluten and paraffine are present, it may be used to adulterate drying oils. When these are removed, it makes an excellent lubricating oil. If the palmitine be removed, it can be mixed with a number of the oils; and when bleached, cannot readily be detected from olive oil. We can make an excellent quality of soap from it, several specimens of which lie upon the table before you. By changing the process a little, we could convert it into most excellent miner's oil; or, if you wish it as lard, we will provide it for you. Do you desire it as butter? You can have it. If you desire to obtain glycerine from it, we can make it for you; and if you wish it in the form of ointments and plasters, you can get it by calling upon your druggist. Prejudice prevents, and will continue to do so for a long time, the use of the article in the kitchen; but if you will sell it dashed with lard, tallow or butter, people will use it. Some manufacturers have had to christen it ‘butter oil,’ ‘cookaline,’ etc., in order to introduce it.

“The great lard suit in Chicago this year develops the fact that much of the lard in the market contains at least twenty-five per cent. of cotton-seed oil. In this case, if I am not much mistaken, one of the witnesses testified that he had seen one hundred and twenty barrels of cotton-seed oil and forty hogsheds of tallow made into first-class lard in one day. Think of it, gentlemen! What a demand there must be for cotton-seed oil in Chicago, Indianapolis and Cincinnati! Probably the greatest application that the oil finds in the arts is in manufacturing soap. It is now a well-known fact that a very large portion of our finest toilet

soaps are made wholly or partly from cotton-seed oil. It is best for this purpose when mixed with other oils or fats. It is the cheapest of the oils that can be had for this purpose."

Although the use of cotton seed, either whole or ground, as food for stock may be rather said to be a discovery than a development, it has all the effects of the latter, since its use dispenses with much food once purchased West, and it will enable our farmers to throw into the market so much more of their production, (of what will make food for stock,) instead of consuming it, as before. Here is some striking language from the same source just quoted:

"There is not an animal produced upon a Southern plantation that cannot be fed and fattened upon the productions of that plantation, if they be properly prepared. It is simply the nonsense of fashion which leads the Southern farmer to send to the Northwest for his feed. The Mississippi farmer has at his door 550,000 tons of the very best feedstuff in the world, worth, at the rates at which we calculate the food values of different materials, \$23,880,000. If we compare this with the oat crop of Illinois, which produces more than any other State, we find that crop worth only \$25,558,000. We pay high prices for grain brought from the North, while we ship away or allow to waste a better feedstuff, obtaining for it less than half of its value.

"The farmer of the North can well afford to ship grain here and buy back cotton-seed meal. The values stand as follows: If corn is worth per 100 pounds \$1.11 as a feedstuff, cotton seed is worth \$2.08, cotton-seed meal \$2.30, oats 98 cents, cow peas \$1.33, good hay 75 cents. These valuations are given in 'Stewart's Feeding Animals,' which has lately been published, and are based upon the most carefully made analyses.

"The feed value of the cotton-seed meal and cake is not appreciated by the Southern farmers as it is by those elsewhere. Where competition is the greatest and the farmers the most intelligent, or where there is necessity for economic feeding, we find cotton seed is most highly prized. There we have no complaints about it killing stock. It is only where the farmers are so careless as to allow their stock to eat too much of it without other food that it will kill the stock. Corn, wheat and oats, under the same considerations, would do the same, probably; though as they are not so rich, they are not so likely to do it as the rich cotton seed and its products are. We have no hesitation in saying that the cotton-seed meal or cake is one of the best feedstuffs that is produced in any climate. The meal is better than the seed, but at present prices the farmer cannot afford to sell his seed and buy meal."

Putting the whole of the South at only six times as much, (for Mississippi now does not produce one-sixth of the cotton crop of the United States,) here is not less than one hundred and forty million dollars as a feed value in the Southern cotton seed every year; and it may be said to cost nothing to make it, (given by nature's bounty,) because the cotton crop must be made anyhow, and would cost as much to do so without as with the seed. Let the Western farmer think how many bushels of corn and oats, how many bales of hay, this large sum will buy; or, rather let him reflect how much of these raised by the Southern farmer can be sold by him in competition with him, (the Western farmer,) because he (the Southern farmer) has cotton seed as a substitute, largely.

It is to be hoped that the South will learn more and more to use the cotton seed as a fertilizer. I know, from my own investigations, that this has grown in parts of the South to a wonderful degree. Mills that a few years ago sold all or nearly all their oil cake to Europe, now sell in the shape of cotton-seed meal for a fertilizer, instead of sending it to enrich the soil there. Professor Myers computes that cotton seed "simply as a fertilizer are worth (on the basis for calculating the value of commercial fertilizers) \$16.86 per ton, or 28 cents per bushel." A good plan is to feed to stock, and get the fat as well as the fertilizer.

I shall close this topic by a further quotation from Professor Myers' address, hoping that what has been said may commend this great product of the South to greater appreciation and use. He says:

"The mills do not receive more than the one-half of the value of their products. For example, the meal is worth \$46 a ton as a feedstuff and \$42.18 as a fertilizer, while they obtain only \$20 for it. The only way to cause the price to rise is to have its value better understood, and especially by the Southern farmers, who will use more of it for feed and fertilizers, instead of sending North for both.

"And now, in conclusion, there is no agricultural product known to your speaker that has a value equal to this in almost any place that you can put it. You may take its hulls and use them for cattle feed, for fertilizers, for fuel, for car axles. The kernel you may use as a feedstuff, a fertilizer, or substance from which oil may be obtained. The oil is one of the best culinary articles, is of extensive use in pharmacy, and of almost unlimited application to the arts. It makes little difference whether you buy it as butter, as lard, as lubricating oil or olive oil; whether you apply it as a salve, a pomade or a soap; it is good, and good everywhere."

It would be quite germane while on this fertilizer side of cotton seed to say something at large on the development of phosphate mining and fertilizer manufacturing South, more particularly in South Carolina, and which is the outgrowth of the last few years. It is a most important topic, and one to which the South ought to give great, and will give increasing, attention. The wealth of the South in marls is incalculable, and some day they are destined to play a most important part in the agricultural supremacy of the South. Space forbids further elaboration, and I shall have to refer the reader to this topic in the article on South Carolina.

#### RAILROADS.

Although the mineral resources of the South and her vast forests have attracted much consideration and large investment, in no regard has she so much enlisted the attention of the nation or of Europe as in building railroads. This is the most commanding theatre of capital, and strikes the eye of the world not only for its colossal combinations of money, but the prestige of its participants. Some of the most sagacious and celebrated railroad men of this continent are largely interested in Southern railroads. Nor is the participation in the South's progress in this respect confined to the United States. The Erlanger syndicate, headed by Baron Erlanger, of Paris, and other rich foreign corporations, have invested during late years many millions of dollars in building new railroads and improving old ones throughout the whole South. These gentlemen and a number of others who represent capital in Europe and the United States have added untold and incomputable momentum to the progress of the South. While they may not have led the way in starting the South on her wonderful speed of development, they have largely added to and confirmed—sealed, as it were—the confidence of the civilized world in the eligibility of the South as a field for investment and enterprise; and the South owes an immense debt of gratitude to these monetary magnates who have stamped, with the golden seal of their capital, the indelible impress of their confidence. The logic of confidence in the South's progress is enunciated in the golden argument of capital, and is voiced in the fierce rhetoric of thunderous and clattering railroad trains. And these roads are bands of iron to bind our Union in the bonds of an indissoluble fraternity; and the cogency of common interest is added to the kindest friendship.

It were a vain task to attempt to keep pace with the Southern railroad projects. It seems as though almost every day brings a revelation of some new railroad scheme. It is quite certain that railroads are projected, surveys being made, "ground" being "broke," under the auspices of such wealthy corporations as to confirm public confidence in the seriousness and good faith of their operations and intentions. But to assume nothing as to the amount of capital to be invested in roads not actually built, the South can make an exhibit which is "both a pledge and prophecy" of her progress. The following table shows the railway mileage in the Southern States, 1887, compared with 1880:

	MILEAGE JAN. 1867.	MILEAGE JUNE, 1880.
Alabama .....	2,286	1,780
Arkansas.....	2,208	822
Florida.....	1,939	529
Georgia.....	3,274	2,433
Kentucky.....	2,069	1,560
Louisiana.....	1,393	522
Maryland.....	1,252	931
Mississippi.....	2,069	1,119
North Carolina.....	2,187	1,440
South Carolina.....	1,802	1,393
Tennessee.....	2,184	1,816
Texas.....	7,234	2,697
Virginia.....	2,727	1,697
West Virginia.....	1,143	692
	<hr/> 33,767	<hr/> 19,431

Here is proof of development and of the confidence of the capitalists of the civilized world to the measure of over 14,000 miles of railroad in six and a-half years, and that, too, during a comparative dullness in railroad building North and West for much of the time. At a low average, the construction of these 14,300 miles must have cost over \$350,000,000, in addition to which many millions have been spent in the purchase and improvement of old roads. According to Poor's Railroad Manual, the actual cost of the railroads now in the South and their equipment is over \$1,300,000,000, against \$679,804,000 in 1880.

The South has also progressed considerably in cotton production. If the cotton-picker should prove a success, the production of cotton will be greatly increased, and a revolution in the locality of cotton raising will ensue. In the Mississippi bottom, it is a common thing to make more cotton than is picked. It has been said that there is land enough in Mississippi, in what is called the "bottom," to make cotton enough for the present needs of the world. If, therefore, the cotton-picker will serve the purposes hoped for it, it would seem that the cheapest labor would gravitate there, and wreak itself on the most productive land. This will greatly enhance the price of those lands, rapidly bring them into cultivation, and greatly improve the healthfulness of the country. It will tend to depopulate the hill country, and, indeed, the now called cotton belt of the negro. Vast areas now devoted to cotton raising will be given over to raising stock, grass, cereals, etc. For awhile, at least, these lands, unable to compete with the rich bottoms in cotton production, will be even cheaper than now, until they become possessed by the numerous immigrants from the North, the West and Europe. These immigrants will not raise cotton. They will go into general agriculture, and will resuscitate these lands by "clovering," green manuring, the use of marls, etc.; and fruits, vegetables, cereals and live stock of all kinds will be raised. One can see that if all the cotton be produced on land that will produce a bale or more per acre, and can be picked, that cotton can sell at much less and pay better than now. If the pork and corn be raised near that is consumed in making it, then the business of cotton raising alone may be pursued with profit. But all this is conjecture; and yet it looks as though the "cotton belt" of the South might be on the verge of an agricultural revolution.

#### MILLING INTERESTS.

Still another development of the South is in her flour and grist mills. Making flour from Southern raised wheat is growing to be a very considerable industry. We shall not only make all we need for home consumption, but we shall find a large market in the peoples south of us, and shall send early flour North before the wheat raised there is fit for use.

It is hardly in place here, but may be noted, that the South will do an increasing business in making ale and beer from home-raised barley. Only a short time ago there were few breweries South. Now there are four considerable

ones in New Orleans alone. The South can raise fine barley, and will take up this industry in time and brew her own beer.

TIMBER RESOURCES.

I come now to a topic which is of vast moment—an advantage now impressing the whole world as no other advantage, except, perhaps, her mineral riches, does, although the latter does not impress such a multitude—her incalculable resources in her virgin forests of superb hard wood, pine, etc.

It would not be out of place here to give at length a list of the plants of the South, but limits, already transgressed, forbid. The South is very rich in her flora. Her altitudes and her climate vie in the production of plants; and as if by a beautiful caprice of nature, the stern native of austere climates elsewhere, here looks down from his lofty high upon the tropical beauties at his feet. Hale, in his “The Woods and Timbers of North Carolina,” on page 19, says:

“The mountains on the western border of the State are several hundred feet higher than any others in the Union, so that the difference of elevation between these and our sea coast occasions a difference of vegetation equal to that of 10 or 12 degrees of latitude. Thus, upon the higher summits are found species such as belong to the White Mountains of New Hampshire, those in the northeastern part of New York, and to Canada.”

In the census report on the forests of the United States it is said:

“The pine belt of the South Atlantic region still contains immense quantities of timber unequalled for all purposes of construction, although unsuited to take the place of the white pine of the North. The Southern pine forests, although stripped from the banks of streams flowing into the Atlantic, are practically untouched in the Gulf States, especially in those bordering the Mississippi River. These forests contain sufficient material to long supply all possible demands which can be made upon them.”

In discussing the hard-wood resources of this section, the same report says:

“Two great bodies of hard-wood timber, however, remain, upon which comparatively slight inroads have yet been made. The most important of these forests covers the regions occupied by the Southern Alleghany Mountain system, embracing Southwestern Virginia, West Virginia, Western North and South Carolina, and Eastern Kentucky and Tennessee. Here oak unequalled in quality abounds. \* \* \* The second great body of hard wood, largely oak, is found west of the Mississippi River, extending from Central Missouri to Western Louisiana.”

Elsewhere it is said that “the most valuable hard-wood forest remaining on the continent exists in Southwestern Virginia, Kentucky, Tennessee and North Carolina.”

The total amount of pine standing in the Southern States, as reported by the census, was as follows:

ESTIMATED AMOUNT OF MERCHANTABLE PINE STANDING MAY 31, 1880.

	LONG-LEAVED PINE, <i>Pinus Australis.</i> No. Feet, Board Measure.	SHORT-LEAVED PINE, <i>Pinus Mitis.</i> No. Feet, Board Measure.	LOBLOLY PINE, <i>Pinus Teda.</i> No. Feet, Board Measure.
North Carolina.....	5,229,000,000	.....	.....
South Carolina.....	5,316,000,000	.....	.....
Georgia.....	16,778,000,000	.....	.....
Florida.....	6,615,000,000	.....	.....
Alabama.....	18,885,000,000	2,307,000,000	.....
Mississippi.....	18,200,000,000	6,775,000,000	.....
Louisiana.....	26,588,000,000	21,625,000,000	.....
Arkansas.....	.....	41,315,000,000	.....
Texas.....	20,508,200,000	26,093,200,000	20,907,100,000
Total.....	118,119,200,000	98,115,200,000	20,907,100,000
Total of pine, all species .....	237,141,500,000 feet.		

The amount of pine standing in the whole country in 1880, not including the South, was about 94,000,000,000 feet, or much less than one-half of the quantity in the Southern States.

Dr. Kerr, in his special report as geologist in charge of the Southern Division of the United States Geological Survey, as to a portion of North Carolina, gives an interesting statement as to this vast range of *flora* within a comparatively limited latitude. The following is taken from his report:

"It will bear restating and emphasizing, that no other commercial route in this country of the same length as this railway, (with its navigable water connection to the seaboard,) includes so wide a climatic range. A reference to the geological report of 1875 shows a range of mean annual temperature from 66° at the mouth of the Cape Fear, to 45° on the Grandfather plateau; and these are also the figures for Southern Alabama, Mississippi and Texas on one hand, and Canada and Saskatchewan on the other; that is, the climatic range along this route of less than 300 miles, direct line, *is continental in extent*—from sub-tropical to cold temperate.\* The annual rainfall, given in the same report, for the Middle Region of the State is nearly forty-six inches, which is distributed in nearly equal amounts through all the months of the year.

"The above facts—the variety of soils, the wide range of temperature and the abundant rainfall—have, of course, found expression in a correspondingly great range of natural products; the *flora* having a really continental breadth and variety—from the palmetto and live oak on the one hand, to the white pine and Canadian fir on the other; so that what I have said in the geological report of the variety and richness of the forests of the entire State may be applied, with scarce a modification, to this tract, which includes both the extremes that gave its unique breadth of climatic and botanical characteristics to the whole; that is, there are about one hundred species of woods—more than in all Europe. Of twenty-two species of oaks in the United States, (east of the Rocky Mountains,) nineteen are found here, all (eight) of the pines, four out of five spruces, all (five) of the maples, both of the walnuts, three of the five birches, six of the eight hickories, and all (seven) of the magnolias; more species of oaks than in all the States north of us.

"Of the twenty kinds of timber admitted to the ship-yards of New York, nearly all are found here. The following is a partial catalogue of the commercial timbers common to one or another section along this tract: Pine, six species; white pine, fir, three species; hemlock, juniper, cypress, red cedar, oak, fourteen species; hickory, six species; walnut, two species; chestnut, beech, black locust, maple, three species; ash, four species; elm, three species; cherry, holly, dogwood, gum, two species; sassafras, palmetto, magnolia, (cucumber tree,) persimmon, poplar, birch, two species; sycamore, tulip tree, (poplar,) linn, (basswood)—sixty-four species valuable for their timber."

The favor into which Southern lumber has grown of late years is very surprising, especially pine and cypress. The latter wood grows in but few of the States. Mr. Thomas Hassan, Jr., secretary Mechanics, Dealers and Lumberman's Exchange of New Orleans, La., says of it:

"The merits of this wood destine the trade in it to become one of the most important industries of this State. No other timber combines in so happy a degree the essential qualities of durability, cheapness and ease of manipulation. For factory work it has no equal, and sash, doors and blinds made of it are always preferred by builders. It is invaluable for ship building, its durability placing it second to live oak alone. In the cooperage industries it has, in this locality, for a long time, been in use. In house building it should be as strong with its cheaper rival, yellow pine, as its durability more than counterbalances the difference in price."

Southern pine is rapidly winning its way into popular favor in nearly all parts of the United States and also in foreign countries. The shipment of this lumber from Pensacola, Pascagoula, Mobile, Jacksonville and other Southern ports to Europe has become an enormous business during the last few years, and gives employment to many vessels, both sail and steam. From the same ports millions of feet of yellow pine are shipped to Baltimore, New York and other Northern cities, a very large fleet of fine coasting vessels being constantly engaged in this trade. The Western cities are also large consumers of this lumber, and in

\*"In Watauga, one readily imagines himself in Vermont or Ontario; and among the rice fields and palmettoes of the Lower Cape Fear, one has the agricultural landscape of the gulf coast."

this direction, as well as in the others already mentioned, the demand is steadily increasing.

The enormous timber resources of the South and the great variety of woods to be found there, coupled with the remarkably low price at which the best timber can be purchased, give that section very superior advantages for the establishment of furniture factories and enterprises of a similar character. There are already quite a number of flourishing furniture factories in the South, but so far they are mainly confined to the production of the cheaper grades. With the rapid increase of wealth in the South there is naturally a steady increase in the demand for high-priced furniture. The representative of a large Northern furniture factory which has an immense Southern trade has lately expressed to the writer his surprise at the noticeable increase of late in the amount of the very finest furniture now sold in that section. At the present time, notwithstanding its almost limitless timber resources, the South buys the great bulk of its furniture, both cheap and high-priced, in the North and West. In this line there is a most excellent opening for those who understand the business and who desire to engage in manufacturing in the South.

The general lumber business in the South is very prosperous, and there is hardly a manufacturing interest in the South so well diffused and developing so rapidly as this. In much of the pine-woods district of the South the saw mill is the forerunner and foundation of the town.

The increase in the last few years in the number and capacity of saw mills in the South has been so enormous that the census statistics give but little idea of the present magnitude of this industry; but as no other statistics are obtainable, it may be worth while to give the census figures, as they show the extent of the business in 1880:

	NUMBER OF ESTABLISHMENTS.	TOTAL STEAM AND WATER-POWER.
Alabama .....	354	9,234
Arkansas. ....	319	9,031
Florida .....	135	5,875
Georgia .....	655	15,300
Kentucky.....	670	17,587
Louisiana.....	175	5,128
Maryland.....	369	7,464
Mississippi.....	295	8,266
North Carolina.....	770	16,895
South Carolina.....	420	9,116
Tennessee.....	755	17,899
Texas.....	324	10,222
Virginia.....	907	18,091
West Virginia.....	472	11,481
Total .....	6,626	161,589

The aggregate amount of capital invested in these 6,626 saw mills was nearly \$25,000,000. While the number of saw mills has enormously increased since 1880, there has at the same time been a rapid increase in the number of other wood-working establishments. From Maryland to Texas many planing mills, sash, door and blind factories and enterprises of a similar character are being built, a goodly proportion of them being constructed in the most substantial manner and fitted with the best machinery to be had in the country.

#### ROSIN, PITCH AND TURPENTINE.

Another aspect of Southern development is in the production of rosin, pitch and turpentine. The increase in the business of turpentine and rosin manufacture has been very rapid. It is spreading in the pine woods in the South, wherever railroads open conveniences for shipping. It does not pay to haul the sap over ten or twelve miles to the "still." Any one who will study the statistics showing the growth of the trade of Mobile, Ala., and Savannah, Ga., conspicuously, can see how this branch of development has grown.

## ADVANTAGES OF THE SOUTH.

There are some advantages the South possesses and must ever possess over the North and West. One of the most conspicuous of these is climate. Let us consider this in some of its more prominent aspects—saving in fuel, clothing, food to man and beast, etc.

## CLIMATE.

Take fuel; compute the consumption of the aggregate of Southern cities and towns, and a like aggregate of population in Northern cities; consider that the consumption of fuel over the average territory of the South and North would be fully three months longer in the latter than the former; and the much greater consumption North during the months both use fuel for comfort, together with the three months mentioned, (when the South virtually does not use it for comfort,) would give fully three months advantage to the South over the North in saving fuel for comfort.

Take the principal cities North—those of a population of 100,000 and upwards—New York, Philadelphia, Brooklyn, Boston, Chicago, St. Louis, Cincinnati, Cleveland, Buffalo, Detroit, Jersey City, Newark, Milwaukee, Pittsburgh, Providence. These cities show in the aggregate, in the Census Report for 1880, 4,686,467 people. Allowing only fifty cents consumption of fuel *per capita* for three months, the aggregate will amount to over seven millions of dollars. Surely it is much within bounds to say that all the other cities of the North consume three times as much more, and at least, at a like cost, for the time in question. Any one can see then, that the South saves annually, a round sum of money, in the cost of fuel. Then, the cost of stoves, and above all, heating appliances will swell the cost of fuel to a much larger amount than I have named. In the South the open fire-place is most in vogue, and is all that is needed for much of the area, and is much more healthful.

The farmer can estimate the cost of winter at the North—in the expense of feeding live stock five months in the year. Let us take some figures and make some computations upon them. Below is given a tabulation which shows the live stock on farms in the States named, June 1, 1880. Several States and territories are omitted because there are some who would say of them: "They have their corn, and must feed it to their hogs and cattle, or they could do nothing. Their hay costs nothing but cutting, and it is worth nothing, for they can't sell it, as there is no demand." I give States where corn and hay are salable, and have a good cash value. The man who could, by some magic, have green pastures there in winter, could certainly pocket the value of the hay and corn he is forced, at that time, to feed to his stock.

	HORSES	MULES AND ASSES.	WORKING OXEN.	MILCH COWS.	OTHER CATTLE.	SHEEP.*	SWINE.
Connecticut .....	44,940	539	28,418	116,319	92,149	59,431	63,699
Illinois .....	1,023,082	123,178	3,346	865,913	1,515,063	1,037,073	3,170,266
Indiana .....	581,444	51,780	3,970	494,944	864,846	1,100,511	3,186,413
Iowa .....	702,322	44,424	2,506	854,187	1,755,343	455,359	6,034,316
Maine .....	87,848	298	43,049	150,845	140,527	505,918	731,369
Massachusetts .....	59,629	243	14,571	150,435	96,045	69,979	80,123
Michigan .....	378,778	5,083	49,393	384,578	466,660	2,189,389	964,071
Minnesota .....	257,282	9,019	36,344	275,545	347,161	267,598	381,415
New Jersey .....	86,940	9,267	2,022	152,078	69,786	117,620	219,669
New York .....	610,358	5,072	39,633	1,437,855	862,233	1,715,180	751,907
Ohio .....	736,478	19,451	8,226	767,043	1,084,917	4,902,486	3,141,333
Pennsylvania .....	533,587	22,914	15,062	854,156	861,019	1,796,598	1,187,968
Rhode Island .....	9,661	46	3,523	21,460	10,601	17,211	14,121
Vermont .....	75,215	283	18,368	217,033	167,204	439,870	76,384
Wisconsin .....	352,428	7,136	28,762	478,374	622,005	1,336,807	1,128,825
	5,629,992	298,763	288,793	7,220,765	8,955,559	16,070,430	21,131,279

\*Exclusive of spring lambs.



Putting the cost of keep for winter, at \$15 per head for horses; for mules and asses, \$12 per head; for working oxen, \$12 each; for other cattle, \$10 each; milch cows, \$10 each; for sheep, per head, \$1; for swine, each, \$3, we have an aggregate cost for winter's feed of all the above animals\*—\$347,731,151. The sum is almost incredible.

But some one may say will not these animals sell for so much more North than they would South as to pay all if not more than this higher cost of winter's "keep" at the North? Well, the answers to this question are many. In the first place, for by far the larger proportion of this computation, the food contributed to support will not count as a factor in gain; for the animals are not fed for fattening with a view to sale. Steers, hogs and sheep, possibly, may; but horses, mules, working oxen and milch cows are not. For all these the computation represents the bare cost of "keep" and the maintenance of condition. If you shall say that the cost of keeping the other animals will be got back in their enhanced value, by reason of the fat they will lay on, the reply is, then you must increase the cost of the estimate upon them. Then, if milch cows are to be added to the gainful side, by reason of their butter or milk yield, more must be added to their cost of "wintering." In other words, are not plenty of people North and East willing enough to let one have the use of a cow for "wintering" her? Can any one suppose, too, that the value of a cow North for her butter or milk is greater than at the South? Is milk anywhere in the South worth less than ten cents per quart? or butter worth less than twenty to twenty-five cents per pound? Are not millions of pounds of Northern-made butter carried South? Is not grass-flavored Southern butter from grade Jerseys worth from twenty-five cents to forty cents per pound? Is not fancy all-Jersey butter worth from forty cents up to prices too high to be credited? Do mules sell higher in the North than in the South? Is not the South the great market for them? Are not horses worth more South than North? Is a hog worth more North, as compared with the South, than the cost of his winter's food? Pray, where does a large part of our pork come from? What has kept the South poor so long but, among other things, buying Western pork?—(soon, fortunately, to stop.) Where do Southern cities get their live hogs from? They are hauled from the West by hundreds of car-loads daily. Do we not get our best fat beeves from the North and West?

But there are other aspects to this matter of winter's "keep"—a factor hard to weigh; an unknown quantity: the superior health of the animal South; or, rather, the greater cost of the inferior health North. Every one knows the bad effects of confinement of sheep in close barns in winter. I have known of much money lost in one season in only one herd of fine Merinoes. Who does not know the impaired quality in wool in the change from green to dry food in winter, and *vice versa*, in spring? The loss in cattle in these transitions is more or less by reason of diseases and complaints incident to it. Because we cannot compute it, it is none the less true. The fields of much of the South can be kept green the year round with blue-grass, the clovers, etc. On them every animal is naturally kept in better health than on the artificial food of corn and hay.

There is a great temptation to dilate upon the enormous losses in some winters, and the very considerable every winter, in the aggregate, at the North and West, by the freezing of animals, or their death by some incident in connection with cold. From this the South is absolutely exempt, except in parts of Texas, where the "Northerners" sometimes catch stock.

\*In this estimate I did not rely on my own views, but recently submitted the matter to stock-raisers at the World's Exposition. Of course, the estimate varies according to length of winter, prices of feed, etc. I have, however, put the figures very considerably below the estimates of the gentlemen mentioned.

The saving in food and clothing to man, by reason of the climate, is a topic it would be interesting to explore at length; but I can but barely touch upon it, hoping the reflection of the reader will supply my constrained meagreness of treatment.

It must be obvious to the most superficial reflection that the mildness of our Southern climate dispenses largely with the necessity for meat to supply carbon or heat, in order to resist the rigors of Northern winters. It is no answer to say that much meat is eaten South. I am speaking of necessity, and not of choice or habit. Meat is the large element of cost in the support of life North in winter, and is indispensable there. Again, the mildness of the Southern climate over a large area gives the opportunity to draw largely for the support of life (and even for money-making) upon the winter garden. "Greens" of all sorts are to be had there in winter. The Irish potatoes planted in July or left in the ground bear a second crop, from which a winter's supply is to be had. Cabbages "set" in the fall grow through the winter. Lettuce and radishes can be planted at all times. So through the list. The ground from which the crops of corn, cotton, oats, wheat, rye, barley, etc., are taken is available for turnips, cabbages, carrots—what you will—and needs not to lie unutilized till spring. Your hens are laying eggs all winter, and chickens can be hatched in fall. Your ewes can be made to "lamb" in November. Your cows can "come in" when you please in winter. In large areas of the South the finest fish can be had much of the winter in the salt and fresh waters; crabs, shrimp and oysters all winter in parts of the South; and I do not elaborate the migratory birds that, forsaking the North in winter, bring choice contributions of the most prized food supply to both the epicure and poor man, in this season, to the South.

In clothing, the aggregate of cost to be saved by the South in winter, as compared with the North, is very considerable. The increased quantity of wool in the character of goods worn North, of necessity, counts very heavily in money's worth, as compared with that worn South. It is one of the discomforts that Northern people suffer who "winter" pretty well South, in persisting in wearing the same clothing South they are habituated to at home. Less bed clothing is necessary, too. Lap blankets, buffalo robes, are a trifling expense South. Indeed, there are hundreds of thousands of people South who never saw a buffalo robe. In an experience of a good many years South, I never have used, never have seen a buffalo robe on but two or three occasions. There are plenty of children of the poor in the South whose feet are innocent of shoes the whole year round. It is useless to say that they ought to wear them. They do not, and are very robust. I have seen plenty of children clad in next to nudity in midwinter South, and they could not be more healthy than under this treatment. Then, blankets for horses are very rare.

These matters may seem quite trivial, but aggregate them, and the cost will be found to be very considerable. Indeed, there is the germ of an industrial revolution in the thought that there is not the ratio of consumption South to the ratio of production, as at the North and West. Look how much of the wool, pork, hay, corn, wheat, etc., that the Northern man produces, which he and his stock must consume! South, in winter, he and his stock not only do not consume much of these, but he is producing at the very season the Western man is consuming.

In a view of "points," I ought not to omit the expense of buildings and barns, particularly the latter, so often expensive, which at the South find a substitute in comparatively cheap and open shelters.

#### HEALTH.

I have given some of the advantages the South possesses in her climate over the North and West. It is almost, if not a corollary of her climate, that she has

has a great advantage in her superior health. In the article on Mississippi something will be said generally on this topic, and, through the pages of this book comparisons are drawn here and there between some of the Southern States, and others in the country at large. But the theme is an important one, and cannot well be too much elaborated. And, first let me consider some well known facts, the bare statement of which ought to have great weight. It is known to every intelligent reader, that a very considerable area of the South is regarded as a sanitarium by much of the country at large, for diseases of the throat and lungs. It would be invidious to particularize the best localities South for the cure or amelioration of these complaints, even if their comparative merits could be determined. The appreciation of the South in these regards, or rather, the utilization of her areas by the inhabitants of rigorous winter climates, is a matter of very recent date. While it is doubtless true that the wisdom of the selection of resorts, now greatly favored and patronized, has been vindicated by remedial and curative results, it is also quite as true that there are probably many other localities as yet almost, or altogether unnoted, or, at least, not celebrated, where the lenitives of climate are quite as efficacious as the most cherished areas, for the regards in question. Because the unprized localities have as yet no appreciation, argues no more against them than the disregard of now celebrated areas argued against the latter a few years ago. I can see no reason why a very large area of the pine-woods belt of the South is not as near a specific for the complaints in question, as climate can be. It is quite certain that localities next to unknown by the country at large, have proven very beneficial to sufferers. Besides the sufferers from catarrh, bronchitis and pulmonary consumption, those who suffer from rheumatism and neuralgia will find great relief in much of the South. I have mentioned the immense patronage of parts of the South, by sufferers from the complaints named, as a conclusive demonstration of the healthfulness of the Southern climate in the premises. My argument is offered by the Northern people themselves, and therefore is not to be questioned. Is it necessary to array figures to show the fearful decimation of our race by lung and throat diseases?

Another fact to be borne in mind is that the diseases of the South are largely of a class that are tractable and avoidable, and will largely disappear by agricultural development. As is well known, remittent and intermittent fevers constitute a large proportion of Southern complaints. These mostly yield readily to wise and prompt treatment. They can largely be avoided, even under present conditions, by prudence. Malaria, (which has its share in producing these complaints,) will disappear with improved agriculture, drainage, use of lime, etc. Many localities North, once very sickly from malaria, are now healthy by reason of the latter. Better regard of dietetics and hygiene will work an immense improvement in the health of the South. The enormous consumption of salt pork, corn bread and cabbage—not to say coffee, South, is undoubtedly a fruitful cause of disease and death. Diseases of the stomach and bowels are certain to follow the use of such food. Every physician knows how certain complaints can almost be banished from localities by a change of food. The large use of fruits and vegetables, South, will work great changes in statistics of mortality in this section. One can readily see that, for summer's food, South, the use of pork, cabbage and corn bread, is certainly very injurious to health.

Another point, almost impossible to be duly estimated by the average Northern reader, who does not know the South, is the mode of living of the average negro. As a whole, they are ill-fed, ill-housed, ill-clothed. They are, also, to the last degree, as a race, in the South, improvident and imprudent. Getting sick, they do not take medicine, and if they do, often guess at their complaint and its remedy, and often take nostrums. Often too poor to pay for

medical services, they dispense with them altogether, or send too late to save life. They are the poorest of nurses in the world, and are too ignorant often to administer medicine as prescribed. They have very seldom the food a sick person needs. Often when they should be in bed because of sickness or debility, they go to the field; and this, too, from no irresistible impulse to industry. When one is in such a state of exhaustion from disease that composure is of the utmost or absolute importance, it is made the occasion of "calls" from numerous visitors, and the most noisy and often fatal demonstrations of sympathy or piety, or both. Then, cleanliness is not a distinction of the race; and I pass without mention diseases that must be left to conjecture. The negro as a race, South, has a great fashion of turning night into day. His nocturnal fashions are past describing and past finding out—mysterious and inscrutable. He is prone to "sprees," "cake walks," balls, "hoe-downs," religious gatherings, (long protracted,) in night time, etc. One can see that orgies night after night, long tramps, (in wet and dry,) to meetings and gatherings, and then work at day in the field, are not promotive of health. No wonder that the mortality of the race is marked, as compared with the whites.

I have been somewhat explicit in order to show that the statistics of mortality South are not fair expositions of the Southern climate. If there was some way of obtaining statistics by classes, a fairer insight would be had; but, even then, conditions which militate against the South in the computation, ought to be eliminated in justice to the climate, the diet, the imprudences, etc., of the people. In fine, the fault is not with the climate, but the people; and a quarter of a century will show changes in the South in her favor that will astonish the statisticians of that day.

#### EXEMPTION FROM INSECTS.

Another advantage the South possesses over the North and West is in her comparative exemption from the ravishes of insect pests. It is the opinion of at least two eminent entomologists, that the South must, (for much of her area,) be comparatively exempt from insect pests for two reasons: Her great rainfall and her mild winters. The former drowns the insects and washes the eggs from their places of deposit. As is well known, the rains in the South are frequently very heavy, torrential, and are very fatal to insect life. They are frequent, too, in the early spring—a season of ovipositing and hatching. Again, the mild winters keep the insects in a state of life, that, giving them insufficient heat for vigor, induces animation and speedy death.

Any one who has read Professor Cyrus Thomas' *brochure* on the chinch bug, (*Lygaeus leucopterus*), published a few years ago, will see what devastation this pest has wrought in some years in the West. It amounts to many millions of dollars. Very rarely, according to my investigations, does it accomplish much damage South. The West well knows what it is, without any comment on my part.

The Hessian fly, I think, is nothing like so abundant here as at the North and West. It was supposed to have had, among its earliest footholds in this country, a place in North Carolina, but my investigations of it, in a part of the South where wheat is more or less raised, show it to be almost unnoted.

The Rocky Mountain locust, it is almost superfluous to say, cannot endure the South. Professor E. V. Riley has shown that this insect will never penetrate a certain atmosphere, which the South will always, humanly speaking, possess.

The potato bug—Colorado beetle—(*Doryphora decemlineata*), I have never seen South, and I have hunted and enquired for it, and sought to find it from those who would be apt to know of its advent. The *Juncta* is to be found, and is apt to be commonly mistaken for the former.

I have noticed these common scourges among insects, because, among other matters, I think their absence and paucity go very far to sustain the views first enunciated under this caption.

## VARIETY OF PRODUCTS.

An advantage of the South, worthy a very thorough survey—which I shall not attempt, is the numberless variety of her products. She has been reduced to the verge of beggary and temporary ruin by her wretched unpolicy in cultivating cotton so disproportionately. Suppose she could produce nothing else. The West is likely to suffer unspeakably before long, in those areas where she has only or can only raise wheat. In a considerable portion she cannot raise maize. In other areas the West cannot raise the cultivated grasses. But who shall enumerate what the South can produce? Fruits and vegetables have been considered, and will be treated more at length in the article on Mississippi. To enumerate them all is impossible. Let one think of the range from the climate of the Siberian crab-apple to the orange and the pineapple, for fruits, and that in much of the South fruits of some kind are to be had much of the year, (think of the strawberry and the peach for six months!) and vegetables all the year. And the vegetables one cannot think of undertaking to enumerate.

In the article on Mississippi are to be found a small list of grasses; but there are probably a hundred species strictly Southern, so to speak, not mentioned; and many grasses are green the year round. Cotton, ramie and jute, the South may be almost said to have a monopoly of; and silk culture can have no better climate in the known world, according to the best judgment of experts.

In cereals the South can show a long list—Indian corn or maize, wheat, rye, barley, the oat, buckwheat,\* rice. Then there are ginger, indigo, the tea-plant, etc., etc. Her plants I have touched upon; they range from the sugar-cane of the tropics to the pine of rigorous climates. An interesting paper might be made upon the medicinal plants and herbs of the South. A very interesting book has been written on them; and in parts of the South it is a vocation of people to gather them in the wilds for the uses of pharmacy.

Consider all these resources in a mild climate, fertile soil abundantly watered by rainfall and never-failing streams, pierced by navigable rivers, with inexhaustible coal and iron.

## WATERCOURSES.

Another advantage the South possesses is in the distribution of her navigable rivers, and their communication with ocean highways. One must take a map and view the remarkable location of the South. With the exception of Tennessee, Kentucky and Arkansas, from Maryland, clear round to away west and south in Texas, there is no Southern State but may be said to have an ocean front. Into the Atlantic Ocean and Gulf of Mexico empty streams which have their sources far in the interior. On these streams, at greater or less distances from their mouths, are situated the leading Southern cities. Before the era of railroads, water dictated the location of cities; and water of what one may term a navigable depth can never be superseded by railroads. In the past, water has played a most important part as a factor in the development of Southern cities. Look at her leading cities—Baltimore, Richmond, Norfolk, Wilmington, Charleston, Savannah, Mobile, New Orleans, Galveston. But in the future water is to play a still greater role than ever in the past. One illustration—that of the deepening of the Mississippi River—shows what one great waterway may do. This came very nearly revolutionizing the grain transportation of this country. It saved (and will for all time save if the jetties act well) millions of dollars per annum to the Western farmers, by giving cheaper rates to Europe. It is probably destined to deflect greatly immigration from New York; as if immigrants settle South, New Orleans or some other Southern port is their proper place of debarkation; if West, they

\*Two crops per season. The best buckwheat I have ever seen was raised on the gulf coast, between Mobile, Alabama, and New Orleans, Louisiana.

are readily distributed there by Southern railroads running from the West to their point of debarkation.

The import trade of the country, especially that of the West, is likely to be shared largely by the South.

But these rivers emptying into the ocean and the Gulf of Mexico penetrate far into the interior in the South. Almost every navigable river has its source in mountains, and is of unfailling flow. The Gulf of Mexico and the Atlantic Ocean furnish vast reservoirs for unfailling evaporation; and by a stupendous harmony, the mountains compel the clouds to a deposition of their moisture, to flow down again in unceasing current to the source. Thus the Southern sun lifts the ocean, and the mountains take the welcome burthen; and this must ever be. However science may vacillate about the forests making more or less rainfall, the ocean must rise in vapor at the bidding of the sun; the clouds must obey the stern command of the haughty altitudes of the Apalachian chain.

I have said that Arkansas, Tennessee and Kentucky are the only Southern States that have not an ocean front; but, except for certain conditions and for purposes of transportation, they virtually have. The Mississippi River rolls past the whole eastern front of Arkansas, and rivers from away up in the interior of the State bear down her products. Past Western Tennessee the Mississippi flows the entire latitude of the State. Then Kentucky shares the benefit of the Mississippi River to Cairo, Ill. At Cairo the Ohio joins the Mississippi. From Cairo the Ohio is the western boundary of the State up to the State of Ohio. At Paducah, Ky., the Tennessee River comes in, after its rise in its sources in Western North Carolina and East Tennessee, and watering much of the latter. It sweeps well down into Alabama; then runs along much of the northern part of this State; then is deflected north, and courses clear through Tennessee and a part of Kentucky. The Cumberland, after watering much of Northern Tennessee and part of Kentucky, joins the Ohio.

The possibilities of this river system no one can predict. It is certain to play a great part in the future of these States. Their grain, flour, live stock, iron, coal, etc., will be immense interests in the future. Take the river system of Alabama and East Mississippi. See the future these rivers have before them!

It would be a matter of great interest to show the vast sums of money which are to be saved to the South in the development of her coal and mineral interests. Messrs. C. A. Miltenberger & Co. (to whom I here express my obligations for information) show, in their last annual statement, that there were consumed in New Orleans in 1884 3,864,300 barrels of Pittsburgh coal. The consumption has increased since 1869, beyond which year I have not their figures. The average price for the year was about 30 cents per barrel wholesale. There were over 700,000 barrels of Tennessee and Alabama coal received. This is over 4,500,000 barrels received at New Orleans. Pittsburgh coal has sold at from \$1.50 to \$2.25 per barrel retail. At wholesale it used to bring 75 cents per barrel. Thus there is saved to New Orleans the sum of at least \$2,000,000 by the advent of Alabama coal. Now, Pittsburgh coal by water competes with Alabama coal by rail. The former is 2,000 or more miles from New Orleans by water; the latter is, say, 300 miles. Can anything better show the value of water for cheap transportation?

General J. W. Burke, Collector of Customs at Mobile, Ala., in a speech before the Joint Committees of the Merchants' Exchange and Cotton Exchange of that city, says, on page 25 of the pamphlet containing his address: "As late as 1878 the government paid for the coal furnished its vessels at the gulf ports from \$8.00 to \$12.00 per ton. To-day, coal is furnished at the rate of \$3.40 per ton."

Capt. A. C. Danner, of Mobile, Ala., a gentleman most conversant with the coal trade of the Southwest, and who is most prominently connected with its development, says, in a letter to the Baltimore Manufacturers' Record of January 19, 1884:

"Now, of the six rivers that we have in the State, five of them run right through coal beds. It is true that the coal beds are situated on the headwaters, and above present navigation; but these streams can and will be made navigable as far up as the coal beds.

"And then there are magnificent tracts of coal lands now within twenty or thirty miles of the navigable part of one of these rivers—a river that never freezes up, and that is navigable eight months in the year. When these coal lands last referred to are developed, and a railroad built to the river, with barges and tug-boats, coal can be dumped on to the barges at the cost of \$1.10 per ton. It can then be transported to Mobile in large quantities at a cost for freight of less than 50 cents per ton, and transferred from the barge to a ship for, say, 10 cents per ton. Add 50 cents for incidentals, interest and profit, and we have *coal put f. o. b. a vessel in a good port* (Mobile is now the cheapest port for vessels in the United States) at the price of \$2.20 per ton.

"No coal in the world can then compete with Alabama coal in all the markets of the Pacific coast and of the Gulf of Mexico.

"Mobile will supply South America, Cuba, Jamaica, the Windward Islands, California, Mexico, Texas and Florida."

These illustrations are given to show the value of water transportation, and that the rivers of the South, in parts, penetrate, in many instances, very rich mineral tracts. In other parts of the South the same may be said of a number of their rivers. But, besides transportation for the future flour, cereals, live stock, hay, the products of the mine and manufactories of various kinds, the rivers and streams will play a most important part in furnishing cheap, abundant, never-failing, never-freezing water-powers for the future factories of the South. Much of this is given elsewhere; but the following, from the pen of the Commissioner of Agriculture for Alabama, will be of interest here. On page 119 of a pamphlet recently issued, he says:

"The Tennessee River, having a volume of water greater than the Ohio, descends for a space of thirty miles over a series of shoals, creating an amount of power greater than is to be found anywhere on the continent within the same compass. The canal now in course of construction, and upon which upwards of three millions of dollars, under appropriations by the general government, supervised by its own officers, have been already spent, and which will be completed in less than two years, will, it is estimated, afford power enough, without impairing its efficiency for purposes of navigation, to turn all the machinery in New England. The Coosa, throughout a still greater extent of its course, affords power, in the aggregate, little inferior in magnitude to that of the Tennessee."

The agriculturist and stock-raiser can appreciate the value of these rivers when he knows that they are supplied by hundreds of streams and thousands of rivulets forever dancing in sparkling joy through the meadows and over rocks, in dells, along from their unfailing sources in the mountains. The dairyman will cherish the spring-houses, and the stock-raiser and farmer will find perennial water for his flocks and herds; and a matter of no small consideration is it now, and hereafter will be a greater one, (in the great future of the South,) that cities and towns do and may have cheap and unfailing supplies of the clearest and purest water; and as many of these streams already contain abundance of fine fish, while many of them will be thickly populated hereafter by the wise providence of the Southern States,\* the people of the future South will find one of the best species of food for the support of man.

#### CHEAPNESS OF LAND.

Another most striking advantage of the South is in her cheap lands. The shrinkage in the value of lands at the South, by reason of the war and its correl-

\*Several Southern States have already addressed themselves to supplying their streams with fish.

ative, the abolition of slavery, is past computation. An estimate would be complicated by impairment in intrinsic value through wasteful tillage; but it is quite certain that there is an extrinsic depreciation of an enormous measure. The South possesses many millions of acres now open to investment, which, for some of the purposes of agriculture, are as good as ever. Then, none of her lands but are capable of resuscitation. It is quite true that it will take years and wise management to restore the Southern "worn-out" lands, so called, to their primitive fertility; but we have irrefragible proofs of their capability of resuscitation and production in the "intensive" culture more and more obtaining, and the results of the use of commercial fertilizers. The wise use of the inexhaustible marls of the South, "clovering," turning under green crops, proper rotation of crops, subsoiling, sheep raising and many other aspects of improved agriculture, are yet to play their parts—as yet, almost untried—in the future agriculture of the South. There are lands for sale in the South, ready for the plow, in vast areas—millions of acres that can be had at from one-fifth to one-tenth their value before the war. I know of some of the finest lands in the world that sold for from fifty to one hundred dollars and more per acre, now purchaseable at from five to fifteen dollars per acre.

Another consideration the Northern and Western farmer must not forget is, that the bulk of Southern arable lands have only been "scratched." The average of Southern lands are not "broke" for over two or three inches deep, and vast stores of fertility lie accessible to better culture. Then there are millions of acres of fine woodland absolutely undeseccrated by the superficial tillage of the South—virgin soils the richest in the world. These can be had at merely nominal prices, and await the thrift of a new husbandry to be inaugurated, with all and more than the cheapness of a new and unsettled country; with all our advantages of climate and thicker population, and the other incidents of civilization in schools, churches, railroads, a settled state of society, low taxes, competing modes of transportation, etc., etc.

Is not an acre of land in the South that will produce all and much more than an acre in Iowa, Ohio or New York, with products as valuable, and that sells for five to ten dollars per acre, worth quite as much for production as an acre that sells for from thirty to one hundred and fifty dollars per acre? The enhancement in value of the land—its selling price—is only a question of time South.

As to titles, they are, in almost all the South, of the very best character.

As to taxes, they are a mere *bagatelle*. Lands are general assessed very low—probably on an average of five dollars per acre at most—that is, farm lands. Taxation is very generally prohibited by the constitutions of the various Southern States in excess of one and a-half per cent. on the assessed value. A man with a very small farm in the Middle States and New England pays far more than one in the South with a thousand acres of good land. Then there are few Southern States where the onerous burthens of taxes for building railroads must be paid, as at the West.

It must be remembered by all thinking of buying lands South, that the impairment in price of Southern lands is not impairment in value. Climate is left. Conditions more favorable to the happiness, thrift and influence of the white farmer obtain now, than when lands were from five to ten times as high in price. Railroads are built or building, of which there were few South before the war, and add their great influence to a true enhancement of values. Immigration is coming in. The foolish notion that white men cannot stand Southern climate is abundantly disproved by tens of thousands of Europeans and Northern men in Texas, Arkansas, North Carolina, Georgia and other States. The grasses have been tried and found quite equal, if not superior, to the same North and West.



Stock raising in all branches and dairying have proven not only practicable, but profitable and easy. The immeasurable benefits of multifarious industries is the promise of the future, with potent, yet comparatively small, earnest in our present cotton mills, iron furnaces, flour mills, &c. These are some of the benefits that make our lands truly much more valuable than before the war. If they were worth then from thirty to one hundred dollars per acre, they are worth twice as much now. They only sell for from five to fifteen dollars per acre now; but wait ten years!

Akin to this topic of cheap lands is the proximity of the most fertile lands in the country to the mineral lands of the South, and to what will some day be the seat of the great manufacturing interests of this country; for be it remembered the South will combine the predominant features of New England industrial life with iron and its cognate industries. Space forbids the elaboration of this matter of the proximity of the rich lands of the South to the future great centres of manufacturing industry. Let any one, however, contemplate the exhaustless fertility of the bottom lands in Louisiana, Arkansas, Mississippi and Tennessee. There can be raised enough breadstuffs to support the entire South, to say nothing of other areas. It is hardly four hundred miles from the farthest point of these rich lands to the great mineral lands of the South, with easy grades for railroads; no chances of trains ever being incommoded by snows, and with low prices of construction. More than this, a large part of the area is pierced by navigable rivers running from this rich territory into much of the most noted mineral areas. Let one take a map and look across the country from the bottoms of the Mississippi River to East Tennessee, North Carolina, Alabama and Western Georgia. It will then be seen what is the proximity. And this is leaving out of account millions of acres in fertile valleys in the mineral States.

Now, the West is a long way from New England, Pennsylvania and New York. All these States have largely ceased raising cereals. They leave this to the West; and the West must send them over expensively-built roads a long distance to the consumers East. As is well known, New England may be said to raise no breadstuffs. She has her naturally poor land in grass and fruits, and raises these and poultry and makes butter for her cities and towns, so dependent upon her manufactories for support. The fertility and cheapness of land West have made the Eastern States no longer the breadstuffs producers of the country.

Now, our Southern rich lands are near for the cheap breadstuffs. They unite the advantages of fertility, proximity, low grades for cheaply-built railroads, with all the cheapness of far-off Western lands. The East has the short haul of products, but very high-priced lands. The West has the low-priced lands, with the long haul. The South unites both advantages of low-priced lands and short hauls. Both North and West the climate is rigorous and fuel high-priced; South, just the reverse. Now, the South can raise, near her future large manufacturing cities, fruits, vegetables, poultry, hay, beef, mutton, wool, and can dairy on cheap lands; and all these she can raise, not for a season, but all the time. This will give great enhancement to the value and price of these lands. There cannot be a reason why these lands shall not always be valuable, because these future cities will flourish by reason of inexhaustible supplies of raw material and the exemption from a ruinous competition. If iron and cotton manufacturing industries were new, or if the South had long ago embarked in them, these lands would have been high-priced, because large cities would have been built. They, instead of lands from which to feed artisans selling at ten and fifteen dollars per acre, they might have been as high as the same land situated North and East. But now these lands enter the lists to buttress Southern competition, and add their formidable strength to the struggle; and so great is the present production, as

compared with consumption, of materials from cotton and iron, that a little added from the South makes a formidable factor in these affairs. Soon, as has been said, there must be desertion of cotton manufacturing East, and an immense increase in iron manufacturing South. Then will come the demonstration of the immense value of our rich lands being within a day or two's transportation of our great mining and manufacturing centres.

#### RAINFALL.

Yet another advantage the South possesses is in her rainfall. The rainfall of each of the several States is given as they are treated of hereafter. It is a well-known fact that the first portion of a rainfall contains ammonia, and therefore the greater the rainfall the greater the ammonia. In this fact, with the large rainfall at the South, if the soil be in proper condition to absorb it, there is a very considerable advantage. It is certain that this heavy rainfall in winter, together with much of the warmth of the sun, are what promote the growth of the grasses, vegetables, etc., at the South in winter. In most of the South there is, in strictness, neither a dry nor wet season. Sometimes there are disastrous drouths in the South, as over the country at large; but, on the other hand, sometimes the heaviest rainfalls are during the summer months; and the South is so circumstanced that her dryer weather (in late spring and summer) cannot often work disaster, as is frequently done North and West. The cereal crops of the South are frequently "made" before the dry weather comes. It is seldom very dry before July in much of the South. By that time, oats, rye, barley, wheat and corn are generally "made," or beyond frequent great injury. Cotton can endure much dry weather at the dryer season South. Blue-grass, clovers, orchard grass and others give way, generally, by July, and Bermuda grass, Japan clover and other dry-weather-enduring grasses have been in full vigor months before; so that live stock do not suffer as they would had we not these latter grasses. If any one will consult the charts in the Tenth Census of the United States, it will be found that rather more than half the annual rainfall of the South is in spring and summer, and one will see that the greater spring and summer rainfall is in the Southern States. These are facts of the utmost consequence in agriculture, and should duly impress the farmer. Prof. Henry Gannett, E. M., in the volume entitled "Population" of the last census, on page 63, thus says:

"The prosperity of a country depends largely upon its rainfall, as, to a very great extent, the primary industry—that upon which all others depend directly—viz: agriculture, may be said to flourish in a degree directly proportioned to the amount of moisture. Of rainfall this country receives in its different parts a very different supply. Throughout the eastern half of the United States the rainfall is ample for all purposes of agriculture; while in the western half, with the exception of a narrow strip along the Pacific coast, the supply is very deficient. With the exception of the Cordilleran Region, our rainfall is nearly all derived from the Gulf of Mexico and the Atlantic Ocean. Of the two, the principal source is the gulf. The warm, moist currents which accompany the Gulf Stream from the Caribbean Sea are not deflected toward the eastward in the Gulf of Mexico, as the great oceanic river is, but pass northward and eastward over the land in a broad belt extending from the coast of Texas to the peninsula of Florida. Judging from its effects in the form of rainfall, the central portion of this current passes over Eastern Louisiana and Mississippi and Western Alabama. The natural result of leaving the warm ocean surface and entering the continent is to cool these air currents and make them deposit their vapor. The heaviest deposit is along the northern shore of the gulf, in the States of Louisiana, Mississippi and Alabama, and the western part of Florida, where the rainfall reaches sixty inches per annum. Were there no mountains or other irregular topographical features to modify the rainfall, this wave would move inland in a northeasterly direction, the precipitation decreasing eastward, northward and westward, the lines of equal rainfall taking the form of great concentric ellipses. This form we see roughly outlined in the western part of the Mississippi Valley, the rainfall decreasing regularly to the northward and westward. To the northeastward,

however, these moisture-laden currents encounter the southern end of the Apalachian chain, and are driven at once up to high altitudes, where they are forced to disgorge their vapor, giving to this end of the mountain system a heavy rainfall; while farther along the chain, toward the northeast, the rainfall diminishes, becoming even less than that of the lower country on the east and west. The portion of the moisture-laden current which passes to the eastward of the Apalachian chain meets and mingles with moist air currents coming directly from the Atlantic, and produces, in the central parts of North and South Carolina, an area of abnormally heavy rainfall. A second source of moisture is the Atlantic Ocean. Here the moist air currents from the Gulf Stream produce a line of heavy rainfall along the Atlantic coast, reaching from Florida to the neighborhood of the Bay of New York. This strip is quite narrow, being confined to the coast and its immediate neighborhood. Back of that, and over the greater portion of the Atlantic plain, the precipitation is notably less."

He then says further on, as to whether the "Cordilleran Region" can be redeemed by "a judicious system of cultivation and tree planting:" "It is doubtful whether that effect can be produced by this or by any other means within the power of man."

#### MARLS.

An advantage of incalculable proportions is the vast and inexhaustible wealth of the marls of the South. They are of great variety in their components, but most of them, with proper knowledge of their qualities, can be made great aids to agriculture. In the future days of stock raising and grass growing in the South, these marls will play a most important part. They are known to be in all the Atlantic States of the South. They are very abundant in parts of Mississippi and Alabama, and, indeed, it is probable that no Southern State is without them. To compute their value would be idle. Were I to quote the language of scientists in praise of them, it would sound very extravagant to many. There are few richer marls certainly than those of South Carolina, and other States may yet prove to have equally as rich. The reader will find something more at large in the articles on South Carolina and Mississippi. There is no doubt that the South far surpasses the rest of the country in this most valuable wealth.

Another advantage the South offers is the opportunity for the loan of money on her lands and otherwise—cotton mills, etc.—at a high rate of interest and on long time. No greater good could be conferred on the South; no safer investment can be found. Lands at from one-fifth to one-tenth their value under slavery, when there were few railroads, no immigration; when there was nothing but an agricultural spirit marking the South, are burdened with mortgages paying eight to ten per cent. interest. These lands are now far more valuable than before the war. Slavery is a thing of the past. Immigration is coming in. The manufacturing era is inaugurated. Railroads are built. The capital and enterprise of the world yearns for the South. Here is a chance to loan hundreds of millions of capital on the best security of the age.

Banking facilities in the South are limited, and here is offered a fine opportunity for investment. National banks in the manufacturing towns pay, in some instances, enormous dividends. There are many growing towns where banks are badly needed.

The purchase of the stock of cotton manufactories opens another fine field for the investment of capital, as does the purchase of forests, pine lands, the construction of manufactories of one kind and another.

One feels tempted to aggregate the value of the development in railroads, mines, manufactories, cereal production, etc., but I pass it.

It would seem necessarily inferable from what has been said in this introduction, that the South will soon raise her own breadstuffs; that with corn, wheat, oats, pork, hay, sheep, beef, lard, butter, cotton seed, etc., we shall soon utterly dispense with these from the North and West. It seems very probable

that we shall, before long, be competing with the North and West in their own markets, by sending them our cheaply raised beef, early lambs, wool, our grass-flavored winter butter, our cheese, as we now send them our early fruits and vegetables. It is also likely that our own canned fruits, vegetables, fish, oysters, shrimp, etc., will soon furnish a Southern supply, and that we shall send considerable of these (as is now done on an extensive scale in one Southern State—Maryland) for consumption outside the South. I believe that, before ten years, most of the cotton mills of the country will be in the South, and I dare to hope that the South will ere long manufacture the bulk of the cotton goods for the world's consumption. We shall soon raise silk largely and manufacture it at home. I expect to see the South the seat of woolen mills, manufacturing the finest goods from wool sheared from the delicate breeds of sheep raised South—from sheep too delicate to be raised North and West. We shall raise all our own horses and mules. In twenty-five years we shall see scores of cities (of which Birmingham and Anniston, Ala., Roanoke, Va., and one or two more, are the present hints and signs,) South, where all our iron and steel used in every shape will be made, and many goods from these sent elsewhere; where locomotive works, manufactories of railroad cars, cutlery works, agricultural implements, cotton-manufacturing machinery, wagons, carriages, furniture, woodenware, buildings for export and much more will be found. I hope to see the South the great seat of iron steamship building of the United States. We shall see paper mills on Southern streams manufacturing paper for all the South, and selling in considerable quantities outside. Our boots, shoes, harness and all articles of leather consumed South will be made here. We shall ere long manufacture all our own flour and meal from our own home-raised cereals, and be sending Southern-made flour to the country south of us in great quantity; and we shall make the barrels in which to pack it here out of our own lumber.

The South has yet to experience through all her arteries the invigorating influence of cheaper money. It would be risking little to say that ten per cent. is a low estimate of what the money invested in manufactories has cost for hire. When it is seeking the South, as some day it will, at half that rate, an amelioration of present conditions, an impetus to new and many, and an enlargement of old industries, will follow, of which one can have but a small conception.

The South unites some wonderful factors—her rivers, ocean and gulf for transportation, and their cheap food supply; the water-powers of her streams, which are perennial and never frozen; her mild climate and ever bounteous land; cheapness and inexhaustibleness of fuel; the cheapness and fertility of her lands; low prices of building materials; cheap raw materials; wonderful wealth in forests and mines; proximity to markets; her railroads, etc.

Many will call most that has been written "rosy," "visionary," "exaggerated." That is to be expected. I ask that the sincere doubters—those who are not pre-determined and ready-made—to read the following. It is from no romancing vagarist or prejudiced sectionalist. Rhetoric and exaggeration are aloof from his style and habit. He is used to dry facts, to cautious statements; he enumerates rather than describes. It is from "Farm and Factory: Aids to Agriculture from Other Industries," by J. R. Dodge, M. A., statistician of the Department of Agriculture of the United States. As has just been said, these are not the vagaries of an enthusiast. They are from one used to a sober and staid style of writing; whose habits of investigation are most careful; who finds, and does not invent:

"The territory lying between the Potomac and the Rio Grande, including eleven States, is eighteen times as large as the State of Ohio, and fully three and a-half times the size of France or Germany. Its surface is diversified by mountains, with extreme elevation above six thousand feet. Its soil is of great variety—from light sands to heavy clays—and unfathomed alluvial deposits. The rainfall

is abundant and seasonable—from forty to sixty inches per annum; springs of pure water are so numerous as to supply largely the place of wells in farm economy, and rivers furnish a perennial supply of power for possible manufactures.

“It is a healthful and beautiful land, redolent of flowers and surfeited with wild fruits, while cultivated fruits of the temperate and sub tropical zones grow profusely with little care or cultivation. The dweller in a forest cabin can subsist in luxury on fish and flesh and fruits, with venison, turkey or duck upon his table daily, with no labor beyond that of the angler or huntsman. The climate is so mild that his house could be constructed with a few days’ labor in the primitive forest, and the fuel for his cuisine and comfort could be gathered within a furlong of his door.

“Though the rainfall is distributed through the summer, it comes in showers, and not in long seasons of drizzling mists, leaving the landscape bathed in sunshine through nearly all the hours of daylight. While the temperature is high, the heats are abated by breezes from the gulf and ocean, and the lowest latitudes have cool and comfortable nights, favoring sleep and recuperation. Evaporation of heavy rainfall cools the earth, and abundant shade subdues the noonday heat, for it is a country wooded as well as watered, the farm lands having an average of fifty-four per cent. of their area in forest.

“It is a country favorable to health and conducive to high physical comfort. Life is rich and full and joyous in this sunny land. In the summer days, a vacation in the mountains, to the dwellers of the cotton belt, is a physical luxury; and the variety and purity of the thermal and mineral waters of the slopes and plateaus of the Alleghanies are among the wonders of nature.

“The coal, iron, and a long list of minor minerals, are found in great abundance, and are mined at little cost. The long range of mountains, on the eastern and southern slopes of which these States lie, stretch fringe-like ridges through the lower areas, piercing the cotton region with fuel-bearing lines. In the centre of Alabama are hills solid from surface downward with ore so rich that two selected tons will make one of pig iron; so accessible that it has been mined with a crowbar, and so cheap that fifty cents would place a ton of it upon the cars. And there is abundant coal near by, and limestone for fluxing purposes. This land has been sold for taxes in the days of the cotton craze, because not suited to the best results in fibre growing.

“The live oak, the Southern pine, the cypress, the black walnut, the wild cherry, the ‘white-wood’ poplar, and a great variety of cabinet woods, and those used in the industrial arts and in building, await the demands of commercial and manufacturing enterprise. There may still be seen black walnut fences rotting by the roadside; still the most valuable woods are ‘girdled’ to make a clearing for the field of the settler, and a pioneer holocaust consumes remorselessly the wealth of the forest which is the accumulation of a hundred years.

“These bare hints of the wealth of nature in the South, which might be extended to a volume of detail without exhausting the subject, show that this fertile domain was not intended for a sparse population or a single product or mere agriculture, but for all arts, all culture, and a dense population of industrious and thrifty people. This prodigality of resources was not intended merely to garnish a desert with beauty. The hidden ores and darkling coals were not merely for unconscious trampling of hunters, red or white, but for the use and comfort of man. The people of this favored territory are beginning to realize and to appropriate these values, which are a cipher without labor, but millions with it.

“The population is sparse—12,990,246 people occupying 732,471 square miles, showing a density of 17.7 to the square mile. There is still elbow room. For every man here there are six in Germany and five in France. In Belgium there are twenty-seven for every man in the South.

“The farm area of this great district is forty-two per cent. of the whole, and only one-seventh is ‘improved’ or productive land, and a part of this is yearly in fallow. Counting only that which bears the crops of the year, exclusive of some wild lands depastured, there is only one acre in ten that renders actual service in agriculture.

“In comparison with districts more populous and less exclusively agricultural, the proportion of land in farms and of ‘improved’ land was in 1879:

	ACRES IN FARMS.	PER CENT.	ACRES IMPROVED.	PER CENT.
Cotton States.....	197,002,545	42	67,350,802	14.4
Ohio Valley States.....	98,119,094	88.8	68,861,666	62.3
Middle States.....	47,592,113	72.9	33,984,124	52
New England.....	21,483,772	54.1	13,148,466	33.1

"The northern portion of New England is mountainous and very rough, and much of the surface quite unavailable for agriculture, and there is a portion of the Middle States that is very rugged and yet in wilderness. The Ohio basin has therefore a relatively larger improved area than any other district.

"When the sixty-seven million acres, as above, represented the improved land of the cotton States, the area actually tilled was about forty-four million acres. There has been rapid enlargement of cultivation in four years, and the crops in tillage now occupy fifty-three million acres. About three millions of this increase is in cotton, and more than four millions in corn. There are now growing in these eleven States about seventeen and a-half million acres in cotton and nearly twenty-four millions in corn. Thus almost four-fifths of the tillage is in these two crops. It is too large a proportion, and the earnest and persistent endeavor of Southern farmers should be to enlarge this miscellaneous fifth to a full third at a very early day.

"Three-fourths of this remainder is in wheat and oats, which should have a greater breadth, and a large extension of sugar-cane is imperatively required, as well as of orchard fruits, market gardening, various fibres, forage for stock feeding, plants for oil production, and a multitude of exotic plants which might be introduced for use as aliment, in medicine and in the arts. There is no part of the United States, except on the Pacific coast, where such variety is possible in agriculture as in the States of the South.

"The census statement of value of farm productions makes an aggregate value for 1879 of \$547,567,526. This does not include meats of any kind, or the milk used in the families of farmers, or the fruits consumed at home, which may be estimated at about \$222,000,000, making an aggregate of \$770,000,000 in round numbers, which is equivalent to \$59 *per capita*, while the average to all engaged in agriculture (farmers and farm laborers) is \$241.

"This is scarcely \$300 for each family, and should be largely increased by greater variety of production, more effective labor-saving implements and advancing progress in scientific agriculture. But this can never be fully attained without progress, *pari passu*, in the industrial arts, which demand varied culture of head and hand, and the latest results of scientific research and inventive genius in application to labor in every industry.

"Nor will \$300 per annum suffice to supply all the wants of a family, and allow a little surplus for acquisition of a competence; scarcely a remainder for a 'rainy day' or the disabilities of age. To the values of products of agriculture must be added those of mining and manufactures in all the rich variety suggested by the natural resources of this region.

"The events of the past year give assurance of growth in manufactures as rapid as can be desired. The extension of the cotton manufacture is a prominent example of the advance in other directions. New cotton mills in Virginia, North Carolina, South Carolina, Georgia, Alabama and Tennessee have been erected the present year,\* costing from fifty thousand to four hundred thousand dollars each, and requiring many millions of dollars of capital. Between January and May, Southern investments in new manufacturing and mining enterprises, as reported by a Baltimore paper, amount to over fifty-five million dollars, of which eleven are placed in Kentucky, nearly the same in Alabama, nine in Virginia, six in Texas, with smaller investments in Georgia, North Carolina and other States. They include iron companies, cotton and woolen mills, flour mills, saw mills, machine shops, wood-working, cotton-seed mills, and other operations.

"It is now estimated that the number of spindles now in operation in the South is 950,000, and the capacity for consumption 420,000 bales per annum. There is some difference of opinion among mill proprietors as to the precise measure of advantage over manufacture in the North, but an average view is five dollars per bale, or one cent per pound. This is equal to a tenth of the farm value of the cotton. The saving of freights, commissions and other expenses is an undoubted advantage, and there is abundant and cheap labor and power; but the great benefaction of manufacturing near the cotton fields is not comparative as a matter of profit to proprietors, but is an absolute and priceless boon to the laborers, the neighboring farmers and the whole community adjacent to the place of manufacture.

"The manufacture of oil from cotton seed, now so active and progressive, is the utilization of a product formerly useless except as a fertilizer. A crop of six million bales produces three million tons of seed, or twice the weight of the lint

\* 1884.

saved, capable of yielding products worth more than a third of the value of the fibre itself. Less than a fourth of it is yet utilized, though the proportion is rapidly increasing. Here is a product that has been practically thrown away which is worth more in its manufactured state than all the barley, rye and buck-wheat grown in the United States. Yet this waste of an actual product is only a mild suggestion of the immense wealth that has failed to materialize by neglect of the rich natural resources of this region.

"It is useless to deplore the past. It is the present that calls for action, and the future that promises its rewards. The land is there, much of it in original fertility; there is more labor than at any former day; and the visible evidences of wealth, the improvement and construction which represent accumulated labor, are more numerous and valuable, by far, than at any previous date. It is believed that an era of industrial progress and great prosperity is now opening."

To the writer, no aspect of Southern progress is so marked and cheering as the hopeful, erect, self-assertive industrial spirit of the South. No longer is she supine, inert, self-mistrustful, with head bowed down. Hope elevates and joy brightens her face, and on her brow sits courage plumed. Time was when the South had almost no courage to undertake manufacturing. The few cotton mills could not sell their goods to the Southern trade direct, but had to send them to Northern salesmen, who sold them to the merchants within the shadow of the mill where they were made. The South thought her manufactures were next to worthless. She must need have New England goods. But this has passed away now. She believes in her capacity to do. It is not the rash and presumptuous confidence of unreflecting imbecility or inexperienced immaturity; it is a courage based on results. The South, in some regards, has confidence, experience and the advantages of situation. Her aggressive and experimental spirit will carry her into new fields of endeavor, where there are many opportunities for conquest.

# MARYLAND.

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Maryland has for its northern boundary the State of Pennsylvania, while on the east are Delaware and the Atlantic Ocean, and on the south and west Virginia and West Virginia. It is separated from Virginia by the Potomac River. The Chesapeake Bay, a magnificent body of water about 200 miles in length, divides the State into two parts, known as the Eastern and Western Shores. The State lies between 38° and 39° 43' north latitude, and longitude 75° 3' and 79° 32' west. As shown by the census of 1880, the land surface of the State included an area of 9,860 square miles. The population was 934,943—724,693 whites and 210,230 colored; native 852,137 and foreign 82,806. The assessed value of real estate was \$368,442,913, and of personal property \$128,864,762. There were 40,517 farms and 3,342,700 acres of improved land. The value of farms, including fences and buildings, was \$165,503,341; the value of farm implements was \$5,788,197, of live stock \$15,865,728, and the value of all farm products consumed on the farm or sold was \$28,839,281.

## SOIL AND TOPOGRAPHY.

Maryland presents a great diversity of surface and soil. The tidewater section of the State is mostly level, ranging in elevation from sea level to 100 feet, the surface gradually rising towards the north and west. Western Maryland is high and undulating, becoming more rolling and hilly as you approach the Blue Ridge Mountains, which cross the northwestern portion of the State. The extreme western counties, Garrett and Alleghany, which are crossed by chains of the Alleghany Mountains, are wild and rugged, presenting the general characteristics of mountainous countries everywhere. Much of their area is covered with original forests and underlaid with coal and iron ore. In this section there are wide valleys possessing the most fertile soil in the highest state of cultivation. In fact, Western Maryland, notably Washington and Frederick Counties, can boast of some of the most highly improved and productive farms in the country. The Middletown Valley and that of the Monocacy, in Frederick County, are noted for their wealth and their magnificent farms, which are cultivated on the most approved principles of agriculture. The soil of this portion of the State is mostly a rich loam underlaid with limestone. There are also granitic and slaty soils. The rolling character of the land and the numberless intersecting streams afford good drainage. The central part of the State, including Carroll, Howard and Montgomery Counties, and most of Baltimore and Harford, is for the most part slightly rolling, and in some sections hilly. The soil is variable, but on the whole is very productive and capable of high improvement. There is some limestone land of very great fertility. As a rule, the farms are in a fine state of cultivation, and more attention is given to improved methods of culture than in the States farther south.

The lower counties of the State—Anne Arundel, Prince George, Charles, St. Mary's and Calvert—form a peninsula lying between the Chesapeake Bay and the Potomac River. They present a variety of surface—level, gently undulating and



hilly. The soils are for the most part a clay and sand loam. In some parts there are dark, stiff soils, very productive. The lands of this section were originally very rich, but have been depleted by excessive cultivation, without proper attention to their needs. Though, to some extent, impoverished, they are readily susceptible of resuscitation, and under proper care and management, with the judicious use of nourishing manures, they may be restored to their former condition.

The Eastern Shore of Maryland is that portion of the State east of the Chesapeake Bay, and includes the counties of Cecil, Kent, Queen Anne's, Caroline, Talbot, Dorchester, Somerset, Wicomico and Worcester, covering an area of about 2,700 square miles. In the north it is somewhat broken and hilly, but through the central and southern portions it is almost entirely level. It is intersected by many navigable salt-water rivers and creeks. The soil varies from light sandy to rich black meadow lands, the sandy having mostly a clay subsoil. The land is entirely free from stones, and is remarkably easy of cultivation and susceptible of high improvement.

#### CLIMATE.

The climate of Maryland varies with the topography. On the Eastern Shore, placed between the Atlantic Ocean and the Chesapeake Bay, the heat of summer is very greatly modified by the sea breezes, while in the western and northern sections the same result is produced by the elevation. In the western part of the State the winters are somewhat severe, but in the lower counties are milder and the cold weather less protracted. The usual range of the thermometer in summer is from 80 to 90, though it sometimes goes several degrees higher for a few days. In winter the mercury rarely gets lower than 10° above zero. According to the temperature maps of the census report, the mean temperature for July is 75° to 80°, except in the extreme northwestern section, where it is 70° to 75°; the mean temperature for January is 35° to 40° in the lower counties of the Eastern and Western Shores, 30° to 35° in the central part of the State, and 25° to 30° in the west. The average annual rainfall ranges from 38 inches in the western counties to 45 inches in the tidewater section.

#### PRODUCTIONS.

This State produces as great a variety of cereals, vegetables and fruits almost as any State in the Union. Agriculture has reached a very high state in Maryland, and this important interest has flourished and prospered even during the long depression which has been so seriously felt by the wheat producers of the West. In this State a wise agricultural system prevails in the wide diversification of crops. Wheat, corn, oats, rye, buckwheat, hay and all the usual products of the farm are cultivated. Of the cereals, wheat probably receives more attention than any other. It is extensively cultivated in Western Maryland, the rich valleys producing heavy yields. It is also a very prominent crop in some parts of the Eastern Shore. Maryland produced in 1884 8,260,000 bushels of wheat, 1,980,000 bushels of oats and 15,237,000 bushels of corn.

Tobacco is a leading crop in the lower counties and in parts of Western Maryland. The census report on the culture of tobacco says:

"A marked characteristic of Maryland tobacco is its mildness. There are some fine Bay, Burley and cigar-leaf tobaccos raised in Maryland. The soils are capable of producing a much larger proportion of the finer types than has generally been grown, requiring, of course, a change of varieties and appropriate management. Nearly all the tobacco grown in Maryland is produced in the counties of Anne Arundel, Calvert, Carroll, Charles, Frederick, Howard, Montgomery, Prince George's and St. Mary's."

Truck farming is an interest of very great proportions, and certain sections of the State are among the most noted areas in the country for the production of vegetables and fruits. The business of market gardening is carried on around Washington and Baltimore as in the neighborhood of other large cities, and on an extensive scale in Anne Arundel County and lower Eastern Shore. The soil of the lower counties of the Eastern Shore is peculiarly suited to trucking; light, easily worked, responding readily to fertilizers, the yields of cabbages, potatoes, peas, tomatoes, beans, asparagus, melons, berries, etc., are very large. From Worcester and Wicomico Counties thousands of crates of strawberries are annually shipped by railroad and by steam and sail-boats. The demand for fruits and vegetables raised in Maryland is not limited to the supply needed for immediate consumption. Enormous quantities are also required by the large number of canning factories in Baltimore and throughout the State.

Maryland produces a wide range of fruits in great abundance. The raising of peaches is one of the most important industries in the State. The soil and climate of the Eastern Shore are peculiarly adapted to this fruit, and it has become a source of enormous revenue to that section, one of the most noted peach districts in the world. The famous peach orchards of Maryland occupy there as important a position relatively as orange groves in Florida. The profits of the business are very large, and fortunes have been made in it. During the season thousands of car loads and vessel and steamer loads are shipped to Baltimore, Philadelphia, New York and other markets. Large quantities are also absorbed by the local canneries.

#### DAIRYING AND STOCK RAISING.

The dairying interest is one of great extent, and along the lines of railroads leading into Baltimore and Washington, almost every farmer makes this a part of his business. The fine grazing lands of Western Maryland support some splendid herds of cattle, and much attention is given to stock raising, both for market and for dairying purposes. Some of the leading farmers in the State give much attention to raising the finest breeds of live stock, an industry conducted on a large scale also by a large number of wealthy Baltimoreans, whose stock farms are among the most noted in the country. There is probably no State in the Union which can show finer herds of the highest grades of cattle than Maryland.

#### MINERAL RESOURCES.

Maryland is rich in mineral resources, the largest source of wealth in this line being the inexhaustible veins of bituminous and semi-bituminous coal in the northwestern part of the State. Coal mining was commenced in Alleghany County in 1842, and has been vigorously prosecuted ever since. There are now over 20 companies engaged in mining in that county, the coal reaching the seaboard by the Baltimore and Ohio Railroad and the Chesapeake and Ohio Canal, the latter connecting Cumberland, Md., and Georgetown and Washington, D. C. Nearly 2,500,000 tons have been shipped from that county in one year.

Iron ore of a superior quality abounds in a large part of the State

Marble of the finest quality for building purposes is very abundant in some sections. Maryland marble, quarried at Cockeysville, in Baltimore County, was used in the erection of about four-fifths of the Washington Monument lately completed at Washington, D. C. The same marble is used largely in public buildings in Baltimore and Washington.

Granite is found in unlimited quantities.

The limestone beds in the central part of the State yield large supplies of limestone for building and agricultural purposes.

Copper, gold, marl and other minerals are found to some extent in certain sections.

## MANUFACTURING.

The manufacturing interests of Maryland are varied in character and of wide extent. There is probably no State in the Union having better advantages for many lines of manufacturing than Maryland, and in Baltimore are concentrated advantages which, if properly appreciated, would make that city one of the most important seats of industrial activity in the country. It has cheap land, cheap living, cheap water, cheap raw material, low taxes and unsurpassed transportation facilities by land and water. The report of the census for 1880 places the amount of capital invested in manufactures in Maryland at \$58,742,384, the number of establishments being 6,787. The amount of wages paid was \$18,904,965; the materials used were valued at \$66,937,846, and the aggregate value of the products was \$106,780,563. The great bulk of this interest is centered in and around Baltimore—the value of the products of manufactures in that city being \$78,417,304, and in Baltimore County \$11,147,294, or a total for the two of over \$89,500,000 out of an aggregate for the whole State of \$106,780,563. The leading industries, with the amount of capital invested and the value of products produced, were in 1880:

INDUSTRIES.	NO. OF ESTABLISHMENTS.	CAPITAL.	VALUE OF PRODUCTS.
Boots and Shoes.....	34	\$ 590,600	\$2,212,963
Bakery Products.....	341	864,022	2,275,227
Clothing, men's.....	220	3,894,943	9,579,066
Cotton Goods.....	20	4,605,816	4,688,714
Fertilizers.....	48	4,271,870	5,770,198
Flouring and Grist Mill Products.....	546	3,145,520	7,954,004
Foundry and Machine Shop Products.....	91	2,684,358	4,454,317
Fruits and Vegetables, canned and preserved.	114	2,412,692	6,245,297
Furniture.....	131	863,727	1,663,143
Iron and Steel.....	23	4,962,125	4,470,050
Lard, refined.....	2	240,000	1,544,000
Leather, tanned.....	63	802,343	1,468,591
Liquors, distilled.....	16	715,500	1,202,303
Liquors, malt.....	53	2,145,590	1,820,303
Lumber, sawed.....	369	1,237,694	1,813,332
Marble and Stone Work.....	59	673,926	1,007,893
Slaughtering and Meat Packing.....	9	865,000	3,377,605
Tinware, &c.....	226	1,179,267	3,564,994
Tobacco and Snuff.....	10	602,600	1,531,424
Tobacco, cigars.....	369	623,607	1,730,604

The manufacture of pig iron has for many years been a leading industry in Maryland, the total capacity of all the furnaces now in the State, both in and out of blast, being a little over 87,000 tons a year. The manufacture of cotton goods is a very important industry in this State, and in the past yielded large profits, but, in sympathy with all other manufactures, this business has suffered considerable depression lately. It is estimated that over 75 per cent. of all the cotton duck made in the United States is produced in Woodberry, a manufacturing town near Baltimore, in which are located extensive cotton mills and machine shops. The flour milling interests of Maryland are of considerable extent. This industry was first started in 1874-76 by the Ellicotts, who built a mill at what is now Ellicott City, and called it the Patapsco Mill. From this have grown the three Patapsco Flour Mills now in operation in that State. The winter wheat raised in Maryland and the adjoining States is admitted to be much superior in nutriment to the Northwestern spring wheat, and this has had much to do with the popularity of Maryland-made flour. The canning of fruits and vegetables, which in summer is carried on in the same establishments that in winter are used for packing-houses, is one of the most important industries in the State. The value of the products of these factories in 1880 (not including oyster canning) was \$6,245,297, but since then there has been a large increase in the business. It is this industry mainly that makes the raising of fruits and certain kinds of vege-

tables so profitable in Maryland, as it affords a ready home market for these products. Maryland farmers are thus enabled to devote their attention mainly to the fruit and "trucking" business in sections suitable for that industry, as they can always be sure of finding a sale, and that, too, without the expense of heavy freights. Baltimore is the most important center of the fruit canning trade in the United States, and the great success that she has scored in this industry should stimulate the other Southern States that have excellent natural advantages for the business to engage in fruit and vegetable canning.

As already stated, the total value of the products of manufactures in 1880 was \$78,417,304. To show how large the increase in manufactures since then has been, it may be well to give some statistics compiled by the Merchants and Manufacturers' Association of Baltimore as to the industries of the city in 1884. In this report the value of the products of Baltimore's manufactures is given as follows:

Agricultural Implements.....	\$ 550,000	Looking-glass and Picture Frames..	610,500
Boots and Shoes.....	2,055,560	Millers.....	3,255,000
Brick and Tile.....	1,084,921	Marble and Stone Works.....	1,891,340
Bread and Steam Bakeries.....	1,550,000	Malsters and Brewers.....	2,313,250
Clothiers.....	12,002,000	Paints and Oils.....	4,205,500
Carriage, Coach and Wagon.....	905,050	Pianos, Organs, &c.....	1,400,000
Canning and Fishing.....	16,424,546	Potteries, stone and earthenware...	554,000
Cotton Manufactures.....	6,302,500	Printing, Lithographing and Pub-	
Candy, Confections and Fruit.....	3,101,334	lishing.....	2,157,134
Distillers.....	2,000,000	Soap and Candles.....	760,000
Drugs, Chemicals and Patent Medi-		Saddlery, Harness and Whips.....	1,018,207
cines.....	10,519,618	Sashes, Doors and Blinds.....	1,136,250
Fertilizers.....	6,720,000	Shirts, Underwear and Overalls...	3,540,000
Furniture.....	3,246,000	Shot.....	609,375
Glass.....	1,683,200	Tin, Copper and Sheet Iron.....	9,492,065
Hardware.....	575,000	Tobacco Manufactures.....	5,868,750
Hair.....	2,715,320	Woolens.....	651,079
Iron, Steel, Bell, Brass and Ma-			
chinery.....	16,276,305	Total.....	\$127,774,604

It will be seen that, according to these figures, the value of the manufactures of Baltimore in 1884 exceeded by \$21,000,000 the value for the whole State in 1880.

#### OYSTERS.

Maryland is the greatest oyster producing State in the Union, though there is danger of her temporarily losing this position, as the oyster beds have been so much overworked that there is now a growing scarcity of oysters as compared with former years. This may, however, be remedied by more attention being given to the planting of oysters. The field for profitable employment in this direction is practically unlimited. The Chesapeake Bay and its tributaries can easily support a dozen men for every one now employed, when the importance and practicability of oyster cultivation are fully appreciated, and the profits to those engaged in the business will be larger and more certain than at present. The demand for oysters is yearly increasing, and there is no danger or even possibility that the supply will ever exceed the wants of the country. While the gathering of oysters is so far mainly confined to the native population, except the crews of the dredging boats, which are composed of all nationalities, quite a number of New England people have embarked in the planting of oysters in the Chesapeake Bay, and, so far as can be learned, with unvarying success. Until lately the State laws have not been calculated to encourage oyster farming, but there is now a disposition on the part of the State officials to do everything in their power to develop an industry that is of such vital importance to the welfare of the State. The statistics of the Maryland oyster business were compiled in 1880 for the United States Census by Mr. R. H. Edmonds, editor of the Manufacturers' Record, Baltimore, and from his report the following figures are gathered: The total number of boats engaged in the oyster trade in that year was 3,275, of which 1,825 were canoes averaging about three hands each, while 1,450 were larger vessels running in size from 5 to 75 tons, and in value from a thousand

dollars or so up to \$8,000 or \$10,000. The aggregate for the whole fleet was \$2,042,500; while the number of men employed on these vessels was 13,748, their wages and earnings for the oyster season aggregating \$2,538,000. The total amount of capital invested in all branches of the oyster trade was, in 1880, \$6,245,876, and the number of hands employed was 24,337. During the same year there were 10,600,000 bushels of oysters, valued at about \$2,500,000, taken in Maryland waters, of which 6,653,000 bushels were canned or shipped raw, while over 2,000,000 bushels were sent out of the State in the shell, mainly to Northern cities. Baltimore is the center of the oyster canning trade, controlling the great bulk of the business, but several small cities are beginning to develop a large trade in this line. In the whole State there were, in 1880, 98 firms engaged in canning oysters, their capital, including the estimated value of the buildings which they occupied, being a little over \$3,900,000. The number of hands employed was 8,600.

#### FISH AND GAME.

The waters of the State abound with the finest food fishes. Rock-fish, sheep's-head, trout, tailors, mullet, perch and all the well-known varieties are caught in limitless numbers, affording a large source of food supply and furnishing sport to the fisherman. Turtles and terrapin are found in abundance. Millions of wild fowl infest the creeks and rivers. Partridges, snipe, rabbits, squirrels, etc., are found all over the State.

#### TRANSPORTATION FACILITIES.

Every portion of the State is provided with the means of ready access to the best markets. The State is traversed by numerous railroads, bringing every section within a short distance of the line of some road. The tidewater districts are closely connected with Baltimore by the Chesapeake Bay and the rivers and creeks tributary to it, through hundreds of steamboats and sail vessels.

#### EDUCATION.

Maryland has one of the most efficient systems of public schools to be found in any State. Every section of the State is supplied with good schools, and teachers are specially trained for their duties at the State Normal School in Baltimore. There are in different parts of the State, and notably in Baltimore, many private schools of a high order. The renowned Johns Hopkins University, which has, within the few years it has been in existence, taken rank among the most noted institutions of learning in the world, is located in Baltimore.

# VIRGINIA.

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The history of no other State has more to appeal to the imagination and the judgment than that of Virginia—a history romantic, heroic and august. What shapes trod her early stage! No experiences of age dispel the charms of her bright romance. No aspiring historian, panting after iconoclasm, can destroy these idols of childhood. Smith and Pocahontas will be always real and dear; and the sounds of the names of some of her rivers make melodies in our ears now, as they did in young and day-dream days. But if her early history is so dear for the charms it gave our childhood, there are eras, in the contemplation of which veneration is the fittest mood. Her soil seems hallowed with the ashes of the best and bravest of our countrymen. She seems an “eternal camping-ground” for fame; and the spirits of her warriors and statesmen crowd their sacred trysting-place—a numerous and immortal concourse. There reposes all that mortality can claim of one of the most revered of Christian warriors and statesmen—Washington. In the soil of Virginia rests the immortal author of the Declaration of Independence—Thomas Jefferson. There, too, lies Patrick Henry, one of the most kindling and enthralling orators of any time. There is buried Randolph of Roanoke, the fierce and fiery tribune, whose “splendid conflagration” illumined in his day the most august forum of his country—the United States Senate. But who shall call the long roll of heroes in proper tones?

Her generous bounty gave to the nation long ago a large area. Lately she was dismembered by cutting off from her what is now West Virginia; but she is still not only a noble and glorious, but a great State. She is now on a new path of progress, and her bowels yearn to endow the State with a vaster wealth in her minerals than has ever been drawn from her bosom by agriculture.

Virginia lies in latitude  $36^{\circ} 33'$  to  $39^{\circ} 27'$  north, corresponding to Southern Europe, Central Asia, Southern Japan and California. Its longitude is from  $75^{\circ} 13'$  to  $83^{\circ} 37'$  west from Greenwich. On the south it adjoins North Carolina for 326 miles and Tennessee for 114 miles, making the line of the State from the Atlantic west 440 miles; on the west and northwest, Kentucky for 115 and West Virginia (by a very irregular line) for 450 miles, form the boundary. Maryland is northeast and north, separated by the Potomac River and the Chesapeake Bay for 205 miles from Virginia, and by a line of 25 miles across the Eastern Shore. East and southeast it is bordered by the Atlantic for 125 miles. The boundary lines of the State measure about 1,400 miles. On the northwest they are mostly mountain ranges; on the northeast and east, water. The longest line in the State, from the Atlantic southwest to Kentucky, is 476 miles; the longest from north to south is 192 miles.

The State has an area of land surface of 40,125 square miles, and a water surface estimated at 2,325 square miles. The population, according to the census of 1880, was 1,512,565—an average of 38 to the square mile. Of this number, 880,858 were white and 631,616 colored.

There are six great natural divisions of the territory of Virginia—belts of country extending across the State from northeast to southwest, as a general direction, nearly parallel to each other, and corresponding to the trend of the Atlantic coast on the east, and of the ranges of the Apalachian system of mountains on the northwest. These grand divisions are, taken in the order of succession from the ocean northwest across the State: 1st. The Tidewater Country; 2d. Middle Virginia; 3d. The Piedmont Section; 4th. The Blue Ridge Country; 5th. The Great Valley of Virginia; 6th. The Apalachian Country. These divisions not only succeed each other geographically, but they occupy different levels above the sea, rising to the west like a grand stairway. They differ geologically also; therefore they have differences of climate, soil, productions, &c., and require a separate consideration in every respect in a description of the State.

TIDEWATER VIRGINIA is the eastern and southeastern part of the State that on the south borders North Carolina 104 miles; on the east has an air-line border of 120 miles along the Atlantic; on the west is bounded by 150 miles of the irregular outline of the Middle Country—(this would be 164 miles if it took in the mere edge of Tidewater along the Potomac up to Georgetown.) The shore line of the Potomac River and the Chesapeake Bay for 140 miles, and a line of 25 miles across the Eastern Shore, separate it from Maryland on the north. The whole forms an irregular quadrilateral, averaging 114 miles in length from north to south, and 90 in width from east to west, making an area of some 11,000 square miles.

The latitude is from  $36^{\circ} 33'$  to  $38^{\circ} 54'$  north, corresponding to that of the countries bordering on the northern shores of the Mediterranean in Europe, and to the central belt of States—Kentucky, Missouri, California, &c.—in the United States. The longitude is from  $75^{\circ} 13'$  to  $77^{\circ} 30'$  west from Greenwich—that of Maryland, Central Pennsylvania and New York, in the United States, and Ontario, in Canada, on the north, and of North Carolina, the Bahamas, Cuba, &c., on the south.

This is emphatically a tidewater country, since every portion of it is penetrated by the tidal waters of Chesapeake Bay and its tributary rivers, creeks, bays, inlets, &c., which cover some 2,300 square miles of surface, and give nearly 1,500 miles of tidal shore line. The united waters of nearly all this section, with those that drain 40,000 more square miles of country, or the drainage of 50,000 square miles, (an area equal to that of England,) flow out through the channel, 12 miles wide, between Capes Charles and Henry—the “Virginia Capes”—into the Virginian sea of Captain John Smith, along the eastern border of which, 50 or 60 miles from the land, runs the ever-flowing Gulf Stream.

Tidewater is naturally divided into nine principal peninsulas, and these are sub-divided into a great number of smaller ones, giving a wealth of outline not even surpassed by the famous Morea of Greece; in truth, there are here dozens of Moreas. These peninsulas are, politically, each divided into counties, (thirty in all,) most of them laid out and named when this, the first settled portion of English-speaking America, was a British colony, and the names given them were those of the counties or worthies of England, the “Mother Country” at the time.

The first peninsula, taking them from the north to the south, is the Northern Neck, 75 miles long and from 6 to 20 wide, extending southeast from the Middle Country to the bay, between the Potomac and Rappahannock. Its counties are King George, Westmoreland, Richmond, Northumberland and Lancaster. This peninsula is almost surrounded by navigable waters.

The second, or Middlesex Peninsula, extends southeast for 60 miles, with a breadth of from 3 to 10, between the Rappahannock and the Piankitant Rivers, including Essex and Middlesex Counties. The Rappahannock is navigable all

along one side, and the Piankitank nearly half of the other. This is one of the short peninsulas succeeding a long one.

The third, or Gloucester Peninsula, reaches southeast from the Middle Country, between the Piankitank and the York and its extension, the Mattapony, some 70 miles to the bay, where it is "forked" by the Mobjack Bay. Its width is from 6 to 18 miles. It includes King & Queen, Mathews and Gloucester Counties.

The fourth, the King William or Pamunkey Peninsula, a short one, extends 60 miles southeast, between the Mattapony and the Pamunkey, (the streams that form the York.) This is from 3 to 14 miles wide, and includes the counties of Caroline and King William, although the former extends across the neck of the third peninsula to the Rappahannock.

The fifth, a long one, is known as "The Peninsula," by way of eminence, as it was the first settled; and Williamsburg, its chief town, was the colonial capital of Virginia. This stretches 100 miles to the southeast, with a width of from 5 to 15 miles, between the Pamunkey and its extension, the York, on the north, and the Chickahominy and the continuing James on the south. This large peninsula extends from the Middle Country to the bay, and looks out between "The Capes." Its counties are Hanover, New Kent, James City, York, Warwick and Elizabeth City.

The sixth, the short, Richmond or Chickahominy Peninsula, between the Chickahominy and the James, is 50 miles long and from 5 to 15 wide, divided into Henrico and Charles City Counties. The former contains Richmond, the capital of Virginia.

The seventh, or Southside Peninsula, embraces all the country south of the James, and between it and the Nansemond River and the North Carolina line. This is the last peninsula trending to the southeast, which it does for 64 miles, with a width of from 35 to 40. Its counties are Prince George, Surry, Sussex, Southampton, Isle of Wight and Nansemond.

The eighth is the Norfolk Peninsula, including the counties of Norfolk and Princess Anne—the territory between the Nansemond River, Hampton Roads, Chesapeake Bay and the Atlantic—some 30 by 35 miles in extent, protruding northward.

The ninth, the Eastern Shore, is the peninsula extending to the south between Chesapeake Bay and the Atlantic, divided between the large counties of Accomac and Northampton.

The last two are the Upper Tertiary Plain, raised but from 20 to 30 feet above the sea level, composed of north and south-lying belts of smaller peninsulas and islands, with the "pocoson" ends of the other peninsulas, forming the first step of the ascending stairway or terraces of Virginia to the westward. The shifting sands of its ocean shore are often elevated into dunes more than 100 feet high.

The seven other peninsulas, with all their masses extended southeast and northwest, rise up as the second and third steps. The second step, corresponding in the main to the middle tertiary formation, attains an elevation of from 80 to 120 feet above the sea. This is the widest tidewater terrace, gashed and broken by the broad estuaries that flow through it. The third step has its eastern edge just west of the meridian of 77°, and attains an elevation of from 90 to 150 feet above the sea, occupying the belt of lower tertiary country. Beyond this rises the fourth step, the border of granite and sandstone elevated from 150 to 200 feet above the sea, forming the rocky barrier over which the waters of the Middle or "upper country" fall, and up to which the tides of the "low country" come, making the "head of tide" for the Atlantic slope, and furnishing sites for manufacturing and commercial cities, where water-power for manufacturing and tide power for commerce are found side by side. Here, half in Tidewater and half in



Middle, on the fourth step and on the level of the first, on the hills and below them, are Petersburg, Richmond, Fredericksburg and Alexandria.

The Tidewater Plain, then, has an average width of nearly 100 miles, and rises in three successive terraces to an elevation of about 150 feet. It is a fine, rolling, low country, with a surface diversified by salt-water marshes and meadows, river bottoms, plains, upland, slopes and ridges, with a moderate proportion of "pocoson" or swamp country.

The MIDDLE COUNTRY extends westward from the "head of tide" to the foot of the low, broken ranges that, under the names of Catocton, Bull Run, Yew, Clark's, Southwest, Carter's, Green, Findlay's, Buffalo, Chandler's, Smith's, &c., mountains and hills, extend across the State southwest, from the Potomac, near the northern corner of Fairfax County, to the North Carolina line, near the southwest corner of Pittsylvania, forming the eastern outliers of the Apalachian system, and that may with propriety be called the Atlantic coast range.

The general form of this section is that of a large right-angled triangle, its base resting on the North Carolina line for 120 miles; its perpendicular, a line 174 miles long, extending from the Carolina line to the Potomac, just east of and parallel to the meridian of  $77^{\circ} 30'$  west, is the right line along the waving border of Tidewater which lies east; the hypotenuse is the 216 miles along the Coast Range, before mentioned, the border of Piedmont, on the northwest—the area of the whole, including the irregular outline, being some 12,470 square miles.

The latitude of this section is from  $36^{\circ} 33'$  to  $39^{\circ}$ ; the longitude  $70^{\circ}$  to  $79^{\circ} 40'$  west. So its general situation and relations are nearly similar to those of Tidewater.

The Middle Country is a great, moderately undulating plain, from 25 to 100 miles wide, rising to the northwest from an elevation of 150 to 200 feet above tide, at the rocky rim of its eastern margin, to from 300 to 500 along its northwestern. In general appearance this is more like a plain than any other portion of the State. The principal streams, as a rule, cross it at right angles; so it is a succession of ridges and valleys running southeast and northwest, the valleys often narrow and deep, but the ridges generally not very prominent. The appearance of much of this country is somewhat monotonous, having many dark evergreen trees in its forests. It needs a denser population to enliven it. To many portions of the Middle Country the mountain ranges to the west, of the deepest blue, form an agreeable and distant boundary to the otherwise sober landscape. There are a few prominences like Willis', Slate River and White Oak Mountains farther east, only prominent because in a champaign country.

There can be but little natural grouping of the political divisions of the Middle Country, since there are but few great natural landmarks, unless James River, which crosses this section at right angles nearly midway, be considered as one, and the twenty-five counties of Middle Virginia be grouped as northside and southside ones. Many of these counties were laid out, named and settled in colonial times also, and some of the oldest settled portions of the State are here.

The northside counties are Fairfax, Alexandria, Prince William and Stafford, bordering on the Potomac; Spotsylvania between the Rappahannock and North Anna, Louisa on the south of the North Anna (portions of Caroline, Hanover and Henrico properly belong here,) Fluvanna and Goochland on the James—making 8 northside counties.

The seventeen southside counties are Buckingham, Cumberland, Powhatan and Chesterfield, between the James and Appomattox rivers; Appomattox, on the James, Prince Edward, Amelia and Dinwiddie, south of the Appomattox, and the two latter between it and the Nottoway, (Nottoway is north of the river of that name;) Campbell between the James and Staunton (or Roanoke) rivers, Charlotte

north of the Roanoke, Lunenburg between the Nottoway and Meherrin, Brunswick and Greenville extending from the Nottoway across the Meherrin to the North Carolina line, (a portion of the latter county is in Tidewater;) Pittsylvania and Halifax reach from Staunton across the Banister and the Dan to the North Carolina line, and Mecklenburg extends from the Meherrin across the Roanoke to the same boundary.

Portions of Fairfax, Prince William, Stafford, Spotsylvania, Caroline, Fauquier, Culpeper, Hanover, Henrico, Goochland, Powhatan, Chesterfield, Buckingham, Cumberland, Prince Edward, Campbell and Pittsylvania, which are on the triassic, or new red sandstone formation, differ considerably in appearance from the rest of the Middle Country which is on the eozoic, or granite, gneiss, &c., rocks.

This section is essentially the same as the rest of the eozoic belt that extends from the Alabama River to the St. Lawrence, embracing large portions of the best sections of Alabama, Georgia, South Carolina, North Carolina, Maryland, Pennsylvania, New York and all the New England States. The cities of Atlanta, Raleigh, Petersburg, Richmond, Fredericksburg, Alexandria, Washington, Baltimore, Philadelphia, New York, New Haven, &c., are situated, in whole or in part, on these rocks.

PIEDMONT VIRGINIA is the long belt of country stretching for 244 miles from the banks of the Potomac and the Maryland line southwest, along the eastern base of the Blue Ridge Mountains, and between them and the Coast Range, to the banks of the Dan at the North Carolina line; it varies in width from 20 to 30 miles, averaging about 25; its approximate area is 6,680 square miles.

Its latitude corresponds with that of the State  $36^{\circ} 33'$  to  $39^{\circ} 27'$  north; its longitude is from  $77^{\circ} 20'$  to  $80^{\circ} 50'$  west.

This Piedmont Country is the fifth step of the great stairway ascending to the west; its eastern edge, along Middle Virginia, is from 300 to 500 feet above the sea; then come the broken ranges of the Coast Mountains, rising as detached or connected knobs, in lines or groups, from 100 to 600 feet higher. These are succeeded by the numberless valleys, of all imaginable forms, some long, straight and wide; others narrow and widening; others again oval and almost enclosed, locally known as "Coves," that extend across to and far into the Blue Ridge, the spurs of which often reach out southwardly for miles, ramifying in all directions. Portions of Piedmont form widely extended plains. The land west of the coast ranges is generally from 300 to 500 feet above the sea, and rises to the west, until at the foot of the Blue Ridge it attains an elevation of from 600 to 1,200 feet. The Blue Ridge rises to from 2,000 to 4,000 feet above the sea; at one point near the Tennessee line, it reaches a height of 5,530 feet; its general elevation is about 2,500, but its outline is very irregular.

Numerous streams have their origin in the heads of the gorges of the Blue Ridge, and most of them then flow across Piedmont to the southeast until near its eastern border, where they unite and form one that runs for a considerable distance along and parallel to the Coast Mountains, and takes the name of some of the well known rivers that cross Middle and even Tidewater Virginia, like the Roanoke or Staunton, and the James. Some of these rivers break through the Blue Ridge from the Valley, making water gaps in that formidable mountain barrier, as the Potomac, the James and the Roanoke; but they all follow the rule above given in their way across this section.

This is a genuine "Piedmont" country—one in which the mountains present themselves in their grand as well as in their diminutive forms—gradually sinking down into the plains, giving great diversity and picturesqueness to the landscape, with its wealth of forms of relief as varied as those of outline in Tidewater. Few countries surpass this in beauty of scenery and choice of prospect, so it has

always been a favorite section with men of refinement in which to fix their homes. Its population is 31 to the square mile, giving some 21 acres for each.

The political divisions of Piedmont are fourteen. Some of its counties have long been settled, and are highly improved. There are no natural groupings possible for these counties; they all, with three exceptions, run from the summit of the Blue Ridge across this belt of country. Taking them from the Potomac, the counties are: Loudoun, watered mostly by Goose and Catoctin Creeks and the Potomac; Fauquier, drained by the Rappahannock waters, to which river it extends; Rappahannock and Culpeper, on the southwest side of the same stream, Culpeper reaching to the Rapid Anne, as does also Madison; Greene and Orange, southwest of the Rapid Anne; Albemarle, drained by the Rivanna and Hardware branches of James, and reaching to the James; Nelson and Amherst, bounded by the Blue Ridge and the James, Amherst by that river, both southeast and southwest; Bedford and Franklin, southwest of the James, and drained chiefly by waters of the Roanoke or Staunton; Patrick and Henry, next the North Carolina line, furnishing many branches to the Dan. Every portion of this section is penetrated by watercourses and is well supplied with unfailing, bright, pure water, from springs and mountain rivulets.

The BLUE RIDGE SECTION, for two-thirds of its length of 310 miles, is embraced in the Valley and Piedmont counties that have their common lines upon its watershed; it is only the southwestern portion of it, where it expands into a plateau, with an area of some 1,230 square miles, that forms a separate political division; still the whole range and its numerous spurs, parallel ridges, detached knobs and foot hills, varying in width from 3 to 20 miles, embracing nearly 2,500 square miles of territory, is a distinct region, not only in appearance but in all essential particulars. The river, in the gorge where the Potomac breaks through the Blue Ridge, is 242 feet above tide. The Blue Ridge there attains an elevation of 1,460 feet. Mt. Marshall, near and south of Front Royal, is 3,369 feet high; the notch, Rockfish Gap, at the Chesapeake and Ohio Railroad, is 1,996 feet, and James River, where it passes through the Ridge, is 706 feet above tide, or more than twice as high as the Potomac at its passage. The Peaks of Otter, in Bedford County, are 3,993 feet, and the Balsam Mountain, in Grayson, is 5,700 feet, and in North Carolina this range is nearly 7,000 feet above the sea level. These figures show that this range increases in elevation as we go southwest, and every portion of the country near rises in the same manner. At a little distance this range is generally of a deep blue color. The whole mountain range may be characterized as a series of swelling domes, connected by long ridges meeting between the high points in gaps or notches, and sending out long spurs in all directions from the general range, but more especially on the eastern side, these in turn sending out other spurs giving a great development of surface and variety of exposure.

The political divisions upon the plateau of the Blue Ridge are the counties of Floyd, Carroll and Grayson, all watered by the Kanawha, or New River, and its branches, a tributary of the Ohio, except the little valley in the southwest corner of Grayson, which sends its waters to the Tennessee. The population of this romantic section is 23 to the square mile.

The GREAT VALLEY OF VIRGINIA is the belt of limestone land west of the Blue Ridge, and between it and the numerous interrupted ranges of mountains, with various local names, that run parallel to it on the west at an average distance of some twenty miles, that collectively are called the Kitatinny or North Mountains. This valley extends in West Virginia and Virginia for more than 330 miles from the Potomac to the Tennessee line, and 305 miles of this splendid country are within the limits of Virginia. The county lines generally extend from the top of the Blue Ridge to the top of the second or third mountain range beyond the

Valley proper, so that the political Valley is somewhat larger than the natural one, which has an area of about 6,000 square miles, while the former has 7,550, and a population of twenty-six to the square mile. The latitude of the Valley is from 36° 35' N. to 39° 26'; its longitude is from 77° 50' to 80° 16' W.

While this is one continuous valley, clearly defined by its bounding mountains, it is not the valley of one river, or of one system of rivers, but of five; so that it has four water-sheds and four river troughs in its length, along the Valley from the Potomac to the Tennessee line. These valleys and their length in the Great Valley are, from the northeast—

1st.	The Shenandoah Valley.....	136 miles.
2d.	The James River Valley.....	50 "
3d.	The Roanoke River Valley.....	38 "
4th.	The Kanawha or New River Valley.....	54 "
5th.	The Valley of the Holston or Tennessee.....	52 "
		330 miles.

As a whole the Valley rises to the southwest, being 242 feet above the tide where the Shenandoah enters the Potomac and the united rivers break through the Blue Ridge at Harper's Ferry, and 1,687 feet where the waters of the Holston leave the State and pass into Tennessee. The entire Valley appears then as a series of ascending and descending planes, sloping to the northeast or the southwest. That of the Shenandoah rises from 242 to 1,863 feet along the line of its main stream, in 136 miles, looking northeast; those of the James slope both ways, from the Shenandoah summit to the southwest, and from the Roanoke summit to the northeast, and so on. This arrangement gives this seventh great step a variety of elevations above the sea from 242 to 2,594 feet, or even to 3,000, in a great enclosed valley, sub-divided into very many minor valleys, giving "facings" in all directions; for the whole Valley has a very decided southeastern inclination, to be considered in this connection, its western side being from 500 to 1,000 feet in surface elevation above its eastern, presenting its mass to the sun, giving its streams a tendency to flow across it toward the east, as the result of its combined slopes, and making the main drainage way hug the western base of the Blue Ridge. A moment's reflection will show that this is a well watered country, having a wealth of water-power and drainage and irrigation resources almost beyond estimate.

The aspect of this region is exceedingly pleasant. The great width of the Valley; the singular coloring, and wavy, but bold outline of the Blue Ridge; the long, uniform lines of the Kitatinny Mountains, and the high knobs that rise up behind them in the distance; the detached ranges that often extend for many miles in the midst of the Valley like huge lines of fortification—all these for the outline, filled up with park-like forests, well cultivated farms, well built towns, and threaded by bright and abounding rivers, make this a charming and inviting region.

The fifteen counties of the Valley—its political divisions—are naturally grouped by the river basins, to which their lines generally conform.

The noted *Shenandoah Valley* has, in Virginia, in the northeast Frederick and Clarke counties, reaching from the North Mountains to the Blue Ridge across the Valley, watered by the Opequon Creek and the Shenandoah River and branches; Shenandoah County, extending from the mountains west to the Massanutton range, that for 50 miles divides the Valley into two, one watered by the North and the other by the South Fork of the Shenandoah; Warren, that lies at the confluence of these forks and between the Massanutton and the Blue Ridge, and Page County, between the same mountains and intersected by the South Fork; Rockingham, a large and noted county, reaching across the whole Valley, and holding the sources of the North Fork; and Augusta, the largest county, also

occupying the width of the Valley, and containing the head springs of the Shenandoah. These seven counties occupy the whole of this well-known, fertile and wealthy valley.

In the *Valley of the James* are Rockbridge and Botetourt, two fine counties in the heart of the valley, both extending across it, the former watered by the North and South rivers of the James, and that river and other tributaries, and the latter by the much-developed James River and Catawba, Craig's and other creeks. The mountain scenery of Rockbridge is especially noted.

In the *Valley of the Roanoke* is the small but rich county of the same name; portions of Botetourt and Montgomery are drained by that river also.

The *Kanawha* or *New River Valley* has Montgomery, Pulaski and Wythe Counties, famous ones for grazing and stock, that reach from mountain to mountain.

In the *Valley of the Holston* or *Tennessee* are the two fine counties of Smyth and Washington, with soils of rare fitness.

APALACHIAN VIRGINIA succeeds the Valley on the west. It is a mountain country, traversed its whole length by the Apalachian or Alleghany system of mountains. It may be considered as a series of comparatively narrow, long, parallel valleys, running northeast and southwest, separated from each other by mountain ranges that are, generally, equally narrow, long and parallel, and quite elevated. In crossing this section to the northwest, at right angles to its mountains and valleys, in 50 miles one will cross from 6 to 10 of these mountain ranges, and as many valleys. As before stated, a strip of this region is embraced in the Valley counties, as they include the two or three front ranges that have drainage into the Valley; so that some 900 square miles of Apalachia are politically classed with the Valley, leaving 5,720 square miles to be treated of here. This, in Virginia, is an irregular belt of country 260 miles long, varying in width from 10 to 50 miles. Its waters, generally, flow northeast and southwest, but it has basins that drain north and northwest, and south and southeast. The heads of the valleys are generally from 2,000 to 2,800 feet above tide, and the waters often flow from each way to a central depression—that is, from 600 to 1,200 feet above sea level—before they unite and break through the enclosing ranges. The remarks made concerning the slopes of the Great Valley apply also to this section, except that the Apalachian valleys are straighter.

The twelve counties of this section group very well as follows:

1st. The James River group, the waters from which flow into that river, including Highland, on the water-shed of the James and Potomac, the South Branch of the latter having several of its sources there, with the Cow-pasture and Jackson's River branches of the former; Bath, crossed by the same branches of the James; Alleghany, through a portion of which the same rivers flow, and in which they unite, meeting the waters of Dunlap's and Pott's Creeks from the southwest; and Craig, drained by Johns', Craig's and Barber's Creeks, flowing from the southwest. Sinking Creek of New River flows southwest from this county. All these waters but the last run into the James before it crosses the Valley.

2d. The Kanawha or New River group includes Giles, which is intersected by New River, into which flow from the northeast Sinking and Big and Little Stony Creeks, and from the southwest Walker's and Wolf Creeks; Bland, on the head waters of Walker's and Wolf Creeks, just mentioned, and having also some of the springs of the Holston, that flows southwest.

3d. The Tennessee River group, on the waters of that river, embraces Tazewell, on the divide of New and Tennessee, (the lowest gaps of which are 2,116 feet above tide); Wolf Creek, Bluestone and East Rivers run from this county

northeast into New River, while the North and the Maiden Spring Forks of Clinch flow southwest; Russell is southwest of Tazewell, and the Clinch and its Copper and Moccasin Creek branches run through it to the southwest; Scott is next, on the southwest, and the same streams pass through it from Russell, and the North Fork of the Holston besides, all running southwest; Lee is southwest of Scott, Powell's River and its numerous branches flowing southwest from it to the Clinch. All these waters unite in the State of Tennessee, and form the river of that name. The land of the counties of this group is exceedingly fertile, large portions of it being limestone; and its exposure to the southwest, and the situation and elevation of its surrounding mountains, secure to it a very mild climate.

4th. The Sandy River group includes Buchanan County, drained by the Tug, Louisa and Russell's Forks of the Big Sandy, flowing northwest, and Wise County, drained by Russell's and Pound Forks of the same river, and a portion by the Guest's River branch of the Clinch, and some head springs of Powell's River. These two counties really belong to the Trans-Appalachian Country, the great plain that slopes from the parallel ranges of mountains to the northwest, from which the waters have eroded their deep channels. They cover Virginia's part of the great carboniferous formation, and give her a most valuable coal field.

Appalachia is noted as a grazing country, its elevation giving it a cool, moist atmosphere, admirably adapted, with its fertile soil, to the growth of grass and the rearing of stock of all kinds.

INLAND WATERS.—The State has two systems of inland waters—(1) the Atlantic and (2) the Ohio or Mississippi.

(1.) The waters of the State, from Tidewater, Middle, Piedmont, the eastern slope of the Blue Ridge and the central part of the Valley, flow southeast to Chesapeake Bay and Albemarle Sound, following the inclination of the "Atlantic slope." Those from the northern portions of the Valley and Appalachia follow the mountain ranges northeast to the Potomac, which river follows the southeasterly course before mentioned.

(2.) The waters from the southwestern part of the Blue Ridge, the middle of the southwestern half of the Valley and Appalachia, flow northwest and north to the Ohio; those of the southwestern portions of the Valley and Appalachia flow southwest to the Tennessee. So the waters of the State flow in all directions.

PRINCIPAL RIVERS AND BRANCHES.—The waters belonging to the Atlantic system drain six-sevenths of the State. The principal streams of this system are: The Potomac, a wide and deep river, the northeastern boundary of Virginia, with its large branches, the Shenandoah and the South Branch, and its prominent smaller ones, Potomac Creek, Occoquan River, Broad Run, Goose, Catocin and Opequon Creeks, draining a large area of each of the sections of the State. The Potomac is navigable for 110 miles from where it enters the bay, some 65 miles from the ocean. It has many landings, and lines of steamers and sailing vessels connect them with all portions of the country, giving great facilities for cheap transportation to a very extensive and valuable portion of the Northern Neck. The Rappahannock, with its Rapid Anne and numerous other branches flowing from the Blue Ridge across Piedmont, Middle and Tidewater, irrigating a large territory. The Rappahannock is navigable to Fredericksburg, 92 miles from its mouth at the bay, some 40 miles from the ocean. The Piankitank, draining only a portion of Tidewater, is navigable for some 14 miles; and Mobjack Bay and its rivers furnish deep entrances to the Gloucester Peninsula. The York, with its Pamunkey and Mattaponi branches, and many tributaries flowing from a considerable area of Middle and Tidewater. The York is a wide, deep and almost straight *belt* of water, reaching over 40 miles from the bay to the junction of the Pamunkey and the Mattaponi, which are themselves navigable for many miles

for light-draught vessels. The James, with the Chickahominy, Elizabeth, Nansemond, Appomattox, Rivanna, Willis', Slate, Rockfish, Tye, Pedlar, South, Cowpasture, Jackson's, and many other inflowing rivers and streams of all kinds, gathers from a large territory in all the divisions, draining more of the State than any other river. The James is navigable to Richmond. The Elizabeth is a broad arm of the Hampton Roads estuary of the James, extending for 12 miles, the last four of which are expanded as the superb harbor between the cities of Norfolk and Portsmouth. All these flow into Chesapeake Bay. The Chowan, through its Blackwater, Nottoway and Meherrin branches and their affluents, waters portions of Middle and Tidewater Virginia. The Roanoke receives the Dan, Otter, Pig, and many other streams from the Valley, Piedmont and Middle Virginia, and then flows through North Carolina to Albemarle Sound, joining the Chowan. The sources of the Yadkin are in the Blue Ridge.

The waters of the Ohio, a part of the Mississippi system, drain the remaining seventh of the State; but they reach the Ohio by three diverse ways. The rivers are: The Kanawha or New River, that rises in North Carolina, in the most elevated portion of the United States east of the Mississippi, flows through the plateau of the Blue Ridge, from which it receives Chestnut, Poplar Camp, Reed Island and other creeks and Little River; across the Valley, where Cripple, Reed and Peak's Creeks join it; across Apalachia, from which Walker's, Sinking, Big and Little Stony and Wolf Creeks and East and Bluestone Rivers flow into it, and then through West Virginia into the Ohio, having cut through the whole Apalachian system of mountains, except its eastern barrier, the Blue Ridge. The Holston, through its South, Middle and North Forks, Moccasin Creek, &c., drains the southwestern portions of the Valley and Apalachia; and the Clinch, by its North and South Forks, Copper Creek, Guest's and Powell's Rivers, and many other tributaries, waters the extreme southwest of the Apalachian Country. These flow into the Tennessee. A portion of the mountain country gives rise to the Louisa and Russell's Forks of the Big Sandy River, and to some branches of the Tug Fork of the same river, the Tug forming the Virginia line for a space. These flow into the Ohio by the Big Sandy.

These are but a few of the thousand or more named and valuable streams of Virginia. They abound in all portions of the State, giving a vast quantity of water-power, irrigating the country, furnishing waters suited to every species of fish, giving channels for tide and inland navigation, and enlivening the landscapes. Springs are very numerous, many of them of large size. Nearly every portion of the State is well watered.

#### GEOLOGY.

The geological formations found in Virginia, like its geographical divisions, succeed each other in belts, either complete or broken, nearly parallel to the coast of the Atlantic. In fact, the geographical divisions of the State that have already been given, correspond in the main to the different geological formations, and have been suggested by them; hence, those divisions are natural.

The formations developed in Virginia, taken in the order in which they succeed each other and cover the surface, or form the rocks found with the surface, from the Atlantic at the Virginia capes to the northwest across the State, are as follows:

*Tidewater*.—1. Quarternary; 2. Upper Tertiary; 3. Middle Tertiary; 4. Lower Tertiary. *Middle*.—5. Triassic and Jurassic; 6. Azoic and Granitic. *Piedmont*.—7. Azoic, Epidotic, &c. *Blue Ridge*.—8. Azoic and Cambrian. *The Valley*.—9. Cambrian and Silurian. *Apalachia*.—10. Sub-carboniferous and Devonian; 11. Silurian; 12. Devonian and Sub-carboniferous; 13. Great Carboniferous.

**TIDEWATER.**—This is what the geologists call a tertiary or lately formed region—one where the remains of plants and animals found in the rocks and soils do not differ greatly from the plants and animals now living; they belong to the same families. The beds of mineral substances here found are rarely converted into real rocks, but lie as beds of sand, gravel, clay, &c., much the same as when they were deposited in shallow waters by the ocean and inflowing rivers.

1st. *The quarternary or post-tertiary* formation is the sandy shore, the mere margin, of the Atlantic and the bay. It is like the shore land of Lincolnshire and other eastern counties of England.

2d. *The upper tertiary or pliocene* is the first step or terrace of the State above the ocean. It is the low plain of the Eastern Shore and Norfolk Peninsulas, where the surface is composed of “light-colored sands and clays, generally of a fine texture, and never enclosing pebbles of large dimensions. This is, geologically, a similar country to most of Suffolk in England, to the hills of Rome in Italy, and the territory around Antwerp in Belgium. Underneath this are found the other formations in order, and their valuable marls can be reached at no great depth by going through this. The immense piles of shells found along the shores and the refuse fish furnish fertilizers adapted to the soils of this section.

3d. *The middle tertiary or miocene* is the surface of the second step of country, extending from the western border of the last-described formation, where this passes under that, to a line running southward from Mathias Point, on the Potomac, to Coggin’s Point, on the James—a line just west of the meridian of 77°. From the James south it inclines to the west. This formation generally, descending from the surface, consists of the following materials:

1. Beds of coarse sand and gravel just under the soil, sloping in position.
2. Horizontal beds of sand and clay.
3. Yellow marl, underlaid by a conglomerate of fragments, with shells nearly entire, but water-worn.
4. Yellow marl, with friable shells and tenacious clay.
5. Upper blue marl—a clay, bluish, of fine texture, rich in shells.
6. Lower blue marl—clay with more sandy materials, more shells and more varieties.
7. A thin band of pebbles, with ferruginous matter—the bottom of the formation.

In some parts of Tidewater some of these strata harden into a sort of limestone or into sandstones, very good for building purposes. Of course, the lower tertiary underlies this as this underlies the upper, and is overlapped by it. This formation covers a large portion of the Atlantic plain and of the Lower Mississippi Valley of the United States; it is the formation of the valley of the Columbia in Oregon and of the valleys of California; in Europe it forms the Gironde and Landes of France and the basin of Vienna; in England it is the New Forest Region of Hampshire and Dorset, the country around Portsmouth and Southampton.

4th. *The lower tertiary or eocene.* This formation underlies both the others, and forms the surface of the remainder of Tidewater west of the line already described as forming the western boundary of the middle tertiary. It is a strip of country some 15 miles wide along the “head of tide.” The fossils found in this are more unlike the forms now existing. This green-sand marl formation on the east pushes its headlands into the middle tertiary, and on the west fills up the ravines between the headlands of sandstone, granite, &c., that protrude into it from the Middle Country.

The following section, from the banks of the Potomac below Aquia Creek, will give an insight into the composition of this group of “rocks:”



- (1.) The soil.
  - (2.) 20 feet of yellow clay, impregnated with sulphates.
  - (3.) 5 feet of sulphur-colored clay, containing shells.
  - (4.) 3 feet of rock, resembling marl in color and composition.
  - (5.) 12 feet of yellowish gray marl, specked with green sand and abounding  
— in shells.
- 40 feet, the level of the Potomac.

In some places the marl of this eocene contains so much carbonate of lime from the shells distributed through it, it has become a limestone. Here are also beds of blue marl, shell-rock, gypseous and acid clays, dark bluish clay and sand containing sulphates of iron and lime. There are also beds of sand and gravel, coarse and often cemented by iron. In all of these there is great variety of color and composition. The strata are slightly inclined, generally to the southeast. This is the formation on which the most of Essex, Middlesex, Kent, &c., counties around London in England, are situated—the region of the noted London clay. (The same material abounds in Virginia.) The Isle of Wight, Dorset, Wilts, Hants, Suffolk, Norfolk, Cambridge and Lincoln Counties, the most productive in England, are in the lower tertiary; the cities of Liverpool and Paris are also on it.

5th. *The triassic or new red sandstone* is sometimes found as transported fragments from that formation, (which forms a part of the western boundary of this section,) scattered over the surface of some of the peninsulas southeast from where this rock is found in place.

6th. *The azoic or primary rocks*, which underlie all the others, and also form part of this western border, are sometimes found as headlands thrust into the tertiary or as islands in its surface.

MIDDLE COUNTRY—The larger portion of this region is azoic or primary. The rocks contain no organic remains. They are crystalline in their character, generally stratified, dip at a high angle either to the southeast or the northwest, or are nearly vertical, rarely horizontal, and their exposed edges or "strike" run northeast and southwest. The strata vary in thickness from the fraction of an inch to many feet.

The rocks of this formation are: Gneiss, (a name given to any crystalline, stratified rock composed of quartz and felspar, mixed with smaller quantities of hornblende, mica or other simple minerals,) the most abundant, which, along the east side of the Middle Country, is a gray rock consisting of quartz, felspar and black mica, with some spangles of white and grains of hornblende. This is the fine Richmond granite. In some of the layers of this rock the felspar predominates, and the rock crumbles on exposure. The finer grained gneiss is generally called granite; the coarser, syenite or syenitic granite. The former are quartzose; the latter felspathic. Next, going westward, are other varieties of gneiss more slaty in structure, containing more felspar and hornblende, (quartz is the flint rock; felspar is softer and duller in color; hornblende is dark green or black,) and are more decayed, sometimes into beds of porcelain clay or kaolin. These are succeeded, on the western border of this section, by a broad belt of micaceous, talcose and argillaceous slates, according to the ingredient predominant in the rock, whether mica, talc, or soapstone or alumina. The rocks on the east side of this slaty belt are most micaceous; on the west, talcose. In these belts are some beds or small tracts of chloritic gneiss, slate, steatite, serpentine, &c., making spots noted for fertility like the Green Spring Country in Louisa County. In the more argillaceous part of this belt—the western side next to Piedmont—some of the slates become so sandy, they pass as sandstones or conglomerates, (gneissoid sandstones,) and among these are found roofing slates and a fragmentary belt of limestone. Through the centre of this region runs the "gold belt," where gold is

found in quartz veins, interstratified with the other rocks. Here are also veins of various kinds of iron and copper ores. This formation covers large areas of valuable country in all parts of the world.

In this Middle Section, as before stated, laid over the other rocks, (the granitic ones,) or filling depressions in them, are a number of patches of the triassic and jurassic, or new red sandstone rocks, sometimes called the middle secondary, and generally known as "brownstone." The localities of this are (*a*) the "Richmond coal-field," a large oval area in Chesterfield, Powhatan, Goochland and Henrico Counties, inside Middle Virginia; (*b*) a small oval territory bordering Tidewater, between Ashland and Milford stations, on the Richmond and Fredericksburg Railroad, and nearly divided by it; (*c*) a long narrow strip bordering Tidewater from several miles south of Fredericksburg, on, along the west bank of the Potomac, to near Mount Vernon; (*d*) a large wedge, nearly 600 square miles, resting for some 20 miles on the Potomac, and extending southwest, between the Middle and Piedmont Sections, to its apex on the Rapid Anne, near Orange Court House, with a small outlying portion near that place, and extending beyond it towards Gordonsville; (*e*) a curved portion of land extending from Hampden Sidney College north through Farmville to Willis' River, and northeast along that river to near Cumberland Court House; (*f*) a narrow belt along James River from Scottsville, some 15 miles to the southwest; (*g*) a band of country some 60 miles long, extending from a point southeast of Campbell Court House southwest to the North Carolina line near Danville.

These rocks are of the kind known as sedimentary—composed of particles of sand and earth, and of pebbles derived from other rocks, and deposited by water where they now are. They are in strata, some of coarse conglomerate, with very large pebbles; others of finer material, making sandstones, slates and shales, generally dark brown or red in color, but sometimes gray, brownish gray or yellow, and greenish gray. They generally dip but little, being nearly horizontal. The "brecciated marble" of the Potomac is from this formation, as is also the "brownstone" from Manassas. In this formation are found remains of plants as lignite or coaly matter, and of fishes; and in the Richmond, Danville and Farmville portions are valuable beds of rich bituminous coal.

PIEDMONT is in the same region of primary, azoic or transition rocks as Middle, but they differ much in their characteristics.

The gneiss of Piedmont, from the Blue Ridge to the Southwest Mountain, is usually of a darker color and coarser texture than that of Middle Virginia, and it has much more variety in its structure and composition. Generally, it contains more or less talc or chlorite, not much mica, and very often hornblende and iron pyrites—the latter a powerful agent in decomposing rocks, and, with hornblende, giving a red tinge to the soil, so that this is often called the "Red-land" District. Near the base of the Blue Ridge are belts of granitic gneiss; also belts of micaeous, chloritic, argillaceous and talcose slates, generally narrow, with bands and patches of limestone. The epidotic or greenstone rocks form the chief mass of the broken Southwest Mountain or Coast Range chain, the eastern border of Piedmont. These rocks are of a greenish hue, with crystals of epidote and quartz. They weather into a yellowish soil that changes into orange and red, and is always fertile. Bands of iron ores of various kinds, slates, soapstone, &c., are found throughout this section.

The BLUE RIDGE is the border land between the azoic, primary or transition rocks and the fossiliferous ones. Generally, its eastern flank and summit, and sometimes a good portion of the western slope, are composed of the epidotic rocks before mentioned—more highly epidotic than even those of Piedmont—and so it acquires peculiar geological characteristics. The epidote is found there

compact, with quartz imbedded as amygdaloid, &c. Here are also beds of epidotic granite, of whitish granite and of syenite, with sandstones and slates of various kinds; but epidote is here more abundant than elsewhere, and this, by decomposing, makes the wonderful soil of this mountain range.

The western flank of the Blue Ridge is composed of the rocks of the Cambrian, Potsdam Sandstone, Primal, or Formation I of Professor Rogers; for by all these names is known the "close-grained white or light gray sandstone," with beds of coarse conglomerate, brown sandstones and brownish olive-colored shales, here found, that once made the eastern shore of a great ocean. In this formation are bands of specular iron ore and beds of hematite.

The VALLEY is the region of Cambrian and Lower Silurian rocks—Formations I, II and III of Rogers, or from Potsdam to Hudson River formations of New York, inclusive—a country mainly of limestone, slate and shale rocks, with a fertile soil and undulating surface. The section across the Valley through Staunton gives some thirty alternating bands of slates and limestones of various kinds—some magnesian, others silicious or rich carbonates; some compact, others flaggy or slaty, &c. Among these are beds of chert, iron ore, umber, lead, zinc, &c. This formation extends northward, and forms the rich Cumberland, Lebanon and other valleys of Maryland, Pennsylvania and New Jersey, the Hudson and Mohawk Valleys of New York, and the Champlain Valley of Vermont. Southwest it becomes the Valley of East Tennessee, and extends into Alabama, making a great central valley some 1,500 miles in length of unsurpassed fertility and productiveness. This formation underlies a large portion of Scotland, especially the southern and central parts; much of the area of Wales, and large districts in the west, southwest and northwest of England. It covers an extensive tract in Russia; is found in Spain, &c. The most fertile portions of New York, Ohio, Indiana, Kentucky, Wisconsin and Missouri are also underlaid by this rock.

Belonging to the Valley counties, (the lines of which extend to the summit of the Blue Ridge, and cross often several ranges of the mountains west,) of course, we have the half of the summit and all the western slope of the Blue Ridge, already described. To it also, politically, will belong parts of the Upper Silurian and Devonian systems, that are more especially referred to in the account of the Apalachian Country. These form long ridges that rise up and run for great distances in the Valley, like the Massanutton and other mountain ranges, making barriers that divide the Valley lengthways into two parallel valleys. The rocks of the Valley generally dip to the southeast at a high angle. In some places there runs an axis through the Valley from which the rocks dip both ways—to the southeast and to the northwest—making an anticlinal. The upturned edges of the rocks strike or run northeast and southwest with the Valley.

Fragments of the sub-carboniferous formation are found along the western margin of the Valley, sometimes containing valuable beds of semi-anthracite coal, as in Montgomery, Augusta and other counties. This formation consists of conglomerates, shales, sandstones, &c.

The APALACHIAN COUNTRY, beginning with the mountains on the west side of the Great Valley, is occupied chiefly by the Upper Silurian and Devonian rocks from IV to IX inclusive. It also shows narrow outcrops of Lower Silurian and important areas of carboniferous rocks, comprising sandstones, slates, limestones, coal seams, &c. The sandstones hold up the high parallel ridges or chains of mountains that run unbroken for such long distances; the slates and limestones form the rich valleys between. In these rocks are great continuous bands of hematite and fossil iron ores, among the most abundant and valuable in the world.

The Devonian rocks (or old red sandstone—Rogers' VIII and IX; the corniferous, Hamilton, Chemung and Catskill groups of New York,) are found among

those that have already been described, the convulsions of nature having exposed in successive ridges and valleys the different formations. Formation VIII is composed of slates and slaty sandstones that often appear as low serrated ridges. The slates are black, olive, green and reddish, sometimes with calcareous bands. Some of the shales contain copperas, alum and iron ore. Formation IX is known by its red slates and sandstones alternating with green, yellow, brown and dark gray shales and slaty sandstones, with some iron ore.

The sub-carboniferous rocks in Virginia, Formations X and XI, are confined to narrow belts made up of conglomerates, slates, shales and limestones, running along the southeast flanks of the North Mountains. It is in Formation X (Vespertine) that Rogers locates the coal of Augusta, Botetourt, Montgomery, &c. Formation XI is very calcareous, and is the repository of the gypsum and rock-salt of Southwest Virginia, (Rogers.) This is the equivalent of the carboniferous limestone of England. Great down-throws and upheavals of the rocks have brought the carboniferous and Silurian formations in the southwestern portion of Apalachia side by side, and all the intervening formations are often wanting. Iron ore of good quality is found in the shales of this group.

The carboniferous or true coal-bearing rocks, Rogers' XII to XV, cover but a moderate area in Virginia, when compared with that occupied by the other formations; still, the State has nearly a thousand square miles of territory that belongs to the great carboniferous in the southwest, in that portion of it lying north of the Clinch River and drained by its western branches, and in the Virginia territory drained by the Sandy River, with some small adjacent areas. This formation is a group of sandstones, slates, bands of limestone and seams of coal, that together make the great Apalachian coal-field—one of the most remarkable in the world for the number, thickness, quality and variety of its seams of bituminous coal, and for their accessibility above water level.

The formations of the Apalachian District are the same as those that cover large portions of the States of New York, Pennsylvania, Ohio, Indiana, Michigan and Iowa. In Europe this formation occupies the Lowland Region of Scotland, the country of Edinburg and Glasgow; also the Cromarty and Caithness Region. In England it underlies large areas in the northwest and southwest, and in Wales.

#### CLIMATE.

Virginia, as a whole, lies in the region of "middle latitudes," between  $36^{\circ} 30'$  and  $39^{\circ} 30'$  north, giving it a climate of "means" between the extremes of heat and cold incident to States south and north of it.

If Virginia were a plain, the general character of the climate of the whole State would be much the same; but the "relief" of its surface varies from that of some of its large peninsulas not more than 10 or 15 feet above the sea level, to that of large valleys more than 2,000 feet above that level. Long ranges of mountains from 3,000 to 4,000 feet in height run entirely across the State, and the waters flow to all points of the compass. So diversified are the features of the surface of the State, within its borders may be found all possible exposures to the sun and general atmospheric movements. It follows from these circumstances that here must be found great variety of temperature, winds, moisture, rain and snowfall, beginning and ending of seasons, and all the periodical phenomena of vegetable and animal life depending on "the weather."

The winds are the great agents nature employs to equalize and distribute temperature, moisture, &c. Virginia lies on the eastern side of the American Continent, and on the western shore of the Atlantic Ocean. It extends to and embraces many of the ranges of the Apalachian system of mountains that run parallel to that ocean shore; therefore it is subject not only to the general move-

ment of winds, storms, &c., from west to east, peculiar to the region of the United States, but to modifications of that movement by the great mountain ranges. It is also subject to the great atmospheric movements from the Atlantic that, with a rotary motion, come up from the tropics and move along the coast, extending their influence over the Tidewater and Middle Regions of the State; sometimes across Piedmont to the foot of the Blue Ridge, but rarely ever over or beyond that range. It has also surface winds, usually from the southwest, that follow the trend of the mountains and bring to them and their enclosed parallel valleys the warmth and moisture of the gulf that clothes them all with an abundant vegetation.

The same causes that produced the magnificent forests of the carboniferous era and furnished the materials for the vast deposits of coal in the 60,000 square miles of the great Apalachian coal-field that flanks Virginia on the west, still operate and clothe the surface of the same region with an abundant vegetation. The laws of the winds make one region fertile and another barren. America owes its distinction as the Forest Continent to the situation of its land masses in reference to the prevailing winds.

The mean annual temperature for the State is 56°; for the Tidewater Region, 58°; for the Middle and Piedmont, 35.60°; and for the Valley, 54°. The average mean temperature of the State for January is 42°, and for July 78°.

The notable points about the climate are, first, its range—from that of the southeastern low plain, fronting the Atlantic and tempered by it, to that of the high mountain plateaus of the northwestern margin, where cold temperate conditions prevail; second, its mildness, on the whole, notwithstanding this considerable range; third, its dryness, although the rainfall is abundant, and, compared with most European countries, large. The climate is healthful and favorable to a great variety of agricultural products.

The rainfall is next in importance to the temperature in the climate of a country, for heat and moisture are the two great requisites for abundant production when a fertile soil is present.

Guyot, a standard authority, says: "North America has in the eastern half a greater amount of rain than either of the other northern continents in similar latitudes." \* \* "The great sub-tropical basin of the Gulf of Mexico sends up into the air its wealth of vapors to replace those lost by the winds in crossing the high mountain chains. Hence the eastern portions—the great basins of the Mississippi and the St. Lawrence and the Apalachian Region—which, without this source of moisture, would be doomed to drought and barrenness, are the most abundantly watered and the most productive portions of the continent." "In the eastern half of the United States the southwesterly winds which prevail in the summer spread over the interior and the Atlantic plains an abundant supply of vapors from the warm waters of the gulf. Frequent, copious showers refresh the soil during the months of greatest heat, which show a maximum of rain. Thus the dry summers of the warm-temperate region disappear, and with them the periodical character of the rains so well marked elsewhere in this belt."

These quotations show the advantages Virginia has, in this respect, over the warm-temperate regions of Europe and elsewhere.

As to mean annual rainfall, nearly the whole State lies in a zone of from 40 to 45 inches.

#### SOILS.

The character of the soils of Virginia, as of other countries, is dependent on its geology.

TIDEWATER is a tertiary region. Its soils are the alluvial deposits—the sands and clays peculiar to that formation. The soil of the low, flat, sandy shores and

islands is, naturally, thin, light and soft. At the same time it is warm, and, under the influences of a mild climate, a near ocean and bay, and the dense crops of wild bent-grass, magothy bay-beans, &c., that grow and decay upon it, it becomes very productive and "quick." The salt-marshes of this region are rich in the elements of fertility, as is evidenced by the crops of grass they produce. The soil of the Eastern Shore Peninsula is like that already described, only it rests upon a stiff clay, and so retains fertilizers applied to it and is easily improved. The soils of the Norfolk Peninsula also belong to this class. They are light, warm, easily tilled, and respond quickly to the influence of fertilizers. All these may be characterized as garden soils, adapted to the hoe. In all this upper tertiary country there is much salt-marsh and swamp land that, when properly drained, becomes exceedingly productive.

In every portion of Tidewater along the streams are "first" or alluvial bottoms, composed of mixed materials, the sediment of the waters. These, where above tide, or where protected by embankments, have a perpetual fertility.

The second bottoms, or second terrace above the waters, are called the "rich lands" of the country. They "are composed of loams of various qualities, but all highly valuable, and the best soils are scarcely to be surpassed in their original fertility and durability under severe tillage." The subsoil is a dark red or yellow clay—the yellow becoming of a chocolate color on exposure—lying not very deep. These soils are drier and stiffer than those of the first bottom. Sometimes they are sandy; but all are susceptible of improvement.

In some places there are spots of "shelly" soil, where the remains of oysters, mussels, &c., have decomposed and mingled with the loam and sand. These are permanently fertile, bringing forth abundantly. "Shelly" soils could be made anywhere in this region, for Providence has bountifully supplied the means by which this "hint" may be taken advantage of.

The first and second bottoms are not far above the water level, and form a comparatively small portion of the country. They are succeeded by the "slope"—the incline that reaches back to the ridge or water-shed of the peninsulas. The soil of these slopes, compared with that on the flat ridges, "is of a higher grade of fertility, though still far from valuable;" \* \* "generally more sandy than the poorer ridge land," and, when exhausted by injudicious cultivation, inclined to wash during rains. "The washing away of three or four inches in depth exposes a sterile subsoil." Sometimes these soils are productive, but, as a rule, do not wear. That they are not wanting in some of the elements of fertility is well shown by the dense growth of pine trees that speedily covers them when abandoned by severe cultivation. Though thin, sandy and poor, and considered as almost valueless, these lands have been made fertile by using the marls and shells that are near by. The same can be done again. There is a large area of this land.

"The ridge lands are always level and very poor, sometimes clayey, more generally sandy, but stiffer than would be inferred from the proportion of silicious earth they contain, which is caused by the fineness of its particles." These evils "vary between sandy loam and clayey loam." Numerous shallow basins are found in these soils which are filled with rain water in winter and are dry in summer.

The soils of the MIDDLE COUNTRY vary, of course, as the rocks do which they overlie. In a work on the Geology of New Jersey, speaking of a similar region in that State, it says: "Hitherto the country in which they\* are found has been considered poor and little capable of improvement. But gradually the farmer has been encroaching upon them, and turning these unpromising hills into fruitful fields. It is observed that the rocks are in many places subject to rapid

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\*The azoic rocks.

decay, and that in such localities the soil is susceptible of high cultivation." This report then gives an analysis of three varieties of felspar common in the composition of the rocks there, and also in Middle Virginia, with the following results:

	SODA FELSPAR.	POTASH FELSPAR.	SODA AND LIME FELSPAR.
Silica.....	68.6	64.6	62.1
Alumina.....	19.6	18.5	23.7
Soda.....	11.8	....	....
Potash.....	....	16.9	....
Lime.....	....	....	14.2
	100.0	100.0	100.0

It has been found that the soda and the soda and lime felspars are more easily decomposed than the potash ones. It will readily appear that a soil containing the ingredients shown in the table must have the elements of fertility; and since there are numerous and wide belts of these in this section, we find here upon these fertile and productive soils. Along the streams also the transported materials of these easily decomposed rocks have been deposited, giving everywhere rich soils in the "bottom" lands. Where the beds of gray or light brown slate occur, the soil is not productive; but it has been found that lime renders the soil from these fertile. Wherever the rocks contain epidote, they decompose into a very fertile soil of a deep red hue. Sometimes these rocks cover considerable areas; and we find these noted for their fertility, like portions of Louisa, Buckingham, and the other counties of this section. There are also calcareous soils found in various portions of the Middle Country, where the patches of limestone before mentioned occur. These are always fertile. Some of the red soils of this section are derived from gneiss rocks containing sulphuret of iron, but not epidote. Such soils are as noted for sterility as the epidotic ones are for fertility.

The soils of the triassic or new red sandstone belts are generally fertile and easily worked. The composition of these rocks in New Jersey shows what they furnish to make a good soil. The red shale of the triassic at Brunswick, N. J., gave, by analysis, the following results:

Silicic acid and quartz.....	73.00
Peroxide of iron.....	10.00
Alumina.....	3.20
Lime.....	4.93
Magnesia.....	0.90
Potash.....	0.73
Soda.....	0.97
Sulphuric acid.....	a trace
Water.....	1.00

Other analyses of other rocks from this formation indicate the presence of a considerable percentage of lime, potash, soda, sulphuric acid, alumina, silica, &c., &c., all valuable ingredients of fertile soils. As a rule, the soils on the areas of this formation are among the best in this section.

The soils of **PIEDMONT** and of its southwest mountain border are much more epidotic in their character, and therefore naturally more fertile than most of those farther east.

The red or chocolate-colored soils of this section, formed from the decomposed dark greenish-blue sandstone here found, is generally considered the most fertile. This sandstone contains several per cent. of carbonate of lime. The other soils of this region are grayish or yellowish. These are by no means as fertile as the darker soils; but there are red soils here, as in Middle Virginia, that are also poor ones, and for the same reasons. The epidotic rocks, from which the best soils of this region are formed, often contain, says Rogers, 24 per cent. of lime. Hornblende, in decomposing, forms a red soil also that is very fertile, but it contains magnesia, and less lime and alumina.

The soils of Piedmont are, many of them, undoubtedly among the most fertile known, and can be made to produce a great variety and abundance of crops.

They are loose and easily worked, but care must be exercised in their management, since they are easily washed away by heavy rains. If neglected, they are soon covered by a growth of underbrush.

The BLUE RIDGE is composed of much the same materials as Piedmont, only they are richer in their abundance of greenstone rocks, which impart to the soils of this much expanded mountain range a wonderful fertility, and adapt them to the growth of rich grasses, vines, orchards and all the usual crops of the country, wherever the character of the surface admits of cultivation.

The soils in the sandstone belt of the western slope of this range are sandy and poor.

The soils of the GREAT VALLEY are quite numerous. They are generally called limestone soils, as this is a limestone region. The prevailing soil is a stiff, clayey loam—a durable and fertile soil well adapted to the growth of grass and grain. In the slaty belts the admixture of the decomposed aluminous rocks makes a lighter and warmer soil. There are also belts of sandy or gravelly soil that are cold, and require cultivation and fertilizers to make them productive, but once redeemed, they yield very well. Much the larger portion of the Valley has, naturally, a good soil, rich in the elements of fertility. The soil, like the rocks, runs in belts, with the Valley, and the lean ones are the smaller number. The streams, as in all limestone regions, are very winding; so there is here a considerable area of bottom lands.

The soils of the APALACHIAN REGION are very marked in their character. The sandstone ridges and mountains are very poor, while those made up of limestones and some of the shales are very rich. Some of the slate valleys have a thin and poor soil; others on limestone or certain red sandstones are very rich. Indeed, the natural exuberant fertility of some of these broad ridges and narrow valleys is something wonderful. Some of the little valleys are appropriately called "gardens." This region is so penetrated by streams that it has everywhere alluvial lands.

Thus it appears that there are soils of every variety in Virginia suited to all kinds of productions.

In TIDEWATER—peat-bottom, or swamp and savanna lands, for cranberry culture; salt marshes and meadows for grass and cheap grazing; river marshes that reclaimed are fine hemp lands; plains, with soft and warm soil, for great market gardens and the rearing of delicate fruits; river bottoms—marly alluvial lands—excellent for cotton, corn, wheat, oats or meadows; thin, sandy uplands for great sheep pastures and for forest planting.

In MIDDLE—clay soils that produce the finest of wheat; mixed sand and clay, well suited to general agriculture; thin lands, where fruit growing would be remunerative; rich low grounds, where great crops of Indian corn and rank tobacco grow from year to year without exhausting their fertility; light soils, where the finer kinds of tobacco are produced; lands for swedes, mangolds, &c., and improved sheep husbandry.

In PIEDMONT—rich upland loams unsurpassed as wheat or tobacco lands, and producing heavy crops of cultivated grasses; low grounds, where the corn crop is always good, and where heavy shipping tobacco comes to perfection; lighter soils, where the vine and the apple produce abundantly; the best of lands for dairies, and for sheep and cattle rearing.

In the BLUE RIDGE, where the natural grasses invite to sheep and cattle grazing, and the rich, warm soil and sunny exposures are adapted to fruit culture on lands that elsewhere would be too valuable for the plow.

In the VALLEY—the natural blue-grass lands, the home of the stock-raiser and dairyman; the heavy clay lands, fat in fertilizing ingredients, always repaying



the labor spent on them in crops of corn or wheat; the lighter slaty lands, famous for wheat crops; the poorer ridge lands, where sheep rearing should be followed.

In the MOUNTAIN REGION are great cattle ranges—lands where grass grows naturally as soon as the trees are cleared away and the sunlight admitted; rich meadow lands in the valleys well suited to dairying; fat corn or tobacco lands along the streams; lands for root crops along the slopes and on the plateaus.

### PRODUCTIONS.

**ANIMAL PRODUCTS.**—The climate of Virginia is favorable for the growth and the products of its soil for the sustenance of animal life, consequently it has an abundant and vigorous native fauna on its land and in its waters. All the varieties of domestic animals reared in temperate climates have here found a congenial habitation, and excellent breeds of horses, mules, milch cows, working oxen, beef cattle, sheep, swine, goats and poultry abound in all sections of this State.

The cost of producing a given quantity of butter and cheese is much less in Virginia, owing to its milder climate and longer seasons, than in many other States of the Union. The statistics of production show the effects of elevation above the sea of portions of the State, giving them more adaptability to natural grasses and to the dairy business.

*Sheep* have always thriven in Virginia, and the wool here grown has an established reputation for excellence of quality. Wherever the business of rearing sheep, for wool or for mutton, has been judiciously conducted, it has proven remunerative. Few States have as many special adaptations for sheep husbandry—extensive areas of cheap, elevated lands, covered with natural grasses; broad plains suited for root culture; short winters and a comparatively dry climate, with nearness to markets.

Experience has shown that lambs can be raised in Virginia, in the spring, and sent to the great Northern markets long before they can be put there from the farms nearer; consequently good prices can be realized. The low priced lands of Tidewater and Middle Virginia are especially well situated for thus supplying early lambs, and large areas there are well adapted to the growing of swedes, mangolds, and other crops that are so extensively cultivated in England and elsewhere for fattening sheep.

*Angora Goats* have been successfully and profitably raised in Piedmont and Middle Virginia, furnishing large fleeces of the valuable cashmere wool.

*Bees* find in the sections of this State an abundant flora, and the long and comparatively dry seasons are peculiarly favorable for apiculture; especially does this seem to be the case in Piedmont, where large profits are reaped by those that have given some attention to this pleasant home industry.

*Swine* are easily and cheaply raised in all portions of Virginia, especially in the portions abounding in forests, where they subsist much of the year on the nuts of the beech, oak, chestnut, and other trees, at no cost to their owners; in fact, they are often fattened entirely on "mast." These animals can be reared more cheaply here than in almost any other part of the country; consequently they are kept in large numbers, and "Virginia bacon" has a valuable reputation in the markets. The climate is credited with aiding in the "cure" of hog meat.

*Stock and Beef Cattle*—the "other cattle" of the census—including all horned cattle, except milch cows and working oxen, are reared in large numbers in all parts of Virginia, but especially in Piedmont, the Blue Ridge, the Valley and Apalachia, where stock raising is an important and profitable branch of husbandry. Large numbers of fat cattle are annually sent to the Eastern markets from the rich grass lands of the sections named, especially from the portions where the nutritious and fattening "blue grass" grows. Many young stock cattle are also sold to the farmers of the country near the large cities, where they are stall fed.

There are vast tracts of mountain land in Virginia that furnish a "range" for young cattle, enabling the grazier to rear them at but little expense. These tracts of land are covered by a growth of timber, more or less heavy, beneath which is an undergrowth of rich-weed, wild grasses, &c., that are highly nutritious, and on which cattle can subsist from April to November. The stock raising capacity of the State can hardly be estimated, so great is it.

The *Scale and Shell Fish* of Virginia furnish not only a large portion of the animal food of thousands of the people of Virginia, especially in the Tidewater country, but immense numbers are taken from the waters of this and shipped to other States.

The thousands of square miles of Virginia territory covered by tidal waters abound, in the proper seasons, in shad, herring, rock, perch, sturgeon, sheep's-head, bass, chub, spots, hogfish, trout, tailor, Spanish mackerel and other fish, besides crabs, lobsters, terrapins, &c. The fishing season opens early, and while the waters near New York, Philadelphia, and other cities in a higher latitude are yet frozen, the shad and other spring fish can be caught in Virginia waters and sent to Northern and Northwestern markets, where they command high prices. Many of the fresh water streams of the State abound in many kinds of fish, and both the State and the United States authorities are stocking them with other varieties. No country has more or better streams for fish breeding.

*Oysters* are found in all the tributaries of Chesapeake Bay and along the Atlantic coast, giving to Tidewater an extensive territory where this valuable shell fish grows naturally and where it can be propagated and reared in almost any desired quantity.

An industry that is receiving some attention and will be largely developed, is the raising of oysters. For some years the supply of oysters from the Chesapeake has been growing less, and the demand increasing. Under the present system of depletion, the supply will soon be altogether inadequate to the demand, and prices will necessarily be higher even than at present, and the man who has a well-stocked "oyster shore" can always find ready sale for all his oysters at good prices. There is little expense attending the business, and the difference between the cost of the oysters "bedded" when small, and the price realized for them as "cove" oysters a year or so afterwards, will leave a wide margin of profit. There is no reason why the artificial propagation of oysters should not be conducted on an extensive scale. In France there are oyster farms that pay an annual profit of \$500 to \$600 an acre.

*Birds* for food are abundant, especially water fowl, in the great marshes and rivers of Tidewater, where canvas-back, mallard, creek, red-head, bald-face, teal and other ducks, geese, swans, sora, &c., swarm abundantly. In all portions of the State are found partridges or quails, pigeons, wild doves, grouse or pheasants, wild turkeys, and other game birds.

*Wild Deer* are found in all portions of the State, especially in Tidewater and the Middle and Mountain sections.

The statistics give Virginia most ample resources of animal food, sufficient for a population many times as numerous as she now has. Nowhere is this kind of food better or cheaper.

This State has always been noted for the general excellence of the horses and mules bred in it, and it is well known that they can be reared cheaply in almost any section.

**VEGETABLE PRODUCTIONS.**—Virginia has a rich and abundant native flora, and the introduced plants, the cereals, grasses and others, that in temperate climates are objects of cultivation, here have found favorable soils and congenial climates. Here grow and yield abundantly the "plants good for food" both for

man and beast, and those employed in manufactures. Timber trees of many kinds abound in all sections of the State.

A comparison of the production of cereals with any other country presents Virginia in a most favorable light as a grain-producing region, while nearness to markets adds largely to the value of the products.

*Indian Corn* is the staple bread grain of most sections of the State, except the Valley; the laboring rural population, in many portions, use it almost exclusively.

In Tidewater both *sweet* and *Irish potatoes* are a staple crop, the former having a high reputation in market for their superior quality. The latter are sent to market very early in the season. Except in the Tidewater section, where market gardening has become a leading industry, potatoes, as a rule, are only raised in Virginia for family consumption; they are not fed to stock, nor, except from Tidewater, sent to distant markets. There is no question but that more use should be made of this prolific and easily raised article of human and animal food.

*Peas* and *Beans* are not cultivated in Virginia to the extent they should be when account is taken of the large areas so admirably adapted to their cultivation, so much more so than to the production of maize, that requires a strong soil, which it rapidly exhausts. Only in Tidewater and parts of Middle Virginia are peas and beans farm products.

*Oats* and *Barley*, cereals not used here for human food, are important Virginia crops, especially the former. Barley is only cultivated to a limited extent, though it always does well, and it could be most advantageously grown for exportation, since the climate would give it generally the quality it has only in occasional seasons in England, when it bears a high price.

*The products of orchards and market gardens* in Virginia are large and valuable, much more so than is indicated by the returns of the census. Every portion of the State is remarkably well adapted to the growth of fruits of the warm-temperate and temperate climates.

In Tidewater Virginia, apples, pears, peaches, quinces, plums, cherries, nectarines, grapes, figs, strawberries, raspberries, gooseberries, currants and other fruits thrive and produce abundantly, the quality of the products being unsurpassed, as the awards of the American Pomological Society attest. The value of the small fruits alone annually sent to market from Tidewater is more than the sums for orchards and gardens. The trade in early strawberries is one of large proportions. Especial mention should be made of the wild Scuppernong grapes, peculiar to the Tidewater Country near the sea, which spread over the forests and bear large crops of excellent fruit, from which a very palatable wine is made. The originals of the Catawba, Norton's Virginia and other esteemed American grapes grow wild in the forests of Virginia.

All the fruits named above grow in every section of the State, except, perhaps, figs. Piedmont, the Blue Ridge and the Valley are famous apple regions. Peaches flourish in all sections, but Middle and Tidewater may claim some precedence in adaptability. The Blue Ridge is entitled to the name of the "fruit belt," and its extensive area is yet to become the most noted wine and fruit-producing section of the United States east of the Rocky Mountains. All the fruits of Virginia flourish there in a remarkable manner, and find special adaptations of soil, climate and exposure.

No country can be better situated for market gardening than Tidewater Virginia. It is from 14 to 36 hours by water from Baltimore, Washington, Philadelphia, New York and Boston, the centres of population of the Atlantic slope of the United States. At the same time, its seasons are from one to two months earlier, giving an advantage of fully a double price for its garden products over the country in the vicinity of those cities.

The home gardens are not considered in any of the "returns" of the productions of Virginia, where potatoes, Irish and sweet, corn, peas, beans, onions, beets, parsnips, radishes, lettuce, celery, salsify, asparagus, melons and squashes of numerous kinds, carrots, okra, tomatoes, &c., &c., are raised in the greatest abundance, and form a portion of the daily food of the entire population.

The *Peanut* is extensively cultivated in Tidewater. Isle of Wight, Surry and Sussex are very notable counties for production of peanuts. Sandy and light soils are suited to their growth.

*Vegetable Sweets* are produced in Virginia from the sugar maple and the Chinese sugar-cane.

The *Wine* crop of Virginia is a small one, compared with the extensive territory here found that is especially adapted to the growth of the vine, both by the character of the soil and the conditions of the climate. Fully 2,000,000 acres of land in Virginia have soils and exposures similar to those of the most noted wine-producing sections of Europe, and the seasons are so long that the grape has ample time to fully mature and develop its natural juices, fitting them for the manufacture of pure wine. Experience has shown that the vines here grown are free from diseases, and that they may be relied on for abundant crops.

The Blue Ridge offers great advantages for viticulture. One vineyard on it in Warren County of 75 acres produces from 20,000 to 30,000 gallons of wine and from 6,000 to 10,000 gallons of brandy annually, the yield being from 300 to 500 gallons per acre. The "red lands" of the Piedmont Section are famous for their fitness for this pleasant and profitable industry. There are many localities in the other sections of the State where the vine flourishes. Early grapes are sent in considerable quantities from Virginia to Northern and Eastern markets. Mention has been made of the Scuppernong grape of Tidewater, marvellous for the space a single vine will cover and the quantity of fruit and wine it will produce. There is no more inviting field for the vigneron than Virginia.

*Tobacco* is a staple product of Virginia. The "Virginia Leaf" is noted the world over for its excellence, the result of manipulation as well as of soil and climate. The soils of the Piedmont and the Middle Sections are among the best for the growth of good tobacco; those of Middle produce the finest and most valuable. Tidewater is the region for Cuba and Latukiah varieties, while immense crops of coarse and heavy tobaccos are grown on the rich lands of the Blue Ridge, the Valley and Apalachia.

It should be noted that tobacco culture is not an exclusive one in any part of Virginia. Large crops of grain and roots are raised on the same plantations.

*Cotton* is grown in the southeastern counties of Virginia, between the James River and the North Carolina line. The State ranks twelfth in cotton production, the census of 1880 showing an annual product of 19,595 bales.

*Grass* is one of the abundant productions of Virginia, much of its territory being inside the limits of "natural grasses," and all of it is adapted to the vigorous growth of the "artificial" or cultivated ones. But the character of its climate does not require a large stowing away of hay; therefore it does not "figure" largely in the returns. A reference to the number of cattle in each section of the State makes the quantity of hay produced appear very small in proportion, but it shows that the pastures can be relied on for most of the year, owing to the mildness of the climate, greatly to the advantage of the stock-feeder. It is true that a large quantity of long forage is obtained from the "tops, blades and stalks" of Indian corn, which, where this is a staple crop, take the place of hay for home consumption, and leave the hay for market, if desired.

Fine crops of hay are made from cultivated grasses in all portions of the State, but the natural meadows are mostly in Piedmont, Blue Ridge, the Valley

and Apalachia. The "Hay Map" of the Statistical Atlas of the United States shades these sections the same as it does most of Pennsylvania, West Virginia, Ohio, Indiana, Illinois, Missouri, &c., and as more productive than most of Tennessee and Kentucky.

The perennial grasses of Piedmont, the Blue Ridge, the Valley and Apalachia, including the noted "blue grass," are famed for their nutritious and fattening qualities, and place these among the most highly favored grazing regions in the world. Nowhere, save on the great plains of Texas and the extreme West, or South America, can cattle be reared and fattened more cheaply than in these sections of Virginia, as has been proven by the investigations of the United States Department of Agriculture. The Valley leads in the production of hay and seeds; Piedmont follows. The meadows of the low country in Virginia have an advantage in the early "haying" time, and where not too remote from the great cities, much profit can be gained by being early in market. Tidewater and Middle Virginia have many fine alluvial meadows, and the salt marshes of the former yield fine crops of hay and perpetual pastures.

The crops of clover and grass seeds are unusually large where they are made an object; the long seasons seem to give a larger yield of good seed. The first crop of clover for the year is generally cut for hay—it has so large a growth; and seed is taken from the less rank second growth.

*Flax* grows well in all portions of Virginia, though little attention is now given to its cultivation. The elevated mountain valleys suit it admirably.

*Castor Beans* are raised in considerable quantities, especially on the Eastern Shore of Tidewater.

The warm thin lands of Tidewater and the Middle country offer many advantages for growing *Garden Herbs* and *Perfumery Plants* and *Shrubs* on an extensive scale—the requisite heat and dryness of climate can there be found.

*Hops* are only raised for domestic use, except in a few cases. When planted the vines grow luxuriantly and bear well.

Large areas of land, similar to the hop lands of Kent, in England, and to those of the State of New York, can be found in Virginia, and hop culture could be advantageously undertaken in many localities, to vary the industrial productions.

*Ramie* and *Jute*, most valuable textile plants, could, without doubt, be most advantageously and successfully cultivated on the deep and rich second bottoms and reclaimed swamp lands of Tidewater. *Ramie* is a perennial, and the stalks are cut three or four times in a year. Millions of bales of jute are now annually consumed in the manufacture of paper, gunny-bags, grain sacks, &c.

*The products of the forests* of Virginia are large, varied and important.

TIDEWATER VIRGINIA has extensive forests of pine (the noted yellow Virginia,) oak, cypress, cedar, locust, &c., from which large quantities of sawed lumber and timber, staves, heading, hoop-poles, shingles, railway ties, fire wood, &c., are constantly shipped, very often from the edges of the forests, since sailing vessels can penetrate all portions of the section—directly to all the seaboard markets of the country. Sumac is here an abundant shrub.

THE MIDDLE SECTION has large areas of superior hard pine, black, white and other oaks, hickory, locust, persimmon, gum, cedar, holly, and other trees, from which much excellent lumber, tan bark, &c., are sent over the railways and canals that penetrate and cross it to various markets. Sassafras and sumac are plentiful, and the former could advantageously be made a staple crop on the ridge lands.

PIEDMONT has considerable forest land with many varieties of oak, hickory, tulip-poplar, black walnut, locust, cedar, chestnut, pine, and other timber trees, but it can hardly be considered a source of supply for timber for exportation, save in a few localities. Sumac and sassafras abound.

The BLUE RIDGE is mostly covered with forests of oak, white, black, red, rock, &c., hickory, chestnut, locust, birch, some excellent yellow pines, and other trees. This section has furnished great quantities of charcoal for the manufacture of iron from the ores of its western margin, and it will long be a source of supply, so rapidly do its forests renew themselves. The timber supply of pine and other woods for the eastern part of the Valley is drawn from the Blue Ridge. Here is found much valuable hard wood, as hickory and oak for wagon and agricultural implement making. This is yet to become a most important source of supply for oak tanbark to convert into quercitron for exportation, or to be used in the country for tanning. Almost any quantity of oak bark can be obtained from this extensive range.

The VALLEY has nearly half its surface covered by a growth of oaks, hickories and locusts, interspersed with black and white walnuts, yellow and other pines, all having a uniform age of 150 to 200 years. This timber, while not the largest, is of the very best quality, and no well settled portion of the Union can offer a larger quantity of timber suitable for wagon, carriage, railroad car, cabinet and other work, for which hard, sound and durable woods are required. The slaty lands abound in sumac.

The APALACHIAN COUNTRY is both rich and poor in forestal wealth. On the sandstone mountain ranges, and in the slate and shale valleys, the trees are small but the growth is dense, consisting of oaks and other hard woods, pines, &c., good for charcoal, with larger trees in the hollows and more fertile spots. On the limestone ridges and adjacent valleys, as also in the calcareous and some shale valleys, on the other hand, the oaks, walnuts, white and yellow tulip-poplars, birches, beeches, locusts, cherries, sycamores, and other timber trees, are found of a sound growth and very large size, often several feet in diameter, straight and without a limb for fifty to eighty feet from the ground. Only portions of this region have been reached by railroads, and extensive forests of the best of timber for nearly all purposes await the progress of internal improvements and future demands. There are some extensive forests of white pine and of the more common varieties of the fir tribe, but generally the Coniferæ, suitable for timber, are not abundant in the forests of this section. It is fortunate that there is so much excellent coaling timber here in the vicinity of large deposits of easily fused ores of iron. It is from these mountain forests that ginseng, snake root, sarsapatilla and other medical plants are obtained.

*Forest Fruits*, such as blackberries, whortleberries, cranberries, strawberries, dewberries, haws, persimmons, service berries, thorn and crab apples, wild plums and cherries, are found in boundless abundance in nearly all the unoccupied lands and in the forests of Virginia, where, in their season, they may be had for the picking by any one that is inclined to gather them. Not only are thousands of bushels of these wild fruits annually gathered for home use and sale in home markets, but they are dried or canned for exportation, furnishing important and valuable articles of commerce.

*Nuts* are found in all sections, embracing chestnuts, chinquapins, black walnuts, white walnuts or butter nuts, hickory nuts of several kinds, hazel nuts, beech nuts, acorns of many varieties, &c.

#### MINERALS.

The mineral resources of the State may be summed up as consisting—

In TIDEWATER VIRGINIA—of several kinds of marls, greensand, &c., highly esteemed as fertilizers; of choice clays, sands and shell-limestones, for building purposes.

In the MIDDLE SECTION—of fine granites, gneiss, brownstone, sandstone, brick-clays, fire-clays, soapstones, marble, slates, &c., for building materials; epidote

in various forms and limestone for fertilizing uses; gold, silver, copper, specular, magnetic, hematite and other ores of iron in abundance; bituminous coal, &c.

In **PIEDMONT VIRGINIA**—granitic building stones, marbles, sandstones, brick and fire clays; epidotic rocks and limestone, for improving the soil; magnetic, hematite and other ores of iron; barytes, lead, manganese, &c.

In the **BLUE RIDGE DISTRICT**—various and abundant ores of copper; immense deposits of specular and brown hematite and other iron ores; greenstone rocks, rich in all the elements of fertility; sandstones and freestones; glass sand and manganese; brick and fire-clays.

In the **VALLEY**—limestones of all kinds, for building and agricultural uses; marbles, slates, freestones and sandstones; brick and fire-clays, kaolin, barytes; hematite iron ores, lead and zinc in abundance; semi-anthracite coal, travertine marls, &c.

In the **APALACHIAN COUNTRY**—limestones, marbles, sand and freestones; slates, calcareous marls, brick clays, &c.; various deposits of red, brown and other ores of iron, plaster, salt, &c., and a large area of all varieties of bituminous coal.

### COAL.

Prior to 1883 comparatively little coal was mined in Virginia, the output of 1880 being less than 50,000 tons, but during that year the Flat Top coal regions were opened up mainly by the Southwest Virginia Improvement Company, the Norfolk and Western Railroad having been extended to this section. In 1883 this company mined 99,871 tons of coal, and in 1884, 283,252 tons. There are now several other companies developing coal mines in the same territory, and the prospects are good for a very important coal mining interest growing up in that section. The coal is of excellent quality both for steam purposes and for coke making, and as the Norfolk and Western Railroad Company have built at Norfolk, Va., one of the largest coal piers in the world for shipping this coal, there is no doubt that there will be a large increase in the amount of coal produced at these mines during the next few years. This will naturally result in making Norfolk an important coal shipping port, and coaling station for foreign steamships. The distance from these mines to Norfolk is about 378 miles. For coking purposes, this coal, as already stated, has proved very satisfactory, and Col. D. F. Houston, the general manager of the Crozer Steel and Iron Company's 100-ton furnace at Roanoke, writing of it, says: "We have been using coke made from the Flat Top coal at Pocahontas for the past ten months, and find it equal to Connellsville coke, which we used the first two months of our blast."

This is of great importance in the future development of Southwest Virginia as an iron making region, as it brings the necessary cheap and good fuel within convenient distance of the large supplies of iron ore accessible on New River, Cripple Creek and elsewhere.

It may with safety be predicted that in a few years Virginia will take an important rank as a coal producing State. And she will moreover have two important coal ports: Norfolk receiving and shipping the steadily increasing quantity of coal brought from the Flat Top coal field by the Norfolk and Western Railroad, and Newport News, already doing a heavy business in West Virginia coal mined along the line of the Chesapeake and Ohio Railroad, and carried by that road to tidewater at Newport News.

### IRON ORE.

In writing of the iron-ore resources of Southwest Virginia, Mr. Andrew McCreath, in his "Mineral Wealth of Virginia," says:

"The most important development of the brown hematite ores along the Norfolk and Western Railroad system, and, considering their richness and char-

acter, one of the most important in the country, is the great iron-ore belt which is opened up by the Cripple Creek extension. The railroad passes for miles through rich outcrops of iron ore, with numerous mines now opened and worked to supply the small charcoal furnaces of the region.

"This iron-ore region is for the most part embraced in Pulaski, Wythe and Smyth Counties, in Southwest Virginia. The ores lie on both sides of New River and Cripple Creek, and the railroad line following these streams renders the whole ore supply practically available for market.

"The limestone ores of the Cripple Creek region show as high a general character as any brown hematite ores mined in the country. The result of numerous analyses shows an average richness in metallic iron of over 54 per cent. in the ore dried at 212° F., with about one-tenth of one per cent. of phosphorus. This unusually fine character is found to be very uniform through all the numerous mines and outcrops examined. It is somewhat extraordinary that not only is there this regularity in the percentage of iron, but also that the phosphorus shows a great uniformity in specimens taken widely apart; and in no case has it been found to exceed two-tenths of one per cent. The quality of the ore is such that it smelts very easily in the furnace, and it should require a minimum amount of both flux and fuel.

"The mountain ores of the Cripple Creek region have been but little worked, owing to the greater accessibility of the limestone deposits.

"Geologically, these mountain ores represent the same horizon as those which have been extensively worked in numerous other places, which have so frequently afforded large quantities of good ore, and which are now furnishing the regular supplies to the Crozer Furnace at Roanoke and to the Gem Furnace at Milnes.

"The quantity of iron ore in the Cripple Creek region is undoubtedly very great. The limestone deposits occur in clefts and cavities of the limestone mixed with clay, but in this district rarely with any flint. The method of occurrence is such that the banks will yield widely varying quantities of ore. Some of them have been worked for many years, and shafts are reported to have been sunk 100 feet in ore-bearing clays with bottom of shaft still in ore. Frequently the ore-bearing material is of unusual richness, yielding in the washer fully one-half clean ore.

"The developed mines represent but a part of the limestone ore deposits, as there are numerous rich and widely extended outcrops of iron ore which have either as yet never been tested, or else only a few shallow pits have been sunk just sufficient to show that the ore continues below the surface, without determining its depth.

"Facilities for economical mining are possessed by this region in a marked degree, for the limestone ores are very free from flint, and are generally found in a loose granular clay which is easily washed out; there is abundance of water for washing purposes, both in the branch streams and in Cripple Creek itself; the ore deposits are geographically and topographically well situated for mining, and the ore-bearing material is frequently of unusual richness. As a result of all these favorable circumstances, the region is to-day producing very cheap limestone ore, and the amount of such cheap limestone ore can be quickly and largely increased. It is safe to say that the district can compare favorably in the cost of production with any other brown hematite iron ore producing region."

#### PIG IRON.

The production of pig iron in Virginia has shown a very rapid increase during the last five years. The advantages possessed by that State for making iron are probably not surpassed by any other section of our country, when the cost, transportation facilities and nearness to consuming markets are taken into account. Since 1880 Virginia has increased her production of pig iron from 29,934 tons to 157,483 tons—a rate of increase that is surprisingly large. The gain has been steady from year to year without any fluctuation. In 1880 the production was 29,934 tons; in 1881, 83,711 tons; in 1882, 87,731 tons; in 1883, 152,907, and in 1884, 157,483 tons, showing an increase in 1884 even, as compared with 1883, notwithstanding the fact that the aggregate production of pig iron in the whole country in 1884 was 557,000 tons less than in 1883, owing to the general industrial depression. The cost of making pig iron in the South is a much disputed question. There are some who claim that it can be produced at extremely low figures, even \$8 and \$9



a ton being often mentioned, while others are equally as positive that the cost is much greater. In the first class there are probably some who are interested either in selling mineral lands or in seeking to develop some special locality, while among the second class would doubtless be found some who have private reasons for making the cost appear larger than it really is. There is, however, a middle ground which will bring us very near to the truth. Probably the most reliable and unbiased statements regarding the cost of pig iron making in Virginia are those of Prof. McCreath, already quoted. Prof. McCreath is chemist to the State Geological Survey of Pennsylvania, and consequently can hardly be accused of being partial to Virginia; moreover, he was recommended for this work by many of the leading iron makers of Pennsylvania. After a thorough examination, he submitted the following estimates as to the cost of making pig iron in Virginia and in Pennsylvania:

COST OF MAKING IRON IN VIRGINIA.

	AT MILNES.	BUCHANAN.	ROANOKE.	PULASKI.	CRIPPLE CREEK.
Ore.....	\$ 4 50	\$ 4 73	\$ 4 79	\$ 4 79	\$ 3 40
Coke.....	5 25	4 46	3 69	3 31	3 88
Limestone.....	30	60	75	60	50
Labor.....	1 50	2 00	2 10	2 00	2 00
Incidentals.....	1 00	1 25	1 25	1 25	1 25
Total cost per ton....	\$12 55	\$13 04	\$12 58	\$11 95	\$11 03

COST OF MAKING IRON IN PENNSYLVANIA.

	MIDDLE PENNSYLVANIA.	HARRISBURG.	LOWER SUSQUEHANNA.	LEHIGH VALLEY.	PITTSBURGH.
Ore.....	\$ 7 75	\$ 7 50	\$ 7 25	\$ 8 00	\$10 00
Fuel, coal and coke..	4 62	4 50	4 95	5 00	3 00
Limestone.....	1 00	85	56	77	77
Labor, Incidentals. }	3 25	3 25	3 25	3 25	3 25
Total cost per ton..	\$16 62	\$16 10	\$16 01	\$17 02	\$17 02

The figures for Milnes, Virginia, are the *actual* cost of making coke pig iron at the large furnace located there; and while the figures for Roanoke were given when made as estimates, they are confirmed by the general manager of the Crozer Steel and Iron Company of Roanoke, who puts the actual cost at his furnace at \$12.60. It is possible—indeed, quite probable—that the economies lately introduced into iron making, forced, as they were, upon furnace owners by the extreme depression of 1884, have made somewhat of a reduction from the foregoing figures as to the cost of iron making in Virginia. Prior to the severe business depression that at this writing appears to be passing away, a large number of companies had been organized and chartered to erect furnaces in different parts of Virginia, and but for this depression, probably half a dozen large furnaces of an aggregate capacity of 150,000 to 200,000 tons annually would now be under construction in that State. These companies, having their charters already secured, will no doubt take advantage of the first decided improvement in the iron trade and commence the erection of their furnaces, and thus add to the steadily increasing production of pig iron in Virginia.

MANUFACTURES.

In the amount of capital invested in manufactures, Virginia at the taking of the census in 1880, was surpassed by only two of the Southern States—Maryland and Kentucky. Next to Virginia came Georgia with \$20,672,410 invested in manufacturing, against \$26,968,990 in the former State. In 1880 Virginia had 5,710 manufacturing establishments, employing 30,184 hands, and producing manufactured products to the extent of \$51,780,992. These figures, however, give but little idea as to the extent of manufactures in this State at present, as the last four years have been very active ones in the building up of the industrial interests of Virginia. In 1880 for instance, Virginia produced only 29,943 tons of pig iron,

while in 1884 nearly 153,000 tons were made in that State; in 1880 the cotton mills of the State had 44,000 spindles, while in 1884 they had 66,000. These are but illustrations of the general industrial progress of Virginia, though possibly in other interests the development has been somewhat less rapid. It has lately been stated by a good authority that in one county alone \$5,000,000 had been invested in manufacturing and mining industries during the last ten years, and of this the bulk has been invested since 1880. In the manufacture of tobacco Virginia takes a high rank, the product of her immense tobacco factories being found in nearly if not every civilized country of the world. As in North Carolina, this business is rapidly increasing, and lately a number of important tobacco manufacturing enterprises have been organized in the State. The flour milling interest is a very large and flourishing one, the excellent quality of Virginia wheat enabling the millers to produce a superior quality of flour in much demand outside of the State, and especially in South America, where very large quantities of Richmond flour are annually consumed.

The manufacture of machinery is probably carried on more extensively in Virginia than in any of the other Southern States, excepting Maryland and possibly Kentucky, though it is impossible to give any statistics on this, later than the census reports of 1880, and they are of little value so far as the present industrial position of the Southern States is concerned. At Richmond and Roanoke there are machine shops of enormous size and capacity, equalling in extent and in the character of the work turned out, the largest machine shops to be found in the North. These shops not only make the general run of machinery such as engines, boilers, saw mills, &c., but they also do a very large amount of railroad work, some of the locomotives manufactured by them being equal to the best made. In nearly all portions of the State manufactures are receiving increased attention, and strong efforts are made by the press and the people to encourage the manufacturing interests.

#### OYSTER INTERESTS.

In the Chesapeake Bay and its tributaries, Maryland and Virginia have a magnificent source of wealth. This bay has long been noted as containing the most extensive and valuable oyster beds in the world. It is true that these oyster beds are gradually being depleted by excessive dredging; but as this will drive the oystermen into the regular cultivation of oysters, and thus increase their profits and enlarge the annual yield, it can hardly be looked upon as a permanent injury to the State. There are few industries of any kind that offer larger returns for the capital invested and are as safe and secure as oyster planting. It is an industry which needs only a moderate amount of attention, and does not require any special training or education, and yet, if intelligently managed, will almost certainly yield very liberal profits. The oyster planters of the Chesapeake almost without exception find their business profitable. It is a business in which either large or small capital can be invested to advantage—the rate of profit probably being very nearly the same in either case.

In 1880, Mr. R. H. Edmonds, editor of the *Manufacturers' Record*, Baltimore, at the request of the United States Census Department, prepared a report for the census upon the "Oyster Interests of the Chesapeake Bay," from which the following statistics are gathered: There are 14,236 men engaged in catching oysters in Virginia, using in their work 4,481 canoes or small boats averaging about two men each, and 1,317 larger boats running from 10 to 20 tons each and employing on the average about four men each. Of the aggregate number of oystermen, 6,538 are white and 7,698 colored. The total value of the boats engaged in this business in Virginia is \$790,200. There were in 1880 twenty-five firms in Virginia engaged in canning oysters, their capital being \$119,350. They handled in that

year 1,622,130 bushels of oysters, valued at \$726,693. The total quantity of oysters taken in Virginia waters for the census year was 6,837,320 bushels. The aggregate amount of capital invested in all branches of this business was \$1,361,100; the number of people employed, 16,264, and their wages and earnings were \$3,125,923.

#### EDUCATIONAL FACILITIES.

The State has an excellent system of public schools, as complete, except in thinly-settled districts, as in any other State. Private schools, academies and colleges are numerous. The University of Virginia, near Charlottesville, ranks with the best universities in the country. The Washington and Lee University and Virginia Military Institute are colleges of high grade.

#### TRANSPORTATION.

Virginia is well supplied with transportation facilities. The State has a large railroad mileage, and through its enormous extent of water front along the Chesapeake Bay and its numberless tributaries, the whole of Tidewater Virginia is kept in close and cheap communication with leading markets by means of steamboats and sailing vessels.

#### MINERAL WATERS.

Virginia has for years been famous the world over for the number and value of her mineral springs. In the western section of the State there is hardly a neighborhood without its springs of mineral water. There is, probably no other State in the Union possessing so many popular resorts. The people not only of the South, but of the North and West as well, gather at these springs in the summer in enormous numbers to drink the health-giving waters and breathe the invigorating mountain air. The furnishing of farm products to the hotels is a profitable business for the local farmers and truck raisers.

Virginia offers many inducements to the investor and the settler, and her advantages for industrial or agricultural pursuits and her attractions as a place of residence are well worth investigating.

# WEST VIRGINIA.

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This State lies south of Pennsylvania; it is bounded on the east by Maryland, on the southeast and south by Virginia, and on the west by Kentucky and Ohio: it is separated from Ohio by the Ohio River. The population of the State is given in the last census report as 618,457—600,192 native and 18,265 foreign; 592,537 white and 25,886 colored.

The following on the topography of the State is by Wm. M. Fontaine, A. M., Professor of Natural History, &c., at the University of West Virginia:

It will, perhaps, give a better general idea of the topography of the country if we select for examination one of the streams which rise on the eastern edge of the State, near the Alleghany Mountains, and flow westward into the Ohio. Such a stream, when followed from its mouth to its source, will take us across the entire width of all the various surface features to be seen in that region; for it must be noted that areas with similar topographical features have their greatest dimensions along lines running northeast and southwest here as elsewhere in the Appalachian Region.

For our present purpose no stream is better suitable than the Kanawha, and its continuation in the New and Greenbrier Rivers. The features seen along this line are to be found on any of the streams which pursue a similar course. Such are the Big Sandy, Guyandotte, Gauley, Elk and Little Kanawha.

Commencing then on the Ohio and proceeding eastward, we note the following facts:

In the vicinity of the Ohio, as we enter the Kanawha, we are accompanied by hills of moderate height (200–300 feet) with gentle slopes, and placed more or less widely apart, having extensive bottoms along the river and other indications of a surface composed of soft and easily worn-down material. These features accompany us for a long distance, until we approach Charleston. As we near this point the hills become higher and higher, with more precipitous slopes and narrower valleys. At the same time they close down on the river nearer and nearer.

Passing Charleston, the same features continue, the hills gaining in height along the river until they reach, in the vicinity of Coalsburg, the altitude of 800 feet above the stream. They continue to rise gradually until, near the falls, they attain the height of 1,100 feet. At the falls the river passes into that part of its course marked by canon features, and from this point takes the name of New River. A little back from the immediate banks the hills rise into quite lofty mountains, attaining in Gauley Mountain the height of 1,800 to 1,900 feet above the river.

The canon features attend New River to beyond Quinimont, a distance of more than 40 miles. These are caused by the rise above the water level of the massive sandstones of the conglomerate series. Wherever the rivers are flowing through and over this series, especially its upper portion, they present much the same character. In such cases they are walled in by high hills or precipitous cliffs

which rise almost immediately from the water's edge, leaving no bottoms or low grounds. The beds of the streams are rugged and choked with great masses of stone fallen from the cliffs above, while continual rapids and falls combine to give them still more of the character of mountain torrents. Such a conformation has given to New River its well-known reputation for wildness and ruggedness. But in these features it is even surpassed by its southern neighbors, the Guyandotte and Big Sandy.

While such wild and rugged scenery is presented along the immediate banks of the streams in this area occupied by the conglomerate, the case is very different when we ascend the inclosing hills. It is thus seen that the rivers are really flowing in deep trenches far below the general plane of the country. This general plane is determined by the upper surface of the conglomerate series, which continues to rise to the east at an average rate of 50 feet to the mile. As a consequence of this state of things, the conglomerate rising faster than the rivers fall, the cliffs which border them become higher and higher and the general surface more elevated as we proceed east, until the upper surface of the conglomerate series is carried so high in the air that it has been broken down and removed by the action of the elements.

This plane, determined by the upper surface of the conglomerate, is dotted over with hills, which do not, in their general aspects, differ from those seen elsewhere over most of the State. Many of them rise to a considerable height, owing to special agencies which have acted to preserve them. Where their conglomerate base has risen to a considerable height, they attain above tide an elevation which would by no means be suspected by an inspection of their altitude above their bases. Such elevations are those of Big Sewell, Cherry Pond and Guyandotte Mountains, &c.

The conglomerate base continues to rise as above described until it makes its last appearance on the east in the Great Flat Top and White Oak Mountains. Here it has attained the elevation of 2,800 to 3,000 feet.

Passing beyond the line of these mountains, near Hinton, and following the Greenbrier River eastward, we find the general plane of the country greatly lowered, the canon features lost, and the surface presenting general features like those seen below Charleston. This continues until we approach the White Sulphur, on the eastern border of Greenbrier, when we meet for the first time the long parallel folds of the Alleghany Mountains.

If now we take a similar course from west to east in the northern part of the State, we will find a different topography. There is no rise of the general plane of the country to the east in this quarter, for the conglomerate is too deeply buried, and its thickness has become too much diminished. Commencing on the Ohio in the northern part of Wetzel and proceeding east across Monongalia to the west border of Preston, we find no essential difference. On the Ohio the hills are higher here than at the mouth of the Kanawha, since they reach the height of 500 and 600 feet above the river. In Wetzel they rise still higher above their valleys, but in Monongalia they again show the same altitude as on the Ohio. On the west border of Preston we meet in Laurel Hill the most westerly of the parallel folds of the Alleghany system, and thence these are continued, growing closer and higher as we proceed eastward.

A bird's-eye view of the Ohio River would show it, throughout much of its course, flowing between high sharp-backed hills. These are higher in the north, lower in the middle, and higher again in the southern part of its course.

In order to understand the topography of a country we must know its geology, for the rocks which underlie the soil form the materials out of which the surface features have been carved, and their varying hardness and proneness to

disintegration will determine the shapes finally assumed. We will then, in this connection, briefly describe some of the more important geological formations solely in their topographical relations. The formations which have had by their presence the most influence on the topography of our State are the following, beginning with the highest and latest formed: 1. The upper barren measures and productive coals. 2. The lower barren measures and productive coals. 3. The conglomerate series. 4. The umbral shales and limestone. 5. The vesper-tine shales. We may omit, in this connection, the consideration of the other formations, reserving their description for another topic, since they compose a comparatively small portion of our area.

The upper barren measures and productive coals are everywhere in the State—mainly soft crumbling rocks, such as shales and shaly sandstones, which are easily worn down and removed by rains and running streams. They are greatly thickened in the northern part of the State, but in passing South become comparatively unimportant. Whenever they are present, owing to the readiness with which they are worn away, they produce high conical or rounded hills, with deep narrow valleys, forming an irregular net-work of streams. These streams rarely have much bottom land, but it is not uncommon to find the hills with broad flat summits.

The lower barren measures and productive coals, in the northern part of the State, are comparatively thin, and do not differ materially in their structure and topography from the overlying series first described; but in the south there is a very material change. The series becomes greatly thickened, and there is a much larger proportion of firm massive sandstones in it, especially towards the lower portion. As the topographical effects of these sandstones are, in general, the same with those of the conglomerate series, we need not consider them separately. It will be sufficient to say that the change in the topography, described above, as seen in approaching Charleston from the Ohio River, is due to the rise of these rocks above water level. The conglomerate series, in the northern portion of the State, is comparatively quite thin, and is so deeply buried under the productive coal measures that it has no effect on the topography. It is first seen in Laurel Hill rising above the surface, and from that point eastward it has an important influence on the surface contours, entering mainly into the mountain ridges. It is here principally massive sandstone.

In the south, on the contrary, we find it greatly thickened and elevated to the surface over broad areas. Along New River and southward it has a threefold structure, being massive sandstone at bottom, more shaly and easily eroded strata in the center, and on top again massive sandstone of great thickness. Throughout the series massive sandstones predominate. The influence of this series, combined with that of the more massive portions of the lower productive coals, has had an exceedingly important effect on the topography of the central and eastern portions of the State. This is in large part due to the highly siliceous character of many of these sandstones, which has enabled them to resist in a remarkable manner degradation and removal by running streams. Such sandstones are indestructible, except by undermining and throwing down the ledges; and this process of undermining is what has filled the streams flowing in this formation with the huge masses of stone which we see. Especially is this true of the uppermost ledge, which is usually over 150 feet thick.

Underlying the conglomerate series we have the umbral shales and sandstones, followed below by the umbral limestone. These shales and sandstones are generally soft and easily cut away, while much of the limestone beneath is more resistant. Hence the country having these rocks on the surface is usually much lower than that occupied by the conglomerate, they having been cut away much

more rapidly. We find these strata over much of the country lying to the east of the conglomerate, which, as stated above, makes its last appearance in White Oak, Elk Knob and Flat Top Mountains.

The last formation to be mentioned here is the upper member of the vesperine, which is formed of crumbling red shales, and these even more readily than the shales of the umbral are broken down and removed. These form the only other rock composing the surface of Mercer, Monroe and Greenbrier besides the above named.

For the purpose of topographical description we may divide the State into two regions, in which the surface features present important differences, and are due to the action of essentially different causes. Our dividing line must be somewhat arbitrarily selected. It may be taken as follows:

Beginning in the north, it commences in Laurel Hill, on the west border of Preston, and is thence continued south, in the mountain of that name, on the western border of Barbour; thence in Rich Mountain in Randolph; Gauley and Greenbrier Mountains in Pocahontas; the Main Alleghany, near the White Sulphur; and lastly, Peter's Mountain, in the southern part of the State. The country between this line and the Ohio River may be styled the Hilly Region, and that lying to the east of it the Mountain Region.

It must be borne in mind that this division is not founded on altitude alone, but also on considerations which will be presently given. Indeed, contrary to what the titles might suggest, the elevation of much of the Hilly Region is above that of a portion of the Mountain Region.

In that section which we have styled the Hilly Region, and which comprises much the larger part of the State, are to be found those peculiar topographical features which have given our State considerable celebrity. Leaving out of view for the present the special features which mark the canon portions of the streams in the south, and the country wherever the conglomerate has attained a considerable height above the rivers, we may briefly describe them as follows: First, we note a vast multitude of hills, sometimes closely placed, and rising immediately from the V-shaped depressions in which the streams flow; again, sloping more gently, with considerable bottoms at their base, spreading out into flat-topped, gently undulating plains on their summits; or again, expanding into elevations attaining the dignity of mountains. Looking across such a region, it often presents nothing but a succession of such hills and valleys. As a rule, these succeed each other in no particular order, but occur just as the streams, turning hither and thither to avoid some harder rock, carved them out. Occasionally the outcrop of some more indestructible stratum has determined the direction of a line of elevations, or a remnant of a harder overlying mass has, along certain determinate lines, preserved the underlying softer material from erosion, and so left more or less connected ridges and mountains. These are the general features presented by the elevations in the softer strata of the productive coals, and in the similar rocks underlying the conglomerate series. The special modifications produced by this latter series will be noted further on.

Again, as might be inferred, the streams in the above-described districts are marked by the great irregularity of their courses. They flow to every quarter of the compass, but all finally make their way westward or northwestward into the Ohio. These, as well as all the streams in the State, are remarkable for the great depth to which they have cut their channels. Here, however, although the valleys are deep and narrow, they have none of the canon features; but the bordering hills may be cultivated to their tops, though often too steep and with a soil too light to render frequent ploughing advisable.

In all this Hilly Region the surface features are entirely the work of erosion. The rains and running streams have cut lofty hills and veritable mountains out of the gently sloping and often almost horizontal strata, having removed a truly astounding mass of material by their slow, ever-wearing flow. Indeed, when one thinks over the vast amount of wear that the surface of our State exhibits, he is tempted to speculate about a period when the rains were far heavier and the streams more powerful than at present—a period when the land, newly raised from the carboniferous seas, was exposed as a lofty barrier to the sweep of westerly winds laden with moisture from extensive seas penetrating into the land far beyond the present Gulf of Mexico.

We will now turn to the inspection of the topography of the Mountain Region. Omitting the counties of Berkeley (in part) and Jefferson, this region includes all east of the line described as the eastern boundary of the Hilly Region. Here also we find stupendous monuments of the leveling powers of the atmospheric agencies; but these have not been the only forces at work in this district in modeling the hills and valleys, as was the case in the Hilly Region.

The surface of this part of the State, when first upheaved and exposed to denuding forces, was thrown into long parallel elevations and depressions running in a northeast and southwest direction. These folds, on the east border of the State, are comparatively close together and narrow. Going west they widen out and become more distant, until, before reaching the Ohio, they become imperceptible. The strata which compose these folds are alternations of soft yielding rocks and massive sandstones, among which latter the conglomerate series above described plays no unimportant part.

In the easternmost and more sharply folded flexures the stiff, unyielding sandstones were, along the crest lines of the ridges, where the strain was greatest, burst asunder and broken to fragments, exposing the next succeeding soft strata below.

When now these elevated ridges or anticlinals were exposed to the wearing action of rains and torrents, these stripped off all softer material from the summits, and left bare the arches of massive sandstone, with their fractured crowns. The surface waters working their way along these fractures soon reached the softer material below. Here their progress was more rapid, and, by cutting down and undermining the walls on either side, they have finally excavated channels of greater or less width.

Such has been the history of the formation of many of the narrow parallel valleys in the northeastern counties of the State, and more particularly in Randolph and Pendleton. Where the process above described has been carried on on an extensive scale, we see the river now flowing in a narrow valley between two mountain walls. This is the case with Tygart's Valley River in Randolph. Where less complete, we find the stream flowing on the top of a mountain, and still cutting its way down in the massive sandstone, as in the case of some of the Forks of Cheat.

Again, in the originally depressed portions or synclinal valleys, which, being less elevated, have suffered less from erosion, we find streams flowing, in like manner, between mountain chains; and it is easy to see how the waters would have gathered in such valleys. Synclinal valleys may be distinguished by the fact that the rocks dip from both sides towards them, while in the case of valleys of the former class, or anticlinal valleys, they dip away from them on both sides.

It often happens in the Mountain Region which we are describing that the arches and folds are too broad to be cracked along their crest lines. Then they often afford on their summits flat or gently undulating surfaces, which are called Glades by the inhabitants, but which are simply table-lands of greater or less



extent. This feature is more common when the huge unyielding masses of the conglomerate series enter into the structure of the country. We also find the anticlinal valleys, with their canon-like features, more commonly where the conglomerate is present. This rock is extensively exposed in the Mountain Region.

Such are the general features presented in the two regions into which we have divided the State, and such were some of the special circumstances which modified erosions in the Mountain District.

#### CLIMATE, &c.

In considering the climate of the State we may divide it into three belts running in a northeast and southwest direction.

The first belt comprises the counties along the Ohio River, and may be taken to coincide with our first topographical belt. This comprises the lowest land in the State. The second climatic belt may be taken to include all the rest of the State, except the Mountain Region. The third half includes the Mountain District. It will be convenient to designate the first belt as the "Ohio counties;" the second belt as the "Plateau District," and the third as the "Mountain District," inasmuch as these names suggest the position and altitude of the areas which they designate.

For all of these there is a great lack of data connected with the climate, but in the Ohio counties records have been kept for a much longer time than elsewhere. For the Plateau District we have a few details, and for the Mountain District none at all.

The Ohio River Valley is often spoken of as possessing features of climate distinct from those shown in other parts of the State. This, taken without qualification, would lead to erroneous ideas of the topography of the stream. The valley proper is a narrow trench cut out in high hills for most of the way.

It attains at most the width of only a mile or two, and cannot exert any important influence on the climate of the country in general. In summer it may influence to some extent the formation and course of showers, or it may facilitate the passage of bodies of warm, moist air from the southwest. Apart from minor and local influence, it is to be considered merely as one of the factors influencing the climate of the belt of country along its banks.

If, however, we apply the term "Ohio Valley" to the belt of comparatively low country along the west border of our State, then, no doubt, climatic features somewhat different from those of the rest of the State do exist here.

Leaving out of consideration the influence of altitude, the most important general causes controlling the climate are the character of the exposure of the surface, the direction assumed by the principal elevations, and the prevailing winds. The State forms a sloping surface, inclining in a northwesterly direction, from the highest ridges of the Alleghany to the hills along the Ohio River. The principal elevations, even in the Hilly Region, run in a northeast and southwest direction.

When now we take into consideration the winds which prevail along the Apalachian belt of the United States, we can easily see that these topographical features assume great importance. In our latitude, even east of the Blue Ridge, easterly winds are not the predominant ones; but in Virginia, especially in winter, they often blow for a considerable space of time, bringing with them, when from the northeast, the longest spells of wet weather. Owing to our protection by the Blue Ridge and Alleghanies, such winds do not reach us, and hence, in West Virginia, winds with an easterly element are extremely rare. If they do reach us, they are usually drying and clearing winds, having been deprived of their moisture by passing over the mountain tops.

Our winds are almost exclusively those with a westerly element, such as southwest, west and northwest. When these enter our State, the northeast and southwest direction of our elevations exert such a guiding influence on them that instead of passing directly across the State, they are forced to traverse it longitudinally. The consequence is that we feel the full effects of such winds, whatever they may be. Southwest winds enter freely and are guided unchecked in their original direction; hence such winds the year round predominate, at least in influence. Westerly and northwesterly winds are partly deflected, so as to preserve a southeast or northeast direction. The inclination of the face of the country also exerts an important influence.

Such winds enter the State on its lowest side, and in working their way over it they rise higher and higher. The consequence is that they become cooled, and their moisture is condensed if they be moist, warm winds. Thus an abundant rainfall is secured. The country never suffers from the prolonged dry spells which sometimes occur east of the Alleghanias. A mere inspection of the map of this region will show, by the enormous number of perennial streams possessed by it, that this precipitation is not only abundant, but that it is uniformly distributed throughout the year. Our State contributes no small proportion of the volume of water carried by the Ohio into the Mississippi. It is well known that this surpasses that of any other tributary of that great stream. After these general considerations we may turn to the examination of the individual factors which constitute the climate of a country.

TEMPERATURE.

Temperature is influenced both by latitude and elevation. The main body of the State of West Virginia lies between the parallel of 37° and 40°. For points at the same elevation, this would give a difference of about 3° in the mean annual temperature of the southern and northern portions of the State. According to Dodge, the State is embraced between the isothermals of 50° and 54°. The isothermal of 52° passes nearly through the centre of it. The general elevation of the surface renders the mean temperature somewhat lower than that of points on the same parallel of latitude in the States further west. Within the State itself, the greater altitude of the plateau and mountainous portions renders the mean temperature of these belts lower than that of the Ohio counties. This difference of altitude may be taken on an average to be about 1,500 feet, causing a lowering of the mean annual temperature of about 4½° on the same parallel of latitude. Hence such elevated counties as Fayette, Nicholas, Raleigh, &c., do not possess that higher mean temperature which they should have, in consequence of their more southerly position. The isothermals passing through the Mountain and Plateau Districts bend strongly up northward. The mean annual temperature of the State may be taken as 52°.

RAINFALL AND MELTED SNOW.

From what has been already said a pretty good idea of the precipitation over the State may be gained. The following statistics, though scanty in amount, are offered. For Wheeling, observations for 17 years ending 1871, made by Dr. E. A. Hildreth, give us the following:

Spring .....	10.9 inches.	Autumn .....	9.57 inches.
Summer.....	12.93 "	Winter.....	9.36 "
Year.....			41.95 inches.

By the same observer at the same place the following annual average of rainy, snowy, &c., days are given during a period of 27 years:

For each year..	{ Rainy and snowy days.....	119.81
	{ Clear and fair.....	170.16
	{ Cloudy.....	76.28

He also deduces the mean annual rainfall for the State from observations amounting in the aggregate to 103 years to be 39.89 inches. While the above estimates for Wheeling may represent fairly the precipitation along the Ohio in the north, it cannot be doubted that for the Plateau and Mountain Sections the precipitation is greater; but, unfortunately, details from these elevated parts of the State are mostly wanting. The rainfall deduced from the records at Morgantown, a point more inland, and near the foot of Laurel Hill, show an unusual average of 49.22 inches. As the year 1874 was noted for the heavy summer rains, no doubt this is too high, and a mean annual precipitation of 45 inches may be taken as near the mark for the more elevated districts.

The following record from Kanawha Salines was taken for three years and three months—from April, 1857, to February, 1861:

Spring .....	12.92 inches.	Autumn .....	16.18 inches.
Summer.....	12.03 "	Winter.....	14.71 "
Year.....	35.75 inches.		

This, without doubt, is above the average, but it would seem that the Kanawha River Valley has usually an exceptionally high rainfall.

For Lewisburg, records kept during six years for the Smithsonian Institution show the following results:

Spring .....	7.39 inches.	Autumn .....	9.60 inches.
Summer.....	9.21 "	Winter.....	9.55 "
Year.....	35.75 inches.		

Records kept at the White Sulphur Springs for five years and six months show a mean annual rainfall of 37.54 inches. Both of these results are below the average of places of the height of Lewisburg and the White Sulphur, which are each about 2,000 feet above tide. This is due to the position of these localities. They are situated between the Alleghany Mountains on the east and the high country of the eastern part of Fayette and Raleigh on the southwest. These latter highlands lie in the direct path of the southwest winds, which bring moisture into the country, and in passing over them these winds are deprived of much of their temperature and vapor.

#### AGRICULTURAL FEATURES.

The following on the soil and productions of West Virginia is from the author quoted above:

The following are the principal soils existing in the State:

*Clay Soils.*—These contain 75 per cent. and over of clay. The remaining 25 per cent. is composed of sand, calcareous, ferruginous, vegetable and other matters. In their physical character, when moist, they are stiff and tenacious. They dry with difficulty, and are rather slowly warmed by the sun's rays. When dry they become baked to a more or less hard mass, and are also, in freezing and thawing, more apt to injure the roots of plants than other soils. With these disadvantages, however, they combine many advantages, and, when properly managed, make the best lands for certain crops. Stiff clays such as those just described do not make a large proportion of our soils. They are chiefly to be found in the eastern and southern parts of the State.

*Sandy Soils* contain 75 per cent. and over of sand. The remaining components are clay and the other constituents, except sand, mentioned as occurring in clay soils. In their physical characters they are the opposite of clay soils, and are much inferior to them. They are loose, thirsty in nature, and do not hold manures well. Hence, a mixture of sand and clay in land is beneficial, the one correcting the defects of the other. Such strictly sandy lands are comparatively rare, and are mainly found in the northeast mountain counties and in the outcrops of the sandstones of the conglomerate series.

*Loams.*—These are composed of clay and sand mixed in about equal proportions. They contain also various other substances like those found in the two above-mentioned soils, making 20 to 25 per cent. of the whole. When clay predominates they are called clay loams; when sand, sandy loams; when lime forms a large proportion, calcareous loams or marls. These make usually the most fertile lands known, since they contain all the elements needed by the plant, combined with the best physical condition, uniting as they do the good qualities of sandy and clay soils, so far as these arise from the texture and condition of the land.

West Virginia is fortunate in having a large proportion of such lands. Indeed, they may be said to be the characteristic soils of the country, and to form the larger part of the surface. The strata of the coal measures above the conglomerate, which covers so large a portion of the area of the State, are peculiarly fitted to produce the best class of these, since they consist of shales, argillaceous sandstones and layers of limestone or calcareous strata intimately mixed. These readily break down under the action of the elements, and give a deep light earth. It will not be necessary to specify localities. Even where the rocks under the coal strata furnish the material, they are usually so compounded of sandstones and shales as, by their disintegration, to produce such soils.

*Calcareous Soils.*—These are soils in which lime forms a large constituent, mixed with clay, sand and other matters. Such soils are, from their chemical composition, among the best that are known.

In their physical character they resemble more nearly the loams, and are especially suited for the production of grass. Of these the State has a large proportion. As localities where they occur may be mentioned Jefferson and a part of Berkeley, which contain the lower Silurian limestone of the "Great Valley," with Pocahontas, Greenbrier, Mercer and Monroe containing the sub-carboniferous limestone and shales. The northern counties on the Ohio with the limestone of the upper coal measures belong here also.

*Alluviums.*—The alluviums may be divided into two classes, according as they are produced by deposits from turbid streams or by slow surface action. We may call the first *stream alluvium*, and the second *upland alluvium*.

Stream alluvium, as is well known, is produced by deposits from streams in seasons of flood. Such soils are generally mixtures of all the kinds of matters found along the watercourses which deposit them.

If such deposits are subject to occasional overflow, they receive by this means a renewal of their fertilizing components, and will then last indefinitely. If not overflowed, such soils must, under continued cultivation, eventually be exhausted, provided no return by means of manures be made to them.

Magnificent soils of this class are found in the State. The "bottom lands" along the principal rivers are widely celebrated for their productiveness and for the great length of time during which they have been cultivated. Some of these have continued without intermission for more than 100 years to make heavy yields of that most exhausting of all crops, Indian corn.

Upland alluvium is produced by the slow action of the surface waters on the hill slopes. Such action tends to accumulate in the valleys much of the fertilizing constituents of the hills, and to carry down to the lower levels much of the vegetation which year after year falls and decays on the higher grounds.

This has gone on for ages, and has finally produced in the bottoms a soil of from one to ten feet and more in depth, which combines in the highest degree all the elements of fertility. Were the hillsides formed of slowly decomposing rocks, this process would soon leave them bare. In fact, however, the rapidity with

which they break down and renew the earth prevents this denudation, while not checking the accumulation of deep soils in the valleys.

Upland alluvium is generally more productive than even stream alluvium, since it retains nearly all the fertilizing matters which have been slowly accumulating. On the other hand, stream alluvium, being a deposit from water, has lost most of its soluble enriching matters from the greater or less length of time during which it has been suspended in water. In consequence of this, these have been dissolved and carried off. This superior fertility of the upland alluviums explains the great size of the timber which grows on them.

The large amount of vegetable matter which they contain is one of the most important enriching agents. The humus of the hill-slopes gradually works its way down, in the first place, into the bottoms; and then, in the second place, the conditions of moisture, &c., found in such places specially favoring luxuriant vegetation, cause large additions from growth on the spot. This, in the dense shade, moulders away with extreme slowness.

From the immense number of hills in this State, the amount of bottom land of this kind is very large, that of the streams and uplands together being put by some at 30 per cent. of the entire area.

The present conditions and the prospects of agriculture in West Virginia cannot be understood without some explanation. Any present exhibit of her productions from the soil would not give a fair idea of her capabilities. It will be readily seen that the capacity of no new country can be fairly judged by her productions at any given time. Census reports and statistics may afford us data to determine the resources of old and well-populated regions, where all the branches of industry have adjusted themselves into harmonious working order, and each pursuit is maintained by a sufficient body of laborers trained for their special calling. This is far from being the case in West Virginia. Almost every condition requisite for the present full development of her abundant resources is wanting. Her population is sparse; much of her land is still in the primeval forests, and her people have not confined their attention to special fields of labor and striven to perfect them. There has also been a great deficiency of labor and capital. Last, but not least, railways and roads, until of late, have been rare within her borders. With respect to this last feature, much has recently been done and very much more is projected, so that we may soon hope to see generally introduced into our State that great stimulus to active farming—a ready and cheap transportation to market.

For the general and thorough working of our lands we greatly need an immigration of industrious settlers. Thousands pass yearly through our State to the far West, not knowing that here they can find an abundance of untouched virgin land at nominal prices, and with a fertility not surpassed by any which they can hope to gain in the remote West. But suppose that lands were higher and poorer here, our climate and proximity to the great markets must ever give us a great advantage over farmers who, when they make a good crop, find it destroyed at one blow by the ravages of insects, by tornadoes or floods of rain, and who, if successful in escaping their numerous enemies, find all profits swallowed up in charges for transportation to markets which lie at our doors.

But these are not the only or chief causes which have lessened the amount of farm products with us. The way in which the State was settled and the consequent habits of her inhabitants have been unfavorable to the existence of extensive or skilled farming, and have directed the industry of the people into almost every other channel. The original settlers were, to a large extent, men without means, who, on entering this country, then cut off from all exit to market, were content to clear small patches of ground, whose generous response to even poor

cultivation yielded returns sufficient to supply their limited wants. His little "clearing," selected in the most convenient spot, was cultivated by the pioneer year after year in corn and vegetables, which served to support his family along with a hog or two and possibly a horse and a cow. With fowls and the abundant game in the forests around, there was abundance of meat and bread. Even now in many parts of the State this is the mode of life.

When the original clearing was exhausted by long tillage, an addition was made by felling more timber. Thus the cleared lands gradually grew around the cabins until extensive openings were made, but still without causing attempts at establishing communication with the outside world. This independent mode of life impressed upon the people habits of thought and action, which, though calculated to foster industry, frugality and hardiness, were not most favorable for the promotion of undertakings which require communication with and dependence upon other countries.

We see at the present day the influence of this training. Until of late West Virginians have paid but small attention to the raising of agricultural products for exportation. They are usually content with the production of a sufficiency for home consumption. But rarely is an improved system of farming employed, and the cultivation is of the rudest kind. The tendency is to look to other sources than the farm for products of exchange. As an example, this spirit has led our people along all the streams which can float a raft, to denude the forests of the magnificent timber which they afford, often sacrificing it in the most prodigal manner. So, too, they turn their attention, when the finer timber has been removed, to the getting of tan-bark, hoop-poles, &c., &c., which business occupies a very important position among our industries. All of these causes have led to a neglect of agriculture and stock farming—industries for which, especially the latter, our State is peculiarly fitted. Of course, there are important exceptions, especially along the Ohio and in the older counties, as in Greenbrier, in the South Branch District, &c.; besides, we are speaking rather of what has been. Of late years there has been a marked improvement, and we are being forced into those industrial channels which nature intended that we should follow. The opening of important lines of railroad has brought capital to develop our coals and iron, and the established value of these bids fair to bring other lines within our limits. The increased amount of cleared land has given greater impetus to stock raising, which has been still farther increased by the dictates of a sounder system of agriculture. This has taught us to keep our hillsides, with their easily washed soils, as much in grass as possible, and the ready-money returns which our sheep, wool and the cattle purchased in the fields bring us tend strongly in the same direction. Again, our people are no longer satisfied with the miserable roads, which have been no small obstacle in the way of farming. More attention also is paid to systematic farming, although much yet remains to be done in that direction.

This State at present pays more attention to corn than any other crop. To the production of this the soil and climate are well adapted. When the lands produce grass, and especially on the calcareous soils, the following rotation has been found advantageous: First corn, one or two years; then oats, then wheat, then grass—clover, timothy, or both mixed. The land, if productive enough, may be grazed during the whole time it is in grass. When the blue-grass grows spontaneously, as it does over most of the State, it tends to overrun meadows, and hence foreign grasses, such as clover and timothy, cannot be maintained for any great length of time. The farmers on the calcareous soils of the Panhandle say that their hills grow grass almost as well as the bottom lands, but on neither can they keep timothy longer than five years as the predominant grass. After this period blue-grass takes the ground, and this being indigenous, maintains possession

indefinitely, forming excellent pastures. It is claimed that the land improves so long as it is in either grass. The blue-grass pasture is again broken up and the same routine takes place. The same rotation essentially is followed in other grass lands with beneficial results. Rye and barley may be substituted as small grain crops.

In the uplands of the South Branch District of the northeast counties, which is a fine grazing region, and produces fine grain and hay in the bottoms, the rotation of crops is corn, wheat, clover, and occasionally rye or buckwheat. This rotation may, perhaps, be taken to represent a good succession for any highland grain district.

As to the character of the crops, fruits, etc., that may be raised within the State, it will be easily seen that it must be very varied. No State has a greater variety of soil within certain limits, and few have a greater range of elevation, varying, as that of West Virginia does, from 500 feet to 4,000 feet. Between the summits of the mountains in the northeast and the valley of the Ohio in the southwest there is a climatal difference of at least 14°.

Stock raising is an industry of considerable importance, and in some sections is carried on on a large scale—a market for beef cattle being found at Washington, Baltimore, Philadelphia and New York.

#### COAL.

The coal area of West Virginia covers 16,000 square miles, or 4,000 square miles more than the entire coal area of Great Britain, and a few hundred square miles more than the combined coal area of Great Britain, Germany and France. It is also over 3,000 square miles greater than the coal area of Pennsylvania. These figures will give some conception of the magnitude of the coal territory of West Virginia. The development of these interests has been very great within the last few years, during which time several railroads have been constructed to open up new coal-fields, and others that have been planned with the same object in view will shortly be built. In 1876 about 800,000 tons coal were mined in the State; in 1881 this had increased to 1,500,000 tons, and again in 1883 to 2,805,000 tons. The official statistics for 1884 are not at this writing available, though the output is estimated by Saward at 3,000,000 tons. This is probably too small by several hundred thousand tons. Thus the amount of coal mined in the State doubled from 1876 to 1881, and again doubled from 1881 to 1884. At the present time there are about 140 to 150 mines being worked, while new companies with large capital are being organized almost every week. The coal mined in this State reaches tidewater over the Chesapeake and Ohio Railroad, which has erected fine coal-piers at Newport News, Va., where a large coal trade is now carried on, and over the Baltimore and Ohio Railroad to Baltimore. A large amount of West Virginia coal is made into coke in the State and used in the manufacture of iron.

The following is from M. F. Maury, Esq :

The coal mining advantages of West Virginia arise from the great number of seams found accessible above water level, and from the fact that they contain coals of various compositions adapted to all the requirements of trade and manufacture. The fat coking, gassy bituminous, the hard and valuable splint and the rich and oily cannel in this highly favored region are found in great purity, and made easily accessible to the miner through the agency of running water, which has exposed the seams in thousands upon thousands of places, and in consequence of this and their size, coal, as a general rule, can be mined cheaper and with more economy under the same rates of labor than in any other part of the Alleghany Coal-field.

In fact, when the northern portion of the State was wrinkled into folds, and the southern tilted gently from its original horizontal position, water, with its vast planing and eroding power, washed off the superincumbent strata and cut and counter-cut the country by deep and narrow valleys, thus preparing this field with numerous objective points for safe and economical working, for it left vast areas of the coal measures above water, accessible at many points by simply removing from the outcrops of the seams the alluvium that has formed there by the decaying work of ages.

This will more clearly appear by a comparison of the position of the coals here and in Great Britain in this respect. There the coal is deep below water level, and to reach it requires years of labor and vast sums of money. In its great northern coal-field the shafts are rarely less than 150 feet deep, and many have the great depth of 1,800 feet, sunk at an expense in some cases of \$240,000, while the Dukinfield colliery was taken down 2,600 feet at a cost of \$500,000, mainly to reach the "Black Mine Coal," a seam 4 feet 8½ inches thick.

Here mighty natural forces have sunk pits which need neither repair or renewal. The inclination of the strata, coupled with the laws of gravity, have provided the most costless, perfect and permanent pumping machinery; and the perfect ventilation of the mines is but a matter of the most simple and ordinary care, as, except in one or two instances in the northern portion of the State, there are none of those noxious gases to be dealt with which oftentimes render coal mining so dangerous.

There are, however, many districts where the seams are below the surface, though easily reached by shafting; but when we consider the number that are over three feet thick, and that such an one is workable and yields about 4,800 tons per acre, it will be seen that we need not treat of the deeper ones, for we have no need to sink shafts at all, as it will be a long time before the cost of winning coals from day levels will be so far raised as to necessitate other styles of working; and West Virginia can justly be proud of the numerous advantages it holds in this respect.

### IRON.

The iron to be found in West Virginia may be divided into two classes:

1. Those ores which belong to and are found in the Apalachian Coal Measures, consisting of brown oxides, carbonates and black bands, and in some places nodular red hematite.
2. Those which belong to the region lying between the eastern escarpment of the coal formation and the eastern border of the State, forming a part of the great iron belt of the Atlantic States, and consisting of the brown and red hematites, which are much more rich and abundant than those of the first class.

#### IRON ORES OF THE COAL MEASURES.

Little attention has been paid to the iron of this geological horizon, except in the northern counties, where a few small blast furnaces have worked the native ores. With these exceptions, as there was generally no cheap and convenient outlet, and consequently no great value for this mineral or its product, it has not possessed much attraction for the people at large, and but little attention has been paid to it.

A careful geological survey may and no doubt will show that there are more workable beds of it than are now known, and, in fact, within the last few years most valuable seams of black band ores have been uncovered, the presence of which was not thought of before.

With but one exception, (in Jackson County,) so far as examinations go, it is only the lower coal measures and the lower barren measures that in West Vir-



ginia contain workable beds of ore, which may be divided into carbonates and black bands.

*Black Band Iron Ore.*—This is nothing more than a carbonate of iron of a more or less black color, by reason of an admixture of bituminous matter. So far as yet known, it is confined entirely to the southern part of the State, where it has been discovered only within the last few years. From the fact of its very often resembling black slate in its structure, it may often have been passed over unnoticed, and careful search will no doubt show it in many places where it is not now suspected.

It is a class of material that makes an excellent iron and from which much of the celebrated Scotch pig is smelted. It possesses an especial value from the fact that in many cases a low grade ore can be roasted into a higher grade. For instance, take that from Davis Creek, in Kanawha County. Where mined it contains 33 per cent. of metallic iron and 26 per cent. of carbonaceous matter. By piling it in heaps and setting fire thereto, the carbonaceous matter is burnt out, and in the process of combustion, generates enough heat to convert the carbonate of iron in the ore into a richer oxide, so that the mass, after being thus roasted, analyzes 65 per cent. of metallic iron.

Unfortunately, we can never reckon or depend upon any seam of it continuing of a uniform value, for in one place it will contain an ore well worth working, while half a mile off it may become so mixed with slate or earthy impurities as to be utterly valueless. As an example: On Bell Creek, Fayette County, an excellent bed about four feet thick was found by Mr. L. Bemelmans, of Charleston. Some two or three miles from this place, up a ravine a short distance below the mouth of Bell, the same seam showed only 12 to 14 inches of the good material; while on Little Elk Run of Gauley River, some three miles to the north, the results of two analyses from the same seam gave only 5 and 7 per cent. respectively of metallic iron. If we search for it in another direction, it may open to a very valuable deposit. From this irregularity and from the fact that it has been well proven in this field, it will be readily understood that careful search may find it in many places where it has never yet been noticed, and wherever it is found in workable quantity its presence adds great value to the land.

*Carbonate of Iron.*—Under this head may also be classed the brown hematites of the coal measures, as they are merely the results of the decomposition of the carbonates, and, in fact, when a seam of the former is discovered, we may expect it to turn into the latter as soon as we go far enough under ground to get beyond atmospheric influences.

We see the result of this decomposition in the pieces of brown oxide that are found on the hills in every portion of the State. These have led to many erroneous ideas as to the richness of certain localities in this mineral, which came originally from the carbonates of iron existing in the beds that were once superimposed upon the present strata, and have long since been worn away by erosion. As this took place the lighter materials were washed off by the currents, while the heavier ore settled down and was left resting on our hillsides. Sometimes a great deal was deposited in one place and the soil is full of it, while in others but a single lump was left, and hence it is that on many of our mountains we find the "blossom" of good ore, and yet have no bed of it near by.

Like the black band, the seams of carbonate of iron are quite variable, so that in one locality they will be workable, while in another they may have thinned down or degenerated so much from an admixture of earthy impurities as to be worthless. They usually contain more or less carbonate of lime, which is of much importance in the blast furnace in helping to flux out any earthy impurities that may be present.

By roasting, the carbonic acid of this ore is driven off, and the mass is converted into the red oxide. As the former, when pure, contains 48.3 per cent. of iron, and the latter 70 per cent., it will at once be perceived that a thorough burning will raise the percentage so that an ore of low grade can often be roasted to a higher one—a very fortunate circumstance, as otherwise many of our seams would be too poor to be of value.

#### SALT.

Rich as is West Virginia in coal, iron, timber, &c., she is scarcely less rich in that indispensable necessity to human health and comfort and to animal life—common salt. Fossil or rock salt has not been found in the State, but salt brines of greater or less strength and in greater or less abundance are found by artesian borings at greater or less depth throughout the Apalachian Coal-field, which underlies the greater portion of our State.

The strength of these brines varies in different localities and in different wells in the same locality. The range may be stated at say 6° to 12° by the salometer, Baume scale, (distilled water being 0°, saturation 25°,) but the average strength of the brines from which salt is now made is about 8° to 10°. The value of these brines depends, of course, upon their location as regards accessibility and cheap transportation of the products to market, as well as the convenient proximity of cheap coal for fuel and timber for barrels. Only locations on the navigable rivers or lines of railways at present fulfill these indications; but as population increases and new routes of travel and traffic are opened up, it is probable that new salt manufacturing localities will be developed.

The principal points at which salt has been manufactured in the State are Charleston, on the Great Kanawha River; from West Columbia to Hartford City, on the Ohio River; at Bulltown, on the Little Kanawha; at Louisa, on the Big Sandy; in Mercer County, on New River; near Birch of Elk River, and at some other less important points, for local use.

#### TIMBER.

The following on the Timber Resources of West Virginia is from "The Virginias," of Lynchburg, Va :

The forests of West Virginia, with the exception of the belt of pine and spruce confined to the high ridges of the Alleghany Mountains, is principally composed of broad-leaved trees, the most important of which are the white and chestnut oak, the black walnut, the yellow poplar and the cherry. The white pine and spruce forests reach within this State their southern limit as important sources of lumber supply.

The forests have been largely removed from the counties bordering the Ohio River, and the most valuable hard-wood timber adjacent to the principal streams, especially black walnut, cherry and yellow poplar, has been culled in nearly every part of the State. But slight inroads, however, have yet been made into the magnificent body of hard-wood timber covering the extreme southern counties, which still contain vast quantities of oak, cherry and poplar.

The black walnut found scattered everywhere in West Virginia is least plentiful in the northwestern and Ohio River counties, and most abundant along the upper waters of the rivers flowing into the Ohio through the southwestern part of the State. Yellow poplar is found throughout the State, and is still abundant about the headwaters of nearly all the principal streams. Large bodies of cherry are found in Greenbrier, Nicholas, Webster and other counties immediately west of the mountains, and a large amount of hemlock is scattered through the valleys and ravines of the northeastern part of the State and along the western slopes of the Alleghanies. The area still occupied by the white pine is estimated to extend

over 310 square miles and to contain about 990,000,000 feet of merchantable lumber. The principal centers of lumber manufacture are along the Kanawha River, at Ronceverte, in Greenbrier County, at Parkersburg, and along the upper Potomac.

Partial returns of the hoop-pole industry gave a production during the census year of 3,549,000, valued at \$146,000.

During the census year 476,775 acres of wood were reported destroyed by fire, with a loss of \$155,280. Of these fires the largest number was traced to the careless clearing of land for agricultural purposes, although many had their origin in sparks from locomotives.

The manufacture of coeprage stock is fast increasing in importance, and seems destined, with the exhaustion of more accessible hard-wood forests of the country, to assume a much greater development than at present. Large quantities of black walnut, yellow poplar and oak in the log are shipped to Northern markets and to Europe.

The following notes upon the forests of West Virginia are extracted from Mr. Pringle's report: "Entering West Virginia at Keyser (New Creek) by way of Cumberland, Md., we find ourselves in one of the narrow valleys lying among the low, abrupt ridges of the northern Alleghanies, among which we have been traveling since we reached the vicinity of Williamsport, Pa. Coming south from Middle Pennsylvania, however, the forest growth covering the long mountain chains within view of the railroad becomes heavier and heavier, the evidence of fire and axe largely disappearing. On the hills above Keyser fewer evergreens appeared than I had previously seen. A few slopes were principally occupied by pine in variety, but the mountains of this region were covered with a growth of deciduous trees—white, black, red, Spanish and chestnut oaks, hickories, butternuts, black walnuts, yellow poplars, locusts, elms, sugar maples, etc. At Piedmont some \$200,000 have been expended in the construction of a boom on the North Branch of the Potomac. At this point, as well as at Swanton and Deer Park, on the Maryland side, there are mills sawing chiefly white oak, and also considerable white pine, spruce, hemlock, poplar, white ash, etc. Some spruce which had not been seen or heard of in the timber belt of Pennsylvania is found 20 miles above Piedmont. The market for lumber manufactured here is chiefly eastward. Much of the oak is sent to Europe, partly in the form of squared timber, partly cut 5 by 12 inches and from 15 to 20 feet long. The mills at Swanton and Deer Park are located on the railroad, and cut timber is hauled to them from the vicinity. The mills at Piedmont are fed by logs driven down the river from the western portion of Mineral and Grant Counties, W. Va. This lumber is chiefly spruce, oak and hemlock. Great difficulty is experienced in driving this part of the Potomac, as it is a swift and rocky stream. Logs, especially oak, constantly lodge on the rocks or bank, and there has been great difficulty in maintaining the boom and dam at this point.

"Rowlesburg, in Preston County, owes its existence as a lumber depot to the fact that the Cheat River, upon which it is situated, as it passes through the Briery Mountains for a distance of 25 miles below this point, has so narrow and rocky a channel and so swift a current that it is not possible to get the logs further down the stream. Above Rowlesburg the stream is good to drive, and any one of its branches can be driven from a point 125 miles above that point. From the mouth of Black Fork, 30 miles above, the timber is brought down in rafts rather than as separate logs. This is because there is no boom as yet at Rowlesburg to stop the logs. There are small booms on Black and Shaver Forks, many miles above Rowlesburg. Scattered along the river above Rowlesburg there are a few small mills, the product of which is floated down the stream on rafts. The timber of

Preston County, between Rowlesburg and the vicinity of the mouth of the river, is oak, poplar, chestnut, ash, beech, birch, hemlock, basswood and hickory.

"The timber of Canaan Valley, in Tucker and Randolph Counties, is largely hemlock on the lower lands; on the higher situations and slopes, sugar maple and beech, and as soon as a suitable elevation is reached, spruce is mingled with black cherry. In other portions of Tucker County and on the tributaries of Cheat River flowing out of Randolph County, the timber is chiefly oak, poplar, ash, spruce, cherry, black walnut, white pine, etc. This, however, is not a black walnut region, and there are here nowhere more than scattered trees; a careful search has failed to find any great body of this timber here. It is estimated that 2,500,000 feet of yellow poplar are still standing in the valleys of the Cheat and its tributaries.

"Shaver Fork is heavily timbered with spruce. A boom has been constructed at Grafton, on Tygart Valley River, a main branch of the Monongahela. It is a rough stream, unfavorable for lumber operations, and for a distance only of 10 miles above Grafton is it smooth enough to admit of the passage of rafts. All lumber has, therefore, to come down in separate logs, and only such kinds as are light enough to float well can be got down. For this reason there is very little except poplar sawed at Grafton. Oak is too heavy to be driven successfully, and as it cannot be tied up in rafts with poplar, as is done on the Cheat, the stores of oak timber growing in the valleys drained by this river must wait for the building of a railroad to bring them to market. The yellow poplar still standing in this region is estimated at 300,000,000 feet, and on the higher grounds, especially about the headwaters of streams, there are fine bodies of black cherry mixed with other trees.

"At Parkersburg are located the mill and shops of the Parkersburg Mill Company, situated on the banks of the Little Kanawha, a short distance above the confluence with the Ohio. This is the only company operating in lumber within the city of Parkersburg. It manufactures about 6,000,000 feet of lumber annually, mostly poplar, some oak, and a quarter of a million feet of beech. Little black can be now obtained here, and that of inferior quality. Rough lumber and manufactured articles of wood find a ready market in every direction West, North and East. I was astonished and delighted to see how closely the lumber was worked up, and the great variety of articles manufactured from slabs, edgings, culls, etc., which are in other mills so generally thrown into the waste pile. Broom handles, corn-popper handles, brush handles, brush heads, tool handles of many descriptions and fly-trap bottoms are but a few of the articles that are turned out by millions from odd bits of wood, few of which are too small to make something or other from. The company executes orders for articles used in manufactories widely distributed over the country from Cincinnati and Chicago to Boston and New York. Poplar is used for broom handles, and beech, maple, sycamore, black walnut, cherry, etc., for the smaller articles. This company does not own and operate timber lands, but buys its logs from parties who deliver rafts at its mills. Formerly much lumber was wasted in this region in clearing farms, but now proprietors of land find it to their advantage to cut and saw their logs, which they bring down in rafts themselves, or sell to parties who make a business of rafting. Once out of the small streams, the logs are easily rafted down the Little Kanawha during favorable seasons. There are no booms on the Little Kanawha, except temporary constructions for special purposes, which are broken up by every flood. Several years ago it was supposed that the timber on this river was nearly exhausted, but it continues to come down in undiminished quantities to the value of some hundred thousand dollars annually, in addition to railroad ties, staves, etc. It is only about 40 miles up the main river and no great distance

back from the stream that the supply of oak is exhausted. The river is 100 miles long, and about its upper waters and those of its tributaries the oak is comparatively untouched.

"Much of Wirt County and the greater part of Roane, Calhoun and Gilmer, in the upper part of the valley of Little Kanawha, is a vast virgin forest of oak and poplar, containing a good deal of black walnut and sugar maple and some black cherry. Braxton County is magnificently timbered, as is Webster, although the timber here is as yet inaccessible.

"The Guyandotte is a good river for lumbering operations. Rafts can come down from a point 100 miles from its mouth. There are yet no booms on this river, except strings of logs occasionally stretched across it for temporary purposes. On its course above Guyandotte Station are four or five mills doing, for the most part, a local business, their product for export being only about 1,000,000 feet of sawed lumber. The rafting of this sawed lumber is attended with some risk of loss, and therefore a greater amount is brought down in unsawed logs bound together in rafts, which are taken down the Ohio and sold to the various mills along its course. These rafts are usually made 11 logs wide, and three or four of these courses are placed end to end. White oak is made up into rafts with a poplar log in the center of each course, and the raft is made light enough to float easily. Along the Guyandotte, in the lower part of its course, oaks and poplars have been cut for a distance of from one to two miles from the stream, the black walnut for some five miles back; but nine-tenths of the area drained by this river is still in original forest, composed of white, chestnut and other oaks, poplar, walnut, several hickories, beech, sugar maples, sycamore, ash, etc. In this region there is, in the aggregate, a good deal of black walnut, but it exists as scattered trees rather than in groves or tracts.

"Coal River is 160 miles long, and for 36 miles, or to Pletona, is navigable for barges. The valley of this river is covered with truly magnificent forests, in which the trees of the several species composing them attain remarkable dimensions. Poplar and white oak here exist in nearly equal proportions, and together constitute about a third of the timber. Besides these, there is a good deal of black cherry, lin and locust, as well as hemlock, the latter not being considered valuable in this country. Black walnut appears more abundant in this region than in any other of similar extent of which I have yet heard. But little timber has yet been removed from the valley of this river, and it is chiefly the lower portion and the immediate vicinity of the banks which have been lumbered.

"The Elk River empties in the Kanawha at Charleston. About two miles above its mouth are located a boom and several saw mills, and here are also a dam and lock which secure slack water for some 20 miles. The river is about 180 miles in length. Logs have been driven from a point 150 miles above its mouth, but its valley has only been lumbered to any great extent in the immediate vicinity of the main river, and to a distance of some 110 miles from its mouth. Most of the original growth of the forest of the Elk basin still remains, and is composed largely of white oak, hickory, chestnut and poplar. Black walnut here, as everywhere else in this State, is scattered, although it is estimated that 10,000,000 feet of lumber still remain in this region. Above a certain altitude and about the upper waters of this river considerable black cherry, sugar maple and birch is found; here also beech and basswood abound; by the streams hemlock occurs, and on the mountains a little black spruce. About the upper settlements on this river miles of fence constructed with boards of black cherry and farms fenced with black walnut rails may be seen. Formerly large numbers of coal boats and salt boats were built up Elk River. Once also the salt works of the Kanawha required vast numbers of barrels, these were made of black as well as white oak.

Now but five of the sixty furnaces once boiling brine in this vicinity are in operation, and there is little demand for black oak for staves. The country along the Kanawha between the Elk and the Gauley Rivers has been lumbered for five or six miles back from the streams, and about one-fourth of the timber has been cut from these valleys.

"The Gauley River, with its several large tributaries, drains a valley which covers nearly 5,000 square miles. Its length is about 110 miles—much less than that of Elk, which is a long slender stream—but it occupies a much broader valley and has twice the volume of water of the Elk. Unlike the rivers just considered, which wear out for themselves smooth channels through the soft sandstone, the Gauley is a rough stream, tumbling rapidly over hard conglomerate, its bed being full of boulders and ledges. For the first 10 miles from its mouth the fall averages four feet to the mile, while its upper waters are so swift and rough as to be unnavigable even for small boats. For these reasons the Gauley does not admit of the passing of rafts, and it is a difficult river upon which even to drive single logs. Its valley is but little settled, except on Meadow River and along its right bank below that stream. Above a point 15 miles from its mouth no timber has been touched except by the few settlers. In the lower part of the valley of the Gauley, for 15 or more miles, the timber is chiefly oak, poplar, walnut, etc. The Gauley and its large affluents, the Cherry, Cranberry and Williams Rivers, all head back in the forests of black spruces, which sometimes take entire possession of the mountain tops. A little lower, yet often mingled with the spruce, cherry trees so predominate over others as to have given their name to the stream. Here are trees often four feet in diameter. The region intermediate between the lower and the upper districts of the Gauley thus described contains much beech, sugar maple and black cherry. The white oak, which abounds in the lower basin of this river, disappears above an altitude of 2,000 feet. I was informed that, although lumbering operations were but lately begun on the Gauley, nearly 1,000,000 feet of poplar were brought out of the river in 1879, and that it had yielded 50,000 feet of black walnut in 1880, while there were now in the river poplar logs enough to make 3,000,000 feet of lumber. About one-fourth of the cut of late years has been sawed at mills near the falls; the rest is rafted to Charleston.

"The valley of the New River is only lumbered for from three to five miles from the stream, although the walnut has been gathered 10 miles farther back. This is a rough country in which to lumber, since the streams cut deep into the earth, and New River cannot be driven.

"Ronceverte is situated on the Greenbrier River at a point where the Chesapeake and Ohio Railway first meets this stream as it descends from the Alleghany Mountains. Here is the St. Lawrence Boom Company, and here are located three or four lumber firms operating steam mills. One of these, the New York Hoop Company, uses 2,000,000 hoop poles per annum, chiefly hickory, manufacturing hoops for flour barrels, pork barrels, hogsheads and tierces, besides hoops for boxes, etc. The process of manufacturing hoops was explained to me as follows: The poles of assorted lengths and sizes are passed through machines which split each of them into two, three or four pieces, and these are put through other machines which plane flat the inner side of each strip, leaving the bark intact. The hoops thus made are tied into bundles and shipped to New York.

"The Greenbrier River rises in the limestone sinks of Pocahontas County, whence it flows southwesterly through the fertile limestone valley between the Alleghany and the Greenbrier Mountains for a distance of 120 miles, emptying into the New River at Hinton. Flowing through such a valley it is not a rapid stream, but from a point 12 miles below Travelers' Rest, on its headwaters, it is

fine for rafting. Yet the stream needs some improvement, especially by the closing up of back channels into which the logs are borne by high water, to be left in swamps when the flood recedes.

"Only a small proportion of the timber of the Greenbrier River has been removed as yet, and it has been estimated that in its valley white oak, white pine, poplar, cherry, hemlock, walnut and ash enough remain to make 1,000,000,000 feet of boards, and that there are not less than 500,000,000 feet of white pine in this region, occupying a belt through the center of both Greenbrier and Pocahontas Counties. The eastern limit of the black spruce belt, on the headwaters of Elk and Gauley Rivers, the most extensive and valuable in West Virginia, coincides with the western limits of the white pine belt lying in Pocahontas County. From this point its western line runs through the center of Webster County to the vicinity of Huttonville, in Randolph County, the northern end of the belt covering the upper waters of Shaver Fork of the Cheat River. Over this belt black spruce is scattered more or less densely, sometimes occupying almost exclusively the high slopes, particularly the northern slopes and the summits of the mountains.

"It is believed that over 10,000,000 feet of black walnut in paying quantities could still be gathered in this part of the State, and that there would then be left an equal amount so scattered that it could be profitably collected at present prices."

#### MANUFACTURES.

The natural resources and advantages for manufacturing possessed by West Virginia can hardly be surpassed by any State in the Union. The mineral and timber wealth of the State is enormous—coal, iron ore and the most valuable kinds of timber being found in almost inexhaustible abundance. These vast resources are attracting increased attention from year to year, and the industrial progress of the State is very rapid, notwithstanding the fact that transportation facilities are still too limited, although there is a steady improvement going on in this direction through the building of new railroads. West Virginia seems destined to be the center of enormous manufacturing and mining interests within the next few years, so boundless are her mineral and timber interests, and Pennsylvania itself will hardly be more widely known for its industrial interests than West Virginia.

In 1880, according to the census reports, there were 2,375 manufacturing establishments in this State, having an aggregate capital of \$13,883,390, which turned out in that year \$22,867,127 of manufactured products. The three leading industries in the State were iron and steel manufacture, flour and grist mills and lumber mills. These figures, however, give but little idea of the present position of manufactures, for during the last five years since the census figures were gathered there has been a wonderful development of the State's industrial interests. In the manufacture of nails West Virginia ranks as one of the leading States in the Union, Wheeling being the center of a great nail-making district. The substitution of steel for iron nails, now going on in all parts of the country, has necessitated the changing of a number of the Wheeling mills into steel nail mills, and the erection of very expensive steel-making plants. The Wheeling nail makers have been among the leaders in this great change, and have made heavy outlays for the new plants needed. West Virginia probably turns a greater proportion of the pig iron made within her borders into manufactured products than any of the States south of her. As already stated, the timber wealth of the State is enormous, and while lumbering operations are being carried on quite extensively, yet the vast forests of hard woods have been but very slightly depleted, and in many parts of the State they are still untouched. In the aggregate value

of manufactured products, however, the lumber mills probably rank second, being exceeded only by the iron and steel interests.

When the great natural resources of the State are considered, West Virginia is, comparatively speaking, very backward in manufacturing interests; but it should be remembered that the population of the State is not large, and that many of the inhabitants live in sections purely agricultural and not yet penetrated by railroads. In this view, West Virginia has really already accomplished wonders in the manufacturing line, and her future progress will assuredly be very rapid.

#### MINERAL WATERS.

As a scientist might infer from the general geological character of West Virginia, and especially from the chemical character of her abounding minerals, numerous medicinal waters are found to exist in the State, some of which have been well and fully tested for many years, and are equal or superior to any other waters of their class found in any portion of the world.

West Virginia comprises within her southern and southeastern border a large portion of the celebrated mineral spring plaza long known as the "Spring Region of Virginia," and which for the last 80 or 90 years has been greatly resorted to by the seekers of health and pleasure of every great section of the United States. The widely known White Sulphur Springs are located in Greenbrier County, in this State.

#### EDUCATIONAL.

The State has an efficient system of free schools, the teachers of which are trained by State Normal Schools. Numerous private schools of a high order are located at different points throughout the State.



# NORTH CAROLINA.

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The State of North Carolina has a population, according to the estimate of the Department of Agriculture in 1883, of 1,500,000. Classified by the census according to sex, there were in 1880, 687,908 males and 711,842 females; by race, 867,242 whites, 531,267 colored people, 1,230 Indians, and one Japanese. The aggregate population consisted of 270,994 families, living in 264,305 dwellings. The number of persons to a square mile was 28.81, the number of families 5.58, dwellings 5.44; the number of acres of land to a person 22.21, to a family 114.73; the number of persons to a dwelling 5.30, to a family 5.17. Distributed according to topography, 421,157 of the population live on the South Atlantic coast, 743,739 on the interior plateaus and table-lands, and 233,654 in the mountain districts. According to the same distribution, 203,711 colored people live on the South Atlantic coast, 300,236 on the interior table-lands, and 27,270 in the mountain districts. The area of the State is 48,580 square miles. There are 94 counties in the State. The county of least area is New Hanover, with 80 square miles and 21,376 population. There are two counties that are equal in the number of square miles—Wake and Robeson—the largest areas in the State. The population of the former is 47,939; of the latter, 23,880. The capital of the State—Raleigh—is situated in Wake. Towns of population of 4,000 and upward are: Charlotte, 7,094; New Berne, 6,443; Raleigh, 9,265; Wilmington, 17,350—the latter a seaport of considerable consequence.

The State of North Carolina is bounded on the north by Virginia, east by the Atlantic Ocean, south by South Carolina, and west by Tennessee. It is included nearly between the parallels  $34^{\circ}$  and  $36\frac{1}{2}^{\circ}$  north latitude, and between the meridians  $75\frac{1}{2}^{\circ}$  and  $84\frac{1}{2}^{\circ}$  west longitude. The extreme length of the State from east to west is  $503\frac{1}{4}$  miles. Its average breadth is 100 miles; its extreme breadth is  $187\frac{1}{2}$  miles. Its topography may be best conceived by picturing to the mind's eye the surface of the State as a vast declivity, sloping down from the summits of the Smoky Mountains—an altitude of 7,000 feet—to the level of the Atlantic Ocean. The Smoky Mountains constitute a part of the great Apalachian chain, which here attains its greatest height—the greatest, indeed, in the United States east of the Rocky Mountains. This slope is made up of three wide, extended terraces, if that term may be allowed. The first, a high mountain plateau, distinguished as the Western or Mountain Section; the second, a sub-montane plateau, distinguished as the Middle Section, of which the western half is further distinguished as the Piedmont Section; the third, the Atlantic plain, distinguished as the Low Country or Eastern Section, and that part from the head of the tides downward as the Tidewater Section. From the first to the second section there is a sharp descent through a few miles only of not less than 1,500 feet; from the Middle to the Low Country, a descent of about 200 feet; through the two latter, however, there is a constant downward grade.

The State is traversed by two ranges of mountains. The first, the Blue Ridge, a grand and lofty chain, which, conforming to the trend of the Smoky

Mountains and that of the coast line, runs in a direction N. E. and S. W. entirely across the State. The Brushy and the South Mountains are bold offshoots of this chain. The second, the Oconeeche and Uwharrie Mountains, a range of much inferior elevation, whose rounded summits and sloping outlines present themselves in forms alike graceful and pleasing, crosses the State in a parallel direction near its centre.

The State is watered by numerous rivers, many of which have their rise on the flanks of the Blue Ridge. Those which flow west empty into the Mississippi, breaking their way through the Smoky Mountains, plunging headlong for miles through chasms from 3,000 to 4,000 feet in depth, the walls of which are perpendicular to the height of 1,000 feet. Of those which rise on the eastern flank, only one—the Roanoke—reaches the sea within the borders of the State. The rest, following the line of the softest rock, meander first towards the northeast, then sweeping round with bold curves, flow to the sea through South Carolina. The principal rivers which reach the sea within the State limits take their rise in the northern part of the Middle Section, and on the eastern flank of the Oconeeche range, near its northern termination; and of these, only one—the Cape Fear—flows directly into the ocean. Many of the rivers in every part of the State are noble streams in their middle course. Some of those that flow into the sounds swell to majestic proportions, spreading out to a width of from three to five miles. The eastern rivers are navigable from 50 to 150 miles.

By reference to the mean parallels of latitude of the United States, it will be seen that North Carolina is situated nearly midway of the Union; and inasmuch as those States lie entirely within the temperate zone, it follows that North Carolina is situated upon the central belt of that zone. This position gives to the State a climate not excelled by any in the world. The average rainfall throughout the State is 53 inches, which is pretty uniformly distributed through the year.

Dr. Kerr, in his geological report, classes the climate of the different sections of North Carolina with reference to their isothermal ranges, as follows: "Middle and Eastern North Carolina correspond to Middle and Southern France, and Western North Carolina to Northern France and Belgium; and all the climates of Italy, from Palermo to Milan and Venice, are represented."

For a thorough understanding, it will be necessary to take a survey of the different sections more in detail. It has been seen that the divisions of the State are founded on natural and physical peculiarities.

#### EASTERN SECTION.

The whole eastern portion of the State belongs to the quarternary system, with frequent exposure along the rivers, ravines and ditches of the eocene and miocene epochs of the tertiary. It consists of a vast plain stretching from the sea coast into the interior of the country—a distance of from 100 to 125 miles. Traversing this section from north to south are tracts of country which vary little from a perfect level. The Wilmington and Weldon Railroad has a stretch of 40 miles where there is neither curve, excavation nor embankment. From east to west the surface rises by easy gradations at the rate of a little more than a foot to the mile. The rise, however, is not perceptible to the traveler. But, though level in parts, it is, in general, relieved by slight undulations. In its extreme western part—in the county of Moore—it attains an elevation of above 500 feet.

The western boundary may be roughly defined by a line extending from the western part of Warren through Franklin, Wake, Cumberland, Chatham, Moore, Montgomery and Anson. This line marks what, at an early period of the earth's history, was a line of sea beach. Over this whole section the primitive rocks are covered with a deep stratum of earth, principally sand. Along the western border

there is a broad belt of unequal width, but generally from 30 to 40 miles across, where granite, slate and other rocks are sparingly distributed; they are also found near watercourses in the exterior of this section.

The upland soil is, for the most part, a sandy loam, easily accessible to the sun's rays, easily worked, and very productive in the crops there cultivated. There are, however, extensive areas of country where sand predominates to such a degree that the surface, to a considerable depth, is a bed of white sand; yet this kind of land is the favorite habitat of the long-leaf pine. When cleared it yields good crops of corn and cotton for a few years without manure, and always with slight help from proper commercial fertilizers. There are other extensive areas where clay enters so largely into the soil as to form a clay loam. The counties on the north side of Albemarle Sound—a very fertile tract of country—are examples of this class. The alluvial lands of this section—lands always in the highest degree productive, from the fact that all the elements of fertility are intimately intermingled by having been once suspended in water—are of unusual extent and importance. The grain grown there supplies food not only for people of other parts of the State, but large populations in other States.

Another class of land remains to be mentioned which will be a resource of inestimable value in time, perhaps not distant. Bordering on the sea and sounds are extensive tracts of country designated as swamps. Though so called, they differ widely in their characteristic features from an ordinary swamp. They are not alluvial tracts; neither are they subject to overflow. The land covered by many of them lies, for the greater part, quite low. But this remark seldom applies wholly to any of them; to some it does not apply at all. On the contrary, many of them occupy the divides or water-sheds between the rivers and sounds, and are elevated many feet above the adjacent rivers, of which they are the sources. These latter are susceptible of drainage, and, when reclaimed, have every element of the most exuberant and lasting fertility.

Throughout this entire section, cotton, corn, oats, sorghum, peas, potatoes, (especially sweet potatoes,) are the staple crops. Upon the rich alluvions and the reclaimed lake and swamp lands, corn, with peas planted in the intervals between the corn, forms the exclusive crop. Occasionally, on the broad low-grounds of the Roanoke, wheat is grown to a considerable extent. In the counties on the north of Albemarle Sound it is one of the staple crops. On the low-grounds of the lower Cape Fear rice has long been the staple crop, and during recent years its culture has been extended northward along the low-lying lands of the rivers and sounds. The upland variety of rice has been introduced within a few years past with entire success. The cultivation of jute also has been the subject of experiment with like success, and it only needs proper encouragement to be grown to any extent. This section is everywhere underlaid with marl—a mixture of carbonate of lime and clay, formed by the decomposition of the imbedded shells—sufficient in quantity, when raised and applied to the surface, to bring it to a high pitch of fertility and maintain it so. Its metallic substances will be elsewhere noticed.

If the indications of nature are to be relied on, North Carolina was plainly marked out as the land for vineyards. Some of the finest wine grapes of the United States—the Scuppernong, the Isabella, the Catawba and the Lincoln—are native to this State.

All the cultivated fruits and berries grow here in great perfection, with the exception of the apple. This, though by no means an inferior fruit, is yet not equal in size and flavor to that of the Middle and Western Sections. Among the swamps the cranberry is found in profusion. The melons are of every variety and of peculiar excellence.

An industry peculiar to this section is what is known as the "trucking business." It consists in rearing fruits and vegetables for the Northern markets. The principal centres are Goldsboro and Newbern; but it is probable that the farmers along the line of the Norfolk and Edenton Railroad will become successful competitors for this business. All the conditions for success are found there—a fertile soil and quick transportation.

Each section of the State embraces a great number of trees largely used in building and the domestic arts not mentioned here. In speaking of the timber trees of this section, the first place is due to the long-leaf pine. It is the most valuable of all trees. The cypress is next in importance. It is found everywhere in the swamps of the eastern part of this section. The margins of the swamps only have been cleared. Beyond this margin is an immense forest of these trees which has been scarcely encroached upon. Its height is from 60 to 100 feet, with a circumference above its swollen base of from 20 to 30 feet—often much larger. The white cedar, commonly called juniper, is also abundant in the swamps. The live oak, so highly prized for ship-building, is found all along the coast, though most abundant from Hatteras southward. It is commonly 40 to 50 feet high and one to two feet through the trunk.

The mainland terminates not at the sea, but at large bodies of water termed sounds. These sounds are properly narrow seas. They are separated from the ocean by a barrier of sand called "The Banks," which stretches along the whole coast, except at Beaufort and at the mouth of the Cape Fear. Between these sounds and the ocean are a few narrow passes termed inlets. The largest of these sounds are Pamlico and Albemarle—the former about 75 miles long and 15 to 25 miles wide; the latter in length about 50, and in breadth from five to fifteen miles. These sounds abound in fish of the finest varieties; but the principal fishing stations are in Albemarle Sound. An immense business in catching fish—herrings, shad, etc.—is done; and salting them is also a large business. The sounds are the resort also of vast quantities of water-fowl, notably ducks and geese; but it is in Currituck Sound that they are found in greatest quantity. A number of small islands dot the shallow waters of the eastern side of this sound, where the wild celery and many kinds of grasses flourish in profusion. These are the favorite haunts of the mallard, red-head and canvas-back ducks. They frequent these islands and shallow waters in incredible numbers. This region is the paradise of the amateur sportsman, and clubs of Northern gentlemen have lodges here, to which they regularly repair at the proper season for hunting.

A canal connects the waters of Albemarle Sound with Chesapeake Bay, and steamers ply to every point from Newbern to Norfolk. This region of country, though once locked up, is now fully laid open to commerce. Few, indeed, possess such ample facilities for transportation. In addition to this line of steamers, there is another by the Chowan and Blackwater Rivers, connecting with the Seaboard and Norfolk Railroad. Lastly, a line of railway has recently been constructed from Edenton to Norfolk.

"The Banks" girdle the whole coast of the State—a distance of over 300 miles. Though they shoot out from the northern extremity as a long narrow peninsula, they are broken in their course into a number of islands. They vary in breadth from one hundred yards to two miles, and in height from a few feet above the tide-level to 25 or 30 feet. Consisting as they do of pure sand, there is little cultivation of any sort. The subsistence of the inhabitants is generally derived from fishing, in which they are bold and expert. The possessions of these islanders consist mainly of flocks and herds.

## MIDDLE AND PIEDMONT SECTION.

The Middle Section extends from the western boundary of the tertiary formation or Eastern Section to the Blue Ridge Mountains, the western half of which, as already said, is distinguished as the Piedmont Section. It comprises nearly one-half of the territory of the State.

In passing from the Eastern to the Middle Section there is a marked change in the general aspect of the country in its natural and cultivated productions and in other respects. The great Atlantic plain is left behind, which, on account of the uniformity of its surface, partakes of monotony, even where most fertile. Here, on the contrary, is an endless succession of hills and dales. Every step brings to view some new charm in the landscape—some new arrangement of the rounded hills, some new grouping of the tracts of forest which still cover so large a part of the country. The hills, indeed, in their gracefully curving outlines, present lines of beauty with which the eye of taste is never satiated. These are attractions which depend upon permanent features of the landscape, and which, though infinitely heightened in their effects by the verdure of spring and summer, are only brought into fuller relief by the nakedness of winter. The variations of surface, though less defined at first, become more marked towards the west, and towards the Blue Ridge the country assumes a bold and even rugged aspect. The long-leaf pine, so conspicuous in the Eastern Section, disappears, and is replaced by all that range of forest growth for which the State is so noted—a range in which there is scarce a tree that belongs to the temperate zone proper that is not only found, but found in abundance. If the two sections are viewed at the season when the crops are growing, the contrast is striking. Along with the long-leaf pine, the cotton crop, except on the eastern and southern borders, has nearly disappeared also. Wheat, corn, sorghum, oats, buckwheat, barley and tobacco occupy the cultivated fields. In the Eastern Section, hay and pasture crops have not been enough cultivated to impart any distinguishing aspect to the country. In the Middle Section, clover and other grasses clothe the hills more or less; the larger bottoms are laid down in meadows; and commonly, the narrow flats between the hills, made by the little branches or rivulets, are sown in grass, and present belts of richest verdure. The change is seen in the streams. Those of the lowlands are dyed to a sable hue by the decaying vegetation with which the soil there is charged; those of this section are as clear and pure as they flowed from their fountains, mirroring in their pools and longer reaches every object on their banks. A difference in the summer and autumn is felt in the air of the two sections. That of the lowlands, though kindly and not unhealthy, disposes somewhat to lassitude and inaction; that of this section is invigorating and wholesome, (being kept in perpetual motion at that season by gentle gales,) and favors active exertion.

The hand of improvement is more visible in this than in any section of the State. In this section nature has distributed her blessings with a bounteous hand. Its salubrity, the variety and value of its productions, its mineral wealth, its manufacturing facilities, mark it out as one of the most desirable abodes for man and a future centre of great wealth and population. Nowhere do the conditions which are friendly to health, to the finest physical development, to the successful exertion of industries of every kind, and to rational enjoyment, exist in greater abundance than here. Those bounties are visible only in part. The earth is stored with coal, iron, gold and other metals, ores and minerals. Explorations have demonstrated that these exist in such quantity that localities in this section will become the seats of mining and manufacturing industries on a large scale when population and capital shall favor their full development.

The descent of the slope formed by the surface of the State is greatest in this section—through its entire extent, from 1,000 to 1,200 feet. The rivers, in their eastward flow down this descent, make their way with a lively current, varied with long reaches of comparatively tranquil water. Oftentimes they force their way through large barriers of primitive rock, and there occur rapids and falls which afford the finest water-powers. These have been utilized to some extent by the erection of grist and flouring mills in every neighborhood, and cotton mills on some of the rivers. Within the last few years the number of cotton mills has largely increased. Woolen mills have also been established in this section, and, though this branch of manufacture is yet in its infancy, the success which has attended the experiments that have been made cannot fail to invite investments in this direction. Sheep husbandry cannot be said to have made even a beginning in this State. Sheep are a part of the domestic animals on every farm, but are reared for domestic supplies of meat and wool. The surplus only is sold. Yet the supply of wool would suffice for scores of such factories as are here. No pursuit would pay better than sheep husbandry in this State. The natural pasturage of the Mountain Section cannot be surpassed, particularly in the northwestern part of the State. Some of the most valued cultivated grasses are indigenous there, and all flourish with the greatest luxuriance.

The wild range of the forest trees of North Carolina long since attracted the attention of botanists. It includes all those employed in the useful and many of those employed in the ornamental arts. Indeed, nearly all the species found in the United States east of the Rocky Mountains are found in North Carolina. Her wealth in this respect will be appreciated when the fact mentioned by that eminent botanist, Dr. Curtis, is brought to mind, that there are more species of oaks in North Carolina than in all the States north of it, and only one less than in all the Southern States east of the Mississippi. Of these the white oak is the most prominent as being in most general use and most extensively serviceable. It is found from the coast to the mountains, but it is most abundant in the Middle Section. It rises to the height of 70 or 80 feet, with a diameter of two or three feet. The white hickory, too, is found in the forests from the coast to the mountains; but that of the Middle Section, for weight, tenacity, strength, and for its capacity for receiving a high polish, is pronounced by experts to be superior to any in the world. There are large establishments here for the manufacture of spokes, rims and handles, which are sent everywhere. The mature tree is about 60 feet high and 18 or 20 inches in diameter. The white ash is found in both the Mountain and Middle Sections, but is manufactured for exportation chiefly in the latter. It is 50 to 70 feet high and two to three feet through. The elm is found in each section, though most abundant in the Middle. It is from 30 to 50 feet high and 12 to 18 inches through. The maple is found throughout the State, but from its superior facilities for transportation, the timber is chiefly obtained in this section. The wood in old trunks is full of minute irregularities like knots. These, if cut in one direction, exhibit a spotted surface, to which the name of bird's-eye maple is given; while if cut in another direction, they produce a wavy or shaded surface, called curly maple. The tree attains a height of 50 to 80 feet and a diameter of two to three feet. The beech is common here and grows luxuriantly, but is most abundant in the Mountain Section. The tulip tree or poplar is native to all parts of the State, but is not so common in the lower section as the others. The persimmon is found in all parts of the State, but it is here only that it is obtained to any considerable extent. The black walnut is most abundant in this section. The yellow pine is sparingly found in the Eastern Section, but enters largely into the composition of the upland forest through the Middle and

**Mountain Sections.** Its uses are so familiar and universal as to need no enumeration. It is from 40 to 60 feet high, with a circumference of four or five, and even six feet. The mulberry tree, though not valued for its timber, is so important in another respect as to deserve mention. It grows in all parts of the State, but is least abundant in the lower section. In the Middle Section it occurs so commonly that nature may be said to have laid the broadest foundation for the cultivation of silk there. This does not exhaust the list, but it will serve to give a clearer idea of the timber resources of this section. But though the materials for this branch of manufacturing abound here, a beginning only has been made. There are establishments for making wagons and pleasure vehicles, excellent both for material and workmanship, but great numbers of these are still brought in from other States. One branch of wood manufacture is prosecuted here with spirit and success—that of spokes and rims for carriages, and bobbins and similar implements used with the machinery of cotton and woolen mills. These are sent off in great quantities to distant parts of the United States, and to Europe and Australia.

The branch of manufacture which has been most fully developed here is that of tobacco. The kind of tobacco chiefly used in these factories is known as the golden leaf. Villages and towns have grown up at short intervals within a few years on the principal lines of railroad, where the large warehouses and factories, the handsome churches, school-houses, residences and stores, give evidence of high prosperity. In some of these towns almost the whole business consists in prizing and manufacturing this commodity into different forms for the markets of the world. Of the productions of the State, none are manufactured at home to the same extent as tobacco.

The cultivation of fruits of all kinds has been long pursued in this section with skill, energy and judgment. Its wonderful adaptation for fruits was early discovered, and many nurseries were established for rearing the young trees. Here the native fruits were perfected, choice foreign kinds introduced, and new kinds originated. The enterprise of the nurserymen has planted the finest fruit trees—as the apple, the peach, the pear, the apricot and the cherry—about every dwelling in this section, and widely beyond it. Nor have the garden fruits—as the fig, the currant, the raspberry and the like—received less attention. The supply of every kind for home consumption is unlimited—that of peaches and apples such that large quantities are fed to hogs. Here, too, as in the Eastern Section, the grape is an object of special culture. They are grown for the table at home and for the market. There are in this section several vineyards, some of which have an established reputation for their wines and brandies. Grapes are, however, grown mainly for the market. The genial soil and climate of this State enables the growers to put this and other fruits in the Northern markets some weeks in advance of the same fruits grown there, and at a season when the appetite for fresh fruit has been whetted by abstinence, and when they bring the highest price. When dried, also, they are a staple article of export. Wild berries, whose bushes spring spontaneously and cover every cleared spot not in cultivation, have given rise to an important industry here. The business of gathering and drying blackberries gives employment to many persons, especially children, whose services would not be available on the farm. They are shipped in quantities inconceivable by those unacquainted with this branch of trade. The demand for them is large and increasing, and the incomes derived from this source are in the aggregate very considerable.

The different areas over which the cultivated crops of this section grow are well defined. Tobacco is the staple crop in the northern counties, though the cereals enter into the rotation; in the central counties the cereals are the principal

crops; in the southern counties cotton is the staple crop; but in all of them the cereals are also cultivated. There are many watering-places in this section which have long been favorite resorts for health and recreation.

#### WESTERN SECTION.

The Western Section is commonly called the Mountain Section—a name which, on account of its prominent physical features, is strictly applicable. It lies enclosed between the Smoky range on the west and the Blue Ridge on the east; on the north and south it extends to the Virginia and South Carolina lines. In form it resembles an ellipse. Its width is from 25 to 50 miles; its length is about 150 miles. It consists of a lofty plateau, the general level of which is from 2,000 to 2,700 feet above the level of the sea. This plateau forms a base, upon which is clustered together a great number of the loftiest mountains to be found in the United States east of the Rocky Mountains. The mountains which reach a height of 6,000 feet can be counted by scores; the number of those of an elevation but little inferior is almost countless. On the eastern side of the plateau the mountains are massed together without any of that orderly arrangement common to most mountain systems. They are scattered, indeed, in wild disorder. On the western side a definite arrangement may be observed. The Watauga, the Nolchucky, the French Broad, the Big Pigeon and the Hiwassee flow nearly at right angles to and through the Smoky range. Between each of these rivers runs a chain of mountains parallel to them, and forming the divide between them. The mountains are clothed, with few exceptions, with trees to their tops. The exceptions mark a singular caprice of nature. Through these chains of mountains are found many upon whose broad summits not a tree is to be seen, and hence designated as "Balds." They are covered to the height of a horse's knee with grasses that afford the finest pasturage. This section is a land where all the elements of beauty and grandeur are everywhere combined in a way to astonish and delight the beholder.

The forests of this section include most of the trees of the Middle Section and many that belong to high Alpine latitudes—the same timber trees and some that are peculiar to this section. The wild cherry is found in each section, but here only does it acquire its full dimensions or occur in quantity. On the rich and cool declivities of the mountains it attains a height of from 60 to 80 feet and a diameter of two to three feet. The white pine is found in this section of the State, and in this only. It forms peculiar and handsome forests in the rich elevated valleys of Ashe and Yancey. It is from 60 to 70 feet high, with a proportional diameter. The cucumber tree in this State grows only on the mountains, particularly of Ashe, Yancey and Burke, in moist, fertile soils of declivities and on the banks of torrents. It is from 60 to 80 feet high and from four to five feet in diameter. The hemlock is also confined to this section. It grows on the borders of torrents and cold swamps, but extends down to the very base of the mountains. The black birch or mountain mahogany is found in this State only in the Mountain Section. It affords a firm, compact, dark-colored wood, much valued for furniture, and is sometimes used for screws and implements requiring strength. The white walnut is found upon bottom land and river banks in the valleys of the mountains. It attains a height of 50 feet, with a diameter of three feet or more. The chestnut, though found sparingly in the Middle Section, is confined chiefly to the mountains from Ashe to Cherokee. Its usual height is from 50 to 70 feet, and stocks are sometimes met with which, at six feet from the ground, measure 15 or 16 feet in circumference. The beech, though found in the Middle Section, occurs here in greatest abundance, and here



only attains its proper size. It rises from 50 to 80, and even 100 feet, with a diameter of two and three feet. The locust extends along the mountains from the northern to the southern boundary of the State. It is largely used by turners instead of box. The linn or lime tree is common in this section. It seldom exceeds 40 feet in height, with a diameter of 12 or 18 inches. In respect to those timber trees found here in common with the other sections, the mountain section has the advantage of possessing an unbroken forest. In comparison with the extent of forest lands, the clearings here are mere patches. There is little hazard in saying that there is nowhere in any of the States an equal area of land covered with timber trees of such various kinds and of such value. The walnut, tulip trees (poplars) and oaks attain a size that would hardly be credited by one who had not seen them. The preservation of this magnificent forest is due to the fact that it has hitherto been inaccessible to transportation. Within the past two years much of it has been brought into connection with the markets of the world. One railroad line passes entirely through this section, and another, branching off at Asheville, and leading to the extreme southwest of the State, is under construction. Into the northwestern part of the State also a railroad has been completed and others projected, of which two are partially graded.

The cultivated productions of this section are the same with those of the Middle Section, cotton and rice excepted. Its garden vegetables are the same; but the cabbage and the Irish potato grow here to a degree of perfection that cannot be excelled anywhere. Among the fruits, its apples are noted for size and flavor. Peaches and grapes grow well generally, but for their highest perfection nature has made provisions by a suspension to some extent of her ordinary laws. Throughout the mountains in certain localities and at certain elevations there are horizontal belts where frost is never known. Such localities are found not only in this section, but in the South Mountains and in the Brushy range. They constitute an unfailing source of supply of these fruits, and in process of time will be occupied by establishments for canning fruits for the markets of the world.

The climate of this section differs less from that of the Middle Section than would be inferred from its higher altitude. The difference is more perceptible in summer than in winter. In the former season, its cool and bracing air, together with its varied scenery, its mineral waters—sulphur, chalybeate and thermal—made this section one of the favorite resorts of the people of the South and Southwest when it could only be reached by private conveyances. Since it has been penetrated by railroads, the influx of health and pleasure seekers has increased an hundred fold, and in the future will add very largely to its resources. It is the resort, too, of people from the far North in winter. It is protected by the range of mountains which form its boundaries from all the cold winds—the northeast, north, and the northwest. The degree of cold is therefore temperate. A pinching season may come at long intervals; it is, however, of short duration, being quickly succeeded by weather of a moderate temperature. Such seasons are not unwelcome by way of contrast. The quantity of snow that falls here very little exceeds that of the Middle Section. Even in the high mountain ranges, cattle are excluded from pasturage by the snow only once in about seven years.

The soils of the basins of the great rivers of this section and its mountain valleys are noted for their fertility. The capacity for the production of cereals and hay grasses is equal to those of any lands. As might be inferred from the heavy forest growth with which the entire surface is covered, the mountain sides are susceptible of profitable cultivation up to their summits.

The mineral wealth of this section is varied and abundant. Marbles of the finest quality and of various colors compose whole mountains, so to speak, in

Macon and Cherokee. Corundum abounds in Macon, Clay, and many other counties. Mica is abundant in Mitchell and Yancey, and those counties yield a large part of the world's supply. The largest and finest sheets of it seen at the World's Fair at Vienna were from Yancey. This section is rich in iron ores of the best grade. Copper also is prominent among the metals of this region. The most noted mine is in Ashe. It has been extensively developed, and the business in all its branches is conducted with intelligence, skill and energy. The effect of these mining enterprises upon the prosperity of this section has been marked. Labor has found profitable employment, a home market has been furnished to the farmer, and there has been a general appreciation of property of every kind.

Railroads are now entering the northwestern part of the State in several directions. The completion and connection of these, and the opening up of this region, so rich in elements of undeveloped wealth, is now regarded as the first and most imperative duty of the statesmen of North Carolina.

The soils of the Middle and Mountain Sections may be treated of in one view, since they owe their origin to the same cause. The rocks of this part of the State were brought into the position they now occupy at an early period of the earth's history. The soils that have been formed upon them have resulted from their disintegration and decay. No stratum of foreign matter has been brought in from abroad in either of these sections, that which has been caused by rain-water rushing down the sides of hills and flowing along the beds of streams alone excepted. The rocks are chiefly of the primitive formation—granites, schists, slates, &c. The soils vary in chemical composition and fertility according to the character of the rocks from which they are derived. The rocks range with the seashore and the mountain chains, and run uniformly in a direction from northeast to southwest. A brief notice of the principal formations of rocks is here subjoined, and the characters of the soils of each discriminated in a general way.

West of the Eastern Section, (in our early geological reports termed tertiary, and by the later distinguished as the quaternary,) there occurs, in the counties of Northampton, Halifax, Johnston, Nash, Franklin, Warren, Granville, Wake and Cumberland, a body of ancient primitive rock largely covered by sand. Amongst these, granite prevails more extensively than any other, and when the tertiary sand is absent, there is a fertile soil.

The next formation of rocks going west is the sandstones. It commences in Granville, three or four miles southwest from Oxford, and passes through Orange and Wake, Chatham and Moore, Montgomery, Richmond and Anson, but through a part of Moore, Montgomery and Richmond it is covered by tertiary sand and clays. The principal constituent of this formation is a fine-grained greenish or reddish sandstone, whose particles are connected together by a mixture of clay and oxide of iron. This produces by its decomposition a soil favorable to the growth of corn, cotton, oats, and especially sweet potatoes, but is not so well adapted to that of wheat.

The next formation is that of the transition and slate rocks. These occupy a large space in North Carolina. The principal body of these rocks traverses the State in a northeasterly and southwesterly direction, immediately west of the great sandstone formation, occupying a breadth of about 30 miles. This formation includes the western part of Granville, the eastern part of Person, the central part of Orange, more than half of Chatham, nearly the whole of Randolph, the whole of Montgomery, (what is called sandstone excepted,) the whole of Stanly, the southern corner of Davidson and Rowan, the northwestern part of Anson and southwestern part of Mecklenburg. The most common and abundant constituent of this formation is a compound of silica and alumina—a simple argelite

or clay slate. This prevails especially near its two extremities—in Granville and Person on its northern, and in Anson, Mecklenburg and Stanly on its southern extremity. The slate undergoes decomposition slowly, and has not to this day covered itself with any great depth of earth. The soil is never of a very high degree of fertility, but with good cultivation excellent crops are obtained. The adaptability of these lands to the growth of fine yellow tobacco has very much enhanced their value. Throughout this body of slate, nowhere very thick, the granite occasionally penetrates and rises to the surface in tracts larger or smaller. In the southern part of Person, in Orange, Chatham, Randolph and Davidson, there are large patches of granite, and there results a much higher degree of fertility in the soil.

West of the slate formation a vast body of granite rock traverses the State, including in its area a large part of the counties of Person, Caswell, Orange, Guilford, Randolph, Davidson, Rowan, Cabarrus, Mecklenburg, Lincoln, Iredell, Davie, Stokes and Rockingham. Throughout this region, mica, one of the usual constituents of granite, is rare, and is replaced by chlorite or hornblende. The whole mass of rock, with a structure more or less granitic, has an earthy aspect, indicating a recent origin. In consequence, it decomposes readily and into a fertile soil. Two of the three constituents of the granite—mica and felspar—furnish, by its disintegration, valuable ingredients to the soil. Both contain a considerable percentage of potash, though, from the refractory nature of the mica, the potash, that element so essential to tobacco and the smaller cereals, is chiefly derived from the felspar. When chlorite replaces the mica, it adds, upon the decomposition of the granite, another element—magnesia, its chief ingredient—an element indispensable to the healthy growth of the corn plant, (maize.) When mica is replaced by hornblende, the latter supplies from its ingredients both magnesia and lime, and the presence of lime is a fundamental condition of fertility in all soils; and it is observable that, of the region occupied by this formation, which is the great grain-growing region of the State, the tracts where hornblende predominates in their composition—as in Cabarrus and Mecklenburg—are superior to the rest.

West of this formation are the most ancient primitive rocks. Here every form of granite is met with. The tertiary compound of quartz, felspar and mica is most common, but with endless diversities, depending upon the proportion, color, size of the grains and other character of the constituent minerals. There occur here also indefinite alternations of gneiss, hornblende and micaceous schists, and occasionally chloritic and talcose slates. There is a great variety of soil, subordinate, however, to that general uniformity which characterizes the same formation, for most of the above rocks are essentially granitic.

There is another body of transition slate in the western and northwestern part of the State, adjacent to Tennessee. It ranges along the western half of the border counties; but through Yancey and Mitchell shoots off a long projection, extending quite across the Blue Ridge to the Catawba, in Burke.

#### COAL.

The coal fields of North Carolina are referred by Dr. Emmons and Prof. Kerr to the triassic system. There are, says the latter, in this State two narrow fringes of an eroded and obliterated anticlinal which belong to this system—the smaller, or Dan River Belt, from two to four miles wide, following the trough-like valley of that stream (about N. 65° E.) for more than 30 miles, to the Virginia line; the other—the Deep River Belt—extending in a similar trough five to fifteen miles wide, (and depressed 100 to 200 feet below the general level of the country,) from the southern boundary of the State, in Anson County, in a N. E. direction, to the middle of Granville County, within 15 miles of the Virginia line.

The most important and conspicuous member of the series is a large body of black shales, which encloses seams of bituminous coal two to six feet. This coal lies near the base of the system in both belts, and is underlaid on Dan River by shales and on Deep River by sandstones and conglomerates—the latter constituting the lowest member of the series, and being in places very coarse. The black shales near the base of the system contain beds of fire clay and black band iron ore interstratified with the coal.

Emmons reports five seams of coal, separated by black slates, shales, black band iron ore and fire clay; and, in general, he finds a remarkable similarity to the coal deposits of the carboniferous formation. The coal, with its shales, outcrops along the northern margin of the belt at various points for more than 15 miles; and many shafts having been sunk to and through the main seam, which is the upper one, it is ascertained to be very persistent in all its characteristics and associated beds. The area of this coal field is given by Emmons as about 300 square miles. The quality of the coal is also discussed by him and by Admiral Wilkes, and various analyses are published—the three following by the latter, of samples from different parts of the field:

Carbon.....	60.7	59.25	84.56
Volatile Matter.....	32.7	30.53	7.42
Ash.....	5.3	10.21	7.89
Sulphur.....	1.3		
	100.0	99.99	99.87
Specific Gravity.....	1.28	1.41	1.49

The first analysis (by Schaeffer) represents the coal at the Egypt shaft, the second (by Prof. Johnson) the outcrop at Farmersville, and the third (by the same) the Wilcox seam. Wilkes says, in his report to the United States Government, "the three upper seams of the bituminous coal are well adapted for fuel, cooking, gas and oil. It is a shining and clear coal, resembling the best specimens of Cumberland. It ignites easily, and burns with a bright, clear combustion, and leaves a very little purplish gray ash. It swells and agglutinates, making a hollow fire. It yields a shining and very porous coke, and is an excellent coal for making gas or for burning. The dry or debituminized coal exists in but small quantities in the basin, and contains less than one-quarter of the volatile matter that the bituminous coal contains.

In regard to the value of the Chatham coal for gas-making, the reports of the superintendents of the gas-works of Norfolk and Portsmouth are highly favorable, "both as to the quality of the gas produced and the quantity which a given amount of the coal yielded."

It is worth while to mention here also the bituminous shales, which show themselves in so strong force above the coal in the Egypt Section. Dr. Emmons estimated the thickness of the oil-bearing strata at 70 feet, and pronounced them capable of yielding 30 per cent. of their weight in kerosene oil; so that here is an inexhaustible resource for fuel over and above that furnished by the coal seams.

On Dan River the coal first shows itself on the surface about three miles east of Germanton, being imperfectly exposed in a ravine. The coal is about three feet thick. Some six to seven miles further east, at Stokesburg, there are outcrops of three seams in succession—the upper about three feet thick, with a heavy body of bituminous shales. The other two were not well enough exposed for measurement, but they were explored by a very intelligent gentleman, who reports one of them as much thicker than the top seam. The black shales and slates crop out at various points about the town of Madison; and near Leaksville a slope was driven some 60 feet on the coal seam, which is here three feet thick and with a dip of 34°, and considerable quantities were mined during the war. It is classed as a

semi-bituminous or dry coal. The outcrops show that the coal is continuous through the whole length of the belt in this State, which is above 30 miles.

### COPPER.

Dr. Genth, the eminent mineralogist, says, in regard to copper ores: "Copper ores have been found in many localities throughout the State in the veins of the old gneissoid rocks, as well as in the more recent slates, and even in the triassic formation. The principal ore is chalcopryite or copper pyrites, and there is every reason to believe that many of the mines require only a fuller development to enable them to furnish large quantities of valuable ores. Many of the gold veins are associated with pyritic ores, and, in fact, almost all the North Carolina copper mines in the central counties have first been worked for gold; and there are hardly any mines in Guilford, Cabarrus and Mecklenburg Counties occurring in the gneissoid and syenitic rocks which do not show strong indications of copper ores. The general character of these mines is, that about at water level, the so-called brown gold ores are replaced by quartz richly charged with iron pyrites more or less mixed with copper pyrites—the latter increasing as the mine deepens, and in many places becoming the only or the predominating ore, and forming a regular copper vein. The ores either became poor in gold or the latter could not be extracted by the ordinary process then chiefly in use in North Carolina—Chilian mills and arastra. Therefore, many valuable mines were abandoned, mostly before a larger and paying quantity of copper ores had been reached. The principal mines which promised to change into copper mines are, in Guilford County, the Fisher Hill, the North Carolina, the McCulloch, Lindsay, Gardner Hill, Twin Mines, etc.; in Cabarrus County, the Ludowick, Boger, Hill, Phoenix, Orchard, Vanderburg, Pioneer Mills, etc.; and in Mecklenburg, the McGinn, Hope-well, Rudisill, Cathay Mines, etc. The cupreous minerals observed in the mines are, near the surface, small quantities of native copper and cuprite—the latter sometimes in beautiful needles; the so-called chalcotrichite, malachite; rarely azurite, chrysocolla and pseudo-malachite, and in some of the mines chalcocite and barnhardtite—all resulting from the decomposition of chalcopryite or copper pyrites, which forms the principal ore. Siderite or carbonate of iron often forms an important gangue rock." There are, says Emmons, several veins of copper ore in the northeast part of Person County.

### GOLD.

The gold of North Carolina belongs to four different geological positions: 1. The loose quartz grit beneath the surface soil; 2. In stratified layers, which are cotemporaneous with the rock; 3. In connection with seams and joints of the rocks, and probably also diffused in the mass; 4. In regular veins associated with quartz and the sulphurets of iron and copper. The principal counties in which it has been found in sufficient quantity for exploitation are Franklin, Nash, Granville, Alamance, Chatham, Moore, Guilford, Davidson, Randolph, Montgomery, Stanly, Union, Cabarrus, Rowan, Mecklenburg, Lincoln, Gaston, Catawba, Caldwell, Burke, McDowell, Rutherford, Polk, Cleveland, Cherokee, Jackson, Transylvania and Watauga. It is generally more or less alloyed with silver, varying from pure gold on the one side to pure silver on the other. Near the surface it is usually associated with limonite, and at a greater depth of the deposits with pyrite, chalcopryite, galenite, zincblende, tetradymite, arsenopyrite; rarely with altaite and nagyagite.

### GOLD MINING IN 1882.

Mr. G. B. Hanna, U. S. Assay Office, writing in 1882, says: The auriferous area of North Carolina in a general way embraces nearly one-half of the State.

The productive area is much less, containing a little more than 12,000 square miles. Franklin and Nash Counties on the northeast, Moore County on the southeast, and the Tennessee line, mark approximately the east and west boundaries of the gold field. It extends on the north into Virginia and on the south into South Carolina. It comprises the best known and most productive part of the Appalachian gold belt. Nearly every mode of occurrence of gold known to the geologist and mining engineer finds here an illustrative example.

#### GEOLOGICAL DISTRIBUTION OF THE MINES.

The best known mines are upon the central belt of granite (for such it may be termed in a general way) stretching across the State in a northeast or southwest direction, with a width of 10 to 25 miles, the towns of Greensboro and Charlotte being nearly on its axis. This area is commonly regarded by geologists as among the oldest on the American Continent. To the east is a large body of slates, generally argillaceous, but frequently departing from that type, with a width varying from 15 to 50 miles. This region also abounds in mines, but it has been less explored. To the west is a still larger area made up for the most part of gneissoid and schistose formations, and extending nearly or quite to the Tennessee border. This area, too, has a large number of mines, but the most valuable deposits are placers and gravel washings.

To give a list of the gold mines of the State, with the various components and values of their ores, would be beyond the scope of this work; nor could I hope to do justice to them. Everyone thinking of investing in a gold mine will visit the spot, investigate the elements of cost and profit, and consider so many things upon which even a large work could not supply adequate information, that I feel that no disappointment will result to an investigator by reason of my brevity. Suffice it therefore to say that North Carolina is one of the greatest gold-producing States east of the Rocky Mountains; that there are nearly or quite 300 gold mines in the State; that some of these are of great profit; that some are managed on most approved plans; that capital may be said to be continually flowing into this industry; and that reduction works, either for an entire or partial reduction of the metallic gold, are situated at various points in the State.

#### IRON.

After having again and again gone over my material, trying to reduce it to something like proportions compatible with my scope, I am compelled to fall back on the merest outline. This vagueness is objectionable. But to mention all localities is impossible; to mention some and omit some is an invidious discrimination. But the persons seeking iron in North Carolina cannot be so much injured, because investigation will pay so well there. Hardly anywhere in the United States will exploitation prove more remunerative than there. Undoubtedly, immense deposits of most superb iron ore are to be found there whose presence is unsuspected by the inhabitants, or disregarded. Enough is known to show the richness of much of North Carolina in mineral resources. But much of the surface has only been *scratched*, as it were, especially in the western part of the State. In order that I may not seem to exaggerate, I quote the language of Prof. Kerr, who, in his report for 1875, gives some very strong language to the many discoveries of and references to the iron ores of the State. He says in closing: "This completes the description of the North Carolina iron ores as far as my investigations and information have gone. There remains much to do to complete the chapter. There are many blanks to fill, and whole counties of which little is known, except that they contain iron ores. My work has been necessarily limited to the study of such ore beds as have happened to be opened, and of

course these are but a small proportion of the whole in a region always wholly devoted to agriculture, and studiously eschewing all sorts of manufacturing."

Since the above was written there has been no geological survey of the State. Private enterprise has done something doubtless, but its fruits are not accessible; but all investigations confirm Prof. Kerr's views. To later exploitation (but still very limited) some of the inspiration of Prof. Colton's language may owe its force and (to the uninformed) its air of almost over-statement.

In Western North Carolina, Prof. Colton says, there is an "immense quantity" of magnetite. Further: "The day will come when this Western North Carolina will be as famed for its mines of magnetic and specular iron ores, of copper, nickel, manganese and chrome, as is now the Lake Superior Country." Further on he says: "Having in our reach (referring to North Carolina) and in our own mountains (referring to Tennessee) as much magnetic iron ore as either of these other States," (referring to New York and Pennsylvania.) "Only a small part of the great Alleghany magnetic ore vein is in Tennessee," but in North Carolina it exists in prodigious quantity.

We shall now briefly mention the counties where iron ores occur, give some analyses and the varieties of the ore. As preparatory to this, however, it will be well to quote from Prof. Kerr as follows: "The ores of iron are very widely distributed in this State, their occurrence being not only co-extensive with the area of the archæan or azoic rocks, but extending over the mesozoic, and even into the quaternary; and these occurrences include all the principal kinds of ore—magnetite, hematite, limonite and siderite—and most of their varieties and modifications."

LIMONITE ORES OF THE EAST.

Beds of various proportions, from two to four feet thick, are found in the counties of Nash, Duplin, New Hanover, Edgecombe, Pitt, Halifax and Robeson. This ore is of common occurrence in most of the above counties. Two analyses are given. One shows:

Sulphuric Acid.....	0.03
Phosphoric Acid.....	0.11
Iron.....	42.73

Another gives:

Sulphur.....	0.05
Phosphorus.....	0.02
Metallic Iron.....	53.93

The author says that reliable authority tells him "the iron made was of excellent quality, soft and very strong."

HEMATITES OF HALIFAX AND GRANVILLE.

In Halifax County there are several outcrops of hematite ore. The ore is granular for the most part, and of the variety known as specular, with a considerable variety of magnetic grains disseminated through it. Analyses of two of them show ores of conspicuous purity:

Phosphorus.....	0.00	0.05
Sulphur.....	0.03	0.08
Metallic Iron.....	58.73	53.31

In Granville County iron ore is reported in various places.

IRON ORES OF CHATHAM AND ORANGE.

Very important iron counties. Ore in former likened to that of the Iron Mountain, Mo., and its extent and mode of occurrence suggests the Pilot Knob. It is at least equal to either of these notable iron-ore deposits in quantity, and is equally pure, and has the advantage of both in the presence of large percentages of manganese, and the capacity to produce *spiegeleisen* without admixture of other

ores. A company—The American Iron and Steel Company—has secured a small vein in one part of the county and is working it. They make a superior car-wheel iron. Analyses show that the product is mostly a *spiegeleisen*.

An ore partly limonite, but mostly red hematite, is found in this county. Two analyses show it to yield nearly 50 per cent. of iron, with little phosphorus and no sulphur. There is some black band and ball ore, or "kidney ore." These ores seem to be co-extensive with the coal on Deep River, outcropping everywhere with it, and several places outside of its limits. Two seams are shown in the sections, and there is a third in the bottom shales not penetrated at the Gulf, but shown in the Egypt Section as accompanying the lower coal 30 feet below the main seam. Some of it contains 33 per cent. of metallic iron. In one place it occurs "in balls or continuous beds." Its adaptation as a use for flux is obvious—an analysis showing 52.80 per cent. of carbonate of lime and 13.60 of carbonate of magnesia. In one place the seam of black band between the main coal beds in one shaft is 16 inches—the lower one consisting of two thicknesses of three feet each, separated by a thin seam of coal. Prof. Kerr says the quantity of phosphorus which these beds contain is notable, but says they are valuable for casting, and, with the exception of phosphorus, are well constituted, containing the necessary amount of carbon, of flux and of manganese for the manufacture of iron very cheaply, by judicious mixing of the ores obtainable in the immediate neighborhood. There are many other places in Chatham County where ore of great purity and abundance is found, making it a notable iron county. One ore yields 63.49 metallic iron, no phosphorus and little sulphur.

Another very notable iron county is Orange. An analysis of Orange County ore gives a yield of 65.77 per cent. of iron, with sulphur 0.11 and phosphoric acid 0.04, and the quantity is very great.

Of the county of Person Prof. Kerr says: "There is a vein of hematite, (specular,) from which iron was made to some extent during the war. The vein is described as about six feet thick.

The ores of Montgomery and Randolph Counties belong properly (geologically) to the Chatham range. They are found in the same great slate belt (Huronian) that constitutes the most notable feature of the Middle Region of the State, both geologically and mineralogically. Some of the strongest and most highly prized iron obtained during the war came from Randolph County. It was all devoted to the manufacture of shafts and other machinery for the steam rams (ironclads) and the like. In Montgomery County, hematite of apparently considerable extent, and free from sulphur, and a very pure ore, is found.

One of the most remarkable and persistent ranges of iron ore in the State crosses the county of Guilford in a northeast and southwest direction. It passes clear across the county into Rockingham—a distance of some 30 miles—making its appearance on nearly every plantation, and, indeed, almost every hillside in the range. The ore is granular magnetite and is everywhere titaniferous. This range has been explored by Prof. J. P. Lesley, one of the most eminent geologists on the continent, and many analyses made by Dr. F. A. Genth, of Philadelphia, Pa., whose reputation is also well known. Of Prof. Lesley's report on these ores I can give space to only a few points.

The ore is in the form of beds, full of foldings and fractures—to be expected where only the oldest metamorphic rocks are found. It is coarse grained and associated with crystals of chlorite. The ore beds vary from point to point below the range. The belt of outcrop of ore-bearing rocks has a uniform breadth of several hundred yards. They dip as low as a mile beneath the surface, and then rise again as ore beds. In one section the ore bed is full six feet across; solid ore;



a very green, chloritic, mica slate, rock ore. In this vein of 800 yards there are apparently 200,000 tons above water level in the one six-foot bed.

The quantity of ore which this remarkable range is capable of yielding is obviously immense. The principal beds may be safely estimated on an average of four feet, and in the best mining localities the average yield of a long gangway may reach five feet. It is evident that centuries of heavy mining could not exhaust it, for each of two or three principal beds may be entered and mined at fifty places.

The kind of ore is titaniferous magnetite. More particularly, not only titanium, but chromium and manganese are uniformly present. It is the same family to which the Champlain (or Adirondack) ores, the Marquette (Lake Superior) ores and the ore of the Iron Mountain, in Missouri, belong. It is very similar to the New Jersey ores, which are so extensively mined for the furnaces on the Lehigh River. It is a mixture of magnetic crystals and specular plates of sesquioxide of iron, with quartz, felspar and mica in a thousand varying proportions. Sometimes the bed will be composed of heavy, tight, massive magnetite, (or titaniferous magnetite,) with very little quartz, &c.; at other times of a loose, half-composed mica-slate or gneiss rock, full of scattered crystals of magnetic iron.

Many analyses are given, made by Dr. Genth. The summary is thus given: "From these analyses it is seen that the average of the 10 specimens of original iron ore, which represent the whole range for a distance of nearly 30 miles, is: Iron 54.61 per cent.; titanium 8.07 = 13.24 per cent. of titanous acid. The ratio between titanium and iron is = 1 : 6.77. All the ores were examined for sulphur and phosphorus, and were found to be entirely free from these substances." A good deal is said of the value of titanium in iron in proper proportion, showing the great value of this ore, and proving it superior to the Canada ores, and making it like the "best Swedish iron."

I give a few of Dr. Lesley's general conclusions: "The quality of ore, although various, and suited to at least two branches of the iron manufacture, is of the very first rate; none better in the world. The soft ores will smelt easily and make magnificent iron; absolutely the very best; perfectly malleable, tough and strong. The hard ores will command a high price for puddlers' linings; will be in demand for mixing with poorer ores of other regions, and will have an especial value for the Siemens and the Bessemer processes, and the steel manufacture generally. The quantity of the ore is limitless."

Prof. Kerr then remarks with great pertinence: "Any one who has the least knowledge of the present drift of the iron industry of the world, and of the controlling importance of high-grade ores, is prepared to realize the immense value of such deposits as those just described in Guilford, and in Harnett, Chatham, Orange and Halifax Counties. This Guilford range of ores has not been traced to its termination in either direction, and doubtless other valuable beds will be discovered; and there are already indications that there are outcrops of the same kind of ore as far northeast as Caswell County—some very fine specimens of magnetite having been brought to the museum from that county."

In Rockingham there are iron-ore localities which do not belong to this range, and a bed of red hematite is spoken of about 10 inches thick at the outcrop. It is very dense, heavy and hard, uncrystalline and almost jaspery, and is no doubt a good ore, judging from its appearance.

#### IRON ORES OF MECKLENBURG AND CABARRUS.

No iron mines of any extent have been worked in these counties, but ore has been found in a number of localities. Hard specimens of magnetic ore of great purity are frequently seen.

## IRON ORES OF GASTON, LINCOLN AND CATAWBA

In these counties is one of the most extensive ore ranges in the State. It is also the best known and best developed of them all, and has been the principal source of our domestic supplies of iron for a hundred years. Some of the furnaces of the region were put in blast during the Revolutionary War. The ores are predominantly magnetic, with a variable percentage of hematite, and are found in the belt of talcose and quartzitic slates. They are mostly of a very slaty structure and friable; in fact, they may be generally described as magnetic and specular schists. For a considerable part of the range there are two parallel beds, their thickness running from four feet (and sometimes as low as two feet) to twelve—the interval of twelve to twenty feet between them being occupied by talcose and chloritic slates, with a little ore in layers. The beds generally occur in lenticular masses or flattish disks, which thicken at the middle and thin out toward the edges, having nearly the same dip with the bed; but they do not succeed each other in one plane, their edges overlapping so as to throw the upper edge of the lower behind the lower edge of the upper. The ore has been generally mined in a very rude and wasteful fashion, the operations seldom penetrating beyond water level 50 or 60 feet, and generally limited to surface openings. In one locality the quantity of ore seems to be very great, the thickness of the beds at some places being estimated at about 18 feet. Limestone for fluxing is found convenient in the range of beds which accompanies these slates one to two miles to the west, from King's Mountain to a point several miles beyond Anderson Mountain. The range of these two parallel beds naturally divides itself into two groups of beds—the northern and the southern—the one lying mostly in Lincoln, and the other in Gaston.

In Catawba County there is a series of ore deposits whose mineralogical character and geological relations are entirely different from those of the ore beds of Lincoln County. They occur in the syenitic belt—a narrow zone of three to five miles parallel to the slate belt across these counties, from the great bend of the Catawba River nearly to South Carolina. The ore is a remarkably pure magnetite—heavy, black, metallic and non-granular for the most part. It occurs in irregular masses—*pockets*, which seem to be scattered very disorderly through the massive syenitic rock; so that the proper way to seek for it is by the miner's compass. The iron manufactured from it in the forges of the neighborhood was in much request before and during the war, being very malleable, tough and strong. During the war the blooms were used for the manufacture of shafts for ironclads and bolts for the cannon of the coast forts. One analysis of these ores gives 66.75 per cent. of iron; and Dr. Genth says "these ores contain neither sulphur nor phosphorus."

The belt of limestone which forms an unfailing term of the King's Mountain slates through their course, lying generally about a mile west of the iron-ore beds, with timber, water-power, &c., furnishes favorable conditions for the cheap production of iron.

## IRON ORES OF YADKIN, SURRY AND STOKES.

The ores of this region are found along the base and among the spurs and foot-hills of the Pilot and Sauratown Mountains. There are two groups. They are all magnetic and granular, but differ in the two groups in their mode of occurrence. In the latter case the ore is disseminated in grains, for the most part, through mica slates and gneiss rocks, and the earthy and rocky matter often bears a large proportion to the ore, and requires to be separated by stamping and washing before it is sufficiently concentrated for the forge. The rock is generally decomposed to a great depth, and the grains of ore easily separated by very rude and cheap means. Analyses show some of the iron to be apparently very pure.

The northern or Slokes group of the range lies on the east (north) side of Dan River. The ores (of which there are several beds,) are all magnetites, with sometimes a small admixture of hematite. Analyses by Dr. Genth show fine iron—one analysis yielding 65.34 of iron; another 61.74. Prof. Kerr says the purity of these ores is conspicuous. Phosphorus is wholly wanting. Some samples contain a small percentage of pyrites.

#### IRON ORES OF BURKE, CALDWELL, ETC.

There are many valuable beds of limonite in a range extending in a northeast direction from the northeastern foot-hills of the South Mountains into the Brushy Mountains; from Jacob's Fork of Catawba River, near the eastern border of Burke, across the Catawba, and by way of Gunpowder Creek, to the waters of Middle Little River, near the eastern border of Caldwell; and beyond, near Rocky Creek, in Alexander; and even on the northern slopes of the Brushy Mountains, in Wilkes, the same ores occur, being undistinguishable in appearance and of identical lithological relations. These ores are associated with the peculiar kyanitic hydro-mica schists and purplish paragonite schists which characterize the region. Specimens of magnetic ore are of frequent occurrence in Burke County and the western part of Catawba.

Watauga County has some of the specular martite schist. In one location there is a bed three or four feet thick. The quality of this ore is so high as to justify an exploration of this promising outcrop, and, indeed, of the whole range, which, however, does not stop at this point, but follows the line of the Blue Ridge for a distance of 75 miles, showing itself in the notable magnetiferous and martitic schists of Fisher's Peak, near the Virginia line, on the Surry-Alleghany border.

In McDowell County there are several beds of limonite. When worked alone they make an inferior iron, but mixed with the magnetites and hematites of the region, they would become available for the manufacture of good metal. The limestone beds of the same belt are conveniently located for furnishing a flux, and the forests of these mountains will furnish indefinite quantities of fuel.

At Ore Mountain, in Buncombe County, there is a bed of limonite. The bed is not well exposed; but three or four feet of thickness are visible on the steep escarpment, and large masses which have broken off are fallen down to a lower point on the slope.

#### IRON ORES OF MITCHELL AND ASHE.

In Mitchell County is found one of the most remarkable iron-ore deposits in North America. It is known as the Cranberry Ore Bank. It is in the northeast corner of the county, three miles from the Tennessee line. The prevalent and characteristic rock of the mountains in this locality is hornblende slate and syenite, and it is on the northern margin of a mountainous ledge of such rocks that the ore bed occurs, gray gneisses and gneissoid slates coming in beyond in immediate succession and association in part. The ore is a pure magnetite, massive and generally coarse-granular, and exhibits strong polarity. It is associated with pyroxene and epidote in certain parts of the bed. The steep slope of the mountain gorge and ridges which the bed occupies are covered with blocks of ore often of hundreds of pounds weight, and in many places bare vertical walls of massive ore 10 and 15 feet thick are exposed, and the trenches and open diggings which are scattered without order over many acres of surface everywhere reach the solid ore within a few feet of the surface. The length of the outcrop is about 1,500 feet, and the breadth 200 to 800. As this is a most remarkable iron ore, I give the following tables:

	64	65	66	67	68
Magnetic Oxide of Iron.....	94.37	91.45	85.59	80.77	91.89
Oxide of Manganese.....	0.26	0.06	0.24	1.42	0.32
Alumina.....	0.42	0.77	0.11	0.52	1.03
Lime.....	0.43	1.01	0.72		1.06
Magnesia.....	0.36	0.53	0.33		0.23
Water.....		0.44	1.53	8.21	1.15
Silica, Pyroxene, etc.....	4.16	5.74	11.48	9.08	4.02
Sulphur.....					0.25
Phosphoric Acid.....					trace
	100.00	100.00	100.00	100.00	99.95
Metallic Iron.....	68.34	66.22	61.98	58.49	66.53

The first four of these analyses are by Dr. Genth, who says "the first three samples contain neither titanitic acid, nor phosphorus and sulphur; the fourth contains a trace of phosphoric acid." No. 68 was made by Prof. Chandler, of Columbia College, New York City, who remarks: "This is the best iron ore I have ever analyzed. It is very rich in iron and very free from sulphur and phosphorus." The smiths and farmers of the region will use no other iron if the Cranberry can be had, and they willingly pay 50 per cent. more for it than any other in the market. The softness and toughness of this iron is very remarkable, and its tensile strength, as tested by the United States Ordnance Department, ranks with that of the best irons known. *In quality it is unsurpassed by any iron in the world*; and in regard to quantity, the bed much exceeds the great deposits of Missouri and Michigan, and at least equals anything in the Champlain Region; so that it has not probably an equal in this country.

The Cranberry Ore Mine was purchased some years ago by a Pennsylvanian, who built a railroad (narrow gauge) about 40 miles to the mine, and has been shipping the ore principally to Allentown, Pa., where the furnaces are. Of late a furnace has been built at the mines.

In Ashe County, in the northwest corner of the State, there are some important ore deposits on the waters of north fork of New River. The ores are highly magnetic. In one instance a bed of very pure magnetite is reported 18 feet in thickness. This is manifestly an iron region, and worthy of a thorough investigation.

#### IRON ORES OF THE FRENCH BROAD.

There are several localities on the western slopes of the Black Mountains, on the head-waters of Joy, in the eastern edge of Madison, where magnetite is found in considerable surface masses, though no explorations have been made. The prevalent rock of the region is gneiss, with much hornblende slate and syenite. There are many fragments of this ore of considerable size along the steep slope of a mountain spur. There is a bed of titaniferous ore in the county. In various other parts of Madison surface indications of magnetite are found.

In Haywood County there is a large massive outcrop of granular magnetite. It is in the northwestern part of the county, on Wilkins' Creek. The bed is no doubt large, from the boldness of the outcrop, which projects in large masses above the surface. There are also magnetites and hematites in various localities of Jackson and Macon Counties, some of which are represented in the museum by very fine specimens, and the deposits are reported to be extensive; but as no iron has been made in those counties, there has been no occasion for their development.

#### IRON ORES OF CHEROKEE.

There is no other county in the State which contains so much iron ore as Cherokee. It is all, however, of one species—limonite. The marble beds of Valley River and Nottley River are everywhere accompanied by beds of this ore. There seem to be generally two, three and four parallel beds of it, one or

two of which are frequently slaty and micaceous—a limonitic mica slate—and the others cellular, concretionary, etc., and the most western generally ochreous. The breadth of this iron and marble range is two to more than three miles. The whole iron range of the county is above 30 miles. The most common and characteristic terms of the series in cross-section are, counting from the northwest, slaty gneiss and mica schist, limonite, steatite, marble, limonite, slaty quartzite, slaty limonite, mica schist and slaty gneiss. An analysis by Chatard for Genth shows as follows:

Sesquioxide of Iron.....	85.69
Silica.....	1.50
Water.....	12.81
	<hr/>
	100.00
Metallic Iron.....	59.88

Many localities are given where this ore prevails, and in some places of great thickness. The marble will furnish flux and the forests fuel.

Thus somewhat imperfectly I have sifted out something as to the iron of North Carolina, and am quite largely indebted to Mr. P. M. Hale's work, "In the Coal and Iron Counties of North Carolina."

In "Mineral Resources of the United States," by Williams, 1883, I find on page 429 the following: "Quite recently a new deposit of chrome ore has been discovered in Jackson County, North Carolina. It promises to be of better quality than any other in the Eastern States."

#### OTHER USEFUL MINERALS.

*Mica*.—Mica mining has been carried on most extensively in Mitchell, Yancey and Macon Counties; in Jackson, Haywood and Buncombe, &c., to a less extent. One mine in Mitchell yields a ton of marketable mica a month, and this region furnishes the bulk of this mineral to the world's markets. The aggregate product of these mines has been over 250,000 pounds, worth about half a million dollars.

*Corundum* has been found in large quantities in several counties west of the Blue Ridge, and is now extensively mined. Several valuable rubies and sapphires have been obtained, among them a crystal of 312 grains, which is in the cabinet of Amherst College, Massachusetts.

*Chromic Iron*.—Small quantities of chrome are found associated with some of the iron ores of the State, the lead which crosses Guilford County for example; but it is also found as chromic iron in coarsely crystalline masses often of considerable size, and in the form of very irregular veins or pockets, in the chrysolite beds of Jackson, Yancey, Mitchell and Watauga Counties. The most considerable deposits are two—one in Jackson County, the other in Yancey.

*Manganese*.—Pyrolusite, psilomelane and wad are found in small quantities in many places in this State, but nowhere in abundance, so far as known. They are generally associated with iron, gold and silver ores. There is a very promising vein or bed of psilomelane in Caldwell County. There is also a small seam in Stokes County, and laminated masses of one half to one inch thick occur in the Buckhorn iron-ore beds. Manganese is found associated with the iron ores in various parts of the State. Beds of manganese garnet are of common occurrence and often of great thickness. There is a series of such beds associated with the King's Mountain slates of Gaston, Lincoln and Catawba, which are superficially changed to black oxide. Several veins of the black oxide of considerable extent, says Prof. Kerr in a recent report, have been found.

*Kaolin* is found abundantly almost from one end of the State to the other—from Edgecombe and Robeson to Macon.

*Fire Clay.*—The vast tertiary and quaternary tracts of the Eastern Section, says Prof. Kerr, abound in beds of potter's clay, fire clay, &c. Dr. Emmons, in his report, refers particularly to one locality. He says: Clay for fire brick is abundant in Gaston County. It is free, I believe, entirely from lime and the alkalis, potash and soda. It extends through the county. It is inexhaustible in the vicinity of King's Mountain.

*Agalmatolite* is found in the southwest corner of Chatham. There is a large deposit occurring in Montgomery. It is popularly called soapstone, and has the soapy feel of that mineral, but contains only 3.02 per cent. of magnesia. This substance has been an article of trade to New York on a large scale and for many years.

*Whetstone.*—Among the silicious argillites so abundant in the Huronian strata there are frequent beds of novaculite or whetstone. One of the best localities is in Orange County. Other quarries are found in Person County, in Anson, in Montgomery and adjoining counties, on the great Huronian Belt, and, in fact, almost every section of the State has its own quarries.

*Millstone and Grindstone Grits, &c.*—The sandstone of the State is in many places well adapted to the purposes of grindstones, and during the war, while the foreign supply was cut off, they were largely so used. The Anson County quarries furnish a very fine grindstone and whetstone grit. The conglomerates of the triassic series, which are associated with and replace the sandstones above mentioned, have been long and widely used for millstones. They have been principally obtained from Moore County, where they are of excellent quality, and they have been distributed from this point over a large number of the intervening counties to the Blue Ridge. Some of these stones have been in use for 50 years, and they are occasionally found to be nearly equal to the French buhr-stone. The coarse porphyroidal granites and gneisses which are scattered over so large a part of the State, are, however, the most common material for millstones; and in the Eastern Section the shell rock is often partly or wholly silicified, forming a sort of buhr-stone, as in Georgia, and is well adapted to the same uses. In Madison County, in the Huronian slates on Laurel River, there is an irregularly laminated whitish quartz occurring in large veins, which is used for millstones, which are reported to be a good substitute for buhr-stone.

*Graphite.*—This mineral is quite widely distributed in North Carolina, both in the Huronian and Laurentian formations. There are very fine beds in the museum from a number of counties—Person, Yancey, Catawba, Cleveland, Burke and others; and there are beds of a more or less impure, slaty and earthy variety in several sections of the State, the principal of which are two—one in Gaston, Lincoln and Catawba, and the other in Wake County. The Wake County beds are the most extensive as well as the best known graphite beds in the State. They extend in a northeast and southwest direction for a distance of 16 or 18 miles, passing two and a-half miles west of Raleigh. There are two beds apparently. The thickness is two to three, and occasionally four feet.

*Limestone.*—Mitchell's Geology says that limestone has been discovered at three points in the primitive rocks in Stokes County, at one on the bank of the Yadkin, in Surry, and at several places in the southeastern part of Buncombe and Henderson. Small nodules and masses also have been found about Lincolnton. The limestone of King's Mountain is in a small tract of later primitive, bearing an intimate resemblance to the country around Charlotte, and like that, rich in veins of gold. This mineral is not as abundant in North Carolina as in many States, constituting, as has been seen, but an insignificant proportion of the mass of its rocky strata; and yet its distribution is such, and such are its relations to existing and abundant means of transportation, that it is accessible to the greater

portion of the State. That part of the Eastern Region south of the Neuse River is abundantly supplied with eocene or shell limestone, and to the northern half of that section, both this source of supply is open, and the oyster-shell heaps of the sounds and bays round to Norfolk.

*Marble.*—In the extreme west, in Macon and Cherokee, the limestone range, both on Nantehaleh and Valley Rivers, contains beds of very fine marble of various colors—white, pink, (or flesh-colored,) black, gray, drab and mottled. It is capable of a very fine polish, and will one day, when the difficulties of transportation shall be overcome, acquire a high value in architecture, as well as in other ornamental arts. In this last connection, some of the *serpentine* beds may be mentioned as likely to come into use, and so to acquire a market value.

*Talc.*—Foliated talc of a white or greenish white color is found in many of the chrysolite beds west of the Blue Ridge, in Clay County, Macon County, Jackson County, Yancey County, Mitchell County, and other localities; in sheets of three-quarters to one inch in thickness, and of a somewhat columnar structure, near Pilot Mountain, Surry County; fibrous talc with silky lustre, and of a white or green color, also compact crystalline white talc with a splintery structure, in Cherokee County, and also in Macon County. Talc slate and coarse soapstone is found in many localities throughout the State.

*Serpentine.*—Dr. Genth says that the massive are found in many localities. The best appears to come from Caldwell County. It has a dark greenish black color, and contains fine veins of the yellowish green fibrous and silky chrysolite, and admits of a fine polish. Greenish gray massive serpentine, also with seams of greenish and grayish white chrysolite, is found in Caldwell County, at which place is also found the variety picrolite. Dark green serpentine has been observed in Forsyth and Wake Counties. A grayish or yellowish green serpentine occurs in the chrysolite beds of Macon, Jackson, Yancey, Mitchell and other counties. It results from the decomposition of the chrysolite.

*Baryte.*—In Prof. Olmsted's report is found the following notice of the vein found in Orange County: "Three miles south of Hillsboro is a fine vein of a mineral called sulphate of barytes or heavy spar. This substance is not very uncommon, but it is rare to meet with it of such purity and elegance as at this place. It is beautifully white and shining."

*Marls.*—Marl is very abundant in 25 counties in North Carolina, very widely distributed, and of several kinds, the principal of which are four, viz: green sand, eocene, miocene and triassic. The former has generally but a small percentage of carbonate of lime—5 to 30; the second usually 40 to 95; the third 20 to 60, and the fourth generally less than 50. The last is of little consequence as a fertilizer, because of the very limited extent of its outcrops, and it is scarcely used where abundant. These marls are more extensively exposed than elsewhere in the northwestern part of Wake County, and in the edge of Orange, between Morrisville and Durham. Nothing better shows the need and the value of exploitation than the fact that, until very lately, North Carolina knew nothing of the valuable phosphate beds just introduced to the world by Charles W. Dabney, Jr., State Chemist, who has just issued a pamphlet with relation to these beds. I merely have space for a quotation as to their locality, and to say that lime is afforded thereby to a part of the State where it is most needed "*Distribution.*—Phosphate rock has been found so far, (March 1st, 1884,) in larger or smaller quantities, in Sampson, Duplin, Onslow, Pender, New Hanover, Bladen, Columbus and Brunswick Counties. The largest deposits now known are in Duplin and Sampson. The same rock probably extends into the southern part of Wayne County. Phosphatic marls of great richness are known to exist besides in Greene, Lenoir, Pitt,

Jones, Craven and Carteret Counties. It is likely that phosphate will be found in these counties."

*Asbestos.*—This is, says Prof. Kerr, one of the commonest associates also of the chrysolite beds heretofore mentioned, and it occurs also quite widely in the Laurentian rocks of the middle and western parts of the State. One of the best known localities in the State is that in Mitchell County. It is long, fibrous, white, and readily reduced to a pulp or mass of fine lint. An equally fine article is brought from the southern part of Jackson County. It is also found near Tryon Mountain, in Polk County. Another well-known locality is in Caldwell County. This is associated, like many others, with a serpentine rock. Specimens have been exhibited also from Ashe and from Yancey. This mineral occurs in many places from Warren to Jackson County.

*Soapstone.*—This is a very common mineral in North Carolina. The most extensive beds of it are found in Cherokee and Macon, in immediate association with the marble range, and accompanying it throughout its whole extent, on Nantehaleh River, Valley River and Nottelley. An analysis of this rock as it occurs on Nantehaleh gave 23.71 per cent. of magnesia, which is about the percentage of pyrralolite. The variety rensselarite is found in Forsyth County, and probably also in the South Mountains in Burke County.

*Pyrite.*—Pyrite is one of the most common minerals in North Carolina. It is not only found in globular crystalline masses in many of the marl beds of the eastern counties, but many of the gneissoid rocks and slates contain it in considerable quantities, and besides, it is found in almost every mine of the State. In the gold mines the associated pyrite is generally auriferous. Cubical crystals occur in Catawba and Gaston Counties. Combinations of cubes and octahedra are found in Chatham County and in the Guilford County gold and copper mines. The pyritohedron, often in combination with cubical and octahedral planes, is found in Union County, Guilford County, Gaston County, Mecklenburg County, &c. Large veins of compact pyrite occur in Gaston County.

#### BUILDING STONES.

There exists the greatest abundance of material for architectural and engineering uses over a large part of the State. Granite and gneiss are among the commonest rocks throughout its whole length, except in the coastward region, where it is overlaid by the tertiary and cretaceous beds. And the sandstones of the triassic—red and gray—as well as those of the Huronian, are available over considerable areas; while the shell limestone of the eocene furnish a very fair building material to the sandy and alluvial coast region; and the crystalline limestones and marbles of the west supply an ornamental building stone of great variety and beauty. Seventy-nine specimens of building stones have been sent from the State to the new National Museum at Washington. These embrace granite of every variety, (the beautiful Scotch granite included,) gneiss, soapstone, talc, limestone, marble, fire-stone, lime-rock, sandstone of various shades and texture, syenite and porphyry.

#### PRECIOUS STONES.

In the United States, systematic mining for gems and precious stones is being carried on at only two places, viz: Paris, Maine, and Stoney Point, North Carolina.

*Diamonds* have been repeatedly found in North Carolina. In every instance this gem was found associated with gold and zircons; sometimes with monozite and other rare minerals, in gravel beds resulting from gneissoid rocks; but it has never been observed in the North Carolina itacolumite, or any debris resulting from its disintegration.



*Beryl* has been found at several places in the State.

*Zircon* abounds in the gold sands of Burke, McDowell, Rutherford, Caldwell, Mecklenburg and other counties; also abundantly on the south side of the Blue Ridge, near Green River.

*Garnet* is widely distributed throughout the State, and some very beautiful crystals have been found. Burke, Caldwell and Cherokee Counties are taking the lead. The massive manganese garnet is abundant in Rutherford, Chatham, Stokes, Cabarrus, Lincoln, Gaston and Rockingham Counties.

*Agate*.—Rough specimens very common in Cabarrus and Mecklenburg Counties. Some very fine specimens of moss agate in Orange County. It is found in Granville County also.

*Opal*.—A number of gems of this species have been found in the State. Within the last 12 months a large number have been picked up in Cabarrus County, some of them of much beauty and high market value.

*Hiddenite*—a rare and new gem of great value, limited to North Carolina and one county. It is of an emerald-green color.

*Emerald* is found in the mica mines of Mitchell and Yancey Counties.

*Ruby*.—Corundum, found as a gem in Clay and Macon, may also be found in other corundum localities in Jackson, Mitchell, Iredell, Gaston, &c.

*Sapphire, kyanite*.—Best are found at Swannanoa Gap and top of Black Mountain; the common sort in Mitchell, Gaston and other counties.

*Rock Crystal, False Diamond, California Diamond*.—Abundant in this State.

In addition, it is worth while to mention that specimens of opalescent quartz occur in Cabarrus and elsewhere; also malachite, carnelian, jasper, chalcedony, rutile, tourmaline, chrysolite, lazulite and smoky quartz; so that this list of native gems is certain to be extended, and very considerably, too, whenever extensive mining operations are resumed.

Of the entire list of real gems, nine have been found as such in this State; and of the minerals which constitute these gems, all but one occur here; and of minerals which furnish the semi-gems, a majority also occur in this State. This fact is explained just as the other broader fact of the occurrence of so wide a range of mineral species. It is due to the prevalence of the older rocks, which make up almost the whole of North Carolina geographically, outside of the overmantling sands and gravels of the east.

## MANUFACTURES.

As a manufacturing State, North Carolina has long been prominent, although her industrial interests have not, of course, ever attained the great magnitude reached by the principal Northern and Western States. Within the last few years there has been a very rapid increase in the manufacturing interests of this State, and in none of the Southern States is this growth of a better or more diversified character. In a few of the Southern States the amount of capital now being invested in industrial enterprises is larger than in North Carolina; but this is mainly due to the establishment of comparatively few extensive iron works or industries of that character; while in North Carolina it is particularly noticeable that the aggregate of its new manufactures is being made up of a great number of mills, factories and shops of moderate size, but covering almost every branch of manufacturing, denoting a healthy growth of a wide range of industries.

In cotton manufacturing, North Carolina's many advantages have caused a very rapid development, and there are now between 90 and 100 mills, having an aggregate of 213,362 spindles and 3,543 looms, being an increase of 43 mills, 110,595 spindles and 1,583 looms since the census of 1880, or an increase of nearly 100 per cent. in the number of mills, and of over 100 per cent. in spindles. The

abundant water-power of the State; its large production of cotton, furnishing raw material without the expense of heavy freights; its excellent climate and other advantages, assure a rapid growth of this industry in North Carolina. Georgia and the two Carolinas are apparently in sharp but friendly competition as to which shall lead in cotton manufacturing.

The vast timber resources of this State have naturally caused the erection of many saw mills, and in all sections of the State new mills are springing up; but it will be many years yet before the almost boundless forests of virgin timber show signs of exhaustion. The timber resources of this State offer abundant facilities for unusually profitable investments. As North Carolina has many saw mills, so has she also many flour and grist mills, mainly of small capacity and of old-time machinery, though there are some most excellent roller-process mills producing very superior flour. The wheat crop of the State is of excellent quality, and there are good openings in the State for the erection of modern mills.

The most rapid growth during the last two years in any manufacturing interest has been in tobacco—a business of comparatively recent origin, at least as a leading industry. The peculiar excellence of North Carolina tobacco has caused an increasing demand from year to year from almost every part of the world, and with this increase, there has been a steady increase in the number of factories to meet it. It is only recently that experiment has demonstrated the fitness of the soil of a large part of the State for tobacco growing, which, until within the last few years, had been confined almost wholly to a few counties. The progress of tobacco culture in North Carolina has been, without exception, marked by a steady improvement in the financial condition of the farmers, whose profits range from \$100 to \$400 an acre, and in the rapid development of all other interests; in fact, tobacco has proved a bonanza to the whole State. Some idea of the increase in the tobacco trade of North Carolina may be gained from the fact that over 50 tobacco factories were erected in that State during 1884, and that many others will be built during the present year.

Woolen mills, wood-working establishments for furniture, spokes, handles, sashes, doors, blinds, &c., machine shops, and many other diversified industries, are of considerable extent and importance; and while their growth has hardly been as marked as that of tobacco and cotton, yet it is sure and steady, and their productions largely help to swell the aggregate of the manufactures of the State.

#### WOODS AND TIMBERS.

The area of land covered with woods and timbers now standing in each of the counties of the State, as reported in "Hale's Woods and Timbers of North Carolina," will be found in the table hereto annexed:

COUNTIES.	WOODED AREA.	COUNTIES.	WOODED AREA.
Alexander.....	One-half.	Greene.....	One-half.
Anson.....	One-third.	Halifax.....	Six-tenths.
Ashe.....	Seven-tenths.	Haywood.....	Four-fifths.
Bladen.....	Nine-tenths.	Iredell.....	One-half.
Brunswick.....	Two-thirds.	Jackson.....	Five-sixths.
Camden.....	One-half.	Johnston.....	Two-thirds.
Caswell.....	One-half.	Lincoln.....	Two-thirds.
Chatham.....	One-third.	Macon.....	Five-sixths.
Cherokee.....	Four-fifths.	Madison.....	Three-fourths.
Clay.....	Five-sixths.	Mitchell.....	Three-fourths.
Cleveland.....	Six-tenths.	Montgomery.....	Three-fourths.
Columbus.....	Two-thirds.	Moore.....	One-half.
Currituck.....	Three-fifths.	Northampton.....	One-half.
Davidson.....	Two-thirds.	Onslow.....	Six-tenths.
Davie.....	One-third.	Orange.....	One-third.
Edgecombe.....	One-half.	Pamlico.....	Nine-tenths.
Forsyth.....	One-third.	Pender.....	Two-thirds.
Gaston.....	Three-fifths.	Perquimans.....	One-fourth.
Gates.....	Three-fourths.	Person.....	One-eighth.
Graham.....	Seven-eighths.	Pitt.....	Three-fourths.
Granville.....	Six-tenths.	Polk.....	Three-fourths.

COUNTIES.	WOODED AREA.
Randolph.....	Five-sixths.
Richmond.....	Two-thirds.
Robeson.....	Two-thirds.
Rockingham.....	One-third.
Rowan.....	One-third.
Rutherford.....	Three-fourths.
Sampson.....	Six-tenths.
Surry.....	Three-fourths.

COUNTIES.	WOODED AREA.
Swain.....	Five-sixths.
Tyrrell.....	Seven-tenths.
Union.....	One-third.
Yancey.....	One-tenth.
Warren.....	One-half.
Wayne.....	Four-tenths.
Wilson.....	Six-tenths.
Yadkin.....	One-half.*

Forestry Bulletin No. 8, from the United States Census Office, gives the amount of merchantable pine—long-leaved pine (*Pinus Australis*) standing in fifteen counties, as follows:

COUNTIES.	NO. FEET.	COUNTIES.	NO. FEET.
Bladen.....	288,000,000	New Hanover.....	96,000,000
Brunswick.....	141,000,000	Onslow.....	34,000,000
Chatham.....	448,000,000	Robeson.....	864,000,000
Columbus.....	288,000,000	Sampson.....	602,000,000
Cumberland.....	806,000,000	Wake.....	48,000,000
Duplin.....	24,000,000	Wayne.....	40,000,000
Harnett.....	486,000,000		
Johnston.....	563,000,000	Total.....	5,229,000,000
Moore.....	504,000,000		

### STOCK RAISING.

The entire transmontane country is well fitted for this business. The cultivated grasses flourish everywhere with even ordinary care. But it is in the north-western counties—particularly in the counties of Ashe, Alleghany, Watauga, Mitchell, Yancey, that all the conditions are found necessary for its perfect success. The soil throughout these counties is a deep rich loam, up to the summits of the mountains. The whole country is covered with a dense vegetation, amongst which will be found some of the largest timber in the United States, and as yet the forests are comparatively unbroken, because they have been inaccessible to market. The clearing of the timber is a work of some difficulty; but when that is done the labor of the farmer is rewarded with the richest crops. After two or three crops are taken off, the land, if suffered to lie at rest, springs up spontaneously in timothy herbs, grass and other rich pasture grasses; and once established, the grass perpetuates itself upon the land. Nor is an entire clearing necessary to establish the land in grass. If the undergrowth is removed, the trees thinned out, and the surface stirred and sown in orchard grass (Cock's foot), it flourishes luxuriantly, even while the forest trees are left standing.

Its capacity as a grazing country has long been known. But formerly the cattle were left to the resources of nature, which, indeed, in such a country, were abundant and rich. Of late, attention has been turned to the breeding of fine stock, and some herds of cattle and flocks of sheep are found there which will compare with the best in Kentucky. This country is already penetrated by one railroad, and others are in course of construction. When fairly laid open to railroad communication, it will offer—besides its rich mining interests and timbers—one of the finest fields for cattle and sheep breeding and for dairy products that the Union presents.

### SILK CULTURE.

Mr. Edward Fasnach, of Raleigh, North Carolina, who speaks from a practical knowledge of the business, says: Among the undeveloped resources of North Carolina, there are probably none deserving of more thoughtful consideration than silk culture. The mulberry, which supplies the food for the silk-worm, is indigenous, and grows in great abundance in almost every section of the State, and it attains its fullest development with scarcely any cultivation. Nor is the silk-giving quality of its leaves less noticeable; for wherever North Carolina

\*The reader must not forget that large areas of timber land have been sold in this State of late, and great inquiry is made for hard-wood lands there, and indeed elsewhere in the South.

grown silk has been put to a test, it has been found of most excellent quality, and equal to the best French and Italian.

There is no branch of agriculture that offers so generous a reward for so little capital invested as silk culture. The making of a crop, from the hatching to the gathering of the silk, be the crop small or large, will consume but six weeks' time. Moreover, the otherwise unemployed members of the family—as the women, the children, the aged, and even infirm—can here find profitable occupation. Nor is silk culture limited to the farm or country, but where there is a room and food for the silk-worm available, whether it be in town or city, silk can be raised.

Our endless tracts of cheap and uncultivated lands, so well adapted to the growth of the mulberry, and our mild and equable climate, present strong inducements to French and Italian colonies of silk growers, with whom the culture of silk has become an hereditary occupation.

#### EDUCATION.

The Constitution sets apart a large extent of land and appropriates all moneys arising from certain specified sources for establishing and maintaining free public schools in the several counties of the State; further, it directs the appropriation of 75 per cent. at least of the State and county capitation tax for the same purpose. The moneys from these sources form a permanent fund for education which cannot be diverted. The legislation of the last few years shows a growing sense of this great interest. That of the session of 1881 was a marked advance on any that had gone before. In addition to the provisions specified above, a tax of 12½ cents was levied on every hundred dollars' worth of property and credits, and the tax on the poll was correspondingly increased 37½ cents, in aid of the education fund. The revenue from these sources was reckoned to be fully adequate to keep open the public schools for four months in the year. If the tax thus levied should prove insufficient to maintain one or more schools in each district for the period named, the County Commissioners are required to levy annually a special tax to supply the deficiency. The ages for admission to the public schools range from six to twenty-one years.

The provision for higher education is ample. Private schools for both sexes are numerous. The principal institutions for the education of boys and girls are of the highest order. There is a State university, maintained in part by annual appropriations. Science and learning in their widest range are there taught by professors eminent in their several branches. Second only to the university are the denominational colleges of the State, each having a corps of learned professors and tutors.

# SOUTH CAROLINA.

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The State of South Carolina lies between north latitude  $32^{\circ} 4' 30''$  and  $35^{\circ} 12'$ , and longitude west from Washington  $1^{\circ} 30'$  and  $6^{\circ} 54'$ . The United States Census of 1880 makes its area 30,170 square miles. The coast is about 190 miles long. The State is broadly divided into the up-country and low-country.

## PHYSICAL AND AGRICULTURAL REGIONS.

In addition to the two grand divisions of South Carolina into the up-country and low-country, it will facilitate the consideration of the agricultural characteristics of the State to treat of them under certain minor natural and parallel sub-divisions, which are quite well marked. These are as follows:

I. *The Coast Region.* It coincides very nearly with the post pleiocene formation, rarely extending inland more than ten miles from the shore line. It consists:

1st. Of the Sea Islands lying south of Santee River, and containing about 800 square miles.

2d. The salt marshes, uncovered at low tide, bordering and intercalating with the Sea Islands, capable of being reclaimed, and embracing 600 square miles.

3d. The continuous shore line north of Santee River and Georgetown entrance, 300 square miles in extent.

II. *The Lower Pine Belt, or Savanna Region, lying inland and parallel with the Coast Region.* It has a width of about 50 miles; attains a maximum elevation above the sea of 130 feet. It may be divided:

1st. Into the region below the influence of the tides—the rice fields of South Carolina.

2d. The region above tide-water, notable for its turpentine farms and its cattle ranges.

III. *The Upper Pine Belt, or the Central Cotton Belt, having a width of 20 to 40 miles.* It is covered with a growth of long leaf pine, mixed with oak and hickory. The soil consists of a light sandy loam, underlaid by red and yellow clays. It has an elevation above the sea of from 130 to 250 feet. Large inland swamps, bays and river bottoms of unsurpassed fertility, covering 5,500 square miles, are interspersed among the two regions last named.

IV. *The Red Hills* are immediately north of the last region. They have an elevation of 300 to 600 feet above the sea. The soil is red clay and sand, and there is a heavy growth of oak and hickory. They embrace the range of hills extending from Aiken County, through Orangeburg to Sumter, where they are known as the High Hills of Santee, and also the ridge lands of Edgefield, famous for their fertility.

V. *The Sand Hill Region.* A remarkable chain of sand hills, attaining an elevation above the sea of 600 to 700 feet, and extending across the State from Aiken to Chesterfield Counties.

VI. *The Piedmont Region* includes that portion of the State known as the upper country. It has a mean elevation above the sea level of 400 to 800 feet. Its soils are:

- 1st. The cold gray lands, overlying for the most part the clay slates.
- 2d. The gray sandy soils, from the decomposition of granite and gneiss.
- 3d. The red hornblende lands.

4th. The trappean soils, known as flat-woods meadow or black-jack lands in various sections.

VII. *The Alpine Region* is the extreme northwestern extension of the rocks and soils of the region just mentioned, differing from the former by its more broken and mountainous character, and by its greater elevation, ranging from 900 feet to 3,430 feet at Mount Pinnacle, near Pickens C. H., the highest point in the State.

The Sea Islands are the great seat of the production of the long staple cotton. They are very slightly elevated above sea level. Soil—fine sandy loam, resting on a sub-soil of yellow sand or yellow clay. There are flats reclaimed by drainage very fertile, with soil of black vegetable mould of great fertility resting on fine blue clay and marl. Climate rather equable and moist. Health better than is supposed. The olive and orange trees bring their fruit to full perfection on the South Carolina coast. Once only during a period of 16 years prior to 1880 were the orange trees injured by frost.

#### THE LOWER PINE BELT, OR SAVANNA REGION.

Contiguous to and immediately inland from the coast region lies the Lower Pine Belt, or Savanna Region of South Carolina. Northward it may be bounded by a line dividing Hampton County nearly in half, leaving the Savannah R. ver in Lawton Township, running east across the county and through Broxton and Warren Townships, in the northwest corner of Colleton County, to Orangeburg County, including the townships of Branchville and Cow Castle; thence along the northern boundary of Charleston County to the Santee River. Leaving the Santee River about Wright's Bluff, this line traverses Clarendon County to its northeast corner, crosses Lynches River, descends that river to a point opposite where Catfish Creek empties into the Great Pee Dee, follows that stream to Barker's Creek, passes up it to Reedy Creek, down it to the Little Pee Dee, and up that river to the North Carolina line. The section thus bounded includes the half of Hampton County, nearly all of Colleton, two townships in Orangeburg, all but the northwest corner of Clarendon, the southwest portion of Marion, the whole of Williamsburg, and all Charleston, Georgetown and Horry Counties not lying on the coast, and comprises nearly one-third of the entire State.

The general appearance of the country is low and flat. The uniform level of the surface is scarcely broken anywhere, except here and there on the banks of the streams by the occurrence of slightly rolling lands. Eight large rivers, receiving all the water that falls in South Carolina, and a large proportion from the water shed of North Carolina, besides several smaller rivers and innumerable lesser streams, traverse this region, and furnish more than 1,000 miles of navigable waters. The maximum elevation of this region above tide-water is reached at Branchville, on the South Carolina Railway, and is 134 feet. Much of this country is underlaid with marl and cretaceous rocks. The valuable phosphate rock is in this division, vast deposits being near Charleston. It contains 55 to 61 per cent. of phosphate of lime; carbonate of lime, 5 to 10, &c. There is a very large business in mining the rock at that city and near it.

The soils of the Lower Pine Belt (7,000 square miles of uplands) comprehend three leading varieties: 1st. A sandy loam, with a white sandy sub-soil. 2d. A

sandy loam, with a yellow sub-soil. 3d. A sandy loam, with a clay sub-soil. The clay is generally yellow, but sometimes it is red. The characteristic growth of the uplands is the long leaf pine. The Savanna Region is thickly grown with small cypress. The uplands have scarcely any undergrowth, except here and there the scrub oak and the wire and drop seed grass. The magnolia, tulip tree, sweet and black gum, white and red bays, the white oak, the black walnut, the elm, hickory and cypress, are among the largest and most conspicuous trees of the swamps.

## CLIMATE.

Almost everywhere there are found small tracts—*islands*, as it were—of dry, sandy soil heavily timbered with the long leaf pine, which is a barrier to the invasion of malaria. These retreats furnish places of residence as healthful as are to be found anywhere. Rice is the most characteristic crop. Both upland and lowland are raised. Lowland rice farms that sold before the war at from \$200 to \$300 per acre, may now be bought at from \$20 to \$30, or less. Difficulty of obtaining labor is the explanation. Profits in rice raising good; an average yield per acre—20 bushels—worth \$35.30. Price of land in this belt ranges from 50 cents to \$10 an acre. Sugar-cane, rice, corn, cotton, sweet potatoes, oats, common crops, cane and native grasses are the chief agricultural products. A good range for stock is to be had. Water mostly free-stone.

## THE UPPER PINE BELT

lies between an elevation above the sea of 130 and 250 feet. It crosses the State in a northeasterly direction, from the Savannah River to the North Carolina line. It comprises, generally, the counties of Barnwell, Orangeburg, Sumter, Darlington, Marlboro and Marion. The northern half of Hampton and the northwest corner of Colleton are included in it. To the south it is bounded by the Lower Pine Belt, where the flat, open, piney woods, with an undergrowth of coarse grasses, gradually gives place to the higher and more rolling pine lands, with an undergrowth of oak and hickory. To the north the Upper Pine Belt sweeps round the feet of the interrupted range of high red hills traversing the State, or rises in the intervals of this range, to the still more elevated sand hills.

The land is level, without being flat, and is sufficiently rolling to insure good drainage for the most part. The watercourses rising in this region, or in the sand hill region above, are clear and rapid, while the larger rivers passing through it that come from the mountains are turbid. There are also many smaller streams, with fine water powers. Pure, cool water is found in an abundant supply generally, at from 10 to 20 feet depth.

## SOILS.

The Upper Pine Belt contains over 6,000 square miles, about one-sixth of which is swamp, and the remainder uplands. The uplands consist of a fine, light, gray, sandy loam resting on a sub-soil of red or yellow clay. In the east—in Marlboro and Marion—it is usually found at only three to four inches; in the west it is deeper.

The swamps are: 1st. The river swamps. This soil is a heavy alluvial loam, mulatto-colored, and sometimes mixed with fine sand and mica. These lands are very fertile and subject to overflow. The other swamp lands are known as bays, or upland swamps and creek bottoms. They are found on smaller streams and in bodies of different sizes in the pine lands. Soil—black, decomposed vegetable matter. They are not suitable for cotton, but produce good corn.

## CLIMATE.

The Upper Pine Belt is a peculiarly healthful region. There are no prevailing diseases, unless it be a mild type of malarial fever during autumn along the river

swamps. The upland swamps, not being subject to overflow, and resting on sand, are not troubled with these complaints when drained and cultivated. The swamp woods are cypress, white oak, gum, ash, hickory, beech, elm and black walnut. Besides the pine, there is on the upland, dogwood, hickory, and eight or ten varieties of oak, among which are the forked leaf black-jack, indicative here of a dry and thirsty soil, and the round leaf black-jack, showing a moister and more fruitful soil. The olive, the Italian chestnut and pine, varieties of the mulberry, the fig, peaches, apples, pears, pomegranates, plums, pecan nuts, English walnuts, grapes, &c., are successfully grown.

#### PRODUCTIONS.

The staple crops are cotton, corn, oats, rye, (the Southern variety,) and wheat to a limited extent, peanuts yielding an average of 40 bushels to the acre, sweet potatoes and rice. The culture of indigo and tobacco has been abandoned, though once found profitable.

Shad in the spring, and sturgeon and rock-fish in the summer and autumn, ascend all the rivers in this region, except that shad never enter the waters of the Little Pee Dee, notwithstanding they are clear and deep, like those of the Edisto. The Pee Dee is the last river to the south, where herring are caught in large numbers.

The Upper Pine Belt has a population of 221,409. The area of *tilled land* is 948,521 acres. More than one-third is in cotton. 418,417 acres are in grain of all kinds, including corn, small grain and rice.

The *farms* number 19,649. The grain crop in 1880, according to the census, was 3,631,302 bushels—an increase of one and a-half millions on the return of 1870. This includes corn, small grain and rice, and constitutes 21 per cent. of the grain crop of the State. Cotton planting is done during the month of April.

Lands vary much in price in this belt—from three to fifty dollars per acre, according to soil, location, improvements, &c. In a good many localities there are no lands for sale. Land rents from one to three dollars an acre.

#### THE RED HILL REGION.

The very gradual slope of the Upper Pine Belt having attained an elevation of 200 to 250 feet above the sea level, an irregular and somewhat interrupted line of high hills is encountered. These hills rise 200 to 300 feet above the plane of the Upper Pine Belt in the distance of a few miles, and not unfrequently this elevation is attained in traversing a few hundred yards. To the south and east extensive views over the gentle and irregular slope of the lower country are exposed from the summit of these declivities; to the north and west a sort of table-land stretches back, and gradually merges into the higher and more extensive Sand Hill Region of the State.

The general trend of these hills corresponds pretty nearly with that of the other regions of the State. Starting on the Savannah River, near Hamburg, they extend across the southern and western portion of Aiken and the northern townships of Barnwell Counties. Following the northern boundary of Orangeburg, they acquire their greatest width in that county around Fort Motte, near the confluence of the Congaree and the Wateree Rivers. West of the Santee River their course is more to the north, and they constitute that remarkable line of hills traversing Sumter County, long known as the "High Hills of Santee." Included in this region is also a body of lands in Edgefield County known as the "Ridge," which lie along the Augusta and Charlotte Railroad. Although the latter are above the outcrop of the granite rocks, being continuous with the Red Hills, and resembling them closely in physical features and soil, they are described with them.



While these Red Hills form a well marked belt across the State below the Sand Hills, from the southwestern part of Aiken County to the northeastern corner of Sumter, they are not continuous, but are interrupted at greater or less intervals by the protrusion of the Sand Hills. Mills' description of them east of the Santee River will give an idea of how this occurs. He says: "They take their rise about nine miles north of Nelson's Ferry, on the Santee, and form that fine body of brick mould land (3d Sup. Dist., E. D. 14 and 15,) in the Richardson settlement. After continuing eight miles, they become suddenly sand hills a little above Manchester. At the end of 11 miles they again become red land, which continues to Buck Creek, nine miles above Statesburg. These hills up to this point appear to hang over the Wateree Swamps; but now they diverge and turn to the northeast, with one ridge in the middle forming a backbone, breaking off into hills towards the Wateree, and sloping off gradually towards Black River. At Buck Creek the hills again become sandy, which gradually increases for 15 or 16 miles, to Bradford Springs. A little above this place they join the Sand Hills of the middle country." If these alternations were carefully traced, it is probable they would be found to be due to removal by denudation of the red clay loam from the slopes of sand and gravel that rise in the Sand Hills; for the sienna-colored clay loam, characteristic of this region, seldom has a depth greater than 20 feet, and is underlaid by beds of sand and gravel.

#### SOILS.

The reddish loam of this region presents an appearance somewhat similar to that of the soils derived from the hornblende rocks in the upper country, but it is not so tenacious and waxy. Although, when not cultivated, it becomes very hard in dry weather, in wet weather, owing to the large amount of sand it contains, the intervals when it cannot be worked are short. Vegetable matter rots rapidly in it, and for this reason long manures (as composts) are better adapted to it than fertilizers. The former are rapidly incorporated and well retained; and there is no soil that responds so well or is so capable of great improvement under treatment with stable and lot manures as these. Worked without manure they rapidly consume themselves and become unproductive.

#### CLIMATE.

Having an elevation of 400 to 500 feet and upwards above the sea level, the Red Hills enjoy a dryer and more bracing atmosphere than the regions to the south. While it is a notable fact that they are not so subject to the severer influences of storm winds as the lower lying lands, the ordinary movements of the air are more perceptible there than in the lower grounds. Thus, during the extremest heats of summer, there is rarely a night when the refreshing influence of a gentle south wind is not felt, blowing with a uniformity as though it had directly traversed the 70 miles intervening between these slopes and the ocean. Owing to this movement of the air and to its greater dryness, late spring frosts are of less frequent occurrence here than they are further south; nor is vegetation destroyed by cold so early in the fall. In ascending these hills in the autumn and early winter, at a certain elevation a stratum of warm air is encountered which seems to cling about the hill-tops, while a much chillier night air fills the bottoms. These advantages at one time made this region famous for its fruits. During the severest winter of the last half century the banana and the sago palm in the open ground, protected only by a few handfuls of cotton seed on their roots, though cut by the frost, retained sufficient vitality to throw up vigorous shoots the ensuing spring. This greater length of growing season has also made attempts at growing Sea Island cotton and sugar-cane more successful here than lower

down. The whole region is remarkably healthy; no taint of malaria approaches it, and it is in an unusual degree free from epidemics of every description. For these reasons many localities here, especially the "High Hills of Santee," were formerly much frequented as summer and health resorts by planters from all parts of the State, as well as from other Southern States.

#### GROWTH.

The long leaf pine thins out on these hills, and is sometimes replaced by short leaf pine of large growth. The characteristic growth, however, is oak and hickory of large size. Red oaks attain very large size.

The Red Hill Region contains about 1,620 square miles and has a population of 44,866. 56 per cent. are colored. The area of tilled land is 234,682 acres. The number of farms is 4,568, averaging for the whole 228 acres to the farm.

In grain of all sorts 114,425 acres are planted, yielding 804,443 bushels. In other days, when well manured, some of these lands yielded 34 bushels of wheat per acre. Lands near railroads range from \$15 to \$40 per acre. Large tracts by no means inferior to those already mentioned, except as regards accessibility, are offered at from three dollars to ten dollars an acre. These lands produce every variety of crop, and are well adapted to cotton. Not one-fourth of these lands are in cultivation.

#### THE SAND HILL REGION.

The Sand Hill Region of South Carolina stretches across the State from the Savannah River, opposite to Augusta, to the intersection of the North Carolina line by the Great Pee Dee River. The average distance of its lower border—among the Red Hills—from the sea is about 95 miles. Its length is 155 miles. Its width is variable. The maximum, which is reached in Lexington County, is about 30 miles, and the average width will hardly reach 20 miles. It occupies the larger portion of five counties, viz: Aiken, Lexington, Richland, Kershaw and Chesterfield. The Upper Pine Belt, ascending the eastern bank of the Congaree River in Richland County until it touches the granite rocks of the Piedmont Region at Columbia, divides the Sand Hill Region into two portions—an eastern and a western portion.

The physical features of this region are of a monotony aptly characterized by the term "pine barren" applied to it. The hills slope up from the Savannah River to a plateau having an elevation at Aiken C. H. of about 600 feet above the sea level. Beyond the North Edisto River the gradual ascent is resumed, until an elevation exceeding 700 feet is reached in Platt Springs Township, in eastern Lexington, whence there is a rapid descent of more than 700 feet in a short distance to the Congaree River. East of this stream the rise is again gradual, and the maximum elevation is reached on the northeast border of Richland County, where the hills again descend abruptly to the Wateree River. Beyond this river there is no data as to levels, except that on the water shed of the Great Pee Dee there is evidence as to extensive denudation of the surface to a depth of at least 150 feet.

#### SOILS.

The characteristic of the soils of this region is the loose, rounded sands which form their chief constituent. The organic matter which it contains consists largely of charcoal, resulting from burning off the woods, principally the pine straw (leaves of the pine.) Occasionally there are rounded hills of very fine sand of a dazzling whiteness, of such purity that they seem just to have emerged from the waters or to have been blown together by the winds on the seashore. There are, however, many elevated flats, which, under good culture and manuring, give excellent crops; and in the vales the soil is often productive. Since the intro-

duction of fertilizers, level lands in the neighborhood of the South Carolina Railway which sold in 1860 for three dollars an acre, have sold for \$30, and even as high as \$40 an acre. Throughout this region thousands of acres equal and superior to these, though not immediately upon a railroad, are for sale at one dollar to five dollars an acre. Under high culture 30 bushels of wheat per acre have been raised in this soil.

#### GROWTH AND PRODUCTIONS.

The growth is almost exclusively long leaf pine, and on the more barren ridges even this tree becomes stunted, and sometimes, on the higher and finer sand crests, yields its place to the New Jersey tea-plant, which alone covers the dazzling whiteness of the sands. Usually, however, there is a heavy growth of long leaf pine, and this tree here, almost on its northern limit in the State, attains its highest perfection, not only as regards size, (trees of three feet and four feet in diameter being not uncommon,) but also as to the quality of its wood, which has more heart and is more resinous than elsewhere. There is often an undergrowth of the forked leaf black-jack, and where there is a suspicion of moisture in the soil, this is replaced by the round leaf black-jack—a sure indication here of better soil. Besides the staple products of cotton, corn, the small grains, peas and potatoes common to this latitude, these soils have been thought specially adapted to other crops, such as peanuts, Palma Christi, sorghum, watermelons, vegetables, scuppernong grapes and peaches.

#### THE CLIMATE

of the Sand Hills is dry, tonic, sunny and stimulating, and entirely free from malarial influences. They have long been a resort during winter for consumptives from northern latitudes, and during the summer months for persons from the lower country of the State. Aiken, a town in that area, has for years been very celebrated as a resort for health.

The area of the Sand Hill Region is estimated at 2,441 square miles. The population is 28,612. The area of tilled land is 151,359 acres. It is divided among 4,238 farms, giving 35 acres of tilled land to the farm. 59 per cent. of the population is colored.

#### THE PIEDMONT REGION.

The Piedmont Region of South Carolina coincides very nearly with what is known as the upper country of the State. It includes the whole of eight counties, to wit: Abbeville, Anderson, Newberry, Laurens, Union, Fairfield, Chester and Lancaster. It also embraces the northern portion of Edgefield and Lexington, and the northwestern portions of Richland, Kershaw and Chesterfield. The southern parts of Oconee and Pickens, and the southern and larger portions of Greenville, Spartanburg and York, are within its limits. A line drawn from a point on the Savannah River three miles above Hamburg to Columbia, and running thence northeast to where the Great Pee Dee River crosses from North into South Carolina, defines, in a general way, its southern border. Its northern boundary follows, in the main, the direction of the Atlanta and Charlotte Air Line Railroad, which lies on the edge of the Alpine Region, just north of the one under consideration.

The physical features of this portion of the State entitle it to the name of the Piedmont Region. Its rocks are so similar to those of the Blue Ridge Mountains, that, though they have been broken down, levelled off and worn away by exposure during the countless ages, to the vicissitudes of the seasons, they are and always have been the foot-hills of the Apalachian range; while the broken and mountainous region to the north, usually spoken of as the Piedmont Country, might be better called the Alpine or Sub-Alpine Region of the State.

The face of the country presents a gently undulating plain, which becomes more rolling as it approaches the rivers and larger streams, and is finally hilly and broken above the bottoms and narrow low grounds through which the numerous water-courses find their passage. The mean elevation of the Columbia and Augusta Railroad where it passes along the southern borders of the region is 575 feet. That of the Air Line Railroad, in South Carolina, lying to the north of it, and almost wholly within the Alpine Region, is 910 feet. Between these two lines, therefore, a distance of some 90 miles, there is a general rise of the surface of 335 feet, or less than four feet to the mile. This is a gentler slope than that of the tertiary plane or low country. While the general rise in the surface is less than that in the low country, the rise in the beds of the streams, owing to the resistance of the underlying rocks, which prevent the water from deepening their channels, is much greater. This adds largely to their availability as water-powers for manufactures.

The Savannah River is now navigable for pole-boats carrying 50 bales of cotton for 154 miles above Augusta. The Saluda River is navigable for 84 miles above Columbia, where it unites with the Broad to form the Congaree River, for the same kind of boat. The Broad River is navigable for 113 miles in South Carolina, above Columbia, and for 28 miles more in North Carolina, for this class of boats. It has a total length of 175 miles. The Catawba River has a fall of 325 feet in the 55 miles of its course in South Carolina. Its banks are 300 to 3,000 feet apart, and from 10 to 100 feet high. *Above Rocky Mount, in Chester, there is a fall at one point of 50 feet in 400 yards.* It has a total length of 272 miles, and its source is 2,500 feet above the level of the sea.

The data above given were obtained by surveys made in the driest season of a very dry year, and therefore represent these streams at extreme low water. This low stage of the water prevails during October and November. At other seasons the volume of water would be, on the average, two or three times as great. The rivers are subject to freshets, rising 20 to 30 feet above low water mark, this rise being greatest where they issue from the Piedmont Region.

#### SOILS.

The area of land in the Piedmont Region whose culture is impeded by the rocks prevalent there is comparatively insignificant. This is due to the remarkable extent and depth of the disintegration of these rocks.

The granite soils occupy by far the largest area. These soils are characterized by two distinct names:

1st. The gray, sandy soils occupy the ridges and levels, and have been formed by the gradual separation of the silicious and argillaceous materials found in the debris of the decomposing rocks that underlie them. This gives a light, loose, warm, sandy loam, varying in depth from three to eighteen inches, and fine or coarse, according to the grain of the rock from which they are derived. The sub-soil is red or yellow clay. Such soils are of easy culture, respond readily to the use of commercial fertilizers, and are well adapted for cotton. For these reasons they are much more highly esteemed than formerly.

2d. The red clay loams are the prevailing soils of the hilly and broken country. Occupying slopes of greater or less declivity, the loose sand has been washed away as fast as it has been released from the tenacious clay. The washing of these hills is not so destructive of their fertility as it would have been if the soil were not formed from rocks rotting *in situ*, and thus including at every depth all the numerous and varied elements of parent rocks.

The hornblendic soils are a variety of these red clay soils, derived from granite and gneiss rock, traversed by seams of hornblende. They are dark in

color, and of a more brilliant red. They occur in Edgefield, about Horn's Creek, and more extensively in Newberry, especially between the Court House and Asheford's Ferry, extending thence into Fairfield. They form excellent cotton lands, and are well suited to the culture of all the grains.

The clay slates underlie a soil that is characterized as a cold gray soil. In color they vary from gray to yellow and brown. The sub-soil is, for the most part, of yellow clay, but sometimes it is reddish. These soils are better adapted for small grains, and especially for oats, than for cotton. They cover an extensive area in Edgefield, and reach along the northern border of the tertiary; thence to Chesterfield.

The trappean soils traverse York and Chester Counties in a northeasterly direction, coinciding very nearly with that of the Charlotte and Columbia Railroad. They give rise to a distinctly marked body of lands known as the "rolling black-jack lands" and as black-jack flats. The latter are the most extensive and better defined in their characteristics. The lands are level; the streams slow and tortuous, with low banks. The soil is a rich dark brown chocolate color; sometimes jet black. The sub-soil is a yellow, waxy clay, exceedingly tenacious, and where the rocks are not thoroughly decomposed, it assumes an olive green color. Beneath it the decomposed, and lower down the undecomposed, rock is found, called here "iron rock" or "negro head." The level configuration of the surface and the impervious nature of the sub-soil interfere naturally with drainage—an interference, however, not at all beyond the remedy of art, as the fall for properly conducted drains and outlets is ample. But because they require drainage, these lands which, from their general appearance and from their chemical analysis, should be ranked as among the very best in the State, have received little attention. Corn and cotton planted on them turns yellow—"frenches," as it is termed. When, however, thorough drainage has been effected and stable manure used, they have proved very productive and enduring.

The "rolling black-jack" lands, as might be inferred from their name, have a better natural drainage, and have long been highly prized for their productiveness.

Rich bottom lands are to be found scattered along the numerous rivers, creeks and branches that everywhere traverse this well-watered region.

#### CLIMATE.

The shorter seasons and lower temperatures of the Piedmont Region, as compared with those lying immediately south of it, are but slightly attributable to differences of elevation or of latitude, these differences being themselves slight. In so far as it obtains, it results, perhaps, from greater nearness to the mountains, and, as affecting agriculture, still more to the heavier clay soils and sub-soils, more retentive of moisture, and therefore colder and later in spring than the lighter sandy loams of the lower country. Cotton planting is about 10 days later than in the Upper Pine Belt. Cotton blooms are also later, but by a lesser period; and the same is true of the opening and picking season of the plant—showing that, with a later start, it grows faster, passing more rapidly through its various stages to maturity. This region, however, does not seem to be much affected by that variability of temperature common to localities in proximity to mountain ridges. This is shown by the singular exemption of certain localities here from the injurious effects of late spring frosts. Thus, on Rich Hill, in Pacolet Township, Spartanburg—a ridge six miles broad between the Pacolet and Fair Forest Rivers—fruit has been injured *by late frosts but once in 40 years. Localities in Union also enjoy this immunity in nearly the same degree.* In the absence of other records, some idea of the temperature may be formed by observations on the temperatures of springs, assuming that this temperature approximates the annual

mean. Lieber states, as the result of a number of observations, that the springs of the Alpine Region have a temperature of 55° to 58° Fahrenheit; those on a line passing through the centre of the Piedmont Region, one of 58° to 61.5° Fahr., and below this line, one of 61.5° to 66° Fahr. The only accessible records of rainfall are those published by the Smithsonian Institution, May, 1881. They give an average annual rainfall in this region of 52.34 inches, varying from 44.05 inches to 60.12 inches. This gives a greater annual rainfall for this region than for those south of it, and places it, in this regard, next to the areas of greatest *annual precipitation in the United States*. The spring rains vary from 12 inches to 15 inches, and in this regard it holds the same relations as in the former to the regions south of it and to the United States. The summer rains are 10 inches to 14 inches less than in the regions south of it, and third or midway between the areas of greatest and of least summer precipitation in the United States. The autumn rains are eight inches to ten inches, and in the counties east of Broad River they are 10 inches to 12 inches—being about the same as in the region to the south, and midway between the areas of greatest and least autumn precipitation in the United States. The winter rains are 10 inches to 14 inches—something more than in the lower country, and a little above midway between the areas of greatest and of least winter precipitation in the United States. In the whole year, and in each season of the year, the rainfall is less than in the Alpine Region north of it.

In point of healthfulness this region leaves little to be desired. When first settled the country *was entirely free* from all malarial influences. Subsequently, during the period when the first clearing of the forest was in active progress, the hitherto clean-bordered channels of the streams became obstructed, in part with fallen timber and brush from the clearings, and in part by the washings of the hill sides, under the injudicious use of the plow. These washings occurred to such an extent as to alter the original level of the surface, and to pile the dirt up around the trees in the bottoms until they were killed. Such operations were attended with the prevalence of malarial fevers. Later, the uplands having been cleared and partly exhausted, attention was directed to the drainage and reclaiming of the low grounds for agricultural purposes, and the healthfulness of the locality was restored. It has thus happened that, with the extension of the settlements, a belt of malarial influences has moved forward with them, vanishing below and advancing above, until it reached the wooded slopes of the mountains before disappearing.

#### GROWTH.

The original forest has disappeared almost altogether, and has been replaced by younger oaks of small growth, by underbrush, and by the loblolly pines of the abandoned fields. The cane has gone likewise. The wild pea vine is no longer known, though since the stock has been penned, under the new fence law, a plant supposed to be it has appeared in the open woodlands, with several other grasses not observed before. The prairies have become covered with a growth of heavy-bodied post-oak and black-jack. The latter, in turn, has now given place to the cedar in Chester. The chestnut has been dying out for 50 years. In some localities where it once flourished it has entirely gone, and in others the large dead stems and stumps are the only vestige of this valuable and stately tree. The chinquapin is also sickening and dying, and the chestnut oak likewise. During some years past somewhat similar symptoms of disease have appeared in the red and black oak, and fears on this account have been entertained. The distinctive growth of the region is the short leaf pine, with a large variety of oaks and hickories. On the water-courses, willow, beech, birch, black walnut, ash, poplar and gum abound. In sections of Laurens, the long leaf, formerly unknown in

this section, has, within the last 10 years, appeared among the old field pines. The sycamore sometimes attains a great size. The tulip tree also is often very large. The sugar maple is found, and another maple of larger growth, and yielding a superior sugar, both as to quantity and quality, is known in Lancaster under the name of the sugar tree. The country is particularly commended as a grass country, and will produce fine hemp, tobacco, wheat, corn, grapes, oats, &c.

This region embraces about 10,425 square miles, or nearly one-third of the entire State. The population numbers 395,043—the increase since the census of 1870 being 30 per cent. The percentage of colored population varies greatly in the different counties, being as high as 70 in Fairfield and as low as 34 in Spartanburg; the average is 58. Of the 6,672,000 acres of land in this region, 50 per cent. is in wood, 22 per cent. is in old fields, and 28 per cent. is tilled. There are 35,591 farms. This is an increase of at least 80 per cent. since 1870, and of 180 per cent. since 1860, while the increase in the decade preceding that—a time of much prosperity—did not much exceed one per cent. 56 per cent. of the farms are worked by renters and 44 per cent. by owners. The tilled land is 1,861,922 acres—an increase of 56 per cent. since 1870. 48 per cent. is in grain of all kinds, 40 per cent. in cotton, and 12 per cent. is in gardens, orchards, fallows, and all other crops. The crops are: Cotton—274,318 bales, against 94,494 in 1870. It constitutes 53 per cent. of the crop of the State on less than one-third of its area. The average for the region is 166 pounds of lint cotton per acre. The grain crop is 7,731,528 bushels—an increase of 139 per cent. on the crop of 1870. The average yield for the whole region is nine bushels per acre. Per capita of the population the yield is 19 bushels, which is four bushels more than in 1870. This leaves a deficiency. But the attempt to raise farm supplies is pretty general, and is reported as increasing, except in Laurens, where it remains the same, and in Abbeville, where it is decreasing. Usually this attempt is in so far successful as to provide a considerable portion of the subsistence for farm hands and stock. Bacon is largely imported from the North and West, and sometimes hay and corn also for farm use. The larger portion of the lands is held in tracts of from 200 to 500 acres. On three-fourths of the farms mixed husbandry is practiced, and on the remaining fourth attention is bestowed almost exclusively on cotton. The system of credits and advances prevails to a large extent, consuming from one-third to three-fifths of the crop before it is harvested. The statement is general that this is on the decrease, and is correct in so far that a larger amount is being produced at home, and a larger number of purchases for cash are being made by farmers since 1876. Field labor is performed exclusively by natives, and chiefly by colored laborers. In some counties the number of white laborers preponderates. The prevailing wages of field labor is eight dollars per month or one hundred dollars per year. In all cases the laborer is furnished with shelter, rations and firewood, and almost invariably with a garden and the privilege of raising poultry and some stock. Work commences at sunrise and is over at sunset. The time allowed for meals varies. For dinner it is from one to three hours, according to the length of the days. A large proportion of the land is worked on shares. When the landlord furnishes the tools, stock and stock feed, he takes one-half the crop in Laurens, Chester, Abbeville and York, and in portions of Fairfield and Spartanburg. In Greenville and portions of the counties last named, the laborer takes one-third and the landlord two-thirds, under the above conditions. In Greenville also the laborer takes two-thirds if he furnishes tools, stock, and feed for it. The portion paid for land alone varies from one-fourth to one-third of the crop—the former being the most general one.

Statements regarding the average market value of land vary with every locality. They are for Greenville and Laurens, six dollars to ten dollars an acre;

for York, six dollars; for Abbeville and Spartanburg, ten dollars; for Newberry, six dollars to twenty-five dollars; for Fairfield, three dollars to fifteen dollars; for Chester, seven dollars to eighteen dollars. Land rents at from the value of two dollars and a-half to three and a-half per acre. Correspondents in some instances report no lands for sale in this Piedmont Region.

The writer deems it, in much of its area, a fine grass country. In a tour through much of it two years ago, the Kentucky blue-grass was a striking earnest of the possibilities of the country in stock-raising and dairying, if the people will but appreciate it. It was seen growing spontaneously in many places along the line of the Charlotte, Columbia and Augusta Railroad and the branches controlled by it traversing the Piedmont Region.

#### THE ALPINE REGION.

The Alpine Region of South Carolina occupies the extreme northwestern border of the State. Commencing at King's Mountain, in York County, it extends westward through Spartanburg, Greenville, Pickens and Oconee Counties, widening in the three last named, until it embraces a tier of the most northern townships two or three deep. This wedge-shaped area has a length of 114 miles, and a width varying from eight to twenty-one miles.

The physical features of this region present a rolling table-land, broken and hilly on the margin of the streams, but scarcely anywhere inaccessible to the plow. It has a general elevation above the sea level of 1,000 to 1,500 feet. The gently undulating surface extends to the mountains, whose rock-bound walls often rise suddenly to their greatest height. The southeastern face of King's Mountain rises perpendicularly 500 feet above the plain, and its northwestern slope descends gently towards the Blue Ridge Mountains. Table Rock also rises 800 feet vertically, or a little overhanging above the southeastern terrace at its base, formed of the loose fragments that in the course of ages have fallen from above. The steep ascent of these mountains from their South Carolina or southeastern face, and their gradual slope on their northeastern face, and their gradual slope to the northwest, where the mountains of North Carolina rise apparently from a level country, is the reverse of the prevailing rule on the Atlantic slope, which is, that the short steep sides face northwest, and the long gentle slopes face southeast. The bracing and healthful climate of this region, its beautiful scenery, the bold mountain outlines, the rich luxuriance of every growth; no stunted plant on mountain side or summit; every part, even the crevasses of the rocks, covered with trees and shrubs of some kind, all full of life and vigor; the clear swift streams that everywhere leap in a succession of cascades from crag and cliff, and sparkle in their course along the narrow but fertile valleys, have made it for generations a health and pleasure resort during summer.

The elevation above the mean level of the sea of the following points in Western South Carolina were determined by the United States Coast Geodetic Survey: King's Mountain, 1,692 feet; Paris Mountain, (near Greenville,) 2,054 feet; Cæsar's Head, 3,118 feet; Mt. Pinnacle, (near Pickens,) the highest point in South Carolina, 3,463 feet.

#### THE SOILS.

The soils are similar to those found elsewhere in the State which are produced by the decomposition of gneiss rock *in situ*. On the more level uplands a gray, sandy loam, with a red, and sometimes, on the mica slates, with a yellowish white, clay, predominates. On the hillsides a stiff red-clay soil prevails. In the bottoms a still darker loam, more thoroughly saturated with lime and potash from the decomposed hornblende and mica slates, is found. Those bottom lands have long been highly esteemed as yielding abundant crops of corn, the small grains



and the grasses. Little thought or attention was bestowed on the uplands previous to the attempt, so successfully made within the last few years, to introduce upon them the culture of cotton.

## CLIMATE.

According to the physical charts of the Ninth United States Census and the rain charts of the Smithsonian Institute, (2d Ed., 1877,) this region has a mean annual temperature corresponding with that of Kansas or New Jersey. The more mountainous portions have, however, a mean annual temperature that corresponds with that of Montana or the lower region of the great lakes. The annual fall of water is over 60 inches. For spring it is over 18 inches, and for autumn it is 12 inches; in winter it is 16 inches. Dewless nights rarely occur.

## GROWTH.

The prevailing growth is oak, chestnut and short-leaf pine. Hemlock or spruce pine (*abies canadensis*) is found in the mountains.

The Alpine Region of South Carolina embraces an area of 1,250 square miles. The population numbers 34,496—an increase since the census of 1870 of 66 per cent. 26 per cent. of the population is colored. 80 per cent. of the land is woodland and forest, 16 per cent. is tilled, and four per cent. is in old fields. The area of tilled land has more than doubled since 1870, being now 132,791 acres. The number of farms is 4,646. 43 per cent. are under 50 acres. Of the tilled land, 88,766 acres, or 65 per cent., is in grain of all kinds. The average yield of grain is only a little over eight bushels to the acre, and does not express the capability of this section for the production of this article. Fields of corn on bottom lands averaging 40 to 60 bushels an acre are not uncommon, and the minimum of calculation of the crop for uplands, without manure, is 10 to 12 bushels per acre, while 20 to 30 are obtained by good culture. Rice has grown here, without any manure, over 100 bushels to the acre, though very little of it is planted. The yield of grain per capita is 20 bushels, and is greater than elsewhere in the State, except in the Sand Hill Region. The average yield of lint per acre planted in cotton is 141 pounds. The land-holdings average from 150 to 300 acres, including woodlands. Most of the land is rented or worked on shares. The cash rental varies from two dollars and fifty cents to four dollars an acre. The usual terms are one-fourth the cotton and one-third of the grain. Where stock and implements are furnished by the landlord, he gets one-half the crop. The average market value of lands is stated at five dollars an acre; improved lands sell at from six dollars to ten dollars an acre. About one-half the field laborers are negroes. Wages are fifty cents a day; six to eight dollars a month with board; seventy-five dollars a year with board. One-horse plows are generally used.

## WATER-POWERS OF SOUTH CAROLINA.

South Carolina is remarkably blessed with this great source of prosperity to many countries. We cannot think of showing how much there is and where distributed; we touch only the leading points. Among many advantages enumerated as to the water-powers, it is stated: "That the rocky beds of these streams afford everywhere good sites and permanent foundations for mill-dams, while the high angle at which they cross the ledges of rock increases the perpendicularity of the fall, and presents a clean, smooth edge, adding to the facility with which the water is made available." Another great consideration is given: "The metamorphic rocks laid bare on the banks of the streams furnish material for dams and buildings of the best quality. Besides soapstone, gneiss, talc and mica slates, there are few localities where a fine-grained and easily-splitting granite is not to

be had." The following is considered a low estimate, and does not embrace all the territory:

SUMMARY OF POWERS ON RIVERS IN SOUTH CAROLINA, EXAMINED BY G. F. SWAIN, S. B., SPECIAL AGENT TENTH U. S. CENSUS.

STREAM AND LOCALITY.	Drainage Area in Square Miles.	FALL.		FLOW PER SECOND.		HORSE-POWER AVAILABLE.			
		Height.	Length.	Minimum.	Maximum.	Minimum.	Minimum, Low Seasons.	Maximum, With Storage.	Low Seasons, Dry Years.
Wateree River, Wateree Canal.....	4,376	52	5 m.	963	3,500	5,700	7,750	20,700	8,850
Tributaries: Big Pine Tree Creek.....	55	40	.....	28	55	3.2	4.1	.....	6.3
Little.....	12	18	.....	6	12	0.7	3.2	.....	4.9
Catawba River, Great Falls.....	3,600	173	8 m.	793	2,900	15,000	21,000	37,000	24,000
Catawba River, Landsford.....	3,425	40	.....	750	2,500	3,400	4,650	13,000	5,370
Tributaries of Catawba River: Rocky Creek.....	185	.....	.....	18	160	2	3	18.2	3.4
Fishing Creek.....	223	.....	.....	25	200	2.8	4.5	27.8	5.6
Sugar Creek.....	380	.....	.....	50	330	5.6	6.8	37.5	8.0
Congaree River at Columbia.....	7,900	223	34	1,680	6,200	4,200	5,500	15,500	6,400
Tributaries of Congaree River: Congaree Creek.....	115	.....	.....	.....	.....	6.6	.....	13.2	.....
Red Bank Creek.....	12	.....	.....	.....	.....	.....	.....	.....	.....
Broad River, Bull Sluice.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ninety-Nine Island Shoal.....	4,760	17.2	2 3/4 m.	.....	.....	2,150	2,800	7,956	3,320
Boney Shoal.....	4,525	6.0	.....	.....	.....	700	925	2,600	1,075
Summer Shoal.....	4,480	11.61	0.94 m.	.....	.....	1,350	1,775	5,000	2,000
Lyle's Shoal.....	3,490	11.36	4.30 ft.	.....	.....	1,050	1,350	3,320	1,600
Neal's Shoal.....	2,590	9.75	3.30 ft.	.....	.....	650	850	2,500	1,000
Lockhart's Shoal.....	2,400	47.6	1.41 m.	.....	.....	2,000	3,900	11,000	4,500
Ninety-Nine Island Shoal.....	1,387	50	3.20 m.	.....	.....	1,300	2,350	6,323	2,700
Cherokee Shoals.....	1,357	50.2	2 m.	.....	.....	1,300	2,350	6,900	2,700
Surratt Shoal.....	1,142	35	1.75 m.	.....	.....	1,000	1,250	4,000	1,450
Gaston Shoal.....	1,132	10	1 m.	.....	.....	280	360	1,150	400
Enoree River, Yarboro Mill.....	375	16	.....	62	400	112	144	725	176
Mountain Shoal.....	280	.....	.....	42	300	320	450	2,400	500
Leatherwood Shoal.....	234	12	.....	35	250	48	60	340	72
Van Patton Shoal.....	234	55	.....	35	250	250	290	1,550	330
Palham Manufacturing Company.....	94	30	.....	10	100	35	42	340	51
Beuna Vista Factory.....	94	18	.....	10	100	20	25	200	31
Tyger River, Tenue's Fall.....	94	23	80 ft.	10	100	25	32	200	39
Hill's Factory.....	308	40	3-4 m.	45	330	204	272	1,500	330
Nesbitt's.....	274	9	.....	.....	.....	670	180	371	200
Ott's Mill.....	112	36	300 yds.	.....	.....	72	90	238	205
Cleveland's.....	.....	20	.....	.....	.....	.....	.....	.....	60
Dean's Mill.....	60	11	.....	.....	.....	.....	.....	.....	25
Ballinger's.....	.....	14	.....	.....	.....	.....	.....	.....	32
Penny Shoal.....	60	35	1-4 m.	.....	.....	35	.....	140	42
Crawfordsville.....	.....	.....	.....	.....	.....	.....	.....	.....	40
Murphy's Fair Forest Creek.....	180	27	300 yds.	27	200	31	108	613	135
Pacolet River, Trough Shoals.....	380	66	.....	62	420	420	600	2,860	700
Hurricane Shoals.....	82	15	.....	.....	.....	.....	.....	.....	90
Glendale.....	82	35	.....	.....	.....	1,000	140	210	200
Saluda River, Saluda Factory.....	2,350	16	.....	62	2,100	1,000	1,275	3,800	1,500
Mouth of Saluda.....	2,350	34	21-2 m.	.....	.....	2,100	2,700	8,100	3,200
Dreher's Canal.....	2,300	22	1 m.	.....	.....	1,150	1,500	4,400	1,700
Great Falls.....	635	55	1-4 m.	.....	.....	800	1,000	4,000	1,200
Mattox Mill.....	600	5	.....	.....	.....	60	75	300	90
Erwin's Mill.....	523	10	.....	.....	.....	120	150	600	175
Reedy River, Elzer Manufacturing Company.....	400	21	.....	70	.....	.....	.....	.....	.....
Piedmont Manufacturing Company.....	380	20	.....	70	425	160	240	970	284
Reedy River, Tumbler Shoals.....	386	.....	75 ft.	62	400	7	9.4	45.4	11.1
Fork Shoal.....	.....	20	.....	.....	.....	.....	40	.....	53
Reedy River Manufacturing Company.....	87	22	.....	.....	.....	25	32	260	89
Camperdown Mills.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cox & Markley's Factory.....	8	.....	.....	.....	.....	.....	.....	.....	.....
Savannah River, Blue Jacket Shoal.....	5,800	10	600 ft.	.....	.....	1,650	2,050	5,800	2,350
Trotter's Shoal.....	2,664	75	7 m.	670	2,550	5,700	8,160	21,750	9,165
Cherokee Shoal.....	2,212	9	1-2 m.	.....	.....	560	800	2,150	900
Gregg's Shoal.....	2,100	14	1 m.	.....	.....	825	1,150	3,200	1,325
Middleton's Shoal.....	2,078	18	.....	.....	.....	1,060	1,500	4,000	1,700
McDaniel's Shoal.....	1,900	30	5 m.	.....	.....	1,000	2,275	6,100	2,600
Tributaries Savannah River: Little River.....	531	.....	.....	79	450	9	18	51	14
Long Cano.....	183	.....	.....	22	158	2.5	3.2	18	8.6
Hatton's Shoal.....	845	39	1 1/2 m.	20	925	936	1,131	4,095	1,287
Guest's Shoal.....	775	17	1 m.	.....	.....	375	450	1,650	520
Seneca River, Portanan's Shoal.....	740	60	2 m.	189	825	1,200	1,700	5,620	1,950
Twelve Mile Creek.....	148	60	.....	15	135	102	144	92	165
Little River.....	140	.....	.....	20	168	2.3	3.4	19.1	4.0

In the foregoing statement the available water-power examined is estimated at something over 300,000 horse-power. Only about four per cent. is utilized. Without further allowance for the low estimates, or for the improvement that art might effect by dams and canals, there can be no question that, from the lower line of hill country northward in South Carolina, there is more than a million of horse-power in water-powers, varying in size from 30 to 30,000 horse-power, easily

and cheaply available, under conditions peculiarly advantageous, not counting the presence of the large amount of raw material in the shape of cotton to be manufactured.

For general information, the following table of cost of water-powers at various points is also given:

## ANNUAL RENT OR ESTIMATED COST OF ONE HORSE-POWER.

	WATER-POWER.	STEAM-POWER.
Lawrence, Mass.....	\$14 12	\$64 00 to \$74 00
Dayton, Ohio.....	38 00	33 60
Cohoes, New York.....	20 00	
Turner's Falls, Mass.....	10 00	
Augusta, Georgia.....	5 50	

It is estimated that if the State rents the water it is now developing at Columbia at five dollars per annum for one horse-power, that it will obtain a handsome revenue from the labor and material expended.

At seven per cent. on the cost of dams and canals for the water-power utilized and available in South Carolina, the following is a statement of the cost of a horse-power per annum at several factories in this State.

Langley.....	\$2 10
Graniteville.....	5 81
Vaulcuse.....	7 00
No 1, Camperdown.....	0 43
Glendale.....	0 39
Saluda Factory.....	0 28

Average for the whole, one dollar and seventy cents per annum per horse-power.

## MANUFACTURES.

South Carolina, like the other Southern States, has shown rapid progress in manufactures, although probably surpassed in that line by one or two of the others. The growth of the material interests of that State of late years is very forcibly shown by some statistics compiled from the Charleston News and Courier. In manufactures, cotton has taken the lead. The product of the cotton mills of South Carolina was as follows:

In 1860.....	\$ 713,050
" 1870.....	1,274,944
" 1880.....	2,895,769
" 1883-84.....	7,963,198

The percentage of increase was as follows:

1860-70.....	78 per cent.
1870-80.....	127 "
1880-84.....	175 "

In a little more than three years, ending January, 1884, the increase in production was a third more than in the ten years ending in 1880, and the whole product in 1883 was ten times as great as the product in 1860. This is not the whole truth. The actual capacity of the cotton mills in South Carolina as they stand to-day is at least \$9,000,000. The number of looms and spindles was as follows:

	LOOMS.	SPINDLES.
1860.....	525	30,890
1870.....	745	34,940
1880.....	1,676	82,334
1883-84.....	3,652	195,112

Mr. C. H. Parker, Secretary National Cotton Exchange, gives the very latest figures for this State, as follows: Mills, 36; looms, 3,685; spindles, 210,304.

The production of lumber and naval stores has increased with exhilarating rapidity. In 1880 and in 1883, respectively, the value of the products was:

	1880.	1883.
Lumber.....	\$2,031,507	\$5,592,565
Naval Stores.....	2,857,981	2,912,271
Totals.....	\$4,889,488	\$8,504,836

The increase in the value of the product in three years is 74 per cent. In value, the lumber and naval stores business exceeds by half a million dollars the value of the products of the cotton mills last year. The lumber and naval stores of last year equaled in value 212,620 bales of cotton, at \$40 to the bale.

Taking the classification of manufactures, which is followed in the United States census, and reducing the value of the products in 1870 to a gold basis, we obtain the following results, being the whole value of all manufactured products in South Carolina:

1860 .....	\$8,615,195
1870 .....	8,215,198
1880 .....	16,738,008
1883 .....	32,324,404

The progress of the State in agriculture has been satisfactory, as is proved by the following statement of the production of cotton, corn and small grain:

	1860.	1870.	1883.
Cotton, bales.....	353,412	224,500	468,227
Corn, bushels.....	15,635,606	7,614,207	10,876,744
Oats, ".....	906,024	613,593	4,137,082
Wheat, ".....	1,285,631	782,610	1,383,731

The year 1883 was most unfavorable; the crop of cotton, as compared with 1882, being reduced 32 per cent. by drought, rust and worms, while corn was reduced 43 per cent., oats 8 per cent., and wheat 2 per cent. In spite of this, the cotton crop in 1883 was 114,815 bales more than in 1860. This year the estimated crop, as compared with 1860, will be as follows:

	1860.	1884.
Cotton, bales.....	353,412	700,000
Corn, bushels.....	15,635,606	19,210,000
Oats, ".....	906,924	7,437,213
Wheat, ".....	1,285,631	1,803,924

This is a fair estimate of what may be expected, if the season be favorable, and if the estimate be reduced considerably there is still an enormous improvement, in the agricultural situation, as compared with 1860. The increase in oats, a distinctively white man's crop, is worthy of special notice. Moreover, the advance in agriculture is due to the labors of the white people of the State.

The following recapitulation shows the progress made during the last three decades, and to 1883:

1860.	1870.
Agriculture.....\$45,823,512	Agriculture.....\$34,924,585
Manufactures.....8,615,195	Manufactures.....8,215,918
Mines and quarries.....17,000	Mines and quarries.....16,573
<hr/>	<hr/>
\$54,455,707	\$43,157,076
1880.	1884.
Agriculture.....\$41,969,749	Agriculture.....\$41,790,321
Manufactures.....16,738,008	Manufactures.....32,324,404
Mines and quarries.....1,180,805	Mines and quarries.....2,440,000
<hr/>	<hr/>
\$59,888,562	\$76,554,725

#### LOCATIONS OF MINERALS, ROCKS, &c.

*Antimony*—Traces in Abbeville County.

*Asbestos* occurs in Spartanburg County, where there is a mine; in Oconee County; also in the counties of Laurens, York, Anderson and Pickens.

*Barytes*, in great quantities, occurs near the Air Line Railroad in York. A mine is being worked in this county with small capital.

*Beryl* is found in King's Mountain Township, Anderson County, in Edgefield and Laurens Counties.

*Bismuth*, in quantity, is found at one of the gold mines in Chesterfield.

*Buhr-stone* is found in Kershaw County, north of Orangeburg.

*Clay*, for bricks, in numberless places.

*Copper* is found in Anderson County. Before the war—none since—work was being vigorously pushed in mines in York County. It is found, but only slightly developed; in Edgefield County; found, but not mined, in Laurens County; traces observed by Lieber on Tyger River in Spartanburg County, in Oconee County, and in some mill-races in Southern Pickens and Greenville; indications, but no mining, in Oconee County. Copper is found everywhere in the gold veins of the Carolina group. As it increases regularly with the depth to which the veins have been worked, experts have been satisfied that it will be found in remunerative quantities.

*Corundum* is found in Abbeville County and other places—in Anderson, Oconee and Laurens. In this last county there is an extensive field of corundum.

*Feldspar* of excellent quality in extensive veins occurs in Pickens, in Abbeville, and also in Anderson and Laurens.

*Flagging Stones* are found in Edgefield, Abbeville, Chester, Lexington, Fairfield Counties, and the Pee Dee Country. There is a remarkable locality of superior flagging stones eight miles south of Pickens Court House, on the Greenville road.

*Gneiss* is found with granite generally, and it is very often in a state of decomposition.

*Gold*.—South Carolina was quite a gold State years ago. The West overshadowed her. Many mines were opened and profitably worked. The war closed most, if not all of them. Until recently, little has been done in the way of renewed work. Of late, however, considerable activity has been manifested.

Next in the order of superposition above the mica slates occur extensive areas of talc slate. These rocks seem to have yielded more completely to the erosive action of the rivers even than the mica slates. They scarcely appear at all in the angle enclosed between the Catawba and the Saluda. Their largest outcrops are east of the Catawba, in Lancaster and Chesterfield; and separated from these by the whole width of the river system of the State—80 miles—to the southwest, they occur on the further side of the Saluda, in Edgefield and Abbeville. These two localities are the great gold-bearing regions of the State.

*Granite* is in strong force in parts of the State, and much of it of fine character. In Anderson and Chester good building granite is found; also in Greenville and Spartanburg. In Oconee, near Walhalla, inexhaustible quarry of very fine building granite. Pickens has a quarry, said to be of best quality. In Abbeville a very fine granite hammondite occurs.

*Graphite* is found in considerable quantities in Williston Township and elsewhere in Anderson; also in Spartanburg, Greenville and Laurens, on Paris Mountain and in Oconee County.

*Itacolumite* is found on Broad River, near the northern boundary of the State, where Union, York and Spartanburg corner. Thus far only one diamond has been found in South Carolina, though several have been obtained from the continuation of these rocks, both in Georgia and in North Carolina. Itacolumite is found on the Chatuga supporting several bodies of limestone rock.

*Iron*.—Iron in magnetic and specular ores is found in inexhaustible quantities on the western slope of King's Mountain, in York, Spartanburg and Union; also in Chester and Abbeville. Brown hematite occurs in the mica slates of Pickens and Spartanburg. Bog iron ore occurs in nearly every county of the State.

*Kaolin*.—Large beds of kaolin clay, free from grit or other impurity, and of great whiteness, are found intercalated among these sands. Several quarries to the west of Aiken, C. H., have been worked with much profit, the material being used as porcelain clay, and also by paper manufacturers.

*Lead*.—Argentiferous galena is found in Spartanburg and Laurens, and more recently in Edgefield and Abbeville. In Oconee county, on the headwaters of Little River, Lieber examined a very promising vein of argentiferous galena, which he thought might be profitably developed.

*Limestone*.—This rock is scattered over a considerable area of the State, and doubtless future exploitation will greatly more disclose it. It is found in the lower pine belt, disclosing itself in what is called "lime sinks." In Laurens county a lime rock crops out on Reedy River, and below Garlington Falls on Reedy River it is quarried for monuments and for lime burning. On the Chatuga River limestone is found, and there are a number of lime-kilns in operation there. Limestone is also found in Oconee County, where there is also a quarry.

*Manganese*, in great purity and abundance, is found in Edgefield, and also in Abbeville, York, Laurens and Anderson.

*Marl* is found over a large area of the State. So far as can be learned, it seems to lack appreciation, and to be little utilized, yet it ought to be a most potent factor in the resuscitation or enrichment of the soils of the State where it occurs. It is found as the underlying stratum in much of the Sea Island soils.

*Mica* of excellent quality has been mined in Anderson County and in Abbeville County. Large sheets of transparent mica have been found near Walhalla. It is also found in Pickens County.

*Phosphate*—This is a deposit only utilized of late years since 1861, and has been a great source of enterprise and profit. Lands worth only five or six dollars an acre containing the deposit went up at once to five or six hundred per acre. The business has grown from 20,000 tons mined in 1868-70 to 355,000 in 1883. In land and river mining companies there are 25. The total capital is \$2,505,000, number of hands 1,935. But this is only part of it. Besides the mining companies, a large capital is invested in manufacturing fertilizers in the State, of which fertilizers the phosphate is a large constituent. In the State there are nearly \$3,000,000 invested in the latter business.

The extent of the deposits is conjectural, but quite extended. Professor Hammond estimates that one mining company, in river territory alone, has enough phosphate, upon a moderate computation, to yield ten millions of tons.

This phosphate has from 50 to 60 per cent. phosphate of lime. A large business is done in shipping the rock to foreign ports.

*Sandstone* is found in the Sand Hill Region. Professor Hammond thus speaks of it: "Next to the granite is found a stratum of sand stone, consisting of the ruins of the granite consolidated into a pretty hard rock. It occurs on Horse Creek, on the ridges at the head of Lightwood Creek, on Congaree Creek, at the Rock House in Lexington County, where it has been quarried for architectural purposes, and on Second Creek, in the same neighborhood."

*Silver* has been found in Anderson County, in argentiferous galena in Spartanburg and Laurens, and more recently in Edgefield and Abbeville. There are said to be indications of silver in Oconee County. Across the Savannah River from Edgefield and Abbeville Counties, the mining of argentiferous galena for silver, as well as for lead and the zinc-blende associated with it, is attracting much attention at this time.

*Soapstone*.—In Kershaw County masses of steatite occur on Spear's, Twenty-five Mile and Pine Tree Creeks. Steatite or soapstone is found in Chester, Spartanburg, Union, Pickens, Oconee, Anderson, Abbeville, Kershaw, Fairfield and Richland. In Anderson there is a knob of soapstone. In Edgefield County a good soapstone is found. In Grey Township, same county, there are three quarries of soapstone, but not much developed. There is soapstone in Fairfield

County A red soapstone is found in Greenville County. Soapstone of fine quality occurs in Laurens County.

*Tourmaline* is found in York, Edgefield, Laurens, Anderson and Oconee Counties.

*Whetstones* are found in Edgefield, Abbeville, Chester, Lexington, Fairfield and the Pee Dee country.

*Zircon*s are found in Abbeville and in Anderson Counties.

#### HEALTH.

The percentage of deaths in the population of the United States and South Carolina, and in the population of the Upper, Middle and Lower Country of the latter, is as follows, according to statistics compiled by Mr. Harry Hammond :

	TOTAL.	MALE.	FEMALE.
United States.....	1.51	1.53	1.48
South Carolina.....	1.57	1.55	1.60
Upper Alpine Region.....	1.09	....	....
Middle Country, or Piedmont, Sand and } Red Hill, and Upper Pine Belt Regions. }	1.33	....	....
Lower Country, or Lower } Pine Belt and Coast Regions }	2.08	....	....

It is estimated the number of deaths not reported do not exceed thirty per cent. of those reported. The average mortality for the whole country is given, when thus corrected, at 18.2 per thousand, as against 20.5 per thousand in England, and 21.5 per thousand in Scotland. The slightly higher death-rate above given for South Carolina, may be due to a more accurate enumeration, or it may be accounted for by the preponderance of the colored race, whose death-rate is always higher than that of the whites.

#### LAWS.

*Taxation.*—Public institutions generally and all churches and burying grounds are exempt from taxation. A new assessment of property must be made every five years. The State may contract public debts for the purpose of defraying extraordinary expenditures, but it must do so by special act, specifying some single object, and levying a special tax to pay the annual interest on such debt; and such act must be passed by the vote of two-thirds of the members of each branch of the General Assembly.

*Law of Property.*—Any man or woman of legal age, owning real estate in fee simple may freely dispose of it by will, or sell and convey the same by deed, executed in the presence of two or more witnesses, and duly recorded. If the deed be by a married man, the wife must renounce her dower in a formal manner provided by statute. A married woman may hold property separately from her husband, and may dispose of the same as if she were unmarried.

A *homestead* in lands, whether held in fee or any lesser estate, not to exceed in value one thousand dollars, with the yearly products thereof, is exempt to the head of every family residing in South Carolina from levy or sale for debt upon any judgment recovered against him. If the husband be dead, the widow is entitled to the homestead. And if both parents be dead, the children are. Personal property to the value of five hundred dollars is exempt from attachment, levy or sale. Where a woman has separate property, she is entitled to the homestead when the husband's property is not sufficient. The legal rate of interest is seven per cent., but by written contract a rate of interest not exceeding ten per cent. may be charged. If more than ten per cent. be charged, all the interest is forfeited.

The real and personal property of a woman held at the time of her marriage, or that which she may thereafter acquire, either by gift, grant, inheritance, devise, or otherwise, does not pass to her husband by her marriage, nor become in any

way subject to his debts, but remains her separate property, and she can deal with it as she chooses during her life and dispose of it by will, as if she were unmarried.

Every encouragement is given to the employment of capital in manufacturing industries. By a special Act of the Assembly, it is provided that capital invested in the manufacture of cotton, woolen and paper fabrics, iron, lime and agricultural implements, shall be exempted from all State, county and municipal taxation for a period of ten years from the time of the commencement of the enterprise, excepting only the two mill tax for school purposes. But this exemption does not apply to the land upon which factories are erected. Vessels of one hundred tons measurement, and upwards, built and owned within this State, are entitled to the benefit of this act. Those desiring to avail themselves of the act must file with the Comptroller-General proof of the investment. For the purpose of encouraging immigration, real estate purchased by immigrants, and capital invested in improvements thereon, up to \$1,500, are exempted for five years from all State, county or municipal taxation, except the two mill school tax.

In order to give the latest I could about the State, I addressed a letter to the Hon. A. P. Butler, to whom I am indebted for the courtesy of the following reply :

STATE OF SOUTH CAROLINA—DEPARTMENT OF AGRICULTURE.

*A. P. Butler, Commissioner.*

COLUMBIA, S. C., September 10, 1884.

MR. M. B. HILLYARD, *New Orleans, La. :*

DEAR SIR—Your favor of the 4th has been received. The best specimen of walnut that we exhibited at the Atlanta Exposition was from the eastern section of the State, from the Pee Dee swamps, and those swamps abound with fine timbers.

Walnut, hickory and oaks are found in abundance in the northern, or Alpine Section of the State, embracing the counties of Greenville, Pickens and Oconee.

Outside of manufacturing enterprises, I think that real estate, especially in the cities and towns, and stock raising, offer the greatest inducements to investors.

Real estate has rapidly appreciated in value in the past few years, and will continue to improve even faster when larger amounts have been invested in manufacturing.

Within the last few years several stock farms (improved breeds of cattle chiefly) have been established and proven very profitable. The immense fresh water swamps of our larger rivers furnish abundant pasturage of the best quality, and a gentleman who has recently begun breeding common stock for market is very much encouraged by the prospects of success. These offer special inducements to capitalists.

There are many other channels for the investment of money in South Carolina, which I have no doubt you have fully covered by your article.


I am glad to know that you have this matter in hand, and feel sure that, in common with other Southern States, we will receive much benefit from your labors.

Very truly yours,

A. P. BUTLER, *Commissioner of Agriculture.*



# GEORGIA.



As the reliability of the United States Census Reports is unquestioned, I have drawn on volume vi, of the last census, for considerable information relating to the topography and climate of Georgia.

The State of Georgia lies between longitude  $3^{\circ} 47' 21''$  and  $8^{\circ} 42'$  west from Washington, and between latitude  $30^{\circ} 21' 39''$  and  $35^{\circ}$  north, embracing in its area 59,475 square miles, of which 495 square miles is water surface, embracing 150 square miles of coast waters (bays, gulfs, sounds, etc.). 300 square miles consist of rivers and smaller streams, and 45 square miles of lakes and ponds. The land area is therefore 58,980 square miles. There are 137 counties in the State.

## TOPOGRAPHY.

The northwestern corner of the State is crossed from Tennessee to Alabama by several ranges of mountains that rise in altitude from 500 to 1000 feet above the intervening broad and rich valleys. Sand and Lookout mountains are broad-backed, while the other ranges are mostly narrow or "backbone" ridges. In the northeastern portion of the State is the Blue Ridge chain, with other isolated points rising high above the surrounding country. The Chattahoochee ridge, an offshoot from this and forming the Atlantic and Gulf water-divide, passes south of the Chattahoochee river, soon losing its prominence as a ridge and falling in elevation to Atlanta. Southward the country is more generally level or rolling, sometimes hilly, with but few low mountains until the pinelands are reached; thence to the coast the fall is very gradual and the lands are very level.

## CLIMATE.

The State, with its southern boundary resting against Florida and in part washed by the Atlantic ocean on the southeast, its northern boundary 320 miles to the north among the mountains of the Blue Ridge and the Cumberland range, and nearly 5,000 feet above sea level, presents an average temperature of  $68^{\circ}$  F. on the coast,  $52^{\circ}$  to  $56^{\circ}$  in Middle Georgia, and  $52^{\circ}$  in the Blue Ridge region, or an annual average of about  $65^{\circ}$  for the entire State.

The average rainfall for the State is from 46 to 50 inches, the steady rains being usually brought by southeastern winds.

The coast region, with its sea-breezes and "salty atmosphere," has a mean winter temperature of about  $48^{\circ}$ , the lowest being rarely below  $32^{\circ}$ . Its summer maximum is  $90^{\circ}$  and the mean  $79^{\circ}$ . Its rainfall is about 57 inches, December and January being the driest months.

So genial is the climate of the coast counties that oranges, bananas, and other semi-tropical fruits are produced in abundance. The markets of colder States are supplied with very early vegetables and garden luxuries from the farms of this region.

In Middle Georgia the rainfall is less (41 inches), the driest months being June and September. The yearly temperature ranges from  $6^{\circ}$  to  $96^{\circ}$ , with an average of

44° in winter and 73° in summer. During the hottest summer-days the temperature often rises to 100°, but the nights are cool, pleasant and invigorating.

In Northeastern Georgia the extremes of temperature are 6° and 90°, with an average of 43° for the winter months and 75° for the summer. The rainfall for this section is about 57 inches, heavy rains occurring in the fall and winter months. The amount of rain that annually falls in each section and in the wet and dry months varies greatly.

Snow falls in Northern Georgia every winter, but only to depths of from 2 to 4 inches and remains but a short time. In Middle Georgia it frequently falls, but melts almost as rapidly as it touches the ground. Occasionally, on ridges, it reaches a depth of an inch or two. In Southern Georgia snow is rarely seen. High winds, mostly accompanied by thunder-storms, prevail chiefly in the spring and early summer, and come from the southwest, occasionally becoming tornadoes.

Planting in the low or southern country begins as early as March 15, and fall frosts do not appear earlier than December 1, and it often happens that there is no frost during the winter.

In Northern Georgia planting is not done until about the last of April, because of continued cold and frosty weather.

#### GENERAL VIEW OF THE STATE.

The islands cover a width of 10 or 12 miles, with sand-hills seaward and marshes and live-oak lands inland. On the mainland the marshes with live-oak lands extend back for a few miles to the open savanna belt, which occupies the first terrace above the coast marshes and is a level plain covered with palmetto and long-leaf pine, and interspersed with bay and gum swamps. Uniformity in character exists for 10 or 15 miles to the foot of the second terrace. This rises from 15 to 25 feet, and with it the wire-grass region begins. Its surface, at first undulating, has an open growth of long-leaf pine, with little or no undergrowth except wire-grass. These pine barrens extend northwestward about 100 miles and gradually rise to the altitude of 365 feet. As we pass northward over this region the loamy soils become perhaps more sandy, though still firm, and the country becomes somewhat more rolling, the monotony being varied only by cypress ponds, gallberry flats, and occasionally by a stream with its annually overflowed bottom.

The central cotton belt, or yellow loam region, is to the northward. Long-leaf pine is at first most prominent, but gradually thins out to the north, being replaced by the short-leaf variety. The surface of the country, level at first, becomes more and more rolling, and buhrstone lies in fragments on the ground, limestone crops out in the streams, and wire-grass disappears entirely. Oak and hickory are prominent.

The soil, sandy at first, with yellow clay subsoil, becomes more clayey northward; the country also rises to an elevation of 500 feet, and in some places to 600 feet to the summits of the red-clay hills (150 miles from the coast), a rise of over 150 feet in 30 miles. Still northward from this yellow loam and oak upland belt the sand and pine hills, with their pine and blackjack, are crossed. At first the land is lower than that of the red hills, but rises to a line of hills from 500 to 600 feet above the sea. Red clay lands isolated, and similar to those on the south, are found on the northern edge of the belt, which here is only 12 to 15 miles wide. The three divisions form parallel belts and extend from the Savannah to the Chattahoochee rivers diagonally across the State.

With the northern edge of the belt last described the metamorphic or mineral division of the State begins, and presents a rolling, broken, and often hilly surface. Soils varying from gray sandy to red clayey, gravelly and rocky occur in belts of every width, and rocks peculiar to the section, hornblendic and gray gneiss, outcrop in place or are found in fragments on the surface.

The growth is of great variety, the chief trees being oak, hickory, chestnut, poplar and pine. The elevation gradually increases toward the broad central granite region and beyond to Atlanta, where the altitude is 1,050 feet above the sea, and on Stone Mountain 1,686 feet. Thence the country falls to 760 feet at the Chattahoochee river; but from there the altitude increases until it reaches a maximum of 2,347 feet on Pine Log mountain, on the eastern side of Bartow county and at the northwestern border of the metamorphic region, in all about 120 miles from the sand hills. On the northeast the rise from the Chattahoochee river is still greater to the top of the Blue Ridge, a maximum of 4,796 feet, and thence falls to the Tennessee line, a distance of about 150 miles from Macon, on the southern border.

Bordering the metamorphic on its northwestern limit are ranges of hills having various names and a general trend southward from the Tennessee line to the Etowah river and the southeastern corner of Bartow county, and thence westward to the Alabama line. These ranges are metamorphic in character and are higher than the Northwestern Georgia region, not excepting its mountains. From the tops of these ranges we overlook the region popularly known as "Northwest Georgia," whose surface is prevalently characterized by abrupt ridges (mostly synclinal), consisting of folded paleozoic rocks, varying from sandstones, shales, and cherts to limestones, with a general trend south-southwest, and with broad agricultural valleys.

#### NORTHWEST GEORGIA.

The region of Northwest Georgia extends from the Cohutta, Pine Log, Allatoona and Dug Down mountains to the Alabama and Tennessee State lines, and embraces an area of 3,360 square miles, including the counties of Dade, Walker, Catoosa, Whitfield, Murray, Gordon, Chattooga, Floyd, Bartow and Polk. The lands are found to change and alternate at every few miles in crossing the trend of mountains and valleys, and these changes are usually quite apparent in the natural growth of the country, and in the color, relative fertility and adaptation of soils. The great variety of soils, together with a diversity of climate, due to the varying altitudes of this country, render it suitable for the successful culture of perhaps every agricultural product of the temperate climate.

#### TOPOGRAPHY.

The country is banded by a number of mountains, ridges and valleys, extending with a general parallelism in an approximate northeast and southwest direction approaching nearest to north and south in the eastern part of the division, and with divergent mountains running nearer to the east and west in the southern and central portions. Sand, Lookout, and Pigeon mountains, in the northwestern corner of the State, are synclinal table lands belonging to the Alleghany coal field. These vary in altitude from 800 to 1,200 feet above the adjacent valleys, and are usually trough shaped on the top, having somewhat elevated borders along their brows and precipitous sides, marked by perpendicular sandstone bluffs. These mountains have an area on the top, of rolling and often nearly level sandy lands, amounting in the aggregate to 200 square miles.

#### CLIMATE.

The annual mean temperature in this part of the State varies, according to locality, from about 50° to 60° F. The regions of the lowest temperature are about the Cohutta mountains in the northeast, and on the table lands in the northwest, where the altitudes range from 1,800 to 3,000 feet above the sea, and that of the highest temperature in the valleys of the southern and central portions. This difference of climate is due, in part, to a difference of about one degree of latitude between the northern and southern limits of the region, but in a much greater degree to the general features of the country, mainly to the difference of altitude, and again to the general direction of the slope, which is toward the south in the central and most

of the southern portions, and towards the north in the northwestern and north-eastern portions. These influences all combine to give a warmer climate to most of the valleys drained by the Coosa river and its immediate tributaries.

In the extremes of temperature the thermometer seldom rises above 90° F. in the summer, or falls below 20° in the winter. Vegetation usually starts sometime in March, and there is a difference of about a week in this respect between the more northern and the more southern counties, giving to the latter an earlier time for planting and a somewhat longer crop season. Severe frosts rarely occur after the first of April and about six months usually elapse between the latest frosts in the spring and the earliest in autumn. Ridges and mountain slopes of 100 feet or more in altitude above the valleys are free to a greater or less extent from spring frosts, and are less subject to cold dews in spring and summer. For this reason the fruit crop seldom fails in such situations. The climate of the table-lands differs in several particulars from that of the valleys, being much more uniform and having a lower mean temperature.

The Smithsonian Rain Charts indicate for this part of the State a mean precipitation of rain amounting for the summer to 10 inches and about the same for the winter months, with 40 inches for the entire year. The amount of rain, however, varies very much in different seasons, and also to some extent with the local features of the country, the heavier precipitations, as well as the greater number of rainfalls, occurring usually in the vicinity of the larger mountains.

During the fall, winter and spring months continued southeast winds are usually accompanied within a few hours by clouds, and are commonly followed within thirty-six hours by a fall of rain. These rain spells often continue through two or three days of cloudy weather, with either occasional showers or else slow and constant or drizzling rains. Rain clouds from this direction are generally dispersed by westerly or northwesterly winds, and the clearing off is usually preceded by brisk showers accompanied by gusts of wind. Snow clouds, unlike the rain clouds in winter, come from a northwest direction. Snows, however, are comparatively unusual, and the winter season very often passes without a snowfall that lies on the ground. A snow of six inches depth or one that covers the ground for more than two or three days in the valleys is unusual; but on the mountains snows are somewhat more frequent. Southeasterly winds in the summer season are not so commonly accompanied by rain clouds as in the cooler portions of the year, but the vapor with which the atmosphere is charged, mainly from this source, is condensed into clouds usually by cold winds approaching from the northwest. Thus the summer rains, and particularly the thunder-storms, come with clouds drifting in a direction almost the opposite of that of the winter rains. Severe wind-storms in the warm season are almost uniformly from the west.

#### SOIL.

The lands in this portion of Georgia are divided into several classes:

*The Gray Sandy Lands* are mostly on the eastern sides of Murray and Gordon, and the eastern and southern sides of Bartow and Polk counties. The soil is of moderate productiveness. The lands are mostly in forests, owing to the broken character of the country. The growth consists of red, black, post and mountain oaks, hickory, chestnut, and short-leaf pine. In the higher portions of the Cohutta mountains there are spruces, holly, and white pine.

*Flatwoods.*—These soils are of varied texture, and their topography is correspondingly diversified with mountains, hills and nearly level "flatwoods," but the soils are nearly everywhere of one general character, at least with regard to sterility. The most extensive area of these lands is that of the flatwoods, near the Oostenaula and the Coosa rivers, in Gordon, Floyd and Polk counties, and a mountainous section south of the Coosa river, in Floyd and Polk counties, belonging to the same

formation and with which these flatwoods are continuous. It occurs again in a belt of hills in the southern part of Murray county, extending southward nearly across the county of Gordon.

*Red Clay Lands.*—This region covers in Georgia, about 400 square miles, occurring in belts of from half a mile to 2 or 3 miles in width, and is found in all the counties under consideration except Dade. The formation affords an argillaceous soil of an orange or light red color, and is of great importance, nearly the entire area consisting of slightly rolling or nearly level lands, most of which have been long under cultivation. It has a good deal of clay in it, is more or less calcareous and of easy culture. It rolls enough for good drainage. The forest growth is red, white and spanish oaks, hickory, dogwood, chestnut, pine; the principal agricultural products corn, oats, wheat, clover and grasses, cotton. Land of this character that has been kept in cultivation for thirty or more years, with little or nothing returned to the soil for its improvement, will now produce about 20 bushels of corn, 6 bushels of wheat and 10 bushels of oats to the acre. These lands are, however, capable of a high degree of improvement, and where they have been properly kept up, the yield is good. The lands where hilly are inclined to wash. The valleys abound in springs; water in wells obtainable at from 20 to 40 feet. With fertilizers these lands will produce 500 pounds of seed cotton to the acre.

*Gray Siliceous Soils of the Ridges.*—This region covers an area of 894 square miles, or about one-fourth of the entire extent of country. The formation gives rise to ridges or knobby belts of country of from 1 mile to 10 miles in width, with heights varying from 100 to 300 feet. Where these belts are broad they often contain lands that are nearly level or at least consist of low rolling hills. The lands have a gravelly soil varying in color from light to dark gray, with generally a porous gravelly subsoil; but in some places there is a good clay subsoil, with a gravelly soil of a dark brown or red color. These lands are generally regarded as poor and are, for the most part, in the original forests. The prices range from 50 cents to \$3 per acre, according to situation, the highest values being given to such as adjoin the valley lands, without regard to their adaptation to culture. Recently attention has been attracted to these as among the most profitable lands for cotton. They are found to give a better *immediate return* for manures than the richer valley lands, and their present cheapness and comparatively easy culture, with their general healthfulness, give them additional importance. The timber is of good size and consists of red, black, mountain, post, white and spanish oaks, chestnut, pine, hickory, dogwood, sour wood and black gum. The oaks predominate, but chestnut and short-leaf pine are generally abundant. Corn does not do well on these lands, after a few years cultivation, except in very rainy seasons. With the use of fertilizers wheat might be made a profitable crop, as it is less subject to disaster, and nearly always matures a better developed grain than on the richer valley lands; but without fertilizers it does not "tiller" or spread well, and the average yield is not so good. The lands are well suited for fruit culture, the trees being healthy and long-lived, and the tops and slopes of ridges here have an immunity from late spring frosts that often kill the fruit on lower lands. There are no springs or constantly running streams in the central portions of these belts, and water is obtained, with some uncertainty, at depths of from 70 to 100 feet in wells that always require curbing.

*Brown and Red Loams.*—In Dade county, and in that portion of Catoosa, Walker, and most of Chattooga counties that lie west of Taylor's ridge, the lands are all highly calcareous, and are perhaps the richest uplands in the State. The timber is large and consists principally of red, spanish and white oaks, hickory, poplar, sugar maple, post oaks and cedars, with an admixture of most of the varieties indigenous to the country and common to the valley lands. The lands generally

lie well, but are sometimes hilly and inclined to wash. Where the blue limestones are nearly horizontal they are sometimes exposed or else lie in close proximity to the surface. Such lands are usually covered with a growth of cedar and red haw, and are known as cedar glades; but there are no very extensive areas of this kind. Where the limestones lie unexposed near the surface, this fact is usually indicated by a growth of post oak. The soil consists of two principal varieties, viz: a brown calcareous loam of the blue limestone areas, and a red calcareous loam of the rotten limestone. The first varies in color from a light to dark brown and almost black, a dark or chocolate brown being the most characteristic color, with a subsoil of lighter shade, sometimes approaching to red. The soil of the rotten limestone belts is of a dark red color with a red subsoil. There is quite a striking difference in the appearance of these lands, though in the more essential characteristics of productiveness and in adaptation to various crops a comparison shows no important difference. In Polk, Floyd and Murray counties the lands are red, but of a lighter color than that of the rotten limestones. Lands that have been in cultivation for 30 or more years will often produce from 30 to 50 bushels of corn to the acre. The soils seem to be considerably deteriorated for the wheat crop, but after the land has been rested in clover, and a crop of this turned under, from 10 to 20 bushels is not an unusual yield. Cotton has not been grown to much extent on these lands north of Floyd county, and in this county and Polk about 600 pounds of seed cotton per acre is the usual yield.

*Sub-Carboniferous Brown Loam Lands.*—The rocks of this formation consist of limestones arenaceous shales, and siliceous or cherty limestones. The lands, which are generally rolling, but sometimes nearly level where the valleys are broad, have a brown soil that is calcareous and siliceous or sandy, with sufficient clay in the subsoil to give it a somewhat retentive character, and yet admit of good drainage, even where the lands are nearly level. The areas of this character are in the valleys immediately around Sand, Lookout, and Pigeon mountains, in the broader valleys immediately east of Taylor's ridge, and again, east of Horn's mountain, viz: West Armuchee valley in Walker county, Sugar valley in Gordon, Dirt Town valley in Chattooga, and Texas valley, with a large portion of the country to the west of Coosa river in Floyd county. These are decidedly the best cotton uplands in this part of the State, yielding often, without fertilizers, from 1,000 to 1,200 pounds of seed cotton to the acre. They seem to be especially adapted to the cotton crop, but corn, wheat, and oats do well.

*The Sandy Lands of the Mountain Summits* are from nearly level to rolling and hilly. Sand mountain in Dade county, Lookout mountain in Dade, Walker and Chattooga counties, and Little Sand mountain in Chattooga county, afford the lands of this character. The daily range of the thermometer here is about 50 per cent. less during the summer months than in the valleys, though the daily minimum temperature is usually but 20° or 30° less. The temperature is too low for cotton. The lands are especially adapted to fruit culture and to a great variety of vegetables. A variety of mineral springs is found on these table lands. The timber is of medium size, consisting of mountain, white and red oaks, chestnut, pine and hickory, with less undergrowth than is common to other woodlands in this part of the State, and with a good coat of grass covering the surface nearly everywhere.

*Alluvial Lands.*—In the mountains, where the streams are rapid, the alluvial lands have but little extent, but in the valleys the creek and river bottoms are comparatively broad; the bottom lands vary from about one-eighth of a mile on small streams to 1 mile or 2 miles on the larger ones, the greater part of their widths being generally on the western side of the stream. The alluvial deposits of small streams vary more in character, those of the larger ones in general being most productive. Alluvial lands with a large proportion of sand are the only ones on which cotton

has been grown with success, the Coosa and Etowah rivers affording some of the best cotton lands in this part of the State.

### THE METAMORPHIC REGION.

The rocks and soils characterizing the Metamorphic Region cover the whole north half of the State except Northwestern Georgia. Its southern limit follows an irregular line passing through the cities of Augusta, Milledgeville, Macon and Columbus. These cities, situated respectively on the Savannah, Oconee, Ocmulgee and Chattahoochee rivers, mark the heads of navigation, shoals and falls in the streams at these points being formed by the outcropping gneisses and other metamorphic rocks. The dividing line between this and the Northwestern region would pass from Alabama slightly northeastward through the southern part of Polk county to the northern part of Paulding, and into the southeastern corner of Bartow, thence north through the eastern part of Bartow, Gordon and Murray counties, into the State of Tennessee. There are, in all, fifty-six entire, and portions of seventeen counties included in the Metamorphic Region, and the area is approximately 19,090 square miles. The entire surface of the country is or has been heavily timbered, with the exception of the bald areas, without either vegetation or soil, where granite is exposed. The timber growth common to the entire region comprises red, white, post and black jack oaks, chestnut, hickory, short-leaf pine, dogwood, black gum, and walnut on the uplands, and poplar, ash, elm, sycamore, birch and sweet gum on the lowlands. It has been estimated that of the entire Metamorphic Region about 46 per cent. has been cleared for cultivation, leaving 54 per cent. of the original growth still standing. The northern portion of the region differs so widely in its features from the rest of the Metamorphic counties that it will be described under the subdivision of the Blue Ridge region.

#### THE BLUE RIDGE.

Soon after entering Georgia, and especially after leaving Rabun county, it is but little else than a long and high ridge, so narrow and with sides so steep that it forms a most convenient boundary line southwestward between the counties north and south of it. From the main ridge a number of others form, as it were, offshoots known by different names. In Pickens county the Blue Ridge terminates with several isolated and short mountain ridges which have the same trend as the main ridge. Another line of high mountain ridges leaves the terminus of the Blue Ridge proper, and, with a northwestwardly trend, passes through Gilmer and Fannin counties into Tennessee. The general elevation of the valley lands at the foot of the ridges is from 1,600 to 1,800 feet, and from them the mountains rise abruptly from 2,000 to 3,000 feet, their sides and sharp summits being covered with a somewhat dense timber growth. The counties included in the Blue Ridge region are Rabun, Towns, Union, Fannin, Gilmer, Pickens, Dawson, Lumpkin, White and Habersham, making a little over 3,000 square miles. About 33½ per cent. of their aggregate area is estimated to be too hilly and broken for tillage.

#### MIDDLE AND SOUTHERN METAMORPHIC, OR MIDDLE GEORGIA.

Southward from the Blue Ridge counties the elevation of the country becomes less and the surface less mountainous, though still hilly to the Chattahoochee river. The mountains now are mere isolated ridges or points of from 500 to 700 feet above the general level of the country. Their sides are steep and their summits sharp, and they are all timbered. Sawnee mountain, in Forsyth county, is 1,968 feet high, and Kennesaw mountain, in Cobb county, is 1,809 feet high. Only 7 per cent. of the lands of the eleven counties embraced in this region is too broken for successful tillage, and, together with the Blue Ridge region, it forms the great gold-bearing belt of the State from North Carolina to Alabama. Other minerals also occur, such

as corundum, asbestos and copper. On the south side of the Chattahoochee river, and within a few miles of it the ridge, which in Habersham county is high and prominent, falls in elevation southwestward to Atlanta, and to that point is the water-divide of the Atlantic and Gulf tributaries; its summit is very nearly marked by the course of the Air-Line Railroad.

Atlanta, situated on the point where the water-divide turns to the southeast, has an elevation of 1,050 feet above the sea and 288 feet above the Chattahoochee river. The height of the ridge above the surrounding country is scarcely perceptible, as it rises gradually northeastward to Habersham county, where the ascent from the south is very abrupt for several hundred feet. From the river southward to the sand hills, a distance of about 70 miles, there is a gradual fall of 400 feet, the elevation being about 600 feet along the lower limit of the Metamorphic, except that section between the Ocmulgee and Ogeechee rivers, which has an altitude of only 300 or 400 feet. About  $1\frac{1}{2}$  per cent. of the area of the twenty-two counties in this region is too hilly and broken for tillage.

#### TOPOGRAPHY AND CHARACTER OF THE LAND.

The surface of country covered by gray lands is always more or less hilly and rolling, but has broad, level areas either on the ridges or in the valleys. Except in the mountains the slopes are not too steep to forbid cultivation. Their light, sandy nature makes them liable to wash, and they require management to prevent this. The soils are coarse, gray and sandy, frequently dark colored for an inch or two, with decayed vegetation, are more or less gravelly, from 3 to 12 inches deep, and have a yellow, clayey subsoil. The growth is generally short-leaf pine, post, Spanish (red) and white oaks, hickory, dogwood and persimmon, with some ash, black and sweet gums, poplar, walnut and cherry on the lowlands. Pine has not as large a growth as on granite lands, and only the short-leaf variety is found. Though these lands are said to produce late crops of cotton, they are preferred to the red clays as being more productive and because they enable the stalks to stand the drought better. They are also easy to till, and a larger area can be cultivated than of the red lands with the same labor. Fresh lands yield from 500 to 700 pounds of seed cotton per acre, as do also old lands by the use of fertilizers; but without fertilizers the latter yield only 250 or 300 pounds per acre, or about 100 pounds of lint.

*Red Lands.*—Under the designation of red lands are included both red sandy and clayey soils, no matter from what source derived. There are a great many different red belts. A narrow belt of mulatto land reaches from Rabun county southward into Lumpkin, and thence probably turns northward into Forsyth and Milton, but becomes very much intermixed with gray soils in those counties. Along the foot of the Blue Ridge some red areas also occur, in Towns and Union counties, where there is much hornblende rock. Another red belt from the northeastern part of Cherokee county passes southward (south of Canton,) into Cobb, Paulding and North Carroll counties. Kennesaw and Lost mountains, in Cobb county, are composed entirely of hornblende gneisses. From the Chattahoochee river southward to the pine hills the country embraces the largest areas of red lands. Chattahoochee ridge of Habersham county is composed mainly of hornblende rocks, and on the south, lying parallel with the river, is a narrow belt of red land extending into Fulton county to the granite section at East Point, with an apparent continuation on the west, into Coweta and Troup counties, and terminating a little west of La Grange; thence, after a narrow break, a wide area extends southwesterly into Alabama. On the east and south of the central granite regions the red lands largely predominate, covering large areas and occurring in wide belts. Another extensive belt of red land occurs north of Milledgeville, Baldwin county, and along the line of the southern granite region westward and northeast into



Hancock county. The largest of these belts is that which enters the county of Franklin from South Carolina with a southwest trend, and turning southward through Clarke, Morgan and other counties, again turns southwest to the sand hills. The belt at first is very wide, covering nearly the whole of Franklin, and its lands are formed principally from hornblendic rocks; but southward it narrows, and biotite gneisses are occasionally found associated with the strata. In the southeastern part of the region there are but few red areas, and these are mostly from hornblendic rock, and lie on the outskirts of the granite regions.

#### TOPOGRAPHY AND CHARACTER OF THE SOILS.

The surface of the country occupied by these red lands is rolling or undulating and often somewhat hilly, there being but few very level areas and then not in very large tracts. Very little is too broken for cultivation. The growth is red or Spanish, white and post oaks, hickory, chestnut, dogwood and some short-leaf pine, with poplar, ash, walnut, cherry and buckeye in the lowlands of some of the counties.

*The Red Lands* are usually sandy for a depth of several inches, and hence are rather easily cultivated, especially in dry weather. Decayed vegetation frequently gives to them a dark or black surface, but the subsoils and underclays are very red. The lands are often good cotton lands, particularly if soil be sandy. Yields vary, according to quality of lands, from 300 to 1,000 pounds per acre on fresh lands. Lands are in general difficult to till in wet weather, being sticky, and in dry seasons are very hard and compact. Except perhaps in the southern counties, these red clay lands are considered best for small grain, (especially oats,) as they are cold, and their cotton crops are late in maturing.

*Granitic Lands.*—Large and small areas of gray sandy soils, having outcropping and underlying granite rocks, are found in many counties of the Metamorphic region, but chiefly in its southern half, and cover about 2,600 square miles.

#### TOPOGRAPHY AND SOILS.

The surface of the country is generally rolling and broken, with sharply defined and rounded hills in localities which have the granite boulders or rounded masses, and broad, level areas when only the flat rock underlies the land. The almost universal timber growth on all these lands is pine (either long or short-leaf), with oak, chestnut, hickory, and some black jack. The soil is often a coarse gray or gravelly sand, from 3 to 6 inches deep, with a subsoil of yellow or red clay, more or less sandy, or sometimes a whitish impervious clay, the result of feldspar decomposition. The soils are reported by some as cold, but are easily tilled and well adapted to cotton culture. The yield per acre on these lands is about 800 pounds of seed cotton when fresh and unmanured, equal to 270 pounds of lint. Cotton is planted only on the uplands, it being liable to rust on the lowlands.

#### LOCALITIES.

The largest area of granitic lands lies south of Atlanta, covering all of Clayton, Henry, Fayette and Rockdale counties, and portions of Fulton, Campbell, Coweta, Spalding, Butts, Newton, DeKalb, Walton, Gwinnett, and Jackson, while an offshoot follows the river in a southwest course. It covers in all about 1,660 square miles, and has a general altitude of from 900 to 1,000 feet above the sea. Parts of the country are very broken and large areas lie beautifully for farming purposes in parts of the region. The lands lack lime, but contain a fair percentage of potash.

*Flatwoods.*—These comprise but a small area in Georgia. The largest belt is found entering from South Carolina above the mouth of Broad river, passing with a southwest trend across Oglethorpe into the upper part of Greene county. In Elbert county the belt is from 5 to 7 miles wide, and has a dark colored soil and a growth of black jack oaks. In other counties the belt is about 4 miles wide and has a similar growth. The lands are very level, and in places large ponds of water are found. The soil is tough in places like pipe-clay, but sometimes produces good cereals.

The lands north of the Chattahoochee river on the northeast have almost entirely gray sandy soils, with but a few strips of red clay. The subsoils are almost universally clays. This section has been designated the "Northeast Division" by the State Department of Agriculture, and the yield per acre, with fair cultivation, is reported as follows: Corn, 20 bushels; wheat, 15 bushels; oats, 25 bushels. rye, 8 bushels; barley, 25 bushels; hay, from 2 to 3 tons; sorghum syrup, 75 gallons. Tobacco, buckwheat, and German millet can also be grown with great success. The fruits adapted to the section are the apple, cherry, pear, grape, plum (in all its varieties), peach, gooseberry, raspberry and strawberry.

In the rest of the Metamorphic or Middle Georgia region the products are: Cotton, corn, oats and wheat, and all the grains and grasses, and even tobacco may be grown successfully. After the coast country, this division was the first settled, and has continued to be the most populous in the State. A large proportion of the land has suffered temporary exhaustion by injudicious culture, which claimed everything from the soil and returned nothing; but this ruinous practice is fast giving way to a more enlightened and economical system. The abandoned fields, grown up in stunted pines, and for from twenty to forty years considered useful only as pasturage, have been restored to cultivation and are now among the most productive lands of the State. The fruits to which this section is best adapted are the peach, fig, apple, pear, strawberry and raspberry. The yield per acre of the common crops under ordinary culture is: Corn, 12 bushels; wheat, 8 bushels; oats, 25 bushels; barley, 30 bushels; rye, 8 bushels; sweet potatoes, 100 bushels.

#### THE CENTRAL COTTON BELT.

The Central Cotton Belt includes that broad strip of country extending across the centre of the State in a slight south of west course from the Savannah river on the east to the Chattahoochee on the west, and is included between the Metamorphic on the north and the long-leaf pine and wire-grass regions on the south. Its width eastward from the Ocmulgee river has an average of about 40 miles, but on the west of that river it widens, its southern limit passing in a southwesterly course, via Albany, to the southern part of Early county. Its extreme width along the Chattahoochee river is about 90 miles. The area embraced is about 6,835 square miles, and includes all of the following counties, viz: Richmond, Glascock, Washington, Wilkinson, Twiggs, Houston, Taylor (nearly), Macon, Schley, Marion, Chattahoochee, Stewart, Quitman, Webster, Sumter, Lee, Terrell, Randolph, Clay and Calhoun; the lower or southern portions of Columbia, McDuffie, Warren, Hancock, Baldwin, Bibb, Crawford, Talbot and Muscogee; the upper or northern portions of Early, Baker, Daugherty, Dooly, Pulaski, Laurens, Johnson, Jefferson and Burke, and the eastern part of Screven, along the river—all of twenty and parts of nineteen counties. Within this Central Cotton Region there are three distinct belts, differing very widely from each other. The first is the Sand Hills and Pine Belt, on the north and bordering the Metamorphic region of the State. The northern limit of this belt is a few miles north of Augusta and Thomson, a few miles south of Warrenton and Sparta, to Milledgeville, Macon, Knoxville, Geneva and Columbus, at which point the metamorphic rocks are found outcropping in the beds of the streams while the sand hills extend northward a short distance along its border. The southern limit is easily defined by the somewhat abrupt red clay hills along its border. Its width varies greatly, but is greatest on the east and west, about 25 or 30 miles from each of the large boundary rivers. Between the Ogeechee and Flint rivers it is rather narrow, but widens to the west to 20 miles or more in Taylor and Marion counties. On the Chattahoochee river its southern limit is near the mouth of Upator creek. The area embraced in the sand hills is about 2,950 square miles.

The surface of the country embraced in this belt is high and rolling, and this is

especially the case near its northern limit where the altitude is from 500 to 600 feet above the level of the sea, and sometimes 100 feet or more above the adjoining Metamorphic region. Southward the country falls to the foot of the line of red hills which often rise abruptly from its limit. Again, in other localities, as between the Flint and Ocmulgee rivers, the lower part of the belt presents a broad plateau which gradually declines southward. In the western portion of the belt the transition to the red hills is gradual. The country is very hilly and broken, with a height of from 100 to 150 feet above the streams, and is interspersed with deep gulleys, formed by the washing away of clays and sands.

This belt is characterized by deep beds of white sands and gravel overlying white and variegated clay, with ledges of a gritty and micaceous mass, called by Professor Lyell, decomposed granite. The usual timber growth is long and short-leaf pine, scrub black jack oak, sweet gum, and some dogwood. The lands of the sand-hill regions have a soil of white sand from 6 to 12 inches deep, and usually a sandy soil underlaid by variegated clays, and are not very productive, except where fresh or highly fertilized. The yield, after a few years' cultivation, is only about 200 pounds of seed cotton per acre, but on the best lands it is 300 pounds. A large proportion of the lands originally in cultivation now lies out.

#### RED HILLS.

A region of red hills occupies a narrow and interrupted belt, 4 or 5 miles wide, southward from the sand-hills region, and passes through the western part of the counties of Burke, Jefferson and Washington, the middle of Wilkinson and Twiggs, and the southern part of Houston to Flint river. West of that river, in the counties of Macon, Schley, Sumter, Webster, Stewart and Randolph, the red clays are found scattered over a large territory, and, with the exception of a few large areas, they are rather in patches, being frequently covered by the white sands of the yellow-loam region. The red-hills region is characterized by a high rolling or broken, and well-timbered surface, covered with deep red clay lands, more or less sandy, and having a thickness of from 20 to 50 feet, including siliceous fossil shells and rocks, and sometimes beds of green sands.

*Soils.*—The lands of these red clay hills are usually somewhat sandy, and have a depth of from 12 to 24 inches in the eastern counties, and from 6 to 12 inches in the others. The subsoil is a heavy clay loam, deeper in color than the soil and more clayey, which sometimes overlies a variegated and plastic pipe-clay. The growth is oak, hickory, short-leaf pine and dogwood, with beech, maple and poplar on the lowlands. The lands of the belt lying between the Savannah and Flint rivers are considered the best of the region, and not only occur in larger areas, but are more productive and durable, and are easily tilled. The subsoil is stiff and tenacious, and hard to break up. The lands yield from 800 to 1,000 pounds of seed cotton when fresh, and 500 pounds after a few years' cultivation. Reports give the product, after fifty years' cultivation, as 300 pounds. These lands are, however, preferred for small grain. West of Flint river the red clay lands of southern Stewart, Webster and Randolph counties have similar productiveness and durability; but the more sandy of the red lands while having, when fresh, a yield equal to the above, are not as durable.

#### THE OAK, HICKORY AND LONG-LEAF PINE HILLS, OR YELLOW LOAM REGION.

This region forms a belt of country across the State between the Savannah and the Chattahoochee rivers, and extends in width from the sand hills south to the pine barrens and wire-grass region. Its width varies greatly. The entire area embraced by the yellow loam region, including the red hills, is about 6,650 square miles. The surface of the country between the Savannah and Flint rivers, while very broken in some localities, is gradually rolling with ridges parallel to the streams, and a timber growth of long-leaf pine, post and Spanish oaks and hickory. The long-leaf

pine is most prominent, and in many places is almost the exclusive timber. This belt or region is underlaid at from three to ten feet by the same bed of soft limestone and marl found under the red hills. The soils of this eastern part of the belt are sandy and gray, except on the immediate surface, where they are dark from decayed vegetation. Black, brown and yellow ferruginous gravel is abundant in some of the counties on the surface and mixed with the soil. The subsoil, at a depth of from 3 to 9 inches from the surface, is either a yellow clay loam or yellow sand. Lands having the latter are poor and unproductive, except perhaps for a year or two. The better class of soils, with their clay subsoils and mixed growth of long-leaf pine, oak and hickory, are easy to cultivate and are well drained, and yield an average of 500 pounds of seed cotton per acre when fresh, and 250 or 300 pounds after a cultivation of ten years. West of Flint river these lands cover the greater part of the oak and hickory region. The upper counties and those along the Chatahoochee river, as far south as Clay county, are hilly and are usually covered with a heavy deposit of sand. Underneath the sandy soil are the red and yellow clays over variegated and joint clays with cretaceous marls. The growth of these hills is oak and hickory, with a large proportion of short and long-leaf pine, which also characterize these lands southward. Ferruginous sandstone is abundant in some localities on high points. These lands are but sparingly under tillage, owing to their broken character and to the abundance of good valley lands. Going southward from these hills the country becomes more level, and soil is a finer loam. The clay subsoil is covered by the sandy deposit to a much less depth, and buhrstone is found in fragments. There are large areas of level uplands in Sumter, Webster and Stewart counties, in the lower parts of Macon, Schley and Marion, and in the upper parts of Lee, Terrell, Randolph and Quitman. In these counties the clays are underlaid by a hard limestone, outcrops of which are seen in the bluffs of the Chatahoochee south of Pataula creek, Clay county, in the caves of Randolph county north of Cuthbert, and in the bluffs of Flint river at Montezuma. Pine, oak and hickory also characterize the growth of this section. Going still farther south, into the counties of Clay, Early, Calhoun, Terrell, and the lower part of Randolph and Sumter, we find the lands very level except along the river. The sandy soil is still more shallow, and the red or yellow clay subsoil often comes to the surface, forming by admixture a mulatto soil sometimes 10 inches in depth. Long-leaf pine becomes more abundant and the growth more open. Lime sinks are found and underground streams are frequently seen flowing through them. Streams disappear and as suddenly reappear miles away. The yield of the fresh uplands region, as claimed by correspondents with but few exceptions, is from 600 to 800 pounds of seed cotton per acre, or from 250 to 400 pounds on lands of several years' cultivation. There is, however, some difference in the crops of various portions of the area, some producing fully 25 per cent. less than others.

#### SOUTHERN OAK, HICKORY AND PINE REGION.

The region embraced in this division comprises portions of the counties of Decatur, Thomas and Brooks, lying along and near the Florida line. The country is for the most part high and rather rolling, and is about 75 feet above the open wire-grass country on the north, or 130 feet above the river. The area in the region is about 2,317 square miles. The surface of the country is for the most part very open, with a tall timber growth of long-leaf pine. The soil is very generally sandy, from 6 to 12 inches deep, with mostly a clayey subsoil underlaid by white limestone. A peculiar feature of the region is the presence of a red clay loam in small localities where the timber growth is oak and hickory. Wire grass occurs but seldom in this region, and siliceous shell rocks are almost entirely absent, except in some lowlands. The yield is reported to be from 600 to 800 pounds of seed cotton per acre after four years' cultivation.

## LOWLANDS OF THE CENTRAL COTTON BELT.

The bottoms of the larger streams are usually liable to yearly overflows, and are, therefore, but little in cultivation. The hummocks, or second bottoms of the larger streams, above overflow, are largely under cultivation, and on some of the streams are very extensive. They are very level, and have a growth similar to the bottoms. The soil is a rich sandy loam, from 12 to 24 inches deep, with much decayed vegetation, and is considered the most productive of all the lands of the belt. Of seed cotton these hummock soils yield about 1,400 pounds when fresh, and from 800 to 1,000 pounds after being cultivated a few years. Heavy clays also underlie the lands. These lands are, however, not considered best for cotton, that crop being liable to injury from early frosts and rust, though large crops are produced. They are said to be late, cold, and ill-drained. The alluvial lands of the Savannah river are very level and wide, and have a growth of beech, white and water oaks, hickory, ash, holly, bay, birch, walnut, mulberry, sycamore and cottonwood. The soil, a fine brown loam mixed with scales of mica, is from 2 to 3 feet deep, with a putty-like tenacious pipe-clay, which is hard to till, and breaks up in clods. These lands are largely under cultivation, being well adapted to cotton, corn and grain, though the former suffers much from rust and early frosts. The yield in seed cotton is about 1,500 pounds on fresh land, and 1,000 pounds after a few years' cultivation; and, unless prevented by having the rows far apart, or by other means, it grows to a height of 5 or 6 feet. Very little of this land lies out.

Along the Chattahoochee river, south from Columbus to Georgetown, there are many level valleys of open prairie occupying a position similar to the second bottoms of other streams, but higher and without their growth. In Muscogee county these valleys are very broad and open, and have a fine sandy loam soil, from 5 to 12 inches deep, and a heavy clay subsoil. In the counties south, where the blue clay marls approach near the surface, these prairie valleys are richer, the soil being darker and more tenacious. The sand and red clays of the adjoining hills enter more or less into its composition. In the southwestern part of Stewart county this valley is two or more miles wide. The lands under cultivation yield from 800 to 1,200 pounds of seed cotton per acre when fresh, and from 600 to 800 pounds after five or ten years of constant tillage.

## LONG-LEAF PINE AND WIRE-GRASS REGION.

This region covers a large portion of Southern Georgia, south of the oak and hickory and pine lands of the Central Cotton Belt, extending from the Savannah river on the east to the Chattahoochee river on the west, and including in its area eighteen whole counties and large parts of others. The entire region is, as it were, a vast plain very nearly level, except on the north, and covered with a growth of tall long-leaf pine. Their large and straight trunks are devoid of branches for from 30 to 100 feet above the ground, and stand so far apart as to make an average of only from 50 to 75 trees per acre, with only here and there some undergrowth. In most of the region public roads are of use only as guides and a means of crossing any small streams that may come in the way, and to avoid the fallen timber that marks numerous storm-tracks. Over large areas, where the lands are a dark sandy loam with yellow sandy subsoil, the roads are compact, hard and smooth. Houses in this region are few. Lumber, turpentine, resin, and charcoal are prominent products. Turpentine farms of from 10,000 to 75,000 trees each are found throughout the entire region, and especially in the middle, eastern and southeastern portions. The assertion that the long-leaf pine will not return on land cut over or burned off, needs to be vehemently denied, for it has obtained wide credence. Every close observer, however, can go into the wood and find pines (long leaf) from a foot high, on through all sizes. Doubtless yearly *burnings over* do much to prevent the growth

of young pines; still, even under these difficulties, plenty of young long-leaf (*pinus Australis*,) pines can be found. The region takes its name from the so-called wire grass that covers the entire region from the Savannah river westward to the Chattahoochee river, and into Alabama.

#### STREAMS.

The streams of the Long-leaf Pine and Wire-grass Region, soon after they leave the oak and hickory belts, become slow in their movements, and have banks from 25 to 30 feet high (showing on some of the streams heavy beds of sandstone), with bottom lands not very wide. Southward they become slower in movement, with bottom lands increasing in width. The small streams are usually very sluggish, and dark from decayed vegetation. The saw palmetto appears on the lowlands, while the pitcher plant also covers large areas.

The surface of the upper and western portion of this region is somewhat rolling or undulating, with a few low ridges or hills, and is elevated from 25 to 50 or even 75 feet above the streams, and from 200 to 500 feet above the sea. This is especially the case in the northeastern and southwestern portions of the region, which also differ from the rest in being underlain by limestone (lime-sink region,) and having a better class of soil, as indicated by the occasional admixture of oak and hickory with the long-leaf pine.

#### THE LIME-SINK REGION.

The Lime-Sink Region lies chiefly on the west of the Atlantic and Gulf water-divide. The soft limestone underlying this section, instead of the sandstone alluded to, is accompanied on the surface, and sometimes in beds, by masses of a siliceous and aluminous and often flinty shell rock. The eastern limit of this Lime-Sink Region is marked by a line of low ridges, branching off southward from the main divide, and separating the waters of the Allapaha and Withlacoochee rivers from those of the Flint river. This line passes through the eastern side of Worth and Colquitt counties, and southeastward into Brooks and Lowndes. The region embraces about 7,020 square miles and includes the following counties and parts of counties: Screven (except a strip along the eastern and northern sides of the county), the lower part of Burke, the upper part of Bulloch, all of Miller, Mitchell, Colquitt and Worth, the southern parts of Pulaski, Dougherty, Baker and Early, the northern parts of Decatur, Thomas, Brooks and Lowndes, the eastern parts of Dooley, Lee and Dougherty, and the western parts of Irwin, Berrien, Dodge and Wilcox.

In this Lime-Sink Region the banks of the streams are from 50 to 75 feet high, and the bottoms rather narrow, with a growth of oak, hickory, walnut, magnolia and dogwood. The water is generally clear, though not rapid in movement. On the uplands the timber growth is almost exclusively long-leaf pine, except in the vicinity of large streams, where oak is found to some extent. The country is very open, and resembles very much the pine barrens, though it is not as level. The depressions of the surface, called "lime-sinks," are caused by the dissolution and wearing away of underlying limestone. Into one of these sinks sometimes a small stream falls and disappears, while in another the underground stream may be seen flowing past. In others the water is still and quiet, but rises and falls in conjunction with some neighboring large stream, thus showing underground connections. Ponds are also abundant; one of these, near Bainbridge, Decatur county, being 3 miles in circumference. Caves are often found associated with these sinks, and in some the great rush of air, that either enters or comes from them, has given to them the name of "blowing caves".

This is a better cotton-producing region than the pine barrens. The uplands of the region, with their long-leaf pine and wire grass, have a gray sandy soil, which is from 6 to 12 inches deep, and a red or yellow sandy clay subsoil. They yield at

first from 500 to 800 pounds of seed cotton per acre, but after eight or ten years, without fertilizers, this is diminished to 350 or 500 pounds. The country is so sparsely settled that the farms are located chiefly on the better classes of land. The narrow bottoms of some of the creek lands are very fertile.

#### PINE BARRENS, OR SANDY, WIRE-GRASS REGION.

The division known as the Pine Barrens proper covers an area of over 10,000 square miles, and includes the following counties and parts of counties: Tattall, Montgomery, Emanuel, Telfair, Appling, Coffee, the middle of Effingham, the southern portions of Bulloch, Johnson and Laurens, the eastern parts of Wilcox, Irwin, Berrien and Lowndes, the upper portions of Pierce, Wayne, McIntosh, Liberty and Bryan, and areas in Jefferson, Washington, Dodge, Ware and Clinch. It has a generally level or slightly undulating surface, and is underlaid in many places by a sandstone, which juts out in bold bluffs on some of the streams. The soil is usually fine and sandy, with a yellow sandy subsoil, though clay frequently underlies it. The surface of the country in the upper counties is rolling or undulating, but becomes quite level southward, the soil also becoming less sandy. The lands contain much ferruginous gravel or brown pebbles. The Atlantic and Gulf water-divide forms a rolling country as it passes south and then southeast through the counties of Dooly, Wilcox, Irwin and Coffee.

The Wire-Grass Region terminates near the coast, forming the second terrace. From this terrace there is a descent for 15 or 25 feet to the the savannas and pine flat and palmetto lands. About eighteen counties are devoted to cotton culture, lumber and turpentine interests, absorbing nearly the whole attention of its country people, especially near the navigable water courses. The introduction of fertilizers in this section has made the cultivation of cotton profitable, and has broken up to some extent the old method of throwing away old land and taking in new. The soil of the uplands is sandy and gray or ash colored, 12 inches deep, and has a subsoil of yellow or orange colored loam. In the higher regions there is sometimes a clay subsoil approaching the surface, giving to the land greater fertility and durability, as indicated by the oak and hickory growth. The soil is frequently covered with gravel, either of quartz or ferruginous concretions, yellow or dark brown externally, and either smooth or rough with a black interior. These sandy soils, while producing a very good crop of cotton when new and fresh, very soon wear out, and without the aid of fertilizers their cultivation is not profitable. The yield in seed cotton on fresh sandy uplands, without the aid of fertilizers, is about 500 pounds per acre; after cultivation for several years this is diminished to about 300 pounds of seed cotton, or 100 pounds of lint, per acre. Of other crops, corn and oats yield 10 bushels per acre, while sorghum cane does very well and much attention is given to its cultivation. The bottom lands in some counties are considered better than the uplands, but are more or less liable to overflow. In the northern section it is found that where cotton is cultivated it suffers from rust, and is liable to be killed by early frost; hence corn is raised instead of cotton. The soil is very sandy, and is almost colored black by decayed leaves and other vegetation. Its depth is 12 inches or more, and it is sometimes underlaid by clay. The growth is poplar, cypress and titi, with some pine and "fever-tree" or Georgia bark (*Pinckneya pubens*). The second bottoms, or hummock lands, differ from the bottoms in being above overflow, but their other features are similar.

I think that one great use these immense pine tracts will be put to some day will be to convert them into immense sheep walks, seeding them to Bermuda grass, white clover and red-top or orchard grass. These gravelly hills will doubtless, in many instances, become clad with vineyards. No doubt the Delaware grape will succeed well there.

## PINE AND PALMETTO FLATS.

The region thus designated lies in the southeastern corner of the State, around Okefenokee swamp, and embraces mainly Charlton, Echols and Clinch counties and large portions of Ware, Pierce and Wayne. It is considerably higher than the belt of the coast region that extends across other counties to the Savannah river. The country is very level, open, and sparsely settled, and is covered with many swamps having a dense growth of gums, titi, sweet and loblolly bays, etc., forming an impenetrable thicket.

## COAST REGION.

The region properly designated "*savannas*" occupies a belt of country from 10 to 15 miles wide, between the pine barrens and wire-grass region on one side and the coast live oak lands on the other, extends from the Savannah to the Saint Mary's river, and embraces nearly all of the counties of Chatham, Bryan, Glyn and Camden, and large portions of Liberty and McIntosh. The surface of the country is very level, and 10 or 15 feet above tide water, and comprises what is known as the "first terrace." Its northwestern limit is the bluff of the second or wire-grass terrace, passing through the lower part of Effingham (20 miles north of Savannah,) into Bryan, where it is 50 feet high. Southward through Liberty county this bluff forms the "gravel hill" south of Hinesville, which has an elevation of from 15-to 30 feet above the sea. Deep sands are found here. Thence the limit extends through McIntosh county to Waynesville, and, on the eastern side of the Saltila river, into and across Camden county at a distance of about 15 miles east of Colerain. At this point the rise is about 25 feet. Within this region, adjoining the marsh lands, there is a belt of live-oak land, having a width of several miles, which properly belongs to the savannas. This region, along the first or lower terrace, is noted for its beautiful meadow or savanna lands, which are broad, flat and open plains, having no growth other than sparse and tall long-leaf pine and a thick undergrowth of saw palmetto, with here and there bunches of wire grass that has found its way down from the upper terrace. In the spring and early summer months these plains are covered with a dense growth of flowers which gives to them an enchanting appearance.

I have thus given great space to the many minute divisions made of Georgia lands. Georgia is such an immense State, so prominent agriculturally, has caught the public eye so thoroughly that I have felt it worth while to show to the reader, who may be thinking of making a home there as a farmer, as much of the State from an agricultural standpoint as I could, particularly displaying topographies and soils. Having seen something of the constituents of the various soils and their needs, let us see what Georgia possesses to supply these original defects or impair wasted fertility. This leads us to a consideration of her

## MARLS.

Throughout the Central Cotton Belt there occur extensive beds of marl and limestone, beneath the sands and clays of the hills, often exposed along the banks and bluffs of the streams. The marls, composed of a mass of comminuted shells, are especially valuable agriculturally, because of their richness in lime, and sometimes in potash and phosphoric acid. They vary greatly in the thickness of their beds and in their character and composition, and mostly belong to the class of stimulant manures that serve by their lime to make available for plant use the food elements that exists in the soil in an insoluble condition. There are also other beds containing much green sand (*glauconite*), rich in potash and valuable as a nutritive manure.



BLUE GREEN-SAND MARL.

There is an extensive lot of blue marl along the banks of the Chattahoochee river, in Stewart county, which is rendered valuable by its green sand character. It occurs in a bed exposed some 15 or 20 feet, and for many miles along the river, dips to the southwest, and finally disappears below the water.

TERTIARY MARLS.

The tertiary marls are far more extensive, as well as more valuable, than are the cretaceous beds. They are generally a white and friable mass of broken shells and fine corals, and are so compact as to form almost perpendicular bluffs where exposed on the larger streams. This is especially the case with the lower or Claiborne beds, which occur at Fort Gaines, Clay county, forming there a bed 25 feet or more thick. This marl has numerous outcrops eastward to the Savannah river, where thick beds occur at the foot of Shell Bluff and at Silver Bluff. It contains usually as much as 95 per cent. of carbonate of lime, and is well worth transportation to the farms of the region and elsewhere. Its use upon the soil has been attended with a large increase in productiveness, as attested by several farmers in Lee county. When used broadcast on the land its effects are not usually apparent in the first year's crop; but afterwards it produces a marked and continuous improvement, provided there are fair amounts of potash and phosphoric acid already present in the soil.

GREEN-SAND CLAYS.

Overlying these beds of limestone and white marl in the counties of Twiggs, Wilkinson and Houston are other beds of green-sand clays from 12 to 24 inches thick. These contain, as shown by analysis, from 2 to 3 per cent. of potash, and are well worth removal to those farms whose soils are lacking in this element of plant food. A complete analysis of the marl has not been made. Another bed of a white pulverulent marl occurs in the banks of the Saltilla river, at Burnt Fort, in Charlton county; it is doubtless also very rich in lime.

Mr. John C. Smock, in Williams' *Mineral Resources of the United States*, gives the following localities of marl; Bibb, Chattahoochee, Stewart, Quitman, Thomas, Randolph, Clay, Crawford, Washington, Houston, Pulaski, Charlton, Burke, Screven, Effingham, Chatham, Bulloch, Emmanuel and Jefferson counties. These counties occupy central and southern parts of the State.

I take the following table from Williams' *Mineral Resources of the United States*, printed in 1833:

ORES, MINERALS AND MINERAL SUBSTANCES, OF INDUSTRIAL IMPORTANCE, WHICH ARE AT PRESENT MINED.

Mineralogical Name.	Common Name.	Remarks.
Chalcocite .....	Buhrstone, millstone... Vitrous copper, copper glance.	Early, Burke, Screven, Bullock and Jefferson counties. Canton mine, Cherokee county; other localities with chalcopyrite.
Chalcopyrite ...	Pyritous copper ore, yellow copper ore, copper pyrites.	Canton mine, Cherokee county; other localities in Lumpkin, Fannin, Townes, Fulton, Carroll, Murray, Paulding, Haralson, Greene and Lincoln counties.
Coal.....	Coal .....	Bituminous coal, Dade county; on west brow of Lookout mountain; Coal Measures, in Chattooga county, and in Walker county.
Gold .....	Gold .....	Auriferous district occupies one-third of State from North Carolina and Tennessee southwest and west to Alabama, occupying a large number of counties. Deep mines and placers, worked chiefly in Rabun, Lumpkin, Dawson, White, Hall and Union counties. The mining centres are at Dahlonega and vicinity, and about Auraria, in Lumpkin county. A third district is on the east side of State, in McDuffie, Lincoln and Wilkes counties. Gold occurs in quartz seams and veins; which traverse micaceous, talcose, chloritic and hornblendic schists. The soils, disintegrated rocks and gravels, and sands also are gold-bearing over wide areas.
Hematite.....	Red Hematite, fossil ore	Lookout mountain, Dade county, a continuous stratum 1 to 3 feet thick; McLemore's cove, Dade county; Iron Ridge, Walker county; Whitfield and Floyd counties.

Mineralogical Name.	Common Name.	Remarks.
Hematite.....	Specular iron ore.....	Allatoona Hills, along Etowah river, Cherokee county, extensive deposits; valley of Etowah river, in Cass, Floyd, Murray and Paulding counties.
Limonite.....	Brown hematite.....	Mine of Cherokee Iron Works, five miles east of Cedars-town, Polk county, very extensive bed; Ætna Iron Works' ore bank, Ætna, Polk county; ore banks of Ridge Valley Iron Works, Floyd county; Hall's station banks and Barton Iron Works, Floyd county; Peach-tree bank, Barton county; iron ore reported also in Fannin, Gilmer, Whitfield, Catoosa, Gordon, Haralson, Milton, Hall, Habersham, White, Jackson and Walker counties, in northwest and north part of State; in Greene, McDuffie and Burke, in central belt.
	Marble.....	Near Van Wert, Polk county, white; Fannin, Gilmer, Whitfield, Floyd, Richmond, Walker, Catoosa and Chattooga counties, all in northwest part of State.
	Marl.....	Bibb, Chattahoochee, Stewart, Quitman, Thomas, Randolph, Clay, Crawford, Washington, Houston, Pulaski, Charlton, Burke, Screven, Effingham, Chatham, Bullock, Emanuel and Jefferson counties. These counties occupy central and southern part of State. Marls have limited use in the immediate vicinity of diggings.
Muscovite.....	Mica.....	Warren, Pickens county; Heard, Cherokee, Gwinnott, Townes and Carroll counties.
	Slate (roofing).....	Gentry's Quarry, near Van Wert, Polk county; Rockmart, Polk county; Gordon and Barton counties.

ORES, MINERALS, AND MINERAL SUBSTANCES OF INDUSTRIAL IMPORTANCE AND KNOWN OCCURRENCE, BUT WHICH ARE NOT AT PRESENT MINED.

Amethyst.....	Amethyst.....	Rabun, Cobb and Oglethorpe counties.
Arsenopyrite....	Mispickel.....	Canton mine, Cherokee county.
Asbestos.....	Asbestos.....	Rabun, Fulton, Townes, Habersham, De Kalb, Paulding and Troup counties.
Barite.....	Barytes, heavy spar....	Near Allatoona, Barton county, extensive bed; Murray and Barton counties.
Corundum.....	Emery.....	Rabun, Townes and Union counties.
Covelite.....	Indigo copper.....	Canton mine, Cherokee county, with chalcopyrite and chalcocite.
Diamond.....	Diamond.....	White and Hall counties. Only few finds thus far.
Galenite.....	Galena, sulphide of lead.	Harris' mine, Hall county, argentiferous galena with pyrite; Cohutta mountains; Murray, Floyd, Lincoln, Habersham, Hall and Union counties.
Garnet.....	Garnet.....	Turner's mill, Paulding county.
Granite.....	Granite.....	Stone mountain; Gwinnett, DeKalb, Heard, Oglethorpe, Clarke, Muscogee, Columbia, Richmond and Wilkes counties.
Graphite.....	Plumbago, black lead..	Pickens and Carroll counties (specimens); Habersham, Cherokee, Carroll, Clarke, Elbert and Hart counties.
Itacolomite.....	Flexible sandstone.....	Hall county.
Kaolinite.....	Kaolin, porcelain clay..	Cherokee, Pickens, Heard, McDuffie, Columbia and Richmond counties.
Magnetite.....	Magnetic iron ore.....	Near Rome, Floyd county; near Villa Rica, Carroll county, no well-defined vein; Lumpkin and Carroll counties.
	Manganese ore.....	Townes, Lincoln and Barton counties. In latter has been mined for use in manufacture of ferro-manganese.
Molybdenite....	Sulphide of molybdenum	Heard county.
Novaculite.....	Oilstone.....	McDuffie, Oglethorpe and Lincoln counties.
Opal.....	Opal (fire-opal).....	Fire-opal, Washington county, good specimens as gems; Bullock county; hyalite in Burke and Screven counties.
Pyrite.....	Pyrites, iron pyrites....	Fulton and Carroll counties.
Sapphire.....	Sapphire.....	Blue sapphires have been found on Sequale creek.
Serpentine.....	Serpentine.....	Rabun, Townes and Union counties.
Silver, native...	Silver.....	Union, Hall and Murray counties.
Talc.....	Steatite, soapstone.....	Dalton, Whitfield county; Cobb, Union, Fannin, Gilmer, Hall, Habersham, White, De Kalb, Fulton, Murray, Jasper, Paulding, Elbert and Clayton counties.
Tetradymite...	Tellur-bismuth.....	Polk, Lumpkin, Paulding and Cherokee counties.
Tripolite.....	Infusorial earth.....	Murray, Whitfield and Lincoln counties.

I have seen fine slates from Polk county. The colors are black, red and olive. A scientist tells me it is in great force there.

Messrs. Campbell & Ruffner lately compiled a pamphlet on a "Physical Survey of Georgia, Alabama and Mississippi along the line of the Georgia Pacific Railway," from which I quote:

"While the chief mineral wealth of Georgia and Central Alabama is treasured

up in iron ores, limestones and coals, there are yet other valuable minerals that claim our attention. Of these Georgia holds a liberal share. The copper belt in Georgia and Alabama possesses some promising features, and has already attracted considerable attention, due in part to the successful utilization of the sulphur of these ores, in making sulphuric acid near Atlanta. Villa Rica, in Carroll county, 38 miles west of Atlanta, is a good starting point for those who wish to make special examinations of the present developments and future prospects of the copper ores. N. P. Pratt, Esq., in a Report of Progress, makes the following summary of observations near Villa Rica, which we give with some abbreviations :

“ ‘In 1852-1854 the copper fever spread here from Ducktown, Tenn., causing great excitement over every spot along the lode where hydrated-oxide of iron appeared on the surface. High prices were refused by the owners of the lands, many of whom undertook to open mines without any experience or knowledge of mining, and the natural result was the loss of capital and final abandonment of the work. The construction of the Georgia Pacific Railway, and the Atlanta experiment (which has shown that the sulphur formerly thrown away may be profitably used and the copper extracted from the residue), have given this matter new life.’

“ Graphite was found in the archæan rocks of Cobb county, about two miles north of the line of the railway, near Ross' store. There are indications of several seams running parallel with one another. The widest exposure was about two feet. From this deposit N. P. Pratt, Esq., obtained about fifty pounds for the Atlanta Exposition. He also sent a sample to New York, which was valued at \$20 per ton. The graphite here is imbedded in hydromica slate. The outcrop is on a hill-side where mining would be easy. Another bed of graphite was cut in sinking a well in Haralson county, (Lot 105, Dist. 20, Sec. 3,) but its extent has not been determined. The mineral occurs also in Carroll county, Ga., and in Cleburne, Clay and Randolph counties, Alabama.

“ *Corundum*.—Mr. Pratt gave special attention to this mineral, and collected some valuable facts in regard to it. He says: ‘the first locality is about two miles south of Powder Springs, in Cobb county, Ga. \* \* \* Here, about 160 pounds were taken from the surface; one piece, of a flesh color, weighing as much as 3 pounds. \* \* \* The average quality of the mineral is much finer than any I have seen in this country, not excepting the best specimens from North Carolina. The prevailing color is a dark flesh red, and the mineral almost free from impurities. Besides the large masses, characteristic crystals of a grayish color and rough surface were also found. A second locality of corundum is near Villa Rica, in Carroll county, Ga. From this point as much as a wagon load has been removed from the surface by different parties. \* \* \* Specimens of various sizes were scattered in a line running southwest through two forty-acre lots.’

“ *Mica*.—Very little attention has heretofore been given to this mineral in either Georgia or Alabama. Promising samples, however, have been obtained from near McAfee's Ferry, in Fulton county, from several points in Paulding county, and from near Carrollton, Carroll county, Ga.

“ *Talc (Steatite), Soapstone*.—The best specimens of soapstone that we saw were from Douglas, Fulton and Paulding counties, Georgia. It has been quarried successfully about five miles south of Douglasville.

“ *Potter's Clay*.—Georgia has beds in Cherokee, Pickens, Heard, McDuffie, Columbia and Richmond counties, which are not yet developed. A white porcelain clay occurs in Randolph county, and near Sulphur Springs station, DeKalb county. This last locality is worked. Pottery clays are found also in Coosa and Macon counties, and extensive beds occur near Jacksonville, Calhoun county.

“ *Manganese*.—The mines furnishing the most valuable ores at present are located in the Etowah region, in Bartow county, Georgia. Sometimes, with the Georgia

ore, the amount of manganese reaches the neighborhood of 80 per cent. It runs from 66 to 70 per cent.

“ANALYSIS OF GEORGIA ORE:

Water.....	1.17
Silica .....	4.00
Manganese dioxide.....	66.40
Ferric oxide.....	10.08
Barium sulphate.....	0.29
Calcium carbonate—trace.	
Oxide of manganese other than dioxide .....	18.06
Total.....	100.00”

In Georgia, what is commonly known as the “intensive system of culture,” has excited great attention and considerable imitation. It may be said to be the fundamental and vital principle of the revolution impending in Georgia with reference to agriculture. Its influence is communicating to other States, and its effects upon the State of Georgia are seen in many respects—most noticeably in the greatly increased production of agricultural staples, and in the elastic, sanguine, erect spirit of her agriculturalists. Her farmers have seen the *possibilities* in the soils of the State with judicious treatment, and, so far from the repining, shiftless, despondent spirit that marked, almost everywhere, Southern agriculture a few years ago, there is an aggressive hopeful spirit—an alacrity and confidence of endeavor. Hon. H. C. Furman, of Milledgeville, Baldwin county, who died about two years ago, was most prominent because of his extraordinary success in producing 75 bales of cotton and 500 bushels of oats from 65 acres of old land that had previously yielded but 8 bales, and was considered worthless. Mr. Furman’s method is summed up as follows:

“In 1878 I took 65 acres of land, the original growth of which was scrub oak and pine. It lies well, is slightly rolling, and was cleared nearly 30 years ago. The soil is light sand with a firm, red clay subsoil within 5 or 10 inches of the surface, and was worn out and considered worthless years ago. This piece of land, planted in cotton and cultivated carefully, without manure, yielded me the first year 8 bales; second year, with 500 pounds of compost per acre, the yield was 12 bales; third year, with 1,000 pounds of compost per acre, the yield was 23 bales; fourth year, with 2,000 pounds of compost per acre, the yield was 47 bales. This year (1882), I used 4,000 pounds of compost per acre, and have gathered 75 bales. From 5 acres of this land I this year harvested 500 bushels of oats. I then planted it in cotton (June 7), and the yield was from  $1\frac{1}{2}$  to 2 bales per acre. My estimate of the cost of production this year is  $4\frac{1}{2}$  cents per pound. Up to this time I have made no great departure from the Dickson system of cultivation and preparation, have never subsoiled, and only break my land in bedding, plant very late, never till after May, manure in the drill, opening deep and wide, listing in the manure and letting it stand until ready to plant; then throw two furrows on the list and plant with a Dowlaw planter, breaking out the middles and finishing the bed after the cotton is in the ground, thus giving a porous bed for the plant and killing the first crop of grass at the same time; cultivate with a sweep, and let the cultivation be as shallow as possible. I change the drills 12 inches every year, so as to enable me in four years to manure across my land with 4-foot rows.

“The true secret of my success lies in the character of my compost. I insist upon furnishing each crop with a manure that contains every element necessary to that crop combined in the proportions which the crop requires them. In order to do this accurate knowledge of the chemical composition of the crop (stalk, leaf and fruit,) is essential. For cotton, then, my aim was to make a compost that would contain the elements that form it, viz: Phosphoric acid, potash, soda, humus, lime, silica, and nitrogen, and in the right proportions. This compost is made with 30 bushels of cotton seed, 30 bushels stable manure, or well-rotted leaves or organic matter, 400 pounds of acid phosphate, and 200 pounds of kainit. In this mixture

the kainit is indispensable. It furnishes potash, lime, magnesia, soda, and a substance called "bittern," and, combined with humus, is a specific against rust in cotton. After manuring in the drill for four years and filling the ground with humus we come to a point where ideal cotton culture can begin. Now we begin to manure broadcast, turning it in flush, harrowing the ground, laying it off on a level in rows 4 by 4 feet, and planting cotton at the intersection of each furrow. In this system we dispense with the hoe, the most deadly enemy the cotton plant has to encounter, and use the plow altogether, ploughing both ways, and thinning by hand to a stand of two stalks per hill. Under this system of culture, properly carried out, I believe that an average production of three bales of cotton per acre is possible."

From the use of agricultural fertilizers, from the influx of immigrants (from Europe and the North and West,) and from the spread of this "intensive system"—not forgetting the use of improved agricultural implements—from these causes Georgia can show the astounding progress she has made in a few years. She produces now over twenty million dollars (\$20,000,000) worth more of breadstuffs than in 1870. Under the old system of *buying* corn, pork, hay, flour, etc., *all this money would have gone into the pockets of Northern and Western farmers*. Twenty millions less per annum to the West for *one* Southern State, is a large straw to show which way the wind blows!

But to proceed to Georgia's progress in manufactures. My authority in these statistics is that very able and progressive industrial journal the *Baltimore Manufacturers' Record*, and the *Chronicle and Constitutionalist* of Augusta, Ga.

In growth of manufacturing production from 1870 to 1880 Georgia swelled from \$31,196,105 to \$41,162,811, or \$9,966,706—or over 30 per cent. There were in operation in the year 1880 4,713 looms, 200,974 spindles, employing 6,678 hands and consuming 67,874 bales of cotton. Georgia advanced from fourth to third place in manufactured products. Unfortunately, the census of 1880 does not give the full details of manufacture. Georgia had 81 kinds of manufactures. The leading industries were flour mills, carpentering, blacksmithing, lumber, and cotton manufacture. Georgia, in 1870, had among her larger specialties, beside these, leather and wheel manufacture, and, in 1880, iron foundries, brick, tar, turpentine, tin, crackers and candy on a large scale. Since 1880 Georgia has been doing a phenomenally large business in lumber, cotton, fertilizers, and tar and turpentine.

We will take up the three controlling staples of manufacture in all the Southern States—cotton, flour and lumber. Georgia leads overwhelmingly in cotton, doubling any single State. In 1880 she had 63 cotton factories, with a capital of \$6,632,142, making a production of \$7,295,356. That gallant little South Carolina stood second, with a production of \$2,895,769. The whole capital in the South in cotton manufacture was \$17,782,197, of which Georgia alone had over one-third and made one-third of the product. North Carolina had five more establishments, but made over 50 per cent. less product. Since 1880 Georgia has increased her cotton mill capital over six millions of dollars, and in this August, 1884, has \$13,000,000 invested in cotton manufacture, and has nearly one-half of the Southern capital, and makes nearly one-half of the Southern manufactured products. Her products will go to \$14,000,000 annually with 70 mills, 7,843 looms, 340,130 spindles, employing 10,000 hands, and consuming 100,000 bales of cotton. From June 1, 1880, to January 1, 1884, Georgia increased her looms from 4,713 to 7,843, or 3,130; her spindles from 200,974 to 340,130, or 139,156. The addition to her cotton mills was 22.

The following is the increase in cotton milling in the South during this period from June, 1880, to January, 1884, taken from the *Baltimore Manufacturers' Record*, and showing Georgia to continue her leadership:

## INCREASE FROM JUNE 1, 1880, TO JANUARY 1, 1884.

	No. of Mills.	No. of Spindles.	No. of Looms.
Alabama.....	7	26,985	554
Arkansas.....	2	4,285	2
Florida.....	1	1,102	—
Georgia.....	22	139,156	3,130
Kentucky.....	2	17,242	398
Louisiana.....	5	33,571	704
Maryland.....	5	44,286	256
Mississippi.....	3	22,956	416
North Carolina.....	43	110,595	1,583
South Carolina.....	17	98,200	1,614
Tennessee.....	17	32,609	383
Texas.....	4	9,626	94
Virginia.....	6	21,700	508
Total.....	134	562,433	9,651

Taking the statistics of flour milling, the largest single subject of manufacture, running in the South to an aggregate of \$67,769,465 of products, Georgia stands second—Virginia leading with \$12,649,276 of products, and Georgia coming next with \$11,232,029; yet beating Virginia in this, that with two millions less capital she made nearly as much product. Georgia had 1,132 flour mills, working \$3,103,918 capital, and producing \$11,232,029 of products. Georgia had the honor of producing one-sixth of the whole flour manufacture of the South. I think the thoughtful statistician will agree that some day in the early future we shall not only do a large business in supplying “early flour” for the North and West, but that the South will *monopolize* the flour trade of the vast country south of us. Here is a tempting field for disquisition.

Coming now to lumber, we find that the lumber production of the South ran in 1880 to \$36,323,248, and in this powerful industry, as in cotton manufacture, Georgia stood first, leading the section. She had 655 lumber mills, being exceeded in this respect of number by Virginia, North Carolina, Tennessee and Kentucky; but Georgia had larger capital and more products. Her capital ran to \$3,101,452, and her products to \$4,875,310, while Virginia, Tennessee and Kentucky had about two millions of capital each, and did run to over three and a half millions of product. Since 1880 Georgia has increased her capital in lumber mills three millions and her productions in proportion.

The lumber products in the South in 1880 were as follows:

	Est.	Capital.	Products.
Alabama.....	354	\$1,545,655	\$2,640,634
Florida.....	135	2,219,550	3,060,291
Georgia.....	655	3,101,452	4,875,310
Kentucky.....	668	2,229,558	4,064,360
Louisiana.....	174	803,950	1,764,640
Mississippi.....	295	922,955	1,920,355
North Carolina.....	774	1,743,217	2,682,795
South Carolina.....	420	1,056,265	2,031,507
Tennessee.....	755	1,004,503	3,744,905
Texas.....	317	1,660,952	3,773,449
Virginia.....	907	2,122,925	3,434,163
West Virginia.....	469	1,668,920	2,431,857
	5,923	\$20,079,902	\$36,424,266

Georgia's capital in lumber is to-day over \$6,000,000, while the lumber production will exceed \$7,000,000. We thus see that in the leading three manufacturing industries of the South, Georgia is indeed the Empire State, and in them is distancing her sisters.

In looking at the county manufactures of 1870, we see as follows:

Counties.	Capital.	Products.
1. Chatham.....	\$1,148,075	\$2,805,771
2. Richmond.....	1,315,145	2,614,495
3. Fulton.....	434,560	2,000,995
4. Muscogee.....	1,889,770	1,856,600
5. Bibb.....	805,704	1,497,301
6. Floyd.....	343,930	1,250,620
7. Clarke.....	501,325	850,720
8. Cobb.....	535,400	846,220
9. Glynn.....	116,500	655,070
10. Taylor.....	76,740	632,585

These were the leading ten manufacturing counties in 1870. In 1880 the ten leading counties were as follows:

Counties.	Capital.	Products.
1. Fulton .....	\$2,682,131	\$5,125,826
2. Richmond .....	2,402,275	3,490,780
3. Chatham .....	1,176,970	3,483,866
4. Muscogee .....	2,456,374	3,019,300
5. Bibb .....	657,800	1,724,125
6. Cobb .....	537,133	1,383,322
7. Floyd .....	512,005	1,104,376
8. Glynn .....	868,000	755,785
9. Clarke .....	568,400	629,933
10. McIntosh .....	171,750	740,700

The contest is now between Richmond and Fulton. We thus see the changes in ten years. Fulton displaced Chatham and Richmond, and Richmond passed Chatham; Floyd has been left by Cobb and gone ahead of Clarke; Glynn went up one, taking Cobb's place, and Clarke fell back to Glynn's old place.

The Industries thus ran in 1880:

	Est.	Products.	Capital.
Agricultural Implements.....	20	\$601,935	\$200,124
Bakery .....	26	464,102	118,450
Brick .....	76	409,025	212,600
Wagons .....	59	552,581	275,300
Confectionery .....	14	335,335	130,700
Cotton .....	44	6,513,490	6,527,557
Flour.....	1,132	9,793,898	3,576,301
Leather.....	173	619,957	203,450
Iron .....	14	990,850	1,135,900
Foundry .....	39	1,299,491	916,510
Lumber.....	668	5,246,510	3,223,452
Printing.....	21	579,054	506,800
Rice.....	9	1,488,769	263,000
Sash, &c.....	14	366,000	760,500
Meat Packing *.....	9	309,093	25,700
Tar, &c.....	84	1,445,739	513,885
Tin.....	56	329,624	155,350
Others.....	1,135	5,054,445	2,576,671
	3,593	\$36,319,958	\$21,322,250

It is not possible to give the full increase of the manufactures in Georgia since 1880, but we can approximate it. Let us take the three counties with leading cities. The manufacturing capital has grown from 1880 to 1883 as follows:

	1880.	1883.	Increase.
Fulton.....	\$2,468,456	\$5,971,130	\$3,502,674
Richmond.....	2,402,275	5,402,275	3,000,000
Columbus.....	2,456,371	5,364,109	2,907,738
Total increase .....			\$9,410,402

We thus have in three counties a growth of manufacturing capital of \$9,410,402. The *Baltimore Manufacturers' Record* gave the enlargement of capital in the whole State of Georgia in the six months from January 1, 1883, to June 30, 1884, as \$3,759,000. Taking those facts as a basis of calculation, we may reasonably estimate as follows, as to manufacturing capital:

Increase, Fulton, Richmond and Muscogee, 1880 to 1884.....	\$9,410,402
Increase in rest of State to 1884 .....	5,000,000
Increase in State, January to July, 1884 .....	3,759,000
Increase since 1880.....	\$18,169,402
Manufacturing capital in 1880.....	36,399,958
Present manufacturing capital.....	\$54,569,360
Increase, in less than five years, 50 per cent.	

The following compilation, by James M. Swank, Esq., the eminent authority on such topics, shows Georgia's progress:

BITUMINOUS COAL AND COKE IN NET TONS.

1872, .....	1873, .....	1874, 5,516;	1875, 12,685;	1876, 10,018;	1877, 9,194;
1878, 13,860;	1879, 16,240;	1880, 20,044;	1881, 24,000;	1882, 26,875.	

\* Here is another field in which the South is bound, some day, to become a great competitor with the West. Twice as much meat can be put on a hog South, with clover, as at the West. The land is cheaper, ice is home-made and cheap. Already there is one pork-packing establishment started in Arkansas.

Her production of charcoal pig-iron for the same time is, in net tons, as follows:

1872, 2,945; 1873, 7,501; 1874, 4,270; 1875, 3,823; 1876, 500; 1877, 4,029;  
1878, 2,503; 1879, 4,133; 1880, 7,277; 1881, 13,404; 1882, 15,565.

Still more impressive is her progress in the production of all kinds of pig-iron, as follows: Net tons—

1872, 2,945; 1873, 7,501; 1874, 9,786; 1875, 16,508; 1876, 10,518; 1877, 13,223;  
1878, 16,363; 1879, 20,373; 1880, 27,321; 1881, 37,404; 1882, 42,440.

A cognate topic to the consideration of the manufactories of this State is a view of her water-powers. Below I give a table of some of the water-powers of the State, premising that many and very important ones are omitted, particularly some that are *utilized*. These tables are from the Tenth Census of the United States, and the branch of

### STATISTICS OF POWER AND MACHINERY EMPLOYED IN MANUFACTURES,

Collected by George F. Swain, S. B., Instructor of Civil Engineering in the Massachusetts Institute of Technology, Boston, Mass. The following will assist the reader to a better understanding of the tables—an explanation by the author of the tables:

“In describing the separate water-powers I have therefore given four estimates. For convenience of reference, I will recapitulate them here, noting briefly their exact meaning:

1. *Absolute Minimum* can be depended upon *always*, and with no storage at all. Large waste all the time, except for a few days at a time in intervals of several years.

2. *Minimum Low-Season Flow*, with no storage, can be depended upon at all times, except for a short time in some dry seasons—perhaps for a few days in the dry season of each year. With small storage, can be depended upon all the time.

3. *Mean Flow in Very Dry Years—Maximum amount permanently available with storage*.—Storage capacity is already discussed. With larger storage a greater amount could perhaps be utilized for several years in succession, but not permanently.

4. *Low-Season Flow in Ordinary Dry Years*, without storage, can be depended upon generally, except in the low season of dry years, when the supply will be deficient for perhaps several weeks. In very dry years, when the supply will be deficient for a longer time, and in ordinary years, when the supply may be deficient for a few days at a time, can be rendered permanently available by storage. The *low-season flow of ordinary years* can be depended upon less than the above, but generally for nine months of every year.”

TABLE OF POWER AT ANTHONY'S SHOALS, BROAD RIVER.

STATE OF FLOW.	DRAINAGE AREA.	FALL.	FLOW PER SECOND.	HORSE-POWER AVAILABLE—GROSS.	
	Sq. miles.		Cubic feet.	1 foot fall.	40 feet fall.
Minimum .....	} 1,467	}	379	42	1,680
Minimum low season .....			528	60	2,400
Maximum, with storage .....			1,450	165	6,600
Low season, dry years .....			600	68	2,720

TABLE OF POWER ON HATTONS' SHOALS, TUGALOO RIVER.

Minimum .....	} 845	} 39	211	24	936
Minimum low season .....			255	29	1,131
Maximum, with storage .....			925	105	4,095
Low season, dry years .....			290	33	1,287



SUMMARY OF POWER ON THE SAVANNAH RIVER.

Place.	Distance from Augusta.	Drainage Area.	Rainfall.				Height.	Length.	Horse-Power Available—Gross.				Utilized		Per cent. of Minimum utilized.	Remarks.	
			Spring.	Summer.	Autumn.	Winter.			Year.	Minimum.	Minimum low season.	Maximum, with storage.	Low season, dry years.	Horse-power—Net.			Fall.
Augusta	Miles.	Sq. miles.	In.	In.	In.	In.	Feet.										
Blue jacket shoal.....	0.00	6,890	14	13	10	15	33-40	7 miles, 600 feet.	6,375	7,877	22,500	9,000	3,650	38	.....	See description.  Only power utilized is for small grist or saw mills.	
Long shoal.....	19.00	5,800±	14	13	10	15	10	5 miles, 7 miles.	1,650	2,050	5,800	2,350	.....	.....			
Trotter's shoal.....	30±	5,135	14	13	10	15	35	5 miles, 7 miles.	5,100	6,350	18,000	7,250	.....	.....			
Cherokee shoal.....	64.00	2,604	15	14	10	15	75	0.5 mile.	5,700	8,100	21,750	9,105	.....	.....			
Bowman's ledge.....	75.50	2,212	15	14	10	16	9	120 feet.	560	800	2,100	900	.....	.....			
Gregg's shoal.....	83.00	.....	15	14	10	16	3	1 mile.	.....	.....	.....	.....	.....	.....			
Middleton's shoal.....	85.50	2,100	15	14	10	16	14	1 mile.	825	1,150	3,200	1,325	.....	.....			
Ferrill's ledge.....	88.50	2,078	15	14	10	16	18	1 mile, 360 feet.	1,060	1,500	4,000	1,700	.....	.....			
McDaniel's shoal.....	89.75	.....	15	14	10	16	3	5 miles.	1,600	2,275	6,100	2,600	.....	.....			
.....	95.50	1,900	15	14	10	16	30	.....	.....	.....	.....	.....	.....	.....			

TUGALOO RIVER.

Haton's shoal.....	110.00	845	15	15	10	16	56	30.	1½ mile.	936	1,131	4,995	1,287	0	0	} No power utilized on the river.
Guest's shoal.....	113.50	775	15	15	10	16	56	17	1 mile.	375	450	1,650	500	0	0	

SENECA RIVER.

Portman's Shoal.....	113.00	740	15	15	10	16	56	60	2 miles.	1,290	1,700	5,620	1,950	0	0	No power utilized on the river.
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OCONEE RIVER.

Milledgeville. Shoal.....	Distance from Milledgeville.	2,950	12				48	34.0	5-6 miles.	1,930	2,500	10,000	2,860	< 50	6.0	< 4	Mill at dam. Dam 10 feet.
			12	13	13	14											
Fraleys Mill.....	7	2,900±	12	13	9	14	48	4.0	.....	.....	.....	.....	< 50	0.0	< 4		
Satcher's shoal.....	15	.....	12	13	9	14	48	8.0	1,200 feet.	450	580	2,320	660	< 50	0.0	< 17	
Graybill's mill.....	.....	.....	12	13	9	14	48	5.0	.....	.....	.....	.....	0	0.0	0		
Lawrence's mill.....	.....	.....	12	13	9	14	48	6.0	.....	.....	.....	.....	0	0.0	0		
Riley's shoal.....	46	.....	12	13	9	14	48	7-8 (7)	.....	.....	.....	.....	0	0.0	0		
Long shoal.....	47	2,122	12	13	9	14	48	13±	1,300 feet.	490	625	2,535	750	< 50	0.0	< 15	
Hills shoal.....	.....	.....	12	13	9	14	48	Small.	.....	.....	.....	.....	0	0.0	0		
Reid's shoal.....	54	1,635	12	13	9	14	48	8.0	.....	.....	.....	.....	0	0.0	0		
Park's mill.....	58	1,000	12	14	10	15	49	8.0	.....	.....	.....	.....	50	8.0	0		
Scull shoal.....	75	860	13	13	10	15	53	10.0	.....	.....	.....	.....	80±	10.0	0		
Barnett's shoal.....	90	.....	13	15	10	15	53	45±	¾ mile.	700	920	4,600	1,950	0	0		

SUMMARY OF POWER ON LITTLE RIVER.

Place.	Distance from Milledgeville.	Drainage Area.	Rainfall.					Fall.		Horse-Power Available—Gross.				Utilized.		Per cent. of Minimum utilized.	Remarks.	
			Spring.	Summer.	Autumn.	Winter.	Year.	Height.	Length.	Minimum.	Minimum low season.	Maximum, with storage.	Low season, dry years.	Horse-power—Net.	Fall.			
Gage's shoal.....	0.75	600	10	12	9	13	44	Small.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montre's shoal.....	2.00	675	10	12	9	13	44	Small.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Humber's mill.....	3.00	600±	10	12	9	13	44	9.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Peterson's mill.....	.....	.....	10	12	9	13	44	0-8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Grist-mill.....	.....	.....	10	12	9	13	44	13.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Grist-mill.....	.....	.....	10	12	9	13	44	8.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Old Factory.....	15.00	250	10	12	9	13	44	18.0	600 feet.	.....	.....	.....	.....	.....	.....	.....	.....	.....

OCMULGEE RIVER.

Place.	Distance from Macon.	Drainage Area.	Rainfall.					Fall.		Horse-Power Available—Gross.				Utilized.		Per cent. of Minimum utilized.	Remarks.	
			Spring.	Summer.	Autumn.	Winter.	Year.	Height.	Length.	Minimum.	Minimum low season.	Maximum, with storage.	Low season, dry years.	Horse-power—Net.	Fall.			
Macon canal projected.....	.....	2,250	11	13	9	14	47	40±	10 miles.	1,640	2,160	9,170	2,450	.....	.....	.....	.....	.....
Bibb County:	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Holt's shoal.....	.....	2,235	11	13	9	14	47	3,714	400 feet.	150	200	900	230	.....	.....	.....	.....	.....
Holman's shoal.....	.....	2,200±	11	13	9	14	47	1,204	1,400 feet.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Monroe and Jones counties:	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Johnson's shoal.....	.....	2,200±	11	13	9	14	47	5,125	1,500 feet.	200	270	1,200	310	.....	.....	.....	.....	.....
Harris' shoal.....	.....	2,200±	11	13	9	14	47	2,312	3,000 feet.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bowman's shoal.....	.....	2,200±	11	13	9	14	47	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Taylor's shoal.....	.....	2,200±	11	13	9	14	47	5,732	2,100 feet.	230	300	1,360	350	.....	.....	.....	.....	.....
Ram Creek shoal.....	.....	2,000±	11	13	9	14	47	Small.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dame's shoal.....	.....	2,000±	11	13	9	14	47	3,644	400 feet.	130	175	790	200	.....	.....	.....	.....	.....
Falling Creek shoal.....	.....	2,000±	11	13	9	14	47	1,560	3,200 feet.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Clark's shoal.....	.....	2,000±	11	13	9	14	47	Small.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carroll's shoal.....	.....	2,000±	11	13	9	14	47	do.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mitchell's shoal.....	.....	2,000±	11	13	9	14	47	do.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Glover's Mill shoal.....	.....	1,974	11	13	9	14	47	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Head's shoal.....	.....	1,640	11	13	9	14	47	17,916	1,600 feet.	650	850	3,870	980	.....	.....	.....	.....	.....
Burts and Jasper counties:	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Island shoals.....	.....	1,600±	11	13	9	14	47	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Seven Islands shoal.....	.....	1,512	11	13	9	14	47	19,515	1,600 feet.	530	700	3,330	800	.....	.....	.....	.....	.....
Lamar's shoal.....	.....	1,500±	11	13	9	14	47	3,953	1,300 feet.	110	110	680	160	.....	.....	.....	.....	.....
Roach's shoal.....	.....	1,480±	11	13	9	14	47	7,350	3,800 feet.	200	260	1,240	300	.....	.....	.....	.....	.....
Pitman's shoal.....	.....	1,480±	11	13	9	14	47	3,510	1,800 feet.	90	380	6,300	140	.....	.....	.....	.....	.....
Lloyd's shoal.....	.....	1,350±	11	13	9	14	47	39,067	9,500 feet.	975	1,280	6,800	1,460	.....	.....	.....	.....	.....
Car's shoal.....	.....	1,350±	11	13	9	14	47	5,580	400 feet.	140	180	860	210	.....	.....	.....	.....	.....
Levey's shoal.....	.....	1,340	11	13	9	14	47	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Haverly's shoal.....	.....	1,340	11	13	9	14	47	4,000	600 feet.	100	130	620	190	.....	.....	.....	.....	.....
Lennon's shoal.....	.....	1,020	11	13	9	14	47	2,800	700 feet.	50	70	325	80	.....	.....	.....	.....	.....
Barnes' shoal.....	.....	1,017	11	13	9	14	47	11,645	500 feet.	210	280	1,330	325	.....	.....	.....	.....	.....

TABLE OF POWER AT AUGUSTA, GEORGIA.

STATE OF FLOW.	DRAINAGE AREA.	FALL.	FLOW PER SECOND.	HORSE-POWER AVAILABLE—GROSS.			
				1 foot fall.	33 ft. fall.	40 ft. fall.	50 ft. fall.
Minimum .....	} 6,830	33 to 40+	Cubic feet	103.2	6,375	7,728	9,660
Minimum low season .....			1,700	238.7	7,877	9,548	11,935
Maximum, with storage...			6,000	681.8	22,500	27,272	34,090
Low season dry years.....			2,400	272.7	9,000	10,908	13,635

ESTIMATE OF POWER AT TROTTER'S SHOALS.

STATE OF FLOW.	DRAINAGE AREA.	FALL.	RAINFALL.					FLOW PER SECOND.	HORSE-POWER AVAILABLE—GROSS.	
			Spring.	Summer.	Autumn.	Winter.	Year.		1 foot fall.	75 ft. fall.
			In.	In.	In.	In.	In.		Cubic feet	
Minimum .....	} 2,664	74.88	15	14	10	16	55	670	76.1	5,700
Minimum low season....			950	108.0	8,100					
Maximum, with storage..			2,550	290.0	21,750					
Low season, dry years..			1,075	122.2	9,165					

In order to facilitate my researches, and to give me the latest information, I sent out a great many circular letters making many inquiries. Among others I sent one to each of the Governors of the Southern States. Among the answers received was the following from His Excellency Henry D. McDaniel, Governor of Georgia, who could find some inclination and time from the engrossing cares of State to show his appreciation of a work which aims to build up his State in common with others South.

STATE OF GEORGIA, DEPARTMENT OF AGRICULTURE,  
ATLANTA, September 26th, 1884.

M. B. HILLYARD, Esq.

Dear Sir: Governor McDaniel, upon the receipt of your letter and circular, transmitted them to this Department with a request that they should have *immediate* attention. By a careful reading of the circular you will perceive that many questions embraced in its scope would require the close and conscientious labor of days to answer with critical exactness. When it is known that this Department is not only hard pressed with its current work, but overwhelmed, any lack of such critical exactness, we trust, may be excused, if not overlooked. We were compelled to suspend all work properly belonging to our offices and give attention to your inquiry, and by dividing them out between three of our staff, we have been able to accomplish what we send. Very respectfully, your obt. serv't,

T. C. HOWARD, Clerk Agr. Dept.

The work of answering these questions was parceled out to various gentlemen. This explains the strange succession of questions. I give them as they come, omitting some answers more fully covered by my own work :

*The Principal Streams* are the Savannah, Chattahoochee, and the Altamaha with its three tributaries Ogeechee, Oconee and Ocmulgee, in Southern Georgia, and the Coosa, with its tributaries the Etowah and Oostanaula, in Northwest Georgia.

*Leading Water-Powers.*—Fine water-powers exist on all the principal streams of Northern and Middle Georgia and in many places in Southern Georgia. Among the most important water-powers of the larger streams is that of the Savannah river at Augusta and the Chattahoochee at Columbus. The Oconee, Ocmulgee and Flint rivers, for many miles about the lower limits of the metamorphic formation of the

State, offer fine water-powers. The Etowah and many of the smaller streams of North Georgia run in a succession of rapids for almost their extent, and afford fine powers that at present are not utilized to any great extent. The water-powers of small streams with high heads, for this State, would make a long list.

*The Principal Mining Industries, &c.*—The most extensive mining operations carried on in the State are for gold, iron, coal, and pyrites for sulphuric acid. Gold is found and worked in many counties of Northern and Middle Georgia. Marbles are found in inexhaustible quantities and of the finest qualities in many counties of Northern Georgia. White statuary and variegated marbles are found in Cherokee, Polk, Pickens and Fannin counties. Variegated marbles, varying from red and black to nearly white, occur in nearly all of the northwest counties of the State. Kaolin is found in Paulding, Cobb, Cherokee, Fannin, Gilmer, Carroll, Fulton, and, in fact, nearly all of the counties of the middle and northeastern part of the State, and in many places of fine quality and in great quantity.

*Sand for Glass.*—Sand suitable for this purpose is found in Gordon and Whitfield counties.

*Lime.*—There are many lime-kilns in North Georgia that supply local demands for lime. The Howard Cement Works, located at Cement, near Kingston, in Bartow county, prepare lime and hydraulic cement for market. This, and Ladd's limekiln at Cartersville, and Gray's lime-kiln at Graysville, in Catoosa county, are the principal works of this kind in the State. Lime exists in the greatest abundance in ten counties of Northwest Georgia and some portions of Southern Georgia.

*Bituminous Coal* is found in Dade, Walker and Chattooga counties. It has been mined extensively at Cole City in Dade county, and to some extent at various outcrops in Walker and Chattooga for blacksmithing purposes only. The coal measures cover an area altogether, in the three counties named, of about 200 square miles.

*Coke* is prepared at Cole City, in Dade county. The markets are Rising Fawn, Dade county, at the iron works in Bartow and Polk counties, and in Chattanooga, Tennessee.

*Iron* is found in all sections of the State. Red fossiliferous iron ore is found in Dade, Walker, Chattooga, Catoosa, Whitfield, Gordon and Floyd. The outcrop of this ore amounts in linear extent probably to 200 miles, and underlies an extensive area. The beds vary from one to fifteen feet in thickness.

*Limonite* is found in nearly every county of North Georgia, and in vast quantities.

*Magnetic and Specular Ores* are found in Carroll, Bartow, Gilmer, Cherokee, Paulding, Habersham, and in many other counties of the State.

*Copper* is found in Fannin, Paulding, Carroll and Cherokee counties.

*Fir Ore* has not been found in quantities sufficient to mine.

*Gold* is found in Lumpkin, White, Hall, Habersham, Lincoln, Dawson, Carroll, Paulding, Cobb, Cherokee, Pickens, Troup, Gilmer, Fannin, Rabun, Union and Townes counties, and in fact in nearly all the counties of Northeast Georgia and Middle Georgia. The most extensive mining for gold is in Lumpkin county.

*Galena*—In Hall, Lincoln, Habersham, Murray, Fannin, Catoosa, Floyd and Bartow.

*Halloysite*—In Dade, Whitfield and Chattooga counties.

*Gypsum*—In Chattooga county.

*The Truck Farmers* meet in convention, and, in concert with the railroads, agree upon a tariff of rates to the limits of the State. Roads out of the State have made trouble and refuse such rates as would encourage the business of truck-raising. The absolute necessity for better and supporting terms will compel a more liberal policy on the part of connecting roads. The business is of recent date, only two or three

years, and must attract great attention from railroad and transportation companies. The prices at the opening of the market for fruits and vegetables rule high, peaches reaching New York and Philadelphia by the first week in June bring from \$8 to \$16 per crate of three pecks. Asparagus, spring head cabbage, tomatoes, Irish potatoes, snap beans sent forward early in the season, say by 10th of May, bring most satisfactory prices. The Alexander peach and LeConte pear are the most remunerative of our fruits for first shipments. Early water and musk melons of best quality are shipped both by sea and by rail, and when rates of carriage are fair and reasonable, the business pays well. In one word, in answer to the question, "What of the country for melons?" it may be claimed that Georgia is ahead of the whole world.

*Wages.*—Average rate for field hands, without board, \$10.75. Truck farmers pay, during gathering season, 60 cents for men and 50 cents for women.

*Woods.*—From the mountains to the seaboard the finest hard woods can be found. On all the water courses and some mountains of the State the best hickory and white oak can be found. The lower Altamaha can show the finest white oak district in the world. We have only limited supplies of walnut and cherry; but our beech and ash are in great amount and very fine.

*Seminaries of Learning.*—To Georgia belongs the high honor of establishing the first, *very first*, female college in the world. This, the Wesleyan Female College, has an endowment of \$300,000, and a reputation throughout the United States. Besides, there are numerous other institutions, of great merit, for females. Then we have male colleges: State University, at Athens, endowment \$500,000; North Georgia Agricultural College, at Dahlonega; Mercer University, at Macon; Emory College, at Oxford; Pio Nino College, at Macon, and Atlanta University, for blacks, with annual contribution from State treasury of \$8,000.

*Fish.*—Fresh-water fish cannot be said to be abundant in any waters in Georgia, north of Macon, the central part of the State. In the streams and lakes of South Georgia perch, black bass, suckers and catfish are plentiful. But as you ascend and get into the red clay lands the streams become so thick and muddy that they are, to a great extent, depleted of all scale fish. In the clear mountain streams we have the true speckled trout. Fish culture is greatly on the increase, and carp are widely scattered over the State and are giving great satisfaction wherever proper care has been bestowed upon them. In our salt waters fish abound and of the very best sorts. The *first* and best shad of the known world Georgia claims. Her Ogeechee, Altamaha and Savannah shad are by all odds the best in the markets of the United States. Then we have mullet, sheephead, trout, drum, black fish, whiting—in such abundance as to make our fisheries valuable in a commercial point of view.

*Is the Use of Labor-saving Machinery on the Farm Becoming General?*—It cannot be said that it is, but many of our leading minds engaged in agriculture in Georgia are setting the example, and the *diffusion of the idea* is, indeed, very general. The lack of means, and not the want of an intelligent appreciation of such machinery, is in the way of our people. The desolations of the war, and the miserable short-sighted policy of manufacturers' rings, which keep up extravagant and extortionate prices, have been our trouble. But we will, after a while, and a short while, be goaded into self protection on this head, as we have in the instances of spinning and weaving cotton—mining and making iron—and many other things. We are now making the cheapest, and, for their price, the best plows in the United States, and soon we will follow with the reaper and mower and thrasher, and steam engines for farm use. Nothing that we must do will we fail to do, and do better than any other people on earth.

Our whole mountain region of table lands, ranging from 1,800 to 3,000 feet above sea level, and from 600 to 2,000 feet above surrounding valleys, has at last been found to be, of all localities, the best for the consumptive. The waters, varying from pure granite to sulphur, alum, and chalybeate, make this region the exact spot to cure dyspeptics.

*Best Locality for Stock Raising and Profits.*—The pine-woods country, open and unenclosed for thousands of acres, offer the best and cheapest stock ranges in the Union. No snow storms or hard freezes. The grass is kept growing most of the year, and the residue of the turf available all the year. Here are the walks for large herds of cattle and flocks of sheep—as large in certain cases as 7,000 head. The profits of sheep husbandry, for all Georgia, is 63 per cent. Cattle raising in this section of the State, the home of the wire and Bermuda grass, must be very profitable, as the expense is at its minimum for such an industry.

*Progress in Silk Culture.*—This industry is not new to us, Georgia having led all the States of the Union in its first introduction; but the inducements are not strong for its prosecution. Factories are not sufficiently accessible, and the prices offered for cocoons have been simply ridiculous. We can raise silk, and easily, for the osage orange and all of the mulberries are easily availed of, and the climate is all that can be desired. But cotton and a thousand other things for which we have better rewards than silk raising, call off our industry and enterprise.

*What of Evergreens and Flowers?* We suppose the inquiry is for trees of native growth. We have the world-renowned *Magnolia Grandiflora* wild in our swamps, in endless profusion. Then we have that beautiful evergreen *P. Coronarius* or mock orange, and the American olive. These are natives. Of course, we have the whole collection of exotic evergreens, and in perfection. Our wildwood flowers are innumerable, and some of them of rarer beauty by far than very many included in our floral collections and catalogues.

*Are there any Tile Factories?* Yes; one in Bartow county, and clay for the manufacture of tile in abundance.

*New Industries and their Success.*—We have wine making among new industries, and promising well; marble quarrying and polishing—helve factories—ice factories—plover factories—and many others, all doing well.

*Do Insects Depredate Badly, if so, What? Have you the Colorado Beetle?\**—We do not have the Colorado beetle, but we do have the *curculio* (the cotton and cabbage worm), the turnip flea, and many other less notorious and hurtful insect marauders. The grandest triumph over such pests that has been achieved in our day is the control we have acquired over the giant insect enemy the cotton worm. This pest that some years destroy thirty millions of wealth we can now squelch.

*Effects of the Lien Law.*—In a large number of cases the facility with which farmers of small means may purchase supplies on credit, which should be produced at home—under the operation of the lien laws—has tended to encourage speculative farming, relying on the West for bacon, flour, corn, etc. The counties are not generally in debt beyond the amount of one year's taxes. They are prohibited from issuing bonds or incurring extraordinary expense, or from levying more than a specific rate on the general State tax, without special authority from the Legislature. The rate is four-tenths of one per cent. for State purposes, and not more than an equal amount for county purposes, except

\* *Doryphora decemlineata*. The *D. funfla* is found, and may deceive the superficial observer.

as before excepted. Farmers, as a rule, are more or less in debt,\* but the amount is annually decreasing. The legal rate of interest, where no rate is specified, is 7 per cent. simple; but parties may agree on 8. Bank rates vary from 8 per cent. per annum, to regular and approved customers, to 1 per cent. per month.

Each head of a family, or guardian, or trustee of a family of minor children, or every aged or infirm person, or person having the care and support of dependent females of any age, who is not the head of a family, is entitled to an exemption of realty or personalty, or both, to the value of \$600. He shall have power to waive or renounce his right, in writing, except as to wearing apparel, and not exceeding \$300 worth of household and kitchen furniture.

The general law of the State requires all crop owners to protect their premises from trespasses by stock which are permitted to run at large. But a general local-option law is also in force which permits the qualified voters of any county or militia district to determine by an election (which may not occur oftener than once every year,) whether they will adopt the "stock law" or adhere to the "fence law." The "stock law," if adopted, requires owners of stock to keep them within their own enclosures. About one-fourth of the counties in the State have adopted the "stock law," and the operation has been universally satisfactory.

All property of wife, at time of marriage, real or personal, or choses in action, shall be and remain the separate property of the wife; and all property given to or inherited, or acquired by the wife during coverture, shall vest in and belong to the wife, and shall not be liable for the debts or defaults of the husband. She may, without consent of her husband, devise such separate property by will.

The general law of the State authorizes the granting of licenses to retail intoxicating liquors, by the ordinances of the several counties and city authorities of cities, upon the payment of specified license fees, and approval by the officer granting (he may withhold license in his discretion,) of the character of the applicant. Upon granting license, the applicant must give bond and surety in the sum of \$500, to keep an orderly house and to abide by the oath which he must take, that he "will not, during next twelve months, sell, barter, give or furnish liquors to any minor, either white or colored, without consent of his or her parents or guardian." A large majority of the counties have availed themselves of enabling legislative acts to vote upon and adopt the local law prohibiting the sale of intoxicating spirits within their limits. The general laws and the local-option laws are quite generally and faithfully observed, and violations incur the ban of public opinion and prompt judicial punishment.

#### RAILROADS.

*Central Railroad of Georgia.*—Main line: Savannah to Atlanta, 294 miles; Macon to Eufaula, 140 miles; Fort Valley to Columbus, 71 miles; Fort Valley to Perry, 11 miles; Cuthbert to Fort Gaines, 22 miles; Smithville to Albany, 20 miles; Albany to Arlington, 37 miles; Milton to Augusta, 53 miles; Gordon to Eatonton, 40 miles; Griffin to Carrollton, 60 miles; Barnsville, to Thomaston, 16; total, 764 miles.

*Western and Atlantic Railroad* (belongs to the State).—Atlanta to Chattanooga, 138 miles.

*Georgia Railroad* (under lease to President of Central Railroad).—Augusta to Atlanta, 170 miles; Union Point to Athens, 39 miles; Barnett to Washington, 18 miles; Camak to Macon, 74 miles; total, 301.

\* This is the case very generally. It opens the way for long loans at a good rate of interest. The indebtedness is to the merchant commonly.

*Richmond and Danville.*—Main line (in Georgia): Atlanta to Tugaloo River, 100 miles; Athens to Clarksville, 60 miles; Toccoa to Elberton and Hartwell, 80 miles; Gainesville to Social Circle, 60 miles; branch to Jefferson, 10 miles; to Roswell, 10 miles; to Lawrenceville, 10 miles; total, 330 miles.

*Marietta and North Georgia Railroad.*—Completed to Ellijay, 75 miles.

*East Tennessee, Virginia and Georgia Railroad.*—Main line from Cohutta via Rome and Atlanta: Macon to Brunswick, 452 miles; from Rome to Prior's Station, 40 miles; total, 492 miles.

*Savannah, Florida and Western Railroad.*—Main Line: Savannah to Chattahoochee, 258 miles; Waycross to State line, 40 miles; Thomasville to Albany, 58 miles; total, 356 miles.

*Atlanta and West Point Railroad.*—Atlanta to West Point, 87 miles.

*Brunswick and Western Railroad.*—Brunswick to Albany, 172 miles.

*Columbus and Rome Railroad* (Narrow Gauge).—Columbus to Chipley, and extending, 30 miles.

*East and West Railroad of Alabama.*—Cartersville to Cedar Town (narrow gauge), 35 miles.

*Georgia Pacific.*—Atlanta to Talapoosa, 70 miles.

*Rome Railroad.*—Kingston to Rome, 20 miles. Total miles of railroad in the State, 2,870.

*In Process of Construction.*—Buena Vista Railroad, Buena Vista to Anderson, 26 miles; Americus and Lumpkin, Americus to Lumpkin, 36 miles; Richmond and Knoxville, Augusta to Elberton, 70 miles.

*Average Mean Summer and Winter Temperatures of some localities for 10*

years:	Summer.	Winter.	Summer.	Winter.
Atlanta.....	77.5 degrees.	45.2 degrees.	Brunswick.....	81.5 degrees.
Rome.....	78.0 "	44.8 "	Rabun Gap.....	71.7 "
Augusta.....	79.8 "	48.9 "	Gainesville.....	76.7 "
Macon.....	80.7 "	51.3 "	La Grange.....	80.2 "
Americus.....	81.3 "	53.9 "		

*Average Annual Rainfall—*

Atlanta.....	49 inches.	Brunswick.....	48 inches.
Rome.....	47 "	Rabun Gap.....	72 "
Augusta.....	43 "	Gainesville.....	55 "
Macon.....	45 "	La Grange.....	49 "
Americus.....	47 "		

First frost from October 20 to November 20; latest Spring frost from April 1 to April 20. First ice November 1 to 10; last from February 15 to March 15.

*Prices of Land.*—Middle and North Georgia, \$5 to \$20 per acre; wild, unimproved lands, much less. Sheep-raising lands—for fine short wools, Southern Georgia—50 cts. to \$2.50 per acre; for long wools and mutton—Middle and Northern Georgia—\$5 to 20.

*Style of Renting.*—Share system.

*Best Locations for Various Fruits.*—Across middle of State and Southwest Georgia for pears, peaches, plums; North Georgia for apples, pears, small fruits, etc. (See White's Gardening for South.)

*Character of Waters.*—Various. Generally free and soft in Middle and Northeast; hard in Northwest and Southern. Abundant. Wells from 25 to 50 (rarely more) feet deep. Temperature, 55° in northern to 65° in southern portions of State. Artesian wells, in southern half of State, afford abundant supply of excellent water, often medicinal, and greatly mitigating complaints dependent upon hard water.

*Mineral Springs.*—Sulphur (warm and normal), chalybeate, etc., in several places. Chalybeate very common.

*Tobacco.*—Not much grown, though climate and soil well suited.



# FLORIDA.

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I approach the topic of this State with a certain shrinking, realizing the impossibility of pleasing both or either of two large classes of people. One class will revolt at any due enthusiasm. They care not how much praise one bestows on corn and hogs, but flowers and oranges must pass with frigid mention. Skunk cabbage they do not object to, but a choice bouquet they have no use for. The other class will insist that you shall paint Florida in—

“The light that never was on land or sea;”

that he who shall choose that land for a home will be—

“A happy soul, who, all the way  
To heaven, hath a summer’s day;”

that “every prospect pleases,” and each day is “a bridal of the earth and sky.”

Now, this latter class err on the side of beauty, an exalted enthusiasm, and in the direction of right and truth. It will not do to sneer at this and call it overdone, the hysterics of æstheticism, sublimated affectation, etc. The love of mountains and flowers, of balmy climes, is as practical, as true as love of *belles lettres*, of the “fair humanities,” of painting, of sculpture, or even of corn and beef and pork. One cannot write soberly of some, and I think the best, aspects of Florida. The pulses refuse to be equable, and the pen self-contained. One must feel—

“The exulting sense, the pulse’s mad’ning play.”

The name is like an elixir, and the imagination is at once plumed with it. Nor is this responsiveness without its uses, aside from its delights. It is a sort of Arethusa, or a spring of nepenthe, where the wounded sensibilities may find a lenitive; where the “fitful fever” of life may be soothed; where the bondage of routine may be broken; where the dull heart may be gladdened; where a refuge may be found from “weary, carping care;” where we may enjoy the “divine, enchanting ravishment” of nature, and the soft witchery of her lofty spell. And why should not Florida be painted in brilliant hues? If, in describing the polar regions, one should have no glow of language, no hint of flower nor fragrance, because it is fitness, why should not one speak of orange groves, of a—

“Land of delicious lights and floating shades”

as a fact? Ought an Italian sunset to be limned in the cold, sombre, cheerless tints of an Arctic one? We should be ashamed to talk about potatoes, cabbages, corn and hogs in any but plain language; but should we rob flowers of their hues, because some reader is color-blind; or of their fragrance, because another has no sense of smell? The flowers and fruits have their rights as well as potatoes, corn and hogs; and dollars figure just as high and swell a bank account as well from oranges, pine apples, citrons, lemons, etc., as from the former.

I shall defer to three classes of people in treating of Florida, looking at it from the standpoints of utilitarianism, of health and of æsthetics. In all these aspects it has great uses and magnificent capabilities, and I regard each view as strictly practical.

There have been so many books, and so many thousands of magazine and newspaper articles, written in description of the soil, climate, etc., of Florida, that it is difficult to write anything new under these heads, and that portion of the following pages devoted to these subjects is largely a compilation. The authorities quoted are Reports of the Tenth United States Census, and others as reliable and authentic.

The population in 1880 was 269,493. The number of counties in 1880 was forty. The capital of the State is Tallahassee, in Leon County. The names of towns of not less than 4,000 population, according to last census, are: Jacksonville, 7,650; Key West, 9,840; Pensacola, 6,845. All these are very important and growing towns. Pensacola is a great lumber port, and is distinguished for its harbor. Key West is celebrated for its immense business in manufacturing very superior cigars from Cuban tobacco. Jacksonville is too noted to require enumeration of its grounds of distinction.

### PHYSICAL GEOGRAPHY.

Florida, the southernmost State of the United States, lies between the parallels of  $24^{\circ} 30'$  and  $31^{\circ}$  north latitude, and the 80th and 88th meridians west from Greenwich. Its total gross area, as determined by the latest measurements, is 58,680 square miles. The greater part of this area (about 35,000 square miles) is a peninsula about 350 miles long, with an average width of 100 miles, separating the waters of the Atlantic Ocean from those of the Gulf of Mexico. The rest of the State, known as Eastern, (from the Atlantic to the Suwanee River,) Middle, (from the Suwanee to the Apalachicola River,) and Western Florida, (from the Apalachicola to Perdido River,) nearly 24,000 square miles, is embraced in a strip 320 miles long and about 75 miles wide, lying immediately south of the lines of Georgia and Alabama. Roughly speaking, about one-half the area of Eastern, Middle and Western Florida, and from one-fourth to one-third of the Peninsula, are uplands of various kinds; the rest, lowlands, including the level flatlands near the coasts, the everglades, savannas, etc.

### ELEVATION ABOVE THE SEA.

The upper half of what is known as Middle and Western Florida consists of uplands, which are entirely similar to the corresponding uplands of Georgia and Alabama. Some parts of these uplands are broken or hilly, and the elevation above the sea cannot be far from 300 feet. Toward the gulf and Atlantic there is a gradual slope, and within ten miles of the coast the elevation is scarcely more than ten feet above tide. From the Georgia line, in the vicinity of Okefenokee Swamp, southward down the Peninsula, there is an elevated belt of land known, in part of its course at least, as Trail Ridge. This elevated land is known to extend as far south as Polk County, and its height above the sea is between 200 and 300 feet. Between this main ridge and the gulf there is another ridge, known as the Sand Hills, 120 feet and more in elevation. In Hernando County are high hummock lands of considerable elevation, and Mount Lee, near the head of Homosassa River, is said to be 214 feet high. The lower part of the State, from Polk County southward, is generally low, comparatively level, and with an elevation probably not greater than thirty or forty feet. The immediate coast in some localities has an elevation of fifteen feet.

### GEOLOGICAL CHARACTERISTICS.

*Limestone.*—A very considerable portion of Florida is underlaid with limestone, and the peninsula is considered by eminent scientists to be much narrower than it once was, the limestone extending quite a distance into the gulf. Some of

this rock—in Alachua County, for instance—contains as much as sixteen per cent. of phosphoric acid—an easy explanation of the heavy growth of live oak, water oak, Spanish oak and other hard woods. This rock is of a yellowish to white color, somewhat granular, and in disintegrating, breaks up into small, rounded, pebbly masses. Disseminated through the soil, it imparts to it a great degree of fertility. Along the gulf coast, especially from Wakulla County down to Hillsborough, there are frequent spots, sometimes quite extensive, where the tertiary limestone lies near the surface, and its reaction upon the sandy soil brings about the modification known as gulf-hummock land. This land will yield a bale of lint (Sea Island) cotton to the acre in some localities; the average, however, would probably be less. The growth is the usual hummock growth given above. The color of the soil in some localities in Wakulla county is light gray, nearly white, looking very much like white sand. In this place the limestone is a white, pulverulent mass, with shells. An analysis of marl shows that it contains over thirty per cent. of lime, and over twenty-four per cent. of carbonic acid. The intermingling of this substance with the sandy soils gives to this hummock its high degree of fertility.

#### DRAINAGE.

*Rivers.*—The principal streams of Florida are the Apalachicola, the Suwanee, the St. Mary's, St. John's, Kissimmee and Indian rivers, the last named being merely an arm of the sea, running parallel with the eastern coast. The St. John's and the Kissimmee, in some parts of their courses, consist of a chain of lakes connected by the water courses, the former rising in the region surrounding the everglades, flowing northward, and the latter flowing southward toward the everglades, the two, in part of their courses, flowing approximately parallel to each other, but in opposite directions, and at no great distance (twenty to thirty miles) apart.

*Lakes.*—In the number and variety of its lakes, Florida is distinguished among the States. These lakes vary in size from mere ponds to vast sheets of water, like Lake Okeechobee, which has an area of more than 500 square miles. In some instances they are apparently fed from underground sources and form the headwaters of streams; in other cases the streams flow through them, which thus appear as mere local widenings of the channels; and in still other cases, lakes which receive the drainage of large areas by means of rivers have no visible outlet, the waters being removed by evaporation or by subterranean outlets. The waters of Lake Okeechobee are apparently generally connected with those of the Everglades, which are carried off to the sea by a number of channels. It is impossible to form an estimate of the number of lakes, large and small, with which the scenery of Florida is diversified; for in some parts of the State one may travel for days at a time without being out of sight of these sheets of water. In those sections where the lakes are most abundant, they receive the drainage over large areas, and the water courses are subterranean. The headwaters of most of the streams of Southern Florida are found in the Everglades; and Lake Okeechobee, which seems to be a merely open lagoon, receives the waters of at least one large stream, the Kissimmee River.

*Springs.*—The country is well watered, not only by its larger and smaller rivers and lakes, but by innumerable creeks and springs. Springs of great volume are found in every portion of the State, some of such magnitude that they form navigable rivers from their source. Of such are the Blue Springs, in Jackson County, in the west; Wakulla Springs, in Wakulla County, in the middle; Silver Springs, in Marion County, in the east; the very large Blue Spring, on the St. John's, in Volusia County; the Green Cove Spring, in Clay County, on the shore of the St. John's; also Clay Spring, in Orange County. Some of these are medici-

nal, white sulphur, iron, etc. Good water, so universally desired, is found easily at a depth of from eight to fifty feet, according to locality, generally from twelve to twenty feet, but through the country, the many lakes and springs and branches afford ample supply for house and farm purposes. An ordinary gas pipe of one and a-half or two inches in diameter, shod with a conical plug of iron, and perforated for a distance of one or two feet above the plug, will, when driven into the ground to a depth of thirty to forty-five feet, afford a never failing flow of water, at all times cool and refreshing, slightly tinctured with the carbonate of iron and trace of sulphur. The flow is, in many cases, so strong that faucets are placed on the pipe from thirty inches to three feet above the ground in order to check it.

#### SOIL.

The soil in the greater portion of the State is a sandy loam, except in the hill lands and hummocks, where large portions of clay and alluvium are found. The so-called sand of Florida, however, is not the sharp, silicious sand of the ocean-washed beach, or the fine inorganic sand which forms the pine barrens of the North and West. Composed, in great part, of a mixture of humus, lime and loam, the surface sand of Florida has good fertilizing qualities. Florida lands are ordinarily classified as pine lands, hummocks (lands covered with hard woods), and swamp lands. The greater portion of the State is covered with pine—the pitch and yellow pine. The hummocks, high and low, are densely covered with hard wood, such as live oak, oak, magnolia, gum, hickory, etc. The swamp lands are more or less timbered with pine, cypress, cedar and soft woods. The first rate pine lands, so called, are generally elevated and rolling, covered with a dark vegetable mould or humus, several inches deep, resting on a chocolate-colored, sandy loam, mixed with pebble and lime; under this, clay and soft limestone rock. These lands have a durable fertility, and are well adapted to the usual agricultural products and semi-tropical fruits. They are found to withstand drought well, and in rainy seasons growing crops are not affected, except favorably. They are healthy, the water is pure, and it costs little to prepare the soil for cultivation. It is noticeable that the early settlers selected these lands especially for residences and home farms, health, pure water, freedom from insects, good soil for crops and fruit, and ease of cultivation. They produce well for years without fertilizing, but readily respond in increased products to fertilizers. The second rate pine lands, which are also timbered with pine, are more or less high and rolling, are well watered, the surface soil is not deep, are underlaid with clay or limestone, and produce well for a few years. Fertilized, they yield good crops of cotton, corn, cane and root crops; when properly cultivated, they are superior for semi-tropical fruits. Experienced growers have selected this class of land for orange groves.

The Report of the Commissioner of Lands and Immigration for 1875, gives a very thorough and comprehensive description of the soils:

“The bulk of the lands in the State are what is denominated pine lands, and are divided into first, second and third rate. The soil of the first rate pine land rests upon a substratum of clay or marl, overtopped by a dark mould of decomposed vegetable matter. This land is exceedingly fertile, producing splendid yields of the most exhausting crops for several years in succession without any need of fertilization. There are several large bodies of these lands scattered throughout the northern tier of counties and along the gulf coast.

“The second class of pine lands are only a trifle less productive than those of the first class. Generally speaking, these lands are high and rolling, and are characterized by a heavy growth of pitch and yellow pine timber. They rest upon a basis similar to that of the first class, but the mould is lighter, and they show signs of exhaustion after a few years. A little fertilization, however, restores their vigor. ‘Cow-penning’ is the favorite mode of restoration, and treated in this manner, they will yield a bale of cotton of 300 pounds to the acre.

"The third class of pine lands are distinguished by being covered with a growth of saw-palmetto, black-jack, and a shrub called the 'gall-berry.' The presence of the latter is a certain test of poor soil. Another feature of this land is the presence of 'hard' or 'slush' pine, the roots of which are to be found running very near the surface. These lands are not worthless, but can only be made to yield remuneratively after much labor and heavy fertilization. Sisal hemp can be grown very successfully on them, and with proper machinery to crush and prepare the fibre for market, their value would be equal to that of any other class of pine land.

"There is another species of pine land called by the natives 'flatwoods.' About four feet from the surface of this land a stratum of what is called sand-rock is found. This is composed of common fine sand, and cemented by sulphate of iron and aluminum, and a subsoil thus formed is almost impenetrable to moisture. As a consequence it holds up all the rainfall, so that the land becomes packed, and is known to the natives as 'sobbed land.' Such soil is of very inferior quality, and is scarcely fit for profitable agriculture.

"But by far the finest lands in the State are known as 'swamp,' 'low hummock' and 'high hummock' lands.

"The swamp lands are the richest in the State. They are formed entirely of humus, or decayed vegetable matter, of an extraordinary depth, and when rendered fit for cultivation by ditching, give evidence of an inexhaustible fertility. It has been demonstrated that these lands will yield four hogsheads of sugar to the acre—a most convincing proof of their value, especially when it is borne in mind that sugar-cane is one of the most exhausting crops known. Immense bodies of these lands are located in Central and Southern Florida. Drainage is necessary, however, to render the greater portion available for purposes of agriculture.

"The lands denominated 'low hummock' rank next to the swamp lands in fertility. They are generally moist, and some ditching is required for successful cultivation. They will sustain a succession of the most exhausting crops for several years with as much apparent vigor as the swamp lands, but are not so durably rich, and need fertilization after some time.

"High hummocks are the most desirable lands in the State for purposes of agriculture. They are covered with a growth of live oak, hickory and magnolia, and the surface is, for the most part, high and gently undulating. The soil is exceedingly rich and will produce all the crops of the country in a highly remunerative degree. Their productiveness is apparent from the fact that three hogsheads of sugar per acre have been made from them. The chief labor connected with their cultivation is the clearing. The timber is generally very heavy, and the cost of clearing is greater than that of any other quality of land in the State. Once cleared, however, they are free from pernicious weeds and grasses, and but little labor is required in working them. These lands are very abundant. In Levy County alone there are perhaps over one hundred thousand acres of first class hummock land, while in Leon, Gadsden, Jefferson, Jackson, Marion and Alachua Counties they form the great bulk of the land, and can be purchased at from two to ten dollars per acre."

Large bodies of these lands have been sold since the above was written, Disston's purchase alone being 4,000,000 acres.

The cost of clearing land depends on whether sparsely timbered or of thick growth; whether pine, hummock or swamp land; and also, whether the land is to be planted in orange groves or usual crops. It was formerly the custom to simply girdle the trees and remove the fallen timber. This was done quickly and cheaply, and crops put in the same season.

To clear ordinary pine land, removing the timber will cost from \$12 to \$15 per acre; hummock lands will cost more—from \$15 to \$30, according to the density and size of timber.

For a new place, the Virginia rail fence is cheapest, as timber is on the spot and splits freely. There are saw mills throughout the State, so that boards and posts may be substituted.

The new-comer, anxious to have a roof over his head and be ready to go to work, will hasten to build him a house. Now, here is room and range for any person to exercise his taste, talent, extravagance or economy. A comfortable log house for a moderate sized family can be built, say, for \$50; a good frame build-

ing, with four or five rooms, will cost from \$200 to \$300. Lumber of fair quality from \$5 to \$12 per 1,000 feet, at mills.

Any one moving his family to a new State should have either money or provisions to last until he can raise crops.

A homestead to the extent of 160 acres of land, or the half of one acre within the limits of any incorporated town or city, owned by the head of a family residing in this State, together with \$1,000 worth of personal property and the improvements on the real estate, are exempted from forced sale under any process of law, and the real estate shall not be alienable without the joint consent of husband and wife, when that relation exists; but no property shall be exempt from sale or from the payment of obligations contracted for the purchase of said premises or for the erection of improvements thereon, or for house, field, or other labor performed on the same. The exemption herein provided shall not extend to more improvements or buildings than the residence and business house of the owner.

### PRODUCTIONS.

The lands of Florida produce nearly all the crops and fruits of the Middle, Northern and Southern States, and, in addition, a great variety of semi-tropical and tropical fruits and vegetables, and most of the best known and valuable medicinal and fibrous plants. The settler may turn his attention to almost any crop with equal hope of success. For instance, he may raise rye, corn, rice, beans, peas, etc.; or cotton, tobacco, sugar, indigo, sisal hemp, jute, etc.; or Irish potatoes, sweet potatoes, yams, turnips, beets, cabbages, rutabagas, squashes, etc.; or strawberries, melons, tomatoes, cucumbers, etc.; or go largely into fruits, as oranges, limes, lemons, peaches, figs, grapes, pawpaw, plums, etc.; or if he elects to settle in the more southern portion of the State, he may include the cocoanut, pineapple, banana, plantain, guava, etc., etc. Cassava, arrowroot and comitie are also receiving marked attention throughout Southern Florida, due to their astonishing yield per acre, and the large return realized by those engaged in their cultivation.

All crops, whether of fruits or vegetables, mature so much earlier than further north, that the producers receive a threefold price as compared with other parts of the United States. The raising of

#### EARLY VEGETABLES

for shipment to Northern markets is now, and always will be, extremely profitable in Florida. This business, which began in a small way near Fernandina and Jacksonville a few years ago, has already assumed very extensive proportions, and will, in all time to come, prove a most important and profitable industry.

In South Florida, tomatoes, cucumbers and beans thus far have been the leading articles for shipment. The tomato has been the most profitable. In that section of the State the fall and winter months are best suited for vegetable growing. Beans, peas, cucumbers, potatoes and cabbages can be grown at seasons which command for them monopolizing prices. Five, six and seven hundred dollars per acre have been realized, both from cabbages and tomatoes. Cucumbers have paid as much to the area in tillage, to the early grower, as any vegetable on the list. The great drawback, thus far, to the early market gardeners, has been the want of ready and reliable transportation facilities. These, however, are rapidly multiplying and extending. And the vegetable and fruit trade will soon be so immense in its proportion as to command for their use all the commercial facilities that human skill and industry can supply. The State seems likely soon to become one vast orchard for fruits and garden for vegetables.

*The Sweet Potato* comes nearer being a universal crop in Florida than any other the soil produces. It is easily propagated from the roots, sprouts and vine,

and sometimes the seed, though the latter mode is rarely used. From its easy propagation and cultivation, its large yield, and the variety and excellence of the dishes prepared from it, it is one of the indispensable crops. In the southern counties, it may be planted at any season of the year, and generally is not taken from the ground until needed for use.

*The Irish Potato*, or "White Potato," is accredited with being a native of Chili and Peru, and was introduced into North America by the Spaniards, from whence it was, in 1586, carried by Sir Walter Raleigh to England, and perhaps acquired its name of "Irish" from the extent to which it is grown in Ireland, and the excellence with which the Irish soil produces it. This tuber has, within the last few years, taken a very prominent place among the *very* profitable early crops in Florida. On the best class of lands, truckmen have been getting about an average of thirty barrels of first class shipping potatoes per acre, which, getting into the Eastern markets about the time the old crop is exhausted, have been netting, over cost of shipping and selling, about \$4 per barrel, making, say, from \$100 to \$120 per acre realized from land in a short period of generally one hundred days, and leaving the ground ready for some other crop by first of May. These figures have been very much exceeded in many localities. On the excellent farm lands of Middle Florida, some wonderful results have been attained.

*Strawberries* are one of the prominent subjects of interest to the fruit growers and market gardeners. This delightful fruit, so eagerly sought after in every market, grows to great perfection throughout the State of Florida. The fruit comes into market too early to find competition from any other section, and Florida strawberries enjoy a monopoly in the Eastern seaboard markets for many weeks during January, February and March. The production and shipment of the berries North is rapidly increasing, and has now assumed such proportions as to secure the provision by the transportation companies of suitable refrigerating cars for their proper preservation *in transitu*.

*Melons* of every variety abound in Florida, are of the very finest quality, and in the cantaloupe and watermelon, furnish only an additional entry to the shipping list of the truckman, and are by no means one of the least profitable interests.

*Blackberries* grow wild all over the State in great profusion. Some attention has been given in Middle Florida, where labor is abundant and cheap, to drying the berries for shipment. The dried fruit commands fourteen cents per pound, net, and is becoming the source of considerable revenue to those who have undertaken its preparation and shipment.

There are in Florida many plants from which starch may be obtained, but there are three from which its preparation is the leading use. These are the Arrowroot of Commerce, Coontie, or "Florida Arrowroot," and the Cassava. Arrowroot grows well on good land. It is not extensively grown for market, but frequently is grown and utilized for food purposes, as well as starch making. Coontie is indigenous to the southern counties, where it grows most luxuriantly. On the Miami River, in Dade County, parties have been engaged in manufacturing starch from this plant for the Key West market. It is there sometimes appropriated to the uses of the table. Doubtless tillage would improve it in its useful properties, just as other plants have been thus improved and developed. Parties who have cultivated Cassava pronounce it to be a most excellent food crop for fattening hogs; that an acre of this crop will go further in feeding than an acre of potatoes. Like the potato, it may be propagated by cuttings of the stems. From this plant is prepared the Tapioca of commerce. Recently this plant has been utilized in the production of glucose, which it is found to yield in such quantities as to make its manufacture a leading purpose.

*Tobacco* has been found, from the earliest settlement of Florida, to be well adapted to both the climate and soil, and has been at different periods and in different localities extensively produced. Several varieties of marked difference in character and quality are commonly cultivated. Experience has taught that Florida tobacco possesses a fineness and toughness of leaf that admirably suits it to the use of wrappers for cigars. Before the war, a wide reputation was established by the planters in the County of Gadsden for the production of what is termed the "Florida Speckled Leaf," which was pronounced the very best for wrappers grown anywhere, and commanded unusually high prices. The lands of that county were found to be peculiarly suited to its production. One thousand pounds was the average yield per acre, and several handsome fortunes were amassed by its culture. A highly flavored and fragrant article of tobacco is being extensively planted for home consumption in many portions of the State. This quite equals, in the excellence of its flavor, the Cuban weed; is indeed grown from seed originally introduced from that island. What are known as shell hummocks in the County of Wakulla, in Middle Florida, and indeed in many other parts of the State, are most admirably suited to the production of this Cuba variety, and are just now attracting renewed attention for that purpose.

*Silk* might easily be made a most profitable industry in Florida. The *Morus Multicaulis* and *M. Alba* both grow most luxuriantly. Cuttings of either laid horizontally in furrows and covered in early spring, put up a vigorous sprout at every joint, and grow in ten years to be hedges of stout canes. These kept cut back, so as to stool and multiply the number of sprouts, and not allowed to grow into trees, and thus elude the reach, will, the third year and thereafter, furnish heavy crops of foliage for feeding the worms. In many places careful experiment with choice varieties of European, American and Asiatic varieties of worms have proven very satisfactory.

*Honey* is rapidly becoming a staple product of Florida, whose climate and flora seem specially adapted to the propagation of bees. Even in the winter months, in South Florida, there is a supply of flowers quite sufficient to support the hives. This permits heavier tolls to be made on them, as less honey must be left to feed during the winter. Bees work in South Florida all winter.

#### TROPICAL AND SEMI-TROPICAL FRUITS.

First and most important is the *Orange*. The cultivation of the orange is distinctively a Florida industry, and probably three-fourths of all who go to Florida have in view the possession of an orange grove. However extravagantly the subject of orange growing has, in many instances, been treated by some writers, not always without selfish purposes in inducing sale and settlement of lands, there is no shadow of doubt as to the really sure and safe ground for the investment of thousands of dollars in making orange groves.

One thousand dollars per acre per annum has time and again been realized from this business. Indeed, *double* that amount per acre has been frequently made; and with proper culture and fertilization; where the latter is needed, \$1,000 per acre is an available crop. Like all excellent things, orange culture has many and serious obstacles to its successful accomplishment. Being a new business, there is not a great amount of experience to govern and direct the beginner. Almost as many different theories exist as to the most approved methods of culture as there are men engaged in it.

The natural enemies of the tree and fruit are numerous, and not very well understood. An entomologist, sent from the Bureau at Washington, reports having discovered no less than thirty-five different insects that are in a greater or less degree damaging to the orange. Judicious selection of locality, as well



as location for groves, are most important matters. The selection of stocks, buds, seeds, and the best methods of planting, protecting and cultivating, are all material factors of success. Frosts, droughts, gales and other casualties are to be considered, and *time* is largely of the essence of the undertaking.

Orange growing, while it can, of course, be engaged in at a decided advantage by those who have means to conduct it on a cash basis, and be independent of support until such time as the grove is an assured success, does not, nevertheless, present any insurmountable features to poor men—by which term I mean, in this instance, men without ready money, and dependent upon their own labor for a support. But for fear of misleading minds prone to overlooking the details when so dazzling a prospect is offered them of converting in a few years acres of \$1.25 land into bonanzas yielding princely incomes, I caution them that there is a long, hungry gap between raw pine woods and groves of bearing orange trees. It takes many hard licks, plenty of pluck, assured health, good luck and favorable auspices; to all of which, a large family, bad health, indolence, inexperience or accident are possible drawbacks.

It has been urged that the profits of orange growing would directly attract so many to the business as to overstock the market and break it down, but a little reflection will dissipate such fears. Apples sell as readily now, and at as good prices, as they did forty years ago, and yet there are millions of acres suitable to growing apples where there are hundreds suitable to growing oranges, and there are millions of apples now on the market where there used to be one. If the apple market cannot be so overstocked as to break it down, much less can the market for oranges. The consumption of the orange within the United States is put down at 600,000,000 per annum. A little above 80,000,000 of that supply is furnished at home; the remainder, as shown at the custom houses, is made up of receipts from abroad. Florida furnishes about one-seventh of the supply, while foreign sources furnish the balance. The ease by which Florida can effectually occupy the market when its supply is sufficiently enlarged is shown in the fact that the foreign fruit is frequently sold in the market as "Florida" fruit, to procure for it a more ready sale. Florida fruit is of a better quality and richer flavor, and the foreign article finds a market only because the home supply fails to meet the demand; and this demand is increasing almost as rapidly as orange trees in Florida are multiplying.

The natural increase of American population—that is, the number of births over the number of deaths, is only about one-third of the real increase. More than half a million people from foreign lands will arrive upon our shores during the present year with the intention of permanent residence among us. Then every railroad in the other American States, as well as every railroad and canal added in Florida, increases the facility and lessens the cost of putting this tropical fruit at every man's door.

In making an orange grove, the judicious selection of the land is the first and most important point, for on this success in a great measure depends. Choose high dry hummock, or high rolling pine land that has natural drainage and a yellowish subsoil. Avoid low, flat palmetto or gallberry lands. Most of these are underlaid with hard-pan, or sandstone mixed with oxide of iron. The most favorable locations are on the southeast side of wide sheets of water or high lands, which are more generally free from frost. The cost of a five-acre grove at, say, five years from planting, at a liberal estimate where high pine land is chosen, will be about as given below. If hummock land is taken, the cost of clearing will be more. The grove will have begun to yield at the end of the period named. Rev. T. E. Moore, Fruit Cove, Florida, has published a good treatise on orange culture.

## COST OF GROVE.

Five acres of good land, variously estimated, depending on location.	
Cutting timber—clearing.....	\$ 75 00
Fencing (post and board fence) and breaking up.....	75 00
Three hundred trees, and setting out.....	200 00
Manures, labor, cultivating, taxes, etc., for five years.....	500 00
Total, less cost of land.....	\$850 00

Such a grove would readily sell now in Florida for \$1,000 per acre. From and after five years the annual growth of trees and increase of fruit is constant, and thereafter the grove will hold its vigor and fruit-producing qualities for a century or more. The orange is a hardy tree; will stand great extremes of rain and drought; it will show the effects of a single season's neglect, and quickly show a single season of care and attention.

The general varieties of the orange are the sour, the sweet and the bitter-sweet. The sour and bitter-sweet are supposed to be indigenous, growing wild in the forests. The orange, as also all of the same family, can be grown from the seed, grafting, budding and cuttings. All are rapid in growth, annual and abundant bearers, long-lived, easily cultivated, hardy, and not as subject to disease or destruction as most trees. Budded, the sweet orange will commence to bear the third year; the seedling in the sixth year, increasing each succeeding year; at fifteen to twenty years averaging at least 1,000 each.

Besides the orange, other members of the citrus family, viz: the lemon, lime, citron, grape-fruit and shaddock, can be successfully grown in at least a large portion of the State. The lime and lemon will be about as widely used as the orange, though not so abundantly, and as not a titling of so many are engaged in growing them, they will, perhaps, be about as profitable.

*The Grape-fruit* is only a larger and coarser variety of the orange. The shaddock is a yet larger fruit, measuring some ten or twelve inches in diameter.

*The Citron* is a healthy, vigorous grower and prolific bearer, though less hardy than the lemon or orange. By a process as yet not understood in Florida, from this fruit is prepared, in the East, the citron of commerce, which art, when acquired here, will develop only another source of industry and revenue to the State.

*The Banana* is one of the most popular of tropical productions. It is generally relished from the first; but even this fruit requires a little practice to develop in full a palatable sense of its richness and delicacy. Moreover, it belongs to the family—the plantain, which is claimed to be the richest of all the fruits in nutritious matter. It has a number of varieties. The hardiest of these, and the one most widely scattered over the State, is the African. This variety needs to be quite ripe to be in its highest degree palatable. Most of the other varieties, as the French, Fig, Dwarf, Red, Cavendish, Lady-finger and Apple, are regarded as more delicate in their flavor.

*The Pineapple* is largely an air plant, and in a suitable climate will do well, even in a poor soil. Very fine pineapples have been grown as far north as Tampa, about 28° north latitude, and will do well up to 29°. On the islands between Key West and the mainland it is a staple crop, as also in Dade County. Indeed, it may and will be grown profitably anywhere south of 29° north. It is only awaiting convenient transportation.

*The Coconut* just at present is attracting great attention. There is a "boom" in its production in the counties of Monroe and Dade. There are trees in prosperous and prolific bearing at Fort Myers, near the northern boundary of Monroe County. With a little protection to the plant for the first several years during the coldest nights, it will do well as far north as the Manatee River.

*The Date-palm*, from which is obtained the date of commerce, is a somewhat hardier plant than the cocoanut, and will do well, therefore, something further north. Date trees, and very old ones, are bearing at St. Augustine, and in Franklin County, at Apalachicola. As yet this fruit has not attracted much attention as an investment, as about twenty years are generally required to obtain fruit from the seed.

*The Guava*, a tree in its size and shape and manner of growth not unlike the peach tree, does about as well in the southern counties of Florida as it can anywhere. From its fruit is made the guava jelly of commerce, so widely and so favorably known over the world. The taste for the fruit, like the taste for most tropical fruits, is an acquired one, but when acquired is fully endorsed. Some persons like the fruit upon first tasting it, but the majority require frequent tasting before the flavor becomes decidedly agreeable. The full crop ripens in August and September, but the trees have blossoms and fruit all the year, and all the year the fruit is ripening. They grow with less attention than the peach, and sometimes bear the second year from the seed. The fruit is ordinarily about the size of the peach, and fully as varied in size and quality. So far experience has demonstrated no other means of utilizing this fruit for market than by canning, or as jelly or marmalade. As to its exact profitableness, even in one of these forms, we have no very reliable data.

*The "Sugar-apple,"* in local nomenclature, the Spaniards put at or near the head of the fruit list for its excellency. In its flavor it is one of the most concentrated sweets known among fruits, but the first taste has a smack of something repulsive, soon lost in a few repetitions, and then the acquired taste is very agreeable. It grows upon a shrub but little, if any, larger than the pomegranate, and in size and shape is somewhat like the pine cone. It decays too soon after ripening for transportation, and as yet has established a use only at home. It thrives as far north as Tampa.

*The Pomegranate*, several varieties of sweet and sour, grows finely in every part of the State. It is not a marketable product, but when properly prepared makes a most delightful sub-acid summer drink—is a decided febrifuge much in vogue. The tree, with its rich foliage and brilliant, coral-like flowers, is highly ornamental.

*The Coffee Plant* has attained maturity in the open air in but one county in the State, or even the United States. It sometimes attains a height of ten or twelve feet. Whether it can be grown profitably on a large scale, and will figure among the available crops of Florida, is yet to be tested.

*The Mango* is another tropical fruit of high flavor, and is now bearing abundantly as far north as the 28th degree of north latitude. In size and shape it somewhat resembles a pear, and in flavor has been likened to the apricot.

*The Sappadillo*, after a little familiarity with it, is a very luscious and desirable fruit. The tree attains about the dimensions of the orange, but will not stand the cold quite so well. A few trees are growing as far north as the Manatee River. They are not yet in bearing, but as they grow finely, promise well.

*The Alligator Pear*, or *Laurus Persea* (Linnaeus), is a tree somewhat larger than the orange, resembling in the general appearance of its foliage and growth the magnolia. The fruit, when matured, is about the shape and color (the only similarities) of the pear; is palatable; flavor peculiar to itself; preferred by many to any other tropical fruit; is marketable; bears transportation quite as well as the orange; attains perfection as far north as 29° north latitude.

*The Japan Plum* or *Loquat*, as well as the Japanese persimmon, flourish throughout the State. Both are excellent fruit, with growing popularity, and promise to be profitable products for markets beyond the State. The persimmon

is as large as an apple, and, in some of its varieties, very much the same shape. Some specimens of the fruit are seedless. The flavor is rich and pleasant.

*The Peach*, though it grows about as well in the far south of the State as farther north, yet does not fruit as regularly. Sometimes, for several years together, the tree will cast every bloom. In the northern counties, while the orange tree grows well, and even better than in the thinner lands of the southern counties, and for the last half a century have grown full crops for more than three-fourths of the years, yet are liable occasionally to be killed down by a severe freeze; but the peach, in at least its earlier varieties, offers a high remuneration for its tillage. In North Florida it can be ready for the earliest market and command monopolizing prices. The Peen-to or Flat Peach, of China, begins to ripen in the neighborhood of Tallahassee, in Leon County, in the last week in April, and continues for a month. These peaches brought most extravagant prices in New York the past spring.

*Pears* of very many varieties, but especially the Dwarfs, have been for many years favorite incumbents of the orchards in the northern and middle portions of the State, and are found to succeed well. Standards have been extensively planted of late years. Among these, the Bartlett has so far proven the most satisfactory. The introduction within the last few years in the northern counties, especially in Leon and Jefferson, of the celebrated LeConte variety, has given an impetus to the production of this fruit that amounts to a boom, and promises to rival in extent the orange industry. The LeConte is a most vigorous grower, comes into bearing the fourth year from the cutting, attains a growth of twenty-five or thirty feet, and is the most prolific and sure bearer of any character of fruit tree experimented with in Florida. The fruit is not, perhaps, as excellent in quality as some of the more choice varieties, but is, nevertheless, a very edible and readily marketable fruit. The rapidity of its growth, the small amount of capital, labor and time required to secure bearing orchards of any extent, its wonderful prolificness, excellent shipping properties and earliness of ripening, make the production of this pear deservedly one of the most popular investments in Florida. Prices in New York so far have been most satisfactory, and have stimulated the production of the LeConte, so that in the two counties of Leon and Jefferson many thousands of these trees have been put out within the two years past.

*Grapes* of several varieties grow wild throughout Florida. They rarely, if ever, occur in the pine woods, but in hummock land trees are hung and festooned in every direction with the luxuriant growth of vines. In many localities considerable attention has been given to the cultivation of domesticated varieties. The Concord, Catawba, Ives, Clinton and other American grapes of that family have been found to grow and fruit well wherever the proper attention has been given the pruning, etc. The Scuppernong has been more extensively propagated than any other grape. Of the production of any varieties of European wine grapes, I am unable to give any reliable information. Many experiments have been made, and none, I think, have so far been very favorable. This may be entirely owing to the want of proper knowledge of the best methods of pruning, etc. The so-called wines manufactured in Florida and other parts of the South are only cordials, made by the addition of sugar or spirits to the juice of the grapes. They are sweet, heavy drinks generally, with decided flavors peculiar to themselves; are palatable drinks when a taste is acquired for them, but are not wines in a commercial sense. Very considerable profit, however, attends their manufacture and sale.

*Apples*, so far as I know, have never been extensively or very satisfactorily grown in Florida. There are in some of the northern counties small orchards of considerable age that have borne fruit abundantly for years, but are not of choice

varieties. By proper selection of suitable varieties, and the adoption of a system of culture that experience will prove to be adapted to the Florida climate and seasons, there is little doubt that on the stiff, rolling lands of the hill country in the northern portion of the State, apples may yet become a prominent feature among the industries.

*Figs* of every known variety do well in Florida, but in the most southern counties are a little uncertain about fruiting. When it does bear in those sections the fruit is quite as good as that grown further north, and it may be that painstaking in its tillage will discover a remedy for this irregularity. In the East it is an article of great commercial value, and when Florida becomes fully exercised in fruit growing, and has acquired skill in preparing her fruits for market, the fig will probably become prominent among the list. The tree attains great age, and continues to bear indefinitely. Every home has its fig trees of different varieties, and the fruit is among the most wholesome articles of diet.

*Plums* of many wild varieties are found throughout the State. Little attention has been bestowed on them. Some of the early Southern varieties have been found profitable for shipment North. They ripen about the first of April, and can be put into the Northern market at a time when they have no other fruit to compete with.

*The Pecan* of the West grows finely all over the State. It requires no tillage and nursing; comes into bearing from the planting of the nuts in ten or twelve years. The fruit is abundant, falls when ripe, is easily and cheaply gathered, bears keeping and rough shipment any distance in any climate.

#### STOCK RAISING.

In all the southern counties are to be found large and small herds of cattle. These run at large through the pine woods, swamps and vast prairies of the Kissimmee and Caloosahatchie Valleys, and thrive on the coarse pasturage in a manner quite remarkable and satisfactory to their owners, who "round-up" once a year, mark and brand the young calves, and give little other attention to them. So little expense attends this sort of stock raising, that notwithstanding the small size of the cattle produced, they prove most profitable for shipment to the Cuban markets. Indeed, the hide and tallow of a five-year-old steer would return a good profit on the cost of his keeping. The cattle are not so large as those grown in Texas, because less attention has been given here to improving the native breeds of stock. The cattle raised in Florida are small, with thick heavy necks and fore parts and narrow loins; but when fat, a four-year-old, when dressed, will weigh from 400 to 500 pounds.

The buyers in the Cuban markets (to which shipments are made to the extent of 50,000 head per year) prefer Florida to Texas beef. The grasses in the southern counties are more nutritious, and seem to impart a more agreeable flavor to the flesh, than in the northern part of Florida. That this business pays well has this practical proof: More money has been made in stock raising in South Florida than any other enterprise in the State until quite recently, and a number have thus grown wealthy from their herds. The improving of the breeds of cattle, and proper experiments with the grasses which may be grown successfully here, will make stock raising in Florida as general as it is profitable, and will give a value to a vast area in the State now practically a wilderness.

#### FISH.

The great variety and excellence of the fish in Florida is not one of the least attractions, whether to the sportsman or more practical housewife. The lakes and streams of the fresh waters abound in fish of the finest quality, prominent among which are the black bass, pike, jack, bream, and many varieties of the

perch family. Along the coast the list of varieties is longer than the fisherman's list of names for them. Red snapper, black snapper or grouper, sheep's-head, red fish, black fish, pompano, Spanish mackerel, rock fish, mullet, and a long list of small "pan fish" are chief among the marketable varieties. The pompano is regarded as the choice among epicures. The snapper and grouper are both deep water fish, and are taken in great numbers by smacks on the banks off shore for the Havana, New Orleans and Galveston markets. They can be kept for weeks in the "wells" of the fishing smacks without injury to them. On both the Atlantic and gulf coasts there are extensive fisheries, where, in the season of the "run," mullet are taken in vast numbers on the seine-yards. Some of the strikes made by the fortunate seine-masters number hundreds of barrels. These fish take salt quite as well as the mackerel of the northern waters, and furnish an abundant supply of cheap and wholesome food to the inhabitants.

Along the gulf coast, west of the Suwanee, and especially on the coast line of Wakulla and Franklin Counties, the revenue derived from this industry is considerable. The proximity of those points to the southern counties of Alabama and Georgia enables the small farmers of those sections to reach the Florida coast in their farm wagons. About the first of October, when the "run" of the fish commences, the Georgia and Alabama farmer takes his wife and children in his wagon and journeys southward. A week of recreation is spent, after the year's work, on the beach, where these "up-country" folk enjoy the salt air and water, and return home with several barrels of pickled fish to be eaten during the winter. It is estimated that more than three hundred Georgia wagons pass through Tallahassee alone, in the fall, on their way to the fisheries. Perhaps no waters abound in fish in greater quantity or of better quality than the waters of the coast of Florida. Recently the catch of several fisheries along the coast have been utilized in the manufacture of a fish fertilizer, which is taking a high place among the farmers, and promises to develop into an extensive industry.

*Green Turtle* may be mentioned as another commodity of the Florida coast. In Key West the beef and turtle markets adjoin. They are both supplied with about equal regularity, and very many prefer the turtle to the beef, particularly after the latter has been submitted to the hardships of a voyage from the mainland. Turtle are shipped alive to the Northern markets from Key West, and sometimes car loads of them pass over the Florida Transit and West India Railroad from Cedar Keys on their way North. One of the sports of persons living near the coast is walking the beach in April and May, watching for and "turning" the turtle that crawl out upon the shore in that season to lay. When they find the turtle making her nest or laying her eggs, a sufficient number of persons lay hold and turn her upon her back. She is then helpless, unable to re-turn herself, so as to have the use of her feet. Parties are thus supplied with both the turtle and her eggs, and both are prized as savory food.

*Oysters* are so continuous around the coast, that when the railroad and canal system shall have been completed, a supply, at short notice, will reach any part of the interior of the State in a few hours, at the expense of gathering and short freightage. The supply seems inexhaustible.

*Sponge*.—The gathering of sponge along the gulf coast is rapidly becoming an industry of considerable dimensions. The principal sponge reefs lie to the south-eastward of the port of St. Marks, between that port and Cedar Keys. A fair estimate of the value of the whole amount of sponge taken in the year is little short, if any, of \$750,000.

The lumber business is the most important manufacturing interest in the State, and the number of mills is steadily increasing. Saw mills of all sizes, ranging in value from a few thousand to fifty thousand or more dollars in value, are

scattered over the State, sawing lumber for local, Northern and foreign demand. It is almost impossible to compute the immense value of Florida's enormous timber resources, and as Northern forests become more and more exhausted, the timber land of Florida and of the other Southern States will greatly increase in value.

#### SOCIETY.

All classes are found as in other States, and the question of nativity, antecedents, and political or religious views, creates as few distinctions as can probably be found in any community in the world. The stranger is welcomed, and the new-comer finds friendly neighbors around him. Within the last ten years thousands of Northern people have settled in Florida, and engaged in fruit and vegetable growing, as well as other business and professional occupations. This large, new element is regarded and treated by native Floridians as most welcome and desirable, and the State authorities and private citizens join in making their coming pleasant and their residence satisfactory.

#### GOVERNMENT OF FLORIDA.

The Legislature meets on the first Tuesday after the first Monday in January, every two years, and may hold its sessions not longer than sixty days. Senators are chosen for four years. The election for members of the Assembly is on the first Tuesday after the first Monday in November. Each county shall have at least one representative; none more than four. Senators never less than one-fourth nor more than one-half of the whole number of the Assembly. The Governor is elected for four years. To be eligible, he must have been for nine years a citizen of the United States, and three years a citizen of Florida. *Suffrage.*—One year's residence qualifies.

The present Constitution of Florida was adopted in 1868. It is similar to the later constitutions of the North and West, somewhat modified, being more liberal in suffrage and exemption clauses. Foreigners who may become residents enjoy the same rights as to property as native-born citizens. All property of wife owned before or acquired after marriage is made separate, and not liable to debts of the husband.

#### SCHOOLS.

According to a recent address of Governor Bloxham, the number of schools on March 20, 1884, was 1,479—the increase in the last three years being 348. The attendance of pupils in 1876 was 28,444, and in 1882 51,945—the increase in six years being 23,501. In 1876 the expenditures amounted to \$158,846.99; in 1880 \$124,082.91; in 1883 the expenditures amounted to \$262,348.02—showing an increase of \$103,502.03. The principal of the common school fund, which had accumulated from 1845 up to 1882, amounted to \$250,284.25, while to-day it amounts to \$429,984.25—showing an increase in two years of \$178,700, being nearly seventy-five per cent. increase in two years.

#### CLIMATE.

The climate is greatly influenced by the Atlantic Ocean and the Gulf of Mexico. Extremes of heat and cold are rare, the temperature in winter seldom falling below 32°, and in summer seldom rising above 90°. The average temperature for the summer is 78°; for the winter, 60°. The daily ocean breezes temper the heat of summer, the breeze from the Atlantic lasting during the day, while the gulf breeze sets in about nightfall.

The mean temperature of Jacksonville, latitude 30° 19' 38'', calculated upon twenty-seven years' observations, is, for spring, 70.06° Fah.; for summer, 81.82°; for autumn, 70.35°; for winter, 56.33°. The mean temperature of St. Augustine,

calculated upon twenty years' observations, is, for spring, 68.54°; for summer, 80.27°; for autumn, 71.73°; and for winter, 58.08°. The mean temperature of Tampa, which is on the western coast, 1° 48" further south than St. Augustine, calculated upon twenty-five years' observations, is, for spring, 72.06°; for summer, 80.2°; for autumn, 73.08°; for winter, 62.85°. The mean temperature of Key West, in latitude 24° 32' calculated upon fourteen years' observations, is, for spring 75.79°; for summer, 82.51°; for autumn, 78.23°; for winter, 69.58°. The air is bland, not hot, in summer.

#### FROSTS.

At Jacksonville, frosts are possible any month, from October to April inclusive. Dr. Baldwin found, from twenty-seven years' record, an average of 2.3 frosts for November, 5.2 for December, 5.4 for January, 3.1 for February, 1.3 for March. In April and October there is .2 of a likelihood of frost; none between. As the traveler goes southward along the peninsula, the number of frosts, of course, diminishes; and at Key West and along the southern tier of coast counties they practically disappear. Much inquiry left me unable to fix any line north of this where it could be said one had gotten below frost; but the phenomenon is rare, at any rate, below 28° latitude.

#### RAINFALL AND HUMIDITY.

During something over sixteen years the average rainfall at Jacksonville was 50.29 inches. Only 7.06 inches of this amount fell, on the average, in winter; 9.19 inches during the spring; leaving 20.5 inches for the summer, and 12.98 inches for the autumn.

The average annual amount of humidity at Jacksonville was found to be 5.7 grains of water to the cubic foot of air. This is said to be about enough to be pleasant for respiration.

#### NUMBER OF CLEAR DAYS.

During a period of twenty years (and some years longer, for several of the months hereinafter mentioned), it was found that at Jacksonville, January averaged about twenty clear days, February nineteen, March twenty, April twenty-five, May twenty-two, June seventeen, July eighteen, August nineteen, September seventeen, October nineteen, November twenty, and December twenty. It is not to be understood, by any means, that the cloudy days in this calculation were rainy days. Probably, on something like half of them, rain fell.

#### THE WINDS.

The northwest wind is the cold, dry wind of Florida. It is the wind that kills the orange trees. The northeast wind is the cold, wet wind. The east wind is a delightful wind. The south wind is somewhat like it in the temperature it brings and the sensation it produces. Dr. Baldwin also speaks of how visitors at coast resorts on the Atlantic side are disgusted with the northeast winds from the Atlantic, and how much colder they seem than they are. I think this, however, is a characteristic of the northeast winds (and even winds from the east considerably higher up the coast) from the Atlantic. They punish and deceive every one from a western climate, and any climate where one is not familiar with them. "Raw" is the word applied to them, and one seems almost freezing when the thermometer is not at the freezing point.

The winds from the gulf are quite different. Here is a very happy bit of description from Lanier: "There is a certain large blandness in the atmosphere, a sense of farawayness in the wide water stretches, an indefinable feeling of withdrawal from harsh life, that give to this suave region,\* as compared with others,

\*He is speaking of Pensacola.



the proportion which wild dreams bear to reality. It is a sort of Arabian Nights vaguely diffused and beaten out into long, glittering, sleepy expanses, and the waters presently cease to be waters, and seem only great, level enchantments—that shine.”

This “drowsy charm” is one of the great characteristics of the gulf coast, (varied by moods of elevation and inspiration very marked at times), and is unspeakably tranquilizing in nervous diseases, one would think, and deliciously narcotizing.

#### THE HEALTHFULNESS OF FLORIDA

is attested by reports of army officers who kept for years and made statistical reports on the subject from various military stations in the State. I quote from the report of Surgeon-General Lawson, of the United States Army, who says: “Indeed, the statistics of this bureau show that the diseases which result from malaria are of a much milder type in Florida than in other States in the Union; and the number of deaths there to the number of cases of remittent fever has been much less than among the troops serving in other portions of the United States. In the Middle Division (meaning military division of the United States), the proportion is one death to thirty-six cases of remittent fever; in the Northern, one to fifty-two; in the Southern, one to fifty-four; in Florida, it is but one to 287. \* \* From the carefully collected statistics of this office, it appears that the annual rate of mortality of the whole peninsula of Florida is 2.06 per cent., while in other portions of the United States 3.03 per cent. Indeed, it may be asserted without fear of refutation, that Florida possesses a more agreeable and salubrious climate than any other State or Territory in the Union.”

Prominent among the causes of Florida’s superior healthfulness, is its long, narrow figure, north and south, in its peninsular portion, and in its proximity to the gulf in the narrow strip of it stretching westward along the coast. This peculiarity of shape exposes it to the breezes, which remove most of the resulting malaria or other atmospheric poison.

The larger portion of the surface is covered with pine forests, whose tall trees, with branches near the tops only, give to the winds but little obstruction, especially near the surface, while these trees perfume them with a resinous exhalation, healthful in its influence. Moreover, scientific tests have demonstrated that ozone, that peculiar modification of oxygen, which gives to it its purifying properties, exists more abundantly in the atmosphere of the ocean and along the coast than in the atmosphere of places further inland, and no one of the American States has so much coast line as Florida, except, perhaps, California. Some learned medical men hold that turpentine exhaled from the pine forest possesses, in a larger degree than all other substances, the property of converting the oxygen of the atmosphere into ozone. (See proceedings of Medical Association of Florida for 1880, page 71.)

Dr. Chas. H. Lee, editor of Copeland’s Medical Dictionary, as quoted in the authority referred to, says; “Mildness and equability are the two distinguishing characteristics of the climate of the Florida peninsula.” The mortuary statistics of Florida, reported to the Census Bureau for a number of decades, represent her as among the most healthful States of the Union.

I have given the above data from the practical side; and yet, even from the standpoint of utilitarianism, into the “horn of plenty,” along with the oranges, lemons and pineapples, Pomona pours, Flora will put her flowers. It does not detract from the sweetness of perfumes because one puts them in the marts for sale. Mere money-getting in Florida has a halo, a fragrance, an atmosphere about it that it has not elsewhere. This exaltation, this almost glorification of industry, this *aureola* about the brow of thrift, is one of the unique phases of Florida life.

Nowhere else does money-making seem so much a pastime and labor a holiday. The sweat of the brow is transmuted to perfume; "dry" statistics become blooming and odorous; utilitarianism is idealized; capital is æstheticised; thrift is glorified, and the duty and dignity of labor are veiled by its beauty as by a rosy cloud. "The chink of the guinea" finds an endearing and excellent accord in the melodies of bird-songs. Embellishment is not only the embodiment of the soul's aspirations after the beautiful, not only the pledge and promise of remuneration, but remuneration itself. Industry does not swelter in the sweat of toil, but is bathed in the elixir of delight. It brings not only money, as do hogs and hominy, but the blissful remunerations of flowers and beautiful fruits. Indeed, labor is not only the handmaid of thrift, but his enchanting mistress.

But, whatever one may think of Florida from the standpoints of money-making or health, her name is certainly a spell. It is not only suggestive of fragrance, but almost redolent. It acts like an incantation upon the imagination. Her clime is at once bountiful and beauty. She seems the theatre of "selectest influences" of nature in her softer moods, the haunt of the muses, the land of soft and fragrant airs, perpetual flowers and unfailing bird-songs. It is such a place as is dreamed of and sighed for by young lovers, in the engrossing reveries of entranced day-dreams. It is the Mecca of the cultured voluptuary, and the asylum of the invalid. And not only is her spell upon the imagination, but upon the memory. The pages of history and poetry revive; pages where genius has recorded her highest triumphs of description. Arcady and the vales of Cashmere bloom afresh; Cathay and Candahar revive; the Tuscan fields, the famous Arno and "star-bright Italy," and the place of—

"Dance and Provençal song and sunburnt mirth."

Why should she not become the future nursery of poets; a precious repository of the beautiful; at once a glorious picture gallery and nursery of genius; where may be stored the ripe fruits of genius, and where genius may find her highest inspirations and most rapturous solaces? Why should not there be a civilization of as high a type and more romantic than marked the old world; where poetry and art and song can grow side by side with a seemingly utilitarianism—a utilitarianism not hard and cold and all engrossed in money-making, but where time and opportunity are given for a sumptuous taste and a munificent, superb æstheticism to revel in; where the triumphs shall be of the poet's page, the painter's canvas, the sculptor's marble?

Florida will be studied in this aspect by him who seeks "a refuge from the vulgarity and irritation of business;" who recognizes the music of the "inner voice" in the river; who feels—

"A distant dearness in the hill,  
A secret sweetness in the stream:"

who finds—

"Sermons in stones, tongues in the trees,  
Books in the running brooks."

To such, even the most rapturous rhapsody would need no apology; for there is a time for rhapsodies, as well as for plodding, groveling, gain-getting.

I have referred to Florida as a reviver of recollections of poetry. One might almost think some of the pictures of other climes were drawn for Florida. Take some scenes, for instance, from Tennyson's "Recollections of the Arabian Nights:"—

"The sloping of the moonlit sword  
Was damask work, and deep inlay  
Of braided blooms unmown, which crept  
Adown to where the water slept.  
\* \* \* \* \*  
Imbower'd vaults of pillar'd palm,  
Imprisoning sweets, which, as they clomb  
Heavenward, were stay'd beneath the dome

Of hollow boughs.  
Far off and where the lemon grove  
In closest coverture upsprung,  
The living airs of middle night  
Died round the mock-bird\* as he sung."

Or, as one walks, some bright day in winter, through scenes where wealth and taste have reveled in adornment, this description from the "Gardener's Daughter," by the same poet, would not be amiss :—

"All the land in flowery squares,  
Beneath a broad and equal blowing wind,  
Smelt of the coming summer."

\* \* \* \* \*  
"Heaven was pure  
Up to the sun, and May from verge to verge."

Take some lines from Byron :—

"Fair clime, where every season smiles,  
Far from the winters of the west,  
By every breeze and season blest,  
Returns the sweets by nature given  
In softest incense back to heaven,  
And grateful yields that smiling sky  
Her fairest hue and fragrant sigh."  
—*The Giaour.*

"The dewy morn  
With breath all incense and with cheek all bloom."  
—*Childe Harold.*

"It is a goodly sight to see  
What heaven has done for this delicious land;  
What fruits of fragrance blush on every tree."  
*Childe Harold.*

And who does not think of what can be, for the most part, in Florida—only better—as he remembers parts of Selim's Feast in the "Light of the Harem," in Lalla Rookh?—

"The board was spread with fruits and wine,  
With grapes of gold like those that shine  
On Casbin's hills; pomegranates full  
Of melting sweetness, and the pears  
And sunniest apples that Cabul,  
In all its thousand gardens, bears.  
Plantains, the golden and the green,  
\* \* \* \* \*  
And Bassa dates and apricots."

And one is tempted to quote the spread that Porphyro laid for Madelaine, in Keats' "Eve of St. Agnes;" and one thinks of the spirit in "Comus," in the epilogue, as it flies to where—

"West winds, with musky wing,  
About the cedarn alleys fling  
Nard and Cassia's balmy smells:"

and gorgeous descriptions from other poets. Coleridge's "Kubla Khan," the famous scene in "The Lady of Lyons," and more; woo the pen, seeking quotation; but their suit must be rejected.

Thus the memory reverts to scenes where the rich redundance of oriental magnificence and splendor have been glorified by genius. And there is, for many poetic temperaments, that atmosphere for the imagination which almost makes such an one the inhabitant of the "lazy-pacing clouds," and to float over enchanted palaces whence strains of—

"Divine, enchanting ravishment arise,"

and which are peopled with ladies fair and plumed knights; where life is a revel—

"Of love, of joyance and of gallantry."

Suppose Florida were, in fact, only some "delicious land," where the—

"Graces, knit with the hours in rosy dance,  
Lead on perpetual spring."

\*I have substituted the mocking-bird for the bulbul. He often sings during much of the beautiful nights far South.

Even then it would have its uses, as I have said. The *ennuied* millionaire, the overworked scholar, the professional man worn with a long life of toil, the tradesman—all who seek to get out of the hurly-burly, the dust and jostle of this feverish, work-a-day world, and find a respite from it, and who seek rest to the overstrung nerves and the jaded powers, will find a charm in Florida, a harmless but—

“Pleasing sorcery that charms the sense,  
And laps it in Elysium,”

as did the song of the lady in “Comus.” Therefore, if Florida were an Arcady, that were enough. But Florida is not a fancy, but a fact. You see it, “not in the frenzy of a dreamer’s eye,” but as “a sober certainty of waking bliss.” These indescribable lakes, these orange groves, copses of camellia, pittosporum, oleander, sweet olive, roses, viburnum, these bowers of live oak, magnolia, all this “wilderness of sweets,” this wealth of shade and color and fragrance, are all real. “Fancy lags behind fact, the imagination becomes barren and uninventive” when one attempts the theme of description.

And, while there is no glory of time, no halo of history about Florida, none of that hallowing effect that endears decayed splendor and bathes it in the purple light of bygone centuries; while there is none of this prestige of age, this consecration of decadence, I cannot see why Florida should not prove a resuscitation of Spain in her palmy days, her “golden prime,” when the latter furnished olives and olive oils, raisins, oranges, figs and other choice fruits, and the wondrous fabrics of her looms, to commerce. Florida may prove a repetition of these. Her silk and woolen and canning factories will spring up, and the wealth, splendors and sumptuous magnificence of her products will vie with those times, without their ignorance and superstition. She will prove of joy the sojourn, of sickness the asylum, of richest and most beautiful commerce the mart, the home of art, and the most fascinating scene in which to enjoy the *dolce far niente*. It surely ought to be a pride of patriotism, a solace to national pride, that if other lands have had their vales and mountains embalmed in song, we have our Florida, where one can revel in the rich bounties nature, unpersuaded, yields, and where immense rewards of beautiful luxuriance await those who will woo her tender responsiveness, with apposite cultivation. And, while we exult in our magnificent vastness of areas, our great rivers, our lofty mountains and fertile valleys, why may we not cherish the land of orange bowers; where the landscape is perpetually a flower, and ever redolent with myriad fragrances? And I love to think of the solid, enduring contributions to our future literature which the inspirations Florida will awaken shall yield. The imagination will not be cheated of its enchantments and the exalted sensibility of its opportunities. If the nightingale will sing on the heath, her temptation to sing will be none the less in a bower. If the lower slopes of Parnassus yield such inspiration, what will its “heaven-kissing” heights afford? Up there are the finer vistas, “the brighter ether, more purpureal gleams.” So, if the prairie poet, with pig-sty odors haunting his sense, and with corn cribs and hogs in sight, with a kindled imagination, “bodies forth” groves of flowers and “blasts of balm” in his “fine frenzy,” will not those susceptibilities be exalted and his fancy take higher flights, if he shall breathe the odors and pluck the fruit of orange groves, hear the songs of mocking-birds, see—

“Fields ever fresh and groves forever green,”

and be intoxicated with odors undreamed of, exhaled from flowers always abloom; where—

“He sleeps and wakes in scented air;”

where the spirit of fragrance is not only up with the day, but, like a fond, serenading lover, is abroad all the night? If a Milton glorifies the tame landscape—

“Russet lawns and fallows gray,  
Where the nibbling flocks do stray”—

in his musical poem, what may not some future Milton do for the enameled fields of Florida?

And then I think one of the sweetest beauties of Florida is a subtle power of rejuvenation, that springs from some mystic source, we know not where or how; when the feelings of early youth revive, and of the days when we used to pluck the daisies, chase the butterflies, wade in the brook; when our tears were only of the eye and not the heart; when sorrow was as evanescent as an April shadow upon a gladsome bird; the days of the "sunshine of the breast," when the "spirits flew in feathers;" when we were "blithesome and cumberless," like Hogg's skylark, or as lightsome as the swallow, "chasing itself at its own wild will" over the glassy lake or flowery mead; the days ere care came or poverty (or if the latter, heeded not, in blissful compensations); the days ere the vanishment of loved ones, or ever the golden chalice of hope was broken, that used to be "brimmed with such delirious draughts of richest joy." Thankful are we for any "joyfont" whence we can quaff one fill of rapture from life's embittered cup—and that fountain, from the mystic somewhere, springs in Florida.

## HOMOSASSA, ON THE GULF COAST OF FLORIDA.

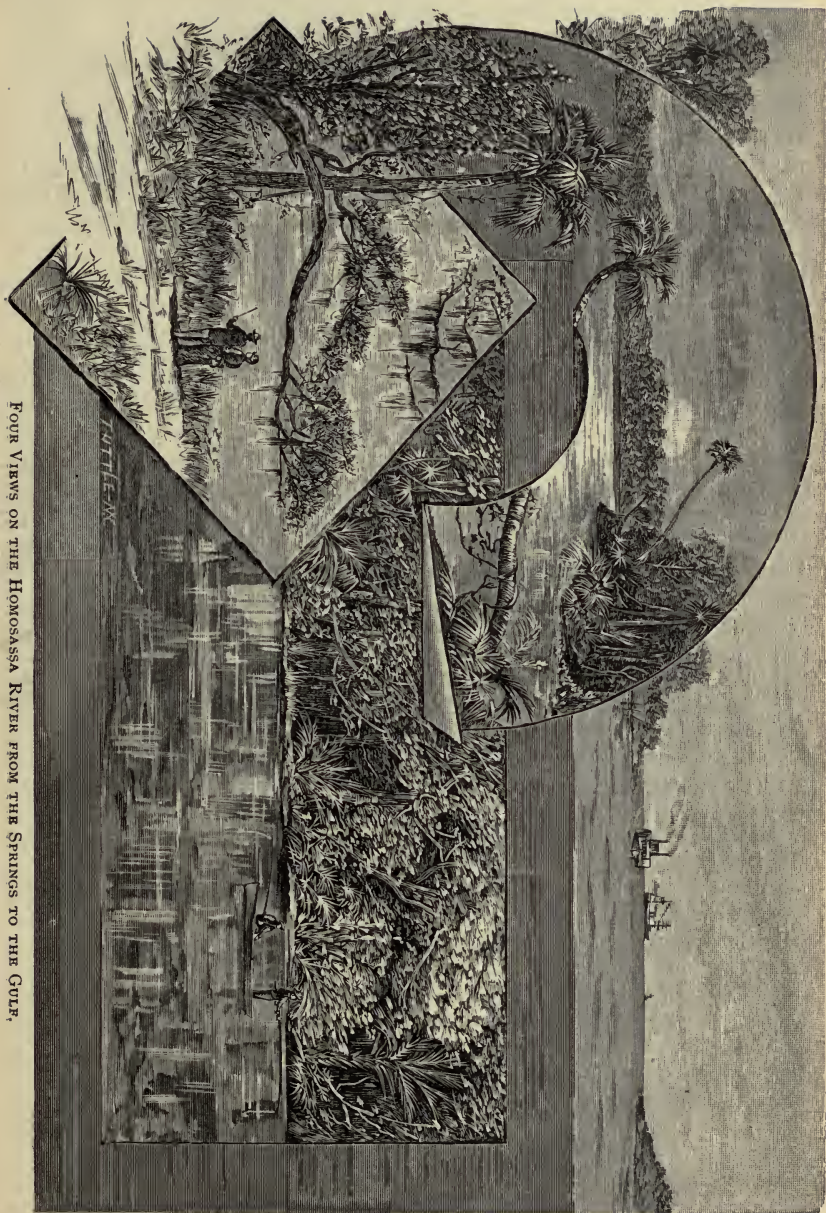
THE Spaniards who first visited Florida found its centers of aboriginal population, not along the eastern coast and the St. John's River, but among the salubrious hills and rich hammocks of the central portion of the peninsula, and about the headwaters of the spring-fed, crystal streams which flow westward into the Gulf of Mexico. De Soto, starting on the memorable expedition which resulted in the discovery of the Mississippi, landed at Tampa, on the gulf coast, in about latitude  $28^{\circ}$ , and began his explorations thence in a northerly direction. The accounts of that expedition, gleaned from the manuscripts of old Spanish chronicles, teem with descriptions of the luxuriant fruitfulness and dense population of this wonderful region.

The Indians of De Soto's time appear to have been dispossessed by the Seminoles. When this brave tribe finally succumbed to the power of the white race, these conquerors instinctively turned towards the west, and, among the fertile fields whence the preceding races had been ejected, founded some of their first settlements and established their most productive and extensive plantations.

Many of these scenes lay in what is now known as Hernando County, which, in location, soil and climate, has natural advantages that, as they are now about to be better known, cannot fail to vindicate the judgment of the pioneers of history. Its boundary on the north and west is the Withlacoochee River, a deep, dark stream, with high, heavily-wooded banks, and navigable for steamboats for a hundred miles. On the west is the Gulf of Mexico, forming its coast boundary for 70 miles. Southerly it reaches to within 10 miles of the waters of Tampa Bay. It extends, therefore, very nearly from the 28th to the 29th parallel of latitude. In the eastern and central portions of the county the surface is rolling, and broken by high hills and beautiful lakes, and heavily timbered with pine. The western portion is a gentle slope towards the gulf, and is covered for the most part by a dense hard-wood or hammock growth. It is traversed also by several bright, broad streams, gushing with great volume and power from the recesses of the earth, clear, swift and deep from their springs to the gulf.

Most notable of these streams is the Homosassa. Nearly midway of the coast line of the State, and at the point where the distance between the gulf and the Atlantic is least, this river bursts suddenly out from the earth in two powerful springs, and flows westerly eight miles to the gulf. The strong current cuts its channel clean and deep, making the river navigable nearly to its source. The transparency of the river waters is something wonderful. On the springs the floating boat seems poised in mid-air, and small objects are as distinct at a depth of 60 feet as if seen through a sheet of window glass. Even here innumerable fish from river and gulf of all variety and size, impeded in their upward course, linger and play as if loath to leave so bright a pool. As one passes up or down the river, shoals of fish beneath dart away in such crowds it seems as if the very bottom were moving out from underneath. The banks are fringed with a growth of the greatest luxuriance, the marvellous richness of the soil declaring itself in gigantic and picturesque oaks, bays, magnolias, palms and cedars, with a dense undergrowth of strange and tropical beauty. Many islands embraced in the broad and winding current are clothed in the same bright garb. Among the salt bayous that back up from the gulf to meet the river in its lower course, the lands stretch away in vast salt meadows, interspersed with islands of palm, like oases, though instead of desert sands, the picture is a scene of outspread verdure.

The shell-rock which underlies the soil, broken abruptly at the water's edge, gives a singular firmness of line to the shore and affords landing places at many points, and at some, perfect piers extending far into the deep water. This same rock often forms a natural bridge among the little islets and inlets of the river. Thus, on Otter Creek, a stream of dark and wondrous beauty overarched by



FOUR VIEWS ON THE HOMOSASSA RIVER FROM THE SPRINGS TO THE GULF.

bright-leaved trees, the rock in one place casts over it a perfect bridge, broad and strong enough for heavy travel.

On several of the islands in the lower river, the shores are lined with deep shell mounds, some covering acres and 20 or 30 feet thick, in which are not only bones and teeth of animals, but also fragments of pottery curiously wrought, and some of them with no mean attempt at artistic ornament. Live oaks many centuries old are growing, deep-rooted, out of some of these mounds.

In the rich hammocks on the banks and islands of this beautiful river the Seminole Indians made one of their principal strongholds, which they fought desperately to defend. On the charming Iathloe Island, four miles from the springs and also from the river mouth, the famous war-chief Tiger-Tail made his home and surrounded himself with his chosen braves. At an early period of colonization a settlement of Swedes was made on a fine eminence just below the springs. They were all massacred by the Indians. These fields—a hundred acres or more—are known as the "Harold Fields."

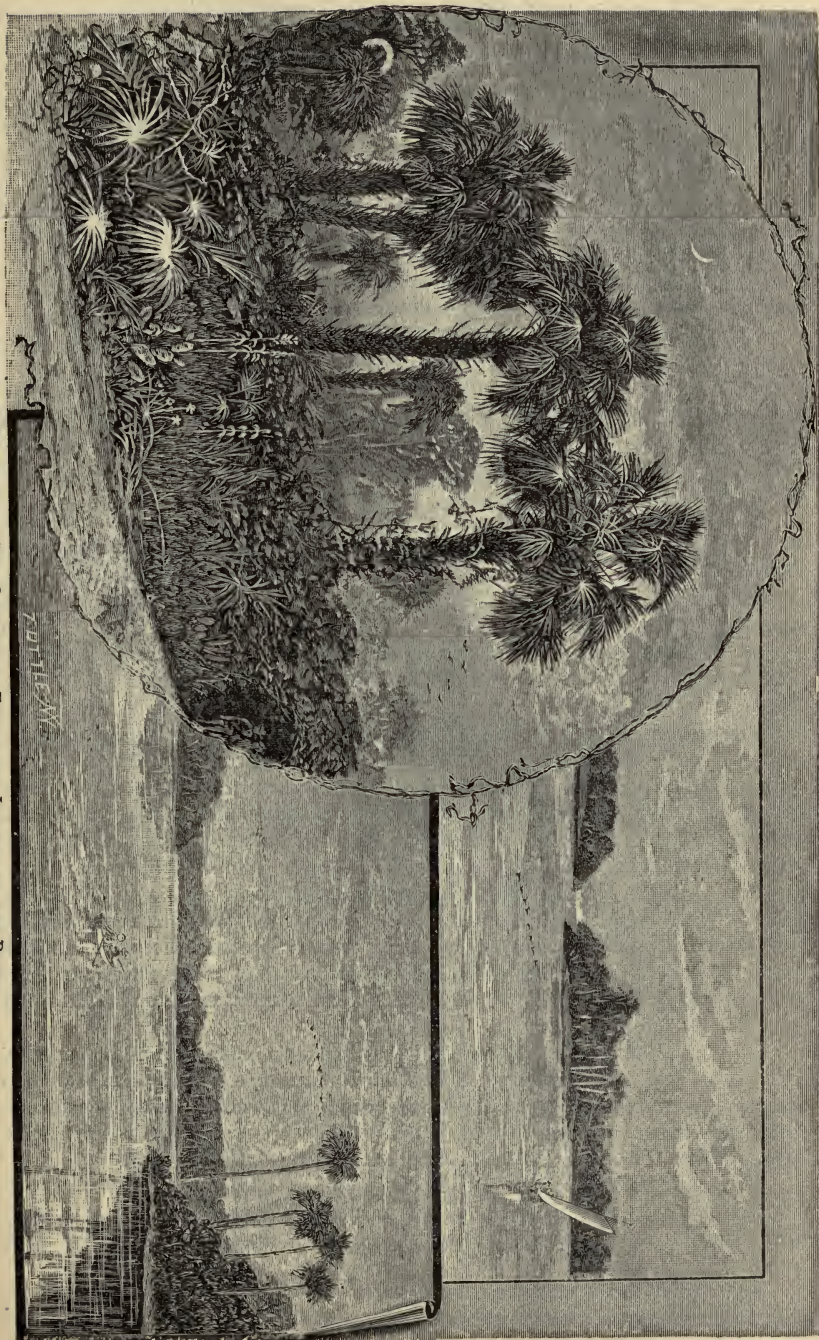
Soon after the close of the Seminole war the Hon. D. L. Yulee, with an entire State to choose from, selected as the site of the great enterprises he contemplated the rich hammock lands on the south bank of the Homosassa. He purchased about 5,000 acres, with a river front of four miles, including the "Harold Fields" and Iathloe Island. Of this dense hammock he cleared a thousand acres, built a small town of "quarters" for his army of slaves, erected the finest sugar mill in the State, with storehouses, shops and all necessary accessories, and entered upon the production of sugar on a vast scale. For his own residence he selected the former home of the Seminole chief, and on Iathloe Island, or, as it was thenceforward more commonly called, Tiger-Tail, he built a commodious house and established his family in a luxurious home. The yield of these fields that had slumbered so long beneath the primeval forest was enormous, averaging a ton to the acre, besides the molasses. Indeed, a single acre, where the soil was thinnest above the table-rock, with a little care to cover the roots and entirely without fertilizers, produced 2,750 pounds of sugar.

During the great days of its prosperity the Homosassa was full of trading vessels and pleasure craft; a mail steamer made weekly trips to its head from Cedar Keys, 40 miles away, and no settlement on the gulf coast showed greater activity.

But the blighting breath of war swept away these solid structures of civilization and culture almost as completely as it had done before to the traces of the ruder life of Seminole and aborigine. A gunboat of the Federal blockading squadron of the gulf entered the river, steamed up among its beautiful banks and islands, bearing destruction with it and leaving ruin to mark its course. The luxurious home on Iathloe vanished like a dream; ashes and crumbled heaps of stone remained alone to mark its place. Although the dense belt of timber that fringed the river bank shut out from view of the gunboat the sugar mill and quarters beyond, so that they for the time escaped destruction, yet the slaves all fled under such terrors that they never returned. It was not strange that conflagration soon swept away the sugar mill and other remnants of its busy life, and that the plantation should be left a picture of desolation. But exuberant nature, with marvellous rapidity, has covered these ruins with a glory all her own. The fields are already for the most part thickly shaded by the vigorous growth of palmettoes and other hard-wood trees, the stone-heaps adorned with tracery of vines and climbing plants, and the furrows in the open carpeted by richest sward of green. Of the old quarters a few cabins stand, with huge stone chimneys and open fireplaces, beneath outspreading live oaks and palmetto and date palms. Near by is the ivy-mantled chimney marking the site of the old plantation.



THE OLD PLANTATION—THE OVERGROWN FIELDS AND ISLANDS ON THE RIVER.



church, and farther on the great stone chimney of the sugar mill, massive and grand as the tower of some ancient castle, festooned from base to summit with thick clustering ivy, woodbine and flowering vines, while beneath are strewn the scattered parts of the magnificent machinery, half concealed by a tropical luxuriance of shrubs and vines and young forest trees.

Among the things that could not be wholly destroyed is the far-famed orange grove on Iathloe Island, whose fruit, known as the Homosassa orange, has long been the chief prize-taker at fairs and eagerly sought in all markets where it is known. This grove and the loveliness of Iathloe Island attracted some enterprising parties to erect upon the ruins left by the gunboat a commodious house and a number of cottages, where for some little time flourished one of the most attractive winter resorts in Florida.

But these structures and tokens of human comfort and appreciation were destined soon, as if by some strange fate, to perish by conflagration.

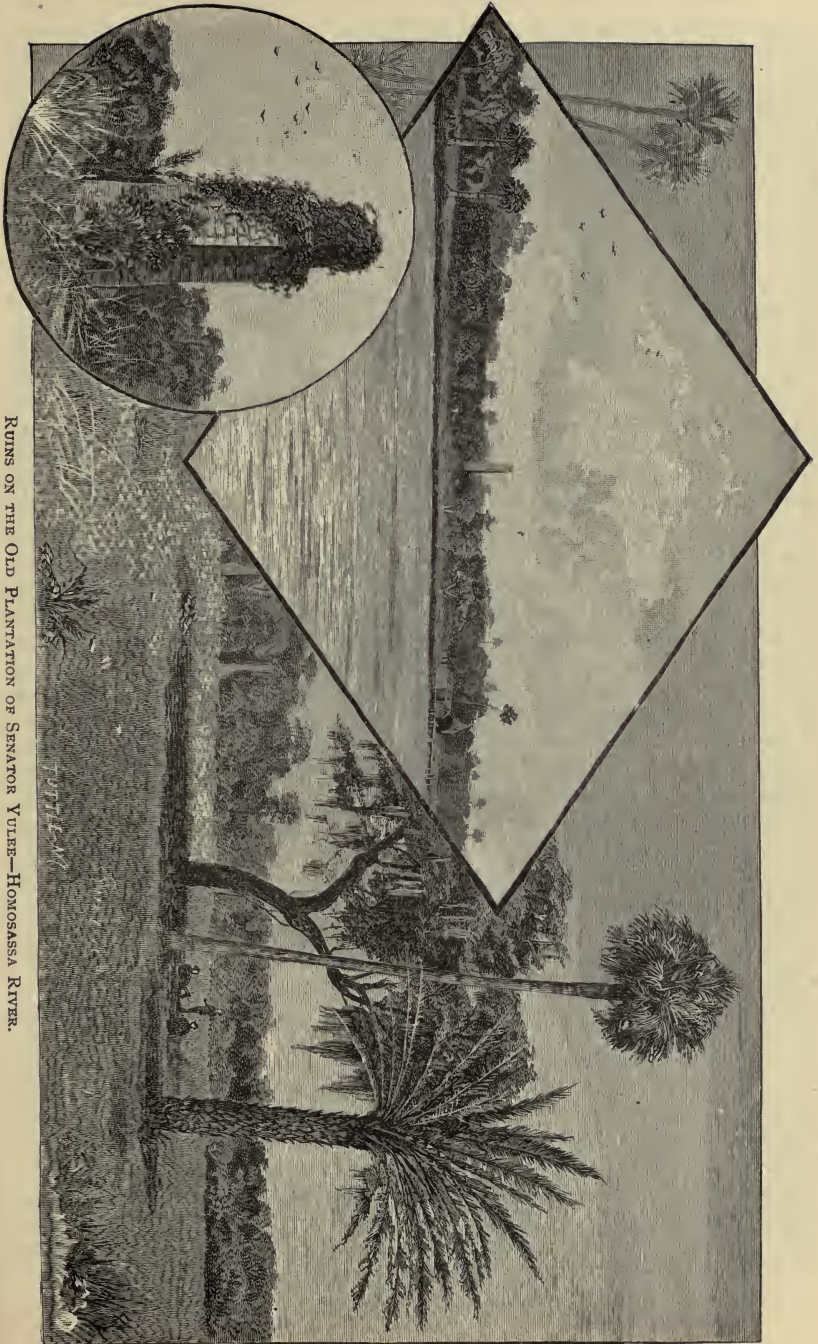
Still the native loveliness remains, and nature unconquerable rises in fresh magnificence upon the ruins of the old. The scars of fire and flame have healed upon the orange trees, or where they were struck down, vigorous shoots have sprung up from their roots; grand old fig trees and luscious lemons, bananas, guavas and other fruit-bearing shrubs, gorgeous cactus and agaves, clustering oleanders that are no longer shrubs but trees, make the thrice-ruined place still a home of beauty.

The soil of the Homosassa region is in striking contrast with that of most other portions of the State, and, indeed, quite remarkable. It is a rich loam, almost without sand, formed of decomposed vegetable matter from the luxuriant growth of centuries, mixed with disintegrated shell and lime. Beneath this is a sheet of level rock, which seems to be a conglomerate of the debris of coral and other marine shells, and still underneath this firm foundation are frequently found beds of marl. Upon this table-rock the soil lies some three feet thick a little remote from the river, but at its edge often not more than as many inches; in a few places, in fact, the rock is quite bare. The appearance to one looking for deep and fertile soils is somewhat disheartening, but these appearances are greatly corrected by experience. The rock is so porous that the roots of plants once started, go through it with ease, and from it draw the moisture which it retains like a sponge, and also other elements which contribute to the perfection of the plant. It is said that, in the old plantation times, the negroes employed in planting cane, upon coming to one of these bare-rock surfaces, would lay a joint down and run for a hoe-ful of earth to cover it. This was all that was needed. This joint would grow as luxuriantly as any of its fellows planted in deeper soil. This thin and rock-supported soil will also produce grasses of the sweetest and most succulent character, which is a circumstance quite different from the case of other more familiar Florida soils.

Back from the river, in the midst of the hammock lands, the soil is deeper by several feet, and, of course, adapted to a deeper culture, especially that of orange and lemon groves; but any of it, even the thinnest, is well suited for the smaller fruits, such as strawberries and pineapples, and many garden vegetables, as cabbages, melons, tomatoes, peas and beans, and other profitable crops.

On the river banks and islands below the old fields, the numerous shell mounds five to twenty feet deep afford inexhaustible fertility for every sort of agriculture, from the orange, lemon, fig, guava and banana to the finest small fruits of the garden.

As to the native woods, the characteristic ones are the palms, the bays, including the magnolia, which flourishes here to a wonderful degree; including also the red bay, a wood firm and fine of grain and susceptible of beautiful polish,



RUINS ON THE OLD PLANTATION OF SENATOR YULE—HOMOSASSA RIVER.

with a color between the cherry and the mahogany; the oaks of all species, the sweet gum and the fragrant red cedar. Not only do the cedar forests fill the air with their rich aroma, but the wood-piles in the door yards are positively attractive by reason of their fragrance. This is a luxury which even the poor man has. It will be observed that the pine and the cypress are absent, the sand for the one and the swamp for the other not being found near the banks of the Homosassa, but only at a distance of three to five miles.

As to the animal products of the woods and waters, nature as yet dominates. In the old fields and the surrounding hammocks, and on the palm-clad islands of the savannas, wild deer abound, and the wild turkey is an easy prize. Bears, too, are common, and the wild cat makes himself quite at home. The panther or tiger, or Florida lion, may sometimes be seen or heard, though seldom met. Coons and 'possums make sport for the sportsman who likes variety.

Many curious birds rarely found in other regions make their haunts among the untraversed woods and streams, while geese, brant and ducks in great flocks frequent the lower waters of the river and the lagoons and bayous near the coast.

Among the edible fish frequenting the river are the sheep's-head, mullet, sea trout, black bass, blue-fish, red and channel bass, skip-jack or silver fish, bream, roach, red snapper, catfish, sailor's choice, cavalla, white ray, pompano and tarpon. Of shell-fish there are crabs, and turtles in several varieties, and the salt bayous that lead into the river in its lower course are literally choked with oysters of the finest kind. There are also porpoise of three varieties, and some fish of not so agreeable form and habit, as the saw-fish, gar-fish, jew-fish, drum-fish, needle-fish, dog-fish and sting-ray. Alligators are seen occasionally in the lagoons, and sometimes by the river side where the banks are low. The famous gulf fisheries are not far off the Homosassa coast. These are of the mullet, the grouper, the red snapper and Spanish mackerel. There is no reason why the broad bays of the lower Homosassa should not be made a rendezvous of fishermen, and a station for curing and traffic in this line. The sponge fisheries, too, are a local industry of the gulf coast. The green turtle fishery also is rapidly attaining prominence, and the ports at which this traffic is carried on are on either side of the Homosassa—namely, at Cedar Keys and Key West. People are just beginning to realize what can be made of the oyster business in Florida. Their beds are innumerable all along the brackish lagoons and bayous of the lower Homosassa. Besides the immense traffic that might be carried on, almost every resident on the river could have his own oyster bed for his household supply.

But it is the climate, above all, which is the chief attraction at Homosassa. It compares favorably with St. Augustine, undoubtedly the favorite seaside resort of Florida, while it is free from the sudden damps and raw north winds which sometimes visit that charming place. Not only is the temperature here remarkably equable and free from extremes—the frost point being rarely touched in December, and the summer temperature seldom standing above 90°—but the atmosphere is, to a surprising degree, free from moisture. It may seem strange, but the relative humidity of this region of the gulf coast in winter compares favorably with that of the high altitudes recommended as health resorts in our Northwestern States. The almost total absence of the "Spanish moss" from the trees shows that there is some peculiarity in the atmospheric conditions here, as compared with that of very many favorite places in the interior and on the east coast; but from whatever combinations of the elements—of earth, waters, sea or air—it may have resulted, the fact is clear that the climate here is both delightful and salubrious. As to the other side of the picture—what are called the "outs" of the case—it is true that in the hammocks the mosquitoes and midges are very annoying in the rainy summer season; but they are not so troublesome by far,



THE LEANING PALMS ON OTTER CREEK.

either in their character or their numbers, as in similar situations on the east coast, and scarcely more so than in many famous places of resort in the North. The red-bug is the pest of the woods, but can easily be guarded against. From snakes and venomous insects this region seems to have peculiar exemption. Such few as there are here disappear at the first approach of cold, and do not emerge until hot weather comes on. They are rarely seen from October to May. It is in the summer season, of course, that one encounters the special ills of a semi-tropical climate. The gulf coast of Hernando has long been celebrated for its comparative healthfulness, and it is a familiar sight to find families from the interior camping for the summer on the banks and islands of the Homosassa. Still, it is undoubtedly true that the Northerner who becomes a permanent resident anywhere in South Florida should exercise much care at first if he would avoid a disagreeable initiation into so unaccustomed surroundings. But with anything like reasonable prudence, a smiling earth, comfortable temperature, bright sun and pure air, inviting to a life out of doors all the year round, cannot fail to furnish good assurance of health.

The exceptional attractions of this region have induced a number of gentlemen, representing all sections of the country, to unite their efforts to open these rich resources to their appropriate uses. They have purchased some ten or twelve thousand acres of choice and selected lands along the whole course of the Homosassa River, including all the Yulee estate, and they are now expending large sums in improving these natural advantages, so as to make them available for visitors or settlers. A careful topographical survey has been made, the lands lotted and mapped, avenues and parks laid out, and works are now going on to bring to the best effect every natural point of interest or advantage. The proprietors will invite gentlemen to erect villas along the picturesque banks of the river; they will provide steam launches and pleasure boats, and open shady walks and drives paved with white shells from the gulf beaches, leading to the points of most interest and beauty; they will reserve for the present the beautiful Iathloe Island, for the purpose of making it a tropical garden, where the flowers and fruit-bearing trees and rarest vines and shrubs of the gulf coasts will be gathered as a type of that Mediterranean loveliness. The fertile lands most suited for general agriculture will be opened to settlers at prices that will be within the means of all. The abundance of valuable woods, such as the live oak, magnolia, red bay, red cedar and palmetto, will invite to profitable industries in wood-working, such as fine finish for houses, boat building, cabinet and furniture making, &c. There is also demand even now for workmen at various trades, such as coopers, wheelwrights, blacksmiths and carpenters. There are many situations here peculiarly suited to the cultivation of the lemon, the guava, the pineapple and other very profitable fruits. Horticulture in Florida is in its infancy. The capabilities of such soil and climate as characterize the Homosassa region can only be dreamed of by one accustomed to other climes who sees how prodigal nature is of her returns for such rude attentions as are paid to her here. This gulf coast is destined to be the early garden of the United States.

The means of communication and transportation which have so long been desired are now about to be made ample. The old familiar route from Cedar Keys by the gulf and river will be reopened. The Silver Springs, Ocala and Gulf Railroad is vigorously advancing by way of Blue Spring and Crystal River, and it is believed will reach Homosassa in the course of the winter of 1885-86. The Florida Southern Railroad is already at Brooksville, on the southern side of Homosassa, about 20 miles away, and the project is now under consideration of bringing it through to the river this winter. Meantime, a comfortable stage line will be run from Brooksville to Homosassa, connecting with the trains of the

Florida Southern, and it is quite probable that another line will run between Homosassa and Blue Spring, on the north.

In anticipation of these openings, a hotel, with the best of accommodations, is to be erected by the Homosassa Company in season for the visitors who will seek this favorable opportunity for recreation, investment or permanent settlement. Indeed, the numerous applications on all these scores already received abundantly ensure the success of this enterprise.

# ALABAMA.

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This State has been brought into very prominent notice by its enormous coal and iron-ore deposits, and is receiving the attention of manufacturers and investors probably to a greater extent than any other Southern State.

Alabama is situated between the 85th and 89th degrees of west longitude, and the 31st and 35th parallels of north latitude. The total area is estimated to be 52,250 square miles, and the total land surface 51,540 square miles. The population of the State, according to the census of 1880, was 1,262,344, of which 661,986 were white and 600,358 colored; 1,252,694 native born and 9,650 foreign.

In the general description of the State I have drawn largely upon the Report of the Tenth Census.

**SURFACE CONTOUR.**—Leaving out of account the minor irregularities, the surface of the State may be considered as an undulating plain, whose mean elevation above sea-level cannot be much less than 600 feet. Toward the north and east the surface rises above this level, and toward the south and west it sinks below it. The arc of a circle, with Chattanooga as a center, described from the northwestern corner of the State around to the Chattahoochee River at Columbus, would include the area whose general elevation is above 600 feet. The axis of this elevation, which is the southern terminus of the great Apalachian mountain chain, runs northeast and southwest, and the altitude increases toward the northeast. There is thus a general slope away from this elevated region toward all points of the compass from southeast around to northwest. The mountains of the State rest upon this high land, and often reach an elevation above it of 1,200 or 1,500 feet, or above sea-level of 2,000 or 2,500 feet.

The rest of the State outside of the area above mentioned, and whose general altitude is less than 600 feet, has a slope south and southwest toward the Gulf of Mexico and the Mississippi Valley. Along this slope the streams have excavated their channels and produced the various topographical features, none of which are due to elevation above the general surface.

**RIVER SYSTEMS.**—There are, in the most general terms, two things which have determined the drainage system of Alabama. These are, first, the slopes toward the northwest and the southeast, away from the axis of elevation above spoken of; and, second, the more general slope of the surface of the State, taken as a whole, southwest toward the axis of the Mississippi Valley. An inspection of the map will show that the latter cause has greatly outweighed the former in fixing the direction of the watercourses, with the result of giving a general southwest direction to the whole drainage system of the State, with the single exception of that of the Tennessee River. In the northeastern part of the State the northeast and southwest direction of the valleys and ridges has also been largely instrumental in turning southwestward (down the valleys) the waters whose natural fall is southeastward at right angles to the axis of elevation of this mountainous region.



*Tennessee River.*—Looking beyond the limits of the State northeastwardly, we find the Blue Ridge, of which the elevated country in Alabama is but a part, acting as a water-shed between the Atlantic Ocean and the Gulf of Mexico. The drainage slopes are therefore toward the northwest and the southeast. At the northwestern foot of this water-shed, in North Carolina, are the headwaters of the Tennessee River. Its natural northwesterly flow is interfered with by the topographical features of the country, the most formidable of which, according to Professor Safford, is the great Cumberland table-land. Parallel with this the river flows through a large part of Tennessee, and, cutting through a detached part of the Cumberland range at Chattanooga, enters the Sequatchie Valley, which it follows to Guntersville, in Alabama, where it cuts through the rest of the Cumberland range, and flows thence down the northwesterly slope to its confluence with the Mississippi River. The Tennessee is thus exceptional among the rivers of Alabama.

*The Chattahoochee.*—This is a boundary stream, and is but slightly related to Alabama, as its headwaters are principally in Georgia. Its tributary streams on the Alabama side are mostly short and insignificant.

*The Tallapoosa, Coosa, Alabama, Warrior and Lower Tombigbee Rivers* have many things in common. They all have their headwaters in the elevated region above alluded to, and all flow south and southwest into the Gulf of Mexico. In their upper parts, with the exception of the Tombigbee, their flow is alternately southwest down one of the valleys spoken of, and then south across a ridge to resume their southwestern courses. Where they leave that elevated region (which is in general formed of the tough and hard rocks of the older formations) and pass into the territory formed by the newer and softer rocks, there appear the cascades which form the first obstructions to navigation. These falls or rapids are seen at Columbus (Georgia), Tallahassee, Wetumpka, Centerville, Tuscaloosa and Muscle Shoals, on the principal rivers, and at corresponding localities on the smaller streams.

The Coosa River, from Romè, Georgia, down to Greensport, Alabama, flows in general along the strike of the rocks, and has no serious obstructions. Below Greensport it turns across these rocks, and rapids are formed, which alternate with stretches of open, smooth waters down to Wetumpka, where the last falls are situated. This river has thus two navigable sections separated by nearly 200 miles of alternating cascades and pools. None of the other rivers in this part of the State are navigable above the lower falls.

*The Choctawhatchie and Concuah Rivers*, with their tributaries, Pea River, Patsaliga, Sepulga, etc., are all turned southward by a prominent topographical feature known as Chunnenuzza Ridge, which divides the waters flowing northward into the Tallapoosa and Alabama Rivers from those flowing southward by various channels into the Gulf. It will be seen that their general direction is west of south, as determined by the general slope of the lower portion of the State.

**MOUNTAINS AND TABLE-LANDS.**—The mountainous region of the State is confined to the northeastern quarter, as before defined, and the higher portions lie in the eastern half of this area. The Valley of the Coosa, from the State line down to the southern line of Shelby and Talladega Counties, divides this region into parts which have very different characters. Southeast of this Valley are some of the highest lands of the State, and the height of the mountains decreases, as a rule, going southeast. In all this region the summits of the mountains are irregular, and sometimes sharp crested, from the outcropping edges of the generally highly-inclined strata. Northwest of the Coosa Valley the mountains are generally level on top, forming table-lands 10 to 15 miles broad, separated by long and narrow valleys. Beyond the Tennessee River these table-lands are cut by

erosion into a number of detached peaks, each with a level or nearly level top. These peaks overlook the valleys in steep escarpments which, especially in the northeast, often attain truly mountainous proportions.

In the lower part of the State there are no elevations which at all deserve the name of mountains, and the highest hills of this region are due solely to erosion—the wasting of the softer rocks by the action of water.

**VALLEYS.**—Many of the valleys of the elevated region show a close dependence upon the geological structure; and while they are all due to erosion, their position has been in most cases, if not in all, determined by the relative positions of the outcropping edges of the strata of different degrees of hardness.

All the valleys in the mountainous region of the State, like the mountain ranges themselves, have a northeast and southwest direction. The most important of these valleys in many respects is that of the Coosa, which is the southern end of a series of valleys extending from New York to Alabama, and known in New York as the Valley of the Hudson, in Pennsylvania as the Kittatinny or Cumberland Valley, in Virginia as the Great Valley, in Tennessee as the Valley of East Tennessee, and in Alabama, as we have just seen, as the Coosa Valley. The several outliers of this valley, which separate the parts of the table-lands and coal-fields, belong to the same general system.

The sandstones which form the capping of the mountain plateaus rest upon softer strata of shales and limestones, and the dip of all the strata is at a gentle angle toward the south or southwest, while the river cuts across at nearly right angles. These are the conditions under which escarpments are formed, such as make the southern border of the Tennessee Valley across the State.

In the lower part of the State, the valleys, like the hills, have very little relation to the geological structure, except in the case of the Prairie Region, which may be considered as a wide valley, since it is many feet below the hills that border it on the north and south.

**CLIMATE.**—The most potent influences which determine climate are latitude or distance from the equator, elevation above tide and configuration of mountain chains, proximity to the sea and the direction of the prevailing winds. In all these particulars the position of Alabama is favorable for a temperate and uniform climate. The geographical position and the mean elevation of the State have already been subjects of discussion.

*Winds.*—The prevailing winds during the autumn and winter months are from the northeast and northwest; during the spring and summer, from the southeast; and for the whole year, from the southeast and south, but the yearly mean directions are nearly evenly balanced.

*Temperature.*—Extremes of temperature are comparatively rare, and the extremes of heat during the summer months are especially moderated by the tempering winds from the Gulf of Mexico. In those parts of the State most remote from the gulf, their elevation above sea-level secures immunity from excessive heat. The mean annual temperature of the State is about 64.58° F. The means for the seasons are as follows: Spring, 63.9°; summer, 79.5°; autumn, 64.5°; winter, 50.4°. The maxima and minima of temperature fall, almost without exception, in the months of July and January, respectively.

In the lower part of the State, below the latitude of Montgomery, the mean temperature for the winter and for the year are nearly normal—that is, the lines of equal temperature run across the State from east to west, approximately parallel to the lines of latitude, the temperature depending thus almost exclusively upon the latitude. Above Montgomery, however, two things interfere with this regularity, viz: 1. The cooling influence of the mountains, which has the effect of deflecting the isothermals southward. 2. The heating influence of wide

river valleys like those of the Coosa, Warrior and Tennessee, that are sunk in these highlands. By this cause these lines are carried northward of their normal position.

With these general principles in view, the distribution of the temperature will be readily understood.

The line of mean annual temperature of 68° F. crosses the State just south of Mobile; that of 64° just above Montgomery, curving, however, southward from Montgomery to Eufaula. The line of 60° follows approximately the curve spoken of as running from Columbus, Georgia, around to the northwestern corner of the State—that is, it follows the borders of the elevated or mountainous region, being, however, carried northward by the Coosa and the Warrior Rivers, and eastward by the Tennessee. The line of 56° is confined to the northeastern corner of the State, but is brought far to the south by the mountain plateau lying between the Coosa and the Tennessee Rivers.

The case is similar with the lines of equal temperature for the winter. That of 52° runs nearly parallel with the 31st degree of latitude; that of 48° has its normal course through Selma and Montgomery, but is carried by the Coosa River as high up as the crossing of the Selma, Rome and Dalton Railroad at Coosa Bridge; and that of 44° follows the margin of the mountainous region, except where it is carried by the Coosa River above Talladega, and by the Tennessee River eastward nearly to Decatur. The line of 40° includes only the northeastern corner of the State, to which it is crowded by the Coosa and the Tennessee Rivers.

The lines of equal temperature for the summer show much greater irregularity, caused apparently by the preponderating influence of the river valleys. Thus the line of 80° runs diagonally from Tallahassee, in Florida, up to Tuscaloosa, by reason of the Alabama, Tombigbee and Warrior Rivers. The line of 78° curves, like some of those above mentioned, around the border of the mountainous region, being considerably indented by the Coosa and Warrior Rivers, while it follows the valley of the Tennessee River through the whole of Northern Alabama into the State of Tennessee beyond Chattanooga.

In the latitude of Montgomery the last frost occurs, as a rule, between the 5th and the 25th of April, and where the last frost is recorded in March the records show that its actual formation in April was prevented by unfavorable conditions, such as cloudy weather or brisk winds. The first frosts occur usually between the 10th and the 25th of October. When the first frost falls in November, the records always show that some time in October the temperature was sufficiently low for frost, the actual formation of which was prevented by the unfavorable conditions above mentioned.

The influence of topography upon the formation of frost is clearly seen in those parts of the State where the variations in level are considerable; for though both the mountains and the valleys are exposed to the same conditions, and radiation from each goes on at the same rate, the effects of the radiation will be felt in different degrees. As the air is cooled it becomes more dense, and in consequence flows down the slopes to the lower levels, where it accumulates. The elevated lands are thus never exposed to the full intensity of frosts, for their position affords a ready way for the escape of the cooled air, which flows down the slopes as fast as formed, and the reduction of temperature is in this way greatly retarded.

On the other hand, the valleys and lowlands not only retain all the cold air caused by their own radiation, but serve also as reservoirs for the cold air descending from the adjoining heights. The conditions for frost formation are thus greatly increased, and in a degree are proportional to the narrowness of the valley and the height of the adjacent hills.

*Rainfall.*—The supply of moisture for the rainfall of the Southern States comes mainly from the Gulf of Mexico, the densest annual precipitation of 60

inches and upward being over the region of the delta of the Mississippi River and along the coasts of Louisiana, Mississippi, Alabama and Western Florida. An area of heavy annual rainfall, 50 inches and upward, spreads thence, with gradually diminishing amount, northeastward, including Louisiana, Southwestern Arkansas, Western Tennessee, the whole of Mississippi and Alabama, Northwestern Georgia, and parts of Middle, Western and Southern Florida. Along the eastern coasts of Florida, Georgia, and South and North Carolina the influence of the Atlantic Ocean is seen in the heavy precipitate of from 55 to 60 inches which falls there.

The distribution of the rainfall in Alabama for the year, and for the winter and summer seasons, is about as follows:

An annual precipitate of 56 inches and upward falls within a belt narrowest in the middle and widening out at both ends, and crossing the State diagonally from the southwestern to the northeastern corner. In the lower part of this belt an area including Mobile and Baldwin and parts of Washington, Clarke, Monroe, Wilcox, Dallas, Lowndes, Butler, Conecuh and Escambia Counties receives an annual rainfall of 62 inches and upward, reaching a maximum of 64 inches at Mount Vernon. In the extreme northwestern corner of the State is another small area whose annual rainfall is above 56 inches. Between these two areas the rainfall is less, falling below 50 inches in the central part. Eastward of the main belt the amount of annual rainfall decreases, being between 44 and 56 inches over the southeastern part of the State, except in two small areas in Lee and Chambers and in Henry Counties, where it ranges between 40 and 44 inches.

During the winter months (December, January and February) we find the area of maximum rainfall running along the western border of the State within 30 miles of the Mississippi line, except where a branch is thrown off, including parts of Dallas, Wilcox, Lowndes, Montgomery, Butler, Crenshaw, Pike and Bullock Counties, and another deflection toward the east in the Tennessee Valley, including parts of Lawrence, Limestone and Madison Counties. Over the rest of the State the winter rainfall is between 12 and 16 inches, except in a small area in the western part of Sumter County and a strip along the eastern border of the State below Chambers County, including parts of Chambers, Lee, Macon, Bullock, Barbour, Dale, Geneva, and all of Henry and Russell Counties, where it falls below 12 inches.

During the summer months (June, July and August) the greatest amount of rain falls south of a line running from the southwestern part of Choctaw County to the upper line of Dallas, and thence southeastward to the southeastern corner of the State, in Henry County. Within the area thus outlined the rainfall is 14 inches and upward, increasing to 18 inches and more in Mobile, Baldwin, Washington, Clarke, Monroe, Butler, Conecuh, Escambia and Covington Counties.

North of the Tennessee River, in Lauderdale, Limestone, Madison and Jackson Counties, we find another area of large summer rainfall, 14 inches and upward, and between the two, over perhaps two-thirds of the State, the summer rainfall falls below 14 inches.

In the meteorological region of which Alabama forms a part there are commonly observed two maxima of precipitation, the principal one about the end of July, the secondary one early in December; also a principal minimum early in October, and a secondary one toward the end of April. The range in Alabama, however, is moderate, and the distribution tolerably uniform throughout the year, as may be seen from the following statement:

The average rainfall of the State is 55.04 inches, and of this 13.86 inches fall during the spring months, 14.07 during the summer, 10.74 during the autumn, and 16.37 during the winter.

The records kept at Montgomery show that no periods of wet weather extend over five days, and that when the periods are long heavy rainfalls are exceptional. During the months of March, April and May thunder-storms are not unusual, and the quantity of rain which then falls is sometimes great. These storms come mostly from westerly directions, from southwest around to northwest, but most often from the southwest. The strong winds with which they are usually accompanied, sometimes reach the force of hurricanes or tornadoes, which sweep over the country in a narrow track, usually of less than a mile in width. The tornadoes come almost without exception from the southwest, the wind having a gyratory motion, as is shown by the positions of the prostrated trees.

Snow falls occasionally in the months of January and February. In the lower counties of the State it is extremely rare, but northward there is usually at least one considerable snowfall during the winter.

For convenience of description the State may be divided into three sections—Northern, Middle and Southern, differing in their main characteristics.

The Middle Division, having an area of about 10,000 square miles, embraces the following counties and parts of counties: All of Cleburne, Calhoun, Saint Clair, Shelby, Talladega, Clay, Randolph, Chambers and Coosa, narrow belts through Jackson, Marshall, De Kalb and Blount, southern Cherokee, most of Etowah, southeastern Jefferson, a small strip along the southeastern edge of Tuscaloosa, northern Bibb, eastern half of Chilton, southern Elmore, Tallapoosa and Lee.

The Northern Division adjoins the Middle Division on the northwest. Its area is about 9,700 square miles, and embraces the following counties and parts of counties: All of Lawrence, Winston, Walker, Cullman, Morgan, Limestone and Madison, and parts of De Kalb, Cherokee, Etowah, Jackson, Marshall, Blount, Jefferson, Tuscaloosa, Fayette, Marion, Franklin, Colbert and Lauderdale.

The Southern Division includes all that part of the State south and west of the limits of the Middle and Northern Divisions, and has an area of about 32,000 square miles. It embraces the counties of Pickens, Greene, Hale, Sumter, Choctaw, Marengo, Dallas, Perry, Autauga, Lowndes, Montgomery, Macon, Bullock, Russell, Barbour, Pike, Crenshaw, Butler, Wilcox, Monroe, Clarke, Washington, Mobile, Baldwin, Escambia, Conecuh, Covington, Geneva, Coffee, Dale and Henry, as well as the whole or parts of Lauderdale, Colbert, Franklin, Marion, Lamar, Fayette, Tuscaloosa, Bibb, Chilton, Elmore, Tallapoosa and Lee.

## GEOLOGICAL AND TOPOGRAPHICAL FEATURES.

MIDDLE DIVISION.—1. *The Metamorphic Region*, a part of the great Appalachian chain, including some of the most elevated land in the State in the counties of Cleburne, Randolph, Chambers, Lee, Macon, Tallapoosa, Clay, Coosa, Elmore and Chilton, and comprising an area of 4,425 square miles. The rocks of this region are the altered and crystalized sediments either of Silurian or preceding ages, and exhibit the greatest diversity, both in their chemical composition, in their physical characters, and in the nature of the topography and the soils to which they give rise. There are all gradations between the hard, almost indestructible quartzites to the easily-eroded marble; from the warm, fertile, and undulating granitic and gneissic land to the much broken, often sterile tracts formed by mica slates and other highly siliceous rocks. With the varying composition of the rocks come varying degrees of resistance to decay and eroism, and hence the great variety in the scenery of this region, where high and almost mountainous ridges alternate with rolling and sometimes rugged lowlands and valleys. In some parts the strata have undergone complete disintegration in place

and have been converted into great masses of stratified clays, interlaminated with seams of quartz, which, gradually broken down, cover the ground with their angular fragments.

2. *The Coosa Valley Region and its Outliers.*—The wide valley, with prevailing calcareous rocks, which lies between the metamorphic area on the one hand and the southeastern edges of the Coosa and Cahaba coal-fields and Lookout mountain on the other has received the name above given from the Coosa River, which traverses its whole length. Geologically it is the continuation of the valley of eastern Tennessee; and, indeed, the valley of which this is a part, and which has been described by Professor Safford as a complex trough fluted with scores of smaller valleys and ridges, extends at least from the Susquehanna River to middle Alabama.

The main valley of the Coosa, with the limits above given, is from 15 to 20 or 30 miles wide, and is closely furrowed with parallel valleys and ridges, all trending northeast and southwest. This valley is embraced in the counties of Cherokee, Cleburne, Calhoun, Etowah, Saint Clair, Talladega, Shelby, Coosa and Chilton, and has an area, including its ridge lands, of 2,580 square miles. Several outlying valleys, with very similar geological structure and soil varieties, may be most conveniently described in connection with it.

These outliers are: 1. The Cahaba Valley, lying between the Coosa and Cahaba coal-fields, in the counties of Saint Clair, Jefferson, Shelby and Bibb, its area being 385 square miles. 2. Roup's and Jones' Valley, between the Cahaba and Warrior coal-fields, in Jefferson, Tuscaloosa and Bibb Counties; area, 285 square miles. 3. Willis' Valley, between Lookout and Sand Mountains, in De Kalb, Etowah and Saint Clair Counties; area, 460 square miles. 4. Murphree's Valley, in Etowah and Blount Counties; area, 110 square miles. 5. The Blount springs, or Brown's Valley, which is a prolongation into Alabama of the Sequatchie Valley of Tennessee, and runs through Jackson, Marshall and Blount Counties, having an area of about 460 square miles.

The strata which appear at the surface and contribute to the formation of the soils in all these valleys are the representatives of all the geological formations occurring in Alabama, from the primordial or lowest division of the Lower Silurian up to the base of the Coal Measures. In the following statement is given, in descending order, the names and geological positions of these strata, so far as their equivalence has been made out:

Carboniferous.....	7. Coal Measures of the Warrior, Cahaba and Coosa fields.
Sub-Carboniferous....	{ 6. Upper, Calcareous, mountain limestone.
	{ 5. Lower Siliceous, siliceous group.
Devonian.....	4. Black Shale.
Upper Silurian.....	3. Clinton or Red Mountain group.
	{ 2. Trenton and Chazy, shales and limestone.
Lower Silurian.....	{ 1. Calciferous and Potsdam. {
	{ e. Dolomite or magnesian limestone.
	{ d. Shale (calcareous shales.
	{ c. Upper sandstone (calcareous sandstone.)
	{ b. Potsdam sandstone proper.
	{ a. Semi-metamorphic shales and conglomerates.

**NORTHERN DIVISION.**—1. *The Coal Measures Region*, including (a) The Coosa field, which embraces about 30 square miles in the northwestern part of Calhoun, about 150 square miles in Saint Clair, and about 235 square miles in Shelby County, making an aggregate of 415 square miles; the Cahaba field, which includes about 50 square miles in Saint Clair, 100 in Jefferson, 160 in Shelby, and 125 in Bibb County, aggregating 435 square miles. In both these fields the strata, consisting of sandstones, conglomerates, shales, and coal beds, are tilted at considerable angles, and possessing varying degrees of resistance of disintegration and erosion, have been very unequally degraded. The main ridges and valleys have the general direction of northeast and southwest, corresponding to the outcrops

of the tilted strata; but this uniformity is often greatly obscured, and in places is obliterated by the irregularities produced by the streams which traverse the fields across the outcrops. In the presence of these inequalities, produced by the folding or the tilting of the strata, these fields differ from the great Warrior field, where the topographical features have no such direct connection with the geological structure. It seems to be well established that the three coal-fields of Alabama were once continuous, and that they have been separated by folds (since denuded) and by faults. (b.) The Warrior Field, the name given to that part of the Coal Measures of Alabama which is drained by both forks of the Warrior River and their tributaries. This field may be divided into two parts: the plateau or table-land, and the Warrior basin proper.

The Table-land.—It is characteristic of the table-lands or plateaus that the limestone beds, which underlie the capping of Coal Measures rocks, are above the general drainage level of the country. This arrangement of the two classes of strata determines in great measure the character of the scenery, for the removal by erosion of the more perishable limestones causes the undermining of the harder sandstones above, which from time to time break off with vertical faces, forming cliffs. In height the plateaus diminish continuously toward the southwest, passing gradually into the Warrior basin. In the State of Tennessee their elevation above the surrounding country varies from 850 to 1,000 feet. In Jackson and Madison Counties some of the spurs attain an equal height, but further southwest, in Morgan and Marshall, the elevation will not average more than 550, and in Cullman and Blount Counties not more than 360 feet, and near the Mississippi line they come down to the drainage level. The main body of the table-land is known as Sand Mountain, lying between the Sequatchie fold, or Brown's and Tennessee Valleys, on the northwest, and Wills' and Murphree's Valleys on the southeast, and include parts of De Kalb, Jackson, Marshall and Blount Counties. The highest parts of this table-land are to be found along its edges overlooking the valleys above mentioned, and there is a general slope both ways toward the center of the plateau, which thus becomes a shallow, elevated trough.

Beyond Wills' Valley is Lookout Mountain, an outlier of Sand Mountain, and beyond Murphree's Valley (southeast) Blount Mountain, a spur of the main table-land. All these parts have similar structure, and their elevated rims, adjoining the valleys, are usually only slightly indented by the watercourses, except where some large stream leaves the plateau, as in the cases of Little River, on Lookout, and Short Creek, on Sand Mountain. Northwest of the Tennessee River, however, the tributaries of that stream have cut the elevated lands belonging to this division into a number of more or less isolated peaks, some of which, especially in the northeastern part of the State, have still the capping of Coal Measures, which have been entirely removed from many of those lying farthest toward the west. Overlooking the Tennessee Valley, in Lawrence and Franklin Counties, the elevated rim, which is locally called Sand Mountain, is the border of the Warrior basin, and will be considered along with it.

Approximately, the area of the elevated lands or plateaus as above limited would be about 1,690 square miles on Sand Mountain and its spur in Jackson, De Kalb, Marshall, Etowah, Morgan, Saint Clair and Blount Counties, about 290 square miles on Lookout Mountain, in De Kalb, Cherokee and Etowah, about 580 square miles in the detached spurs of the Cumberland northwest of the Tennessee, in Jackson, Madison and Marshall, and to these might be added about half the area of Cullman County, whose measures partake of the characters of both the table-lands and of the basin, about 295 square miles; aggregating in all 2,855 square miles. A not inconsiderable part of this area north of Tennessee is mountain slope, and is not strictly table-land.

The Warrior Basin.—This, like the table-land, is in general a trough, shallow and sloping from northeast to southwest, with slightly elevated rims next to the Tennessee Valley on the north and Jones' Valley on the south. As Brown's Valley divides the plateau, so its continuation southwestward as a ridge divides the basin into two unequal parts. Southwest of the confluence of the two Warriors these two parts seem to come together in one common basin by the sinking away of the ridge which separates them higher up.

The Warrior basin includes all of Walker and Winston and parts of Cullman, Morgan, Lawrence, Franklin, Marion, Lamar, Fayette, Tuscaloosa and Jefferson Counties, and will aggregate about 4,955 square miles. The whole area of the Warrior field is thus estimated at about 7,810 square miles. The surface of the elevated border lands here included is comparatively level, though sufficiently undulating, and in places the streams have cut deep gorges into the hard sandstones and conglomerates. In the basin there is much more inequality of surface, and in the vicinity of streams the country is often extremely rough, although the water-sheds are seldom more than 250 or 300 feet above the general level of the streams. Along the edges of both table-land and basin the higher rims are parts of folds of the strata, and are of sufficient height to determine the direction of the water-courses, and hence the nature of the topography. In the basin there are numerous undulations of the strata, but they are rarely of sufficient importance to affect the topography.

2. *The Tennessee Valley Region.*—Under this head are included not only the immediate valley of the Tennessee River, but also the whole region in Alabama drained by its tributaries, except the anticlinal valley, down which the river flows in Jackson County, and the table-lands of De Kalb, the Cumberland spurs in Jackson, Madison and Marshall, already described, and the drift-belt in Franklin, Colbert and Lauderdale Counties. With these limits, therefore, this region will embrace an area on both sides of the Tennessee extending from the State line on the north to the Coal Measures of the Warrior field on the south. The average width of this drainage area from north to south is about 45 miles, and includes parts of Jackson, Marshall, Morgan, Lawrence, Franklin, Colbert and Lauderdale, and all of Limestone and part of Madison Counties, aggregating 4,530 square miles.

The general features of this region are those of a plain 12 to 15 miles wide, the Tennessee Valley proper, through which the river flows on in its tortuous path, the valley being bounded both on the north and on the south by hilly, and in some places almost mountainous country, and the hills and the valley belonging to the same geological age, the configuration of the whole area being the result of erosion during long geographical periods by waters whose present representatives are the Tennessee and its tributaries.

The average elevation of the summits, which represent approximately the general level of the original land surface, is in the eastern part of this region about 2,000 feet above the sea, and there is a gradual slope westward, so that the summits near the Mississippi line are not more than 900 or 1,000 feet above sea-level. The general surface of the lowlands exhibits a similar slope, the elevation at Huntsville being 612 feet, at Courtland 560 feet, and at Dickson 488 feet. The hilly country in the northern part of this area is known as the Barrens, and is a part of the great highland rim of Tennessee.

South of the Barrens lies the valley proper of the Tennessee. The surface is almost level, the uniformity broken here and there by slight elevations, generally covered with trees made up of fragments of chert. Throughout the whole area sink-holes and caves are common and almost characteristic.

The southern border of the valley is made by the escarpment of the Warrior coal-field, Sand Mountain, as it is usually called, rising above the valley to a height



which will average, perhaps, 600 or 700 feet. Along the northern face of this escarpment, about half way, is a terrace or bench, which in the eastern part of Morgan County is very narrow, but widens going westward, and a considerable depression is formed between it and Sand Mountain. In Lawrence and Franklin Counties this depression is deepened into a valley with calcareous soils (Moulton and Russell's Valleys,) and the bench, now completely separated from Sand Mountain, forms a very conspicuous feature of the landscape, known as the Little Mountain range. These valleys have the same general characters as the Tennessee Valley, and are partly based on the same rocks. The Little Mountain range terminates toward the north with rather bold escarpments, but slopes more gently southward.

The three divisions of the Tennessee drainage area in northern Alabama are the Barrens, the valley lands, and the Little Mountain range, and they divide the surface about as follows: Barrens, 910 square miles; valley lands, 2,430 square miles; and Little Mountain range, 540 square miles.

Leaving out of consideration the mountain spurs of the Cumberland range in Jackson and Madison, the anticlinal fold of the Sequatchie in Jackson, and the drift in Lauderdale, Colbert and Franklin, the surface rocks to which the soils of the Tennessee Valley owe their origin belong to a single formation, the sub-carboniferous, the subdivisions of which, as adopted by the State Geological Survey, are as follows: Upper: calcareous—mountain limestone, or Chester; lower: Siliceous—Saint Louis limestone and Keokuk.

In addition to the above, the strata of the Devonian and the Upper Silurian formations are exposed along certain creeks in the northern part of this region, but their superficial extent is small, and their part in the formation of the soils insignificant.

**SOUTHERN DIVISION.**—The cretaceous and tertiary rocks which underlie this whole division are approximately horizontal in stratification, but have a slight dip toward the south and southwest. With the exception of part of the prairies, the whole area is covered with beds of drifted material which have been deposited upon an eroded surface of the older rocks. The drift-beds are, as a rule, very irregularly stratified.

It may thus be inferred that the minor details of surface configuration and the soils are, to a certain extent, independent of the underlying older rocks, and are in great measure determined by these drifted materials. In these respects this division differs from the two preceding ones. But while it depends to so great an extent for its soils and topography upon a single formation, there is not in these the great monotony that might be looked for on this account. The drift itself is composed of materials which offer varying degrees of resistance to denudation, and considerable inequalities of surface result from this circumstance. In addition to this, the older rocks had been greatly eroded before they were covered by the drift, so that the general contour of the country, as well as many of the most prominent topographical features in this division, are quite independent of the superficial drift-coating which determines so many of the minor details.

The low trough of the Prairie Region, the rugged hills of the buhr-stone and the gently undulating surface of the Southern Pine Belt were features of the landscape before the deposition of the drift; and similarly with the soils the drift itself yields a number of varieties, which are still further increased by the modifications brought about by their intermixture with the disintegrated portions of the underlying country rocks. These rocks are referred to two principal formations, the cretaceous and the tertiary.

Taken as a whole, the surface of the Southern Division has a general slope from the margin of the two divisions just described, outward—*i. e.*, west and

south toward the Mississippi basin and the Gulf of Mexico. This general slope is interrupted by the trough of the Central Prairie Region, which is depressed many feet below the general level both north and south of it, and also on a limited scale by the trough of the flatwoods. South of the Prairie Belt there is a line of rocky hills made by the hard sandstones and claystones of the lower part of the tertiary formation, beyond which, toward the south, the country falls away very gradually and uniformly to the coast.

#### AGRICULTURAL FEATURES.

So much has been said about Alabama as an iron and coal-producing State, that its agricultural interests have, in a measure, been lost sight of. The State possesses many attractions for the farmer and stock-raiser. The soil is, of course, like that of all other sections, diversified. There are mountain ridges of sandy, flinty land useless for cultivation, but the land in the main will compare favorably with that of any other State, and in some sections the soil is remarkably productive. The lands are cheap, but are increasing in value. The rapid development of the industrial interests of the State, and the increase in the manufacturing population, furnish a growing market for agricultural products. The furnishing of farm supplies to the new manufacturing towns, such as Anniston, Birmingham and others, offers an inviting field to the agriculturist. Cotton is a staple crop. The State in 1880 was fourth in the list of Cotton States, producing 699,654 bales. Corn, wheat, oats, rye, etc., are raised, and are receiving more attention than formerly. A surprising increase has been made in the last few years in the quantity of oats raised. According to the statistics of the United States Agricultural Department, there were raised in Alabama in 1875 840,000 bushels of oats, while in 1884 the yield reached 5,015,000 bushels. The yield of corn in 1875 was 24,500,000 bushels, and in 1884 30,197,000—an increase of nearly 25 per cent. There are areas of splendid grass-producing lands, and in common with other Southern States, Alabama is beginning to give attention to this important interest. The following from "A Physical Survey of Georgia, Alabama and Mississippi," by Messrs. Campbell & Ruffner, will be of interest:

"The usual standard authorities deny the practicability of establishing a permanent dense sod in the Southern States, except in rare spots where the ground is moist and shaded. Mr. C. L. Flint goes so far as to doubt the practicability of forming a close turf south of the latitude of Baltimore, forgetting Kentucky and the Valley of Virginia, where there are areas of sod equal to the best in England. We also found at Greenville, Winona, Starkeville and other points in Mississippi a grass sod which, for density and freedom from foreign growth, we have never seen surpassed. At all these places Bermuda grass constituted the principal sod. The point to be regarded in the South is the selection of grasses adapted to that section, not to States farther north. Mr. Charles Mohr, of Mobile, a most competent observer, publishes the statement that he has himself collected in South and Middle Alabama 132 species, belonging to 53 genera, of native grasses. He includes in the list the Bermuda and a few other imported grasses which have become naturalized. This Bermuda grass was an immense acquisition. It grows anywhere; bears any amount of drought and close pasturing; is very sweet and nutritious when young; contains 14 per cent. of albuminoids, according to Dr. Ravenel's analysis; and on rich lands is reported to yield more hay than does timothy. The Bermuda grass will take fast hold in the most hopeless-looking gullies and in barren sands where no other grass will grow, and once lodged it holds on and spreads, even under hard pasturing. The Lespedeza is its only rival for possession of the soil.

"The Kentucky blue-grass will cohabit with the Bermuda, and grows in the winter while the Bermuda is dormant. Lespedeza, orchard grass, Kentucky blue-grass, timothy and the panic-grasses do well, except when mowed or pastured closely in summer, in which event most of them are in danger of perishing. The Johnson grass is a prodigious grower, is perennial, and for all purposes is, perhaps, the most profitable grass. The indications are that Georgia, Alabama and Mississippi can produce more good hay per acre than any Northern States of

the same area; perhaps twice as much. The mild winters and wet springs, and the greater size of some of the Southern grasses, such as the Johnson, Guinea, Gamma, Lucerne, Munro, etc., render this probable.

"The Lucerne, which does not succeed well in the Northern States or even in England, flourishes in these States, and, when sown on suitably prepared land, it defies drought. It thrives under the Southern sun here as it does in France and Italy. Each acre may be expected to yield five tons of hay in a season. The Gamma is another grass which grows with great luxuriance. The seed stock grows five to seven feet in height, and the leaves furnish an enormous quantity of palatable forage as nutritious as corn fodder. The crab-grass is a true summer grass which grows spontaneously in the cultivated fields and comes in when most needed.

"Dr. Phares gives an account of a grass (*Panicum agrostoides*) locally called Munro grass which is thought capable of yielding 15 tons of hay in a season. Mr. Munro, for whom it was named, reports a product of 23,870 pounds hay per acre in one season on his own land. It is not so vigorous farther north.

"Clover, millet, timothy and other standard grasses may all be grown in this region.

"The native grasses, which constitute the principal winter pasturage, far more than compensate for the suffering of the other grasses in summer. They may be so managed as to afford good pasture at all seasons, and to render necessary only a small provision of dry forage for winter use, thus giving to these States an immense advantage over those farther north. Mr. C. M. Howard says, in his book on "Grasses," that he has sold fat Ayrshire cattle which had never had a mouthful of feed except what they gathered for themselves in the fields.

"The hay crop has proved exceedingly profitable to the few who have engaged in it, and the yield has never been surpassed."

Stock raising is an industry that is coming into prominence. The State has some advantages that give to this interest large possibilities. The increase in the number of farm animals in the last ten years is shown by the following figures from the Agricultural Department of the United States:

	1875.	1885.	INCREASE.
Sheep.....	185,900	343,925	158,025
Hogs.....	755,900	1,351,752	595,852
Milch cows.....	168,200	282,465	114,265
Oxen and other cattle.....	327,300	432,090	104,790
Horses.....	104,400	120,924	16,524
Mules.....	101,400	131,038	29,638
Total.....	1,643,100	2,662,194	1,019,094

A gratifying feature is the fact that while the number of animals has been increased, the breeds have also been improved. The State has now many fine stock farms, and the finest breeds of sheep, hogs and cattle are raised.

The raising of vegetables and fruits is one of the most prominent and promising of the agricultural industries of the State, and is assuming very large proportions. The field is unlimited and the profits are large. All ordinary varieties of fruits are grown in abundance, and the quality cannot be surpassed. Oranges and some other tropical fruits are raised in the southern part of the State. These, however, will be referred to more specifically later on.

#### SOIL AND PRODUCTIONS.

MIDDLE DIVISION.—1. *The Metamorphic Region*.—At the surface a loam with not much appearance of stratification overlies the decayed slates to the depth of several feet in valleys, but much less along the slopes and on the summits. This loam forms the soils and subsoils, which are thus seen to be in most cases directly related to the underlying beds.

The two principal soil varieties commonly recognized by the farmers are those which make the gray and the red lands respectively. Of each of these, however, there are numerous sub-varieties, exhibiting all grades of color and of fertility. The gray lands may be derived from feldspathic rocks, such as granite and gneiss, in which case they are often quite fertile, or from siliceous mica slates

or other quartzose rocks, when they may be almost barren. Similarly, the red lands, when derived from feldspathic rocks, such as hornblendic gneiss, etc., rank high in productiveness, while those resulting from the decay of certain mica or clay slates, bearing garnets or other ferruginous minerals, frequently lie at the other extreme.

Of the true gray granitic (feldspathic) soils there is only a limited area in this State, but a belt of this kind of land passes through Rockford and Bradford, in Coosa County. It is seen again near Blake's Ferry, in Randolph, and near Louina, in the same county; then near Milltown, in Chambers County. Indeed, the granite itself, so far as it has yet been observed, passes everywhere, by insensible gradations, into a schistose or stratified rock, or into gneiss, and thus our granitic soils might more properly be classed as gneissic throughout.

Of the two principal soil varieties above named, that of the red lands is derived from the decomposed hornblendic gneisses and slates, which in many places, where exposed in washes or gullies, are seen to be merely stratified clays, containing fragments more or less angular of the quartz veins or seams, which are nearly always interbedded with the other rocks of this region. This red soil (the color of which comes from the iron of the hornblende) is considered best adapted to the production of corn and other grains. Its natural growth consists of the various species of oaks (white, post, Spanish, red, and a few black-jacks,) hickory, poplar, and some short-leaf pine, especially where the red and gray soils overlap, making mulatto-colored soils. The top stratum of this soil, from 2 to 3 inches in depth, is often a dark chocolate-brown color, but below it becomes a brighter red, and at varying depths, from 10 to 15 feet, becomes a yellowish hard clay. Where the freshly decomposed rocks are seen the color is yellowish rather than red, the latter color being darker and more intense apparently the further removed the soil is from its original position and the more it is affected by the decay of the vegetable matter. When first cleared, these lands were thought to be the best in the country, and many fine farms are still found upon them. The majority of the farmers, now, however, seem to prefer the gray soil, as being more certain, more easily tilled, and even more fertile. The red lands were the first to be cleared up by the original settlers, and most of the older farms and fine old country residences are upon this kind of land.

The gray soils result from the disintegration of gneisses and mica slates which contain comparatively little or no hornblende or other iron-bearing minerals. They are commonly somewhat sandy, usually light-colored, gray to dark gray, sometimes nearly black, with very often, however, a decidedly reddish color similar to that of the hornblendic soils above described. These gray soils are easily tilled, are certain of crop even with moderately favorable seasons, and are better suited than the red to the culture of cotton. Below some three or four inches of dark gray sandy top soil there is usually a lighter colored but somewhat yellowish subsoil. The timber is much the same as that upon the red lands, viz: oaks and hickory, with a few short-leaf pines.

Of these two soils, in proportion to the amount of insoluble matter, the gray is decidedly better in respect of potash, phosphoric acid and lime, and is probably more thrifty. The red soil is rather deficient in lime, but in retentiveness of moisture it is superior to the other. Both are fairly good soils.

Cotton, corn, wheat, oats, etc., are the chief crops of this region. There are localities where fine pasturage is afforded.

2. *Region of the Coosa and Outlying Valleys.*—Classified according to color and general physical characters, the soils occurring in these valleys are either red or brown loams derived from the pure calcareous formations, or lighter colored to gray siliceous soils, usually filled with angular, flinty gravel, and resting on a

yellowish clayey subsoil derived from cherty limestones of the dolomite and of the sub-carboniferous; or the light sandy loams which result from the disintegration of sandstones such as make up the greater part of the Potsdam proper, the upper sandstone and the Coal Measures.

Some of the best farming lands in the State are in these valleys in Cherokee, Calhoun and Talladega Counties and elsewhere. The yield of cotton is large; corn and wheat produce heavy crops, and all the products of the farm can be profitably cultivated. A strip through Talladega and Calhoun Counties in the Coosa Valley is one of the best cotton-producing sections in the State—the other two areas of largest production being the Tennessee Valley, and the “Cotton Belt” in the Southern Division. The latter produces over half the cotton raised in the State. There are some fine grazing lands in this region, and increased attention is being given to stock raising.

**NORTHERN DIVISION.**—The lands of this division, in their general characteristics, resemble those of the Middle Division. In the Valley of the Tennessee there are soils exceedingly fertile and capable of producing a great variety of crops. The yields of corn, wheat, oats, etc., are large. One of the three principal cotton-producing areas in the State is in this division—the Tennessee Valley. The valley lands are nearly level or gently undulating, but in the gaps between the mountain spurs the surface is more broken. On account of the fertile nature of the soil, most of these lands are cleared and under cultivation.

**SOUTHERN DIVISION.**—This includes all that portion of the State south and west of the Middle and Northern Divisions—about three-fifths of the whole area. The northern part of this division, which embraces the northwestern counties of the State, partakes largely of the character of the Middle and Northern Divisions. The lands are well adapted to cotton and corn, and produce also good crops of the usual farm products. Oats and potatoes are raised in considerable quantities. There are some high table-lands that furnish superior farming lands, desirable on account both of the natural fertility of the soil and of their favorable position with respect to drainage, etc. The “Cotton Belt” of the State is included in this division, and embraces parts of the following counties: Pickens, Green, Sumter, Marengo, Hale, Perry, Dallas, Autauga, Lowndes, Montgomery, Macon, Bullock, Russell and Barbour. The width of this belt across the State is about 75 miles. It includes what is known as the Prairie Region, a belt running somewhat diagonally across the State, having a width of some 30 miles near the Mississippi line, but narrowing down toward the east, and almost disappearing in Russell County, on the eastern border of the State. While under this name are included all those parts of Central Alabama where the prairies occur, only a part, and not the largest part, of the area is of the genuine prairie character. As here used, the term “prairie” does not always mean a timberless region, but refers rather to the character of the soil, which is black or dark gray in color—a stiff soil of exceeding fertility and lasting productiveness. Sixty per cent. of the cotton produced in the State is raised in this Cotton Belt.

Truck farming is an industry of great and growing importance. In the extreme southern part of the State, more especially the territory contiguous to Mobile, this business is rapidly developing. The soil in the vicinity of Mobile is mostly a sandy loam with a clay subsoil. Naturally the lands are not rich, but with the use of fertilizers they produce surprising yields. Cabbages, tomatoes, potatoes, peas and strawberries are the principal crops. The transportation facilities are such as to furnish rapid shipment to Northern and Western cities, which will afford a market for all that can be raised. Coming into market very early in the season, the prices realized yield enormous profits. Considerable attention is being given to the growing of peaches—a fruit said to be as profitable as

the orange. The southern and central portions of the State are peculiarly adapted to the peach. The fruit raised here has a delicious flavor, and coming to maturity so much earlier than the peaches grown in Maryland and Delaware, they bring much higher prices. The Le Conte pear does well in Alabama. Fortunes have been made in Southern Georgia raising this fruit, and it may be as profitably cultivated in the lower counties of Alabama. Oranges are grown largely in Mobile and Baldwin Counties. With care they may be cultivated successfully and profitably, but they are not as safe as fruits less susceptible to frost, though there are some fine groves yielding handsome incomes. Figs are extensively grown. They require little cultivation and produce large yields.

#### MINERAL RESOURCES.

The principal minerals are iron ore, coal, gold, copper, manganese, mica, asbestos, corundum, graphite, limestone, granite, marble. None of these receive very marked attention except coal and iron ore. These have only been mined to any extent within the last few years, but within that time the business has grown to enormous proportions.

#### COAL.

Not only is the quantity of easily and cheaply-mined coal in Alabama such as to render the supply practically inexhaustible, but the quality of a large portion of it is unsurpassed. In Williams' "Mineral Resources of the United States," an official publication of the Department of the Interior, it is said of some Alabama coal that it is "superior to any coal in the United States as a grate coal, and fully equal to English cannel coal." While the wonderful increase in the amount of coal mined in Alabama is in part due to the increasing general demand for it, the main cause has been the erection of a large number of pig-iron furnaces in which coal is used. A very large part of the coal now mined in Alabama is made into coke for use in these furnaces, and the increase in the number of furnaces shortly to be made by the erection of half a dozen or so new ones will necessitate a large increase in coal production. In 1870 Alabama mined only 11,000 tons of coal, and in 1880 the output reached only 340,000 tons. It is since the latter year that the mining interests of Alabama have shown such rapid progress—the amount of coal mined in 1883 reaching 1,000,000 tons, which in 1884 was doubled, the yield for that year being 2,000,000 tons. The production of coal in Alabama, according to Saward's "The Coal Trade," a standard authority, has been as follows:

	TONS.		TONS.
1874.....	40,889	1880.....	340,000
1875.....	75,806	1881.....	400,000
1876.....	102,640	1882.....	800,000
1877.....	172,182	1883.....	1,000,000
1878.....	194,268	1884.....	2,000,000
1879.....	290,000		

Mr. R. P. Porter, a member of the late United States Tariff Commission, after a personal examination of the coal interests of Alabama, predicts that in ten years that State will be mining coal at the rate of 10,000,000 tons a year, and in view of what has already been done, this does not appear by any means improbable. The increase in iron making in Alabama in the next few years will necessitate a corresponding increase in coal production. Moreover, aside from the furnace consumption, there is a steadily increasing demand for Alabama coal for general use, large quantities of it going to New Orleans, Galveston and elsewhere. The efforts to make Mobile a great coal port for shipping Alabama coal to foreign markets as well as to coastwise ports will no doubt be successful in the near future, and thus another opening will be made for the extension of the demand for this coal.

The following is from a pamphlet entitled "The Coal Fields of Alabama," by Gen. J. W. Burke, of Mobile:

"The productive area of the coal fields of Alabama is estimated at 5,350 square miles. Of this the Coosa field has 150, the Cahaba 200, and the Warrior 5,000 square miles. These divisions take their names from the respective rivers—Warrior, Cahaba and Coosa, which flow through them. From these streams branch out in all directions innumerable creeks, subdividing the Coal Measures, and affording, especially in the case of the Warrior, many miles of deep water nine months in the year, thus enabling the coal to be mined far up in the interior and floated to the main stream. Human skill could not have devised a more perfect system of internal canals or auxiliary watercourses than nature has provided on the Warrior. Branching off in all directions, those creeks cut their way through the Measures, and in many cases flow over solid beds of coal. During the summer months this river is not navigable above Tuscaloosa. In fact, it is almost at the very verge of the Coal Measures in Tuscaloosa that the obstructions to navigation commence, caused by the structure of the Coal Measures themselves. 'At this point the river changes its entire character, forming during low water a series of lakes and falls over rocky ledges which completely impede navigation.' In very high stages of the Warrior, and before the construction of railroads, flatboats were successfully carried to Mobile, but the dangerous passage over the shoals and the losses incurred caused the ultimate abandonment of that means of transportation, and at the present time the agricultural produce of the Warrior Country is carried from 30 to 45 miles to the Louisville and Nashville Railroad at Birmingham, and the business of conveying coal by river entirely suspended.

"The great apparent fact connected with these Alabama coal fields is that, taking into consideration their geographical position, their physical characteristics, the superior quality of their product, and the cheapness with which they may be mined and transported, they constitute the only source of supply in the entire world which can successfully compete with British coal in the gulf, West Indies, South America, and, on the completion of the Panama Canal, on the entire Pacific coast."

#### IRON ORE.

Under this head I cannot do better than quote the following on the "Iron Ore and Limestone Regions" from "A Physical Survey in Georgia, Alabama and Mississippi," by Messrs. John L. Campbell, Professor of Chemistry and Geology in the Washington and Lee University, Lexington, Va., and W. H. Ruffner, an eminent geologist of Lexington, Va.:

"1. THE ARCHEAN REGION, extending from Atlanta, Ga., to the margin of Choccolocco Valley, in Alabama, is that in which the specular and magnetic ores are most commonly found.

"Pyrite is found in large quantities among the metamorphic rocks.

"2. CHOCOLOCCO VALLEY claims attention as a distinct ore region. It is traversed by Choccolocco Creek, and is bounded on the southeast by the metamorphic ridge to which Prof. Tuomey, in his second report, gave the name 'Choccolocco Mountain'—a prolongation of the Blue Ridge of Virginia, and on the northwest by the Ladiga range, which separates it from the little valley in which Anniston is situated. The Georgia Pacific Railway enters Choccolocco Valley at the western terminus of the Davisville Tunnel, 86 miles west of Atlanta. The valley is here about three or four miles wide, and is underlaid by limestones, slates and sandstones of Lower Silurian age. The railway traverses this valley from the tunnel somewhat obliquely, but approximately parallel with the creek for 12 miles, and emerges from it near Oxford, where it passes into the Anniston Valley.

"The geological structure of Choccolocco Valley is somewhat peculiar, but is most favorable for bringing its ores within reach of the miner. The ores of this valley are exceedingly rich and abundant, but have hitherto lain untouched in their original beds for want of the transportation and capital necessary for their utilization. The comparative ease with which they can be mined; their proximity to good furnace sites along Choccolocco Creek, which furnishes ample supplies of water at all seasons; the abundance of limestones near at hand; the presence of extensive forests that can be utilized for making charcoal, and the facilities for transporting coal, which are now assured, all contribute to make this a most attractive region for those who have capital and enterprise to invest in the manufacture of iron.

"Limestone.—The limestones of Choccolocco Valley are exposed to view at many points along the streams. The blue variety of good quality has been quarried for lime a short distance northwest of White Plains. Then again, near the point at which the railway crosses Choccolocco Creek, we examined a bed of

grayish-blue stone of fine appearance. The same rock is found at many other points along the valley. We may therefore conclude that it exists here in abundance—a large proportion of it sufficiently pure to be employed as flux in blast furnaces.

“3. ANNISTON VALLEY, a branch of the great Silurian Valley of the Coosa, introduces us to another extensive ore region. Anniston, where the Woodstock Company's furnaces are in active operation in the manufacture of charcoal iron, is at the junction of the Georgia Pacific Railway with the Selma, Rome and Dalton Railroad.

“The region near Anniston is among the best ore fields in Alabama. The ores that supply the furnaces are mined on a large scale on both sides of the valley. In some places they occur in boulders and fragments of every size, from those weighing several tons to others no larger than a pea, and are mingled with clay, sand and water-worn pebbles in such a way as to indicate that they have been subjected to the action of quarternary drift. They appear, however, to have been moved but a short distance from their original bedding, as is inferred from their geological origin and the fact that they are but little water-worn, while the well-rounded boulders and pebbles of hard sandstone have evidently been brought from more distant points. At other places the ore beds are ‘*in situ*,’ as illustrated by Allen's Mine, on land adjoining the Woodstock property, where the ore is imbedded in shale, apparently of the Quebec epoch.

“The Pine Grove ore bank, two miles west of Anniston, is at present worked on quite a large scale for consumption in the Woodstock Company's furnaces. The mining here is comparatively easy and inexpensive. The deposit of ore along the flank of the ridge has been traced for several miles, thus indicating a very large quantity.

“This belt of iron-bearing strata has some interesting developments at points northeast of Anniston and near the line of the Selma, Rome and Dalton Railroad. For example, on lands near Weaver's Station we found some openings of limonite in the Quebec shales, and near the crest of the same ridge mining has been done to some extent, but evidently in an older geological formation than that near the base of the ridge—most probably in calciferous strata; possibly in upper primordial. All these promise good results from future mining.

“Associated with these lowest ores is a bed of manganese ore, the extent of which has not been determined, but it is in the same range as the manganiferous ores successfully tested at Woodstock Furnace in making Spiegeleisen.

“Southwest of Oxford—in fact, within the limits of the town—the Anniston and Choccolocco ore belts coalesce and extend into Talladega County, where they furnish ample supplies of material for the Alabama Furnace, which is now making charcoal iron of good quality.

“The following analyses will serve to illustrate the quality of the ores of this region. They are from banks a few miles southeast of Alabama Furnace, and will serve as general types of the limonite ores of this extensive belt:

#### ANALYSES OF LIMONITE ORES.

PERCENTAGE COMPOSITION.	NO. 1.	NO. 2.
Combined water.....	11.86	11.52
Silicious matter.....	7.58	11.71
Ferric oxide.....	77.54	68.93
Alumina.....	2.07	3.59
Manganese oxide.....	...	3.77
Lime.....	0.07	0.10
Magnesia.....	0.63	0.05
Phosphoric acid.....	0.29	0.13
Sulphur.....	...	...
Undetermined and loss.....	0.59	0.20
Metallic iron.....	58.28	48.25
Phosphorus.....	0.13	0.06

#### ANALYSES OF LIMESTONES.

“The four geological formations to be relied upon for the greater part of the best limestone available for lime and for use in furnaces are the Quebec, Chazy, Trenton and sub-carboniferous. The following table represents analyses of samples from each of these formations: [From State Reports.]

PERCENTAGE COMPOSITION.	QUEBEC.	CHAZY.	TRENTON.	SUB-CAR-BONIFEROUS.
Carbonate of lime.....	55.35	86.72	90.60	93.40
Carbonate of magnesia.....	34.58	6.31	6.74	0.32
Silicious matter.....	7.75	5.32	2.13	5.32
Alumina and ferric oxide.....	1.48	1.56	0.33	0.79
Water and loss.....	0.84	0.26	0.11	0.10



"No. 1 is a well-characterized dolomitic limestone, but has been successfully used for furnace flux.

"In going westward from Anniston towards the Coosa River we find much of the surface of the country occupied by gravelly ridges, the general trend of which is northeast and southwest, coinciding with the strike of the stratified rocks. These hills rest upon beds of limestone, as indicated by the numerous round sinks (pot-holes) found on their surfaces, and by the many exposures of limestones along the valleys eroded by the contiguous streams. Along these valleys and on the adjacent slopes, which have been stripped of their cherty coverings, appear the rich red soils produced by the disintegration of the underlying ferruginous shales and limestones. In these red soils are seen many indications of ore deposits similar to those in the neighborhood of Oxford and Anniston.

"On lands in Calhoun County many favorable surface indications of limonite ores are found. Then, farther west, in the northern part of Talladega County, not more than one or two miles from the line of the Georgia Pacific Railway, abundant bloom of ore appears.

"Farther south, but still nearer the line of the railway, at numerous points between Oxford, Calhoun County, and Eden, St. Clair County, evidences of extensive deposits of iron ore of Quebec age appear, awaiting transportation, capital and enterprise for their development.

"*Limestone.*—The limestone for flux at the Woodstock furnaces is hauled four or five miles on wagons from a little valley (an offshoot of the Coosa Valley) which runs from the neighborhood of Weaver's Station up a small branch of Cane Creek, between two ridges of the Ladiga range. The quarry is in a mass, apparently, of Quebec and Chazy limestone caught as a synclinal fold between the two ridges. The beds are considerably metamorphosed, but the position of those from which the rock is quarried seems to put them in the Chazy formation, though the fossils were too obscure to be determined.

The expensive hauling of this limestone for so great a distance and across a ridge of considerable elevation will be rendered unnecessary by the completion of the Georgia Pacific Railway, which traverses both the Silurian limestones of the Coosa Valley and the sub-carboniferous limestones of the Coosa and Cahaba coal fields. From these sources abundant supplies of fluxing material can be obtained of excellent quality and at very moderate cost. One of the best limestone areas between Anniston and the Coosa River is the Valley of Blue Eye Creek and in some of its branches. This valley also affords some excellent sites for furnaces, with good supplies of water.

"West of the river, two miles from Coleman's Ferry, abundant bloom of limonite ore appears on a cherty ridge belonging to Mr. Coleman—ore apparently good, but no beds opened. This ridge is geologically above the general horizon of the ores of this region. A little farther west is another deposit not far from the line of fault where the Lower Silurian limestones are brought up to the level of the sub-carboniferous strata, on the eastern margin of the Coosa coal field.

"4. COOSA AND CAHABA VALLEYS.—The sub-carboniferous period was iron-producing during a portion at least of its continuance. Overlying the limestones of this period there is, in both the Coosa and Cahaba fields, a considerable stratum of chert and cherty sandstone, in which beds of limonite ore have been accumulated. As an example of this we refer to Daughdrille's Range, a short distance north of Broken Arrow Creek, in St. Clair County, the northwestern face of which is an outcrop of sub-carboniferous limestone full of characteristic fossils and estimated at about 150 feet in thickness. The limestone is covered by a bed of shale, and the whole crowned with a thick stratum of crinoidal chert and cherty sandstones, all dipping, at different points along the ridge, from 35° to 45° southeast. The southeastern slope of the ridge is covered with fragments of chert and cherty sandstones, mingled with floating limonite ore, thousands of tons of which could be gathered up from the surface within a short distance. Daughdrille's Ridge may be taken as a type of a line of broken ridges extending for a long distance towards the Southwest, and consisting throughout the whole extent of our observations of beds of sub-carboniferous limestone, shale and chert, all dipping towards the southeast at angles varying from 30° to 50°.

"Near Eden this limestone ridge is cut into several short ridges, one of which, a little way southwest of the railway line, is strewn with abundant fragments of iron ore and crinoidal chert, like those of Daughdrille's Ridge.

"Passing farther westward into the Valley of the Little or East Cahaba River we find an up-lift of Lower Silurian limestones, shales and cherts, forming a valley (from two to four miles wide) which separates the Coosa and Cahaba

coal fields. It is limited along its northwest margin by a fault or slip which has brought the Silurian limestones, etc., up to the level of the highest coal-bearing strata of the Cahaba coal field, thus causing formations of widely separated geological ages to abut against each other, or, in some places, making the newer coal rocks apparently dip beneath the older limestones.

"About six miles south of the point at which the Georgia Pacific Railway crosses the Little Cahaba we examined an extensive bed of limonite ore on the southeastern slope of what is locally known as Oak Ridge—a long line of hills (once a continuous ridge) composed of sub-carboniferous limestone resting upon the beds of shale and sandstone of the Clinton epoch, and overlaid by the same crinoidal chert so often mentioned as the repository of limonite ores. Here much of the cherty bed is really a cherty sandstone. The ore in it is very massive, and was opened and mined at several points during the war sufficiently to demonstrate its great abundance.

"Near Moody's Cross-Roads the Quebec limestones and shales come to the surface and give evidence of carrying considerable quantities of iron ore.

"*Limestones.*—The iron ores that border the coal fields not only have an abundant supply of fuel near at hand, but have also, within a stone's cast of them, limestones in great abundance, and of quality well suited for furnace flux. The Chazy, Trenton and upper sub-carboniferous limestones are the purest in this region, and are therefore the best for use in the furnace. The Chazy and Trenton lie along the public highway and on several of the cross-roads within convenient distance of the railway for several miles as it traverses the valley. The line of sub-carboniferous ridges along the eastern side will furnish an indefinite quantity of stone similar to that which is now quarried near Trussville and used in some of the Birmingham furnaces.

"5. THE BIRMINGHAM VALLEY.—The Silurian valley in which Birmingham is located, and the Red Mountain ridges which border it in part on both sides, have been already referred to as constituting one of the great ore fields of Alabama, and as embracing two of the geological formations noted for the quantity and quality of the ores they yield. (1.) The lower shales and limestones of the valley are of the same epoch as those from which the ores for the Woodstock and Alabama Furnaces are obtained, and carry with them at many points the same grade of ores. (2.) The other ore-producing formation belongs to the Clinton epoch, and characterizes the celebrated Red Mountain. It is noted as the repository of extensive and well-characterized beds of lenticular and fossil ores of superior grade, both as to richness and purity. These ores form a noted feature of the Clinton group all the way from Pennsylvania, through Virginia and East Tennessee, to Central Alabama.

"The Red Mountain is a striking feature in the topography as well as in the geology of this region. As a conspicuous ridge rising several hundred feet above the adjacent country, it passes within about a mile of Birmingham, and forms the southeast boundary of the valley in which the city is situated.

"The quantity and quality of the ores of both Quebec and Clinton ages along the Birmingham Valley have been fully demonstrated by their extensive and satisfactory use in a number of furnaces. Near Greenpond Station, on the Alabama Great Southern Railroad, about 25 miles southwest of Birmingham, limonite ores have been mined on a large scale for use in the Oxmoor Furnace, where they are employed in admixture with the fossil ores from Red Mountain. The brown ores for the Alice Furnace are obtained from the same region.

"Ores of the same class are mined for the Sloss Furnaces in the valley about eight miles southeast of Birmingham.

"The Red Mountain ore has been opened on the top of the ridge opposite Birmingham and about one mile southeast of the city, but from want of knowledge on the part of the miners the good ore was thrown into a heap with that of inferior quality, making a confused mass too poor to be profitably worked. The prolongation of the same bed farther south may be seen exposed in the railroad cut at Grace's Gap, on the South and North Railroad, five miles from Birmingham.

"The red ores have been extensively mined about two miles northwest of Oxmoor Furnace. The mines are on the crest and southeastern slope of Red Mountain, in a remarkably well-defined bed  $7\frac{1}{2}$  feet thick between strata of hard ferruginous sandstones, which, with the ore bed, make an aggregate thickness of 30 feet. The ore is sufficiently free from clay to be used without washing. It is carried down to the furnace by rail and there mixed with one-third of its own weight of brown ore for use in the furnace. This combination yields one ton of

pig iron to two tons of the ore, and requires for its reduction one ton of limestone with one and one-half tons of coke.

"For the Sloss Furnace the red ore is obtained from a mine a few miles farther toward the southwest. From the outcrop near the crest of the ridge the bed is worked downward on its southeastern dip, and has a thickness of 14 feet of good ore. It is also approached by a tunnel on the northwestern flank of the ridge, 250 feet below the outcrop. The ore brought out by the tunnel is remarkable for its large percentage of carbonate of lime. Both varieties (No. 1 from the outcrop and No. 2 from the tunnel) are employed at the same time, mixed with the Quebec limonite in the proportion of one ton each of Nos. 1 and 2 and a half ton of the limonite. This combination yields one ton of superior pig iron.

"The following analyses of the two varieties of ore from the Sloss Mine, for which we are indebted to Col. Sloss, will serve to illustrate the composition of the Red Mountain ores generally, and may be regarded as representing two types of ore found at different points along the Clinton formation—the one abounding in carbonate of lime; the other containing very little or none:

PERCENTAGE COMPOSITION.	NO. 1.	NO. 2.
Ferric oxide.....	74.98	58.30
(Corresponding to metallic iron.....)	52.48	40.81
Carbonate of lime.....	0.00	22.42
Silica (chiefly as sand).....	14.56	9.04
Phosphoric acid (P <sub>2</sub> O <sub>5</sub> ).....	1.05	0.57
Equivalent in phosphorus.....	0.45	0.24

"The red ore used at the Alice Furnace is mined in the same ridge as those above mentioned, and about nine miles southwest of Birmingham, near the Alabama Great Southern Railroad. It is worked in the furnace mixed with half its weight of limonite ore, the mixture yielding 52.81 per cent. of pig iron.

"The analysis of the red ore of the Alice Furnace Mine, kindly furnished by Capt. Hillman, superintendent, is highly favorable:

Silica.....	12.18	
Alumina.....	2.68	
Lime.....	0.28	
Magnesia.....	0.39	
Phosphoric acid.....	0.29	
Water.....	2.96	99.70
Metallic iron.....	56.64	

"The Red Mountain, still flanking the valley on both sides for a long distance in the same direction, carries with it outcroppings of its characteristic red fossil ores that point to extensive beds beneath. The increasing demand for these ores will soon give rise to new mining enterprises that will bring them into market as a source of wealth to the communities in which they are located, and of patronage to the railroads.

"*Black-band* ore and clay iron-stone have been found at several points in the coal regions, and some samples from the Warrior field have been tested in the furnaces and found to work well in admixture with the more silicious ores. These are the leading ores in England, and have been very successfully worked in Pennsylvania and in West Virginia, so that their real value has been fully demonstrated. There is good reason therefore for making more thorough search for them in all of the Alabama coal fields.

"The bed of black-band about 65 feet below the New Castle coal seam affords one of the best demonstrations we have of the extent of this ore. It is one foot four inches thick, and the ore has been tested in the furnace sufficiently to establish its value.

"*Drift ore* is a term sometimes applied to a deposit of impure limonite found in considerable quantities in the stratified drift heretofore mentioned as spread over the carboniferous rocks in the western part of Walker and in large portions of Fayette and Lamar Counties. The ore is found in greatest abundance cropping out at high points on the faces of the hills as we travel out west of Fayetteville. But its real value remains to be determined by future explorations as to its quantity, and by chemical or furnace tests as to its quality.

"Analyses of three samples of this limonite ore, reported by Prof. McCalley, of the State Laboratory, give the following averages of the most important constituents:

	PER CENT.
Metallic iron.....	55.88
Silicious matter.....	4.41
Sulphur.....	0.12
Phosphorus.....	0.22

"These results compare very favorably with those of analyses of the limonite ores from other parts of the State."

Throughout the regions mentioned in the foregoing extract, there are thousands of millions of tons of ore. In one mountain alone it has been estimated by competent engineers that there are 500,000,000,000 tons. One of the most important considerations is the cheapness with which it can be mined.

#### TIMBER.

The timber resources of Alabama are enormous. Millions of acres are covered with virgin forests of long and short-leaved pine, cypress, the several varieties of oak, chestnut, hickory, walnut and other woods. The most widely distributed is the long-leaved pine, (*Pinus australis*.) In the lower counties of the State are vast forests of magnificent pines, their straight trunks rising to enormous heights, with an entire absence of underbrush. The pine supply of the State was estimated by the Census Department in 1880 to be 21,192,000,000 feet, of which there were 18,885,000,000 feet long-leaved pine, divided as follows: East of the Perdido River, 4,055,000,000; west of Perdido River, 2,000,000,000; in the region of mixed growth, 10,000,000,000; in the Central Cotton Belt, 1,750,000,000; in the Coosa River Basin, 900,000,000; in the Walker County District, 180,000,000. In this estimate no account is made of small timber standing on some 1,282,000 acres which have been cut over, or on 600,000 acres injured by the manufacture of turpentine. There are fewer pine trees per acre in the region of mixed growth than in the Pine Belt proper which it adjoins on the north, but the individual trees being larger, the average amount of standing pine per acre is greater, although generally of poorer quality. The amount of short-leaved pine in the State is put at 2,307,000,000 feet, of which 1,875,000,000 feet were in the Central Pine Belt, and 432,000,000 in the Coosa River Basin. In the northern portion of the State there are large oak forests, and on the timber lands generally throughout the State there are extensive areas of hickory, cherry, walnut, oak, etc. In the swamps along the coast there are large quantities of the finest cypress. The following is from an article on the "Timber Resources of the South," by Mr. Chas. H. Wells, published in the Baltimore Manufacturers' Record of October 11, 1884:

"Leaving Tennessee, we pass through upper Georgia, where some of the finest pine in the world is growing. The Atlanta manufacturers have gotten hold of nearly all the valuable land, and as it is my intention to treat only of those sections open to investment, we will pass at once into Alabama. Possibly no condition of affairs in any country ever presented so impregnable a front against the revolutionizing influences and changing customs of a progressive age as did that of Alabama before the war. The land, as a rule, was held not in acres, but in square miles, by single individuals, through inheritance, deed or purchase. A plantation of the *ante-bellum* days used frequently to extend over an area covering many square miles of territory. These great plantations have been cut up into farms, and, as a result, much valuable timber land is for sale. Capital has poured into this section as the waters of a mighty river break through its banks, and has resulted in the establishment of mills, foundries, factories and manufacturing enterprises of every character; has torn away the barriers of earth that have so long hidden the mineral treasures, and exposed rare qualities of coal and iron ore in incalculable quantities. The same power has crossed her fields with iron tracks of the railways; hewed her mighty forests for shipment, not only throughout our own country, but to Europe as well; has builded her cities, revived her commerce, re-established her credit, developed her resources, and brought her before the notice of the world as one of the most favored sections of country upon the globe. To capital, then, Alabama holds her outstretched arms, and many there be just now who are availing themselves of this opportunity. There is a portion of Alabama known as 'the long-leaf pine region.' It is thickly timbered with this valuable yellow pine lumber, which contributes to the supply of nearly every European city, and provides masts and spars—so tall, strong and straight is this timber—for the sailing vessels of almost every nation on the globe. A railroad has just been finished through this section, and it goes without saying that the

resources of the country have scarcely been touched. These resources exist at present almost wholly in pine forests, which cover thousands of square miles of territory, and seem absolutely inexhaustible in their profuse growth and magnificent development. Before even the survey of the line had been completed, numerous sites for saw mills had been selected, and within a few months after, machinery had been hauled in wagons from Enterprise and Meridian, (its transportation occupying days and often weeks,) was erected and set to work; until at the present date, upon the completion of the railway, there are millions of feet of accumulated sawed timber awaiting transportation to Northern and Eastern cities and to New Orleans for shipment abroad. The surface of the country is rolling and undulating, with almost park-like regularity, and one frequently sees stretches of country which, with its long luxuriant growth of Bermuda grass, its groves of graceful young pine and cedar, and its gentle slopes, bubbling springs and charming depressions and miniature valleys, might rival in beauty many of the city and suburban parks of Northern and Eastern sections. Although the soil, with careful treatment, will prove profitably productive, the principal industry must remain that of timber shipping for many years to come. These lumber lands may be purchased at from \$3 to \$5 per acre, and will yield from 8,000 to 10,000 feet of sawed timber to the acre, worth from \$40 to \$60, for which there is a ready market in the rapidly-growing cities of the Southwest. The only investment necessary is that in the lands themselves and in the machinery for sawing."

#### MANUFACTURING.

Alabama, like her sister States of the South, is making wonderful progress in manufactures. With her immense forests of the best timber, her thousands of square miles of coal, her inexhaustible deposits of iron ore, there is room for unlimited development in this direction, and she possesses unsurpassed, if not unequalled, facilities for economical manufacturing. With the raw material and fuel easily and cheaply accessible—her beds of iron and coal, all varieties of timber, her cotton fields—with all these in close proximity, the cost of manufacturing is reduced to the minimum; added to which she has ready access to the markets of the country by means of her splendid railroad facilities, and through the Tennessee River, which affords cheap transportation to the West by way of the Mississippi and its branches. Looked at from any standpoint, Alabama is an inviting field for the establishment of manufacturing enterprises. The leading industries are coal mining, the manufacture of iron, cotton manufacturing, and the lumber business. In 1884 there were 82,057 spindles and 1,614 looms in the cotton mills in Alabama, against 55,072 spindles and 1,060 looms in 1880. The development of these opens the way for other industries, and is leading to a rapid and healthy growth in diversified manufactures. As bearing on manufactures in Alabama, I give the following, which is from the pen of Col. A. K. McClure, in a recent number of his paper, the Philadelphia Times. It possesses additional interest and weight from the fact that it is by a Northern writer, the editor of one of the foremost papers in Pennsylvania, and a man accustomed to say nothing rashly, but whose statements are based on investigation, and who in this instance states what to him and his readers are unpleasant facts:

"I have studied the resources and opportunities of the State with special interest, because they are certain to revolutionize some of our chief sources of wealth in Pennsylvania, and the more they are studied the more clear it must become to every intelligent mind that England is not to-day more the rival of the Keystone State in the future production of iron and coal than is Alabama. There is not a source of mineral wealth in Pennsylvania, excepting only our oil product, that is not found in Alabama in equal or greater abundance, with the matchless advantages of climate, of easier and cheaper production, and of vastly cheaper transportation. Nature's great gifts to Pennsylvania have been not only liberally supplemented in Alabama, but to them have been added every possible natural advantage for their cheap development and delivery to the markets of the world. If half the capital and business direction that have been given to make Pennsylvania peerless in the production of mineral wealth had been given to Alabama, her productive wealth would be as great as that of the Iron State, and her popu-

lation would be nearer five millions than the million and a quarter now scattered over the boundless but almost untouched riches of this sunny commonwealth. Think of a State with over 5,000 square miles of productive coal fields, whose coal is now sold at a fair profit in New Orleans at less than \$4 per ton. It is mainly of the best quality, alike for commercial, manufacturing and domestic purposes; it is in large veins; it is more easily mined than our most favorably located bituminous coal fields in the North; and in large portions of the coal fields there is good iron in abundance, much of it requiring no actual mining at all, and with the iron and coal is found the limestone. Birmingham is a feeble forecast of what Alabama may do. There a city of a dozen thousands presents a hive of industry where a single house stood at a railway crossing little more than a decade back. It is the one point of Alabama where iron and coal abound that has happened to be reached by transportation, and it has sprung up as if by magic to point out not only the possibilities, but the inevitable and wonderful destiny of the State. It is admitted that iron can now be produced in this State \$6 per ton cheaper than in the reasonably favored iron centres of Pennsylvania, and that is a certain index of the industrial revolution that is rapidly approaching. What has been done in Birmingham not only can be done as well in many other parts of the State, but it can be even more profitably done in Birmingham and elsewhere in Alabama as soon as the great natural highways of the State shall be made available; and no citizen of the North of fair intelligence can review the slumbering wealth of Alabama and the waterways which offer the cheapest transportation without accepting the conclusion that the next generation will see this State an iron and coal centre equal to if not surpassing Pennsylvania, and Mobile the great coal depot of the coast. \* \* \* It is idle for Pennsylvania and other great iron and coal producing States to close their eyes to the fact we have reached the beginning of a great revolution in those products. No legislation, no sound public policy, no sentiment, can halt such a revolution when the immutable laws of trade command it; and the sudden tread of the hordes from the northern forests upon ancient Rome did not more suddenly threaten the majesty of the mistress of the world than does the tread of the iron and coal diggers of Alabama threaten the majesty of Northern iron and coal fields. I do not credit the common saying that iron can be produced here for \$9 per ton. There are many here who will tell you so; but after careful inquiry in the most intelligent and reliable circles, I fix an entirely safe limit of average cost at \$11.50. There is iron produced here at less than that cost; but \$11.50 is as just an estimate for Birmingham as \$17 is for Pennsylvania; and it must be remembered that Pennsylvania has reached the minimum cost in the production and marketing of her iron, while Alabama can and will greatly cheapen the delivery of her iron in the great centres of trade. And what is true of iron must be equally true of coal. They are twin sisters whose development must keep pace with each other. Nova Scotia will soon learn to fear Alabama more than the small tariff now imposed upon her imported coal, and instead of extorting double prices for bituminous coal, as she did in the early days of the late war, before protection had developed our Northern mines, she will find Alabama crowding both herself and Pennsylvania in the New England factories, and with the waterways of the State perfected, even England will have to look to her laurels in the Central and South American States. These lessons come upon us plain as the noonday sun, and it is midsummer madness not to read them understandingly. We cannot war with destiny; we cannot efface the beneficent gifts of Him who leads the waters to the sea and sends them back in the dews and rains of heaven. Alabama has been gifted far beyond even our boasted empire of Pennsylvania, and only the Southern sluggard has hitherto given the race to the North. Now there is a New South, with new teachings, new opportunities, new energies and manifestly a new destiny, and the time is at hand when a large portion of the great iron and coal products of the country which enter competing centres will be supplied cheaper from Alabama than from any State in the North. How Pennsylvania will solve the problem I do not assume to decide; but the logical result would be the transfer of the portion of the iron industry that can best prosper here from the North to the South, just as the spinning and weaving of the home consumption of cotton must soon come to the cotton fields, and the better water-power and climate which they furnish. \* \* \* With the marvelous progress made here when stagnation prevailed in all the coal and iron centres of the North, what must be the strides of this industrial centre when prosperity comes to revive the same industries in Pennsylvania? This country will draw the young men of energy from the coal and iron mountains of Pennsylvania just as the fertile prairies of the West have drawn the

young men of energy from our Pennsylvania farms, and there is room for thousands of them with better prospects of success than in any new State or Territory of the Union. These are strong expressions, but I write them only after the most exhaustive inquiry and careful examination, and I know that they are fully warranted. This is the coal and iron empire of the South, and, I believe, the future coal and iron empire of the United States, and it has a climate and soil adapted to the bountiful growth of everything grown in Pennsylvania, with one-sixth of the entire cotton crop of the South added. It is the equal of Pennsylvania in forest, field and mine, with climate; natural highways and cheapness of product turning the scales in profit by them. They will not make Pennsylvania poor, for her people and resources are equal to any and all the mutations of industry and trade; but they will make Alabama rich, and that will multiply the wealth and grandeur of the whole Union."

## IRON.

Prior to 1870 the iron interests of Alabama had received comparatively little attention. A few furnaces had been erected since the war, but the business in the aggregate was of very moderate proportions—the total production of iron in that State in 1870 being only 7,060 tons. By 1880 there had been a considerable growth of the iron interests, and the census reports of that year show 12 furnaces, with an aggregate capital of \$3,106,196—the production being 62,333 tons. It was not, however, until after the census reports were compiled that Alabama began to attract great attention as the probable centre of an immense iron-making industry. During the last four years there has been a wonderful development of the State's iron resources, and Alabama iron is now successfully competing in Northern markets with Pennsylvania iron. In 1885 the production of pig iron in Alabama was 227,488 tons—an increase in annual production in five years of over 165,000 tons. This State is very generally believed to be able to make pig iron at a lower cost than any other State in the Union, and whether this popular belief is entirely correct or not, it is quite certain that no other State can offer greater advantages for this industry. Hon. Abram S. Hewitt, of New York, whose long experience in the iron trade makes him fully competent to express an authoritative opinion upon such a subject, has said of Alabama:

"It is the only place upon the North American Continent where it is possible to make iron in competition with the cheap iron of England, as measured not by wages paid, but by the number of days' labor which enter into its production. The cheapest place on the globe until now for the manufacture of iron is the Cleveland District, in Yorkshire, England. The distance of the coal and iron from the furnaces there averages about 20 miles. Now in Alabama the coal and the ore are in many places within half a mile of each other. This region, so exhaustless in supplies, so admirably furnished with coal, so conveniently communicating with the gulf, will be of infinitely more consequence to us for its iron than it has ever been for its cotton. I think this will be a region of coke-made iron on a scale grander than has ever been witnessed on the habitable globe."

Stronger language could hardly have been used by the most enthusiastic friend of Alabama. There seems no room now for doubt that Mr. Hewitt's prediction as to the extent of iron making in Alabama is certain of fulfilment and in all probability this will come to pass much sooner than Mr. Hewitt expected. The developments in iron making in that State during the last year or two have been the most stupendous probably ever seen before in the world, in the same length of time. Gigantic enterprises have been undertaken, involving the expenditure of millions of dollars in the building of furnaces, steel works, rolling mills, and iron industries generally, and this marvellous progress continues with no indications of any falling off. It is almost useless to attempt an enumeration of the many companies that are now at work either building or preparing to build large furnaces, for scarcely a day passes without adding to the list. It may, however, be said that between 20 and 30 furnaces, none of them less than 100 tons daily capacity, are either under construction or projected with good assurances of early building. Among the places showing the greatest activity in furnace-building

are Birmingham, Anniston, Ensley, Bessemer and Sheffield, though a number of other places are preparing to engage in the same good work. Steel works, it is understood, will be erected at Bessemer, Ensley and possibly Anniston. It is a noteworthy fact that the developments in the iron interests of Alabama of late years have been mainly the work of Southern men, notwithstanding the prevalent belief, in some sections, to the contrary. It is indeed surprising to note the wonderful energy with which Southern men have engaged in this work, and the amount of Southern money invested in it.

It is especially gratifying to note that even more rapidly than new furnaces are being erected, new diversified iron manufactures are coming into existence. The wide diversity of these new industries is surprising, and not only will Alabama—and what is true of Alabama is also true of Tennessee and several other Southern States—soon be supplying the home market with machinery, agricultural implements, hardware, &c., but will also invade the West, and doubtless enter the foreign markets with more chance of successful competition than the North, owing to the much lower cost at which these goods can be produced. Rolling mills, machine shops, foundries, iron pipe works, nail factories, and many other kindred enterprises are being established in all parts of the State.

#### LUMBER.

The manufacture of lumber is naturally an industry of importance and magnitude in Alabama. There is the best of nearly all kinds of timber; there is a large home demand, which is rapidly growing, and the railroads through the timber belts, as well as the numberless navigable streams, afford access to outside markets. The development of the industrial and commercial interests of the State, and the consequent activity in building, furnish a demand for an enormous quantity of building lumber. The supply of yellow pine in Alabama (which is coming more and more into demand everywhere for building, while the uses to which it is applied are extending) may be said to be inexhaustible; certainly for years to come there can be no perceptible signs of depletion. The rapid increase in the number of furniture factories and other wood-working establishments will require extensive supplies of pine and hardwood lumber. There is probably no branch of business in the State paying better than saw and planing mills, shingle mills, etc. Through Mobile, which is developing rapidly as a lumber port, an immense business is being built up with Northern and foreign ports.

#### GENERAL MANUFACTURES.

Following the development of the coal, iron and timber resources of the State, comes naturally the establishment of minor industries. Furniture factories, spoke and handle factories, wagon and carriage factories, establishments for the manufacture of agricultural implements, stoves, hardware, machinery, etc., find here a most inviting field. There are all the elements of economy in manufacture—cheapness of fuel, the very lowest cost of raw material, with other advantages. Machine and repair shops do well in the manufacturing towns. The canning of fruits and vegetables is a profitable industry. Ice factories pay handsomely.

#### EDUCATION.

The State has a good system of public schools, and numerous private schools and colleges, both for males and females.

#### SOME MATTERS OF LAW.

*Property Exempt from Execution for Debt.*—\$1,000 in personal property and \$2,000 in real property is exempt from execution for debt. On the death of the owner and occupant, a surviving widow or child, or children, or both, the homestead, not exceeding the above value, is exempt during the life of the widow or



the minority of a surviving child; wages and salaries of laborers and employees for personal services to the value of \$25. The legal rate of interest is 8 per cent.

"The property of married women is secured to them by constitutional provision, the husband being her trustee, and entitled to the rents and profits for the support of the family.

"*Fences and Stock.*—Under the general law of the State, stock of all kinds are allowed to run at large, imposing upon land owners the necessity of fencing. But from time to time the Legislature has passed laws applicable to limited districts, requiring owners of stock to take care of them, and rendering them liable for damage to the crops of their neighbors.

"*Taxation.*—All property is equally subject to taxation. By constitutional provision, the rate can never exceed 75 cents in the \$100. The counties can impose one-half of one per cent. in addition. The present State rate is 65 cents on the \$100."

In the article on Mississippi the attractions of the gulf coast for the invalid and the tourist, and as a place of resort, will be referred to at some length. What is there said will apply to a part of the southern coast of Alabama. Mobile and contiguous territory are becoming noted as a place of resort for health and pleasure seekers.

## ANNISTON, IN NORTH ALABAMA.

**A**S a specimen of the rapid development of Southern towns that have only come into existence within the last few years, the publishers present the following description of Anniston: The town is on the main line of the East Tennessee, Virginia and Georgia Railroad, and at the crossing of the main line of the Georgia Pacific Railroad, between Atlanta and Birmingham. It is but a few hours' ride from Atlanta, Columbus, Macon and Rome, Ga., or from Montgomery, Mobile and Selma, Ala., or from Knoxville, Chattanooga and Nashville, Tenn., and only two hours from Birmingham. It is situated in the heart of the mineral and finest agricultural region of Alabama, Tennessee and Georgia. It is reached by three grand trunk lines—the East Tennessee, Virginia and Georgia, the Richmond and Danville, and the Queen and Crescent roads. New Orleans, but 14 hours distant, is reached from Anniston in a night's ride in a sleeping car. Anniston is only 17 hours from Cincinnati, and can be reached in 26 hours from Washington, being on the short line of travel from the East, North and Northwest to Florida and New Orleans. The town is built on a slope of Blue Mountain, a chain of the Blue Ridge, on the most beautiful site that could be selected for a town south of the Potomac, or north of it for that matter. It is one of the highest points accessible to railroads in the State, and for climate, health and beauty of scenery, it stands unrivalled.

### ITS HISTORY.

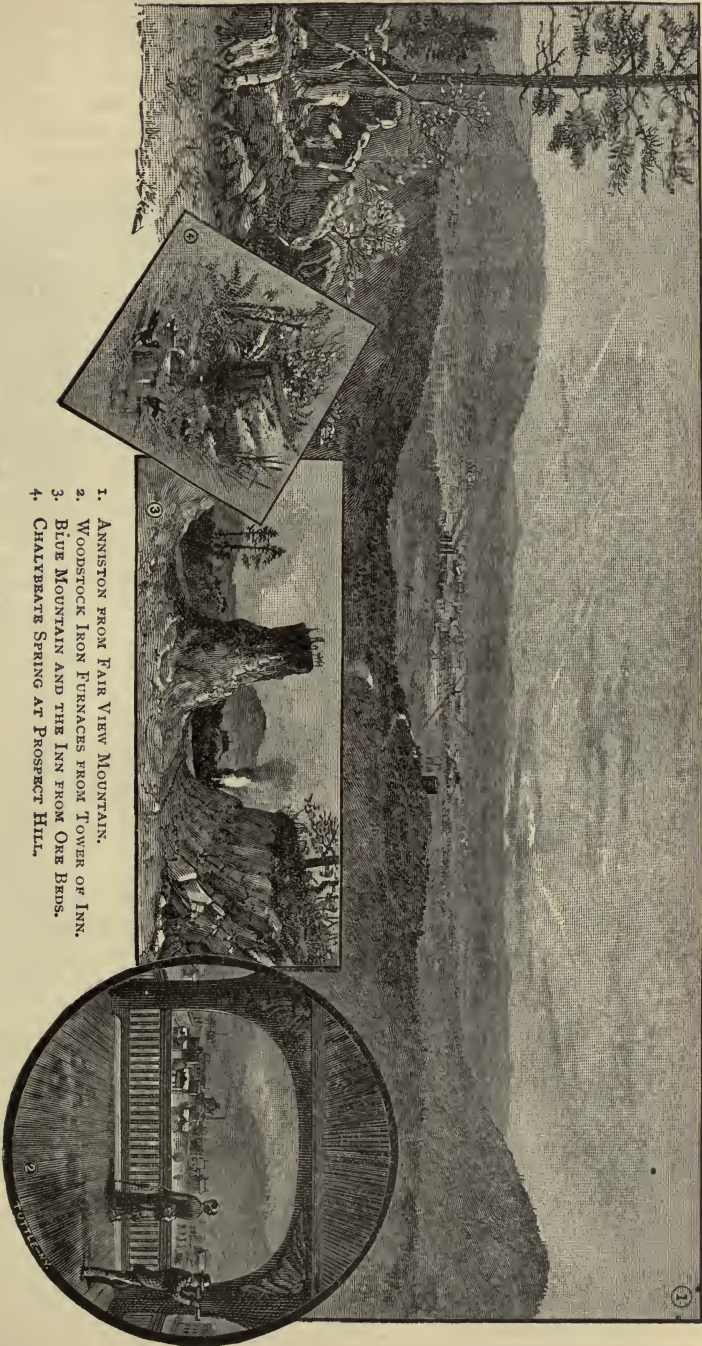
Some 18 years ago, Mr. Samuel Noble, for the first time visiting the ruins of the old furnace built and destroyed during the war, was astounded to see the enormous deposits of iron ore, its richness and excellent quality. Being impressed by the great beauty of the situation, and its natural advantages as a manufacturing and distributing point, he purchased the largest and main deposits of iron ore, and continued adding to the property by other purchases until 1872, when the present company was formed. The Woodstock Iron Company afterwards added, by judicious purchases from time to time, over 40,000 acres, making it one of the finest properties in America, and worked the wonders now to be seen where was a wilderness 13 years ago. Within a few feet of the spot where was found the first suggestion of the wealth that lay within those hills, hundreds of men are daily digging from the soil the finest iron ore to be found in this country. The process is so simple that it does not suggest the usual associations of a mine. The ore is everywhere in the soil. There is no tunneling or delving into depths. Nature left her riches on the surface, and they are taken out as simply and as safely as the farmer digs his potatoes. For 10 years this one hillside has been drawn on, and as yet it seems merely scratched as one looks upward to the great slope and the thousands of acres above which are almost solid iron. A century of such labor would not begin to impoverish this mighty depository. But it is hardly richer than its sister hills, which form a bulwark about the city.

In 1872 the Woodstock Iron Company was formed by General Danl. Tyler, Alfred L. Tyler, E. L. Tyler, James Noble, Sr., John W., Samuel and William Noble, and the first furnace of the company was completed and started in April, 1873, at Anniston.

The second furnace was completed and started in August, 1879.

In 1881 a cotton factory, the largest and finest in the State, was completed. In 1882 the car-wheel works of Noble Bros. were moved from Rome, Ga., to Anniston. Other industries were established on an extensive scale.

Meanwhile a model city had been laid out, a perfect system of drainage designed, the streets macadamized, water-works, stores, churches and schools built, railroad connections secured, and the nucleus of a great town planted in the most salubrious and beautiful spot of North Alabama.



1. ANNISTON FROM FAIR VIEW MOUNTAIN.
2. WOODSTOCK IRON FURNACES FROM TOWER OF INN.
3. BLUE MOUNTAIN AND THE INN FROM ORE BRIDS.
4. CHALYBEATE SPRING AT PROSPECT HILL.

Prior to 1883 no land was sold to anybody. The entire business of the place was done by the founders and owners, who were also the proprietors of the furnaces, factories, foundries, machine shops, saw mills, stores, etc. The city was kept closed to the public up to this date not through any feeling of exclusiveness on the part of the proprietors or any desire on their part to control the trade of the city and the surrounding country. They desired simply to lay the basis of the city in a proper way; to so arrange its drainage that when it became a great city there could be no trouble in keeping it clean and healthy; to so lay off its streets that the city would be systematic and well proportioned, and to so macadamize them that they would afford safe and pleasant drives; to provide the city with parks located at proper places, and with water-works that would protect and beautify the city and give the citizens convenience and comfort; to build schools, churches, hotels, and establish such industries as would give lucrative and fitting employment to its people. They felt that this work, involving heavy expense and the prosecution of one single plan, could not be done with a population of various grades of wealth and of diverse ideas. They therefore, for this reason, shut the general public out of the city.

When, however, this work had all been done, the proprietors, in 1883, threw open the city to the public. The city had then better streets, sidewalks, parks, shade trees, water-works, schools, churches, hotels, etc., than any city of 20,000 inhabitants. These were built by the company and did not entail one dollar of debt on the city. All the local improvements and the three railroads brought to Anniston did not leave one cent of debt on the city or its future population. The population, which at this time was about 4,000, began to increase rapidly as the fame of Anniston's attractions and advantages spread abroad.

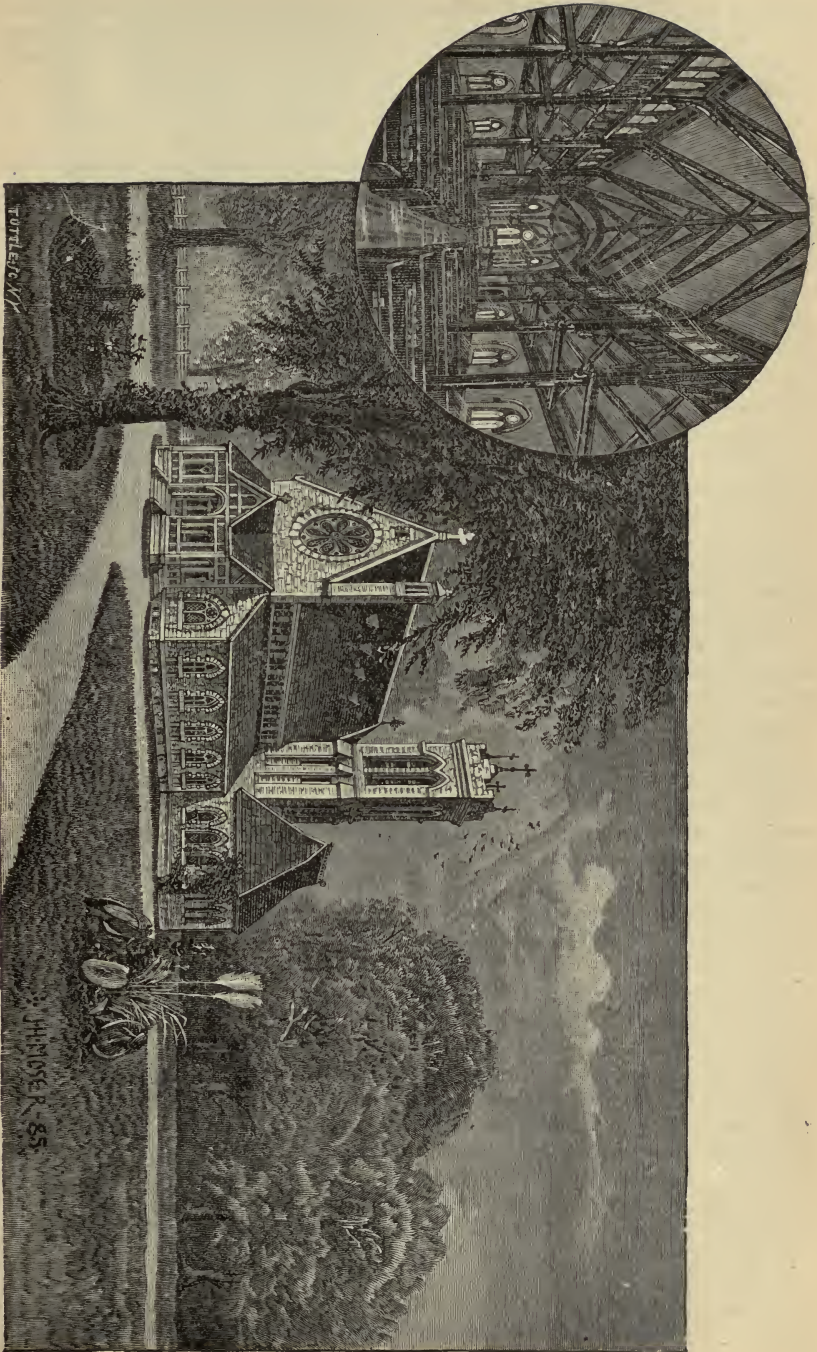
The company very materially aided the different religious denominations by donating them building lots for churches. The Episcopalians, Presbyterians, Baptists, Methodists and Roman Catholics have built or are building very handsome churches and parsonages. Grace Episcopal Church, built by the Tyler and Noble families, is the handsomest structure in the State. It is built of cut sandstone from the quarries at Anniston. The interior is finished throughout in red cedar, highly finished. The windows are of stained glass. The tower contains a chime of six bells. The colored population have also their separate churches and schools.

By act of legislature, Anniston is made a separate school district. The schools are controlled by the Mayor and Council and school superintendent. Great interest has been taken in establishing them. Anniston, for its population, has the largest and most flourishing public schools in the State. In addition, there are two pay schools for boys and girls.

Plans have been prepared and work commenced on two colleges for boys and girls. They will be open to all denominations, but will be under the charge of the bishop and rector of the Episcopal Church.

Nowhere on this continent has so much been so well, so effectually done in any town that has been opened to the public, in establishing manufactures, organizing and sustaining schools, building railroads and hotels, providing water-works, electric lights, grading, macadamizing and rolling the streets, planting shade trees, paving drains—all combining to make Anniston the most beautiful, cleanest, healthiest, best drained town in the United States.

The liberal policy of the Anniston Land and Improvement Company, who own the bulk of the real estate in the corporate limits, has established many other industries. Every encouragement is offered to new industries, with rates of freight to and from all points as low as the most favored city. The richest and most populous agricultural counties of the State tributary to it, and placed in the



GRACE EPISCOPAL CHURCH.

very heart of the rich iron and coal region of the State; supplied with an abundance of the purest freestone water, and with a climate unrivalled; with the best of labor, healthy and contented, and the sale of liquor banished from the county, it is now the manufacturing and commercial center of North Alabama, and will be the great manufacturing center of the State, if not of the South.

#### THE ANNISTON IRON DISTRICT.

Very little has heretofore been written on this, the most important iron district in Alabama, nor has even a hint been given of its wonderful wealth in material, its already large development, or its peculiarly fortunate position in regard to transportation lines.

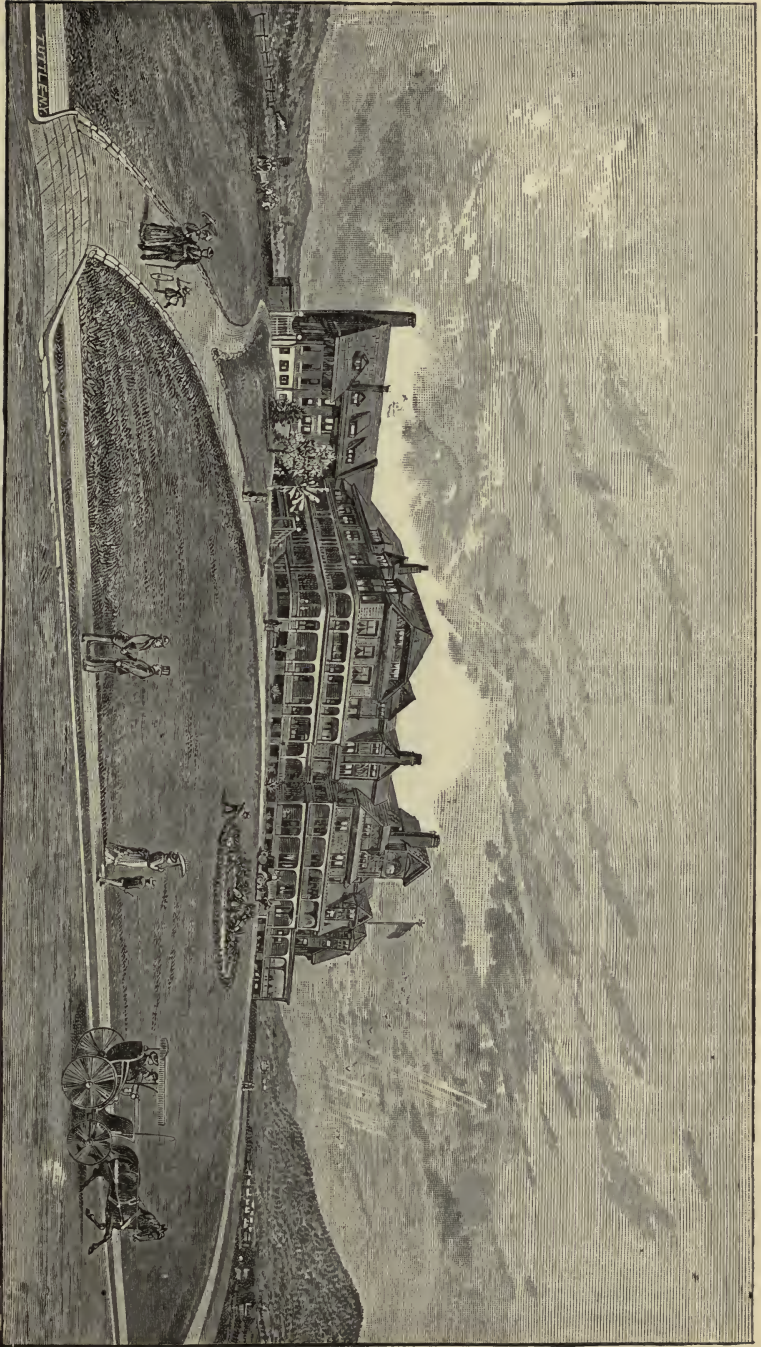
The Anniston district embraces the furnaces and iron region on each side of the East Tennessee, Virginia and Georgia Railroad, from Cave Spring, Ga., to Montevallo, Ala., as well as the remarkable iron deposits along the line of the Anniston and Atlantic Railroad for 50 miles south of Anniston. The latter road will connect with the Central Railroad system of Savannah, Ga., and with the new roads of the Shelby Iron Works, which will afford connection with the Louisville and Nashville system near Calera. The Anniston and Northern road, now under contract, making connection with the Cincinnati Southern system near Gadsden, thus fixes Anniston as the center of the very richest iron region in the South. This district now embraces Etna Furnace, 20 tons capacity; Cherokee, 50 tons; Tecumseh, 50 tons; Stonewall, 25 tons; Rock Run, 35 tons; Woodstock, two furnaces, 50 tons each; Clifton Furnace No. 1, 25 tons; Clifton New Furnace, 60 tons; Shelby Iron Works, two furnaces, 50 tons each; Brierfield, 25 tons per day—12 furnaces in all.

These furnaces have heretofore been run on charcoal supplied from the immense forests of yellow pine contiguous to them. Many of them will continue to use charcoal for fuel exclusively for years to come. Some own such large bodies of timber land that they can use the same fuel indefinitely.

The construction of the East and West Railroad having opened up the Coosa coal-field, the developing of the Broken Arrow mines and building of coke ovens by that company and others, and the opening of the Cahawba mines, 45 miles west of Anniston, on the Georgia Pacific Railroad, places the Anniston district in a far more advantageous position for making cheap iron than its younger neighbor, the Birmingham district. Anniston is now within 25 miles of the Coosa coal-field, which affords the best coking coal in the South, and within 45 miles of the Cahawba, putting it on an equality with Birmingham as far as cheap fuel goes; but otherwise the advantage is all on the side of the Anniston district—in the abundance and excellence of its ores, being lower in silica and phosphorus and richer in iron, requiring less limestone and less coke to make a ton of iron, and producing iron of superior quality for all purposes.

The effect of an assured supply of coke is already seen in the late enlargement of the Cherokee Furnace, increasing its capacity to 100 tons per day, and the substitution of coke for charcoal. The Tecumseh Iron Works propose making a change similar to that made by the Cherokee, and the Woodstock Iron Company are making preparations for the building of two first-class coke furnaces of daily capacity of 100 tons each. The construction of these will be a continuation of the development of this section that will, without doubt, make Anniston the great iron center of the South.

The advantages of the Anniston district over all others is made apparent to the practical iron manufacturer not only by the abundance and excellence of the ores and the ease of procuring certain supplies of cheap fuel, but also by the entire absence of difficulty in mining the ores. So far, in every case, the ore is



ANNISTON INN.

mined in open cut. Mining consists simply in undermining and blasting down hills of ore, no underground mining or timbering being done.

The most noted deposits of ore are the mines owned by the Clifton, Woodstock and Shelby Companies. They have been worked for years and hardly show the signs of being touched, so immense are the quantities of ore in sight; while along the whole line of the East Tennessee, Virginia and Georgia Railroad, from Cave Spring, Ga., to Montevallo, Ala., for many miles on each side, extensive deposits of rich ores exist, and deposits of equal magnitude are found for several miles east and west of Anniston, on the Georgia Pacific road. The most remarkable deposits occur on the line of the new Anniston and Atlantic road, and still more ore will be made accessible by the completion of the Anniston and Northern, which will also bring the Coosa Furnace at Gadsden, with the red fossiliferous ores, into the Anniston district.

Prof. Toumey, in his geological report of Alabama, speaks of the locality where Anniston is now built as possessing exceptional advantages for iron manufacture. A furnace was built here during the war for the manufacture of iron for the Confederate Government, and was destroyed by the Federal forces in 1865 and never rebuilt.

#### ADVANTAGES FOR MANUFACTURES AND TRADE.

Anniston possesses natural advantages as a manufacturing and business point surpassing that of any other place in the South. The neighboring mountains possess exhaustless supplies of coal easily and cheaply mined. Iron can be made at a lower cost than at any other point in the South, making no exception. For miles around there is a magnificent sweep of heavily timbered lands. From the surrounding forests the finest Georgia pine and hard-wood lumber are furnished. Anniston is a competitive railroad point, and commands favorable freight rates to all markets. Thus, for manufacturing, the raw material is cheap, easily accessible and of the best kind, and there is every facility for cheaply transporting the product to market. The remarkable and unvarying success of such manufacturing enterprises as have been established in Anniston is convincing evidence of its superior advantages.

For any kind of general business, Anniston is an inviting field. Tributary to the city, north and south on the East Tennessee, Virginia and Georgia Railroad, east and west on the Georgia Pacific Railroad, and for 50 miles south on the Anniston and Atlantic Railroad, is the richest and most populous agricultural country in the South, which, with the competitive freight rates that are, by location, the right of the city, gives to Anniston as a distributing point for wholesale and jobbing houses a most favorable location. Several wholesale grocery and commission houses are doing a large and profitable business, and daily increasing the volume of trade and extending their territory. A most flattering opening is here presented for wholesale dry goods, notion, boot and shoe, hardware and agricultural implement houses. The trade is ready at hand and needs only to be sought to repay the merchant in handsome returns for his venture. There are two banks in the city—one national, the First National Bank of Anniston, capital \$100,000, all paid in; Duncan T. Parker, president; Saml. Noble, vice-president, and O. E. Smith, cashier; the other, the banking house of R. J. Riddle & Co. They are both doing a very satisfactory business, and are liberal, public-spirited institutions, always ready to exert themselves in furthering any enterprise for the development of the grand resources of this section.

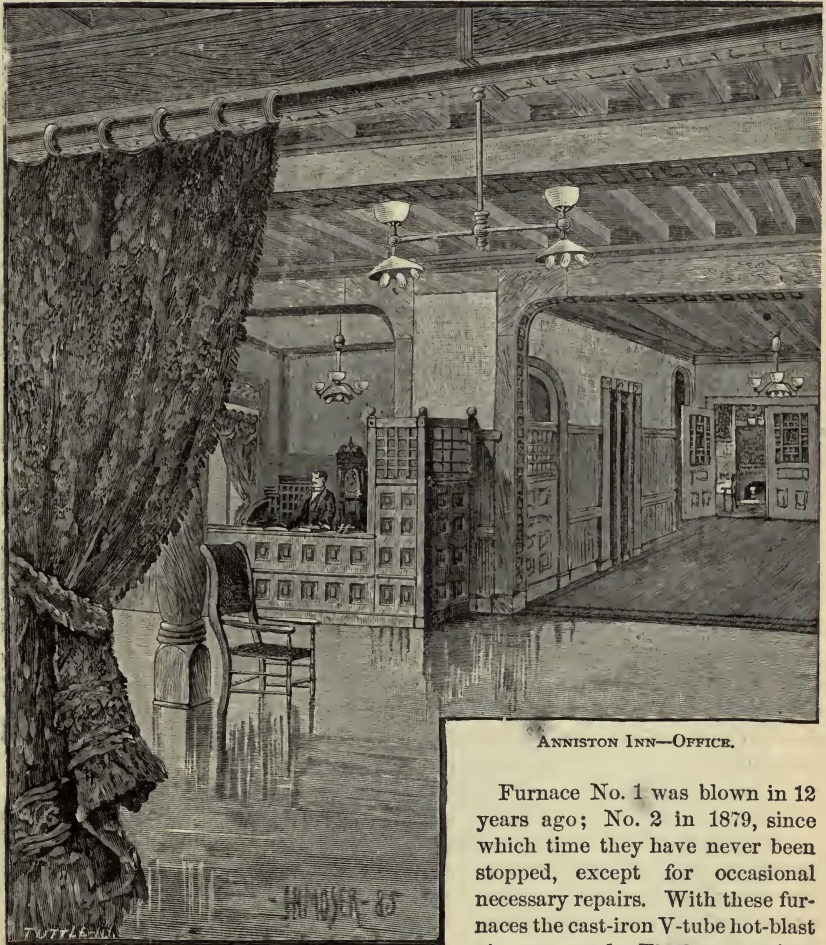
To give some idea of the present extent of Anniston's commercial and manufacturing interests, the following description of the leading establishments now in existence there is presented:



## THE WOODSTOCK IRON COMPANY.

The officers of this concern are A. L. Tyler, president; Sidney F. Tyler, vice-president; Samuel Noble, secretary and treasurer; Charles Noble, superintendent of furnaces and mines.

The first furnace was projected by the present president and secretary in 1872. The furnaces and yards occupy about 50 acres. The location is all that could be desired, adjoining the main line of railroad, with several side tracks leading direct to furnaces.



ANNISTON INN—OFFICE.

Furnace No. 1 was blown in 12 years ago; No. 2 in 1879, since which time they have never been stopped, except for occasional necessary repairs. With these furnaces the cast-iron V-tube hot-blast pipes are used. The heat required

for making charcoal car-wheel iron is not as great as that needed for making foundry iron; therefore, the enormously expensive Whitwell ovens are not used.

The total height of Furnace No. 1 is 50 feet. The hearth is 5 feet 6 inches in diameter and the bosh 11 feet. The tuyeres are  $4\frac{1}{2}$  inches, six in number, and 48 inches in height. No. 2 is 50 feet high, 6 feet hearth, 12 feet bosh, and has six  $4\frac{1}{2}$ -inch tuyeres 50 inches high. Both furnaces are open fronts. Hydraulic hoists are used. No. 1 is only a 7-foot lift, owing to its being built on the side of a hill. The hoist at No. 2 is almost the entire height of the furnace. There are two

Blake crushers in use. The coal and ore sheds and roasting and screening departments are well fitted up in every respect and are very extensive.

The engines are alike at both furnaces, have a 48-inch stroke, 36-inch steam cylinder and 72-inch blowing cylinder. The engine that drives the electric-light motor is supplied with steam direct from the furnace boilers, which is raised from waste gases in the furnace.

The mines have been worked (a portion of them within the city limits) since 1872. Millions of tons have been taken out, but millions more are left, and the deeper the mines go down the finer is the quality of the ore, while the width of the deposits increases. The ore is the brown hematite, yielding 50 per cent. iron.

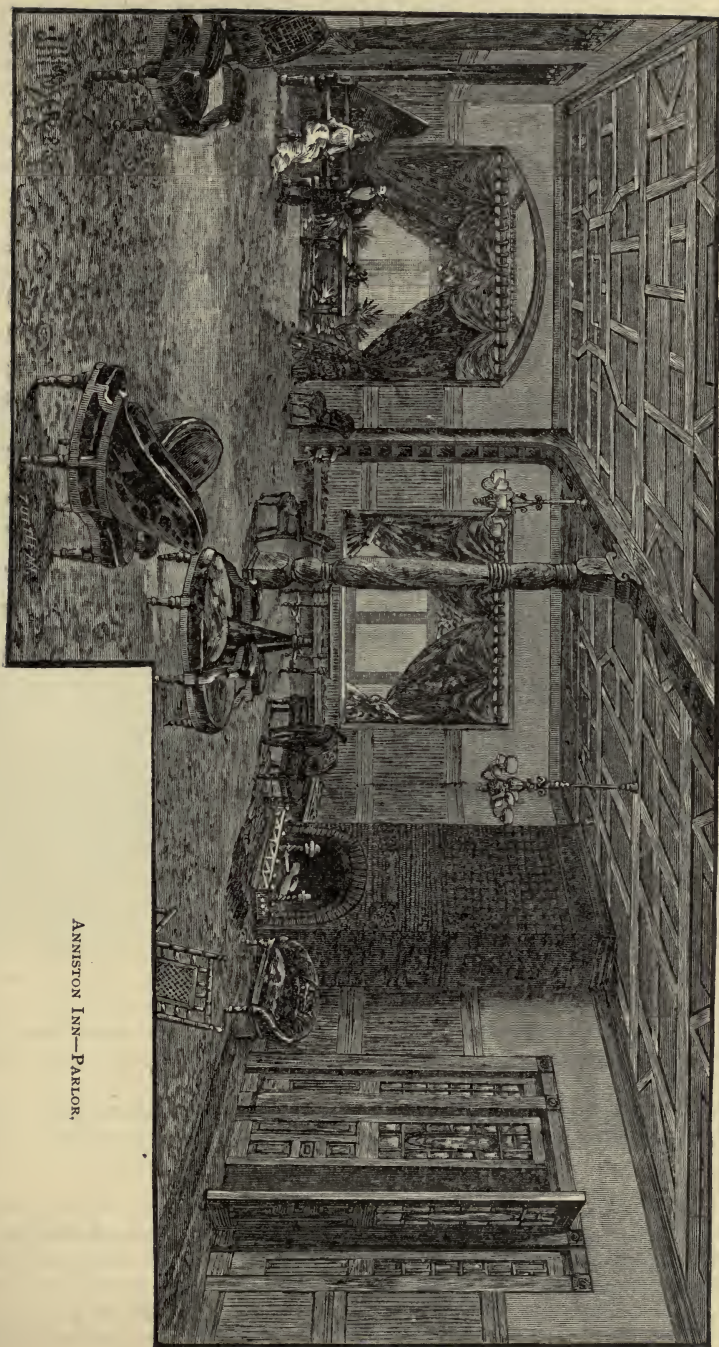
At the mines are three ore washers, which wash from 40 to 50 tons each per day. The washers are run by 15-horse-power engines, and 12 carts are used for bringing the ore to the washers, from which it is loaded on the cars. A tramway is shortly to be laid from the mine to the dumps.

In addition to the two furnaces in the city, the company own two on the line of the Anniston and Atlantic Railroad, a line constructed by them, and penetrating for 50 miles the rich mineral and agricultural country which lies to the southwest. One of these furnaces is at the foot of a mountain. The ore is mined up on the slope, and is literally slid into the fire. A more perfect arrangement and juxtaposition of resources is not possible.

The history of iron manufacture at Anniston has been one of phenomenal success. Since its furnaces were built the iron industry has suffered the severest depressions it has ever known, and the fires have been extinguished in the most favored regions. Anniston has never known what it was to see a cold furnace, and the fame of its fine iron has extended throughout the whole country. The great enterprises of the Woodstock Iron Company, representing an investment of many millions, are flourishing in spite of the financial depression which, during the past few years, has proven fatal to so many similar establishments. The management of this company recognized at the beginning the importance of having an organized force of contented labor, and to this end they have always thought first of the comfort of their employees, and then of their own gain. Knowing that, in the manufacture of pig iron, labor is the great factor, and that it being healthy, contented, comfortably housed, and a proper regard paid to its moral wants, the greatest possible results would be achieved, there has been no effort spared to make the lives of the working people bright and happy. As they anticipated, their pains have been richly rewarded, and it can be safely asserted that the same results in actual wealth created would, at any other point in the South, have required 25 per cent. more labor.

#### THE ANNISTON CAR WHEEL WORKS.

In 1882 the works of Noble Bros. were moved from Rome, Ga., to Anniston, for the manufacture of car wheels and axles, steam engines and heavy castings. The works comprise a two-story brick machine shop 50x150 feet, a foundry 84x335 feet, and the forge, 80x215 feet, and are built with every modern improvement, with hydraulic cranes for handling everything. The car wheel foundry has two cupolas with a melting capacity of 40,000 pounds per hour, and capable of turning out 300 car wheels per day. The machine shops are provided with improved machinery and tools for boring wheels, turning axles and constructing engines and heavy machinery, the whole operated by a 120-horse-power Corliss beam engine. The rolling mill and steam forge for making car and locomotive axles contains three steam hammers, together with a 200-horse-power engine for driving the rolls for working up scrap iron into muck bar ready for the steam hammer. The puddling furnaces have been provided for working up charcoal pig iron with



ANNISTON INN—PARLOR.

the wrought iron scrap into axles. The entire plant of this firm is one of the largest and most complete of its kind in the Southern States. The wheels are manufactured of the charcoal iron produced at the Anniston and Clifton furnaces. It is unsurpassed for car-wheel purposes; is strong and of good chilling properties. The wheels are all guaranteed for 50,000 miles, and many of them run 150,000 miles. They are in use by most of the principal railroads in the South.

The tracks of the Georgia Pacific, East Tennessee, Virginia and Georgia and Anniston and Atlantic Railroads all run into the car-wheel works. The office is elegantly fitted; it contains a large fire-proof vault, and is more suggestive of that of a bank in a large city than a factory.

Messrs. John and William Noble are the managing partners of the concern. Their car wheels have obtained a reputation second to none in the South, and they are both practical machinists and gentlemen of great business capability.

#### THE COTTON MILL

is a handsome three-story brick building, the grounds in front of which are most attractive, being laid out with flower beds and rare and choice plants. It is owned by the Anniston Manufacturing Company, an incorporated company, of which A. L. Tyler is president, J. B. Goodwin, treasurer, and R. Hampson, superintendent. Adjoining are four iron fire-proof warehouses, which have a capacity for storing 6,000 bales of cotton.

The machine shop is furnished with two lathes, a planer and upright drill run by steam power. There is also a carpenter and blacksmith shop. This places the company in a position to do all their own repairs in the mill. The picker room has two breakers and three finishing and lapping machines, manufactured by Whitehead & Atherton, of Lowell, Mass. The card room contains 48 Biddeford cards and 48 Franklin Foundry cards, which run 12 in a section. The spinning room has a total number of 11,238 spindles (the highest number in the State) and six Lewiston warpers. The slasher room contains two Lowell hot air dressers. The weave shop, on the first floor, has 320 Lewiston looms. The cloth room, for finishing, folding, baling and stamping, is supplied with Lowell machinery for the different purposes. The motive power is a Buckeye engine of 300 horse-power, supplied by five boilers manufactured by Noble Bros. The building is supplied throughout with automatic sprinklers, fire-plugs with hose attached on each floor and hydrants surrounding the mill, which is close to the water-works. For the comfort of the hands, dressing rooms are provided on each floor. The number of hands employed is 270.

The Anniston Mills are the largest in Alabama. They manufacture sheetings and shirtings, with a capacity of 115,000 yards per week, averaging 53½ yards to the loom per day of 10 hours. This product is shipped to New Orleans, Texas, New York, and the larger towns and cities of the South. The water for the mill is supplied by the Anniston water-works and two fine springs which feed a large reservoir in the yard.

The village at the rear of the works is owned by the company, and contains 50 well-built and substantial houses, in which the factory hands reside.

#### ANNISTON FOUNDRY.

This foundry, formerly of Cartersville, Ga., has been removed to Anniston and established on a larger scale. It was run at Cartersville in connection with the Georgia Car Company. The buildings are substantial and commodious. Murray & Stevenson are the proprietors, who manufacture all the castings for the Anniston Car Company, with the exception of wheels, and do all the work for the Woodstock Iron Company's furnaces here and at Clifton, besides builders' castings and a general repair business.

## THE ICE FACTORY

is owned by an incorporated company, of which W. J. Rushton is president, W. J. Cameron secretary and treasurer, and F. W. Dixon manager. The factory is run by a Boyle ice machine and has an output of three tons per day. It is working to its full capacity at the present time, and will soon have to enlarge to meet the increasing demand.

These are a few of the establishments that have given to Anniston its character as a manufacturing city, for it is distinctively that; but they are only a hint of what the future will show. The cheapness of iron and coal, the near proximity of almost exhaustless supplies of the finest timber of all kinds, the transportation facilities for the distribution of products—these and other advantages are leading to the establishment of manufactures of various kinds. Factories for the manufacture of furniture, of agricultural implements, of carriages, wagons, etc., of hardware specialties, of railroad supplies, of stoves, and all the varied articles into which wood and iron enter, will be called into existence. Some are



ANNISTON INN—GRAND STAIRCASE.

there now doing a flourishing business. Among other enterprises, there are two planing mills in constant operation. Fine residences and storehouses are in process of construction, and its mercantile business is rapidly extending. There are scores of handsome retail stores with excellent stocks. Two wholesale houses do considerable jobbing, and send their drummers to contest with Atlanta, Birmingham and Montgomery for the trade of the neighboring towns.

## THE WATER-WORKS.

In 1882 the construction of water-works was commenced by the sinking of a well 10 feet in diameter and 80 feet deep, the whole lined with a heavy cast iron curbing put in in segments, all bolted securely together. A splendid 150-horse-power beam engine was built and placed in position to pump the water from the well and force it to the reservoir, at an elevation of 236 feet, on one of the hills east of the city, one and a-half miles distant. Heavy iron pipes were laid through

the streets; over 40 fire hydrants were put up at different points where property was most exposed, and Anniston provided with a supply of pure, clear, mountain-spring water distributed over the town at a pressure of 100 pounds to the inch. The reservoir is always full, and the pressure constant and great enough to dispense with the use of fire engines, hose carriages only being employed, giving Anniston water facilities and fire protection unsurpassed by any city in the United States.

#### ELECTRIC LIGHTS.

In 1884 a contract was made with the Brush Electric Light Company for a plant to light the town and furnaces by electricity. This was done by putting up arc lamps of 2,000 candle-power in different parts of the city.

#### THE FAMOUS ANNISTON INN.

This is a building deserving special mention. It was commenced in the fall of 1884, and finished and opened to the public in April, 1885. It has been pronounced the completest hotel in the South, and no man who has not seen it has a right to dispute that claim. It is a graceful specimen of Queen Anne architecture. Its very appearance is an invitation to rest and ease. The wide verandas extending entirely around the first three floors indicate easy chairs and delicious breezes as far as they can be seen. The approach to the inn is past a 20-acre lawn, in the center of which a lake is being constructed, and up the graveled walks which wind their way through the luxuriant blue-grass to the broad stone stairway at the main entrance. The interior of the inn more than fulfills the expectation awakened by its external attractions. It is simply perfect in all its appointments. The interior finish is of solid wood polished like satin, and relieved by unique tiles and rich tapestry. The square windows with their stained glass and artistic draperies soften the scene with a peculiarly fine effect. The parlors are magnificently furnished, and offer many tempting devices for the ease of their occupants. The bed rooms are large and perfectly ventilated, and from the second to the fifth floor are furnished in equal style and taste. But the most beautiful apartment in this elegant establishment is the dining room. Its walls are of oak, with exquisitely carved ornaments and the finest attainable polish. The glowing arches which span it in three places and the exquisite inlaid work which shines about the windows in various designs are among the many things to admire in this royal room. Its tables are furnished with the clearest crystal, the brightest silver and the most beautiful china. The menu is in keeping with the elegance of the table settings. The entire house is lighted both with incandescent electric lights and with gas. It is kept in every respect up to the metropolitan standard, and is under the superintendence of Mr. Harry Hardell, a well-known Philadelphia hotel man, who is assisted by Mr. Pendleton, of Richmond, Va. From the verandas of the hotel a superb view is had. The breezes sweeping constantly through the wide arches and the fluttering curtains make the inn a most tempting summer resort, and it is arranged to be kept warm and cozy in winter, so that whenever the traveler finds shelter beneath its roof he can be comfortable and happy. The following detailed description of it is taken from the Atlanta Constitution:

"The Anniston Inn has to-day been thrown open to the public, complete in every detail—nothing wanting, nothing lacking, nothing left undone—a perfect marvel of finish, painstaking work, of convenience, of comfort, luxury and taste; furnished as has not been surpassed in this or any other country.

"The situation itself is everything that could be desired, commanding the most beautiful views in every direction, of the finest valley and mountain scenery in the South. The grounds have been laid off on every side and graded and sodded, shrubbery planted, walks graveled and rolled, drives paved, and the whole

work made permanent and secure by the most thorough system of paving and draining. The architecture of the inn is Queen Anne. The first story is cut stone, the second of pressed brick, and the third and fourth and fifth of heavy framed work, covered with California redwood shingles and Georgia slate. The wide windows, heavy window frames, gables and large bay windows give a grand and picturesque effect. The interior, from the first floor to the top, is one beautiful piece of cabinet work of oak, selected Southern pine, California redwood and walnut. The ceilings, floor, beams, wainscoting and window, door casings, hall, offices, ladies and gentlemen's parlor, the sitting and dining room, have been finished and highly polished, bringing out the natural grain of the wood as perfectly as the finest finished furniture. The heavy girders supporting the ceiling of the dining room, ladies' parlor and rotunda have been encased in oak beautifully paneled and polished. The grand staircase is a masterpiece of workmanship and art; built of massive polished oak and flanked on every floor with beautiful stained-glass windows. The ladies' chambers are large, with wide windows, all opening so each window gives a view of the grand scenery beyond. Every room from



ANNISTON INN—SMOKING ALCOVE.

basement to the top floor, as well as the broad porch that extends for nearly a quarter of a mile around the building, is lighted by the Brush incandescent light, the whole arranged either for gas or electricity. The building is heated throughout by hot water conveyed through pipes and register in the rooms and halls, while the baths and water closets are supplied on every floor with abundance of clean water from the mountain water-works, and the entire building protected in case of fire by hose on each floor; water always on at a high pressure from the mountain reservoir. The elevators are run by hydraulic pressure from the same source.

“The ladies' parlor is carpeted with heavy Wilton carpet; the windows draped with heavy Turcoman old gold and velvet curtains suspended by brass poles and brackets. The furniture is upholstered with blue crimson silk plush; the tables are ebony beautifully inlaid; the chandeliers are yellow brass, with center-piece of beaten copper ornamented with silver. The fireplaces in parlor,

gentlemen's sitting room and dining room are built of 'terra cotta,' are very wide and old-fashioned, extending from floor to ceiling, and are ornamented with heavy brass andirons and fenders. The upper sash of the windows of first floor, as well as the doors to ladies' parlor and main hall, are stained glass; the windows and archways all draped with rich Turcoman curtains. The furniture of office and gentlemen's parlor is cherry, beautifully carved—the large arm and smokers' chairs, cherry, cushioned with olive green leather; the writing table, a desk of cherry, elegantly finished. The dining room is a gem—a thing of beauty—well lighted with broad square and bay windows on every side—the upper sash, with small stained glass, being stationary; the lower being doors of large glass swinging on hinges, opening outward—all the windows being hung with heavy rich Turcoman curtains, the floor carpeted with heavy Hartford body Brussels carpets, as are the halls, office, gentlemen's parlor and smoking room, stairway, and every chamber in the inn. The chambers are large and splendidly ventilated—windows of double width, protected by linen window shades on spring rollers; next with folding inside blinds. The windows of every chamber are draped with costly Madras curtains. Many of the suites of rooms have bay windows and broad tile fireplaces, with massive paneled mantels of polished yellow pine and beveled plate-glass mirrors. The furniture of chambers is highly polished cherry and ash, each bed furnished with a spring and hair mattress; the pillows and bolsters of feathers of best quality. The blankets, quilts and linens are of the finest quality, and in keeping with the surroundings.

"The table linen is of the choicest quality; the silver plain, but massive; the china and glass are in keeping with the whole. Two hundred guests can be comfortably seated. The children's and servants' dining rooms are fitted up in the same manner as the main dining room. The inn has two large refrigerators on the ground floor capable of holding a car load of meat and fruit, and one large refrigerator for general storage, and a smaller one on kitchen floor for daily use. On the first floor of the building known as the annex are the steam laundry, ironing room, bakery and boiler room, with two 40-horse-power locomotive boilers to heat the building and run the electric engines. On the second floor is the kitchen, serving room, china and silver room and pantry, all fitted in the most thorough manner. The two floors above are the servants' quarters, being a small inn of itself, the rooms being nicely furnished and carpeted, with bath rooms and closets on each floor."

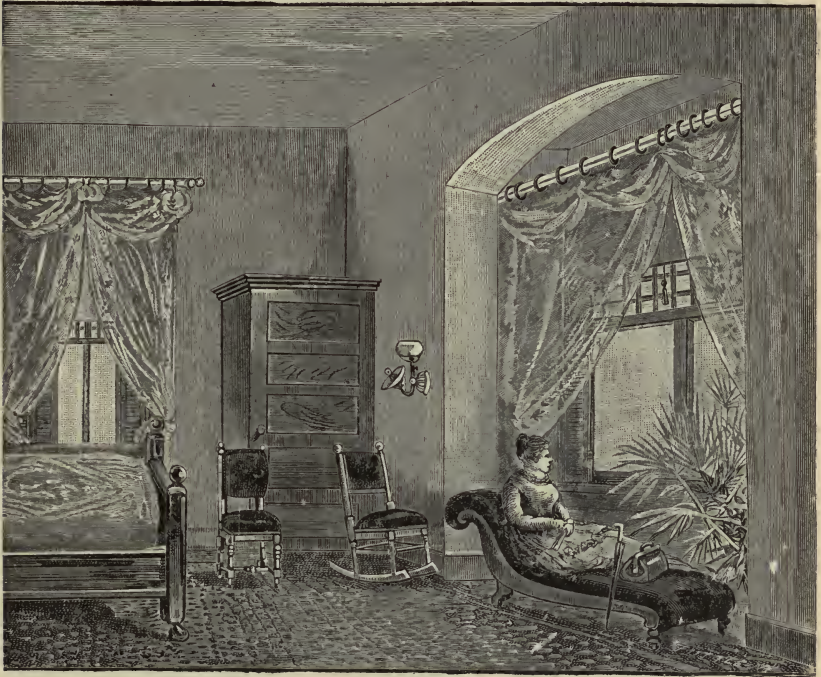
#### AS A PLACE OF RESIDENCE.

Anniston combines unexampled advantages as a manufacturing and business center, with all that can be desired to make up the attractions of a delightful and healthy home. The site of this town possesses every feature that an experienced engineer would desire in selecting a perfect location for a city. It is the highest point on a railroad in Alabama. The beautiful valley in which it is situated lies at the foot of Blue Mountain range, 800 feet above tidewater, and, sloping from the east and west to the center, with a gentle fall toward the south, there is afforded the most perfect natural drainage. This natural advantage has been supplemented by a splendid system of drainage constructed by the founders of the city. The Blue Mountain range towers 1,000 feet above the valley, and its picturesque slopes present the most attractive building sites, from which the eye is delighted by long stretches of beautiful scenery and extended views of the country beyond, to a distance of 30 miles or more.

The three essentials of a good home are: 1st. Pure air. 2d. Good water. 3d. A salubrious climate. All of these are to be found at Anniston. The air sweeps over upland valleys and table-lands nearly 1,000 feet above the sea level; pure and sparkling water from the mountain ranges is obtained, while the climate

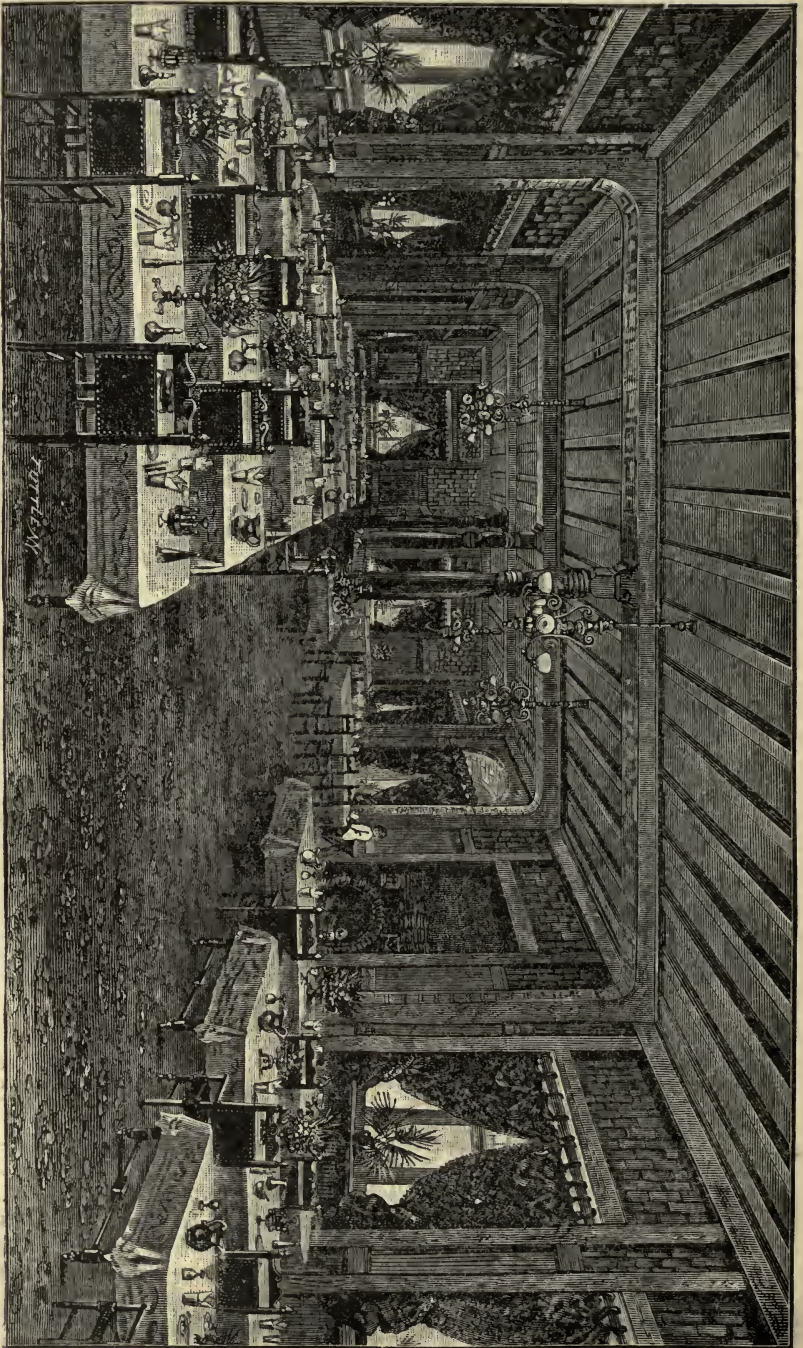


is delicious the year through. Its pure air from pine-clad mountains, its pure water, its absolute freedom from all malarial influences and from mosquitoes, its equable climate—free from the rigorous winters of the North and from the oppressive heat of less elevated localities South—make this, in point of health and comfort, equal to any locality on this continent. In addition to natural charms, everything that could contribute to the attractiveness of the city has been done. It was completely surveyed and laid off before a house was built; then the streets were planted with shade trees and tunneled with sewers. The streets are broad and smooth, with wide, well-paved sidewalks. No expense or pains have been spared in grading and improving the streets, which are covered with crushed slag, and rolled down to a perfection of hard, smooth, clean surface, splendid for riding and driving. A finely-constructed turnpike road across the



ANNISTON INN—A CHAMBER.

mountain east of Anniston to the beautiful Choccolocco Valley beyond will afford a drive over what is probably the finest highway in Alabama. The city is lighted by electricity, the streets, the hotel, opera house, furnaces, etc., all being illuminated by the Brush system. There is a fine system of public schools. There are five churches, besides those for colored persons. There are now in course of erection two churches, which, for architectural beauty and elegance of interior finish, will compare favorably with any in the oldest and wealthiest portions of our country. There are beautiful parks and shade trees. The stores are fine, solid, commodious brick structures, some with handsome iron fronts and large plate-glass windows. One is struck with the neat, clean, well-to-do appearance of the business houses, and the entire absence of the small shed and shanty style of stores common in towns the size of Anniston. The merchants are brisk, live, vigorous; they all



ANNISTON INN—DINING ROOM.

seem to be busy and prosperous. There is an air of thrift pervading everything. The residents, from one end of the town to the other, seem imbued with a sense of cleanliness and neatness and order. The influence of the founders of the town has made itself felt everywhere, and the streets and buildings are kept in perfect condition. Everybody seems proud of the town and anxious to do his part towards keeping up its reputation. In and around the city are some magnificent private residences, the homes of proprietors of manufacturing establishments here. Those outside of the city have extensive grounds, with handsome lawns ornamented with evergreens, flowers, etc., and provided with all the comforts and conveniences and luxurious appointments that could be possessed in suburban homes around any large city. Fine lawns, terraces, orchards, shrubbery, ornamental gardening, conservatories, &c., show the refined tastes of the people of Anniston.

There are suburban towns for the families of the men employed in the shops; another for the factory people, and another where the homes of the colored people are gathered. All are laid out regularly and are made attractive.

The working classes are well paid and well cared for. They live in homes—not in hives. Their cottages are models of neatness and comfort. They are built of the best material, painted and plastered, and furnished with water, which comes gushing down from the reservoir that supplies the entire city. Attached to each cottage is a quarter of an acre, which is devoted to flowers and vegetables. The pride of the cottagers in beautifying their premises is remarkable, some of them displaying unusual taste and skill. One who has never seen a crowded manufacturing town in the North or in England cannot appreciate the comforts of the Anniston mechanics. Compare these pretty cottages, with their ventilation, their vine-covered porches and their blooming gardens, with one of those enormous tenements where the men, women and children are packed into narrow rooms, shut out from the light and the breeze, and shut in with discomfort and disease. The difference can be read in the appearance of the people who are placed in these contrasted conditions. The pale, pathetic faces, with their weary, timid look, so often seen in great manufactories, are unknown in this place, where air and exercise, clean houses, pure water and wholesome food are afforded to all.

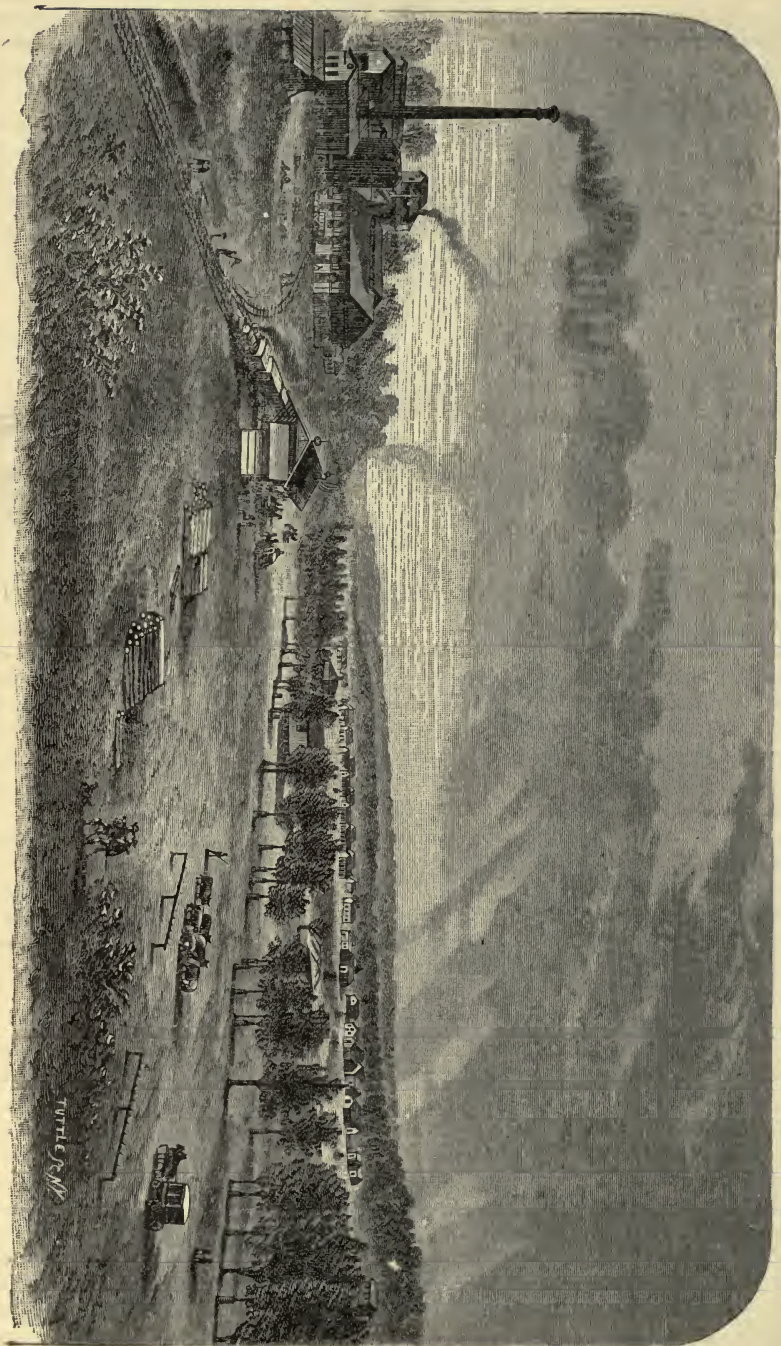
Rents are very light. Four-room cottages are only \$7 a month, and six-room cottages only \$10.

The city is surrounded by some of the richest counties in the State. The fertile lands and the needs of the growing population of the town offer inducements to the farmer and truck raiser. The surrounding country offers rare attractions to the sportsman, the mountains and forests abounding in game.

#### AS A RESORT.

The numerous attractions that give to Anniston its charm as a home also make it a delightful place of resort for those seeking health or pleasure. The climate, for its mild equability, is unsurpassed. The heavily timbered mountains, the extensive pine forests beyond, the great elevation above the sea, the cool days and cool nights in summer, the mild and even temperature of winter, the entire absence of those conditions that breed mosquitoes and miasma, epidemic diseases being unknown; the beautifully sodded fields as a result of 10 years' persistent cultivation of the grasses, the thousands of water-oak shade trees, the beautiful drives, the springs of cool, refreshing freestone water coming from the base of the hills, combine to perfect in Anniston the ideal summer and winter resort. And it is for this purpose that the Anniston Inn, described above, was built and furnished in such magnificent style. Persons going to Florida in the fall or returning North in the spring will find this inn a most entrancing place for a short sojourn. The

IRONATON.



TUTTLE & CO.

stop here will break the fatigue of a long ride. The railroads will give travelers every facility for stopping over as long as they may desire, and will protect them in their through-rate tickets.

Anniston is destined to a great future. Its healthy and beautiful location, splendid climate, enormous mineral wealth and rich tributary agricultural country give it such material advantages that it will continue to increase in population and wealth much more rapidly than in the past.

You have here a town complete in all its appointments, without a dollar of floating or bonded debt, and protected by a provision embodied in the town charter that no tax of more than one half of 1 per cent. shall be assessed for municipal purposes.

There is no other place in the Southern States so healthy, so beautifully situated; none where the air is purer, the water clearer, and where there are so many pleasant inducements to the full enjoyment of these luxuries of life, as in Anniston.

#### IRONATON,

in Talladega County, Alabama, 20 miles from Anniston, is owned and was built by the Clifton Iron Company, and it is beautifully situated, with every provision for drainage, and laid off in broad streets planted in shade trees. The company commenced the construction of Furnace No 2 in June, 1884, and completed and started it in May, 1885. This furnace is one of the finest in the South; is 55 feet high and 12-foot bosh; is provided with two Whitwell stoves and Grittinger ore kilns for calcining ore. It is built close to the ore banks. The furnace produces 300 tons per week of standard charcoal car wheel and malleable iron—the iron being noted for its tenacity and excellent chilling properties, and being lower in phosphorus than any other ores in the State. The furnaces at Jenifer belonging to this company are also supplied with ore from the mines at Ironaton, the product of both furnaces reaching 450 tons per week.

The town and furnaces are supplied by water brought by a 10-inch main from a mountain stream two and a-half miles distant to a storage reservoir of 2,000,000 gallons near the town, from whence it is distributed through the town to the furnaces and to the ore mines for washing the ores. The town is obtaining considerable trade from the adjacent country, and is an important shipping point by the Anniston and Atlantic road for the people of the adjoining country. The Woodstock Iron Company keep quite a force of men mining and shipping ore to their works at Anniston.

The officers of the Clifton Company are: Saml. Noble, president; Sidney F. Tyler, vice-president; John E. Ware, secretary and treasurer; S. N. Noble, superintendent. Directors: John E. Ware, Alfred L. Tyler, W. S. Gunnee, New York; Thos. T. Bouve, Boston.

Ironaton is destined to become quite an iron manufacturing point, the ores being suitable for Bessemer steel, and existing in large quantity

# MISSISSIPPI.

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The State of Mississippi extends from the 35th degree of north latitude to latitude  $30^{\circ} 13'$ , and measures in its greatest latitudinal extent 331.65 statute miles. In longitude it extends under the 31st degree of north latitude from the Alabama line, in longitude  $88^{\circ} 23'$ , to longitude  $91^{\circ} 41'$ , on the Mississippi River, and measures in its greatest longitudinal extent 227.7 statute miles. The area of the State is 46,340 square miles.

There are probably few States in the Union concerning the aspect of whose surface erroneous impressions are more generally prevalent than is the case with Mississippi. The reputed character of a comparatively small portion of its territory—the Mississippi Bottom—is very commonly referred to the greater portion or to the whole of the State, among whose features, swamps, marshes and mosquitoes are thought to hold a prominent place. It may not be superfluous, therefore, to premise, that outside of the Mississippi Bottom, sand hills, with pine, black-jack and post-oak, are a very conspicuous feature in the landscape—the surface being generally hilly, though nowhere mountainous. Few of the ridges probably rise as high as 400 feet above the drainage of the country—the usual elevations of the hills above the minor watercourses being from 30 to 120 feet—and none probably are above 800 feet in absolute elevation.

For the classification of soils, I shall divide the State into six grand divisions, to wit: The Mississippi Bottom, the Bluff Formation, the Yellow Loam Region, the Prairie Region, the Central Prairie Region, the Pine Woods Region.

I find in a pamphlet recently issued in the interest of the Georgia Pacific Railway, and written by Messrs. Campbell and Ruffner, two eminent scientists of Virginia, the following:

## THE ALLUVIAL SOIL OF THE YAZOO DELTA.

The term Mississippi Bottom properly belongs to the entire plain between the bluffs within which the Mississippi River runs, beginning at the The Chains, thirty miles above the mouth of the Ohio, and extending to the Gulf of Mexico. The Yazoo Delta is the part of this plain lying between Memphis and Vicksburg, and is properly so named from the fact that the Yazoo River, with its tributaries, drains the whole of it. This vast delta is ellipsoidal in shape; its length is 180 miles, and its greatest width 75 miles. Its area is over 7,000 square miles, by Prof. Harper's computation, and nearly all of it is in Mississippi. It is crossed by the Georgia Pacific Railway near the line of its greatest width. Much of the delta is liable to inundation, and on this account was long avoided by planters. But, thirty years ago, the Mississippi River—which had communicated with the delta through the Yazoo Pass and other bayous—was excluded by levees, and, except where broken lately, these are now continuous from the mouth of the Yazoo River, near the southern extremity of the delta, to its northern extremity near Memphis. Were the levees made secure, or the jetty system of deepening the channel resorted to, as probably will be the case, the delta generally would be pro-

ected from inundation; and local levees would protect and dry off much of the interior now subject to everflow. Congress has taken the matter in hand with an energy which promises the best results.

All the soil reached by the plough is of two classes—loam and clay. The loam lies in ridges, five or six feet high, along the banks of the streams. The clay underlies the loam throughout the delta, and is reached between the loam ridges where the surface has received less deposit. When swamps occur they are equi-distant between the loam ridges. These loam belts act as levees, and because of their dry and elevated character are preferred for building sites.

The dark loams are easy to work, quick, nearly always in good mechanical condition, and when summer rains are seasonable, produce the largest crops.

The Blue Grass region of Kentucky will not be able to surpass the "buck-shot," or clay lands, in the production of grass when the war waged upon it by the planters here shall have ceased. A planter, not far from Greenville, sowed grass on his land, and a neighbor sued out an injunction against him. Fortunately, when the case came to trial, the court decided that grass on a neighbor's farm was an affliction that had to be borne.

Cattle and hogs thrive on the delta almost without being fed. The wild grasses in summer, and the switch cane in winter, keep the cattle in good order; whilst roots, acorns, beech-nuts, pecan nuts, etc., furnish abundant supplies of food for hogs. The whole delta is burdened with animal and vegetable life, and nothing short of a volume can describe its wealth and all its attractions.

This region has a most unmerited reputation for ill health. Unquestionably, malaria abounds in September, but it is manageable, and the people are manifestly healthy. Having been there during the hottest spell of last summer, I would not now fear to return to it at any time. The timbered lands can be bought at from \$1 to \$5 an acre, and the improved lands at from \$5 to \$30 an acre. If there is any better investment in the world, I know not where it is.

The Mississippi Bottom, which once reached to the mouth of the Ohio River, has justly been compared to the delta of the Nile; but we are in the habit of regarding as an evil what the Egyptians regard as their greatest blessing, viz., inundations. The great Mississippi plain can be, and will be, protected against floods; and yet floods made it what it is, and would build it higher and maintain its fertility. As long as it remains insufficiently protected, however, planters must be prepared for freshets. Since the drainage of the Yazoo Delta has been improved, the cotton planters have been clearing away the forests and substituting crops of corn and cotton, but the development of this kingdom of agricultural wealth has scarcely commenced. The delta of the Nile has never approached in productiveness that of the Yazoo River.

Inasmuch as this great plain, which extends from Vicksburg to Memphis, and from Greenville, on the Mississippi River, to the bluffs on the edge of Carroll County, thus embracing more than ten large counties, is destined to become as famous for its timber as for its soil and agricultural productions, I desire to give some clear idea of the enormous natural growth upon it.

Probably not one-fourth of the plain is cleared; and the other three-fourths, perhaps four-fifths, is covered with probably the heaviest forest on the American Continent. I have seen forests where the trees were more crowded, and were feeble and attenuated in consequence; but here the trees usually have room for the full development of their trunks at least. The foliage is high overhead, whilst the great trunks seem sound and healthy, and stand in endless and impressive columns around the traveler. Occasionally I found too much crowding, and hence smaller trees, constituting areas of what would be called simply good timber; but the mills which attack these forests must always be supplied with the

double saw arrangement, when circular saws are used, many of the logs being much too large to be cut by a single saw.

Except some similar country in Arkansas, Louisiana and Tennessee, there are no such lands on this continent, if in the world, in point of fertility and durability, as the Yazoo River bottoms. The crops of corn, cotton and oats that have been and are made there are enormous. If this land were cleared and well cultivated, it could be made to produce enough cotton for the world's present demand.

This country is now rapidly improving. One great trunk line traverses it, running from New Orleans to Memphis. Another road will cross it, running from Canton, Mississippi, to Arkansas City, Arkansas. It has been running to Yazoo City for some time. Another road is projected to cross the delta from Greenville, Mississippi, and is built some distance east

#### THE BLUFF FORMATION.

The Bluff Formation forms an excellent soil, decidedly one of the most fertile in the State. But a careless and unnatural agriculture has almost completely worn out the soil. The territory of this formation extends to about twelve miles east from the Mississippi.

The Yellow Loam Region, called by Prof. Harper the Middle Tertiary or Miocene Formation, extends from the boundary line of Tennessee, or from the 35th degree of north latitude, to the line of the Eocene Formation, very nearly along a line determined by 32° 30' of north latitude, and extends, westward, to the alluvium of the Yazoo and Mississippi Rivers, where it has been washed away to a great extent, and the remaining portion overlaid by the sediment of the rivers. Eastward it extends to the Cretaceous Formation. Within those boundaries it comprises about 10,692 square miles.

The surface of the newer Tertiary Formation is generally very hilly. Its upper members consist most generally of different kinds of sand or clay, which are very easily washed and swept away by the water of the atmospherical precipitations, and high hills and deep vallies or gullies of erosion and denudation characterize it everywhere, and render it, in some parts, unfit, in others difficult for cultivation. The surface of this formation is, with very few exceptions, nearly equally hilly from the line of Tennessee to within a short distance from its southern boundary. Near this boundary it appears generally a little more level.

Towards the west, along the line of the alluvium of the Yazoo and Mississippi Rivers, it is bordered by an uninterrupted chain of considerable hills, which have prevented those rivers from encroaching farther eastward, and which cannot be considered as originally formed by the rivers.

It would be needless and too tedious to tell of this hill and that valley, of the soils of the various localities. Some are very fertile and easy to cultivate; some are the reverse. Nor would it be worth while to tell of all the streams and springs; and a map will tell the main rivers and their courses. The country is watered by rivers and numerous creeks and streams.

This Yellow Loam Region embraces most of eastern De Soto County, all of Marshall, all of Benton, much of western Tippah, all of Lafayette, most of eastern Panola, most of eastern Tate, a narrow strip of eastern Tallahatchee, all of Yalabusha, all of western Calhoun, all of Webster, all of Montgomery, east Grenada, east Carroll, east Holmes, all of Attala, all of Choctaw, northeast Yazoo, north Madison, all Leake, all Winston, all Neshoba, part of Kemper, Lauderdale, Newton (greater part), and northeast corner of Scott.

The southern division of the Illinois Central Railroad, commonly known as the "Big J," traverses the western part of this area. Passengers, seeing how badly washed and hugely scarred by denudation is a good deal of the country



along that road, are very apt to be badly impressed with the country, and to form hasty conclusions adverse to it. If they will stop off at many places and inspect, they will have their impressions much modified or totally changed.

### THE PRAIRIE REGION.

I come now to an area of Mississippi that it would be a pleasure to write much about. It is its own eulogium when it is in its season and has a chance. It was "the granary of the Confederacy" during the late war. It is one of the prettiest agricultural countries, so far as mere configuration and soil go, to be found anywhere; and no prairie-reared citizen of the United States could ever see it as it ought to be seen without being almost entranced with it. The great drawbacks to it are general lack of water, except in cisterns or artesian wells, and mud in winter. Fences generally are wanting, and good residences; but the day will certainly come when this country will be beautified beyond conception.

This Prairie Region lies in a string of irregular areas in Kemper, Noxubee, Lowndes, Oktibbeha, Clay, Monroe and Chickasaw Counties—their combined area, according to Prof. Harper, amounting to nearly 150,000 square miles. The prairie lands are level or gently undulating, with dark, heavy, calcareous soils that are often simply clay marls or rotten limestone. These prairies are in some places exceedingly rich, but are not always productive, owing sometimes to hard usage, but often to their mechanical condition, which calls for a loosening treatment. The whole Prairie Country is based on a white, chalky limestone; which shows in patches, and occasionally on the streams in mural cliffs. Along the Tombigbee River, in sight of the railroad, it reminds one of the Dover Cliffs on the English Channel. The patches of rotten limestone cropping out in the fields annoy the farmer; but it has been proved by experiment that, with a dressing of rough vegetable matter, these spots will grow clover, and ultimately sod over. A more beautiful and desirable country than is this Prairie Region, or one more surely destined to celebrity, is not to be seen anywhere. It is adapted to all crops.

The sub-divisions of the Cretaceous Formation, except the Rotten Limestone Group, are so limited in area and so comparatively unimportant, that I shall give them but slight attention. The Rotten Limestone Group embraces in its area one of the best countries in the United States. The surface of its territory is generally level or but slightly undulating. When high ridges do occur, their main mass is the limestone itself, on which the orange sand formation is wanting, or present only to an inconsiderable thickness or in patches—the surface formation being mostly stiff clays, which underlie the prairies. Hence, a great dearth of naturally available water during the dry season characterizes the region in an economical point of view. The material of the formation itself is of great uniformity—a soft, chalky rock of a white or pale bluish tint, with very little sand, consisting of variable proportions of fat, tenacious clay and white carbonate of lime in crystals extremely minute, and with some shells of infusoria. The stratum is of great thickness and uniformity of character on its southwestern border, borings of 700 to 1,000 feet being no uncommon occurrence in South Chickasaw, East Oktibbeha, Noxubee and Northeast Kemper.

The Eutaw Group offers no strikingly characteristic features. By far the larger portion of its surface is thickly covered with the strata of the orange sand, from which the upper sandy members of this group are often distinguished with great difficulty. Its structure is bluish black or reddish laminated clays, often lignitic, alternating with and usually overlaid by, non-effervescent sands, mostly (though not always) poor in mica, and of a gray or yellow tint.

Its territory is the border of almost the whole of east Mississippi, where it meets Alabama, from near the north line of Lowndes County to very near the

north line of the State, at Tennessee; save a very narrow and jagged line in the extreme eastern part of Tishomingo County, and a very small area in east Itawamba, where both counties abut on Alabama.

The Ripley Group is the main source of the Tombigbee River, and has many beautiful streams with fertile valleys.

#### THE TOMBIGBEE SAND GROUP.

This group represents a long, narrow strip of country in the eastern part of the State, running from the north line of Tennessee to a little below Columbus. In Lowndes County it occupies an area equivalent to five or six townships. For nearly fifty miles it is hardly three miles wide. For the upper half of its area (say forty miles) it is about two townships wide. Its main course is nearly due south.

The region occupied by the Eutaw and Tombigbee Sand Group is hilly and sandy, and the soil generally inferior. Springs are abundant and their water mostly freestone.

#### THE RIPLEY GROUP.

The surface of the territory occupied by this, the uppermost stage of the Cretaceous in Mississippi, is generally hilly and to a great extent thickly covered with the strata of the orange sand, which have filled up the gaps occasioned by fracture or denudation in the ridges formed by the upheaved strata of the group. Small prairie spots are met with in many localities, but usually on or around isolated hilltops or ridges where some soft calcareous stratum has approached the surface.

In entering upon the territory of this formation from the west side, on which, in South Tippah, Pontotoc and North Chickasaw, it is bordered by the flatwoods, there is a very striking change in the aspect of the country, which suddenly becomes hilly and broken, the hillsides coming down steeply into the valleys, and exhibiting outcrops of hard limestone, while the surface is covered with deep-tinted orange sand.

Springs become abundant, and the growth of vigorous black and Spanish (*red*) oak and hickory, intermixed with lime-loving trees like the poplar, walnut, butternut, linn, umbrella tree and locust on the hills, and of the sycamore, honey locust, wild plum and red bud in the valleys, indicate the change of soil. In some portions of Pontotoc County there is a pretty regular rise as we advance eastward from the flatwoods, the limestone strata, which at first were at the foot, gradually ascending to the top of the hills of the Pontotoc Ridge, until a sudden descent brings us down to the level territory of the rotten limestone, at the east foot of the ridge. Such is the case on the road from Rocky Ford via Tardyville to Ellistown, and on the Tocapole and Camarago Road via Redland. The outcropping ledges of rock there form the crest of the ridge, which runs parallel to the strike of the stratum.

This group begins at the north end of the State, and terminates near Houston, in Chickasaw County. It embraces much of the eastern half of Tippah and Pontotoc Counties, and is a sort of wedge inserted in the upper half of Chickasaw, about midway, east and west, in its area. A very little portion of it is in West Tishomingo. In this group is found the backbone of North Mississippi—the Pontotoc Ridge; and, indeed, it makes the “divide” of the waters far south, finding its termination in the Summerville Ridge, down in Kemper County; and the hills, as “outliers,” running still further south.

Prof. Hilgard, before describing the Prairie Region proper, writes of the surrounding country, characterizing the western portion of the area as gently undulating oak uplands, interspersed with spots and patches of *black* and of *bald* prairie, with wide fertile bottoms. East is a more hilly region, with a poor, sandy soil,

whose prevalent timber is short-leaf pine, black-jack and post-oak, together with chestnut—the bottoms being narrow but fertile. This is the character of the Pine Hills of Northeast Mississippi, whose supply of water is generally dependent on and bears the characteristics of the orange sand formation

The prairies proper—level or very gently undulating tracts possessing a deep black, heavy soil, on which timber is very much scattered or altogether wanting—form belts or series of disconnected patches, having, on the whole, a north and south course, and are interspersed with tracts of a more rolling surface, mostly with a shallow, pale, light soil, timbered with the common upland oaks—Spanish, (*red*), post, black-jack, and sometimes red and black (*black*) and scarlet (*Spanish*) oaks—which, though usually, perhaps, of average fertility, is sometimes absolutely poor, as may be gathered from the scrubby, stunted growth it then bears, the productiveness varying, it appears, very nearly in proportion to the approach of the rotten limestone to the surface. Here we find not unfrequently, where these uplands slope off toward the creek bottoms, “hummock” lands, increasing in fertility as we descend; and in the bottoms themselves, (where the white rock is only a few feet under ground,) passing into black prairie soil, differing little from that on the ridges, though, perhaps, in general, it is somewhat lighter and richer in vegetable matter.

On the western side the prairies are in much greater force, and are the predominant surface soil for considerable areas, as in parts of Madison and Hinds. In the eastern portion the country is spotted very much.

The yellow loams of Madison and North Hinds are justly considered as being among the best uplands of the State; superior to the prairies as to “safety,” while little if at all inferior in productiveness; like the Marshall table-lands, and about equally well suited, on an average, to corn and cotton.

I confess that much of the eastern half of this prairie has extraordinary fascinations for me. The great varieties of soil is one great attraction. A few hundred yards from the stiffest black fertile soil underlaid with limerock, and the soil *par excellence* for clover, Kentucky blue grass and such, is to be found sandy loams fit for the peach, pear, sweet potato, and, in fact, every sort of fruit and vegetable possible to the climate; where swift, clear streams, teeming with fine fish, are dancing over golden sands and pebbles. The great attraction in stock raising is that, in wet seasons, one can turn the sheep and cattle on these sandy tracts, where they have a dry foot. And the well watered character of the lands, with the richness and limestone character, make them an ideal for stock raising purposes.

These lands, in the eastern part, have been rather poorly situated—having indifferent railroad connections; but new combinations have brought them into new relationships with railroad facilities. The New Orleans and Northeastern Railroad is a very considerable help, and the Vicksburg and Meridian Railroad, at one time of comparative little importance, becomes a link in a trans-continental chain; and from being on an “off” road, now becomes on what will probably soon be one of the great thoroughfares across the continent.

The lands in this belt have been selling for almost nothing. I have seen some most superbly timbered and very rich held at from \$2 to \$6 per acre.

#### THE PINE WOODS REGION.

The Pine Woods Region is a section only touched here and there, as it were, with the impress of development in much of its area, and which, with a large population of Scotch or French agriculturists, could be transformed, as can much of the same country south, into a land of beauty and plenty.

Infertile in the main, it can be and has been made to yield immense crops; and its variety of products almost defies enumeration, and has no limit but climate. As fine wheat as can be produced can be raised there, and barley, rye, upland rice, corn and buckwheat are all "at home." Sugar cane, too, does extremely well.

The range of fruits is very great there. On the coast the orange, fig, pear, many varieties of grape, many small fruits do well, and even some varieties of summer apples. Higher up (leaving out the orange and tender fruits) almost every fruit possible to the climate succeeds that will succeed at the north. Among grapes, the Delaware is superb; and one of the most eminent grape growers gave this as his judgment, after thorough investigation. The pear and winter apples of several varieties are fine. As to peaches, I have never seen finer, although a long resident in Central Delaware, and familiar with the peaches of other favored localities.

Vegetables, it would be superfluous to praise. The quality of coast vegetables—Mobile, for instance—is now well-known. There the business of vegetable raising is of immense proportions, and it is growing on the coast, along the Jackson Railroad, the Mobile and Ohio Railroad, and the New Orleans and Northeastern. In diseases of the throat and lungs, the pine woods climate is rapidly gaining reputation for its ameliorating and curative effects. Florida only emphasizes by her vastly more renowned and popular patronage, by invalids, an effect common to those who seek the pine woods of Southern States. Nearly a decade ago, I collected testimony in abundance to demonstrate what Southern Mississippi would do towards lung and throat troubles by climate cure. Some astonishing attestations were given of the cures and ameliorations incident to mere residence. And this is not peculiar to Mississippi. South Carolina, at Aiken; Georgia, at Thomasville; Alabama, at Citronelle, and other places only demonstrate virtues common to most of the pine woods country far enough south to share the benefits of a certain mitigation of the rigors of winter. At what point nature draws this cordon is undefinable. Years ago, while in pursuit of statistics with reference to one matter and another, I was told by Sir John Crossley, M. P., who was then traveling in the United States in the interest of the Mississippi Valley Society, an English organization of which he was president, that we ought, in behalf of the South, and to eliminate a deeply rooted impression in the English mind that foreigners could not stand field labor in the South, to endeavor to extirpate this most injurious belief. I immediately sent out circular letters to all the newspapers printed in Mississippi and Louisiana, asking all readers of European rearing and of Northern and Western life to send me testimonials as to the point in question. I had letters enough to fill a volume, showing that field labor was prosecuted with but little more discomfort and with as good health as in their former homes.

Though in strictness foreign to the topic of Mississippi, these questions, in justice to the South, must find a discussion somewhere, and had as well be gotten rid of here as elsewhere, I therefore give, under this topic of health, a letter written by me several years ago to answer enquiries of northern men, and taken from a paper called "The New South." Its language I mean for far broader application than was its intent when written. It was written from a town in the pine woods of Southwest Mississippi:

First and last, there have been addressed to me many inquiries as to the healthfulness of our climate and locality, and while I may have, in a general way, answered them, I have never done so with the particularity that the importance of the subject demands. Nor is it possible, in the scope of such a letter as your columns would admit the publication of, to do justice to the subject. Still, with your permission, I will deal more elaborately with it than I have heretofore.

"It goes without saying" that we have a larger proportion of deaths from malarial diseases than from any other. These diseases are the great bugbear of the Southern climate, and they are the favorite and most effective topic of invective to all who seek to deter immigration or sincerely dread to seek a refuge from unrequited toil or bleak and dreary winters in the inhospitable climes or unremunerative fields of labor far North and West. To say that we have eight months of beautiful weather; bland climate from October to May; that lands are cheap; that the products of our soil are incomparably more varied and productive than theirs, passes for little or nothing with many of them. They concede it, perhaps, but they say, with long visages, in a solemn voice, "You have fever and ague," and that determines them to bear it, and reconciles them to the long dreary winters of their homes.

This letter will, therefore, endeavor to eradicate from the minds of many persons the very erroneous impressions that this locality is so unhealthy, because of malarious diseases. I would not undertake to prove that our climate is superb for pulmonary affections and rheumatism; that we are comparatively exempt from enteric, cerebro-spinal and typhus fevers, which are such a scourge elsewhere; or that we are very little subject to fatal cases of intestinal diseases.\* We shall assume that as all yielded.

But the charge against our climate, above all, is that it is a malarious one, and the dread of it engrosses the apprehensions of most who think of coming here, or furnishes the most credible imputation of our detractors.

Flinging very much of everything else aside, therefore, I reply to this great bugaboo. If any one will consult the map of the vital statistics of the ninth census—1870—there will be found most startling facts. No mere guess-work that, but hard, dry, relentless truth, that deals with no hypotheses nor theories, but chronicles things as they are. Let that one, therefore, who seeks for enlightenment, turn to the map giving "Deaths from Malarial Diseases." He will there find this locality colored as No. II. He will, by examination, see that we are as healthy, with respect to malarial diseases, as a very large portion of Kansas, quite a portion of Nebraska, very considerable portions of Iowa, large tracts of Missouri, a large slice of Illinois, the same of Indiana, the greater portion of Michigan, some of Ohio, a portion of Pennsylvania along the Susquehanna, a part of New York, and parts of Delaware and Maryland. But that is not all. He will find the malarial hue deeper on the map, and a larger per cent. by nearly a hundred, of deaths from malarial diseases in several States than here. Those States are, large tracts of Missouri, quite a portion of Illinois, a considerable area in Indiana, two areas of Michigan. All this may surprise readers, as it did the writer, but these are facts, and disenchanting as they may be, the stern reality confronts us.

But a consideration of the naked facts, as much as they enlighten, do not do justice to us. No consideration of the question which did not involve a view of the habits of the people inhabiting this locality, would do justice to the question.

Here, our people, in the main, are poor; when they get sick doctors are not sent for promptly, and bills for medicine are dreaded. Their houses are ill-built, and, in many cases, very poor protection against wind and weather. They remind one of the "ruined tenement" in one of Lord Chatham's finest bursts: "They may be frail; the roofs may shake; the wind may blow through them; the storm may enter them." Then look at the fare, the habitual food of by far the larger proportion of our people—corn bread, bacon and collards. Another habit of many is to work in any kind of weather. Does a heavy cold rain come on, they stick to their work in the field, instead of unhitching teams and seeking shelter.

Almost all the travel is done on horseback, or in heavy, slow wagons, where there is no protection from rain. I have seen men by the score come to court in midwinter, wet to the skin with a cold rain, after a ride of a dozen or twenty miles, and trust to fires and whiskey to dry and warm them. They mount their horses, or get into wagons for an all-day jaunt, in the hardest of rains.

Take the indoor life of many of them. Instead of building a little fire morning and evening in fall and spring, they disregard the precaution. Indeed, you may go into many houses in the best society South, and in midwinter you will find the inmates without fires, trusting to shivering and shuddering through the low temperature that chills the blood and sows the seed of fever and ague. I

\*This language will apply to much of the Pine Woods Region South, as, indeed, will most of the statements of the letter.

hardly remember ever to have eaten a meal in a Southern gentleman's house when there has been a fire in the eating-room. Let a bright day come in midwinter, (and there are many of them,) and the children are out in troops, barefooted and next to naked.

But I cannot exhaust the enumeration. With such a catalogue of neglects, imprudences, etc., is there any wonder that people are sick? Need I contrast the habits of Northern people with those I have enumerated? Their comfortable homes, warm "wraps," consideration of fare and hygiene, promptitude in administering medicine, etc.? Yet, notwithstanding all this, we excel or equal so many States in respect to our most dreaded scourge—*malarial diseases!*

What a transformation will come when Northern people try this climate! Indeed, the experience of Northern people shows that, with respect to malarial diseases, they are incomparably more healthy than the natives, and the reason is plain—they take better care of their health.

Now, if any one shall inquire why we are so healthful here, the country need only to be seen for an explanation. We are in the great pine belt, in a high and rolling country, and one whose drainage is perfect, and there is nothing to produce malarial sickness but the imprudence or neglect of hygiene of the residents.

I wish I had time to say more. I could tell of hundreds of Swedes who have tried the climate, and how those who were prudent had the best of health, and how those who were imprudent died;\* how I have scores of letters from men of almost every nationality, who have tried field labor in the South, and had good health.

I hope that I have let some light into sincere but benighted minds, who have thought this country a "vast Sarbonian bog," reeking with malarias and swarming with venomous reptiles.

To this I add the forcible testimony of Dr. A. C. Stevenson, of Indiana, the former president of the American Association of Short Horn Breeders, in writing from Mississippi to the *Prairie Farmer*, of Chicago, Illinois. He says:

"In conclusion, permit me to contradict the old notions that were promulgated in the days of slavery, that white men could not work in this climate. I have conversed with numbers of men from the West, from your State and city, who have lived here for years, who all bear witness to its falsity. But, more, here are foreigners from almost every part of Europe, who work at all seasons with as much impunity as the colored race.† And again, here are many neighborhoods and families in various places, that never owned a slave, who have done their own work, and are to-day the most prosperous and healthy people in the South. Another great error is that persons from the States, formerly not slaves, will not be kindly received. This may be contradicted by the very broad fact that they are more desired here than any others whatever, and will meet the most hearty welcome. Lands can be had for from three to twelve dollars per acre, and in the most healthful situations."

As an illustration of how grossly misjudged Mississippi is, as to her healthfulness, we give the following most striking compilation from the United States census:

ANNUAL DEATH RATE FOR EACH THOUSAND OF POPULATION.

Massachusetts.....	18.59
New York .....	17.30
Virginia .....	16.32
Indiana .....	15.77
Texas .....	15.53
Kansas .....	15.22
Pennsylvania.....	14.92
Illinois .....	14.60
Kentucky.....	14.39
Alabama.....	14.20
Georgia.....	13.97
Colorado.....	13.10
Mississippi.....	12.89

\*This came from their eating (the first year from Sweden) voraciously of salt pork. It was an instructive illustration.

†He was writing from a town where almost all the citizens were other than natives—most of them from New England and the North and West.

In the year 1875 I was appointed to a position on the southern branch of the Illinois Railroad, then under the control of Col. H. S. McComb, of Wilmington, Delaware, who was its president, to develop the material interest of the road. I immediately addressed myself to the work of developing the fruit and vegetable interests and encouraging stock raising and grass growing. Among other interests, I induced S. H. Edgar, Esq., the then vice-president of the said road, to bestow a liberal sum of money to further my work in exciting attention to the adaptation of the soil and climate along part of the road to fruits. Through this liberality and enterprise, a number of gentlemen were enabled to attend the Quarter Centennial Association of the American Pomological Society, held in Boston, in September, 1873, to which meeting they had been appointed delegates of the Louisiana Fruit Growers' Association. The following report, in part, is taken from the report of the proceedings of the American Pomological Society for that year. In the report by the committee, the area to which this list is limited is to "the southwest and that portion of the Gulf coast between Mobile and Eastern Texas;" but I am now satisfied, for my part, that the district to which this list is adapted is very much larger than the limits therein given; for, since then, fruit growing in many parts of the South (then never conceived of) has become a very important industry.

## LIST OF SELECT FRUITS.

*Apples.*—Early Harvest, Red Astrachan, Carolina Red June, Primate, Garretson's Early, Yellow June, Early Strawberry, Bevan, Golden Sweet, American Summer Pearmain, Rhode's Orange, Bruce's Summer, Yellow Horse, Cane Creek Sweet, Batchelor, Taunton, Hoover, Carter.

*Pears.*—Doyenne d'Ete, Julienne, Osband's Summer, Beurre Goubault, Doyenne Boussock, Bartlett, Beurre Superfin, Howell, Sickel, St. Michael Archangel, Duchesse d'Angouleme, Gray Doyenne, Beurre d'Anjou, Lawrence, Winter Nelis.

*Peaches.*—Early Tillotson, Yellow St. John, Tuskena, Amelia, Yellow Rare-ripe, Mountain Rose, Chinese Cling, Early Crawford, Stump the World, Susquehanna, Oldmixon Free, Oldmixon Cling, Columbia, Raymond Cling, Picquet's Late, Lady Parham.

*Plums.*—Temple, Lombard, German Prune, Wild Goose, Indian Chief, Brill.

*Grapes.*—Hartford Prolific, Ives, Concord, Clinton, Maxatawney, Scuppernong.

*Figs.*—Lemon or "Angelique," Celeste, Green Ischia, Brown Turkey, White Genoa, Black Genoa, Brunswick, White Smyrna.

*Oranges.*—Louisiana "Creole," Mandarin, Brazilian.

*Strawberries.*—Longworth's Prolific, Wilson's Albany, Mary Stuart, President Wilder, Charles Downing, Kentucky.

*Raspberries.*—Davison's Thornless, Mammoth Cluster, Golden Thornless, Clark, Herstine.

*Blackberries.*—Early Wilson, Lawton.

This list can be very much enlarged, and I attempt it in a measure with reference to Southern Mississippi; and some of the varieties may suit many other localities.

To apples may be added: Summer—Striped June, Sweet Bough, Early Red Margaret, Hames, Carolina Watson, Early Golden Sweet, Family, Julian, Aromatic Cheese, Stanley's Seedling. Autumn—Bonum, Yopp's Favorite, Pennsylvania Cider, Tuscaloosa Seedling, Mamma, Phillippi, Lawren's Greening, Carter's Blue, Buncombe, Junaluskee, Maverick Sweet, Yates, Ben Davis, Disharoon, Carolina Greening. Winter—Ferdinand, Cannon Pearmain, Oconee Greening, Moultries, Neckajack, Hockett Sweet, Stevenson's Winter, Holly, Pryor's Red, Stansil, Shockley, Romanite, Santa, Limbertwig. Cider apples—Dean Crab, Hewes' Virginia Crab, Yates.

To pears we will add—Madelame, Ott's Seedling, Doyenne Boussock, Clapp's Favorite, Edmonds, Andrews, Buffum, Belle Lucrative, Urbaniste, Louise Bonne De Jersey, (stiff sods in north part of State), Niles, Kieffer, Garber's, Hybrid,

China Sand, Le Conte. The last is planted in prodigious numbers South, of late.

To the list of grapes I add, without any hesitation, Delaware, growing as I have never seen it elsewhere and yielding crops in the gravelly hills of Mississippi.

In the same country the Tokay is considered very fine by an expert who was reared in Hungary.

I am very glad to be able to add such distinguished testimony as the following from Parker Earle, Esq., who wrote it to the New York Tribune over ten years ago:

"I have often seen very beautiful and perfect pears from that country. I think the fruit averages as well as in Northern orchards. All kinds of berries grow well, and vegetables are in season winter and summer. Going from Southern Illinois, where our grapes universally rot, I was much delighted with their perfection in Southern Mississippi, where I found no rot whatever, but great luxuriance of vine and fruit."

#### THE GRASSES IN MISSISSIPPI.

I shall say for grasses in this State what is applicable to most of the Southern States. I have spent years in the study of them; not from the scientific standpoint of botany, or in the books, but from the practical point, "to know what would succeed and where." I have even sown the seeds for hundreds of miles out of the car windows along the Mobile and Ohio Railroad, in East Mississippi. I did this not as a mere vagary. I had a double motive. I thought it would be a monument of my own, and keep me green in the memory of time as long as grass grew, and I knew it would impress the stranger. In my work to develop the State, I was constantly impeded, thwarted and harrassed by numbers of pessimists, who would declare to people who were looking through the country to buy homes "that grass, clover, blue grass, etc., would not succeed; that the climate was too hot; that the sun and dry weather, long heat, etc., etc., would kill it out." I determined to have a living refutation—nature's own assertion of the pernicious heresy; so I sowed Kentucky blue grass, white clover, red top, orchard grass and may be one or two others, from Verona to Shugulak, on the main line of the Mobile and Ohio Railroad, on the branch from Artesia to Starkville, on the branch from Artesia to Columbus, on the branch from Muldon to Aberdeen. All told, I did not sow over four or five bushels; yet, if the traveler will look sharp, he will find some beautiful catches any time between mid-December and July first—the proper season for these grasses South, so far as Mississippi. It has had a poor chance. The road bed is of sand. The hogs root it, the half-starved cattle and mules browse it. The spades of the track-repairers destroy it more or less, but it is to be found, and will stay. So much for the benefit of the casual traveler, and that he may note this living epistle, and, as he "runs, may read."

But I have not only sown these seeds in the rich lime belt of East Mississippi, but in the poor pine woods in various places, and always with success. I commenced in 1873. In that year I sent out hundreds of circular letters and collected testimony, without measure, as to the success of various grasses South. Not only so, but I had as assistants, to inform the country at large, the aid of eminent journalists. These I invited South to my Mississippi home, and showed them ample demonstrations. Their pens attest their conclusions. Dr. M. L. Dunlap, deceased, was a visitor. He thus writes to the Chicago Weekly Tribune, of which he was the agricultural editor, with the *nom de plume* of "Rural," from McComb City, Miss., under date of December 21, 1874: "The mayor of this city, Col. Hillyard, has shown me a large collection of letters from planters in regard to the products of the country. These were in reply to tabulated questions sent-



out for the purpose of drawing out the true state of facts. Clover, sown at the close of summer\* and having the advantage of the wet season, does remarkably well, \* \* \* in some cases cutting three or four tons to the acre during the season. [I have known over 9,000 pounds of extra cured hay made during the summer season from one acre.—*M. B. II.*] On the lawn of the De Soto House is a patch of red clover, sown last May, that is doing finely." (As the last statement may mislead, I will state that the clover was sown late in May by me, because I could not get the seed earlier. I advise no one to sow later than March; always in the autumn, in mid-October, if possible, for the latitude in question.)

After his visit to the writer, I accompanied him over the State. Visiting Jackson, Mississippi, on his tour of observation, Dr. Dunlap writes soon after to the Tribune says: "Mr. Musgrove showed me on his grounds red clover, Bermuda grass, white clover, timothy and orchard grass, all looking well. \* \* The barn of Mr. Musgrove was filled with clover, hay and oats of his own growing, and the hay was selling at \$45 per ton to those who knew that clover would not grow in the State of Mississippi. And yet, here is the evidence that red and white clover will grow as freely as in Illinois."

A little after he visited John Handy, Esq., at Canton, Miss., and wrote: "He has been very successful in growing clover for hay and pasturage; also white and Alsike clover. Strange as it may appear, this latter clover is of thrifty growth. \* \* \* He has a herd of Jerseys as fine as I have seen in the North. The secret of this is his pasturage, which is abundant the entire year."

Thomas Meehan, Esq., Editor Gardeners' Monthly, and then editing the Weekly Press, Philadelphia, paid me a visit. He writes thus in the latter paper: "Old William Cobbett once said that a grain of good practice was worth a whole ton of theory; but here tons of practice, in the shape of grass, may satisfy those whose theories lead them to think that grass will not grow South. Mr. Herwig is very fond of fine cattle and dairying. \* \* \* His stock is of the Jersey breed, which does all that any one can expect."

Mr. Herwig then lived on the southern branch of the Illinois Central Railroad, at Arcola, Louisiana, in the Pine Woods Region, and had even then a considerable herd of Jerseys.

Mr. Meehan visited me again. He wrote to the Philadelphia Press: "I noticed many little patches of blue grass, clover and similar plants used in Northern agriculture, which seemed to feel themselves perfectly at home, though it is the general impression they are unsuited to the climate."

After his return, he thus writes: "The easy, good-natured people of the South made up their minds that clover and grass would not grow down there, but made no attempt of their own to test it. With grass and clover, Southern agriculture would have a glorious future. The writer of this, having traveled much in the South lately, has seen, "with his own eyes," grasses and clover as good there as anywhere, and wonders why the idea ever prevailed that grass or clover will not grow."

The late Rev. Alexander Clark, D. D., then editor of the Methodist Recorder, of Pittsburg, Pennsylvania, writes to the Evening Chronicle: "It has been thought that the grasses are not adapted to the Southern soil. This is a popular delusion. While cotton was king, corn was a conscript, and clover and timothy spies from an enemy's camp. The penalty was beheading and annihilation! The negro has been trained from time immemorial to destroy grass as an interloper. He intuitively takes to cotton. But our friend, Col. M. B. Hillyard, lately from Delaware, has made it a special business to study the grasses, and has wrought

\*Middle October is the best time to sow grass seeds in Mississippi.

some significant results. Within a year or two the planters have seen the necessity of cultivating hay. By more than one hundred letters from various portions of Mississippi, the testimony is that meadows are soon to become a prominent feature of the Southern landscape. We have seen clover a foot high in Pike County, Mississippi, the last week in March. We have walked over as splendid a sward in the same vicinity as ever greened the Miami valley. And these things were the result of the simple sowing of the seed on the natural soil, that of the pine ridges. On the bottoms the chances are still better. The statistics show that blue grass, Herd's grass, Hungarian, clover, timothy, Guinea, tall meadow oats, orchard grass, Bermuda, Mesquite and Rescue grass, will grow anywhere in the State. While the sun is hot for some of these species, the rains and dews are so copious that they never burn out, except in droughts, such as are more common in Illinois than here. We look forward to the day when dairies will be conducted on a larger scale in Mississippi than New York or Northern Ohio. The winters here will be so much lighter, and the yield of grass so much more abundant, that this branch of business must necessarily have large room."

This prediction of dairies South don't look so "wild" now as it did then, especially in view of the fact that the Agricultural and Mechanical College of Mississippi has the only professorship of dairying in the United States.

Mr. J. G. Kingsbury, one of the editors of the *Indiana Farmer*, visited me and inspected the country. He writes to his paper: "As to the adaptation of this region to the growth of our cultivated grasses, Col. Hillyard has already given sufficient testimony in his letters on the subject in our columns. We saw blue grass, timothy and clover all growing thriftily."

In another part of the letter he refers to a New Yorker who had moved to Mississippi, and says: "He was exceedingly well informed regarding the capabilities of this country, and assured us that he had never seen ranker and better blue grass than some he was growing on a farm he owned in another part of the State. With this fact established, it is easy to imagine what a chance there is for making easy fortunes in the cattle business, in a country where the climate does not require the animals to be sheltered for a single month in the entire year, and where vegetation scarcely ceases its growth the year round."

Further on he says: "No doubt but clovering will be found as successful here as at the North, as a cheap and beneficial renovator."

Dr. A. C. Stevenson, of Greencastle, Indiana, then the president of the American Association of Short Horn Breeders, visited the South three times, investigating the capabilities for and inducements of the country to stock raising and grass growing. On two of these occasions he was my guest, and I accompanied him on extensive tours on both sides of the State of Mississippi and extending into Louisiana, showing him the facts I wished to impress upon him, and, through him, the country at large. While on these visits South, his pen was pretty busy inditing letters to various Northern journals about what he saw and thought. The following part of a letter, though somewhat off the topic, is so weighty in its facts and its way of putting them, that I make a long extract from it. It is from the *Indiana Farmer* of February 2, 1876:

\* \* \* "The inducements to emigrants to come South, instead of North and West, are many. The winters are so mild as not to stop the production of many of the necessaries of life during the whole season. Cattle may be kept through the winter with little or no food, as many are kept; the comforts to man and beast during the winter season are most striking. All and more that can be raised North or West can be raised here. Here corn can be raised with the most slovenly cultivation; ground ploughed three inches deep with one small mule, when it should be ploughed eight. Oats do well, and may be sowed

in the fall and pastured all winter. In the northern part of this State wheat products are entirely satisfactory. Barley grows and produces finely. But there are crops here of very great value, in addition to anything that can be grown in the West. Rice is alone a Southern product, and one of great value as an article of food, and in demand everywhere. Sugar is also a Southern product, and one of universal consumption. Cotton is also a Southern product of world-wide demand. These are in addition to the field and garden crops of the North and West, and are no insignificant product, but of the greatest value, and in which the South can have no competition. So that the market in these articles is always sure. This brings us to the realization of another fact: The better markets that must be realized by those producing breadstuffs here (grain and meat) over those who go West. Corn here averages about \$1.50 per bushel; West, about \$0.30 per bushel; other grains in the same proportion. Hay here will average \$35.00 per ton; \*West, about \$10.00. These differences depend upon the "middle-men," and transportation. This being one of the great markets for all such products, and the South must continue to be a market for such products as the West grows, so long as cotton and sugar are produced. These products may as well be grown here as West, and the question is, and the only true one, had he who desires to emigrate, as a farmer, better go West and produce corn and hay, the former at thirty cents a bushel and the latter at ten dollars per ton, or go South and produce corn at one dollar and fifty cents per bushel and hay at thirty-five dollars per ton? Now, if the Western farmer produces fifty bushels of corn per acre at thirty cents per bushel, it is fifteen dollars per acre. Twenty bushels, at one dollar and fifty cents, is thirty dollars, just double, and if the Western farmer makes one ton and a-half per acre, at ten dollars per ton, an acre will amount to just fifteen dollars; whilst a Southern acre, at one ton per acre, would yield thirty-five dollars. But this is not a fair representation. I can select lands here, with fine dwellings which will cost half the value of the land, at twelve dollars per acre, which will yield, with Western culture, forty bushels of corn per acre, and which will yield at two mowings during the season, two tons of hay. The winters are satisfactory. But you ask me what of the summers? Personally, I cannot answer. But here are a number of men from Indiana, who testify most positively that the summers are not perceptibly warmer than they are in Indiana, and the nights are even pleasanter. The summer, or warm season, is longer, that is the only perceptible difference. One thing more, health. How is it? I have no doubt that Mississippi, which I have now visited twice, is as healthy as any of the Western States or Territories—the bottoms of the Mississippi and other large streams excepted. The country is undulating, generally, and a more robust people are not to be found in the United States."

In a full survey of stock raising in the South, in a letter to the National Live Stock Journal, Chicago, for March, 1876, after commenting upon domestic animals South; after stating that a very erroneous opinion has too generally prevailed that this is a grassless country; after some cordial tributes to various native grasses South, he thus writes: "The Mesquite and Guinea grass are much esteemed here. Besides these, some of our common grasses do well. The orchard grass does well, and will make here the best of pasture. I have seen a few fields of red clover, and I have just cut branches nine inches long. Herd's grass, also, is a sure crop. Timothy I have seen looking well in special localities. Blue grass is growing in the yard from whence I write, but I see it seeks shady spots. It might do on north hill sides. White clover seems to grow spontaneously; it may be seen on every cleared spot not in cultivation."

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\*The Southern farmers now raise so much of their own corn and hay that the figures must be reduced at least one-third.

At this day, few well-informed persons can doubt that the South has some of the best grass regions on the continent; but I thought it well to give the testimony of these eminent authorities, who, nearly ten years ago, were satisfied as to Mississippi and other parts of the South. If such men had no doubts then, who can doubt now? I ought to try to impress the reader with another most important consideration. The testimony I elicited at that day bore reference, in the main, to one of the most infertile divisions of the South; the country visited and seen by these gentlemen is one of the least adapted to grass raising—the Pine Woods Region of Mississippi. The land is thin, and will not bring over twelve bushels of corn to the acre, when fresh—much of it. Worse than all, so far as grass is concerned, there is little or no lime in the soil. The deduction is obvious then. If this country will bring such grasses and in such quantity, what will these soils do when enriched and limed, or marled? For marls are very common and abundant in much of the South. Better still, what will the good lands and the rich bottoms do? And greater yet, what will those rich cretaceous soils do that are so abundant in parts of the South?

I hope that this effort to impress the inhabitants of the pine woods of the South will not be in vain; for from Virginia to Florida, in the pine woods, clovers and other grasses can be grown; having satisfied myself as to Florida, with reference to red clover some years ago while visiting that State. And I desire that much and most of what I have said and shall say of grasses (the native varieties excepted) in the article on Mississippi, shall apply to the South generally. In this connection I will give a list of grasses adapted to most of the South, known to me by having tested them or seen them, or avouched by most satisfactory testimony: Clovers—red, white, Alsike, Alfalfa, Lucerne, spotted, Medick (commonly known as California clover, burr, or yellow clover), Japan clover, Mexican or Florida clover (last two of which have only made their appearance within a few years, are spontaneous, and exceedingly rich in nutriment and valuable in other respects). Kentucky blue grass (superb in the cretaceous soils of the South, and good even in rich pine lands, if limed), red top, the Bent grass of England, or Herd's grass of Pennsylvania (almost inextirpable in some soils and growing on very poor soils and even uplands), Timothy, the Herd's grass of New York and New England (a native of South Carolina, I believe), orchard grass, velvet grass, tall meadow, oat grass, Italian rye grass (which last two cannot be too highly extolled), Johnson grass, Guinea grass (wonderful for hay, but should never be put in land not destined for its perpetual use, as it is ineradicable, or nearly so), Texas blue grass (new, very promising and highly commended). I might swell the list by giving many native Southern grasses, but this is needless. There are two other grasses I cannot pass. One is carpet grass. This I have never seen outside of Alabama, Louisiana, Mississippi and Florida, although it is likely it is found in most Southern States. Cattle prefer it to Bermuda. It is one of the earliest and latest grasses, and green all the year as far south as New Orleans. The other is Bermuda grass, the sacred grass of India. This grass will afford perpetual pasture in the extreme South. It is a grass so valuable as to beggar praise. I have lately discovered that it will grow well as high as Frenchtown, Maryland. On the banks of the James River, in Virginia it is known as wire grass, and regarded as a great pest. No grass known will stand as much pasturing and drouth, and none will support as many head of stock per acre.\* It will grow on rich or poor land. The ideal pasture is this grass, Kentucky blue grass and white clover on the same ground. In much of the South this combina-

\*Dr. Ravenel, of Charleston, S. C., by certain treatment of soil, obtained near there ten tons of hay per acre.

tion will afford pasture every day in the year, while, if the land be drained well, it will hold up the "foot" of stock and keep them out of mud in the most rainy seasons.

I have been so elaborate on grasses because I would have no reader left in uncertainty as to whether the South is naturally a great grass country. If any one doubts now, I commend that one to a personal inspection. After this long digression, I return to the Pine Woods Region of Mississippi. But before I comment more particularly on the Pine Woods District of Mississippi, I wish to say a few words about the Pine Woods District of the South as a sheep raising country. I believe that, in a few years, this area, which stretches from the James River in Virginia to Cedar Keys in Florida, and from the Atlantic coast far back into the interior, west, is destined to be one of the greatest sheep walks in the world. Whoever has read the work of John L. Hays, Esq., Secretary of the Wool Growers' Association of the United States, on sheep raising in the South, must have been struck with the capabilities he concedes to the country in question in the behalf stated.

Some years ago, in a very minute and tedious examination as to the health of sheep and cattle, and the feasibility of making these industries great and profitable in the country I was writing of, I became satisfied that dairying, sheep raising and stock raising would become great industries South. For very much of this Pine Woods Region of the South there is a great future. Sheep are almost exempt from disease, are almost incredibly fecund, cost almost next to nothing to raise, produce, for obvious reasons, wool of the finest character. The country is so well watered, is so exempt from the depredation of beasts of prey (except the negro's inevitable cur), the climate so mild, the variety of food so great, that it is almost an ideal sheep country.

In much of the area Japan clover is making its appearance. Some States are becoming well "set" in Bermuda. These grasses will do well in the pine woods. If one will scatter the seeds of white clover, orchard grass, red top and blue grass, these grasses will furnish winter pasture, and sheep, for much of the area, will need no attention in winter. Every railroad running through a pine woods country South ought to sow these grass seeds, so that a traveler can see what the lands will produce.

And this Pine Woods Region, some day, will become the great factor in establishing in the United States, and most likely in the South, one of the future great industries of the country—the manufacture of the finest woolen fabrics, of which France and England are now the great producers. As is well known, what are, in the United States, the great wool producing States, cannot raise the Saxony sheep. The climate is too severe for this delicate breed. The tariff on wool prohibits its importation in the measure needed for a great industry in fabrics founded upon such a quality of wool. So, from these two causes, our finest wear—French and English cassimeres—must be supplied from abroad. But the day will come ere long when millions of these sheep will be raised South, and then the opportunity for an industry new to the country, and most beautiful and lucrative, will enure to the South. Wool from this breed has been raised South that surpassed the best of the imported article.

The raising lambs for early markets North and West will some day become a great industry generally, as it now is in a part of the South.\* The cheapness of these pine woods lands, their healthfulness, their climate, their adaptation to such a vast range of products, mark them as the future seat of a great population and

\*In Tennessee, for instance, it is becoming quite a business. The ewes are fed wheat, mixed with a little cayenne pepper in May, and become "in heat." Their lambs are born in fall and ready for market early in the next year, at high prices.

of great and varied industries. At present, the buzz of the saw cutting the pines into lumber, and turpentine distilleries, are mainly the signs of life in much of the area; for I have ridden on some Southern railroads (and sometimes off) for miles, and have seen hardly a sign of life. Along many railroads the timber has been cut off for several miles on either side, until it has become unprofitable to haul logs. The mills have been moved, and stumps and heaps of sawdust are all that is left to show that there has ever been any business transacted there. The land is considered worthless, but it is better naturally than many parts of the United States I have seen, where a wise husbandry produces bountiful and remunerative harvests, and where taste and wealth make life a charm. Thus much for the pine woods of the South, in general terms. A country too much disregarded.

The pine woods of Mississippi stretches to the Gulf of Mexico on the South; on the west it extends to the Bluff Formation on the Mississippi River; east, the pine woods run to the Atlantic coast, and the Alabama Pine Belt abuts on Mississippi, indistinguishable, except by the arbitrary line of the State; north, it is a curving, sinuous line, running through Lauderdale, Newton, Scott, Madison and Yazoo Counties. On the northern and southern borders the geologists have made divisions into which I cannot particularly follow. But the Pine Woods Belt has been chiefly notable for its immense wealth of timber, its production of turpentine and rosin, and for its capabilities for the production of fruits and vegetables—only utilized of late in the last two respects. Of late years, the value of these pine forests has been appreciated somewhat, more especially by Western lumbermen, who, seeing the rapid disappearance of the Western pine, and the enormous appreciation in the prices of lands containing it, have bought millions of acres in Mississippi. Probably six millions of acres have passed into the hands of speculators at prices of from one to two or three dollars per acre. Fortunately, there are millions of acres left, at a dollar an acre and higher, according to quality. In a few years, however, these lands, for timber alone, must be very much higher in price, and, unlike much timber land West, the land can be turned into valuable agricultural and horticultural uses; although my suggestion for all rolling pine lands in the South, of the usual sandy formation, would be to get them "set" in Bermuda grass, white clover, Kentucky blue grass, etc., and keep them thus perpetually. The country would thus be kept from "washing;" its beauty and symmetry would be preserved; fine pastures for cattle and sheep in a superbly watered land could be found. The upland flats for fruits; the bottoms for cotton and the cereals. By the above management, the Pine Woods Country could easily be made the "thing of beauty" it ought to be.

This Pine Woods Country in Mississippi is one of the best furnished areas in the country with railroad facilities. On the east, the Mobile and Ohio Railroad traverses its eastern border; on the west, the Jackson Railroad (southern branch of the Illinois Central Railroad) penetrates the centre of the western area; along the north line, the Vicksburg and Meridian Railroad runs; from Meridian to New Orleans, runs the New Orleans and Northeastern Railroad, whose names designate its direction. This is a new railroad, and opens up not only the vast pine forests, but a beautiful sheep country and fruit and vegetable area. Another railroad is projected (it is said now that it will be built) from Jackson, Mississippi, to Ship Island, on the Gulf coast. This will open new pine lands and give another north and south railroad. Still another railroad runs through the southern border of this Mississippi Pine Belt—a division of the Louisville and Nashville Railroad. In the article on the Alabama Pine Belt, I said I would defer further notice to remarks on the coast country. This country will soon be attracting great attention from the country at large for its charms as a place of residence. From thirty or forty miles east of New Orleans until as many from Mobile west (say for from

fifty to sixty miles), there is an area, for much of the way, in which the orange will succeed. The advantages of this area are many. It is accessible to the gayety and shopping attractions of New Orleans. In two or three hours, one can leave one's town on the coast and arrive in New Orleans. On the coast one can get fish, oysters, crab, shrimp, in the greatest abundance and cheaply. There are chances for sailing in many large shallow bays, where there is little or no danger; or one can sail in the sound or the gulf, or run up the many beautiful rivers and creeks that "make into" the gulf. The huntsman can find plenty of shooting, in wild duck, geese, snipe, woodcock, quails. If he goes back a little, he finds plenty of wild turkey and deer. The salt water for bathing in summer is another great attraction, and this is the only feature of its many charms that has brought any consideration to this strangely overlooked area. Hundreds of beautiful cottages, with orange groves, are owned by residents of New Orleans, who resort there in summer for bathing and for the cool and healthful sea breezes.

It is somewhere on this coast that I have seen, in fancy, the future ideal city, with some poetic name, arise; where wealth and taste shall vie with nature in lavish embellishment; where architecture shall achieve her choicest triumphs; where time shall recall the glories of other climes and seas, and where famous cities, now (as to their brightest aspects) only memories, shall have glorious similitudes. At thoughts of the future of this gulf coast, the old time splendors of the Mediterranean and Adriatic revive in recollection, and cities forever embalmed in history and song—Naples and Nice and Venice. This city may have, in its environs, its vineyards, from whose grapes the choicest wines will be made;\* groves of orange and olive, orchards of peach and pear. Silk factories may spring up, and the fabrics there made may vie with Lyons, in France, or Paterson, in New Jersey.

And how varied are the delights of the sea! At eventide the pale purple of the sky, glassed in the "ocean mirror rounded large," over which a vast calm is brooding, where the sweet contagion of the tranquility is irresistibly caught, the hush is undisturbed, save by the gentle wave as it tenderly lips the shore—kissing it, as if stealthily, like a lover his sweetheart, lest a kiss sound may betray his dalliance. Other times the colors—here, opaline breadths; there, spaces of dark blue; nearer, the deep green; cloud shadows dusking and dappling here and there; pearly flashes from the breaking billows, leaping and frisking. There are the bounding ships and the screaming, darting sea birds. Along the shore the—

"Flying foam scuds."

The islands lying—

"In dark purple spheres of sea."

And then the morning! Gray's fine line rushes to memory:—

"The breezy call of incense breathing morn."

This joyous air puts the most inspiring influences in nature in sympathy with it. Hear the applauding rustle and the dancing responsiveness of nodding and curtsying trees, the laughing, leaping plaudits of the crisp and sparkling waves, the largeness of movement, the grand swiftness of the wind-driven, wide-spreading clouds, as they fleet so joyously down the sky. Everything on this seaward, wide-view scene speaks of freedom, spaciousness, exaltation. The air exhilarates like laughing gas, and the breast seems too small for the glad throbs of the dilated heart. Landward, the narrow horizon is fringed with varied shades of green from magnolia, live oak, pine and other trees. And, while the mocking bird has, for song, "all seasons for its own," yet, in the morning, he seems most jubilant. This time of the day he embellishes and ornaments in glorious aban-

\*An eminent authority thinks the scuppernong destined to make the choicest champagne that ever titillated the palate of epicure.

lon, and with "bright, keen joyance." From his exhaustless repertoire, he pours—

"From the sleek passage of his open throat, a clear, unwrinkled song."

Never a mortal approached him. Pretty and rapid earthquakes of ecstasy shake his breast; little storms of quavers escape his throat; roulades, eadenzas, fioritures, all ornamentations of music, fly from "the sugared nest of his delicious soul." Diapasons and gamuts are gamboled through in the melodious mazes of his sparkling song, and he revels and riots—seeming to create a being of music, the vibrations of whose very wings are tuneful.

And then the other beauties of the gulf coast, in the flowers, the flowers!

Why a city, such as I have faintly foreshadowed, should not be, one cannot tell. And in its villas our Southern marbles—marbles whose variety and beauty defy description—will play a conspicuous part. These beautiful stones are at the very doors of the gulf, in Louisiana and Alabama especially, and in exhaustless quantity and of superb quality. I am not sure but one can have "marble halls" upon the gulf almost as cheaply as buildings of brick. Hundreds of millions of dollars are invested in villas North, on the Hudson, at Long Branch, Newport. Why not some South? Let one point be deeply engraven on the mind of the invalid. Take the map and see how far from the raw "north-easters" one is who lives on this gulf coast, between New Orleans and Mobile. And this air, when incurred, has come hundreds of miles through forests of pine, whose influence has taken out its fangs and softened its rude blasts with the "balmy sigh" of its medicinal breath. All sea winds on the coast are bland.

It is useless to elaborate these attractions. They will soon receive attention from Europeans and Western and Northern people; and the coast will become a Southern Newport or Long Branch in winter. It will become, in name and fact, the sanitarium of the Southwest. (What I shall say of Florida hereafter will apply, in great part, to the gulf coast). I should have a profound satisfaction in commanding consideration for and helping to build up a country which has no superior in the many regards in which taste, wealth and culture seek their most elegant and charming diversions and pursuits. But I must forbear. The country needs no eulogist. Nature sings an unceasing pæan in the cadences of sea beats, the pathetic pine songs, the melodies of her feathered songsters, and her balm dropping blooms forever murmurous with busy bees. I may, however, extract from some words of the late Hon. J. F. H. Claiborne, the historian, some remarks. In a letter to Gen. A. M. West, published with the Centennial Address of the latter gentleman by the Mississippi State Board of Centennial Managers, he says, on page 30: "Southeastern Mississippi produces a great variety of fruit. The peach, apple, plum, pomegranate, pear and fig; pecan, grapes of many varieties, strawberries, dewberries, blackberries, the persimmon, mulberry and pawpaw, or custard fruit, and melons of various kinds, grow in great perfection and yield abundant returns. Nearer the seashore we find, in addition, the orange, lemon, citron, shaddock, jujube, almond, banana, olive, and occasionally the pine apple." Of "staple crops," he says: "Sea Island, or long staple cotton, is a safe crop on this coast, anywhere within the influence of the salt air from the sea. It rates in the market quite as well as that grown in South Carolina. Yield, about 800 lbs. of seed cotton to the acre, more or less, according to land, culture and season. Tobacco, from Florida or Cuba seed, has been tested, and, in careful hands, would be a paying crop. A large area of land here is specially favorable to its culture. Sugar cane succeeds admirably, and is a reliable and remunerative industry. Rice, so far, has grown exclusively on uplands, and only for domestic use. Its culture might be profitably extended. Sweet potatoes have been made to yield 500 bushels to the acre. Two crops of Irish potatoes are grown on the same land, the



first planting in January, the second in August. Indigo, broom-corn, the sorghums, and the castor oil bean, have all been successfully planted."

I have seen fine oats, corn and buckwheat. It is quite certain, too, that along this coast will, some day, spring up an immense trucking business. Already has a start been made. Its climate is a little earlier than Mobile, with about the same soil, and, as is well known, Mobile is one of the most considerable vegetable producing areas in the country now. It ought to be a great point, too, for canning figs, oranges and other fruits, shrimp, fish, oysters and vegetables. Here and there a cannery is started. Others will follow. Dairying ought to be a considerable business there. I know that fine Jerseys can be raised there. I know that Bermuda grass and Japan clover can be combined with Kentucky blue grass, red top, orchard and white clover, and perpetual pastures are to be had of the choicest grasses. All it needs is skill and rich land. There ought to be many woolen and cotton factories along the coast. The cheapness of living for the operatives, with the sea to feed them from; the healthfulness and the delights of the sea shore; the fact that Saxony sheep can be raised so well and cheaply and their wool had; the further fact that the wool already raised there has a distinct name—"lake wool," is of very superior character, and brings a higher price; the fact that New Orleans is so near, where cotton can be bought every day; the fact that Sea Island cotton can be raised there—all these point strongly to the sea coast as a great manufacturing area. All these operatives of factories, canning factories, these wealthy cottagers, these throngs in winter from the North in the future palatial hotels, will furnish to many dairymen and poultry-raisers lucrative vocations. It is useless to put any more colors into the picture. The sea shore furnishes the canvas. Art and enterprise, wealth and culture some day will draw such a "living landscape" upon it as will make any forecast I could draw the veriest daub. I have said so much to point the way to wealth and taste and enterprise, hoping they will follow it and construct and beautify as they go.

As to the health of the country, it ought to be superfluous to speak. Let me "close the chapter" by quoting a passage descriptive of a resort I am familiar with, from the pen of Col. Claiborne, in the book I have been last quoting from: "But the position is at once beautiful and commanding. A rippling bay, dotted with verdant islets, and looming out into the "deep, blue sea," "far as the breeze can bear the billows' foam." In the back ground stands the great pine forest of Mississippi—those evergreen Titans that have "braved the battle and the storm" for ages, and now fling their hoary shadows and distil their balsamic dews over this charming shore. A crystal river, fringed with verdure, winds, like a thread of silver, around the village; and gigantic live oaks, that no elemental strife can shake, gracefully stoop to kiss the sparkling waters. The prospect and the air are exhilarating, and the invalid finds these powerful adjuvants to the elixir of the springs."

I am sorry that the Forest Bulletin of the United States Census does not give the quantity of pine by counties as it does in some States. It was issued December 1, 1881. It gives the long-leaved pine (*pinus australis*), number of feet, board measure, total 17,200,000,000. Of this, 6,800,000,000 is west of Pearl River. East of Pearl River, 7,600,000,000. There are, in the "region of mixed growth, exclusive of 200,000 acres injured by the manufacture of turpentine," 3,800,000,000 feet. The region of mixed growth is in the northeast corner of the Pine Belt. It is like a right-angled triangle. It starts in the southeast corner of Wayne County and runs northwest diagonally, the base of the triangle resting on Wayne, Jasper and Smith Counties, the apex in southeast Kemper. This variation is explained in the fact that what is called the Central Prairie Region brings its rocks to the surface, making a very fertile, in part, but very variable soil, and making a very mixed forest growth. There was cut, for the census year 1880, 108,000,000 feet

of yellow pine. The quantity cut per annum has doubtless greatly increased. Of short-leaved pine (*pinus mitis*), there were standing on December 1, 1881, 6,775,000,000 feet, board measure. It grows mainly in a country closely related to the position of the Pontotoc Ridge. I shall say something now as to the natural products of Mississippi, not noted before or only glanced at.

*Lignite*.—This material underlies the whole area, and even more territory of the Yellow Loam Region.

*Hydraulic Limestone*.—Prof. Hilgard speaks of an "excellent hydraulic limestone" in the northeastern portion of the State. In another place of a certain locality, he says: "The rock which forms the bald hilltops on the right bank of Yellow Creek (and which may probably be found in many similar positions in the hilly country lying between the Red Sulphur Springs and Eastport road, and the Tennessee River), I have found to be of very superior quality. The cement made from it sets almost as rapidly as plaster of Paris, and becomes very hard."

Subsequently, Prof. W. D. Moore, of the University of Mississippi, visited the locality "between Eastport and the Tennessee line," to make a report. He closes his report thus: "I need not enlarge upon the importance to the immediate district, and to the whole State, of such an immense deposit of hydraulic limestone, sufficient to supply the whole valley of the Mississippi with cement for generations to come, which can be easily worked, and from its vicinity to the Tennessee River, easily transported to every part of the South and Southwest."

Limestones for quicklime, building stones, grindstones and flagstones are found in various places in Mississippi, but would take too much space to particularize. The limestone, in places, can be safely commended as yielding a lime, in some instances, "as good as the majority of the imported article."

*Gypsum*.—Considerable is said about gypsum in Prof. Hilgard's work. Future explorations will doubtless disclose it in places in considerable quantity. "Pure gypsum has been found in wells near Cato, in Rankin County, twelve inches thick. It has been found near Kosciusko, Clinton, West Hinds and other places."

*Kaolin*.—Professor Harper says: "The kaolin deposit in Tishomingo County is, I believe, the largest deposit in the world. \* \* \* The most remarkable phenomenon offered by this immense and really invaluable kaolin deposit, is its appearance on the place where it is found."

*Sand*.—White sand, fit for glass making, I understand is to be found along the coast. I am credibly informed that a very superior article in vast quantity has lately been discovered on the new branch of the Illinois Central Railroad, from Kosciusko to Aberdeen. Prof. Hilgard says that the Pearl River and its tributaries furnish "drifts of white sand that often vie in purity with those of St. Genevieve, in Missouri, whence the Pittsburgh glass works receive a large part of their supply."

*Marls*.—To much of the area of the State, marls of various character are accessible. Along the eastern portion of the State they are underlying much of the whole area from north to South. Across almost the whole lower half of the State, from east to west, they subsist. (Of course, I do not mean they are everywhere accessible). These marls differ much in texture and quality, but they are all well worth utilization. I again quote from Prof. Hilgard, with some analyses: "My deduction, from all the examinations I have given these marls, is that they are far superior to the green sand marls of New Jersey in potash, for which the latter are chiefly distinguished, and also contain many other and valuable elements of plant food that the New Jersey marls totally lack." An analysis of marl near Byram, on Pearl River, where it is probable that there are millions of tons, gives:

Insoluble Matter (chiefly sand).....	12.308
Potash.....	0.611
Soda.....	0.179
Lime.....	43.932
Magnesia.....	1.658
Peroxide of Iron and Alumina.....	2.696
Iron Pyrites.....	1.266
Phosphoric Acid.....	0.224
Carbonic Acid and Loss.....	34.720
Water and Organic Matter.....	2.396
	100,000

Going across to another main line, on the eastern side of the State, I find Prof. Hilgard speaking thus of two counties along this railroad: "In Clarke and Wayne Counties we have a great variety of mineral fertilizers." Here is an analysis of green sand marl from Garland's Creek :

Insoluble Matter (silica and sand).....	21.657
Soluble (in NaO CO <sup>2</sup> ) Silica.....	24.224
Potash.....	1.717
Soda.....	0.465
Lime.....	14.785
Magnesia.....	2.476
Brown Oxide of Magnesia.....	0.403
Peroxide of Iron.....	13.020
Alumina.....	7.751
Phosphoric Acid.....	0.327
Sulphuric Acid.....	0.566
Carbonic Acid.....	12.492
	99.556

This marl is quite remarkable for its completeness as a mineral manure in all respects, containing, as it does, large amounts of every essential ingredient (excepting chlorine, which may, however, be present also); being so constituted as to be equally well adapted to light and heavy soils, and without any danger of over-dressing. It is, thus far, the most complete mineral fertilizer I have found in the State. A better manure can hardly be found. It is far superior to all manure which the agriculturist himself can produce, and, indeed, better than guano itself. It is true guano has, the first year, a better effect upon the crops than the marl can produce, but its effect is confined to one year, while the effect of the marl lasts for ten years. In the first year, the effect of the marl is only slight; it is much better the second, third and fourth years, and decreases then again. Whilst the guano supplies only the food for the vegetation for one year, and acts, as it were, only as a stimulant, the marl improves and enriches the soil. While, of course, these marls can not compare in commercial value nor in fertility with the celebrated phosphate rocks that have now made South Carolina so famous—which contain from fifty to sixty per cent. of phosphate of lime, and which will doubtless be yet laid bare both further north and south, as has been measurably done in North Carolina of late—yet their abundance, accessibility and diffusion make them a vast, incomputable, untouched, inexhaustible source of wealth to the country where found; and were there no other factor to enrich that country, there would be the pledge of its future fertility, under the treatment to be accorded that area by its inhabitants within the next half century.

Had I space, I should like to give a list of the forest growth of Mississippi. Her *flora*, in this regard, is very rich. In 1876, I made a collection or list of names of trees for use at the Centennial Exposition, and I think I enumerated nearly one hundred species of trees. In the unique building contributed by Mississippi to the Centennial Exposition, and which illustrated, in part, her forest wealth, there were sixty-eight varieties of wood used.

#### SOME LAWS OF MISSISSIPPI.

There is exempt from seizure and sale, under execution or attachment, in favor of each head of a family or housekeeper in this State, the following prop-

erty, to wit: Two work-horses or mules or one yoke of oxen, two cows and calves, five head of stock hogs and five sheep, one hundred and fifty bushels of corn, ten bushels of wheat or rice, two hundred pounds of pork or bacon or other meat, one cart or wagon not to exceed one hundred dollars in value, household and kitchen furniture to be selected by the debtor not to exceed one hundred dollars in value, three hundred bundles of fodder, one sewing machine, and all colts under three years old raised in this State by the debtor, and the wages of every laborer or mechanic to the amount of one hundred dollars. The following property is likewise exempt in the hands of the persons named, viz: The tools of a mechanic necessary in carrying on his trade, the agricultural implements of a farmer necessary for two male laborers, the implements of a laborer necessary in his usual employment, the books of a student required for the completion of his education, the wearing apparel of every person, the libraries of licensed attorneys-at-law, practicing physicians and ministers of the gospel not exceeding two hundred and fifty dollars in value; also the instruments of surgeons and dentists used in their profession not exceeding two hundred and fifty dollars in value, the arms and accoutrements of each person of the militia of the State, and all globes, books and maps used by teachers of schools, academies and colleges. That every citizen of this State, male or female, being a householder and having a family, shall be entitled to hold, exempt from seizure or sale under execution or attachment, the land and buildings owned and occupied as a residence by such debtor, provided the quantity of land shall not exceed one hundred and sixty acres, nor the value thereof, inclusive of improvements, the sum of two thousand dollars. The Legislature of the State has passed a law "exempting from taxation for ten years the machinery used for the manufacture of cotton and woolen goods, yarns and fabrics composed of these or other materials, or for the manufacture of agricultural implements and machinery." The municipal corporations are moved generally by a similar spirit, and almost in any town capital would be met by the same exemption the State grants.

The State expends nearly a million of dollars for education in her common schools. She has several institutions of high order supported by the State. She divided the agricultural land scrip dividend equally between the "Alcorn University," for colored, and "The Agricultural and Mechanical College of Mississippi," for white youth. Tuition free in both instances. The fund was \$227,150, and liberal appropriations have been made to both since. Besides, there is the Tougaloo University, for colored students of both sexes, the State Normal School, for colored students, and the Shaw University, for colored students; besides, there are female seminaries, high schools, (to say nothing of the State University at Oxford, for white students of both sexes,) without number, scattered over the State. It would be a gross injustice to pass with bare mention the Agricultural and Mechanical College of Mississippi, because it is a revolutionary institution. It is presided over by Gen. S. D. Lee, and is patronized by the best people of the State. Its curriculum is emphatically agricultural. The labor pertinent to the field and farm is compulsory. It is winning a great reputation for its curriculum and the students it is turning out. It is the only agricultural college in the United States, I believe, that has a professorship of dairying. It thus bravely leads the way to the development of one of the most lucrative and beneficent industries of the world.

This State, full of benevolent aspirations after progression, last winter, laid the basis for an industrial school for females, thus taking very advanced ground in behalf of the education of the sex. Its features are to be as follows: The bill creating the college provides that the object shall be to establish a school where girls may acquire a normal education, together with a knowledge of kindergarten

instruction; also a knowledge of telegraphy, stenography and photography; also a knowledge of drawing, painting, designing and engraving in their industrial application; also a knowledge of fancy, practical and general needle-work, and also a knowledge of book-keeping, with such other industries as may be, from time to time, suggested by experience, or to promote the general object of said institution and college, to wit: Fitting and preparing girls for the practical industries of the age.

I take the following extracts upon the climate of Mississippi from Volume V, Tenth Census United States: "The climate of Mississippi is a 'warm temperate' one, in the literal sense of the term, extremes of temperature prevailing farther north, being tempered materially by the influence of the winds blowing from the Gulf of Mexico. The extreme cold of winter sometimes occurring in the northern part of the State (at Oxford and Holly Springs, where, ordinarily, the winter minimum is from 15° to 20° Fah.), is 10° Fah., sufficient to kill fig trees six years old; but at Grenada, on the Yalobusha River, the fig rarely suffers.\* At Vicksburg and Natchez, the extreme cold thus far observed is 17° Fah.; inland, at Jackson, several degrees lower. It is only near the sea coast that the orange and lemon† can ordinarily be grown without winter protection in the open air. A warm belt extends along the Mississippi River, but, unlike that of the coast, it is liable to 'cold snaps' from the influence of northwest winds, which render the outdoor culture of the sub-tropical fruits precarious, even as far south as Baton Rouge. Cool belts or regions are formed by the elevated ridge lands at the heads of the larger rivers of the State. The summers are long, practically including May and September. During this time the weather is warm, the usual range of the thermometer being from 70° to 90° Fah., but excessive heat and sultriness, such as prevails so commonly during the shorter summers in the Middle and Northern States, is rare, and sunstroke is almost unknown."

#### WINDS AND RAINFALL.

During the summer the winds are altogether predominantly from the south, and blow quite steadily and gently, greatly relieving the sun's heat and allowing sultriness only for short periods. Between southeast and due south, these winds bring clear, warm weather; but as they veer toward southwest the sky clouds over, and between southwest and due west lie the winds that bring warm, steady rains, usually without any severe electrical excitement. The winds between due west and northwest in summer bring the violent thunder storms, coming suddenly and sometimes rising to the violence and cyclonic character of tornadoes. In winter the northwest winds bring the severe cold snaps, usually of only a few days' duration, and accompanied by but a slight precipitation, so that snow rarely falls to the depth of more than a few inches even in the northern part of the State, and is quickly melted by the south and southwest winds with warm rains. As the wind rarely lies for any length of time between northwest, east and southwest, either in summer or winter, the change from a cold and dry northwest wind, with snow flurries, to warm south and southwest winds, laden with moisture, is frequent and rapid in winter, giving that season a character of rather unenjoyable dampness overhead and slushiness under foot, which are, however, offset by its brevity, for the temperate and beautiful autumn often extends into the latter half of December, and the middle of February usually finds the early vegetables fairly up in the gardens, even in the northern part of the State. The minimum of rainfall is in autumn, and October is almost uniformly a dry month. Winter and spring together sometimes include nearly two-thirds the rainfall for the entire

\*I have known the celeste fig killed by cold at Hazlehurst—considerably further South.

†I hesitate to call the lemon a success on the sea coast in Mississippi.

year Although long dry spells are liable to occur, the rainfall, on the whole, is well distributed through the seasons. The rains are often torrential, and immense quantities of water fall in a given time. In spring, quite well into the season, nearly daily rains, coming on about or a little after noon, are a strongly marked feature of the climate for some distance from the coast up into the interior, for fifty miles or more.

#### PROGRESS AND DEVELOPMENT.

The following table will prove very instructive to show how Mississippi has progressed in some of her material aspects:

PRODUCTS.	1870.	1880.	1882.
Indian corn, bushels.....	15,637,316	21,349,800	30,233,600
Cotton, bales.....	564,938	963,111	1,064,000
Oats, bushels.....	414,586	1,959,620	3,080,800
Hay, tons.....	8,324	8,894	10,886
Molasses, gallons.....	219,674	536,625	.....
Rice, pounds.....	374,627	1,718,951	.....
Sweet Potatoes, bushels.....	1,743,432	3,610,610	.....
Orchard Products, value.....	\$71,018	\$378,145	.....
Live Stock, number.....	1,724,295	2,398,934	2,324,429
Butter, pounds.....	2,613,521	7,454,643	.....
Wool, pounds.....	288,285	734,642	.....

No one will understand the great significance of these figures without some comment. I should have liked to show the increase in the produce of butter, as an indication of one of the prettiest aspects of the progress of the State. There are no statistics for the year; but there were nearly 10,000 more milch cattle for 1882 than in the census return for 1880. Every intelligent man in the State knows what that means—a large increase in the product of butter and the value of the cows; for the reason that scores of thoroughbred bulls, mainly Jerseys, have been scattered through the country, and their “get” are better butter-producing stock than “scrubs.” Besides, there are many thoroughbreds. Again, although the number of live stock is something less than in the census return, yet there are two remarks relative to that: The swine are vastly improved in quality, and the very large proportions the shipping of cattle to New Orleans has assumed within a few years, explains the falling off in numbers. In the time of the census, the business was small; it is now large. But, if one will reflect what it means to Mississippi to keep home the money on fifteen million bushels of corn—the difference between 1870 and 1880—he will be impressed with how the State is growing.

The difference to the West of, say, five States like Mississippi buying fifty to seventy-five millions of breadstuffs per annum from her will be severely felt in the end. The merchants in the large cities, too, will feel it; and between the loss to them by reason of compressed cotton sent North or through to Liverpool on through bills of lading, and their loss of these sales of pork, hay and corn to the Southern planter, it looks like their capital must seek new channels: The immense indebtedness of the cotton-planting interest will still enable them to control shipments for a time; but it must be that European and Northern money-lenders will bring their capital South, and thus permit the planters to pay off their indebtedness to the merchants, upon which they are paying ten, twelve and higher per cent. interest. Long loans could easily be made at six to eight per cent. per annum interest. There is room for millions. No investment could be safer. The productive power of the land is incredible; and no greater anomaly marks Southern affairs to-day than the prices at which lands rent and the value of their product, as compared with the prices for which they can be bought. Mr. A. B. Hurt, in his valuable little pamphlet, says: “The value of lands per acre in Mississippi, as compared with the value of products per acre, according to the returns of the census, afford an interesting study. It often happens that lands which rent for from \$5 to \$10 per acre, and yield products in value from \$15 to

\$40 per acre, are rated in market as low as \$10 and \$25 per acre." Much of what I have been saying of the progress and development of Mississippi, and the chances for loans and investments, will apply as well to other Southern States. I do not mean to convey the idea that Mississippi alone offers fine opportunities in the latter regard, or is the only State that has made great development. On the contrary, some Southern States have far outstripped her in the race of progress. But I have been diffuse, because betrayed, half unconsciously, into disquisition.

But no aspect of development in Mississippi promises more for her lasting and alluring greatness than the raising of thoroughbred cattle. There are now in this State four distinct live stock organizations, every member of which must be the breeder of registered stock of the breed of which the association is the champion and exponent. And East Mississippi, with her rich limestone prairies and her large fields of clover and blue grass, has hardly a peer, saving East Tennessee, in the number of her distinguished breeders and their fine stock; in raising thoroughbred, registered cattle, in proportion to her area and population. And I look upon her as to be one of the most renowned theatres for dairying and stock-breeding in the United States within the next quarter of a century; for be it understood, that those who shall there start the manufacturing of cream cheeses of the fine Jersey cream, have a life of opulence awaiting them.

Another phase of progress in which Mississippi is distinguishing herself is jute culture, and I trust I am doing no one a wrong when I say that my friend, Mr. C. Menelas, who is such a zealous and munificent experimentalist, is the leading culturist in the South, and the originator of it South. An organization was formed a year or two ago, and great progress has been made in fashioning a machine to decorticate the fibre. Mr. Menelas lived ten years in India, at Calcutta, and understands jute culture well. The following is part of his testimony before the Tariff Commission of the United States: "In 1878 I bought a plantation in Mississippi, and concluded to make an experiment in jute culture. I wrote to the Agricultural Department at Washington about it, and planted one-eighth of an acre. The land upon which I planted was alluvial, such as is used for corn and cotton. To my surprise, I saw that crop grow magnificently to perfection. I took some stalks to the Cotton Exchange in New Orleans which measured fifteen feet high. I induced the Commissioner of Agriculture of Louisiana and other friends of mine to plant several acres, and I have been through their plantations, and it seems to grow admirably; so there is not the slightest doubt that jute will grow splendidly." Jute is mixed with cotton, linen and silk, and enters into many fabrics. In Dundee, Scotland, there were, in 1872, one hundred jute mills and twenty thousand workmen. It is a large and growing industry, and promises much for the South.

# LOUISIANA.

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Louisiana is the least understood, and, until very lately, has been the most disregarded, of all the Southern States. Before the late civil war her position was one of great eminence in wealth and value of productions, but since then she has sunk very low in the rank of States in these regards. However, those things remain to her that no wars nor misgovernment can take away—climate, soil, great rivers, and a geographical position second to no State in the Union.

Louisiana adjoins Arkansas on the north, Mississippi on the east and Texas on the west. Its southern boundary is the Gulf of Mexico. It is separated from Mississippi by the Mississippi and Pearl Rivers, except along the northern line of a strip that juts out to the east, and along the greater part of its western limit the Sabine River separates it from Texas. The Mississippi winds through the southern part of the State and empties into the Gulf of Mexico 105 miles below New Orleans. The State lies between the meridians of  $89^{\circ}$  and  $94^{\circ}$  west longitude, and between the parallels of  $28^{\circ} 56'$  and  $33^{\circ}$  north latitude. Its area, according to the latest measurements, is "about 45,420 square miles, exclusive of fresh-water lakes, land-locked bays and of Lake Pontchartrain. Of this area about 20,100 square miles is lowland, belonging to the alluvium of the Mississippi and Red Rivers, and to the marsh region of the coast; the rest, or over one-half of the State, being uplands of varying character." The State is divided into 58 districts called "parishes," equivalent to the "counties" of other States.

The population of the State in 1880 was 939,946, of which 454,954 were white and 483,655 colored; 885,800 native and 54,146 foreign.

The following on the surface of the State is from "Climate and Health of Louisiana," by Joseph Jones, M. D., one of the most satisfactory works ever written about any country:

"There is not, perhaps, on earth a continuous tract of equal extent presenting a greater diversity than Louisiana. Within its limits are included all the varieties, from the most recent and still periodically inundated alluvium, to hills approaching the magnitude of mountains; every quality of soil, from the most productive to the most sterile, and from unwooded plains to dense forests.

"All the southern part of this State is an alluvial tract of low champlain country, extending from Lake Borgne to Sabine River, and from the Gulf of Mexico to Baton Rouge and Red River—about 250 miles long, and from 70 to 140 wide. This extensive tract is intersected by numerous rivers, bays, creeks and lakes, dividing the country into a great number of islands. A large extent of country in Louisiana is liable to be overflowed by the Mississippi. According to Mr. Darby, the accurate and learned and accomplished surveyor, the average width of overflow lands above Red River, from latitude  $31^{\circ}$  to  $33^{\circ}$  north, may be assumed at 20 miles, equal to 2,770 square miles. Below latitude  $31^{\circ}$  to the efflux of the Lafourche, about 80 miles in extent, the inundation is about 40 miles in width, equal to 3,200 square miles.



"All the country below the efflux of the Lafourche is liable to be inundated, equal to 2,370 square miles. From this calculation it appears that 8,340 square miles are liable to be inundated by the overflowing of the Mississippi; and if to this be added 2,550 square miles for the inundated lands on Red River, the whole surface of the State liable to inundation will amount to 10,890 square miles. Of this extent, however, not one-half is actually covered annually with water; and every year, by the extension of levees and by the deepening of the mouths of the river, the area of cultivated land is becoming greater, and that subject to overflow less.

"The water of the lakes, as well as that of the Mississippi River, moderate the intense heat of summer and the severe cold of winter; and the residences of the planters on the banks of the streams are noted for their elegance, comfort, thorough ventilation and healthful climate."

The alluvial bottoms of the rivers and bayous afford strips of land of unsurpassed fertility. The usual width of the alluvial plain of the Mississippi bottom between Vicksburg and the mouth of the Red River is from 30 to 35 miles; that of the Red River from 8 to 10 miles; below the junction of the two valleys, the aggregate width is about the sum of the above figures. The "uplands" of the State also furnish soils of astonishing productiveness; scarcely inferior in some instances to those of the alluvial regions.

#### CLIMATE.

As to the climate and topography of Louisiana, the grossest misconceptions prevail. Col. S. H. Lockett, Professor of Engineering in the Louisiana State University, who traveled over all the parishes of this State in search of data for his topographical map of Louisiana, says of it:

"As it is situated at the mouth of the greatest river on the continent, and contains within its limits the delta of this river, intersected by numberless lesser rivers and bayous, and filled with lakes, most people conclude that Louisiana is, throughout its entire extent, a low, wet, swampy region. They imagine its surface to be a great plain of wonderful fertility, when at all arable, with an indefinable succession of deep jungles, tangled swamps, marshes, lakes, sloughs, cane and cypress brakes. But these misconceptions will be speedily dissipated by a journey into the interior, and it will be discovered that few States of the Union possess a greater diversity of surface, soil, climate, scenery and products than Louisiana, and no State has a more varied and interesting population, or a more eventful history."

Professor Hilgard, in his article on Louisiana, in Vol. 5, Tenth Census, speaks thus of the climate of this State:

"Owing to its nearness to the Gulf of Mexico, and the prevalence of winds from that direction, the climate of Louisiana is much less extreme than that of the States lying further north—the summer heat being less oppressive, though more prolonged, and the winter's average temperature (52.8° at New Orleans, 45.4° at Shreveport) very mild, though liable at times to sudden and severe 'cold snaps,' brought on by northwesterly storms, which restrict the culture of tropical fruits on a large scale to the immediate neighborhood of the gulf coast. On such occasions the temperature may fall to 17° even at New Orleans, and to 15° in northern Louisiana. November, December and January are the coldest months, June, July and August the hottest; the temperature ranging from 74° to 98°, with a mean of 81.6° at New Orleans, while at Shreveport the range of temperature within the same months is from 64° to 95°, with a mean of about 81°.

"The rainfall at New Orleans amounts to nearly 73 inches annually, at Shreveport about 47 only, but increases slightly toward the Mississippi Valley.

At New Orleans the rainfall is most copious during the three hottest months, and somewhat less during the three coldest; during both, about 40 inches of rainfall is received, the rest of the annual precipitation being more or less evenly distributed over the spring and autumn. The summer rains frequently come accompanied by violent thunder storms from the northwest, but the southwest is the regular rain wind. The same holds true, more or less, all over the State, the regular summer showers being considered highly conducive to the welfare of the cotton crop, providing they are not too much prolonged at any time."

The following extracts are from the book above quoted, "Health and Climate of Louisiana:"

"The atmosphere of Louisiana is loaded with moisture, and upon this condition, as well as its warm temperature and the abundant uniform distribution of rains in spring and summer, mainly depend its luxuriant forests and splendid crops of sugar-cane and cotton.

"Whilst the rains which water the Atlantic slope are equally distributed, and those of the California coast are periodic, making a well-defined wet and dry season, those which water the Mississippi Valley are unequally distributed—those of spring and summer being greatly in excess. In winter, the mouths of the Mississippi and the region of Pensacola are in the area of greatest precipitation, (18 inches.) From this center the lines of equal precipitation on the west maintain a considerable parallelism—first, near northwest, along the Texas coast; then rapidly curving near northeast, then east, and, as they leave the continent, northeast. In autumn the mouths of the Mississippi and the region of Pensacola are still within the area of greater precipitation. The lines of equal precipitation pursue a north-northeast direction. \* \* \*

"The climate of Louisiana is rendered moist and suited to the culture of the sugar-cane by the winds from the Gulf of Mexico.

"Owing to several causes—the absence of protracted drouths, the abundant rainfall, and the presence of large bodies of water in the city and lakes surrounding New Orleans—the climate, as well as that of the gulf coast, comprising a large area in the Southern States, is very humid, containing a large quantity of vapor, though not in the sensible form of clouds or fogs. This condition of the atmosphere, combined with the tropical heat of summer, favors the rapid development of animal and vegetable organisms. \* \* \*

"The presence of large masses of water within and around Louisiana, as well as the mass of cold water introduced from the northern regions or from the Rocky Mountains into the heart of the continent by the Mississippi River, render the climate of this State less liable to extremes of heat than positions far north and in the interior portion of the Mississippi Valley."

#### SOIL AND PRODUCTIONS.

There is probably no other State in the Union possessing so much land of such marvelous fertility, capable of such continuous cultivation without exhaustion, and adapted to such a wide range of products. On this point Dr. Jones' book, above quoted, says:

"The soil of this State, in virtue of its variations in composition and elevation, is adapted to the successful cultivation of sugar-cane, rice, cotton, corn, wheat, rye, barley, oats, and all the fruits common to the temperate and sub-tropical zones. Louisiana possesses, perhaps, the most fertile soil of any of the States of this Union, in virtue of the large proportions of the alluvium of the Mississippi Valley enclosed within her borders.

"As is well known, a wide belt of recent alluvium borders the Mississippi River from the mouth of the Ohio to the gulf, 75 miles wide in the greatest

expansion at Napoleon, and 25 miles in its greatest contraction at Natchez and Helena. The area of the alluvial tract above the delta is 19,450 square miles. The depth of the alluvial deposits from Cairo to New Orleans ranges between 25 and 40 feet.

"The area of the delta of the Mississippi River, which lies almost wholly within the borders of Louisiana, assuming that it begins where the river sends off its first branch to the sea, namely, at the mouth of Bayou Atchafalaya, is estimated at 12,300 square miles. This would be at the mouth of Red River, in latitude 31°, whilst the mouths of the Mississippi are in latitude 29°; so that the delta extends through two degrees of space. The entire delta is elevated but a few feet above the level of the Gulf of Mexico, and, from its fertile soil and proximity to the Mississippi River and bayous, is perhaps as fertile as any body of land in this or any other continent, and is admirably adapted to the cultivation of rice and the sugar-cane."

The southwestern portion of the State deserves especial mention in this connection. Col. Daniel Dennett, in his able and valuable work on "Louisiana As It Is," refers to it as "that magnificent portion of Louisiana west of the Mississippi, the Teche and Opelousas Region, usually called 'Attakapas and St. Landry'—the land of enchanting scenery, of beautiful bayous and glassy lakes and bays, of splendid prairies and noble forests, of pleasant skies and gentle breezes; the land of flowers, of beauty and of health."

Professor Eugene W. Hilgard, in his "Preliminary Report of a Geological Survey of Western Louisiana, remarks:

"Few sections of the United States, indeed, can offer such inducements to settlers as the prairie region between the Mississippi bottoms, the Nez Pique and Mermentau. Healthier by far than the prairies of the Northwest; fanned by the sea breeze; well watered; the scarcity of wood rendered of less moment by the blandness of the climate, and the extraordinary rapidity with which natural hedges can be grown for fences; while the exuberantly fertile soil produces both sugar-cane and cotton in profusion, continuing to do so in many cases after 70 years' exhaustive culture—well may the Teche Country be styled by its enthusiastic inhabitants the 'Garden of Louisiana.'"

I quote from the book above referred to, "Louisiana As It Is." The country denominated Southwestern Louisiana embraces, according to the treatment of Col. Dennett, the parishes of St. Landry, Lafayette, St. Martin, Iberia, Vermillion and St. Mary. Of this area he says:

"These six parishes contain more than 3,000,000 acres of tillable land, most of it of inexhaustible fertility. Even most of the sea-marsh and all of the swamp lands may be reclaimed by local levees and draining machines, and may become the most productive rice and sugar lands in the State.† \* \* \* On thousands of acres the grass grows on a smooth surface under the waving branches of noble trees. These lands are far more beautiful than the famous woodland pastures of Kentucky. The trees have a more luxuriant growth; the foliage is richer and hangs out on the broad branches in a more generous abundance, and the soil is rich beyond anything we ever saw in the great West. And it is the cleanest looking country we have ever traveled over. The beautiful smooth prairies look as though they had just been washed; the grass looks like a lawn neatly shaved by some "Fine Old English Gentleman," who prides himself on his aristocratic estate. The fat herds grazing upon these green prairies help in giving the finishing touch to this magnificent landscape scenery.

† 1,250,000 acres of these marsh lands have been purchased, and a wealthy English company is rapidly reclaiming them.

"On the border of the sea marsh of St. Mary and Iberia, extending from a point below Berwick's Bay to and into the parish of Vermillion, a line of forest trees, mostly heavy cypress, stands as the dividing line and wall between the marsh and the tillable lands of the Atchafalaya and the Teche. In places this line of timber is from one to two miles wide, and even wider. This line of forest extends down to the mouth of Bayou Sale on both sides, and down both sides of Bayou Cypremont. At Petit Anse Island the sea marsh and prairie meet, and the chain of timber is broken for a few miles. On the side of this crooked chain of timber next to the plantations, in places, there is a heavy growth of gum, oak, ash, hackberry, and an undergrowth of dogwood, vines, palmetto, haws, etc., etc. These lines of timber, reckoning that on both sides of Bayou Sale and Bayou Cypremont, are over 125 miles in extent.

"In the lower or eastern part of the parish of St. Mary, around Berwick's Bay and the lower Teche, the highest land is about 10 feet above the level of the Gulf of Mexico. Near Franklin, the highest bank is from 12 to 13 feet. Near Breaux Bridge, the first bank is 22 feet high; the second bank 27 feet.

"In the parish of Lafayette, the Cote Gelee Hills, Beau Basin and the banks of the Vermillion are 40 feet above the level of the gulf. The general average of St. Landry is about 60 feet above the same level. The parish of Vermillion is about on a level with St. Mary.

"Plums, figs, quinces, pears, cherries, grapes, papaws, persimmons, pecans, hickory nuts, walnuts, blackberries, dewberries, May apples, mulberries, crab apples, black and red haws, chinquapins, strawberries, and some other fruits, nuts and other fruits of little importance, thrive and mature well in these parishes.

"In St. Mary and along the coast to the Mermentau, oranges are raised yearly in great abundance; and the mespilus or Japan plum, lemons, limes, bananas and pineapples may be produced in the open air as high up as Franklin, by giving them a little extra protection in the winter.

"Turnips, cabbages, beets, and all the other garden vegetables and melons, grow as well in these parishes as they do north of the Ohio River. The best winter gardens contain large white-head cabbages, rutabaga and flat turnips, onions, eschallots, garlic, mustard, roquette, radishes, cauliflower, beets, cress, lettuce, parsley, leeks, English pease, celery, endive, etc., etc. These thrive well in the gardens all winter, except in very cold winters, back from the coast, when a part of the list give way before the frosts.

"The yield of oranges per acre is enormous. It is impossible to make any estimate that is reliable, as we have not the acres or yield of any one orchard. The largest orchards produce over 3,000,000 of oranges yearly. Some trees commence bearing when they are five or six years old, and earlier bearing can be produced by grafting and budding.

"A full-grown, healthy orange tree 15 or 20 years old, in a good season, will produce 5,000 oranges. It takes from 300 to 400 oranges to fill a flour barrel; so the largest orange trees produce from 40 to 50 bushels of fruit in a favorable season."

From a report on Southwestern Louisiana, issued by the United States Department of Agriculture, the following extracts are taken:

"The trees are all draped with moss, which grows in great abundance, and forms one of the industries of this country, and really makes the laboring man independent; for a man with ordinary industry can easily earn from \$1.50 to \$2.50 per day gathering and preparing it for sale. The market appears to be as certain as our wheat market. There are dealers along the railroad always ready to take it at quotation price, and ship it to the manufacturers. It is principally used in making mattresses, which are sometimes sold, or, at least, bought, for hair

mattresses. I was very forcibly struck with the idea that this moss business could be worked on a much larger scale. The quantity is almost inexhaustible. The cypress swamps are so heavily covered with it that in many cases the heavy limbs of the trees are broken off by its immense weight, and there it lies in absolute waste. There is a constant demand at a remunerative price, and the material is free to any one who wishes to gather it. You can reach by boat all those cypress swamps, gather and take off the material with much less expense and trouble than you could cart it over dry land.

"The prairie and all the level lands I visited in this locality are of alluvial origin, with a surface soil of from three to four feet of almost inexhaustible fertility, formed and kept up by the annual decay of vegetable matter and overflows from higher altitudes. Some of this land will produce four crops of hay a year. I allude to Bermuda grass, which makes the best hay that is made in this section. A slight variation is found in the subsoil. In this vast prairie, containing three or four millions acres, there is a series of islands that are not surrounded by large and distinct rivers, but by bayous, which are simply little streams that drain them and part of the adjacent prairie. On these islands the soil is good and easy to cultivate, but of course not so rich or so deep as that of the prairies. As a general rule the soil runs as follows: first, rich vegetable mold from four to six inches deep, next loam, then sand, and lastly clay. So far as the soil is concerned, I know of nothing that could not be raised here, except timothy and some small fruits that fail in midsummer if the season be dry.

"Although the prairies are wet during the winter and spring months, you never find them sour or boggy, and the sweet, nutritious grass never ceases to grow; and I have noticed the cattle foraging when the surface was covered with water. In going from place to place the residents drive right through the ponds and lakes after heavy rains in March in preference to going around them. No matter how deep they look to be, there is but little deviation from the level. The wheels hardly ever sink beyond the depth of two or three inches, even when wagons are loaded. The manner in which these prairie lands are drained is by open ditches cut to natural ponds, as they are termed by the natives, or to the bayous. It would be impossible to drain these soils by blind ditches. There is almost an endless variety of vegetables grown here, and the house gardens can be so planted to yield fresh vegetables of some kind the year round. They all seem to grow to perfection, and yield abundantly. The people live largely upon sweet potatoes and yams, together with fish and game. It seemed to be the market gardens only that were stocked with any great variety of vegetables. It was a very agreeable sight to see how thoroughly these gardeners attended to their crops, after noticing with what carelessness the farmers attended to their kitchen gardens. Not much wheat is grown. The yield of straw is very heavy; the yield of grain generally light. They sow nothing but spring wheat.

"Farmers turn their cattle on the grain fields, chiefly oats, about the middle of February, and let them graze two or three weeks. This furnishes good pasture and does not seem to interfere with the yield. I failed to obtain the average yield, but in reply to my questions a farmer told me he expected to make at least 40 bushels to the acre. The Texas or other rust-proof varieties are generally sown, because they are best adapted to the climate and less susceptible to rust and insects. Rye is seldom grown for the grain, but is sometimes sown in the fall for winter and spring pasturage. When grain is sown in the fall the land is thrown up in dead furrows—that is, throwing it up in beds about 18 or 20 feet wide, with an open or dead furrow between, which holds the water during a wet season.

"One of the principal industries of this locality is raising cattle for the butcher, and very little attention is paid to growing fine stock for dairy purposes.

I stopped for some time at the house of a gentleman who owns about 3,000 cows, and the butter for his table came weekly by express from Philadelphia. Cattle grazing yields an enormous profit. Cows can be bought very cheap, from the fact that there is so little demand for their meat; even the poorest class do not care to eat it. They can be bought from \$12 to \$18 per head, and calves will command from \$7.50 to \$9 in the pasture fields. The only way to account for this high price for calves is that veal seems to be the favorite meat. Fresh pork is seldom cooked; in fact, I never saw any during my stay in that locality.

"Cattle raising could be made more profitable than it is by dividing the prairies into smaller pasture fields, and by cutting and curing thousands of tons of hay that go to waste, to be fed from the rack when the pasturage grows short. During at least nine months in the year the grass is so strong and luxuriant that the cattle tramp down and destroy more than they consume. It has only recently been discovered that the sea marsh in this part of Louisiana affords as good pasturage as there is in the world. Strong, nutritious grass grows in great abundance, resembling very much in taste and appearance what is known in the Middle States as red top, only a little taller and as thick as it can stand. From as near an estimate as I could make, if cut and cured, which could be easily done in the proper season, it would yield five tons of good hay per acre. There are thousands of acres of the sea marsh that could be most profitably used by those owning the prairie or higher land adjoining it. I am writing from personal observation, having ridden over it on horseback in perfect safety. The only obstructions to guard against are muskrat holes; but for a pasture for at least six months in the year, without expenditure, it cannot be excelled. I see no reason to prevent them from using it longer, if they will build sheds to protect their cattle in midsummer. Some of the natives say that the mosquitoes would kill them in the spring season, but this I doubt, for there is always a strong gulf breeze.

"Deer are to be found here in great numbers; also wild cattle and hogs.

"There is no danger from floods from the higher countries, for by inquiry from the oldest inhabitants, and these I could rely on for the most accurate information, there has been no overflow for 23 years, and then the water reached the depth of about 10 inches by backing up from the Gulf of Mexico and meeting the floods from the higher lands, remaining but a short time and then flowing off rapidly. Even in cases of an overflow, there are spots elevated above the common level on which they can go for safety. During the winter season the marsh is covered with a heavy growth of the season previous, which makes very good hay, being perfectly clean, free from rust or mold, and we noticed our horses ate it whenever we gave them the opportunity. But the cattle seem to prefer the green spring growth which is just making its way through the root. It has a sweet with a very slight salty taste. I saw a lot of cattle that were turned on the marsh in December when they were there and in bad condition. They are now looking fine and healthy, and nine-tenths of them seal fat.

"This sea-marsh land is very cheap, and yet it is better pasture, in winter especially, than the prairie lands that command ten times the price. The cattle dealers who own sea marsh and the adjoining highlands and prairie have a great advantage over those in the Middle and Western States, for there is no need of fertilizer of any kind, no outlay for shelter, and very little need of fencing. If they fence at all, it is by sticking green willow poles. It seems to make little difference whether they be the main stock or branches; they immediately take root. On these they stretch the wire, with stakes driven down along the line to strengthen it. As the fencing is cheaply done, the older it gets the stronger it is. Those who use the sea marsh as a cattle range drive them off in the latter part of August. At this season the heavy spring and summer growth has fully matured

and begins to dry, when it is burned, to be out of the way of the coming crop. This grows rapidly, and furnishes good pasture about the time the prairie shows the effect of midsummer, especially if the hot season be long and dry.

"In the native cattle there can still be seen traces of the old Spanish breed, with enormously long and wide-spreading horns, narrow chests, high flanks and deeply-sunken backbones. All the characteristics requisite for good breeding animals are absent. The stock-raisers say that these cattle are so thoroughly acclimated that it is a rare thing to see disease or sickness of any kind among them, and requiring so little attention, they look upon them as the most profitable. Past experience teaches them it is a mistake to import old cattle in order to improve the breed, for they invariably die off. The few that live after the first year have made these efforts to improve stock expensive and unprofitable. Some are now adopting a new method, and, I think, the right one, from what I saw. It is importing calves as soon as they are old enough to leave the cow. Some attention must be paid to them for the first season. They will then thrive and do as well as the native cattle.

"I had the pleasure of seeing the finest lot of registered Holstein calves that I have ever seen. The owner says they are doing well and looking better than the herd from which he bought them in New York. They are about 10 months old, and are as large as any of the Alderney cows on the plantation. This herd is on Mr. J. Jefferson's plantation. He also has a herd of about 40 registered short-horns and some fine specimens of the Aberdeen Angus breed. He is very favorably impressed with the Holsteins and thinks they are *the* cattle for the country."

The following from the description of St. Landry Parish will apply to the others and to much of the coast country:

"The crops, fruits and gardens of St. Landry and of the other five parishes described in this circular, excepting cotton and oats, are less troubled by insects and vermin and less liable to disease than they are in higher latitudes in other parts of the United States. The surface cultivated in St. Landry yearly amounts to about 100,000 acres. About one-third of this is planted in cotton. Not a tenth part of the tillable land is under cultivation. With a working population like that of the Western States and the same kind of cultivation, that parish might send to market yearly 100,000 bales of cotton, 50,000 hogsheads of sugar, 75,000 barrels of molasses, and rice, tobacco, broom corn, basket willow, beeves, hay, horses, milch cows, sheep, hogs, hides, poultry, eggs, rosin, turpentine and other valuable products to the amount of from \$10,000,000 to \$15,000,000. Such varied and valuable resources in a climate so salubrious can hardly be found anywhere else on the face of the earth.

"The timbered bottoms are rich and are excellent for sugar, rice, cotton, corn, sweet and Irish potatoes, peas, tobacco, melons, pumpkins, hay, garden fruits, &c. No richer land can be found anywhere. They are heavily timbered with the best of sugar wood, and the swamps contain an inexhaustible supply of the best of timber for building purposes and for hogsheads and barrels for the sugar planters."

The most noted productions of the State are cotton, sugar-cane and rice. Cotton is grown more largely in the upper portions of the State, the census reports showing that 78½ per cent. of the entire crop of the State is produced north of the latitude of the mouth of the Red River. In the tidewater parishes cotton is almost entirely replaced by the cultivation of sugar-cane and rice. Sugar-cane is grown on all the alluvial lands in the State. The report to the Department of Agriculture just referred to says:

"Small crops of sugar-cane on small farms are well adapted to white labor. The cane may be planted in the fall, winter or spring, and laid before the 1st of

July, and no labor is then needed in the crop till the 1st of November, when the ripe cane is ready for the mill. Sugar-cane is not subject to disease and the ravages of bugs and insects like most other crops. Small sugar farms, where from 20 to 100 hogsheads of sugar are made by white labor, are very profitable; they are a complete success."

Within the last two or three years considerable activity in silk culture has taken place. The cultivation of jute is also receiving attention. Both of these have been referred to in the introduction.

The production of rice has been steadily increasing in Louisiana, and its quality will compare favorably with that of the famed rice of South Carolina and Georgia.

All the crops of the Northern States are raised to a more or less extent. Wheat is limited to the northwestern part of the State. Corn is grown largely. Tobacco is a prominent crop. The raising of early vegetables for the Western markets is a profitable business. What has been quoted in reference to the productions of the six southwestern parishes will apply in a measure to much of the State besides.

#### MINERAL RESOURCES.

Among the resources of Louisiana only lately utilized is the rock salt at Petite Anse Island. Dr. Jones says:

"Fortunately, Louisiana produces her own salt of the purest quality and in vast and unknown quantities, in Petite Anse or Avery's Island.

"Louisiana rock salt presents the form, appearance and optical properties of pure chloride of sodium. The large crystalline masses are so perfectly transparent and free from all extraneous matter, and are so uniform in their structure and density, that they would be suited in all respects for the most delicate philosophical experiments upon the transmission of heat through different media. The entire mass of the samples selected was made up of crystals and fragments of crystals, derived from the cube, the primitive form of chloride of sodium. The crystals present a foliated texture and distinct cleavage; they feel when rubbed in the hand dry, and leave no impression of moisture or of saline matter.

"The samples of Louisiana rock salt submitted to analysis, as well as the large solid masses weighing several tons, are the purest and finest samples of rock salt that have ever come under my observation.

"One hundred grains of Louisiana rock salt yield upon analysis:

Chloride of sodium (common salt).....	99.617
Sulphate of lime.....	0.318
Sulphate of magnesia.....	0.062
Moisture (dried at 300°).....	0.093

"It will be observed from this analysis that the Louisiana rock salt contains less than one-half of one per cent. (0.473) of those substances which may be considered as foreign, viz: moisture and sulphates of lime and magnesia, and which are found in greater or less quantities, according to their purity, in almost all samples of salt."

He makes an analysis of Turk's Island salt, and shows the Louisiana superior. He also says it contains nothing injurious to meats.

In "Mineral Resources of the United States," Prof. E. W. Hilgard has an article on "The Salines of Louisiana," in which he says:

"A salt-bearing formation appears in Louisiana in two widely separated portions of the State, and under two different aspects. One is a group of salty flats or 'licks' in the northwestern part, in the parishes of Webster, Bienville and Winn, northward of Natchitoches; the other is the great rock-salt mass of Petite Anse or Avery's Island, situated in the sea marsh on the shores of Vermillion Bay. Last year large quantities of a grade corresponding to the Turk's Island



salt were shipped to the extensive packing-houses in Chicago, Milwaukee and Kansas City. The article was found to be especially adapted as 'heading' salt for packers' use, both on account of its purity and the slowness of its dissolution. Large orders from these points have been renewed."

The report on Southwestern Louisiana issued by the Agricultural Department says:

"Shortly after the late war a company was formed to work the mine. A shaft was sunk and some work done, but the enterprise was abandoned in a short time and lay idle until 1878, when another company was formed to carry on the work, but finding that a much larger capital was required to put it on a successful footing than they had anticipated, they in turn, after a very short trial, retired in favor of a company of New York capitalists, who are now mining the salt and pushing the work vigorously. They have put in a large quantity of the most modern machinery, dug canals, built and chartered steamships and vessels, and lately have completed a railroad to the mine, which places them in direct communication with the entire railroad system of the United States, and permits shipment from the mine to any point without breaking bulk. The salt from this mine is marketed principally in Galveston, New Orleans and Mobile for the Southern States, but large quantities are also shipped to the Western meat packers in Kansas City, St. Louis, Chicago, &c., and its sale is being pushed wherever a market can be found.

"The salt is manufactured into any size or grade the market demands—from table salt as fine as flour up to lumps of solid rock as large as can be conveniently handled for farmers' use. The manufacture is mechanical, no chemicals being used, the only precaution necessary to produce a beautiful white article being care and cleanliness in handling. The works are now producing 200 to 210 tons per day, and machinery is being erected to double this capacity."

#### OTHER MINERALS.

There are several groups of limestone in Louisiana. One of the most important is a rock "partly substantially identical with the rotten limestone of Mississippi and Alabama." In his article on "Cotton Production in Louisiana," in Vol. V of Tenth Census of the United States, Prof. Hilgard, in a brief view of the geological features of the State, says:

"So far the geological strata show a definite dip southward to the gulf; but northward of the Prairie Belt the dip seems to relate more or less to a (mostly subterranean) ridge or 'backbone' of older rocks—cretaceous limestone—which appears to extend from the Prairie Region of Southwestern Arkansas in a southeast direction, diagonally across Western Louisiana, marking approximately the 'divide' between the Washita and Red Rivers, and reaching the gulf shore at the rock-salt deposit of Petite Anse, which undoubtedly is a part of the same formation as that from which, in Northern Louisiana, numerous salt springs flow. These springs or 'licks' occur in flats in Webster, Bienville and Winn Parishes. Some of them have been utilized for the manufacture of salt, and in all of them the cretaceous limestone is found within a short distance from the surface, and of great thickness. Near Winnfield this limestone rises into a ridge 75 feet above the surrounding country. A similar ridge, but much lower, exists near Chicotville, in St. Landry Parish. It is again found overlying the great sulphur bed in the artesian wells of Calcasieu, but at a depth of 300 feet, and it will doubtless be struck below the rock-salt bed of Petite Anse. \* \* \* Not far from Brushy Valley\* is a salt lick known as Rayburn's lick, where much salt was made during the war. It is underlaid by gypsum and (cretaceous) limestone, from which good

\*Bienville Parish.

lime can be burned. \* \* \* A similar lick is 'King's,' near the northeast corner of Red River Parish, where the limestone occurs in even greater abundance and of the best quality. A similar limy spot occurs in the northeastern portion of the parish, near Judy Post-office, on the heads of Dugdemona Bayou."

The State is rich in marls. The following is from an interview published in the New Orleans Daily States:

"The marl especially is a fortune to the State. On my land there is a small lake called the bottomless lake, because a pole can be pushed down a great distance in the mud and no stable bottom is found. This is pure marl, and in it there are millions of tons."

The Agricultural Department Report previously quoted says:

"The deposits in the bottom of the bayous are rich beds of muck, into which a pole may be run to the depth of 10 feet or more. This is an excellent manure for gardens. The supply is inexhaustible."

Recently several varieties of fine marble have been discovered. Building sandstone, fire clay and kaolin also exist. Gypsum has been found in several localities.

#### TIMBER.

Louisiana is rich in the extent and varieties of her timber. There are immense forests of pine, the different varieties of oak, black walnut, hickory, gum, lime, pecan, sycamore, magnolia, ash, and other trees. The New Orleans Times-Democrat, in a recent issue, said:

"In Louisiana there are over 33,000 square miles of woodlands. In some portions of the State the forests average 97 per cent. of the whole land, leaving only 3 per cent. for clearings and cultivated fields. The timber differs with the character of the land. The prevailing forest growth of the good uplands is a very good one of mixed timber. Oaks of various kinds, but principally of the red, white, black and post-oak varieties; the dogwood, beech, sassafras, hickory, black gum, sweet gum, ash, maple and the short-leaf pine constitute the larger growth.

"The growth of the pine hills is almost exclusively of majestic long-leaf pines, interspersed with an undergrowth of scrubby black-jacks.

"The forest in the bluff lands—always magnificent—is made up of oaks of all kinds, especially the white and the water oaks varieties, magnolias, beeches, poplars and hollies.

"The alluvial lands, except where cleared for cultivation, are covered with magnificent forests of cypress, gum, ash, pecan, cotton-wood, hackberry, the varieties of oak, maple, sycamore and holly.

"The pine flats are found in the parishes of St. Tammany, Tangipahoa, Livingston and Calcasieu. Their growth is long-leaf pine, almost devoid of undergrowth. The supply of timber in the State seems inexhaustible. It is estimated that not more than one-eighth of the virgin forest of Louisiana has been felled. The live-oak is found on the southern or gulf coast, on the Chenieres and Buck ridges and bayous, and along the banks of the streams throughout the alluvial region of the State. The forests of the State are filled with all varieties of timber adapted to the manufacture of woodenware, house or ship building. After the live-oak in value comes the cypress. The split timber has been known to withstand the exposure of a hundred years in a fence. It is indestructible under ground or water, and is largely used by the sugar planters for coolers, barrels and hogsheds. It is used also for shingles and fencing. The long-leaf pine is the finest in the world for building houses or ships. These endless forests afford an ample field for the lumberman or manufacturer of tar, pitch, turpentine or charcoal. The oak is in demand in the shape of staves for exportation, and, in connection with the hickory, pecan, gum and locust, affords ample material for

wagon making. The great State of California grows not a single tree which will make a wagon hub."

The estimates of the Census Department placed the pine supply of Louisiana in 1880 at 48,213,000,000 feet—26,588,000,000 feet of long-leaved pine (*pinus australis*) and 21,625,000,000 feet of short-leaved pine (*pinus mitis*.) Louisiana is famous now for her cypress. It is comparatively new in building, but is getting very popular. A prominent writer has recently said of it:

"A wood in which Louisiana has a great interest is cypress, which the State grows in larger quantities than any other in the Union. Valuable cypress swamps exist along the Atchafalaya and its tributaries, and scattered throughout the southern portion of this State. The merits of this wood have only recently been discovered. When the saw mills began manufacturing cypress lumber they found very little demand for it, but they have since quadrupled their production, and find an easy market for all they can saw. This lumber is just beginning to be introduced into the Northern markets, and its advantages are now acknowledged.

"The wood is fine grained. After exposure to the air it becomes of a dim reddish color. It possesses great strength and elasticity, and is lighter and less resinous than the wood of the pines. To these properties is added the faculty of long resistance to the heat and moisture of a Southern climate. The color of the bark and properties of the wood vary with the nature of the soil. Trees growing near the natural bed of rivers, and surrounded half the year with water to the height of three or four feet, have a lighter colored bark than those standing where water does not reach them, and their wood is whiter, less resinous and lighter. These are called white cypress; the others are darker, and so called red cypress.

"Along the Mississippi River grow large cypress swamps just back of the cultivated land. In these swamps, where on the deep, miry soil a new layer of vegetable mold is every year deposited by the floods, the cypress attains its greatest development. The largest trees are 120 feet in height and from 25 to 40 feet in circumference above the conical base, which at the surface of the earth is always three or four times as large as the continued diameter of the trunk.

"This wood is now used for various purposes, and there is an increasing inquiry for it. Boat builders use it to a considerable extent. Many of the small boats belonging to the men-of-war in the United States service are constructed of cypress; much is used for water-tanks, sugar-coolers and cisterns on account of its durability; some enters into the construction of houses and house finishing, it being excellent in ceiling, and large quantities are made into shingles and railroad cross-ties. Some claim that shingles properly prepared will last 100 years; they are certainly very durable. Wood taken from submerged swamps, which has been in contact with the decaying influences of mud and water for untold centuries, is found to be in an excellent state of preservation. Cypress logs have been taken from the soil deep underneath New Orleans in good condition. Evidences are abundant and conclusive in regard to the lasting properties of the wood; hence, it is gradually creeping into use more and more each year. Already it is being used in many houses in New York City in finishing, with calls for more."

#### LANDS.

There are both United States and State lands in Louisiana subject to homestead entry. The price of State lands when sold outright ranges from 12½ cents to \$1.25, the former being for overflowed marsh land. A homestead of 160 acres can be entered for about \$14 cash and \$9 at the expiration of five years. The United States lands can be entered under the Homestead Act, or can be bought at \$1.25 to \$2.50 an acre; 160 acres can also be procured from the United States Government under the Timber Culture Act. Thus 480 acres of land can be pro-

cured in this State. Women can homestead the State land. Aside from the public lands, immigrants can buy land in nearly every parish in the State in quantities to suit them, and at extremely low prices. The scarcity of labor and other causes have necessitated a reduction in the size of plantations, and land is sold in some instances at prices merely nominal. Considerable timber land is yet purchasable at original prices, some parts of which are most bounteously timbered.

#### MANUFACTURES.

In manufacturing, Louisiana is making good progress, due to special advantages possessed by the State for certain branches of industry, such as the manufacture of cotton goods, the manipulation of cotton seed, jute and rope factories, canning establishments, the manufacture of lumber, etc. The cotton mills in the State run 39,668 spindles and 824 looms.

The extent of the cotton-seed oil mill industry in Louisiana may be gathered from the following extract from a recent address of Hon. T. J. Semmes at New Orleans:

"To-day the oil mills of Louisiana consume 130,000 tons of cotton seed. The product is 75,000 to 90,000 barrels of crude oil, worth on an average about \$17 per barrel; 33,000 to 45,000 tons of oil cake and meal, worth about \$26 per ton; 4,000 to 6,000 bales of linters or short staple cotton removed by machinery from the hulls of the cotton seed, worth \$25 per bale. The aggregate value of the whole product fluctuates annually from \$2,200,000 to \$3,000,000, while prior to the war cotton seed was thrown aside as useless except as a fertilizer, and that to a limited extent. This industry pays annually for river and railroad transportation about \$350,000; it pays for labor at the mill about \$250,000, besides incidentally affording a means of livelihood to numerous agents in the country, as cotton seed is an article of barter at country stores; it brings to our port annually a fleet of vessels to transport the product to other countries. This industry is yet in its infancy; its possibilities are vast."

Like all the Southern States in which there is a large supply of yellow pine, the business of manufacturing lumber has greatly increased. Saw mills and wood-working establishments are springing up, and are proving profitable enterprises.

As an inducement to the establishment of factories in the State, the following article has been embodied in its Constitution. Article 207 of the Constitution of 1879, after enumerating the property used for worship, charitable institutions, etc., which are exempt from taxation, goes on to say:

"There shall also be exempt from taxation and license for a period of 10 years from the adoption of this Constitution, the capital, machinery and other property employed in the manufacture of textile fabrics, leather, shoes, harness, saddlery, hats, flour, machinery, agricultural implements and furniture, and other articles of wood, marble or stone; soap, stationery, ink and paper, boat building and chocolate; provided that not less than five hands are employed in any one factory."

#### EDUCATION.

The State has a system of public schools. The amount appropriated for their support has not heretofore been enough to ensure the thoroughness and efficiency characteristic of the systems of some of the other States, but the interest in free schools is increasing, and there is no doubt that in a short time the schools of this State will be placed on a more substantial basis, and that provision will be made for a more thorough training of teachers.

There are numerous private schools and colleges. The Tulane University of Louisiana at New Orleans is one of the leading institutions of learning in the South.

## LAWS.

The following are some provisions of law that will be of interest :

“The General Assembly shall levy an annual poll tax for the maintenance of public schools upon every male inhabitant in the State over the age of twenty-one years, which shall never be less than one dollar nor exceed one dollar and a half per capita, and the General Assembly shall pass laws to enforce payment of said tax.

“The State tax on property for all purposes whatever, including expense of government, schools, levees and interest, shall not exceed in any one year six mills on the dollar of its assessed valuation, and no parish or municipal tax for all purposes whatsoever shall exceed ten mills on the dollar of valuation.

“There shall be exempt from seizure and sale by any process whatever, except as herein provided, the ‘homesteads’ *bona fide* owned by the debtor and occupied by him, consisting of lands, buildings and appurtenances, whether rural or urban, of every head of a family, or persons having a mother or father, a person or persons dependent on him or her for support; also, one work-horse, one wagon or cart, one yoke of oxen, two cows and calves, twenty-five head of hogs, or one thousand pounds of bacon or its equivalent in pork, whether these exempted objects be attached to a homestead or not, and on a farm the necessary quantity of corn and fodder for the current year, and the necessary farming implements to the value of \$2,000.”

## FISH AND GAME.

The Gulf of Mexico, the Mississippi River, the lakes and bayous, abound with fish of the greatest variety; and Louisiana produces not only the greatest abundance of delicious fish, but she has also sufficient to establish a large export trade.

The markets of New Orleans abound with oysters, crabs, crawfish and shrimp of the finest quality and the most delicate flavor.

No city in the world is better supplied with the most valuable products of her soil, forests and waters than New Orleans, and her resources in the matter of food and fruits are enlarged to the greatest extent by the boundless resources of the tropical islands and continental regions lying to the south.

The inhabitants of New Orleans and Louisiana generally have as abundant supplies of the great staples of human food and of fruits and game, and of the actual luxuries of life, as any people on the globe.

A recent writer has said of the southwestern parishes of the State:

“The very poorest class of people live on what we of the Middle Northern States term luxuries. All the bayous and lakes are full of the finest fish, such as trout, black bass, gar, sacylia, sunfish, gaspergo, and numerous others which I do not call to mind just at this moment, and on these same waters abound in great numbers canvas-back, red-head, mallard, bald-pate, blue and green-wing teal, and summer ducks. Wild geese are on the lakes and sea marsh the entire winter. All this is perfectly free. There are no ducking clubs or fishing monopolies here. Every one is at perfect liberty to fish and shoot. The best jack-snipe grounds in the world are found in the Teche Country. To give an idea of the quantity of snipe, I was one of a party of three that killed 53 birds on a piece of ground, measured as accurately as we could by stepping, that was a little less than an acre. Then we did not kill half that flew up. Snipe feed here by the thousand. They also have plover, rail, prairie chickens and quail in great abundance. I have seen gunners a little farther north tramping miles and miles to get a shot at birds found here feeding and jumping around seemingly in perfect security, for they are not molested here by the sportsmen. I allude to such birds as robins, doves, flickers, reed-birds, field-larks particularly, for they are very shy in the North. They do

not fly away, but walk, and will let a person get within 10 feet of them. There are also a great many deer in this county, which generally frequent the sea marsh. Opossum, coon, rabbit and red squirrel are very numerous, but are seldom or never hunted. There is game always in season. When it is out for one kind, the other is coming, so that a sportsman is always in his glory."

#### NEW ORLEANS.

No other city on this continent is so unique in its aspects as this, the chief city of Louisiana. Its quaint hurly-burly; its gay and giddy people; its love of pageantry; its surprising abandon; its fondness for parades; its union of bustle and idleness; the coarse savagery, squalor, ignorance, of part of its population, and the gentle refinement, high culture and effervescent brightness of manner of another; the stench of its gutters, and the floral glories of its gardens and parks; its grotesque and chaotic architecture; its markets, and their noisy and nondescript vendors; the diverse dialects of its inhabitants; the eloquence of its clergy; the desecration of the Sabbath in games, entertainments, pic-nics, theatres and conduct of business; its extravagance in dress and the gayety of it; its consummate beggars; its fine wines and cigars; its world-known carnival, and the matchless participation in its spirit; the knightly valor of its gentlemen, their hospitality and unspeakable charm of manner; the glorious beauty, elegance, sparkle, of its ladies—these and far more that defy enumeration give to New Orleans aspects kaleidoscopic and *bizarre*.

The business possibilities of this most advantageously located city are almost beyond computation. "New Orleans enjoys advantages which are peculiar, and which must make her a great emporium of trade and commerce. These are the facilities for transportation of heavy freight by river; her system of railroads; her safe and deep water port; her geographical proximity to Mexico, Central and South America. She is the natural outlet for the products and manufactures of the Mississippi basin and of the Western States. She should also be the distributing point for the imports from neighboring countries. The Panama Canal, when constructed, will cause an enormous increase in her traffic. She is but five days from Colon, the mouth of the canal; one day's crossing will bring her to Panama. This means communication in six days with the western coast of Central and South America, and an absorption of all the heavy freight from our California coast, and the supply of the wants of the people on the western coast of Central America under such favorable conditions as to defy competition. More intimate connections with Mexico will stimulate traffic between the two countries, a large portion of which must necessarily fall into the lap of New Orleans."

New Orleans ought to be the great center of sugar refining. Her proximity to Cuba and her position as the emporium of the home supply; her river for distribution, along with her railroads, show this. The unnatural competition of German beet-sugar cannot continue. She ought to manufacture flour from Southern-raised wheat, and distribute it to South and Central America, West Indies and Mexico. Many considerations urge her eligibility as a great cotton manufacturing city. Years hence Southern-raised wool will come here in great quantity, and woolen factories ought to spring up. Silk factories we ought to confidently expect, too. Her proximity to Texas and South America for hides point to her as a most proper place for manufacturing boots and shoes, harness, trunks and other articles into which leather largely enters. Here ought to be canned extensively oysters, shrimp, fish, terrapins, wild duck, figs, oranges, pine-apples, many vegetables, etc.

Iron ship-building—and wooden, too, for that matter—ought to here find one of its most eligible localities. Proximity to coal and iron; competing railroads

from the fields of these minerals, with down grades; a river entering, so to speak, distant fields to cheapen these products; the cheapest and best timber in the world—Southern white oak and yellow pine—near; deep water and plenty of room for launching—all these and more show the inducements in this industry.

No place seems so fit for the seat of an immense industry in the manufacturing of furniture, whether one regards her proximity to the fine woods of the tropics, or her contiguity to the abundant—almost untouched—woods of the South. This city could hardly have a rival in the country in the manufacture of either cheap or most elegant furniture. Comparative non-competition, largeness of territory for consumption, cheapness and facility of distribution, are all additional and most important factors.

New Orleans ought to be a prodigious producer of woodenware. This needs no further word. Rags are exported hence to New York. This is suggestive enough of paper manufacture.

New Orleans ought to export the bulk of the tobacco raised in Kentucky and Tennessee. This product would thus bring more money to its producers.

A large increase of capital, available for current uses, is badly needed in New Orleans. This city is now too dependent upon New York.

Most Western importations ought to come via New Orleans, and the South will find her one of the most eligible ports for the exportation of her future home-made flour, cotton goods, canned meats and vegetables, boots, shoes, harness, farming utensils, machinery, etc. Coal and lumber, too, ought to find large exportation from this port. There must be a great future in these. Certainly, New Orleans ought to be the great entrepot for the teas and silks of China and Japan and for the coffee and spices of the tropics. The completion of either the great canal across the Isthmus or Eads' ship railway will open a path which New Orleans ought to enter.

"The South is the coming country." New Orleans is the gateway to the world to and from the South and West.

# TEXAS.



It is with a sense of great embarrassment that I undertake a description of the State of Texas. Her vastness of area is oppressive to the contemplation, when attempting to convey a just conception of it. Her marvellous progress antiquates authentic statistics, and to do her justice, one must disregard them and invade the realm of conjecture—a course always open to criticism, greedily seized by the caviller and detractor, and always repugnant to a writer desiring to secure conviction by unquestionable data. Again, Texas has had no geological survey, and in this regard she has done herself a gross injustice and made a most egregious mistake. While she, beyond cavil, has great mineral riches, their extent and variety are illy defined. Not to speak of them would be rank injustice; to define them with even an approximation is impossible; to endorse the wild claims of enthusiastic ignorance or of sinister exaggeration is not to be thought of. Exploitation is in progress all the while. Great discoveries are claimed to have been made, of which many are, doubtless, true; and it is likely that Texas will add to her other stupendous resources stores of mineral wealth as yet unsuspected—certainly not foreshadowed as yet by any authentic scientific exploitation.

It is also true that Texas is largely in a transition state, in some aspects. Areas devoted to ranges are coming into agricultural conditions. Instead of breeding cattle and selling them young, to be raised and fattened on Western soil, she will disuse more and more the ranche mode; raise corn, and rear and fatten her own cattle, and so vastly increase her own wealth, as well as modify a characteristic vocation.

It is certainly true, too, that Texas is gravitating, in common with other Southern States, more and more towards manufacturing.

The great quantity of wool she raises; her ascendancy as a cotton State, suggest the manufacture of these staples into fabrics, and there is progress that way.

Her stores of iron and coal suggest possibilities for manufacture for home supply; and, Western consumption, it would be idle to forecast.

Her wheat area and production, and the early ripening of the staple, suggest an industry in the manufacture of early flour for the Northern markets, (to be sent thence cheaply by water from Galveston or New Orleans,) and for South America and the West Indies.

Any one can see that in this undefinedness of progression, in this undiscovered mineral wealth, in this ferment of transition and agitation of the public mind towards the new, it is difficult to write of Texas; for while, in a sense, well settled—populated—she is unsettled. She ought to be and may be a great manufacturing State in cotton and woolen fabrics, but she is not; her capabilities and superb opportunities only promise it.

She ought to be, unless appearances greatly deceive, a great producer of iron, coal and copper, yet she is not.

But the great influx of population and capital; the pushing, bustling, driving spirit of her people, promise at an early day an awakening to all great possibili-



ties and a utilization of them. Still, her phases make it impossible to truly describe her; but enough is known to entitle her to the appellation she will one day win, without questioning—that of the Empire State; the *facile princeps* of American commonwealths in the mighty republic of the United States.

The following general survey of the State is from the last census report:

“Texas is the extreme southwestern State of the Union, the Rio Grande separating it from Mexico, and the meridian of  $103^{\circ}$  forming the line between it and New Mexico. On the north the boundary is marked by the Red River from Louisiana to the meridian of  $100^{\circ}$ , thence northward of that meridian to its intersection with the parallel of  $36^{\circ} 30'$  north latitude, and thence west to the meridian of  $103^{\circ}$ . There are 225 counties in the State, 72 of which are still unorganized, and they vary in area from 150 to 12,000 square miles, the large counties lying in the uninhabited portion of the State on the west.

“The entire area, as estimated by Mr. Henry Gaunett, geographer of the Tenth Census, is 265,780 square miles, which includes 3,490 square miles of water area, comprising coast bays and gulfs, rivers and lakes, leaving 262,290 square miles of land surface alone.

“The area of Texas, therefore, comprises 8.7 per cent. of the entire area of the United States and Territories (3,025,600 square miles), and, comparing it with other States, we find it to be nearly as large as the combined areas of Louisiana, Mississippi, Alabama, Georgia and Florida, or of that of the New England and Middle States, with Ohio and Illinois, all combined. In comparison with the countries of Europe, we find that Texas is larger than either the Austrian or the German empire, France, or the islands of Great Britain.

“It is estimated by Mr. Gaunett that of the entire area of the State, 129,200 square miles comprise the inhabited portion, with a population of 1,591,749, giving an average of a little more than 12 persons per square mile. The remaining 133,090 square miles (land area) include the southwestern prairies and the plains and gypsum lands of the west and northwest.

“Between the extreme east and west points of the State there are about 13 degrees of longitude, or a little more than 900 miles; from north to south there are included about 10.75 degrees of latitude, or nearly 750 miles.

“In the State of Texas we find combined a great diversity in both soil and topography, the former passing from the extreme of fertility on the Red River on the north, the Brazos in the middle and the Rio Grande on the extreme south, to the extreme of sterility in the sand desert of the south; in topography, from the extreme of low and flat prairie lands and a very little marsh along the coast, by gradual transitions and elevations, to the chains and peaks of mountains on the far west, whose summits are 5,000 feet or more above the sea.

“To these extremes may be added that of population, for we find on the east and central (north and south) parts of the State comparatively thickly-settled counties and large and flourishing towns and cities, while on the west emigration and settlements have scarcely yet reached the foot of the plateau of the great plains.

“To complete the picture of extremes, as it were, we find that several of the great agricultural regions that form so prominent a feature in the other Southern States have their termini in Texas, and are cut off on the southwest either by the prairies of the coast or by the great mesquite and cactus chaparral prairies of the Rio Grande region, or they abut against the eastern bluffs of the plains.

“The coast of Texas presents features different from those of any other State; for while in other States the mainland coast is greatly cut up into large bays, extending many miles inland, it is here bordered by an almost continuous chain of islands and peninsulas, (the latter having the same trend as the islands.) The

gulf border of this chain is a very regular line southwest from the mouth of the Sabine River or lake to near Corpus Christi, which occupies the highest point on the entire coast, and thence turns with a regular curve south and slightly southeast to Mexico. The islands and peninsulas, which are separated from the mainland by distances of from 10 to 20 miles, more or less, are covered with heavy belts of sand and sand dunes, rising 15 or 20 feet above the beach. The latter skirt the shore line for many miles, and, as on Galveston Island, are usually broad, and offer many inducements to pleasure-seekers. The longest of these islands is Padre Island, which extends from Corpus Christi Bay to near the mouth of the Rio Grande, a distance of more than 100 miles. The large estuaries that have been formed at the mouths of the streams, except the Sabine, the Rio Grande, and those of the Brazos section, form another feature peculiar to the Texas coast. The border lands of these estuaries are usually high, their almost vertical clay bluffs being washed by the waters of the bay, and the open prairies of the uplands often extend to their very edge.

"Mr. Gannett estimates the water area of the coast bays, gulfs, etc., to be 2,510 square miles, and that of the rivers and lesser streams at about 800 square miles."

#### CLIMATE.

*Temperature.*—The large territory occupied by the State naturally presents a variety of climate, and we find from the reports of the United State Signal Stations for 1880 (a statement of which has been furnished me from the chief office at Washington) that while the coast counties are warmed by the sea breezes during the winter months and have a mean temperature of 53° in December, the northern counties along Red River suffer severer weather, the temperature of Denison for the same month being 41°. The minimum and maximum extremes during December were at Galveston 18° and 72°, and at Denison 2° and 76°. At Corsicana, an intermediate point, the extremes were 6° and 80°, with a mean of 47.4°. Brownsville, situated more than three degrees south of Galveston, has for the same month the same minimum (18°) and a higher maximum (83°).

"During the summer months the northern counties of the settled portion of the State enjoy cooler nights and hotter days than those of the coast, though the mean temperature was the highest on the coast by several degrees. July at Galveston and August at Denison were the hottest months, the average temperatures being respectively 83° and 80°, with maximums of 93° and 101°.

"Eagle Pass, on the Rio Grande, seems to be the hottest place in the State, its maximums for the months from the first of March to the last of July being greater than was recorded at any other point during the same time, and that for the months of June and July, 108°, being also the highest in the State for the year.

"At Rio Grande City a maximum temperature of 105° was recorded in April and June, and at Fort Stockton, in Pecos County, 106° in June. At Brownsville and San Antonio the highest temperature, 95° and 98° respectively, was reached in July.

"Fort Elliott, in the northwestern part, or Panhandle, of the State, enjoys the coolest summers, the thermometer for the three months not rising above 86.7°.

"One of the most prominent features of Texas climate is what is commonly termed 'the Texas norther,' a sudden and extreme change of temperature produced by a rush of cold wind from the north, usually coming unannounced, though sometimes indicated by a haziness in the northern sky. The northers are usually preceded by a warm spell of 24 hours, more or less, and the change of temperature is very great, sometimes in the winter months falling as much as 30° or 40°, though usually much less. They continue about three days, the second being the coldest, and are succeeded by warm weather, though sometimes the

northers follow each other so closely as to produce eight or ten days of cold. They may be expected at all times of the year; and it is customary for travelers to be provided with blankets, even for a trip of a few days. These northers are sometimes accompanied by rain, and are classed as dry or wet northers. The summer northers are not as frequent as the winter ones nor as marked, sometimes being oppressively close and warm, instead of cold."

Western Texas has an elevation of about 400 to 1,600 feet above the level of the sea. The atmosphere is dry, dense, very invigorating, free from fogs and malaria.

The climate of Western Texas, according to the isothermal lines, which differ materially from the parallels of latitude, is placed, San Antonio being the principal city, in average temperature with Guaymas, Mexico, New Orleans, La., Madeira Islands and Canton. The climate receives some of its mildness from the great ocean current or gulf stream of the Atlantic Ocean, which makes its circuit of about 10,000 miles, bringing its heat from the equatorial region, and throwing its warm streams hundreds of miles inland; and it fortunately escapes the chilly winds of the Florida coast, caused by the body of cold water coming from the north and insinuating itself between the land and gulf stream, the coast of Western Texas being hundred miles beyond its terminus. It is the Pacific Ocean current (Kura Sewa stream) which imparts to the coast climate of California much of its mildness.

Western Texas is again favored by nature in the abundance of her disinfectant (ozone). This element of the atmosphere is so abundant that meats are preserved perfectly in the open air without salt. The bodies of hundreds and thousands of dead animals lying on the prairies emit no odor whatever. It is this, with the other elements of a pure atmosphere, which removes tubercle and cures the consumptive. It is a well-established fact that yellow fever cannot prevail here as an epidemic. It is equally true that ozone constitutes the exemption.

I again quote from the census report:

*"Rainfall and Water Supply.*—The winds that bring rain and thunder-storms usually come from the southwest, those from the north being mostly dry. From the records of the United States Signal Office it seems that during 1880 the greatest amount of rain fell at Galveston, amounting to 50.1 inches, and at Denison 46.3 inches, while at Corsicana, San Antonio, Fredericksburg and Brackettsville, lying in a northeast and southwest course from each other, the precipitation was over 40 inches. The least amount of rainfall (from 16 to 24 inches) was reported from Fort Elliott, in the Panhandle, Fort Davis, west of the Pecos River, and Rio Grande City, in Webb County, on the southwest, while at several other points on the west and along the Rio Grande it was less than 30 inches.

"With regard to the seasons, it seems that the winter months are the driest of the year very generally throughout the State, the precipitation varying from three to seven inches, and much less in Denton County and several points on the west and southwest. During the spring months the rainfall was greatest in the eastern counties, amounting to from 12 to 13 inches. At all other points, except San Antonio, Mason, Fredericksburg and Fort Griffin, less than nine inches was obtained, the country west of the Pecos River being very dry.

"During the summer months the country around Corsicana suffered greatest from droughts, while Denison, San Antonio and other places over the west and southwest enjoyed their greatest rainfall for the year, the maximum for any one month in the year throughout the State (21 inches) having been reached at Brownsville in August.

"The fall months vary but little from those of summer, except that there is more rain in the eastern counties. From the reports given, San Antonio seems

to enjoy the greatest regularity in its monthly rainfalls, there being but one month when it was less than two inches, while its maximum for any month of the year was 8.6 inches. The record of Corsicana shows very nearly the same regularity, a maximum of 7.7 inches.

"The country west and southwest of the black prairie region is visited by rains, chiefly between the first of May and the last of September. These rains come suddenly, and, while lasting but a few hours, are drenching in character, flooding the country, and hence probably producing the great ravines or *arroyos* that form a prominent feature of the southwest. The water soon disappears; the small streams are dry throughout the greater part of the year, and dependence is put chiefly upon the larger ones that have their sources from springs at the foot of the great plains. In the red loam region, on the north, parties have sometimes been successful in digging wells that afford a supply of water for a portion of the summer, and, when near a village or town, such wells, or even streams of water, are a source of revenue to the owners. Attention is now being turned to the sinking of artesian wells, but I know not with what success their efforts have been met.

"In the black prairie region, occupying the central portion of the State, the various small streams usually become dry during the summer, and some trouble is experienced in obtaining a sufficient supply for general purposes. Wells cannot be relied upon, and their water is so strongly saturated with lime from the rotten limestone rock (cretaceous) as to be almost unfit for domestic uses, thus compelling families either to build cisterns or to haul water in casks and barrels from some neighboring stream, sometimes several miles distant. In the large cities water is furnished from artesian wells 700 feet or more in depth, the supply coming from beneath the rotten limestone formation.

"The timbered region of Eastern Texas is better supplied with water than any other part of the State. Springs of good freestone water are found in almost every county, and wells furnish an abundant supply for domestic purposes. The small streams usually become dry during the summer months, and artificial reservoirs, or simply earth embankments, collect a sufficient amount of water during the rainy seasons for farm and stock purposes."

Although Western Texas has much less rainfall than much of the South, she has, in all except a small area there, more than the western side of the United States, (except a small area here and there,) until the influence of the Pacific Ocean is felt in Washington Territory, California and Oregon. The belt of 20-25 inches reaches near the western border of Texas, and it increases coming east until it reaches, on the coast, 60 inches and above, ranking with the heaviest in the United States, and only found in a very narrow area. It will be sufficient to say that, leaving out a very narrow western area, the driest part of Texas is better watered than much of Colorado, part of Western Nebraska, and a good deal of Dakota, Montana and other States. The belts of rainfall run in a sinuous line north and northeast, and are of various widths—from one-half or less to a degree or more of longitude. They penetrate clear up to the British possessions. Here and there these areas are deflected by rivers, but the decided course is north, and increases in quantity of rainfall as they come east.

Fortunately for Texas, much of her very best land is in an area of ample rainfall for crop making—from the Sabine River, on the east, (where there are 50 inches of rainfall, as high as the 31st parallel,) to the Brazos, as high up as above the 35th degree of latitude, where the least rainfall is 35 inches per annum. In parts of the West, the best land is in dry areas and with limited time for crop making—a matter of exceeding moment, as every Western farmer knows.

Even the Staked Plains (*Llano Estacado*), once supposed to be next to useless for man, now seem to show plenty of water by digging; and even this area is no worse off for rainfall than considerable of Colorado, New Mexico, quite a considerable area of Western Nebraska, a great deal of Dakota, Wyoming, Montana, and even a slice of Western Kansas.

So important a matter is this that it is worth pausing upon, for it opens an area in which there seems much of meaning to the country in the years to come. It is a revelation, really; for only a year or two ago, when the writer was traveling through that country, water for the locomotive had to be carried many miles from the east. Here is an extract from a paper published near that area:

"It is no longer a problem about securing water on the Staked Plains. Wells of pure living water are to be had from 20 to 100 feet deep, and, by the use of wind-mills, water will soon be made to flow as freely and abundantly on the plains as in any section of the State. The cattle and sheep will nip the luxuriant grasses that have heretofore gone to waste because the water was hidden a few feet under the ground. Nature has bountifully supplied this section with water, which only needs a little muscle to bring it to the surface. Mr. W. T. Stewart, who is boring wells for a land company northwest of here about 60 miles, is meeting with splendid success. He began about the 1st of July, and has already completed 12 wells, with a bountiful supply of water in all of them. In no instance has he failed to get plenty of good water, nor in any of them has he gone exceeding 100 feet."

Here is more to the same effect from the Texas Live Stock Journal:

"Messrs. Brune & Graham, who are wool growers in Hall County, Texas, have settled on dry land, and consider the best property they own besides their sheep to consist of a wind-mill, pump and attachments, which they make good use of. At 100 feet deep they found an abundance of water for their 3,000 sheep, and in going to this trouble and expense consider themselves amply repaid. They found a better range than if they had gone on a watercourse, and obtained better water for their stock.

"Mr. Lee Dyer, ranchman of Hall County, who controls an extensive tract of land, has improved his headquarter ranch by the same method, and has constructed several large tanks during the past year.

"Messrs. Gannon, ranching on the plains, have successfully found water without going deep.

"The Quaker colony in Crosby County have found water at a depth of 41 feet.

"A sheep raiser in Nolan County is watering several thousand sheep at one good well, and in the country west of Midland and thereabouts the drill is working constantly.

"We learn of several companies intending to use the drill and the scraper during the coming winter, instead of discharging hands. This is a move in the right direction. It adds to the carrying capacity of the range, opens new ranges and relieves the heavy pressure of stock on the streams, leads to greater improvements and adds to the wealth of the country.

"Want of water need be no detriment to Texas, neither in the older counties nor on the plains. Fifty cents per acre will water the driest land we have and utilize the millions of acres now going to waste, affording to Texas an independent position in enabling the State to carry with profit the increase of herds and flocks for years to come.

"Water is the first necessity of Texas stockmen, and there seems to be no limit to the quantity if stockmen will make but an effort to find it."

In considering the capabilities of Texas as to sustenance of stock, her annual rainfall must not be lost sight of. All except the country west of the Pecos River—a comparatively small area—is in the region from 15–20 inches per annum

and above. The Panhandle is in this category—15–20. Most of the great range district of the Northwest is considerably lower than this.

Then, Texas borders the gulf; has no high intervening mountains to extract the moisture from the damp gulf winds before they reach her area, and has over considerable areas heavy dews, which the Northwest lacks.\* All these will count for more when grasses like Bermuda and others shall have come in to succeed the native grasses, for Bermuda will support more stock to a given area than any grass known.

Then, the bulk of this rainfall is in the spring and summer, or the growing season—a matter of the utmost importance. Thus, for illustration, that part of the Panhandle in Texas having an annual rainfall of 15–20 inches has a spring and summer rainfall of 10–15. This permits a large capacity of support—very different from an almost rainless area—because the pastures, after having been eaten over, come on again.

### TOPOGRAPHY AND SOILS.

In the following description of the topography and soils of Texas, I have drawn largely upon the census report:

The State of Texas, with its immense territory, naturally presents agricultural features greater in variety, perhaps, than those of any other State in the Union. Its position at the southwestern extreme of the agricultural regions of the South gives to a part of the State features similar in most respects to other Southern States. Including, as it does, the southeastern borders of the great Western plains, the lands of the western part of the State resemble those of New Mexico. Those of the gypsum formation and of the red loam region seem only to extend northward into the Indian Territory. The following agricultural regions may be conveniently distinguished:

1. Timbered upland region of East and Central Texas.
2. Southern and coast prairie region.
3. Central black prairie region.
4. Northwestern red loam lands.
5. Western and northwestern uninhabited region.
6. River alluvial lands, including the Brazos delta or "sugar-bowl."

#### THE TIMBERED UPLAND REGION OF TEXAS.

The timbered region, which name is popularly applied to all that part of the State lying east of the central prairies and southward to the coast prairies, and which here is made to include also "the cross timbers" of the former, embraces an area of 45,995 square miles. It covers the eastern part of the State from Red River southward to the marshes of the Sabine River, and extends southwestward, becoming more and more narrow, until it nearly reaches the Frio River, about 100 miles from the Rio Grande, where it ends.

The area, exclusive of the cross timbers, is 40,685 square miles, or greater than that of either Kentucky, Indiana or Virginia. It includes all or the greater part of about 50 counties.

The country is properly divided into three general divisions, the oak, hickory and short-leaf pine uplands, the long-leaf pine hills and flats, and the prairies, which are interspersed throughout the former. In addition to these, the bottom lands of the entire region will be separately described.

*Oak, Hickory and Short-leaf Pine Uplands.*—This group occupies nearly the entire area of the timbered lands southward to the southern part of Sabine, San

\*The dews in that area of the South more particularly within the influence of the saturation of the gulf evaporation are exceedingly heavy and precipitated very early. Very shortly after sunset the quantity is equivalent to a tolerable shower of rain.

Augustine, Polk and San Jacinto Counties, or 35,350 square miles. Its surface presents three general features, which are best described separately, viz: a region of prominent short-leaf pine growth on the east and southeast, known as "the pineries;" a belt of red hill lands occupying the central portion southwestward; and the oak and hickory lands proper, with some short-leaf pine growth. This region is more thickly populated than any other in the State, the average being a little more than 16 persons per square mile. The proportion of lands under cultivation (13.2 per cent.) is a very little less than that of the central prairie region, while the percentage of these devoted to the culture of cotton is 34.4, a far greater proportion than is found in any other part of the State. The cotton acreage per square mile is 28.4 per cent., corn being the chief crop of the region.

The Short-leaf Pine Region.—This region, thus designated because of the prevalence of the short-leaf species of pine, embraces the eastern part of the county of Bowie, a large part of Cass, and portions of the counties south bordering the long-leaf pine region, and also extends in belts along the Nueces River, in Cherokee and Anderson Counties, constituting what are often called "pineries."

The lands are generally but slightly rolling, and have light sandy or silty soils from 10 to 12 inches deep, a yellowish sandy subsoil two or more feet deep, and a red underclay. These depths vary greatly, the clay often coming near to the surface. The pine is interspersed more or less with oaks and hickory, and the bottom lands of the creeks that flow through the region have a growth of sweet gum, elm, oak, etc. The sandy nature of the land makes tillage easy. Drainage is good, and it is claimed that the lands will produce an average of 800 pounds of seed cotton per acre in favorable seasons without the aid of fertilizers.

The Red Hills.—Hills of ferruginous sandstone and concretionary iron ore occur in a number of the counties of Eastern Texas, and notably in Cherokee, Cass, Marion and Rusk. Southwestward the belt of iron ore and red lands extends beyond the Guadalupe River, but, with the exception of a few isolated hills, the country is not so broken, the rocks rather forming beds below the soils. The iron hills of Cherokee County are from 150 to 200 feet above the general level of the country, and are in some cases broad on their tops, while on the sides masses of iron ore outcrop in large and small fragments. The soil of the valley lands between these hills is full of ferruginous pebbles, making them, as is claimed by the farmers, more liable to drought,

Red sandy and clayey lands occur in most of the counties of the oak and hickory region to a greater or less extent, but chiefly, so far as known, in Cass, Morris, Marion, Harrison, Smith, Cherokee, Rusk, Nacogdoches, San Augustine, Sabine, Houston, Anderson, Lee and Caldwell. These red lands are considered best for corn and small grain, though cotton grows well and produces from 600 to 800 pounds of seed cotton per acre. In Lee and some other counties the lands are enriched by a glauconitic limestone (tertiary), which lies in fragments on the surface. The timber growth of the red lands is hickory, red and post oaks, sweet and black gums, and elm.

The Oak and Hickory Uplands.—The timbered uplands, in whose growth pine is almost entirely absent, covers the largest part of this division of the State, and lies between the central black prairie region on the west and the pineries and southern coast prairie region on the east and south. The region has a southwest-erly course, reaching from the Red River on the northeast nearly to the Nueces River on the southwest, and while wide at first (from 60 to 100 miles), becomes narrow at the Brazos River, and is to the southwest interspersed with and penetrated by the southern prairies, the latter feature giving the appearance of long arms or peninsulas of timber extending out from the main region.

The surface of the country is generally rolling, sometimes hilly; the soil sandy to a depth of about 12 inches, and is very generally underlaid by a good clay subsoil, usually red in color. Decayed leaves and other vegetation has given to the surface soil a dark color an inch or two deep, adding much to its productiveness.

The general timber growth of these lands is red, black, post and black-jack oaks, and hickory, with a thick scrubby undergrowth, and some short-leaf pine. The crops of the region are cotton, corn, wheat, oats, sugar and sorghum-cane, pease and upland rice. The uplands are best adapted to cotton, which comprises a large proportion of the crops. It usually grows to a height of three feet in dry and five or six feet in wet seasons, producing, it is claimed, from 800 to 1,000 pounds of seed cotton per acre when fresh, and from 600 to 800 pounds after many years' cultivation. The lands wash readily when allowed to lie idle any length of time, but as yet any effort to prevent this is exceptional.

*Prairies of the Eastern Timbered Region*.—Sandy Prairies.—The prairies of the region differ from each other in character, those on the west partaking largely of the black waxy nature of the central prairies, while those on the east are lighter and sandy. In Cherokee County the latter are known as "brush prairies," from the fact that they are rapidly being covered with a low scrubby growth of red, post and black-jack oaks. The past eight years is said to have witnessed a great change in this respect, and is attributed to the fact that they are not now yearly burned off, as formerly was the case.

The soils of both these and the Boston prairies, in Bowie County, are light sandy or silty, and are not considered as productive as the adjoining timbered sandy uplands, the cotton plant not growing as high, and yielding only from 500 to 700 pounds of seed cotton per acre when fresh. The prairies are very level, those of the Boston being about a mile in diameter, and interspersed with clumps of trees.

*Brown Loam Prairies*.—In the counties of Navarro, Limestone, Grimes, Brazos, Burleson and Lee there are high, rolling and open prairies having a brown loam soil a foot or two in depth and an underlying heavy clay, which in the prairie valleys or lowlands forms very heavy waxy lands, similar in every respect to the black prairies of the West. The largest of these brown loam prairies covers a large part of the two first counties named, and lies along the eastern edge of the black prairie region, extending on the north and south into the adjoining counties, and covering an area of about 1,825 square miles.

The lands of these prairies have a rich brown loam soil from 12 to 24 inches in depth and a heavy reddish clay subsoil. Mesquite growth is plentiful. The lands yield well and are said to be very durable. Cotton grows well, often to a height of four or five feet, producing an average of about 800 pounds of seed cotton per acre. It is stated that very little of this land that has been long under cultivation now lies turned out for rest, its productiveness being as yet but slightly diminished. A large proportion of these prairie lands has never been under cultivation, and still is used for pasturage.

The "San Antonio prairies" of Burleson, and those of Brazos and Grimes Counties, are similar in character to these described, and the same and even greater productiveness is claimed for them.

*Bottom Lands of the Timbered Region*.—Under this head are included only the lands of the smaller streams, those of the large rivers comprising a separate division.

Sulphur Fork River lies mostly within this region on the northeast, and is parallel with Red River, to which it is tributary, and flows almost due east. Its bottom lands, as well as those of the neighboring White Oak and Big Cypress



Creeks, have a dark and heavy loam soil, quite deep, and overlying a stiff bluish clay. They have a timber growth of hickory, pecan, ash, walnut and white oak, with pin, burr, overcup and Spanish oaks. Cotton is very much inclined to run to weed on these lands, and is represented as producing as much as 1,500 pounds of seed cotton per acre in favorable seasons.

Angelina and Neches Rivers, in their separate courses, belong to this division, uniting soon after they enter the pineries. Their bottom lands are from one-fourth of a mile to one mile in width, and have a timber growth of oak, elm, hickory, beech and walnut, with an undergrowth of cane, bamboo, muscadine and wild peach. The soil is a black loam from two to four feet deep, over a heavy clay subsoil. Cotton grows to a height of five feet, and is said to yield when fresh as much as 1,500 pounds of seed cotton, or from 800 to 1,000 pounds after five years' cultivation. The hummock lands that border these bottoms have a width of from one-fourth to one and a-half miles, and a timber growth of pine, oak, hickory and ash. The soil is said to be a heavy whitish brown clayey loam from 12 to 24 inches deep, underlaid by a heavier subsoil and by gravel at a depth of six or eight feet. It yields when fresh from 500 to 800 pounds of seed cotton, or from 400 to 700 pounds after five years' cultivation.

Navasota River bottom is said to have very much the same character of soil and growth as that of the Brazos, to which its waters are tributary. A very high yield is claimed for both, viz: over a bale per acre.

The bottom lands of the Yeguas (creeks lying between the Brazos and Colorado Rivers) are not much under cultivation, as they are subject to overflow. They have a timber growth of pin oak, pecan, elm, ash and hackberry. When cultivated they yield, it is said, about 1,400 pounds of seed cotton per acre. The bottom lands of the Guadalupe River are subject to overflow, and therefore are not under cultivation. Its valley lands are rich and productive, having a dark loamy or often a black prairie soil two or three feet deep over a gray clayey subsoil, and at 10 feet a bed of sand and gravel. Cotton grows usually from five to eight feet in height and yields about 1,400 pounds of seed cotton per acre.

Lake Bottom Lands.—The bottom lands of Little Cypress River and Caddo Lake, in Harrison County, are from two to three miles in width, and have a timber growth of pin and overcup oaks and pine, cypress in the marshes, and blue-jack oak and myrtle thickets along the borders of the lake. The soil is black and stiff, and water stands on it during half of the year. The creek bottoms in the same county have a growth of red oak, sweet gum, hickory, red elm, chinca-pin and bitter pecan. These lands are not extensive, and are little in cultivation.

On the Sabine River, in Rusk County, there are some cypress swamps. The creeks of the county have a bottom growth of white, red, post and overcup oaks, ash, maple and hickory, and a fine sandy soil 18 inches in depth overlying a compact clay, and said to produce from 1,000 to 1,200 pounds of seed cotton per acre.

*The Long-leaf Pine Region.*—The region thus designated does not include all of that part of the State in which the long-leaf pine is found, but, as in Georgia and other States, is meant to represent only lands that are so sandy as to support a timber growth of little else than this species of pine.

In Sabine, Panola and other counties there are large areas covered with a prominent growth of this timber, associated with such hard woods as oak and hickory, and having clay subsoils. They thus differ from the lands in the more southern counties, and are properly classed with the oak, hickory and pine region.

The long-leaf pine region, or "pineries" as it is called, comprises both hills and flats, and embraces the counties of Newton, Jasper, Tyler, Orange and Hardin, the southern parts of Sabine, Angelina, Trinity, San Augustine and Nacogdoches, the eastern and southern part of Polk, and probably the south-

eastern part of San Jacinto, as well as areas in Shelby and Panola and elsewhere. It covers an area of about 6,000 square miles. The "flats" are found in the southern part of the region between the Trinity and Sabine Rivers, and form the western limit of the pine flats of Louisiana and other States. The rest of the region is more rolling and well timbered, chiefly with long-leaf pine, and forms the western extreme of that great belt of pine timber so prominent from Texas to the Atlantic coast.

The northern part of the pine region in Texas is interspersed with open prairies having a variety of soils, from sandy to stiff black loams and clays, and is similar in position and other features to the Anacoco prairie of Louisiana. The timbered uplands have but little else than dark or gray sandy soils, with mostly sandy subsoils, sometimes to a depth of several feet, and are not considered very productive. The country is sparsely settled, with an average of about five persons per square mile. The chief industry of the people is the cutting and shipment of lumber.

The lands under cultivation are chiefly the hummocks that lie along the creeks and larger streams. Their soils are sandy to a depth of many inches, and have a growth of oaks, hickory, beech, walnut, magnolia, etc. It is claimed that these lands will produce as much as 1,500 pounds per acre when fresh and 800 pounds after eight years' cultivation. 2.1 per cent. only of the area of the region is under cultivation, and that is mostly devoted to corn. The cotton average is 3.4 acres per square mile, comprising 25.6 per cent. of the tilled lands, with an average yield of 615 pounds of seed cotton per acre.

*The Cross Timbers.*—The name of "cross timbers" is popularly given to two wide belts of timbered lands that extend southward from Red River—the one, or "lower," in the central part of the black prairie region; the other, or "upper," on the west of the prairie, or between it and the red lands. These belts resemble each other very much in their general features.

The soils of the uplands are generally very sandy for a foot or more in depth, and are not considered valuable. Along the streams and in the lowlands the soil is a dark sandy loam with a clay subsoil, rich and productive. On it cotton grows four or five feet high, and, it is claimed, yields as much as 1,500 pounds of seed cotton per acre, even on lands that have been several years under cultivation.

#### SOUTHERN COAST PRAIRIES.

The coast of Texas is bordered by a low and level prairie, reaching from the marshes of Sabine Pass westward to the densely timbered Brazos alluvial basin, and thence westward, with scarcely any interruption, to the Rio Grande, excepting the narrow timbered lands of a few streams. While there is a similarity in some of its features throughout its length, yet certain portions of the coast have such marked peculiarities as to merit a division into three groups for purposes of description. These are the prairie region east of the Brazos alluvial, the prairie region west of the Brazos alluvial, extending to the Nueces River, and the southwestern prairie region, lying between the Nueces and Frio Rivers to the Rio Grande. The entire region embraced is about 47,680 square miles, which is about the area of the State of Mississippi.

*East of the Brazos Alluvial Region.*—In the southeastern part of the State, lying between the Brazos and the Trinity Rivers, and extending eastward to the Neches, there is a large region of level prairie lands, having large areas each of gray silty and black waxy soils, interspersed with "motts" of pine or oak, and intersected by timbered streams. The region extends from the coast inland into the counties of Waller, Montgomery and San Jacinto, and includes besides these

all or portions of Jefferson, Liberty, Chambers, Galveston, Brazoria (eastern part) and Harris.

The prairies of the northeastern part of the division usually have gray silty soils, and deserve more properly the name of "pine prairies;" but where the underlying Port Hudson clays approach the surface the result is a black waxy soil. On the northwest of the city of Houston, and extending nearly to Hempstead, in Waller County, there is but little to break the monotony of a level and open prairie. Southward to the coast the prairies extend almost uninterruptedly, covering areas of from 20 to 30 miles in breadth, and are characterized by the absence of all growth other than grasses and occasional motts of large live-oak trees. Along Buffalo Bayou and other streams the uplands are well timbered with oak and pine, and in the immediate vicinity of the streams the magnolia (*Magnolia grandiflora*) is a large and prominent growth. The trees, and especially the live oaks, are very generally festooned with the greatest abundance of the long moss (*Tillandsia usneoides*) so common in the coast region of all of the Southern States. The surface of the entire region is very level and even, with a descent to the coast so gradual as to afford no drainage to the soils, and, as a natural consequence, water remains in pools upon the prairies of the region until removed by evaporation.

The immediate coast lands from the marshes of Sabine River westward to the Brazos alluvial are almost entirely open prairies with a light sandy soil, becoming darker inland, and underlaid by a white concretinary clay. This latter comes to the surface near Clear Creek Station, 19 miles from the shore line. Small natural mounds from 10 to 20 feet in diameter and several feet high cover some parts of this coast region. At Allen's Station, about 40 miles from the coast, the subsoil changes to a yellow clay with calcareous concretions.

The soil of the region is very generally a light sandy loam underlaid at varying depths by heavy impervious clays. Large areas of black clayey lands occur along the border of the Brazos alluvial, and eastward to Harrisburg and beyond the Trinity River, which are very similar to those described on the west of the Brazos.

The loam prairie lands of the region are well supplied with the mineral elements necessary for fertility, but from their want of proper drainage are not under cultivation. They are given up entirely to grazing purposes and the production of hay, for which the thick carpet of grass that covers them is admirably suited. The farms of the region are found in the timbered uplands that border Buffalo Bayou and some of the streams.

*West of the Brazos.*—One of the prominent features of the southern and coast prairie region is the large area of black and stiff or waxy lands that occupies a central position between the Sabine and Rio Grande Rivers, and reaches from the coast northward into Washington County. In the counties of Calhoun, Victoria, Jackson, and the western parts of Matagorda and Wharton, these prairies are very broad and extensive, with a gradual rise from the coast inland for 20 or 30 miles, and then become slightly rolling, the view interrupted here and there by the timber growth of the streams or "motts" of mesquite and live oak. On Lavaca Bay there is much Mexican scarlet bean (*Erythrina*) and a few "Brazilwood" trees. Northward, in the counties of De Witt, Lavaca, Colorado, Fayette, Washington and Austin, the prairies are smaller, and are interspersed with sandy and timbered uplands and sandy prairies. In adjoining portions of Gonzales and De Witt Counties there are high and rolling sandy prairies, underlaid by sandstone (Grand Gulf). In the lowlands and flats of these the soil is often a heavy black clay. On either side of the alluvial lands of the Brazos and adjoining

streams, in Fort Bend and Brazoria Counties, or the "sugar-bowl," there are other strips of black prairies.

As far inland as Clinton, in De Witt County, and Columbus, Colorado County, the prairies are underlaid by heavy light and blue-colored clays (Port Hudson) full of calcareous concretions, and often containing crystals of gypsum. They form bluffs from 15 to 25 feet high around Lavaca Bay and the inland lakes, and in them have been found large fragments of the bones of extinct mammoth animals. Limestone also occurs to some extent in these beds. Excellent grass covers the lands of the region, and the prairies are almost entirely devoted to the grazing of stock, the sandy timbered lands of the streams being used for farming purposes. The entire country is very sparsely settled, "nearest neighbors" being generally many miles apart. But little cotton is produced in the counties along the coast, but as we advance inland we find that crop receiving more attention, over one-third of the tilled land of the upper counties of the region being devoted to cotton culture.

The soil of these prairies is black waxy or adobe in character, tenacious, and very difficult to till in wet seasons, while in dry weather it becomes hard and shrinks, forming deep and wide cracks—traps, as it were, for the feet of the unwary beast. Hog-wallow lands are found in localities throughout the region, a feature resulting from the shrinkage and subsequent swelling and bulging out of the underclay upon access of water through the cracks when the winter rains come. The soil has a depth of from 12 to 24 inches, and overlies a lighter-colored and stiff clay, which sometimes contains gravel. The lands are thought to be best adapted to corn. Cotton grows to a height of from three to five feet, the yield being variously estimated to be from 600 to 1,000 pounds of seed cotton per acre when fresh and after long cultivation. Some planters place the estimate much higher.

*The Southwestern Prairie Region.*—The southwestern part of the State lying west of the Nueces and Frio Rivers is almost entirely a prairie region, and includes the agricultural counties of Frio, McMullen and Duval, and the counties of Maverick, Zavalla, Dimmit, La Salle, Webb, Encinal, Zapata, Starr, Hidalgo and Cameron (the latter two, however, having large areas of river lands), which properly may be included in what is termed "the desert."

The entire country is very sparsely settled and almost exclusively devoted to stock raising. Mesquite and a scrubby chaparral variety, with occasional live-oak trees and cacti, are almost the only growth, giving to the region a barren and desolate appearance. "The desert" is a broad area of white sand lying along the border of the Laguna de la Madre from a few miles south of Corpus Christi to the Rio Grande alluvial lands at the mouth of the Sal Colorado, and extending back (westward) to within a few miles of the Rio Grande, and up that stream to near Eagle Pass.

#### THE CENTRAL BLACK PRAIRIE REGION.

One of the most prominent features of the State is the broad region of high, rolling and black waxy prairie lands lying in the central part of the State, from Red River on the north south-southwest to San Antonio, and thence westward. A line marking the eastern limit of the region would begin on the east of Paris, in Lamar County, at the southern edge of the timbered river uplands, pass in a southwest direction to the east of Terrell, in Kaufman County, and four miles west of Corsicana, in Navarro County; thence south to Cameron, in Milam County, southwest to a point a few miles south of San Antonio, and westward to the edge of the great plains of the west. The western limit of the region has not been fully determined, except that it passes from Montague south through the counties of Wise, Parker, Erath, Comanche, Lampasas, Burnet and Blanco;

thence west through Gillespie and Kimble. The region has a width of about 140 miles on the north, 100 in the middle, and is quite narrow on the south—not more than 50 or 60 miles. It embraces 23 and parts of 26 counties, covering in all about 26,050 square miles. A white rotten limestone (cretaceous) underlies the entire region and often appears on the surface. The eastern part of the region throughout its length is composed of prairies, slightly rolling, and interrupted by frequent streams, which are bordered with narrow timbered valleys. In its central part is the broad belt of "lower cross timbers," extending southward from the Red River to the Brazos, near Waco, in McLennan County. To the west the country is more and more rolling and broken, the bald hills on the extreme west standing out in bold relief as isolated peaks and prominent ridges, with high and abrupt sides facing the broad prairie valleys. Rotten limestone, accompanied by beds of cretaceous fossils, outcrops everywhere on the sides of the hills, in the valleys and in the beds of the streams.

In its general level the country rapidly rises from the east toward the west, the altitude of Dallas being 481 feet; Fort Worth, 30 miles westward, 629 feet; Weatherford, 35 miles still westward, 1,000 feet. The latter place is near the western border of the region. On the south Austin has an elevation of 650 feet, San Antonio 575 feet, while Fredericksburg, 60 or 70 miles to the west, has an altitude of 1,614 feet above the sea. From San Antonio northwest to Cibolo the country is a rolling prairie, becoming more and more hilly, and covered with clumps of live oak and other timber. Thence to the Guadalupe River the hills increase in height, with alternating rolling prairies and flats. Limestone is abundant all the way to Fredericksburg. The country northward is well wooded, and granite begins at 17 miles.

Mesquite is a common growth of all the prairies of the central prairie region, but especially in the south, where, with a height of from 10 to 15 feet, it forms rather dense thickets. The "chaparrals" of this part of the State are formed mostly of a low thorny growth of what is known as "wesatche," belonging probably to the mesquite family.

The lands comprise three varieties, viz: Black waxy prairie or "adobe," covering the greater part of the region; black sandy, occurring in localities along the borders of the former, and forming a transition to the sandy lands that border the streams; besides these are the bottom lands, the most important of which are described under the head of "river lands." The first of these varieties, or the black waxy lands, are what their name would indicate—a heavy, deep black and tenacious clay, possessing a very high absorptive power (14 to 17 per cent.) Their extreme tenacity is illustrated and appreciated by the luckless teamster who has to drive his wagon across one of these prairies during a wet season. The black mud adheres in great masses to the wheels, filling up the spaces between the spokes and spreading out on either side, thus making an empty vehicle a load in itself for a team. The mud sticks in masses to the feet of those attempting to walk over these lands in wet weather. In dry weather the prairies assume altogether a different aspect; the roads become very hard and comparatively smooth, and the soil cracks open in every direction.

*Hog-wallow Lands.*—The underlying rock of the region, rotten limestone, comes to the surface very often, though chiefly on the high uplands, being covered to a greater depth by the soils in the lowlands. The soils have a general depth of from 12 to 24 inches, the only perceptible difference in the subsoil being a change in color from a black to a lighter yellow or drab-colored clay.

The lands are very productive and durable, yielding about 800 pounds of seed cotton per acre, both when fresh and after long cultivation. Many farmers claim a greater yield, but this is exceptional. The plant grows to a height of from four

to six feet, and is very often troubled with blight or "dying in spots" in the dry seasons at a time when it has about begun to bloom.

*Black Sandy Prairie Lands.*—These are formed by the commingling of the black waxy just mentioned and the sands of the upland timbered lands, which are usually adjoining. They are generally underlaid by the heavy clay subsoils of the prairies. These lands are comparatively easy to till and are fully as productive as the waxy lands of the prairies. The plant grows three or four feet high, yielding from 800 to 1,000 pounds of seed cotton per acre.

These prairies are usually level and present excellent farming lands.

The timbered uplands that border the streams in narrow belts have gray sandy soils 10 or 12 inches deep and a yellowish clay subsoil. They are usually called "post-oak lands," from the predominance of that timber growth. Hickory, elm and mesquite trees are also common. The lands are easily tilled, well drained and produce well, and are therefore most preferred for agricultural purposes.

The central prairie region is but sparsely settled outside of the towns and cities. The houses and farms are mostly situated in or near the timbered uplands, the prairies, with their excellent grasses, being reserved almost exclusively for the grazing of cattle. The level nature of the land and the comparative freedom from rocks render it especially well adapted to the use of improved cultivators and other agricultural implements. The seasons of summer and fall are always very dry, which, though sometimes cutting off the cotton crop as much as one-third, never produce a total failure. The droughts are felt most by other crops and in the scanty supply of water for stock and for domestic uses. Creeks and branches become dry, and the dependence is upon "tanks" or artificial ponds and cisterns filled by the winter and spring rains. Wells are unreliable, and their waters are to such an extent impregnated with lime and other salts from the rotten limestone as to make them unfit for domestic purposes.

Within the past few years much interest has been taken in artesian wells, and a number have been bored in Dallas and Fort Worth, from which a bountiful supply of good water is obtained at a depth of 300 or 400 feet in the former and 700 feet in the latter place, or below the rotten limestone. They are probably practicable throughout this region at a depth of not exceeding 1,000 feet.

#### NORTHWESTERN RED LOAM REGION.

West of the upper cross timbers and the black prairie region there is a large region embracing what is known as the red lands of the northwest. It enters the State from the Indian Territory and extends westward and southward to the gypsum formation and the plains, while a large section passes southeast nearly to Austin and Fredericksburg. In this latter portion of the belt the red lands are not as prominent as farther north and west, and are associated with gray sandy soils from the granites and other rocks that occur to a large extent. The entire region covers an area of about 27,012 square miles, and embraces 25 organized counties, besides those that have as yet been only outlined and named.

The surface of the eastern counties of the region is hilly or "mountainous" and broken, and is well supplied with timber. These hills are usually long, high and narrow ridges or divides, generally not more than 100 feet high, with rather abrupt sides, are covered with a heavy growth of post and black-jack oaks, and have a sandy soil. Sometimes, as in the southern part of Brown County, the summit is broad and comparatively level, with only a low and stunted oak growth. The valley lands between these hills are broad and open prairies, with red soils and occasional clumps of mesquite bushes, interspersed with motts of live oak. In the low flats, where limestone is often found outcropping, the soil is a dark stiff or waxy clay, very productive.

The surface of the country in the western part of the region is little else than a high rolling prairie, somewhat hilly on the north, but more and more level on the southwest, where with a gradual rise, it merges into the Great Plains, or southern part of the Llano Estacado. The surface is covered with grass and frequent chaparrals, and in localities with mesquite trees and motts of live oak. Red sandstone is perhaps the most prominent rock of the region (except on the south), and is found capping the great majority of the hills in ledges and broken masses of sometimes many feet thickness. Blue crystalline limestones (Palæozoic) also occur abundantly.

On the prairies and in the valleys the greater part of the lands of the region are of a red loam character, more or less sandy and quite deep. In some of the low mesquite flats in Brown, San Saba, Stephens and other counties on the east are found areas of stiff black clays with a growth of live oak, while the summits of the hills are sandy and often covered with a low scrubby undergrowth. The streams are usually bordered with a timber growth of elm, pecan, cottonwood, etc. Their valleys on the west are very narrow, but widen eastward to some extent, and are covered with rich and productive soils from the red clay hills of the gypsum formation and bluffs of the Llano Estacado.

The yield of fresh lands is about 800 pounds of seed cotton per acre, but durability can hardly be expected in these uplands without the application of phosphates after a few years.

The region is almost exclusively devoted to stock raising, for which purpose the excellent grasses are well adapted. The long droughts, and consequent lack of water in the streams and wells, is the chief evil to contend with in all the various interests in which the people are engaged; but with an increased population and a development of the resources of the country, this lack in water will, in part, probably be overcome.

#### WESTERN AND NORTHWESTERN TEXAS.

The country lying west and southwest of the northwestern red loam region, and forming the unpopulated portion of the State, is as yet comparatively unknown, especially so with regard to its agricultural features. It embraces 63 counties (unorganized), which, though having a name, have virtually no inhabitants, and lie in a wild and desolate region, including what is known as the Panhandle of Texas. The great extent of its territory, the lack of water and fuel on the plains, and the many other difficulties attending travel and explorations, make its examination a matter of much time and expense, as well as danger. At present we are largely dependent upon the reports of the United States exploring expeditions, made many years ago, for the little that is known regarding the great western plains.

Three important divisions are represented in this region, viz: The gypsum formation of the northwest and the plains, including the celebrated Llano Estacado or Staked Plain, the southern plain, and the mountainous region west of the Pecos, embracing in all 111,500 square miles, or 42.51 per cent. of the area of the State. The three divisions will be considered separately.

*Gypsum Region.*—One of the most interesting as well as valuable features of the western region is the great area of gypsum lands, covering in Texas, as far as can be determined, about 17,500 square miles. Dr. George G. Shumard, who explored this region with Captain Pope, reports that on Red River the gypsum beds are from a few inches to 30 feet thick. On Delaware Creek a few miles below its source they are 60 feet, while between the Big Wichita and Brazos Rivers there are hills nearly 700 feet high composed almost entirely of this material. It occurs in its many different forms of granular, massive, fibrous, and in large plates of transparent selenites, and is associated with heavy beds of red clays, and overlaid

by sandstones and drift deposits. The exact limits of the region have not as yet been determined. The best sources of information are United States Pacific Railroad Survey Reports.

*The Llano Estacado, or the Staked Plain.*—The northwestern and the extreme western part of the State is part of what is known as the "Llano Estacado," or the "Staked Plain," the name being given to it from the tradition "that in 1734, when the fathers from Santa Fe visited San Saba to establish a fort and a mission, they set up stakes with buffalo heads on them, so that others might follow their route." The name is usually given only to that portion lying east of the river Pecos, in both Texas and New Mexico, but the plains proper extend westward to the Rio Grande. From the northern limit of the State it reaches southward nearly to the 29th parallel, its eastern border lying along the 101st meridian, through five degrees of latitude; thence turns eastward to McCulloch County, and south to Bandera. The area embraced in Texas is about 74,500 square miles, or about 28 per cent. of the entire area of the State. On the north the eastern limits of the plains are strongly defined, and, according to Captain Marcy, are marked by vertical bluffs about 800 feet above the country or gypsum formation on the east. These bluffs consist of red and yellow clays overlaid by 10 or 15 feet of sandstone and a heavy deposit of drift pebbles, the whole capped by a sandy soil and subsoil. Southward, at the headwaters of the Colorado, the bluffs are not so high, a descent of only 50 feet being noted by Captain Marcy, and limestone (probably cretaceous) is found at its foot. This rock, as reported, seems to underlie the entire plains south of the 32d parallel, and is almost absent in the Panhandle region, appearing only in thin seams in beds of sandstone. Throughout the rest of the border on the east and south the line marking the limit between the plains and the regions east can hardly be defined; the country is broken and hilly, with valleys, canons and isolated ridges, in which rotten limestone (cretaceous) occurs abundantly.

The surface of the plains presents a vast and level prairie, "as smooth and firm as marble," apparently boundless. The soil is chiefly a brown loam, sometimes sandy, and with no vegetation other than gamma and mesquite grasses and small mesquite shrubs, which appear a few inches above the surface and serve the purpose of a guide to the large roots below—the firewood of the plains. Alkali ponds or lakes occur frequently, especially in the southern half, and also a number of springs whose waters are suitable for use. Some gypsum is said to occur around the edges of the lakes. The height of the eastern part of the plains was estimated by Captain Marcy to be 2,450 feet above the sea. Westward the country gradually rises 200 feet, and reaches its maximum near the 103d degree of longitude.

On this line, near the southwest corner of the Panhandle, there is a range of sand hills rising from 20 to 100 feet above the plain, occupying a region 50 miles long (north and south) and about 15 miles wide. The hills are conical in shape and utterly destitute of vegetation, and the section, because of the deep beds of sand, is hardly passable with wagons.

From this point westward the country falls some 200 feet to the Pecos, whose banks are without timber growth. A person may come very near to the edge of the gorge without becoming aware of its presence. From the river still westward to the foot of the Guadalupe Mountains the country rises 200 feet, and thence to the Rio Grande, at El Paso, again gradually falls.

*The Mountainous Region.*—Westward from the Pecos River to the Rio Grande the broad undulating plains continue, not continuously as on the east, but interrupted by several high and broken ranges of mountains rising suddenly several thousand feet above the general surface. The plains, having widths of 20 or 30



miles between these mountains, are covered largely with mesquite bushes, cactus and thorny chaparrals, and are interspersed with large salty depressions. Gamma grass occurs in localities, sometimes plentifully; but water suitable to drink is very scarce. The soil is usually very sandy and often covered with incrustations of salt. The area comprised in this region is about 19,500 square miles.

The Sierra Blanco Mountains on the south, near the Rio Grande, is near the point of union of the Southern Pacific and Texas Pacific Railroads, and is said to be the highest point in the State, the plains themselves being about 4,500 feet above the sea.

#### ALLUVIAL OR RIVER LANDS.

The river lands form an important division in the agricultural features of the State, more from their richness and consequent high productiveness than from the area comprised by them. They are all but lightly timbered on the west of the central black prairie region, but thence to the coast the timber growth becomes larger, more dense and of greater variety. The bottom lands also widen out toward the coast. The most important of the rivers described are the Red and the Brazos, and with the latter are the smaller streams, Oyster and Caney Creeks, which are included in the region of its "sugar-bowl" or delta lands. These are looked upon as representing the highest type of fertility, and but for the malarial character of the densely timbered portions, would be mostly under cultivation and more highly valued. The lands of the rivers are considered separately.

*Red River Lands.*—Red River forms in part the boundary between Texas and the Indian Territory. Its course is eastward, for the most part across the head of the other large rivers of the State, until it passes into Louisiana.

In the black prairie region the valley of the river is very narrow, the high limestone bluffs often approaching near the water's edge. In Cooke County these bluffs are 275 feet high, and are formed of the rotten limestone (cretaceous) of the central prairie region. On the north side of the river, in the Indian Territory, the river lands are broader and are partly under cultivation by whites; but to the west, on either side of the river, scarcely any cultivated lands are found. From the "lower cross timbers," in the eastern part of Cooke County, eastward to the Louisiana line, the bottom lands increase in width and are among the richest in the State. They are heavily timbered with cottonwood, pecan, walnut, black oak, hackberry, mulberry and white hickory, and have a dense undergrowth of cane.

Besides the low sandy overflowed lands, there are two general classes comprising the bottoms and occupying terraces above each other, viz: First bottom of red sandy or clayey land, and second bottom of dark or black loam lying about 10 feet above the first and at the foot of the bluff or uplands. These two bottoms are peculiar only to those Texan rivers whose sources are in the region of the Llano Estacado on the northwest, viz: Colorado, Brazos and Red Rivers, as well as the Canadian, North Fork and Arkansas Rivers of the Indian Territory. The soil characters mentioned by Michler continue down the river, the red sands and clays of the first bottom being derived from the red sandstones and red lands of the northwest region. This first bottom soil is of two varieties—a deep red sandy loam overlying a red clay subsoil, and a red waxy clay with a subsoil of the same character. Both are highly productive and subject to occasional overflow, being from 10 to 20 feet above low water. This red land terrace is at first rather narrow, but becomes wider toward the eastern boundary of the State.

The black loam terrace, about 10 feet above the first, is known as the second bottom, and is very level. Its soil is of a light and loose nature, rather silty, and darkened by the long accumulation of decayed vegetation. At the foot of the limestone bluff in Grayson County it is stiff and rather waxy, but this is a local feature only. The entire bottom of the river is from one to two miles in width,

and, though comprising some of the finest lands of the State, a large proportion is still covered with its original timber growth. Cotton is one of the chief crops, growing from four to six feet in height, and yielding, under proper management, a bale of 500 pounds of lint per acre, even after many years' cultivation.

*Sabine River Lands.*—The bottom lands of Sabine River, from its headwaters as far east as Cass County, are of a dark and heavy waxy nature, quite wide and well timbered, but subject to overflow, and are not under cultivation. Thence to its mouth this waxy feature is destroyed by the intermixture of sand, a dark sandy loam covering the wide undulating bottoms, which are here above overflow, and are timbered with post oak and short-leaf pine. Cotton is largely planted on these lands (except in the extreme southern counties), grows to a height of from five to seven feet, and yields, it is claimed, 1,500 pounds of seed cotton per acre.

*Trinity River Lands.*—The extreme headwaters of the Trinity River are in Jack County, but a short distance west of the central black prairie region. The lands of the river bottoms are therefore derived chiefly from the sandy uplands adjoining the streams, and are of a dark loamy or silty character until near the eastern limit of the black prairies, from which point southward there is a thick deposit of black waxy clay over the silt. The bottoms of the upper division of the river are well timbered with oak, elm, pecan, black walnut, bois d'arc (known also as Osage orange), honey locust, hackberry and cottonwood.

The lands are rich, but are not very generally under cultivation, being more or less subject to overflow. They are said to produce in ordinary seasons 1,000 pounds of seed cotton per acre.

In this part of the State there are broad prairie valley lands on either side of the Trinity bottom several miles in width, bounded by the high bluffs of rotten limestone. At the foot of the ridges the soil is usually stiff and waxy, but becomes more and more sandy toward the river, with heavy beds of sand in some places. The valley lies beautifully for agricultural purposes, is gently undulating, and is apparently easy of cultivation. A growth of mesquite occurs occasionally on the prairie. Very little of the valley is in actual cultivation.

The bottoms of the middle and southern portions of the river have widths varying from one to five miles, and are heavily timbered with red, burr and pin oaks, pecan, ash and cottonwood, with cypress on the south.

The lands immediately adjoining the river are light and silty in character, but further back they are a heavy and waxy black clay several feet in depth, and are underlaid usually by sand. They are very difficult to till in wet weather, and produce excellent crops of corn, cotton and sugar-cane. Cotton grows six or eight feet high, and, it is claimed, produces from 1,500 to 2,000 pounds of seed cotton per acre.

*Brazos River Lands.*—The lands of the Brazos River are considered the best and most valuable in the State, and are the most extensive of the river lands. The source of the river is at the foot of the Llano Estacado, and for a distance of 300 or 400 miles the river cuts its way among the gypsum beds, sandstones and limestones of the northwestern region, carrying down with its waters the red sands and clays which go to form the first bottom lands along its entire course to the coast.

The bottom lands, before the river enters the black prairie region, are rather narrow, the bluffs often coming to the bank of the stream. They are not generally heavily timbered, mesquite trees being the prevailing growth in many places. The soil is a red sandy loam, except near the gypsum beds, where it is said to be whitish in color. The water of the river in this northwest region is somewhat salty, and salt incrustations are frequently found on some of the rocks in the streams.

The bottom lands of the river, after leaving this region, may, for description, be conveniently divided into two sections—the first extending to Richmond, in Fort Bend County; the second thence to the coast, and known as “the sugar-bowl.”

The bottoms of the first division have a width of from one-half to two miles, and are covered with a heavy timber growth of cottonwood, poplar, black walnut, pecan and elm, and a dense undergrowth of cane, etc. The soil of the first bottom is a red alluvial loam, quite deep, overlying a red clay. At 30 feet a bed of “white and round quartz pebbles” occurs. That of the second bottom is usually a dark sandy loam.

In some of the counties the red lands of the first bottom are most prominent and extensive, but both seem to be equally productive, and are considered the best cotton lands of the State. A large proportion of these bottoms is under cultivation, but their unhealthfulness hinders their settlement. Cotton grows to a height of from six to eight feet, yielding about a bale of lint or 1,500 pounds of seed cotton per acre. Corn also is very productive, yielding, it is claimed, as much as 40 or 60 bushels per acre.

*Brazos Delta, or “the Sugar-bowl.”*—The lower division of these alluvial lands is the sugar-producing region of the State. It covers an area of about 900 square miles, and embraces, besides the lands of the Brazos, those of Oyster and San Bernard Creeks on either side.

The region is perfectly level, heavily timbered, has a dense undergrowth, and lies from 20 to 30 feet above the common water-level of the river.

The soils of the region present three different varieties, viz: The red alluvial loam, immediately adjoining the river and the two creeks; ash and elm flats lying next to this; and finally, the black wild peach lands.

The red loam lands are considered the best, because of their excellent drainage, easy tillage and great fertility. They occur in belts from one-half to a mile in width, or in bodies containing from 100 to 1,000 acres each. They have a depth of about 30 feet, the color of the soil changing somewhat at 18 inches.

Canebrakes cover the land, the timber growth being cottonwood, ash, elm, pecan, sycamore, hackberry, and a variety of oaks. Cotton grows to a height of from five to ten feet, and yields about 2,000 pounds of seed cotton per acre, both when fresh and after 50 years' cultivation.

The ash and elm lands have a stiff black soil, and are 18 inches deep, with a dark subsoil not so stiff. The timber growth is principally elm and ash. The lands are flat and poorly drained, and do not seem to be much under cultivation, though producing, it is claimed, as much as 1,500 pounds of seed cotton per acre.

The black peach lands, while black in color, are sandy in character, and occur interspersed in small areas. They have a soil 18 inches in depth and a lighter subsoil, and are easily tilled and best adapted to sugar-cane. They have a growth of wild peach, pecan, live oak and hackberry, and are in part prairie. Cotton grows very high on these lands, and it is claimed will produce as much as 2,500 pounds of seed cotton per acre.

Sugar is the chief production of the sugar-bowl region, the yield upon 5,340 acres for the year 1879, according to the census returns, being 4,443 hogsheads, with 355,573 gallons of molasses. The average yield per acre was eight-tenths of one hogshead of sugar and 66.5 gallons of molasses.

*Colorado River Lands.*—The sources of the Colorado and of its western tributary, the Concho, are among the western hills and broad plains and table-lands of the Llano Estacado. For a distance of several hundred miles its waters flow among the sandstones and limestones of the western region with an easterly

course to the black prairie region, then turn southward along its border to the lower edge of Burnet County, and thence east-southeast to the coast.

The bottom lands of the river, from its source to the black prairie region, are narrow, with many and frequent high bluffs near the stream.

On entering the more level lands of the prairies the bottom lands become wider, and thence to the coast have widths varying from one-half to a mile or more. This includes the valley or second bottom lands, the first, or bottoms proper, being narrow and more or less subject to overflow in high-water seasons. The bottoms have a large timber growth of white and pin oaks, elm, ash, cottonwood, sycamore, pecan and hackberry, with usually a dense undergrowth of cane, etc. The lands are for the most part a reddish loam or silt several feet in depth, underlaid by clay. Near the uplands on either side the lands are darker, and in the black prairie region stiffer and more clayey in character. South of Columbus, in Colorado County, they resemble the lands of the sugar-bowl or Brazos alluvium, and properly belong to it. Cotton is the chief crop on the bottom lands of the river, the stalk growing from five to seven feet high, and yielding from 1,500 to 2,000 pounds of seed cotton per acre.

*San Saba River Lands.*—The lands of the San Saba River, a tributary of the Colorado, comprise narrow and timbered bottoms along the banks of the stream—mesquite valleys, with both red gravelly soils and black loamy and clayey soils, reaching back to the hills. These valleys afford the chief farming lands of that section.

*Guadalupe River Lands.*—The bottom lands of the Guadalupe River are not very extensive or wide, and have a timber growth of cottonwood, pecan, ash, oaks, mulberry and hackberry, with a variety of undergrowth. The soil is mostly a sandy loam from 10 to 15 inches deep; the subsoil a yellow clay, sometimes jointed in character. The valley lands are in some places broad and open, with a mesquite growth and a dark calcareous soil. Cotton grows from five to seven feet high, and yields about 1,500 pounds of seed cotton per acre.

*San Antonio River Lands.*—The bottom lands of the San Antonio River are narrow and unimportant. Its valleys have in some counties a width of one and a-half miles and a growth (in Wilson County) of elm, hackberry, pecan, ash and mesquite. In the counties near the coast the river flows between high banks of white clay-stone, or adobe, along which there is usually a growth of pecan trees and mesquite.

*Nueces River Lands.*—The Nueces River is mainly confined to the thinly inhabited southwestern section of the State. In San Patricio County its bottoms have a growth of live oak, cottonwood, ash, elm, hackberry and willow, and a black alluvial soil. Its valley lands seem to be preferred. They have a growth of mesquite and "wesatche," and a light sandy soil, which is easily tilled.

*Rio Grande River Lands.*—The bottom and valley lands of the Rio Grande River, from its headwaters southward to Edinburg, Hidalgo County, are narrow, and, so far as known, are unimportant, the hills of the uplands coming to the river banks very often. From Edinburg to the mouth of the river these lands widen out rapidly, and embrace those of the Sal Colorado, which stream is said to be but an outlet of the Rio Grande in high water, and runs off almost at right angles to it.

The valley from Brownsville northward has a width of 50 miles.

The soil of the Rio Grande valley contains an extraordinary percentage of potash, a large amount of phosphoric acid and a very large amount of carbonate of lime. The percentage of humus is also great, and the soil has a large retentive power for moisture. Altogether, this soil, which is easily tilled, seems to be nearer what may be thought to be a "perfect soil" than any other in the State.

## PRODUCTIONS.

**COTTON.**—Texas now stands at the head of the cotton-growing States, having produced in 1883 1,326,000 bales, against 1,064,000 bales raised in Mississippi, the next highest State.

**CORN** is the next most important crop in Texas. In 1879 that crop occupied 2,468,587 acres, or 32 per cent. of the lands under cultivation, and exceeding the area of cotton by 130,017 acres. In 1884 the acreage of corn was 3,752,700 and the number of bushels raised 60,290,000. The lands of Western Texas seem specially adapted to the growth of corn, and under a proper system of cultivation the present average yield per acre could probably be more than doubled.

**WHEAT.**—Texas is destined, for many reasons, to play a great role as a wheat-growing State. Her area is large, her soil fertile, the product earlier, the quantity good, and raised in a climate that will enable her flour to defy Western competition in future markets of large consumption. An Ohio paper says on this point:

“That West Texas will be an important wheat and other grain-producing district we feel assured by two facts: The adaptability of its soil and the growing demand. The profitableness of wheat growing in Texas is evidenced by several considerations. The price of wheat in Europe in some measure fixes the price in New York, and the price there determines the price in Chicago, St. Louis and other Western centers. From any railroad point in Texas the farmer can ship his wheat to New Orleans or Galveston for five or ten cents less per bushel than he can send it from Iowa or Illinois to New York, and when at New Orleans or Galveston the rate per ton is as cheap as from New York or Baltimore to Liverpool, thus giving the Texas wheat raiser an advantage of five to ten cents per bushel on the price of his wheat over the States now regarded as the great wheat-producing districts. Then the wonderful immigration creates a local demand for wheat that sustains a good price. It is just that we state that the rainfall is increasing annually, and this question of irrigation may be regarded as a very temporary one.”

The acreage in wheat, according to the last census, was 373,570, and the yield 2,567,760 bushels. In 1884 the acreage was 556,600, and 5,560,600 bushels were raised.

The fact that the product per acre of cereals is lower in Texas than in Western or Northern States is not because Texas is less fertile than they, or less adapted to these cereals; it is the fault of the prevailing system of farming. As a recent writer has said:

“The farmers of Texas are too prodigal of the broad acres of rich soil they possess. They lay out farms of unreasonable width; skim over them with implements that are not suited to thorough cultivation; scatter seed without order and cultivate without system; so that, with few exceptions, the farms are overgrown with weeds and grass that, of course, greatly impair the growth of crops, to say nothing of the want of deep plowing and thorough tillage. Put this soil, with its extraordinary adaptation to the growth of such a great variety of crops, and this climate, so congenial to the growth of all kinds of stock, into the hands of New England or Pennsylvania farmers, who would at once subdue and eradicate all vegetation but the crops that are planted; who would plow deep and thoroughly pulverize the soil, and such crops would be raised as are not to be found in countries where millions are annually expended for commercial fertilizers.

“The wheat fields of Texas are replacing those which are being exhausted in the North, and the steady movement towards the region where it can be the most cheaply produced, and to a perfection, because of the long and uniform seasons, is daily increasing.”

**OATS.**—The significance of the growth in the production of oats will not be understood unless it be remembered that this cereal is largely displacing corn as a food for stock, thus leaving the latter to enter the market more as a money producer—an article for sale rather than consumption on the farm. Again, the expansion in the production in hay and the increasing area given to the cultivated grasses are factors for which due appreciation is hard to elicit, and about which we cannot get satisfactory statistics.

Oats are worth from 50 to 75 cents per bushel. The red rust-proof is the common one—very superior in every respect. From 30 to 100 or more bushels per acre are raised, varying with soil, season, culture, etc.

The area cultivated in oats, as shown by the census of 1880, was 238,010 acres, and the yield 4,893,359 bushels. In 1884 this had grown to 478,510 acres and 10,527,000 bushels.

**BARLEY and RYE** are raised to some extent.

**SUGAR CULTURE.**—The sugar belt proper of Texas embraces the counties of Brazoria and Matagorda, both bordering on the Gulf of Mexico, and Fort Bend and Wharton Counties, lying immediately north. These counties contain not less than 2,000,000 acres of choice alluvial cane lands, with an abundance of timber for fuel to use in sugar manufacturing purposes.

In the last census Texas was credited with 4,951 hogsheads of sugar and 810,605 gallons of molasses. Of this, Brazoria County produced of the former 2,440 hogsheads; of the latter 175,530 gallons. As sugar-cane is not “a principal crop,” according to the United States Department of Agriculture, nothing is found for 1884. Of course, the product has increased.

**RICE** is another product not a “principal crop” either; so no figures can be given as to it since 1880. The total crop then was 62,152 pounds for the census year. There can be no good reason why much of the Texas coast region will not prove a superb rice area; and, indeed, a very large area elsewhere will certainly produce fine upland rice.

**TOBACCO.**—In the Agricultural Report for 1884 no statement is made of the tobacco crop of Texas. This does not mean that the State does not or cannot raise tobacco—only that it is not an article of commerce. It is raised only in a small way and for family use. The soils and climates of many of the counties of the State are adapted for tobacco, and the wonder is more is not raised, especially considering that there is so much fresh soil in the State. The crop for the census year was 221,283 pounds.

#### FRUIT CULTURE.

Under this head I quote the following:

“In that portion of Texas lying within 50 miles of the Gulf of Mexico, known as the coast region, tropical and semi-tropical fruits may be grown. There are occasional years when, even at Galveston, damage is done by frost, but a very little protection will suffice to carry trees through. Upon the northern edge of this coast belt the orange is longer in coming to bearing, but after it has reached this ripe age, say eight to ten years, it will stand the coldest weather. The 25th and 26th of December, 1879, are among the coldest days known to the oldest inhabitants of Houston, and certainly the severest in the suddenness of the changes; yet but few orange trees were killed. Bananas that had been stripped of leaves and covered with a sack of Canton flannel or cotton cloth, came out at the top with the first days of spring, and were bearing by the first of June. Immediately upon the coast the grape bears as luxuriantly, but is not as long lived as further north. The White and Golden Chasseles and Hamburg come to perfection in the open air. The native varieties which are common to all Southern Texas bear abundantly. Strawberries thrive well, especially upon the bays near

the coast. Peaches of very early bearing kinds are grown upon the shell lands, but have not proven reliable fruit, even within 50 miles of the coast. The native plum never fails. The pomegranate thrives and bears well. Almonds and dates are in good state of growth. There is one date tree in Houston now bearing. In all that portion of Texas lying south of 30° north latitude the tropical fruits are possible if protected during the cold months, but it is only south of the latitude of Houston that they can be grown with profit.

"In the whole region south of the parallel of 30° 30', lying between the Trinity and San Antonio Rivers, except south of the latitude of Houston, all fruits common to the temperate zone do well, except apples, cherries, gooseberries and currants. Apples are grown, but mainly summer varieties.

"Central and Northern Texas, embracing the region lying between the parallels of 30° 30' and 34° north latitude, and between the eastern border and Colorado River, is as fine a fruit region as the sun shines upon."

## GRASSES.

The following on "Grasses and Forage Plants" of Texas is part of a paper read before the Southern Immigration Association at its annual meeting in March, 1885, and is from the pen of J. F. Joor, M. D., of Texas, an eminent scientist:

"In this line the Texas State exhibit far surpasses that of any other one State, although the collection is very incomplete, there being only 30 or 40 specimens from the vast region west of the Colorado River. We have on exhibit 218 species, and named varieties of *gramineæ*, 76 of *cyheraceæ* and six of forage plants. The most important of these are:

"Texas millet (*Panicum Texanum*), of which we have a bundle 6 feet 3 inches high; goose grass (*P. platyhyllum*); crab grass (*P. sanguinale*), 5 feet 10 inches long; barn-yard grass (*P. Crus-galli*), 7 feet 2 inches; Milo grass (*Paspalum compressum*); Bermuda (*Cynodon Dactylon*), 6 feet; Johnson grass (*Sorghum Halapense*), 8 feet 2 inches; marsh grass (*Spartina rolystachya*), 11 feet; reed grass (*Phragmites Communis*), 17 feet 4 inches; red clover (*Trifolium pratense*), 38 inches; alfalfa (*Medicago sativa*), 30 inches; Japan clover (*Lespedeza striata*).

"Texas blue-grass undoubtedly affords the best winter and spring pasturage, remaining fresh and green throughout the cold season. Accounts differ as to its endurance of the summer sun. Some assert that it dies down in hot dry weather, while others claim that it does not even wilt when nearly everything else is in a dying condition from drouth; and one farmer affirms (I quote his exact words): 'After hard trying 40 years, this is the first and only grass I ever had that I would recommend as a winter grass that (does) not die out in summer.' I myself have seen very little of it.

"Red and white clover do well on the clay soils of Southern Texas, and afford fine grazing in late winter and spring, but die down in summer.\* They do not succeed well on sandy lands.

"Japan clover is naturalized in Eastern Texas. Mr. Winstead says that it 'will propagate on rich or poor uncultivated land, stands drouth well, bears continuous grazing without injury, spreads rapidly, and, when it may be desirable to cultivate the land, is easily gotten rid of.' My own somewhat limited observations go to confirm these statements.

"For summer growth in drouthy regions the best grasses undoubtedly are Bermuda, Johnson and Milo. The two first named are liable to the serious objection that, when once established, it is nearly or quite impossible to get rid of them.† This does not apply to the Milo grass. This resembles Bermuda in its

\*A common matter in most of the South.—M. B. H.

†If one wants to get rid of Bermuda, sow the seed of *Lespedeza striata*—Japan clover—and refrain from pasturing two or three years. The soil will be incredibly enriched and the Bermuda eradicated.—M. B. H.

running habit, but has a much wider leaf. It is scattered pretty well through Southeastern Texas, though very few farmers or stockmen seem to have noticed it, and I do not know of any one who can supply seed or roots.

"Johnson grass yields an immense amount of hay, but unless cut very young it is coarse. It may be cut five or six times a year.

"The best pasture for the whole year that I have seen was clover sown (in the fall) on broken up Bermuda sod. The clover remained green pretty much all winter and spring, and by the time it died down the Bermuda was ready to take its place, lasting till the clover sprang up again. (In the article on Mississippi much can be found of the way these two grasses supplement each other.—M. B. H.) Clover and Texas millet, crab grass and Texas blue-grass, and Japan clover, are combinations worth trying for this purpose.

"On the gulf coast the immense thickets of rank marsh and reed grasses (*Spartina* and *Phragmites*), afford fine pasturage the year round. They are very coarse, but our Texas cattle relish them and thrive on them.

"The most abundant prairie grasses in Eastern Texas are the species of *Andropogon*, *Muhlenbergia*, *Setaria* and (in poor soils) *Aristida*. Further west *Beuchloe* and *Boutelona* are frequent. In the wooded districts the numerous species of *Panicum* constitute a large percentage of the grasses."

The following extracts are from the United States Agricultural Reports:

"For a permanent pasture grass the Texas blue-grass (*Poa arachnifera*) promises to be one of the very best grasses yet brought to the attention of the South. It is a strong, deep-rooted grass, with an abundance of foliage, and seems to possess all of the characteristics necessary for a grass to be successful in most parts of the South. It grows in woods or open prairie, and thrives upon a variety of soils, poor as well as rich, but has not, so far as reported, been tried upon a dry, sandy soil. This grass seems worthy of earnest consideration by all interested."

"I call it Texas blue-grass, and if it were possible to patent it, I would not give it for all the mineral wealth of Texas. I find it is spreading rapidly over the country, and I claim for it all and more in Texas than is awarded to the *Poa pratensis* in Kentucky. It seems to be indigenous to all the prairie country between the Trinity River and the Brazos in our State. It blooms here about the last of March and ripens its seeds by the 15th of April. Stock of all kinds, and even poultry, seem to prefer it to wheat, rye, or anything else grown in the winter. It seems to have all the characteristics of the *Poa pratensis*, only it is much larger, and therefore affords more grazing. I have known it to grow 10 inches in 10 days during the winter. The coldest winters do not even nip it, and although it seems to die down during summer, it springs up as soon as the first rains fall in September and grows all winter. I have known it in cultivation some five years and have never been able to find a fault in it. It will be ready for pasture in three or four weeks after the first rains in the latter part of August or first of September. I have never cut it for hay. Why should a man want hay when he can have green grass to feed on? With a pasture well set in this grass you cannot run after your cows fast enough to get them to eat hay in our coldest weather. Very few of our farmers are paying any attention to grass, but most of them are raising cotton to the exclusion of corn, wheat, oats, &c., and I am convinced it will take some very severe lessons in experience to teach them that grass is the main stake in agriculture, either as hay or pasture."

#### STOCK RAISING.

CATTLE.—A rapid revolution is taking place in cattle raising in the State of Texas. There are many aspects in this change. One feature obtaining more and



more is the grading up of cattle. This is becoming quite common. Large numbers of thoroughbred Short Horn and Hereford bulls have been introduced within the last few years. Their value is up in the millions of dollars. The Hereford is preferred as being a better "rustler."\*

The narrowing of the range by fencing and the encroachments of population are other great changes in the cattle business.

The "drive" will most probably be a thing of the past in a few years. The trouble on the trail, quarantine and other matters will soon end the "drive" business. The Texas people will soon learn the folly of sending their young cattle to Kansas, Colorado, &c., to be fed on corn, and to permit the farmers of the latter States to make the bulk of the money. They will keep at home their steers, and fatten them on home-raised corn, hay, and wild and cultivated grasses.

What seems to the writer one of the most significant factors in the swiftly changing aspects of the Texas cattle business is the comparatively new movement of sending cattle from Texas by rail to St. Louis, Chicago and Kansas City (lately to some extent) via New Orleans. A cheap through rate is made; the cattle are fed and watered at proper times, and reach market in far better condition than by the "drive." I say that the movement is very portentous, and is believed to be the beginning of a revolution.

First, it will strike a great blow at Kansas as the cattle fatterer of Texas, thus depriving the former State of a large source of revenue, and a large and profitable way in which to dispose of her cheap corn and hay.

Next, it will bring into competition with Kansas States nearer the great markets for fat steers. Cattle dealers will repair to St. Louis and Chicago to buy these young steers to raise and fatten. They will hire the blue-grass pastures of Missouri, Illinois and other States upon which to fatten and raise them. As they can buy them so much more cheaply than they can similar animals at home, they will soon compete, in a lively manner, for them, and enhance their value.

The farmers of these States will enter the market, too, to buy and fatten, and will diminish the supply, *pro tanto*, of these cattle, which would else have come from Kansas fat.

And the demand will enlarge. Cattle dealers from Ohio and Indiana will be in the field. These cattle will move farther east. The owners of blue-grass pastures in these last two States will enter the market to buy these Texas cattle.

Bye and bye, cattle dealers and the owners of broad acres of clover and blue-grass in the States of Missouri, Illinois, Indiana and Ohio, will repair to Texas to buy these cattle on the soil of Texas, and their competition will enhance the prices of cattle greatly in the last State; and as the best cattle will be most sought after by these purchasers from these States, great improvement in cattle will be more rapidly promoted, until, in a few years, a genuine Texas steer will be a curiosity and found only in museums.

The Texas cattle raisers, seeing the point, will, more and more, "ripen" their own steers—high grades—at home, on their own cheap lands, with home-raised corn, home-made hay, and broad acres of one and another of the cultivated grasses, to send by cheap rate to Chicago, St. Louis, Indianapolis, Cincinnati and other markets.

Very soon these Texas cattle raisers will be invading the European markets with their cattle, for there are Galveston and New Orleans right at their doors, and no long railroad trips, as to New York and Boston, from the far West. And then will come the era of dressed beef for Europe in refrigerators from these

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\*The Hereford has an aptitude, too, to fatten on grass without other food; has great hardihood, activity and self-reliance in time of need. I do not undertake to say that he will surpass the Short Horn where both are largely corn fed; his superiority is on the "range."

ports of Galveston and New Orleans for these "ripened" Texas-raised cattle. And this will make possible another great epoch—beef canning in Texas. The best beef being sent to Europe in refrigerators, the other portions can be canned in Texas. How can a beef canner in Kansas City, St. Louis or Chicago compete with one in Texas who buys the cheaper steers of Texas, when the latter is so near to the ocean with his refrigerated beef? Need one figure on higher cost of buildings in these cities as compared with Texas; of lower price of cattle in Texas with their lower price of land;\* milder climate; proximity to sea?

Indeed, it is difficult to see why, when Texas shall raise her high grades; raise her corn and cultivated grasses to "ripen" them, she cannot send her choice parts of these steers in refrigerated cars to St. Louis, Chicago, etc., and can her inferior parts of the animals on the soil of Texas.†

I have spoken theoretically of the tendency and effects of the shipping of cattle to St. Louis and Chicago. It has become quite a business for Western cattlemen to repair to Texas and buy for the drive, and something considerable has been done in shipping; and, as has been said, as the "drive" seems doomed, shipping will be the only way out, except canning and refrigeration become partners. It may be that Kansas, Colorado and other States will see the detriment, and quarantine be lifted; but I think the revolution is inaugurated.

These "drives" are affairs of magnitude. Last year, for one of 45,000 head into Colorado, a force of 40 men and 400 horses was required. The journey takes from 60 to 90 days.

In Caldwell, Kansas, last year, "through" Texas cattle sold as follows: . For good straight steers, \$16 for "ones," \$20 for "twos" and \$26 for "threes," and upwards. Prices in Texas this year were very low and the stockmen discouraged by quarantine, but are now better. Good yearlings could be had on the ranch at \$8; in instances, in bunches of 50 and 75, they could be had at \$6 to \$7 each. A sale of 2,500 3-year olds and up was made to a party from Kansas City, Missouri, at \$22 each, to be delivered at Wichita Falls. Another sale was made, delivered near Lockhart, of "ones" and "twos" at \$8 and \$11. At Sherman, a sale of 2,000 "threes" and "fours," one-half each, was effected at \$20. At San Antonio, fat "two," in car-load lots, were selling at \$10. They were shipped to New Orleans. At Victoria, 1,000 head of fat cows and 100 heaves were purchased and sent to Chicago, the prices being \$16 for former and \$20 for latter.

The fluctuations in prices for the past few years, the quarantine, the trail troubles, should teach the Texas stockmen, and will, to grade up more and more, get in cultivated grasses, and ripen their own cattle.

The cattle business in Texas is scattered over the vast prairies of the Panhandle, in the prairies of the coast counties, and in the valleys of the Rio Grande, the Conchos and the Pecos Rivers. A few years ago the cattle ranges almost covered the State, but the influx of population has pushed the business westward into the less populated portion. The fencing *furor* is a recent affair, and at one time threatened to be a very serious matter, but is now, happily, about settled.

In stating that the cattle business is scattered over the prairies of Western Texas, this is said only by way of eminence. It is quite certain that Texas contains a very respectable number of herds of thoroughbred registered cattle that

\*It is a well-known fact that grazing only pays a low rate of interest on the investment in high-priced lands in many of the States North, and yet it is considered one of the best uses to which to put these lands.

†"It is estimated that during the year 1884 about 300,000 cattle were driven from Texas to Northern ranges, to be there matured for marketing, and that about 625,000 beef cattle were shipped from Texas to the markets of Kansas City, St. Louis, Chicago and New Orleans."—Joseph Nimmo, Jr. Of these, many were slaughtered for canning in the former-named cities. The reason why Texas can't kill and can profitably in competition is because she has no large demand for the best part of the beef at high prices, as have Chicago and the others. Were she to refrigerate her best beef, however, this difficulty would be measurably obviated.

are disseminated through the more populous parts, and receive a treatment the very reverse of the rovers of the range. It would be hazardous to give a conjecture as to the relative standing in point of numbers of these thoroughbred herds in Texas. It is quite certain that there is large room for thoroughbred herds of Herefords and Short Horns for grading up the Texas natives for beef, and for Jerseys, Holsteins and Ayrshires for butter and cheese. Nor do I mean to offer a slight to the polled Angus and the Galloway.\* It seems to the writer that there must be a great chance for the crosses of these breeds with native stock, more particularly as the cultivated grasses come in and the necessity for "rustlers" diminishes; and it would seem that there must be an opening to originate distinct breeds by crosses of these last two with the natives—breeding out the horns of the last, and embodying their hardiness and aptitude to fatten on grass, and incorporating the "chunkiness" and beef quality of the Angus and Galloways.

Undoubtedly, dairying is yet to be a very considerable and lucrative industry in Texas. It is quite a reproach to a State in which cattle raising is such a prodigious vocation that in many places a glass of milk is a curiosity and good butter unattainable. However, the largeness of the opportunity will offer such incentives to embarking in the industry, that it will soon be considerable.

Perhaps it would be seriously misleading not to mention that one great reason why the raising of thoroughbred cattle in Texas offers such opportunities for lucrativeness is in the fact that such cattle, unless acclimated, incur awful decimation. Acclimated thoroughbreds of the beef breeds are near the great market of demand, affording two greatest advantages—largeness of demand and inconsiderable cost of transportation; and there is this novel feature—that for a long time to come increased supply will create increased demand, for the reason that increased confidence in the success of acclimated thoroughbreds will incite to their use. There is a wise and pervading dread of unacclimated cattle of this character, because of the great losses incurred in them by pioneers; but as progressive breeders and those who are opposed to change see the good results from the use of thoroughbreds acclimated, they will more and more adopt the latter.

Acclimated thoroughbreds of the milk strains will be in demand, because butter and cheese must, for many years, find in Texas one of the best markets in the world, because it is one of the most rapidly populating localities in the world, is susceptible of such multifarious industries, and will some day become the theatre of such vast consumption of the products of such vocations, in being largely a mining area and engaged in manufacturing textiles.

As to the quality of the Texas beef and the characteristic of the native cattle, I learn that the Chicago market will show that 1,000 pony Texas steers have brought a higher price per pound and realized as large a gross sum as did 1,200 pound "half-breeds" on the market the same day, taken from the same range the same day. The reason is said to be that the Texans, with one-eighth Short Horns or Herefords, take on fat and "ripen," while the others only grow.

The following extracts are from a "Report in Regard to the Range and Ranch Cattle Business of the United States," by Joseph Nimmo, Jr., and just issued by the Treasury Department of the United States:

"The total number of cattle in the State of Texas is the result of a careful estimate upon the subject by Mr. George B. Loving, of Fort Worth, and Mr. D. W. Hinkle, of San Antonio, Tex. The assessment rolls of the State for 1884 give as the total number 6,517,524 cattle, valued at \$81,052,616; but the gentlemen just named agree in the belief that, owing to unavoidable errors in the report of the comptroller of public accounts, the total number may be stated at 9,000,000, and their value at \$153,000,000. \* \* \*

\*An occasional Brahma bull has been introduced to cross on the native cattle for beef.

"The total number and value of cattle in the United States, in the State of Texas, and in the range and ranch cattle area north of Texas, is therefore as follows:

	NO. OF CATTLE.	VALUE OF CATTLE.
The United States.....	49,417,782	\$1,189,577,000
The State of Texas.....	9,000,000	153,000,000
The range and ranch cattle area north of Texas.....	7,500,000	187,500,000

"About half of the area of the State, including the eastern portion not embraced in the range and ranch cattle area, has been taken up, and is now being cultivated as farms. In this part of the State cattle are raised as domestic animals, being generally provided with food and shelter in the winter. The range and ranch portion is also, to a considerable extent, settled up by farmers, especially the eastern and southern portions of the State."

The range and ranch cattle area starts on the coast a few miles east of Matagorda, trending northeast with a semi-circular sweep a few miles east of San Antonio; thence, with a reversing curve, trending north-northeast a few miles west of Austin, a few miles east of Lampasas, a few miles west of Waco, a few miles west of Dallas, and sweeping nearly east, just beyond the river, to Denison, in the northern part of the State.

"The distinction between the 'range' and the 'ranch' cattle business, herein observed, is that the former designation applies to the raising and fattening of cattle upon public lands, or upon unfenced lands generally, where the herds of different proprietors freely range and intermingle; whereas the 'ranch' cattle business is carried on within inclosures belonging to cattlemen, on which only their own cattle graze.

"The State of Texas is, in a marked degree, a cattle-breeding State. Its climate is well suited to that industry, especially in view of the fact that the calves of range cows are, under the prevailing custom as to breeding, dropped at all seasons of the year. Not only do the cows of Texas have more calves during their lifetime than cows upon the ranges of the Northwestern Territories of the United States, but of the total number of cows, a larger proportion have calves each year; also, of the calves dropped, a larger proportion survive in Texas than upon the more northerly ranges and ranches. Differences of opinion exist, however, as hereinbefore mentioned, as to the relative advantages of Texas as a breeding State for cattle. \* \* \* It is asserted that the State of Texas has to-day as many breeding cows as all the other States and Territories west of the Mississippi River together.

"The capacity of the range and ranch lands of the United States for grazing cattle differs widely in the several States, Territories and sections, as the result of differences in the quantity and quality of nutritious grasses produced, the water supply, and the extent to which natural shelter is available for cattle during storms. In Texas from five to thirty acres of land per head are required, and on the Northern ranges almost the same differences are observable in different localities.

"The ultimate limit of the capacity of the entire range and ranch cattle area of the United States for grazing, and the magnitude of its possible annual product, can, of course, only be ascertained from the results of experience. It is evident from the best available information that the number of cattle on ranches and ranges in Texas might be greatly increased. Mr. George B. Loving, of Fort Worth, Tex., in reply to inquiries addressed to him by this office, expresses the opinion that by providing reservoirs, sinking artesian wells and destroying the prairie dogs, which, in certain parts of the State, consume a larger quantity of the nutritious grasses than is consumed by cattle, the number of range and ranch cattle pastured in that State might perhaps be doubled.

"The Texas fever, its cause and its pathology, are yet involved in mystery. \* \* \* Its cause, whatever it may be, is undoubtedly persistent, and yet it is not invariable as to the circumstances attending its appearance. It is endemic rather than epidemic. The lowlands bordering upon the Gulf of Mexico are undoubtedly the locality of its origin. This infected area is believed to embrace somewhat more than one-half of the State of Texas. \* \* \*

"So long as cattle born and raised in this gulf section remain there, Texas fever is unknown among them; but when they are driven or transported to the northern part of Texas, or to the States and Territories of the Northwest, they communicate the disease to the cattle of these more northern latitudes. Such infection of Northern cattle appears to be invariably the result of their walking over or feeding upon the trails along which Texas cattle have passed. The Southern Texas cattle on their way North, in most cases, suffer a constitutional disturbance apparently attributable to change of food and climate, but it is said that usually they are not affected by what is distinctively known as 'Texas' fever. This appears to involve the apparent paradox of their imparting a disease which they themselves do not have. Nevertheless, there is a consensus of opinion among careful observers indicating that this is really the case, and the opinion appears to command popular belief.

"The theory now generally held is, that the cause of the disease exists in a latent state in the cattle of Southern Texas, under conditions of climate and food which produce no impairment of the health of the animal, but that during migration towards the North, such latent cause of disease passes off in fecal matter, and is inhaled or taken into the stomachs of the Northern animals when they feed upon the ground over which the Texas cattle have passed. In other words, the disease is believed to be an incident of a changed condition in Texas cattle by acclimatization. It is also a pretty well established fact that it is not, at least to any great extent, contagious. It is held by many that no animal which has taken the disease from the trail can communicate it to his fellows who have not been upon the trail.

"The general testimony appears to be to the effect that Texas cattle driven North have never communicated the disease to other cattle north of the South Platte River, nor to cattle in the State of Colorado. It has been assumed therefore that the disease is limited as to the sphere of its manifestation both by latitude and elevation. It is also the accepted theory that the cause of the disease is eliminated from the systems of the Southern Texas cattle while 'on the trail' from their place of nativity to the ranges of the North. It is also a well-established fact that herds driven slowly are very much less likely to communicate the disease to the cattle in the northern part of Texas and to other Northern cattle than when driven rapidly. Experience also proves that the disease is much more likely to manifest itself during the months of June, July, August and September than during the other months of the year. That cattle driven from the State of Texas gradually lose the power of imparting disease as they proceed North, and that the limits of the area of infection have been approximately determined, appear to be facts pretty well established.

"According to the best estimate which can now be made, there have been about 2,000,000 young cattle driven from Texas to Northern ranges during the last seven years, which at \$15 a head would amount to \$30,000,000. The 'drive' of the year 1884 was about 300,000, which at \$17 a head amounted to \$5,100,000. These figures, the best which can be obtained, are of course only rough approximations. They clearly indicate, however, a large demand at the North for young Texas cattle, and a supply adequate to meet such demand. The movement has been about as regular as commercial movements are generally, the tendency, on

the whole, being in the direction of progress. It is asserted upon apparently good authority that fully one-half of the blood of all the cattle on the Northern ranges to-day is of the Texas strain. Many persons largely engaged in the cattle trade at the North and the cattle raisers of Texas generally maintain that Texas must in the future hold the position of a breeding ground, and the Northern ranges that of a maturing and fattening ground; but that view is controverted by a majority of the herdsmen of the North, and especially by those engaged in the business of raising cattle and of improving the breed of Northern range cattle."

**SHEEP.**—The business of raising sheep in Texas has become one of great magnitude; as to that there can be no doubt. As to its profitableness, that is another question. It is quite certain that heavy losses have been incurred, and many raisers have become quite dispirited. It is certain that a vast improvement can be made in many respects, and the loose mode in which the business is conducted is an explanation of many of the great losses. Indifferent herding, "northerns," scab, lack of shelter, poor rams, too little attention to grading, too large flocks, non-selection of ewes, failure to properly select wools, twice-a-year shearing, improper shearing, etc., etc., are fruitful causes of loss.

The sheep common to Texas now is a grade Merino. The Mexican ewe, a small, hardy sheep, is crossed by a Merino. The "get" is a greatly improved animal,\* both being hardy and fine rangers. These ewes can be bought at from 75 cents to \$1.50 per head.

The lands upon which the sheep feed generally are either school lands, leased from the State for a small consideration in annual rent, or lands rented of the different railroad corporations.

In herds not too large, the rate of increase is from 75 to 80 per cent. Flocks are grazed in herds of from 1,000 to 5,000 head, in charge of a shepherd. Some flock-masters build corrals of brush; others have light hurdles into which they put their sheep at night. The former is the better mode. No feed is provided except that by nature.

The mutton feature must not be looked to as a source of much revenue. When Texas becomes populous and different breeds come in, (largely, I mean,) or the raising of early lambs for market becomes a business, other factors than wool will change the face of affairs.

Sheep raising has undoubtedly been profitable, but with increased cost of lands, profits will be largely decreased, especially to the present ownership. Then, many poor people owned the sheep, and did not or could not buy the lands when they were cheap. Again, the sheep fever prevailing with men a few years ago induced them to buy at prices far in excess of prices of to-day.

A brief allusion was made to shearing twice a year—in the spring and fall—as being one reason of injury to the sheep business in Texas. The tendency now is to one shearing a year. The bad effects of cold weather after fall shearing, the length of the fleeces—better prices for long fleeces—and the wealthier condition of the wool growers, are the explanations of this growing determination. The liability to a "norther" with short fleece is a feature not common to the rest of the South. The fibre of the wool, too, is changed in condition by the impairment of the vigor of the sheep.

The day will be likely to come when the great struggle for the woolen mills for the New England market and of the country generally will be between the South and Australia. In the Introduction the ground has been taken that the future will probably see the South raising the Saxony sheep, and will find her the

\*The effect of crossing a Mexican ewe shearing a pound of wool, if bred to a pure Merino buck, will give a lamb which, at a year old, will produce three pounds of wool; and the produce, if an ewe and bred to a pure buck, will yield four and one-half to five pounds of finer wool. The wool characteristic in a pure Merino is far-reaching and enduring.

seat of manufacture of the finest woolen goods of the world. Texas must play her part in this, but not, of course, under the present *modus operandi* in sheep culture, and not with Merinoes. But Texas already is a great wool producer for New England mills. Boston and St. Louis and Philadelphia are all competitors for Texas wool, and purchasers from these cities are to be found in numbers at the great wool marts of the State. Prices at Abilene, Tex., only recently were from 12 to 18½ cents per pound.

Texas has made great progress in grading. It is estimated that 90 per cent. of her sheep are, in greater or less degree, of Merino blood. Some superb rams—the highest bred from the stock farms of Vermont, New York and elsewhere—have been introduced year by year for some time, this breed being adapted to the climate and to the peculiarities of the soil, bearing extremes of weather, enduring a scarcity of food with comparative impunity, besides its great wool quality, &c. Such improvement has there been in wool within a few years, that the clip of this last spring—1885—has shown samples rated by experts in the colonial staple, I am informed, as Botany or Port Philip wools. Time was when Texas wools went into Eastern markets in such condition as to incur a shrinkage of 75 to 80 per cent. The fleece was so inferior that it was a drug in the market, and fit only for the most common felting purposes; and the fleeces were made up in the most unshapely ways with hemp, "tags," cotton seed and other trash.

And then the pasturage is being improved, and this will obtain more and more as cultivated grasses are introduced and areas are cut up into small tracts, and better care given sheep. Shelters are more and more coming into vogue, water is being provided, and even, in parts, hay is being made to tide over a short season, where no natural food is found, in the colder parts of the State. Associations are organizing where opinions as to preventing diseases are discussed—scab being most annoying—and other matters pertinent to sheep husbandry.

Then, as a most material matter, shipping facilities are being increased, and it is thought that through rates to Boston will be made as cheap as to St. Louis, and markets will compete with each other in offering prices. Home speculators are entering the field to bid against buyers from a distance; and the raisers are getting wiser than to slaughter prices, and are abler to hold wool.

Then, the literature of the business is increasing and improving. Journals devoted to pastoral affairs are multiplying and receiving patronage.

Another great aspect of improvement is the comparative freedom from burs. This has been a great pest, and the absence of these is an incontestable proof of the improvement in pasturage.

And before long there will probably be great union wool depots or exchanges, where a home market can be provided; where the manufacturer can deal with the flock-master without intermediates sharing the profits. At such places the manufacturers can send their experts to select and complete purchases. Experts in packing can make up bales at the points of these exchanges and send to Galveston, and get cheap transportation to Boston, Philadelphia and elsewhere.\* And then, surely, woolen mills will multiply in the State, and these can bid higher than Eastern manufacturers and help to buoy prices of wool.

A tendency to make advances as a business on wool is developing, seemingly mainly from St. Louis. It is to be hoped that this may fail, in the interest of the State. It gives the opportunity to dictate prices; it allures to improvidence; it tends, almost inevitably results, in paying for this wool with Western corn, flour, hay, pork, lard, etc., thus discouraging or preventing, *pro tanto*, the production of these at home; it promises, measurably, a continuance or restoration of all the

\*Wool-scouring mills may be looked for in the future as a help to the wool-growing interest. At least, one has been established, and it is said to be very profitable.

pernicious features of the "advancing system" to the cotton growers—a system that has done more to beggar and impede the material progress of the South than aught, possibly all, else. Its entire tendency, when the advances are made in distant cities, is to militate against the erection of woolen mills, thus discouraging the most potential factor possible in promoting high prices for wool, and forbidding consumers of mutton—a virtual drug in Texas now—by future operatives in the mills. Texas ought to be the great theatre of woolen mills in the United States; everything demonstrates it. Let her not erect a system most vitally repugnant to it.

Here comes to mind a distinguishing characteristic in the economics of Texas, and a matter of vast and incomputable value—that is, that she has, in her cattle and wool, two immense sources of revenue at a time when money is generally very "tight" in the South. No one not familiar with the cotton States of the South can appreciate or conceive the exceeding scarcity of money there until cotton comes in. Then times are flush. Money is abundant, and it is spent like water. It is a freshet of funds, and soon all is dry again. With the "advance system" on cotton, the cotton States, in large agricultural areas, may be virtually said to have no money from February to September. Everything is bought on credit, and the most ruinous prices are paid. A little while ago one could buy corn for cash in the cotton States for 90 cents or \$1 per bushel, when, on credit, it was "advanced" at the rate of \$1.25 to \$1.50 per bushel. So on through. Now, the disbursement of large sums of money in Texas for wool and cattle are preventives or great alleviatives of this, and tend (what is of inestimable service as a business principle) to establish the cash system—a method of business so badly needed South—thus inaugurating and maintaining a powerful, invigorating and fructifying principle in an enduring, indestructible and enlarging focus. Texas thus becomes a great educator to the rest of the South by a policy broadly beneficent in its illustrations of the wisdom of diversified industries, as well as invigorating the body politic by these golden currents poured through her veins—this blood of nations, as it were.

According to the Report of the Agricultural Department for 1884, the total number of sheep in the United States in January, 1884, was 50,626,626. The average value of them was \$119,902,706. The average price each was \$2.37.

The number in Texas was 7,956,275; the value was \$17,822,056; the average price, \$2.24. California had 6,203,064; their value was \$11,785,822; the average price, \$1.90 each. Ohio had 5,000,036; their value was \$14,650,105; the average price, \$2.93 each. These are the highest States in the industry.

Texas now produces more wool than any other State in the Union, except California and Ohio. Abilene, Colorado, Corpus Christi and San Antonio are the largest wool shipping points, some of them handling 10,000,000 pounds a year.

It is idle to attempt an estimate of percentage of losses. The Agricultural Report for 1884, while computing the losses in cattle, is silent as to sheep; and then, such a computation, if exact, would afford no criterion as to the profitability or risks of the business. The matter would be perplexed with so many obviably or varying conditions, that the naked facts of the loss of sheep in any given year would be next to valueless for the purpose of giving a fair idea of the business. Exceptional shortness of pastures in fall, severe winter weather, greater prevalence of disease, &c., all together or separately, enter into results. Then, proper shelter, feed, herding, etc., alleviate the above conditions.

Texas is, in its main area, one of the best climates and soils for sheep. The "foot" is good, the food nutritious, the sheep generally healthy, and as some of the native grasses disappear under the trying pasturage of sheep, the invaluable mesquite succeeds, rendering more food and better.



As the cattle range moves further north and west, the sheep seem to succeed them, and sheep raising is more and more being combined with ordinary farming operations. About Midway, for instance, they are raising wheat, pumping water with wind-mills, raising sheep, etc., in a country considered almost uninhabitable only three or four years ago for want of water. Along through that country and further east—Colorado City and elsewhere—the ranges were covered with cattle that have gone westward and northward into the Panhandle, and their places are now taken by sheep.

There is one condition of affairs common to the rest of the South from which Texas is fortunately comparatively exempt—the cur is not master of the situation in Texas. The sparseness of population, the system of herding, differentiate the State, in the main, from the South at large.

The magnitude of sheep husbandry in Texas, the possibilities of it in multi-farioussness of aspect, are temptations to conjecture. The day may come when Texas will raise sheep, become the sheep nursery, for the Western States and Territories, as she is now their cattle nursery. They may be “drifted” there without any trouble as to trail or quarantine. Or, after awhile, Texas may get into large breeds and regard “muttons.” Then, it may be that butchers and sheep dealers will go there to buy sheep to carry through the winter, and to fatten for the markets of the populous cities of Ohio, Indiana, Pennsylvania, Illinois, &c. Surely, the day will come when it will be a large business to send refrigerated carcasses of fine fat sheep to these markets, and early lambs in the same mode, as well as alive, from the State. And we may hope for many woolen mills, and some of them making finest fabrics from the future Saxons raised in the State.

MULES AND HORSES.—I have said that there is a growing tendency to raise fine stock in Texas. To know the dimensions of this is impossible. It may be said that it is always going ahead too rapidly to keep pace with it. The vicinity of Fort Worth is notable in this regard. Herefords and Durhams are there being crossed on native cattle. Fine jacks are being imported there and elsewhere. At various points cheap pasture lands are inducing Kentucky and Tennessee mule raisers to establish ranches.

The large breeds of horses are being introduced. The Northwest Texas Norman Company are raising Normans on the grasses of a good pasture as a principal feed, and their success demonstrates the feasibility and profitableness of the business. The Champion Cattle Company of Texas, some time ago, bought the noted Casey, Adair and Salmon herd of cattle and horses, about 32,000 head, for \$1,000,000. Individuals are bringing in Norman Percherons and fine Kentucky saddle stallions.

A moment's reflection upon the enormous demand for saddle horses and mules in Texas will show the opportunities for those phases of live-stock breeding. Men on the ranch will want saddle horses; negroes and Southern men will want mules; the demand for large horses will be active in the towns and cities for draft horses; and Western farmers, who are accustomed to large-bodied horses, will constitute for a long time a great element of demand for such animals. The bare mention of the fact of the formerly immense herds of mustangs in Texas subsisting in a state of nature, demonstrates how considerable an element of sustenance the native grasses of the State furnish to horse-flesh.

The Agricultural Report of 1834 shows the number of horses in the State to be 889,063, and of mules 149,121. The reader will observe the number of mules, and see how it enforces the assertion as to the demand for them from Southern white men and negroes. Very few of these mules are home-bred; nor is it possible to estimate how many of them were imported by the Southern white men and negroes who migrated to Texas to raise cotton on the fresh lands of the

State. It is a clear demonstration, however, of the use of and demand for this animal by so large a percentage of the population of the State, and a clear indication of the large opportunity for breeding mules there. It must be understood that the horses are largely mustangs, a breed that, as valuable as it is for frontier life, must pass away with more agricultural methods, thus all the while offering the very best opportunity for raising horses of a different type.

Hogs.—The last census credits Texas with 1,950,371 head of swine; her population was then 1,591,749. Tennessee, of States considered in this work, alone surpassed her in the number of swine, possessing 2,160,495. The population of Tennessee at the last census was 1,542,359.

The number in Texas in 1884, as shown by the United States Agricultural Report, was 2,011,785. It is probable that the number has not increased in proportion to population, for so rapid is the influx of people, that supply does not keep pace with demand. But this shows the opportunity the State offers to the business, for a large proportion of her population are pork consumers, the census of 1880 showing nearly 20 per cent. colored; and as she has a large population of Southern native whites, the demand for pork will be very considerable, in proportion to population, for years yet. It is also true that much of her population of late years—Western farmers and Europeans—are shrewd enough to see how great is the demand in the State for pork, and will address themselves to the opportunity of such a demand and raise hogs.

Outside of the question of demand and supply comes the query: "Is Texas adapted to hog raising?" And this question seems answered by the fact of her production. If it were not a practicable and profitable industry, it would not have been such a considerable one as in 1880; would not have progressed as in 1884.

The inducements to hog raising in Texas ought to be greater than West. There is the home demand, greater, out of all comparison, in Texas, in proportion to population, than at the West. The vast quantities of oak, hickory, pecan, beech, "post-oak grapes," etc., in Texas offer great inducements to hog raising; and as the Berkshire and grades of it are excellent rangers, hogs can be raised in the rich Texas bottoms, where those trees abound, for nothing or next to it. It is admitted that these facilities are not diffused over the whole State; but one must never forget the vastness of area of Texas, and her hog ranches would probably make as great an area as almost any State in the Union in its territory for all purposes. Some day this great natural mast-ground will be well utilized in hog raising.

There can be no good reason why Texas should not raise and market hogs more cheaply than any Western or Northwestern State. She has already sent some hogs to New Orleans and St. Louis. Even West and Southwestern Texas is being considered by capitalists as a proper theatre for raising hogs for the sole purpose of converting them into lard, not handling the carcass at all. It is claimed that there are sites there that will pay 300 per cent. on the investment. And I cannot see why the day of pork packing may not come, or the refrigerator system for handling them, as beef is now done in the Western cities.

THE ANGORA GOAT.—This animal is beginning to excite interest in the South. Considerable money has been spent in experimenting with it, and with great success. Dr. John L. Hays, whose name is familiar to all readers of literature on sheep husbandry, has written a work on the topic of this article. One of the best and largest herds of Angoras is in the South, in Georgia, and the owner of it has paid very high prices for imported animals. This herd I have visited. There are one or more considerable herds of thoroughbreds in Texas, and the same of grades. In Parker County there is a herd of the former of over 500, and

in another part of the State there is a herd of 1,500 or more of grades. Doubtless there are a number of small flocks of both thoroughbreds and grades scattered over the State. The Texas live-stock journals are commending the animal to the public. The animal is hardy, thrives well in the rough country, protects itself well, but needs to be watched, as it is a great Rambler. With fifteen-sixteenths of pure blood, the fleece will sell at from 40 to 62 cents per pound, and they will shear six or seven pounds each.

The Angora goat, at its best, is said to be the most valuable of the lanigerous animals. The skin is the Turkey morocco of ancient commerce, or, finished with the hair on, furnishes mats, rugs, robes, etc., of great durability and beauty, taking all dyes, as do the fleeces, with the facility of silk. Its product in fleeces is one of the leading four or five raw fibres of the world. The future of mohair would seem to be very important. There is great demand for it, and if sufficient could be had, many mills to use it would spring up.

The climate of Texas is said to be favorable to the propagation of the goat, and it is credibly alleged that in certain localities in Texas the growth of the fabric in texture cannot be excelled in the native haunts of the animal.

The breed is very prolific—a characteristic.

The flesh of the pure Angora is said to be most delicious, upon a very high authority in the South.

With the demand for hides for leather, and that of the fleece for purposes above enumerated, it would seem that there is great scope for goat raising in the State, and the interest in the business is considerable there. Western Texas would seem to be quite as eligible as California, and the Angora succeeds well in the latter State. Indeed, Texas has been tried well enough to demonstrate the success of the business.

As the Angora will live in a country where sheep will not; as they seldom die except from old age; as they do not conflict with cattle; as they are so fecund and their fleece worth so much; as, for many years yet, there will be a great demand for fleeces, the business is just waiting on the will, ready to yield a most remunerative return to those who will engage in it.

I have, perhaps, given undue space to this subject, but stock raising is associated with Texas in the minds of the world as Florida with oranges and Alabama with coal and iron. She is *par excellence* the grazing State of the Union, and it has been felt that much would be expected in the way of subject-matter in writing on this topic.

#### FORESTRY.

The following is from the Report of the Tenth Census:

The most important forests of Texas are found in the extreme eastern part of the State, where the Maritime Pine Belt of the South Atlantic region extends to about midway between the Trinity and the Brazos Rivers. A forest of long-leaved pine occupies most of the territory between the Sabine and the Brazos south of the 31st degree of north latitude, reaching south to within 20 miles of the coast. Beyond the long-leaved pine forests, forests of the loblolly pine, mixed with hard woods, stretch westward 50 or 60 miles, while north of these two regions a third division of the pine belt, composed of a heavy growth of short-leaved pine mingled with upland oaks, occupies the rolling ridges which extend northward to beyond the Red River. The swamps which line the larger streams flowing into the gulf, especially within the limits of the pine belt, still contain large bodies of cypress. The quality of the Texas cypress, however, is inferior to that grown east of the Mississippi River, and probably one-third of the timber growing in the valleys of the Sabine and the Nueces Rivers is "peggy" or affected by dry rot.

West of the pine belt open forests largely composed of post and black-jack oaks occur, gradually decreasing in density, and finally, west of the 97th degree of longitude, entirely disappearing. Farther west, however, the "lower" and "upper cross-timbers," two remarkable bodies of timber composed of small and stunted specimens of these oaks, extend from the Indian Territory far south into the prairie region, occupying long, narrow, irregular belts where sandy or gravelly alluvial deposits overlie the limestone of the prairie region. A belt of forest largely composed of post and black-jack oaks, varying from 20 to 50 miles in width, extends southwest of the Trinity nearly to the Nueces River, its eastern border following generally, at a distance of from 50 to 60 miles inland, the trend of the coast. The bottom lands east of the 100th meridian are lined with the deciduous trees which occupy similar situations in the eastern gulf States. Near the coast the bottom lands of the large rivers, often several miles in width, are covered with dense forests composed of enormous trees. Farther west the bottoms gradually narrow, the number of arborescent species covering them decreases, and individual trees are small and stunted.

West of the Colorado River the forests of the Atlantic region are replaced outside of the bottom lands by Mexican forms of vegetation; the hills are covered with a stunted growth of mesquite, Mexican persimmon, various acacias, and other small trees of little value except for fuel and fencing.

An important tree in the forest of Western Texas is the cedar covering the low limestone hills which occupy hundreds of square miles north and west of the Colorado River, in Travis, Bastrop, Hays, Comal and adjacent counties. West of the 100th meridian all forest growth disappears, with the exception of a few scattered cottonwoods, elms and hackberries, confined to the narrow bottoms, and a shrubby growth of mesquite, which covers the plains of Western Texas, furnishing the only fuel of the region. The mountain ranges—outlying ridges of the Rocky Mountains—which occupy the extreme western part of the State, are covered with an open, stunted forest of Western pines and cedars, with which mingle the post oak, the yellow oak and other species of the Atlantic region.

The pine belt covering the eastern counties of the State is alone important as a source of lumber supply. Areas of river-bottom land covered with trees are, as compared with the area of the State, insignificant in extent, and these river belts of forest are entirely insufficient to supply even the mere local wants of the nearest settlements. The oak forests, which stretch more or less continuously between the eastern pine belt and the treeless western prairies and plains, are, except along their extreme eastern borders, composed of small stunted trees, often hollow, defective, and of little value except for fuel, fence rails and railway ties. The forests of the western mountains are not luxuriant, and, at the best, can only supply a limited local demand with inferior lumber. It is probably no exaggeration to say that west of the pine belt, and with the exception of the small amount of hard wood found on the bottom lands near the coast, the forests of Texas do not contain a single tree fit to manufacture into first-class lumber. The pine forests, therefore, of Eastern Texas and Western Louisiana are important factors in the future development of Texas, as well as of the treeless northeastern provinces of Mexico, which must draw their building material from these pineries. The position of these forests, therefore, with reference to an enormous territory destitute of timber, although adapted to agriculture and grazing, and which must soon be covered with a considerable population and a net-work of railroads, their richness of composition and the facility with which they can be worked, give to them, perhaps, a greater prospective value than that possessed by any other body of timber of similar extent in the United States.

During the census year 599,359 acres of woodland were reported damaged by fire, with an estimated loss of \$273,990. Of these fires the larger number was set to improve pasturage, in clearing land or through malice. These returns do not include the large areas burned in Western Texas by prairie fires, checking the growth of the mesquite over a great extent of territory.

Small amounts of cooperage stock and woodenware, principally for local consumption, are manufactured in the eastern counties from oak and cypress. Manufacturers report an abundant supply of material.

The following rough estimates of the amounts of the three kinds of pine standing in the State May 31, 1880, were made by multiplying the average stand of timber per acre by the county areas occupied by the pine forests, these being obtained by deducting from total areas of the county estimated areas covered by clearings, bottom lands, swamps, etc.:

Long-leaved pine (*Pinus Palustris*), 20,508,200,000 feet, board measure; short-leaved pine (*Pinus mitis*), 26,093,200,000 feet, board measure; loblolly pine (*Pinus Taeda*), 20,907,100,000 feet, board measure.

The principal centers of lumber manufacture in Texas are Orange and Beaumont, on the Sabine and Nueces Rivers, above Sabine Pass. Long-leaved pine and cypress are sawed here and shipped east and west by rail, and in small quantities by schooner to Texan and Mexican ports. Loblolly pine is sawed at a number of small mills upon the line of the International and Great Northern Railroad in the counties south of the Trinity River, and a large amount of short-leaved pine is manufactured in the mills upon the line of the Texas Pacific Railroad in the northeastern counties, Longview, in Gregg County, being the principal center of this industry. The product of these mills is shipped west by rail to supply settlers upon the prairies of Northern Texas with building material.

#### MINERALS.

Texas has been known principally as a stock-raising and agricultural State, and the importance of the mineral resources of the State, vast and varied, has been overshadowed by the greater magnitude of these two interests. Now, however, the value and extent of her minerals are becoming more generally known, and they are receiving constantly increasing attention.

#### COAL.

Coal exists in inexhaustible quantities. Dr. Wm. Deryee, of Corpus Christi, Texas, commissioner in charge of the geological and mineralogical exhibit of Texas at the New Orleans World's Exposition, writes:

The area of the true coal measure is estimated to be about 10,000 square miles, and the coal found in it can be successfully used for smelting, for generating steam and for manufacturing gas.

Young, Jack, Palo Pinto, Stephens, Shackelford, Eastland, Callahan, Brown, Comanche, Coleman, Taylor and portions of adjoining counties belong to the true carboniferous belt. The coals found in more recent formations in eastern, southeastern and other portions of the State have less fixed carbon, but a very large amount of bitumen. Coke cannot be made advantageously from such coals, but they can be used for the manufacture of gas, and, with improved furnaces, may be used for smelting.

Brown lignite has been discovered in a number of localities in Texas, notably near San Antonio, where it sold last year at \$7 per ton retail.

In Young County, off the line of the Texas and Pacific Railway, about three feet of good bituminous coal has been found.

A good bituminous coal seam three feet three inches thick has been opened at Crystal Falls, 30 miles from the line of above railroad.

In Wise County, 10 miles west of Decatur, in proximity to the Fort Worth and Denver City Railway, 22 inches of clean, pure coal, with hard black-slate roof and fire-clay bottom, has been fully exposed. It is reported that a large area of coal underlies Wise County. Much of the territory lying above water level can be mined easily and cheaply on tunnel plan.

Coal mining has been in progress four years at Laredo, the terminus of the International and Great Northern Railroad, on the borders of Mexico.

A clean 4-foot seam of very good coal is reported in the precincts of Eagle Pass.

There is also coal in Jack County said to be three feet thick. It will need to be mined by either shaft or slope.

Coal has been exposed at Colorado City.

#### IRON ORES.

There are vast deposits of iron ore in Texas. The exhibit at the New Orleans Exposition included hematite and limonite from Cherokee and Rusk, magnetite from Llano, and sphærosiderite or spatic iron from Archer County. Dr. Deryee writes as follows:

In the northeastern portion of the State, embracing Cass, Marion, Bowie, Harrison, Rusk, Cherokee and other counties, the iron industry has been in successful operation for many years. The Kellyville Iron Works in Marion County are an example. They have been profitably worked for nearly 20 years. The pig iron turned out of the furnace of Wm. Kelley is so tenacious that horse shoes and horse-shoe nails have been hammered out of it by blacksmiths. John F. Dickson, of Marshall, Texas, has for a long time made car wheels from it, and it is asserted that this is the only iron in the United States from which a marketable car wheel can be made without the admixture of other ore. The belt of this iron ore is computed 160 miles long and of an average width of two miles. The magnetite or magnetic iron ore from Llano County is the same ore worked at Pilot Knob, Missouri, and the ore of which the best Swedish iron is made. It is found massive in the counties of Llano, Mason and Burnet.

The following is from Williams' "Mineral Resources of the United States," under head of Texas:

MINERAL- OGICAL NAME.	COMMON NAME.	REMARKS.
Limonite.....	Brown hematite..	...Five miles east of Calvert, Robertson County, appear to be in large beds; Milam County, opposite coal of Herndon, Robertson County; Young's Iron Works, Cherokee County, both brown and red hematites abundant; eight miles south of Rusk, Cherokee County, ore inexhaustible; near McLain's works, north part of Nacogdoches County; Nash's mine, at works, Cass County; Kelley's Iron Works, five miles north of Jefferson, Cass County; three miles south of Palestine, Anderson County, extensive bed; Whitesborough, Grayson County; Mount Enterprise, Rusk County; Jacksonville to Rusk, in Cherokee County. Iron ores occur in nearly every county in State where older tertiary rocks prevail.
Magnetite....	Magnetic iron ore....	Burnet, Burnet County, thence southwest extend into Llano County, occurring in thick beds in granites; largest bed 12 miles west of Llano, Llano County; another large body eight miles northwest of latter; none of these deposits developed to any extent.

#### GRANITE.

Red and gray granite is found in abundance in several counties. Dr. A. Gregg says of the red granite from quarries near Burnet:

It has been submitted to the severest tests and the most critical examination by experts, and has been pronounced first-class as to durability, strength and adaptability for the construction of large edifices. Its color, having a warm and agreeable dark red ground, relieved by crystals of quartz, feldspar and mica, is

much in its favor. The supply is practically inexhaustible. Sufficient could be procured from this quarry to build a city equal in size to London.

#### OTHER MINERALS.

Marble is found in large quantities. Limestone, brown and gray sandstone exist in exhaustless quantities, and are extensively used for building. Cement, salt, gypsum, copper and many other minerals are mined.

#### MANUFACTURES.

No other State in the Union is making more rapid progress in manufacturing. From the small beginning of a few years ago, the industrial interests of the State have grown to enormous proportions. And this development is in many lines of industry. Flour mills, brick yards, planing and saw mills, furniture factories, machine shops, canning factories, ice factories, cottonseed-oil mills, handle factories, cotton compresses—these are some of the industries recently started. The field, however, is practically unlimited, and there is room for the investment of millions of dollars in manufacturing enterprises. The following on this topic is from a recent issue of the Galveston News:

Texas has come to be a great, populous State of intelligent, prosperous and progressive people, and presents the widest and most inviting field known at this time for emigrants, and, from present prospects, will double her population in a very few years; and with such a vast territory of productive soil suited to such a great variety of products, including a few of the most important minerals, it is not at all likely that she will continue the great folly, the prodigious prodigality, of shipping her products over 2,000 miles, and even across the ocean, to have them manufactured, and to find a market for the surplus.

Truly, Texas could be the most independent, self-reliant State in the world if she could only have any reasonable ordering of the productive system and the means of manufacturing her produce at home. With the growth of population that is to ensue for the next decade, her surplus would be nearly consumed within her own borders, and as a sequence, she would become the wealthiest State in this inimitable galaxy of commonwealths. Hence, men of capital should see and understand all possible of the profits to be realized from manufacturing the products of the State at home, that they may be induced to make investments in manufactories at an early day.

While the cotton crop may not be subject to a heavier loss than any other product of our State, it is the most prominent at this time, and may serve to illustrate the nature of the sacrifices we make in our mode of handling all. The cotton crop may now be averagely put down at 1,200,000 bales of 500 pounds each, valued at \$60,000,000. The cost of transporting this crop to Northern manufacturers over 2,000 miles, including return freights on manufactured articles for consumption, is not less than \$10,000,000, while the manufacturers' profits may be safely put down at \$10,000,000 more. These items are approximately correct—as much so, perhaps, as round numbers may be made to subserve the purpose, and sufficiently so to indicate pretty clearly the losses we sustain by not manufacturing our great staples at home. The estimates show a sacrifice of  $33\frac{1}{3}$  per cent. of the whole crop—\$20,000,000, a sufficient amount to erect and equip all the mills we need for the manufacture of our cotton and wool.

The production of wool is a new but rapidly growing industry. The present crop of this State does not exceed 30,000,000 pounds, but the cost of transportation on it exceeds cotton in proportion, and the manufacturers' profits are greater.

There is no manufacturing interest in Texas of more importance, to the extent of it, than the manufacture of wheat into flour and bran. At least three-

fourths of the flour consumed in the State is imported from Kansas, Missouri, California and other States North, and yet the annual product of this State is about 20,000,000 bushels, of the home value of \$16,000,000, two-thirds of which is shipped North. By this disposition the bran and coarser grades of flour are almost an entire loss, the expense of transportation being nearly equal to the market value, amounting to a total deprivation of our people of the articles. The cost of shipping our wheat and reshipping the flour for consumption, with the profits of manufacturers, amount to at least \$5,000,000.

There are mills in Texas, but they are not supplied with the great improved modes of making flour, and they are by no means of capacity to manufacture the crop of the State. What Texas wants is mills of the highest order; mills that can turn out flour of the finest quality, of the highest grades, and of capacity equal to the manufacture of our whole crop.

But when we come to the subject of hides, figures speak in thunder tones of reckless waste and injudicious management of a great staple commodity; the production of an industry that stands side by side with agriculture, and is as old as the earliest inhabitants. As with cotton, on our 30,000,000 pounds of hides we are subjected to the ordinary loss by expenses of transportation, etc., of  $32\frac{1}{2}$  per cent., to which we may add  $16\frac{2}{3}$  per cent. for profits secured to manufacturers by the raising or watering process, that brings the hides up to an equality in value with hides of cattle of the most expensive rearing.

But this hide question does not stop with manufacturing them into leather. Another profit is realized from manufacturing them into shoes and boots, and another expense—the cost of transporting them back to us for consumption. But in this connection must also be considered the packing of beef. While the loss on hides manufactured abroad is too serious to be tolerated, the shipping of cattle adds to the quantity of hides to the extent of those thus disposed of, and if properly considered in connection with slaughtering our beeves at home, we are driven to the conclusion that, with the increased facilities for making ice and refrigerating railroad cars, we should secure to ourselves the profits of all this diversified interest by establishing beef packeries, putting up shoe and boot factories and laying down tanneries, that we may no longer be deprived of the profits of commodities that we can produce so much cheaper than they can be produced in any other State, and therefore afford better profits.

The material for tanning is abundant. The oak tree of many species is to be found nearly all over the State. The mesquite abounds in exuberance in all the prairies of Central and Western Texas, and the sumach is very abundant in some places.

And now we come to that which is destined at an early day to become the grandest manufacturing interest of the State. The iron interest is simply immense, and its uses are daily increasing. The amount to be used to-day in the construction and repair of railroads and the rolling stock upon them is enormous; and when we consider the vast quantities required for agricultural building and other purposes, we must begin to realize the magnitude of the demand, while the prospect of an increase of our population must assure us of a great increase of that demand.

Iron is doubtless the greatest mineral of the State—one of her greatest sources of wealth. Great beds of the richest ore are to be found all over the State that has been ascertained by tests and decided by experts to be of superior quality, unsurpassed by any known in Europe or America. In Eastern Texas it has been worked for a number of years and proved to be of high quality. In Northern and Central Texas scraps from croppings have been picked up on the surface and hammered into bolts and nails without heating that presented as fine



an appearance as if it had been smelted. The iron of the State has been subjected to the process of converting it into steel, and has turned out specimens of excellent quality; and yet with this invaluable treasure at our doors, at our command, at our disposal, nearly all the iron and steel that have been used in building and equipping our 6,000 miles of railroad, fencing our millions of acres of land, making our iron fronts and ornamental work, together with our agricultural, milling and other machinery and implements, are imported, much of it from Europe, at a heavy expense of freight and charges, to say nothing of duties. The iron rails, angles, bolts and nuts for one mile of road foot up 120 tons, and the freight and charges on it from New York, Pennsylvania or Missouri amount to about \$5,000. The iron for the track of 6,000 miles of road amounts to over one thousand million pounds—500,000 tons, upon which the freight and charges are about \$25,000,000. We presume that the wheels, springs, axles and other iron of the rolling stock, with the other purposes of iron in the State, will at least equal that amount, and add to the freights, etc., of obtaining it from other States and countries \$25,000,000 more, making the item of freights and charges alone \$50,000,000—an amount sufficient, we think, to induce the construction of iron works at an early day; and we hope it may, that this great mineral resource of our State may be developed. It seems to be inconsistent with the vigilant outlook of capitalists and men of enterprise to see this rich mine of wealth, this fine opportunity for investment, this field that gives such high promise for large profits, overlooked, while an extraordinary outlay of money is made for the freights alone on the importation of an article with which the hills of the State are teeming, and only await the application of money and muscle to make it a source of profit equal at least to the outlay that has been made for transporting it hither from other States. It is a singular fact, too, that the beds of ore are found mainly upon timbered lands—large bodies of timber of a quality fit only for fuel; and besides this, there has come to be no question of the existence of coal, and that in abundance, and not very remote from where iron is found.

The western half of the State is supplied with water-power to which no exception could be taken; it is exceedingly fine, and we have no doubt but it may be found profitable to improve and utilize the streams of the eastern half. Wood, however, is abundant and cheap, and that and coal may be had for steam-power.

#### EDUCATION.

The provision for education, in a pecuniary point of view, is simply colossal, and the gigantic scheme is a towering and enduring monument to the wisdom and beneficence of its inventors. According to the best information my research has discovered, the educational fund will, in the end, be not less than from \$80,000,000 to \$100,000,000—the basis of one of the grandest educational schemes in the world.

“In nearly all the recently organized western frontier counties few communities are found without their school-houses and schools. In the older settled sections of the State ample school facilities are found, and many of the larger towns and cities can boast of colleges and high schools approaching, if not equaling, those to be found in the older States.

“For the preparation of teachers to conduct her public schools, Texas has provided and maintains two normal schools, furnishing both board and tuition to the students out of the treasury of the State; has an agricultural and mechanical college already in successful operation. Towards the buildings, grounds, appurtenances, libraries and implements the State appropriated \$250,000. The State University, located at Austin, the capital city, has been recently organized; extensive and expensive buildings have been erected and a faculty selected, which

includes some of the ablest instructors in the land. This institution, having ample means in all its provisions and appliances, will be commensurate with and equal to all the demands of modern education, whether of science or art, of liberal or professional instruction. It is open to the youth of both sexes, tuition free. Surely the liberality of Texas towards the rising generation must commend itself to those in distant States seeking new homes for themselves and educational advantages for their children."

# ARKANSAS.

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The State of Arkansas lies between parallels  $33^{\circ}$  and  $36^{\circ} 30'$  north latitude, while the extreme limits east and west are  $89^{\circ} 40'$  and  $94^{\circ} 42'$  west longitude. It covers altogether 53,850 square miles, including about 805 miles of water surface, and is divided into 74 counties, whose land areas vary in size from 490 to 1,100 square miles. Nearly the entire surface of the State is well timbered with a large variety of growth.

Arkansas is nearly as large as the imperial State of Illinois, the latter having 56,650 square miles and 36,256,008 acres. Doubtless the reader will be surprised that the area of Arkansas exceeds either that of New York or Pennsylvania; but the population and wealth of these have so long dominated the statistics of the country, that we are apt to confound these with area of territory.

The State of Arkansas, with much of the richest soil of the continent, her superb river system, her minerals, her vast virgin and most valuable forests, her climate, and her immense area, will soon be a State of great weight in the great federation of the Western World.

The only place of 4,000 population and over at last United States Census (1880) was Little Rock, the capital, in Pulaski County. The number was 13,138.

## SURFACE FEATURES.

The Mississippi River borders the State on the east, its broad bottom lands on the north reaching far westward from the river, some 60 miles, to the foot of Crowley's Ridge, beyond the St. Francis River. On the south these lands are narrower, and near the Louisiana line they are interspersed with ridges and upland peninsulas. Crowley's Ridge is one of the most prominent features in this region. Lying between the White and the Mississippi Rivers, this ridge, extending from the extreme northeastern part of the State southward to Helena, in Phillips County, with an elevation of from 100 to 150 feet, forms a sudden termination to the low swamps of the Mississippi and St. Francis bottoms; but this elevation rapidly diminishes westward, with flat lands, prairies and low sandy ridges, to White River, at the border of the hilly and mountainous region of Northern Arkansas and the prairies of the South. Another broad alluvial region, bordering the Arkansas River on the north side, extends from near Little Rock (on the line of the rocky and hilly region) southeastward, and, embracing all the country lying between the river and Bayou Meta, becomes again narrow at the junction of the two streams. Its width in one place is said to be as much as 30 miles, and the region presents very much the same features as that of the Mississippi. Broad alluvial bottom lands also border that portion of the Red River embraced in this State, and the southern portion of Ouachita County, near the State line.

A view of the State northward from the line of Louisiana to Missouri presents the following general topographical features in addition to those already given: Along the southern border the country is undulating and somewhat hilly, and is timbered with a prominent growth of short-leaf pine, with oak and hick-

ory—the continuation of the tertiary yellow-loam region of Louisiana and Texas. Northward the surface becomes more and more hilly, and is interspersed with red lands and tertiary iron-ore hills. On the northeast of these, after passing the wide bottom plain lying between the Arkansas River and Bayou Meta, we reach a large area of silty prairies, which separate this region from the Mississippi alluvial and Crowley's Ridge regions; while on the southwest there is a region, interspersed with small black cretaceous prairies, which occupies the lowlands along the streams and at the foot of the pine ridges. The line marking the limit of this pine-hill country would pass from near Des Arc, on White River, in Prairie County, nearly westward to Little Rock; thence southwest to Arkadelphia, in Clark County, and westward through the middle of Sevier County into the Indian Territory.

Northward from this line we enter upon a hilly and broken country, with a few ranges of high hills and mountains composed of sandstones and mill-stone-grit, the valley lands being derived from the associated red shales. The surface of the country is well timbered with oak and hickory as far north as the range of mountains lying between Polk and Scott Counties on the west. Open and level prairies are found interspersed throughout the region northward to the Arkansas River, in the counties of Scott, Sebastian, Logan and Yell, but occur chiefly in the first two. North of the river, after passing a timbered belt of country similar to that on the south, we reach the Ozark Mountain region of high hills and ridges, which increase in altitude from but a few hundred feet on the south to 1,000 or 1,500 feet above the general level of the country on the northwest, where they leave the State. This country is well timbered with a great variety of growth, except on some of the highest ridges, where the poor sandy and cherty soil will support little else than grasses, weeds and stunted oaks. Little or no limestone has been observed southward from the Louisiana line to these mountains, but it now appears at the foot and on the sides of the hills, producing lands of richness and fertility. The hilly and broken character of the country continues to the Missouri line, and in the extreme northern tier of counties we find a region of cherty limestone hills and small open prairies and barrens, the latter having often a soil rich in potash, lime and phosphoric acid. In the middle of this region the prairies are less extensive than on the extreme west, where, in Benton County, they open out into the broad and more level prairie region of the Indian Territory. The hills are from 400 to 600 feet high, and are largely timbered with pine and other growth, except in places where the soil is too thin for anything else than scrub oaks.

#### CLIMATE.

The records of the Smithsonian Institution for a period of many years, as summed up in the Smithsonian Contribution to Knowledge, Vol. XXI, place the annual mean temperature of that part of the State lying south of the Ozark Mountains (or a line from the junction of White and Black Rivers, in Independence County, westward to Fayetteville, in Washington County) at from 60° to 64°, and thence to the Missouri line at 56° F. For the winter months during this time the average temperature in the northern counties was from 28° to 40°, and in the southern counties from 40° to 52°. The annual mean at Helena, in Phillips County, was 61.1°; at Little Rock, 62.3°; Fort Smith, 60.1°, and at Washington, on the southwest, 61.5°. For the summer months the mean temperature for the time mentioned was from 76° to 80° over all of the State, except in the extreme southeastern counties, where the mean was from 80° to 88°. July is generally the hottest month, the thermometer sometimes rising as high as 100°. The nights are said to begin to grow cool about the middle of August, and the first "black" frost appears about the last of October.

## RAINFALL.

The prevailing winds are from the south, and, charged as they are with the vapors of the gulf, we find the greatest condensation or rainfall in the southern half of the State. As the result of many years of observation, the following facts have been brought out by Mr. Schott in a late publication of the Smithsonian Institution: The average number of rainy days in each year for 15 years has been 75. The highest annual rainfall occurs in the southwestern counties, and averages 56 inches. From Louisiana northward to a limit marked by a line from the northeastern corner in Mississippi County to the lower part of Sebastian County, on the west, an average of from 44 to 56 inches falls yearly, while northward over the rest of the State a 38-inch fall is reported.

During the winter months the greatest fall (16 inches) occurred in the southwestern counties and along the Mississippi River from the mouth of the Arkansas River northward to Cross and Crittenden Counties. There was a fall of 12 to 15 inches in the southeastern region, which may be bounded west by a line from the lower part of Poinsett County to Jacksonport, at the bend of White River; thence southward with a curve, passing south of Little Rock, west to Mount Ida, Montgomery County, and south to Red River. Over the rest of the State on the north and west the rainfall for the winter was from six to eight inches. These estimates include the snow that falls during these months, sometimes to a depth of several inches. During the spring months the southern counties were favored with over 15 inches of rain, while north of a line from Sevier County to Little Rock, Ark., and Memphis, Tenn., the fall was from 12 to 15 inches, except on the extreme northwest, where it was less than 12 inches.

During the summer months the rainfall was more evenly distributed over the State, and averaged from 10 to 14 inches, a maximum of 18 inches occurring at Helena, in Phillips County, on the Mississippi River, and a minimum of less than 10 inches in the northwestern counties of the State. The autumn months were drier, the heaviest rains, more than 12 inches, occurring along the Red River, on the southwest. From 10 to 12 inches was reported over the rest of the State, except on the northwest and in the St. Francis bottom lands, on the northeast, where it was less than 10 inches.

## DRAINAGE.

Apart from the Mississippi and St. Francis Rivers on the east and northeast, the northern part of the State is drained by White River, the middle by the Arkansas, the south by the Ouachita, and the southwest by Red River.

Arkansas River, which is next in size to the Mississippi, divides the State into two almost equal parts. Entering on the west from the Indian Territory, its course is very irregular, at first mostly eastward, and then, turning to the southeast, its waters flow into the Mississippi in Desha County. Its basin, covering an area of 11,270 square miles, is bounded on the north by the Ozark Mountains, and has an average width of from 20 to 30 miles. On the south its width along the line of the Indian Territory is about 50 miles, bounded by the range of Rich and Fourche La Pave Mountains, which have an east and west trend, and approach near the river in Perry County. Thence southeastward the river basin becomes quite narrow, its southern rim lying very near the river,

White River is the most important stream in the northern part of Arkansas, draining, with its tributaries, about 17,400 square miles—an area greater than that of any other river within the State. This river rises in the southern part of Washington County, flows northward into Missouri, whence it soon turns south-eastward to the lowlands of the Mississippi River, where, after its junction with the waters of the Black River from the north, it continues southward, and unites with the Arkansas River near its junction with the Mississippi.

The Ouachita River basin includes very nearly the entire country south of the Arkansas basin—an area of about 11,800 square miles; while that of Red River, on the southwest, has only an area of about 4,500 square miles.

The other principal rivers are the St. Francis, Little Missouri, Black, Little Red, Moro and Bayou Bartholomew.

It is claimed that there are between five and six thousand miles of navigable water in the State.

Many streams are beautifully pure and clear and never failing, and almost everywhere fine fish are found. Shad are found in the Ouachita, and bass, pick-erel, wall-eyed pike, silver perch, cat and buffalo are common.

Of course, springs are exceedingly numerous, some of them of wondrous beauty and in most charming scenery. One, the Mammoth Spring, in Fulton County, is 70 feet deep, 190 feet in diameter, and flowing a volume of 65,000 cubic feet of water per minute. It is said to be one of the most remarkable springs in the world.

No locality on earth is more famous than Arkansas for springs. At the city of Hot Springs are the renowned springs of that name, so wonderfully curative of so many diseases. There are between 70 and 80 springs there.

At the Eureka Springs there are over 40. These springs are wonderful in restoring sight.

It follows, of course, with such wonderful streams, that Arkansas is not only most remarkably well watered, but that there is a vast deal of water-power in the State. According to the best information, this is estimated at 1,500,000 horse-power. To mention one or two, there is a superb water-power at the falls of the Ouachita, near Rockport; then there is Mammoth Spring, above mentioned. It is said that for 45 miles of Spring River there is to be found for every half mile 1,000 horse-power. The fall of the river for the first mile is 22 feet; 126 feet fall in 10 miles, and in 17 miles, 153 feet. The flow of water is not affected by drouth or long continued rain, and for 12 miles on either side there are no obstructions of any kind to interfere with putting in machinery. Of course, Arkansas, in common with many of the Southern States, has her streams unobstructed by ice all winter.

#### GEOLOGY.

The oldest occurring rocks of the State are probably those of the Lower Silurian age in the northern counties, embracing a few outcrops of the Potsdam sandstone and large areas of later cherty magnesian limestones. With a broad base resting against Black River north of its junction with White River, covered eastward by quarternary deposits, the triangular area of this formation extends westward, with narrowing limits in this State, until it passes out near the western boundary. Dipping toward the south, it is overlaid by the sub-carboniferous Archimedes limestones, chert and sandstones, which form the southern border of the Ozark Mountains in the northern portions of Stone, Searcy, Newton, Madison and Carroll Counties. So far as known, the Upper Silurian and the Devonian formations are not represented in the State, except perhaps in very small areas. A southern dip carries the sub-carboniferous under the coal measures, which constitute the most extensively developed geological region in the State. This is represented by the sandstones and red shales of the millstone grit, which form the hills and high ridges, its shales also underlying much of the valley land. Coal beds appear in many of the counties. The rock strata are generally regular, except in the lower part of the region, where the effects of granitic disturbance are seen in upturnings and contortions and the presence of many mineral veins.

The next older formation represented is the cretaceous, and this occurs in the southwestern part of the State. It enters the State from the Indian Territory

with a width of about 30 miles, reaching from Ultima Thule, in Sevier County, to Red River, but gradually narrows eastward to a point at Arkadelphia, on the Ouachita River, in Clark County. Characteristic fossils of this formation are abundant in localities, and are probably of the rotten limestone group. This is the northeastern termination of the great cretaceous belt, that, extending westward through the southern part of the Indian Territory, turns southward through the central part of Texas to the southern foot of the table-lands and the Llano Estacado, which are also but a continuation of the same formation northwestward into New Mexico.

The black, waxy and open prairies that form so prominent a feature of the formation elsewhere, are in this State found only in small patches in the lowlands, the formation being covered in the uplands by the quarternary sands and clays, which form hills bearing a short-leaf pine and other timber growth. Salt-licks are a feature of the cretaceous lands of this State, especially in Sevier County (as well as of Louisiana).

During or immediately after the cretaceous period there seems to have occurred a great disturbance or upheaval, bringing to the surface the granitic and metamorphic rocks which cover large areas of country in Saline and Pulaski Counties, with also a small outcrop in Hempstead County. At the same time the shales and sandstones of the region southwestward, in Garland, Hot Spring, Pike, Polk, and the northern portion of Sevier Counties, were upturned, contorted, and, in some instances, broken and altered.

On the northwest of Little Rock the continuation of the line of disturbance is observed in the upturned or folded strata of the Ozark Mountains, which pass into Missouri from Carroll County. Argentiferous galena ores, in veins, are an accompaniment of this formation in Arkansas, the Kellogg silver mines, a few miles north of Little Rock, being the most noted occurrence. Novaculite (whetstone) and sandstone, filled with crystals of quartz, are among the most commonly occurring metamorphic rocks, the former being found in abundance chiefly around the celebrated Hot Springs, in Garland County.

The tertiary formation is represented in this State only by the marl beds and limestones of the eocene, which extends southward into Louisiana. Marl beds, with characteristic tertiary fossils, occur at the foot of Crowley's Ridge, in St. Francis County, and also in the counties lying south of Little Rock. Thick and extensive beds of lignite are said to be found in Ashley, Union, Bradley and Calhoun Counties, exposed in the banks of the streams. The tertiary is all overlaid by beds of quarternary sands, pebbles and clays, which, by erosion, have been left as irregular hills and ridges, capped with ferruginous sandstone formed from these materials. Crowley's Ridge, which forms so prominent a feature of the country lying between the Mississippi and the White Rivers, is made up almost entirely of the material of this last group nearly to its entire height of from 100 to 150 feet, and throughout nearly the whole of its length, from the chalk bluffs of St. Francis River, in the extreme northeastern corner of the State, to Helena, on the Mississippi River, it is underlaid by Silurian and carboniferous beds on the north, and by tertiary marls and limestones on the south.

#### AGRICULTURAL FEATURES.

The lands of the State may be grouped in two grand divisions, separated by a line from the western part of Clay County, on the northeast, along Black and White Rivers to Des Arc, in Prairie County, and thence to Little Rock and Arkadelphia, on the southwest; thence west to Ultima Thule, on the line of the Indian Territory, in Sevier County. Westward and northward of this line lie the rocky, hilly and mountainous lands, or "up country;" but on the east and south the

lands are more generally rolling, or level, sandy, and sometimes gravelly in character, and almost entirely free from rocks on the surface, excepting some scattered pieces of ferruginous sandstone. This southern region also includes those river alluvial lands whose extensive areas make them of great agricultural value.

### SOILS.

It seems almost superfluous to say much about the fertility of Arkansas soils. Numerous analyses might be given to show how rich they are. She divides honors with Mississippi and Louisiana in having considerable of the Mississippi bottom lands, and surely that is enough panegyric on the score of fertility; and the Arkansas and Red River lands are very fertile. Cotton from Arkansas took the prize at the Atlanta Exposition in 1831, the Louisville Exposition in 1883, at the World's Industrial and Cotton Centennial Exposition at New Orleans, La., in 1885. The cotton taking the premium was raised in Chicot County. "It is one of a group of three counties in adjoining States, and also adjoining each other, (East Carroll, of Louisiana; Chicot, of Arkansas, and Issaquena, of Mississippi,) that form the center of maximum cotton production per acre on natural soils in the United States, and probably in the world."

Dr. David Dale Owen, an eminent authority, says: "A comparison of Arkansas soils, so far as made with a few soils collected in Iowa, Wisconsin and Minnesota, shows that her soils generally are equally rich in fertilizing ingredients with those of the said States, and that her bottom lands are, in truth, richer."

At the Atlanta Exposition in 1881 Arkansas received the first premium for corn and cotton, competing with all the States, including Kansas. Every one conversant with expositions knows how Kansas competes in agricultural products. Arkansas also received the sweepstake premium at the World's Industrial and Cotton Centennial Exposition at New Orleans.

Recently, at the Tri-State Fair, Toledo, Ohio, (embracing portions of Ohio, Indiana and Michigan,) a collection of grains, fruits, &c., from the line of the Fort Smith Railroad was awarded a diploma for the best display of corn and fruit, over all competitors.

The geographical position of Arkansas is such that, with her topography, she produces a wonderful variety of crops. With an altitude of nearly 3,000 feet above the level of the Gulf of Mexico, and nearly three and a half degrees of latitude, she yields the products of nearly ten degrees. There can be produced the buckwheat of New England and the rice of South Carolina; the corn of Iowa or Illinois—only better—and the sugar-cane of Louisiana; the wheat of Minnesota and the spelts of Germany; the flax and hemp of Europe and her own unsurpassed cotton; the fig of the semi-tropics and the apple of the temperate zone; rye, barley and oats as good as anywhere, and the last pre-eminently; clovers, red top, timothy, orchard grass, and other favored grasses of the North and West, equal if not superior to those of the latter two areas, and many grasses these cannot produce; superb Irish and sweet potatoes, turnips, cabbage, beets, peas, beans, onions, radish, celery, oyster-plant, egg-plant, squash, pumpkin, okra, lettuce, tomatoes, etc.; melons of most delicious quality and great size—even becoming celebrated for these; tobacco, hops; fruits away beyond enumeration—hereafter touched upon. What an array of products is this only cursory enumeration! There the grasshopper and locust come not; the potato-bug is unknown, and the chinch-bug almost a stranger. The textile fabrics—silk, cotton, wool, mohair, flax, hemp, jute, ramie—can all be produced there, and can nearly all, if not quite, be shown. All the comforts and luxuries needed can be raised in the State.



In general terms, it may be stated that the length of the planting season is from the middle of February to June 1st—an advantage much of the South enjoys. Garden crops are planted early—potatoes and peas often in February, and others in March. Vegetables are plenty in market in April, and late until Christmas. Gardens are made both winter and fall. The rains in spring are generally seasonable and propitious. Early vegetables marketed in St. Louis, Mo., and Chicago, Ill., mainly. Two crops of many vegetables are easy and common. Oats, rye, barley and wheat are sowed in the fall. Two crops of buckwheat per annum can be made.

#### FRUITS.

There can be no doubt that Arkansas is adapted to a wide range of fruits, and produces many of rare excellence. The laurels won by her at the recent display at New Orleans, where the greatest fruit exhibition the world ever saw was made, attest this. The first grand premium of gold medal and \$200 were accorded her, and this was the result, largely, of one man's exhibition—Mr. E. F. Babcock. No horticulturist who saw the display could but be enthused. Her apples, particularly, were indescribable. The Arkansas Valley seems to be conspicuous as an apple region. In the display spoken of there were 135 varieties of apples and 350 varieties of other fruits—peaches, pears, grapes, berries, etc.

Arkansas can grow probably 200 varieties of grapes. The vine flourishes in parts of the State, growing to almost incredible proportions. In her mountains some day will probably be great revelations in the products of her vineyards yet to be. These mountains run east and west, and protect from strong and sudden cold winds, and the soils seem especially adapted to the grape. Some vineyards have reached the size of 15 acres.

The strawberry business is well advanced. Judsonia, Cabot, Beebe, Austin's Station and Malvern are prominent points. Judsonia shipped in 1884 from 250 acres of this fruit; this year, 1885, from 300 acres. There are nearly or quite 2,000 acres in fruits and vegetables there. Last April there were estimated to be at Austin's Station over 200 acres strawberries, 23 acres raspberries, blackberries 12 acres, gooseberries 4 acres, grapes 18 acres, plums 43 acres, pears 7 acres, peaches 229 acres, apples 95 acres, cherries 8 acres—nearly 600 acres in fruit at this one station. Whortleberries figure among the shipments from Cabot. Benton has for a number of years shipped the first strawberries—early in April. It is in Saline County.

In justice to the railroads it should be said that they are offering inducements to fruit growing in rates and cars especially adapted to carriage of fruits.

Arkansas has some large peach orchards and produces superb peaches. This fruit shows immense size there in some seasons, and always a long season. Near Hot Springs, peaches have been picked as late as November 17. Hon. Thomas Essex, Land Commissioner of the St. Louis, Iron Mountain and Southern Railroad, received peaches this season as early as May 15. Peaches have been raised near Conway, Faulkner County, weighing over 22 ounces. Apples and pears weighing over 21 ounces are by no means rare, raised in the State, and the former fruit is sometimes seen over 15 inches in circumference.

The melon and vegetable business is growing to considerable dimensions in the State.

Some progress has been made in canning fruit in the State. This ought to and must increase; to make fruit raising ultimately profitable; and dessicating establishments for drying both fruits and vegetables should come in vogue.

The profits in trucking and fruit raising are claimed to be great; but everywhere the day of fortunes in a year have gone by in these lines.

The markets are St. Louis and towns and cities further north and east. The first fruit train ever run out of the State was started from Little Rock, Ark., on May 12, 1884, to St. Louis, Mo.

### STOCK RAISING.

A finely watered country very naturally suggests stock raising, particularly where rich soil and the success of the most prized grasses are superadded.

The country north of the Arkansas River is a beautiful variation of hill, plain, prairie and woodland. It affords a fine stock range, particularly for sheep. In the mountains, hill country and bottoms, there grow, in the aggregate, according to Lesquereux, 155 native grasses.

The bottoms (and how many there are!) abound in vast canebrakes. These grasses will keep cattle fat summer and winter. Every one who has had any experience knows how fat cattle will keep on cane the year round; and sheep will live on it, although it does not appear much out of bottoms.

The "mast" of the bottoms makes Arkansas certainly equal, if not superior, to any State for hog raising. The bottoms contain pecans, hickories, oaks, beech and other mast-making trees, and are particularly rich in these nut trees. Then, it should not be forgotten that the dense forests of the bottoms afford protection from the very little cold wind to which winter subjects the State. Then, the trend of her mountains breaks off the high cold winds prevailing north of them, and thereby, with their latitude and elevation, produce a very remarkable climate.

But, native grasses and cane aside, there is no trouble with the popular cultivated grasses. Arkansas had an exhibit at the World's Industrial and Cotton Centennial Exposition last year. There was clover to be seen from 3½ to 7 feet long, taken from fields that produced from 2½ to 4 tons per acre; there was timothy from 4 to 4½ feet long, with many heads 10½ inches long; there were fine alfalfa and red top, too. In the land office at Little Rock, samples of clover 7 feet long, and of timothy 5, can be found. Kentucky blue-grass, orchard grass, white clover, Johnson grass, Texas blue-grass, and California or Burr clover, have all been successfully tried. As to lespedeza (Japan clover) and Bermuda grass, as a matter of course, they are all that could be asked.

Pray, why should any one doubt that cultivated grasses (who knows anything of the South) would succeed? And is it not easy to see that, with rainfall, soils of almost incredible and inexhaustible fertility, and the most bountifully and beautifully watered country almost anywhere, Arkansas can be made an ideal stock-raising country? And Arkansas is beginning to see her opening as a stock-raising State, and is doing something (far too little) in that line. As a fact to be mentioned, very few people feed their stock in winter, except working animals.

Arkansas is marked by three belts of rainfall in the chart in the last census denoting the annual rainfall of the country. The lowest rainfall is ample for all needs, and what is well worth remembering is that in the area of lowest rainfall of spring and summer the precipitation is 20 to 25 inches per annum. This well bears out the language of another volume of the census, where, in comparing the summer and winter rainfall, it is said: "During the summer months the rainfall was more evenly distributed over the State." The crop-maker and the stock-raiser will appreciate the benefits of this summer rainfall.

### TIMBER.

The following on this topic is from the report of the last census:

Heavy forests cover the State of Arkansas, with the exception of a few isolated prairies principally confined to Prairie and Arkansas Counties, north of the valley of the Arkansas River, and the western borders of the State. North of the Arkansas River the forests are mostly composed of the deciduous trees of the

Mississippi basin, through which isolated belts occur, often of considerable extent, in which the short-leaved pine, the only species found in Northern Arkansas, is mixed with the hard woods. The southwestern part of the State south of the Arkansas River and west of the broad, level plain of the Mississippi is covered outside the river-bottom lands with an almost continuous forest of pine, in which the short-leaved species occupies the high, dry ridges, and the loblolly the moist soil above the bottoms. Great bodies of cypress cover the extensive swamps that stretch along the eastern border of the State or line the bottoms of the White, Arkansas, Washita and Red Rivers. The hard-wood forests of the State are hardly surpassed in variety and richness, and contain inestimable bodies of the finest oak, walnut, hickory and ash timber. Black walnut of large size is still widely scattered over the State, and is particularly abundant in the valley of the Red and other Southern rivers. The pine forests are almost intact. Settlements made for agricultural purposes have been confined to bottom lands, and only during the last few years has pine lumber been manufactured in the State, except to supply a very limited local demand. Recently, however, comparatively small quantities of lumber manufactured at numerous railroad mills, principally established south of the Arkansas River, have been shipped north and south out of the State.

The forests of Arkansas have received comparatively little damage from fire. Pine generally succeeds pine, even on burned land, although upon certain gravel and clay soils the second growth is largely composed of black and red oaks, or, in the southern part of the State, the sweet gum replaces other trees on bottom lands. During the census year 858,115 acres of woodland were reported devastated by fire, with an estimated loss of \$259,470. The largest number of these fires was due to the carelessness of farmers in clearing land, or to hunters camping in the forest.

Industries consuming hard woods are still in their infancy in Arkansas, although doubtless destined to attain an important development. Rough white-oak staves are largely manufactured in the White River country and in the northeastern part of the State for Eastern and European markets.

A considerable traffic exists in the southwestern counties in the wood of the Osage orange, used for wheel stock, and more recently as pavement in St. Louis and other Northern cities.

#### MINERALS.

The mineral resources of the State are a comparatively "sealed book," because this State has been so impolitic and remiss in not having had long ere this a thorough geological survey of the State. Other Southern States have been wiser, and millions of dollars have been invested in mines and industries cognate, until industrial revolutions have been achieved in them, and enduring advertisements of their resources. Perhaps no better proof of the impolicy of not having had a geological survey of the State can be shown than by the silence of so large and special a work as the volume (X) of the last United States Census so largely devoted to "Building Stones" (a special report, too,) as to Arkansas in this respect, when the State has some beautiful marbles and some fine limestones. And Williams, in the body of his work on the "Mineral Resources of the United State," for 1883, a most valuable and authoritative work, has nothing to say of fire-clays in the State; and John C. Smock, who proves such a careful enumerator, mentions only one county as containing it, whereas it is highly probable that these are abundant in the extensive coal measures of the State. But the State, although it has lost such valuable opportunities of gratuitously advertising itself, is winning its way to public attention in spite of the derelictness of public sentiment, and because of the revelations made by the most shallow and intermittent

exploitations of the truly wonderful mineral resources of the State. This preface is both explanatory and apologetic. The reader should know that extensive and scientific information is not accessible in the premises.

#### COAL.

The coal area is estimated at "12,000 square miles, in 12 counties," in the language of Williams in "Mineral Resources of the United States," issued in 1884. Whether future investigations shall enlarge this cannot be told. Nor is the thickness known; but estimating only at superficial area, there are only a few States surpassing Arkansas in this regard. Kentucky has 14,000 square miles, an area of most superb coking coal having been recently discovered. West Virginia has an area of 16,000 square miles. Pennsylvania has 12,770 square miles of coal of all kinds. The great State of Ohio is next to Arkansas, with 10,000 square miles, according to the best information obtainable. Indiana has 6,450. Illinois, Kansas and Missouri rank higher than any yet stated. All the other States, when possessing coal, are far below Arkansas in area.

It will be seen how important it is that something more specific could be given, and many will be surprised to learn of the mineral resources of this State, which are so great, and yet so little known.

In general terms, a mineralogist holds this language:

"The extent and area of the coal-bearing strata have been generally ascertained. Those districts have been pointed out which are most likely to afford lead ore. Numerous iron regions have been discovered. Wide belts of country have been indicated where marble prevails. Sources have been pointed out where the best limestone can be procured for lime, for hydraulic cement, for mineral fertilizers. Though I have not myself seen one particle of gold, I have no reason to disbelieve the statement of others. Yet, if no gold should be found profitable to work, there are resources of the State in acres of zinc, manganese, iron, lead and copper, whet and hone stones, rock-crystals, paint and nitre earths, kaolin, granite, freestone, limestone-marks, grindstones and slate, which may well justify the assertion that Arkansas is destined to rank as one of the richest mineral States in the Union. Her zinc ores compare favorably with those of Silesia, and the argentiferous galena far exceeds in percentage of silver the average of such ores of other countries. Her novaculite rock cannot be excelled in fineness of texture, beauty of color and sharpness of grit. Her crystal mountains stand unrivaled for extent, and their products are equal in brilliancy and transparency to any in the world."

To return to "Mineral Resources of the United States:—"

"The coal found is semi-bituminous or semi-anthracite. A bed of semi-bituminous coal 9 feet thick is reported in Sebastian County. The Spadra semi-anthracite is the only coal that is known in market to any extent, and an account of its location, etc., will prove interesting: 'This name is given to a deposit of semi-anthracite coal 3 feet thick found at Spadra, in Johnson County, 105 miles from Little Rock, now being worked by the Spadra Coal and Iron Company. It lies almost horizontal, with a slight dip to the north. It crops out on the river bank and is traceable along the river front. On digging anywhere the same vein, from 3½ to 4 feet thick, is invariably struck within 55 feet of the level of the river front. The product is about 5,000 tons. The existence of a second vein, which is, as near as can be ascertained, about 30 feet below the one now working, is a matter of development. The coal can be placed at Little Rock at \$3.25 a ton; at the mouth of the Arkansas River, \$3.75 a ton; at New Orleans, \$5 a ton; at St. Louis, \$6.75 per ton.'

"The only coal to compete with on the lower Mississippi, from the mouth of the Arkansas to New Orleans—600 miles—which section of country consumes

about one million of tons per annum, is the bituminous coal principally furnished by Pittsburgh.

“The mines of the Ouita Coal Company, producing an excellent variety of this semi-anthracite, are 72 miles from Little Rock. The vein is 32 inches thick. Analysis gave 80.46 fixed carbon, 12.66 volatile matter; ash, 5.11; water, 1.77; color of ash, light brown.

“Professor Owen gives an analysis of the coal in the First Geological Report on Arkansas, page 130. It was also analyzed by Mr. I. A. Liebig and by Mr. L. C. Bierwirth, with the following results:

	OWEN.	LIEBIG.	BIERWIRTH.
Moisture.....	0.5	1.524	0.680
Volatile and combustible gases.....	7.9	7.527	10.521
Fixed carbon.....	85.6	85.481	83.719
Ashes.....	6.0	5.468	5.080
Total.....	100.	100.	100.
Specific gravity.....	1.335	1.3408	1.3112

Saward, in “The Coal Trade” for 1884, has this to say:

“The coal region where it enters Arkansas is about 60 miles in width north and south, 25 miles north and 35 miles south of Fort Smith—that is, 25 miles on north side of the Arkansas River and 35 miles on south side of Arkansas River. The outcrops or openings, that are 4 feet to 7 feet thick, are nearly all on the south side of the river, in Sebastian County, and are 12 to 18 miles wide east and west, and 30 to 35 miles north and south; thence east, on south side of the Arkansas, they decrease in thickness for 80 miles or such a matter, and are lost at or east of Dardanelle.

“On the north side of the river the coal so far does not show a thickness of over a foot or two until you reach Ozark, 30 miles from the west line of the State. There it approximates 4 feet, and 20 miles east of that, at Spadra, it is 2 feet 6 or 8 inches, and becomes thinner 20 miles east of that, say at Ouita, where it is only 20 inches, and runs out at 100 to 120 miles east from the Indian border, on the north side of the river. It will be seen that its thickness (from 4 to 7 feet, and, indeed, it may be found 10 feet in Sebastian County) continually decreases east to a shell; and its width of 60 miles at the west side of the State becomes less toward the east, and tapers like a lady’s hand to near the middle of the State.”

From a respected authority—a pamphlet issued under the auspices of The Arkansas Valley Route—I quote as follows:

“This coal is similar in structure to the Lyken’s Valley coal of Pennsylvania, and its quality, by analysis, is very similar to that famous article of fuel, and it is an excellent steam and manufacturing coal. The Arkansas River runs for more than 150 miles through this coal formation.”

Arkansas coal is now used by “The Arkansas Valley Route” lines and the “Frisco” Railroad. A branch line has been built from the main line of the Fort Smith Railroad to the principal mines, which facilitates the “output.”

The Johnson County coal is used at St. Louis, Mo., and has recently been introduced into New Orleans by rail. The coal can be brought by river to New Orleans, and there ought to be a great business in it.

IRON.

This metal is found in several counties. Exploitation is demanded and would richly remunerate. I shall only specify one county, because of the meagreness of such information as is desirable.

Blow-up Mountain, in Polk County, is said to be a vast deposit of brown hematite ore. This analysis is imputed to Prof. Charles E. Wait, of the School of Mines of Missouri:

Silica.....	.23
Ferric oxide.....	83.94
Alumina.....	2.43
Lime.....	.94
Magnesia.....	.01
Phosphorus.....	.08
Water.....	12.24
	<hr/>
	99.87
	58.76

Near by, it is said, are manganese, limestone and good coking coal. If so, here should be steel works before long. It is off the line of railroad.

In this same county, near the boundary line of Howard County, are found immense deposits of the so-called "white iron." It is said to be so pure that horse-shoe nails have been forged direct from the ore. Here is an analysis of it by Prof. Wait:

Water.....	9.94
Silica.....	16.27
Ferric oxide.....	69.69
Ferrous oxide.....	1.03
Alumina.....	2.55
Sulphur.....	.03
Phosphoric acid.....	trace
	<hr/>
Total.....	99.51

It will be observed that it is essentially a very silicious hydrated oxide of iron, limonite, containing 49.58 per cent. of metallic iron, and of easy reduction.

Another assay made in the United States Assay Office (branch mint) at Charlotte, N. C., gave a large proportion of oxide of manganese.

Magnetite, specular, carbonate and limonite are found in the State.

#### SLATE.

A very fine roofing slate has recently been found 15 miles west of Little Rock, and the purchaser will open a quarry.

#### ANTIMONY.

In a pamphlet entitled "The Antimony Deposits of Arkansas," by Chas. E. Wait, C. E., M. E., director of the School of Mines, Missouri State University, it is said: "This is one of the few localities in the United States where antimony is found in workable quantities. I say workable quantities, because two different shipments of ore have been made to English reduction works, and in both cases excellent returns were made."

The discovery of these deposits will, it is hoped, give rise to a prosperous and remunerative industry at no distant day, and when fully developed they may yield ore in sufficient quantity to supply the regulus for the home demand, thus adding wealth not only to those interested, but also to the State of Arkansas.

*The Stewart Lode.*—"This is the most extensive deposit of antimony yet found in Arkansas. \* \* \* The surface indications in this case were quite interesting. The vein has a strike about N. 13° E., with dip nearly vertical. The ore in large pieces was exposed to view in several places within the distance of a few hundred feet. In many places in this distance the ore and quartz seemed to be a solid mass projecting above the ground.

"Soon after this discovery was made mining operations were commenced. The vein was attacked on the surface for several hundred feet, and was removed to the depth of 12 feet. Some fine pieces of ore were taken from this open cut. One piece of apparently solid stibnite weighing 720 pounds was shipped to Little Rock. Other pieces even heavier were raised to the surface. One other piece furnished 1,250 pounds select ore."

A large number of tons of antimonial ore from Arkansas have been shipped to Messrs. Geony, Hallet & Co., London, Eng., for which it is said they paid about \$60 per ton.

Sevier County claims the largest body of antimony ever before discovered.

MANGANESE.

The deposits of manganese in the State are very great and important, not to say startling. It is a genuine "find," in mining parlance. Nothing better proves this than that "the manganese deposits of Independence County have been opened, and large quantities are being shipped to Pittsburgh and other points;" and that "the Cambria Iron Works, of Pennsylvania, have made large purchases of manganese property in Independence County, which they propose to work on an extensive scale;" and that prominent capitalists and practical men are purchasing and working mines there. Such facts are their own commentary.

It is said that in Polk County there is a vein over 800 feet wide and over 8 miles long. The following quantitative analysis is attributed to Prof. Charles E. Wait, of Missouri:

Manganese oxide.....	62.196
Free oxygen.....	11.517
Silica.....	2.764
Water.....	8.344
Copper oxide.....	351
Alumina and iron oxide.....	7.222
Nickel oxide.....	3.872
Cobalt oxide.....	1.457
Baryta.....	2.297
Lime.....	080
Total.....	100.097

Prof. Wait says the occurrence of nickel is a matter of special interest. The amount present is as large as in some ores which are treated for nickel in connection with other metals.

More than a year ago over 100 mining claims were recorded in Independence County, and over 4,000 tons of manganese shipped from Batesville.

SOAPSTONE.

In Arkansas steatite or soapstone has been found; it is in Saline County, and a Philadelphia company has it in hand. It is found in Pulaski County, too.

WHETSTONE.

This stone is said to be equal to the Scotch, and is shipped in large quantity to Germany and other European markets.

KAOLIN.

This is said to be a very superior article, and is demanded in New Jersey and Pennsylvania.

ALUM.

It is claimed that alum exists in great quantities in the argillaceous rocks on the Alum Fork of the Saline River, in Saline County.

OTHER MINERALS.

A most remarkable lithographic stone is found near Batesville. It is quite likely that all along the range of the Ozark Mountains, which are thought to be spurs of the Rocky Mountains, silver, gold, copper, galena, antimony, granite, marble, coal and slate, and other stones and minerals, will all be found in abundance, as some of them are now. The silver of the State has been for some time one of the great sensations in mining circles. The antimony is a witness as to silver.

MANUFACTURING.

Arkansas is coming more into prominence as a manufacturing area than heretofore. The great increase in lumbering and the constantly increasing production of corn and wheat necessarily involve progress in saw and planing mills, wood-working establishments, etc., and grist mills. Arkansas ought to be one of the greatest States in the Union for manufacturing furniture, agricultural implements, woodenware, sash, door and blinds, wagons and carriages, for within her bound-

aries are the greatest hard-wood treasures almost anywhere to be found in the United States, to say nothing of poplar and cypress

Of course, Arkansas ought to be a great cotton manufacturing State. Her cotton has no superior. Her water-powers, abundant coal, cheap wood, climate, plenty and quality of raw material, water for cheap transportation, contiguity to the future best markets for the fabrics, etc., etc., all plainly point the way to the policy and profitableness of manufacturing cotton

#### RAILROADS.

No State could better dispense with railroads than Arkansas, because of her remarkable river system and her number of miles of navigable rivers. Indeed, it is likely that this great gift of nature has been a retardation to railroad construction in the State, as it has been one great cause why population has been so persistent of the great streams. But Arkansas is now very well furnished with railroads.

But there is a view of railroad possibilities for Arkansas which is new and striking—that in the near future she may be a great highway for trans-continental travel and traffic. In this day of breathless hurry, in the half-frenzied utilitarianism of Americanism, the proneness is to short cuts, the aspiration being crystallized in the phrase "air line." Let the reader take a map and glance his eye between New York, Philadelphia, Baltimore, Washington, and the Pacific coast, and he will see that Arkansas stands right in the track of the nearest Northern line across the continent, which would be free from obstruction in winter from snow and ice. A route is built as far West as Fort Smith, near the Indian Territory, and it could be carried on up the valley of the Canadian River away over to Los Vegas, New Mexico, or nearly so; thence, doubtless, a way could be found across Arizona to California. This would prove one of the best routes in the country, shorter than any of the four trans-continental railroads. A company that should put up steel works and make its rails out of the iron and manganese abundant along or near the line, with abundant coal, cheapest cross-ties, easy grades, would find such a line cheap and profitable. It would be a great outlet for Texas cattle, a business ready made and bound to prove enormous, crossing, as it would, the "Panhandle." The cotton trade would be large. Cotton and woolen factories would spring up; large iron and steel works would soon appear. Furniture, agricultural implement, wagon and carriage factories can nowhere find better locations than Arkansas, because there is the finest raw material and in greatest abundance. But such a road would get much of the trans-continental travel, in the winter particularly, and ought to get a great deal of trans-continental freight. Memphis, already quite a railroad center, would be on the track of this great trade.

It seems to the writer that this scheme will be one of the most eagerly seized when capital shall have duly investigated it. Such a road would be placed between the Atchison, Topeka and Santa Fe Railroad and the Southern Pacific systems for quite a distance, and would open some fine territory.

#### LAWS.

*Exemptions.*—The homestead law of the State is very liberal. The homestead of any married man or head of a family to the value of \$2,500, or 160 acres of land outside of a city or village, and the homestead in any city or village, not over one acre of land and improvements of that value, and one-quarter of an acre and improvements without regard to value, are exempted from execution. The benefits of this exemption, should the head of the family be removed by death, inure to his widow while she remains unmarried; also to his children during



their minority. In addition to his wearing apparel, the personal property of any resident citizen of the State to the value of \$500, to be selected by such resident, is exempted from sale or execution, or other final process of any court issued for the collection of any debt. No taxation for State purposes is allowed beyond one per cent.

*Education.*—The Constitution of this State provides that the General Assembly shall require by law that every child of sufficient mental and physical ability shall attend the public school during the period between the ages of 5 and 18, unless educated by other means, and the Legislature has provided a very efficient school law to secure for all the State ample school privileges. The law also provides that the white and colored children shall be educated in separate schools. Section 16 of land in every township, besides certain State funds, are set apart for educational purposes.

Besides public schools, there are a large number of private schools, seminaries and colleges, a blind asylum and a deaf mute institute.

*Temperance, Prohibition.*—This is a question most warmly agitated in the South, generally, and prohibition is making great strides in popular favor. The following from a noted lecturer, Mr. Luther Benson, I find in an Arkansas journal. It is said to have been written by him to the Indiana Monitor-Journal from Arkansas:

“Searcy, the capital of White County, has no saloon. White County has not a saloon. There are in this county 10 little towns; each one of them had two saloons, and this, the county seat, eight, making in the county 28 saloons. The people have voted and petitioned every saloon out of the county, and about 67 other counties have done the same. This State has local option. They vote by counties every two years for or against whiskey. If a majority vote no saloons, that settles it; but if a county votes for license, then there is another law that provides that if a majority of men 21 years old and women 18 years old in three miles of a church or school-house will petition the judge not to grant a license, the law says he shall not. Whiskey has no chance down there.”

#### GAME.

Allusion has been made elsewhere to the abundance of fish in the numerous waters of the State. In the Mississippi bottom and the western or rougher portion of the State may be found bear in plenty, and occasionally panther. Deer are very abundant in many parts of the State. Squirrels, rabbits, turkeys, ducks, quail, snipe, woodcock and pigeons furnish sport to the huntsman almost everywhere. Hardly any State is so inviting to the sportsman. It is, perhaps, the best hunting ground east of the Rocky Mountains.

This faint sketch of the great State of Arkansas is a meagre delineation of her claims upon capital, enterprise and immigration. She is great in her area, in her quantity of virgin and most fertile soil, in her vast forests of most valuable woods, in her quantity and variety of minerals, in her rivers and streams, peerless for navigation, teeming with fish, and of prodigal water-power; in her varied climate, adapted to such a range of cereals, fruits, vegetables, grasses, textiles, and an ample rainfall. There one finds the incomparable advantages of the richest soils for production and vast mineral riches in juxtaposition, and water transportation—a combination so remarkable that it beggars panegyric. The millions of idle capital in money centers may here find choicest opportunities in numberless lines. Her cheap lands, and millions liable to homestead, invite the immigrant. Her location will be apt to be at some day the center of the population and greatest enterprises of the United States. She is on the future highway of this continent.

# KENTUCKY.

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The State of Kentucky is situated between latitude  $36^{\circ} 30'$  and  $39^{\circ} 6'$  north, and longitude  $5^{\circ}$  and  $12^{\circ} 38'$  west from Washington. Her area is 40,000 square miles. The surface of the State is an elevated plateau, sloping from the Cumberland Mountains, on the southeast, to the Mississippi and Ohio Rivers, on the north and west. On the north the Ohio River is the boundary of the State for its whole length from east to west, as it is also, in part, on the west, the Mississippi River completing the rest of its western boundary. On the east the Big Sandy River separates the State from West Virginia for the northern area of its eastern boundary, and for the balance the line between Kentucky and Virginia follows the top of Cumberland Mountain from Cumberland Gap to a point near Crank's Gap, about 40 miles to the northeast, where the mountain bends to the eastward and extends into Virginia; from this point the line follows the top of the Black Mountains until it reaches the Pine Mountain, near Pound Gap. On the south, by an arbitrary line, the State is bounded by the State of Tennessee.

The reader should not fail to note the fact, the advantages of which may be hereafter enlarged upon, of the enormous frontage on navigable rivers of the State, enjoying almost as much of the Mississippi River, in this regard, as the State of Missouri, as much of the Ohio River as the State of Illinois, as much of the latter river as the State of Indiana—the river bordering the last State on its entire extent from west to east—and half as much of the same river as the State of Ohio. The large number of towns in the State of Kentucky enjoying the facilities of navigation on these two noble rivers alone add large store of savings in diminished cost of transportation to inter-State commerce.

The population of Kentucky by the last census of the United States was 1,648,599, of which 1,589,131 were native, 59,468 foreign born, 271,522 colored. According to the census of 1870, the population was 1,321,011. The census of 1880 shows, therefore, an increase of over 24 per cent. By this time—September, 1885—the population may be estimated to be upwards of 1,800,000.

## CLIMATE.

The following is taken from the Report of the Tenth Census:

“The climate of Kentucky is remarkably pleasant, though variable. The mean annual temperature is about  $55^{\circ}$ . The thermometer often falls to  $20^{\circ}$  in winter, and sometimes, though rarely, goes below zero; in summer it rises to  $90^{\circ}$ , and very rarely to  $100^{\circ}$ . Winter sometimes continues from late in November until the last of March, but is often so mild that good grazing for cattle and sheep may be had throughout that period. The prevailing winds in spring and summer are from the southwest; in winter, during the coldest periods, from the northwest. Rain is very frequent in winter, but the summers are sometimes characterized by protracted droughts. Observations by the signal service at Louisville from September 11, 1871, to October 31, 1880, show a mean average temperature for the seasons as follows: Spring,  $56.1$  degrees; summer,  $77.4$ ; autumn,  $56.9$ ; winter,

37.3; average mean, 56.9; highest temperature recorded, 103; lowest, 10 below zero; mean of prevailing winds, south; mean annual precipitation, 48.36 inches."

COAL.

The greater portion of Kentucky, excepting only those strips of territory contiguous to the Louisville and Nashville, Cincinnati Southern and a few other roads which have been in operation for some time, is essentially an undeveloped wilderness, but one which contains, perhaps, greater possibilities than any other region of corresponding area in the United States. The State is divided naturally into three districts—eastern or mountainous, the central or blue-grass, and the western or Green River. The eastern district contains a coal field over 10,000 square miles in area, which, with the western field, gives the State a coal area of over 12,700 square miles, exceeding the area of the Pennsylvania coal fields, or the entire coal area of Great Britain and Ireland. This coal is mostly bituminous and is considered among the best known for manufacturing purposes. In addition to the bituminous coal in the eastern district, there is also the largest area of cannel coal in America. This coal is from three to four feet thick and of superior quality. There was very little coal mining done in Kentucky before the war. In 1870 the total amount mined was stated in the census report for that year to be 150,580 tons, which in 1875 was increased to 500,000 tons, and in 1882 to 1,260,300 tons. In the western field the most persistent and uniform coal of the series is D, or No. 9. It is from four to six feet thick, averaging five feet. It is an excellent coal for grate and furnace and gives a good coke. A lot of slack from this vein from the Saint Bernard Mines, Earlington, washed and coked, gave a bright, firm coke. There is also coal sent out via the Kentucky and Cumberland Rivers, and the Ohio, from Boyd and Lawrence Counties, besides local use.

The railways are becoming large carriers of coal, and they are tending to greatly enlarge its distribution. This, in turn, tends to develop the coal resources of the State. In Greenup County are valuable coals for all purposes. A few sample analyses are appended:

	No. 1.	No. 2.	No. 3.	No. 4.
Volatile matter.....	39.00	47.36	36.90	33.48
Fixed carbon.....	56.00	50.64	58.30	60.52
Moisture.....	5.00	2.00	4.80	6.00

The first and fourth are valuable for steam, and the second and third are good cannel coals. Prof. J. R. Proctor, State geologist, says: "The Eastern Kentucky coal fields are even superior to those of Western Kentucky, and are 10,000 square miles in extent. Coal is found in every county in a line between the Ohio River and the Tennessee State line. The thickness varies from 24 to 54 inches. In the northern part of this district are immense deposits of iron ore, and in close conjunction with coal beds. The completion of the Chesapeake and Ohio Railroad, with its connections, will afford greater advantages for the manufacture of iron than are possessed by the corresponding region beyond the Ohio River. In Bath County and farther south is the Red River car-wheel iron."

The recent survey has demonstrated the fact that the valuable deposits of coking coals which have added such wealth to Pennsylvania and West Virginia, have been traced and identified in the valleys of the Cumberland, the Kentucky and the Big Sandy, with a thickness of seven or eight feet. It is claimed that the analysis of the State chemist shows the coal to be equal if not superior to that of Connellsville or New River, and this will give a great impetus to the development of the region in which it lies. The following figures show the increase in coal production in Kentucky:

	GROSS TONS.
1875.....	500,000
1880.....	1,000,000
1884.....	1,550,000

"In the western coal field are 12 beds of coal of workable thickness of good quality. Associated with the lower coals are several beds of limonite and carbonate iron ores, all above drainage and situated favorably for cheap mining. One ore of good quality has an extensive area, and is from three to five feet in thickness.

"The eastern coal-field area is over 10,000 square miles; elevation above sea level, 650 feet on Ohio River to 1,300 feet on southwestern border and 3,500 feet on the southeastern border. \* \* \* The western coal field has an area of about 4,000 square miles; elevation of 400 feet along the Ohio River to 850 feet in the southeastern portion."

The eastern coal field stretches clear across the State from north to south, and from the extreme eastern point to where it terminates west is quite one-fourth the width of the State.

The western coal field begins on the Ohio River at or near Weston and runs up the river east to Cannelton. Its frontage on the river embraces four or more counties. It runs back, or south, through several counties. It is not far from exactitude to say that this coal field lies in latitude 38 and 37. Its longitude is about two degrees, commencing east a few miles west of 9 and extending west a few miles west of 11 west from Washington. It is superfluous to comment upon this advantage of distribution of coal area and its accessibility by water for cheap transportation in large part.

Prof. John R. Proctor, director of the Kentucky Geological Survey, in a "Report on the Progress of the Survey from January, 1882, to January, 1884," says:

In the summer of 1881 the survey discovered a very thick coal of great purity, and tests in the laboratory indicated that it was a coking coal of superior excellence. During the summers and autumns of 1882 and 1883 the party in charge of Prof. Crandall was engaged in tracing this coal, determining its area and thickness, and making practical tests of its coking properties. These results will be shown in the forthcoming report on the geology of that region. The following facts have been established: This coal, which has been named for convenience of reference the "Elkhorn coking coal," has been identified and traced over a large area on the headwaters of the streams above mentioned, where it is found to be from eight feet to nine feet thick, with conditions favorable for cheap mining. On the outer rim of the basin of thickest coal the same coal is found extending over a considerable area, with a thickness of from four feet to eight feet. It is hoped to extend the known area of this valuable coal during the coming summer. Mr. R. C. Ballard, Prof. Crandall's principal assistant in this work, has been engaged in opening up coals, sampling the same for analyses, and making practical tests of the coking properties. Many tests have been made in the open air, and coal was sent to Cincinnati, O., and Connellsville, Penna., where it was coked in regular coking ovens.

The following analyses from carefully averaged samples are by Dr. Robert Peter and his assistant, A. M. Peter, chemists of the geological survey, compiled from the analyses of 112 coals in the forthcoming chemical report of the geological survey:

No. in chemical report.....	2403	2404	2266	2352	2356	2361
Specific gravity.....	1.271	.....	1.254	1.291	1.286	1.319
Hygroscopic moisture.....	1.60	1.80	1.10	3.26	1.46	2.86
Volatile combustible matter....	29.36	26.80	36.44	32.24	33.26	31.54
Coke.....	69.04	71.40	62.46	64.50	64.90	65.60
Fixed carbon in the coke.....	67.40	67.60	59.66	61.60	59.70	62.10
Ash.....	1.64	3.80	2.80	2.90	5.20	3.50
Sulphur.....	0.610	0.967	0.613	0.656	0.678	0.535

Nos. 2403 and 2404 are from the coal in the basin of the headwaters of the Big Sandy River; No. 2266 from the upper Cumberland, and Nos. 2352, 2356 and 2361 from the upper Kentucky River.

For purposes of comparison, I give below analyses of the celebrated coking coal of Pennsylvania:

	1	2	3
Water at 225°.....	1.260	.950	n. c.
Volatile matter.....	30.107	29.662	31.36
Fixed carbon.....	59.616	55.901	59.62
Sulphur.....	.784	1.931	7.84
Ash.....	8.233	11.556	8.23
Coke.....	68.633	69.388	68.00

Nos. 1 and 2, Connellsville coking coal; analyses by McCreath, from Second Geological Survey of Pennsylvania, Vol. "M. M." page 22. No. 3, Connellsville coking coal, Pittsburg seam; Second Geological Survey of Pennsylvania, special report L, page 120.

The following table of analyses of cokes, compiled from the forthcoming chemical report, will show the excellent character of the coke made from the Kentucky coals. Analyses of the Pennsylvania coals are given for purposes of comparison:

	KENTUCKY COKE.				PENNSYLVANIA COKE.		
	1	2	3	4	5	6	7
Moisture expelled at red heat....	.20	1.20	1.10	0.60	.460	6.10	.50
Fixed carbon.....	93.20	94.14	95.40	93.34	89.576	84.721	88.773
Ash.....	6.60	4.66	3.50	6.00	9.113	12.636	9.512
Sulphur.....	.734	1.484	.517	1.335	.821	1.994	1.328

No. 1, from Elkhorn coal, made in an oven in Cincinnati; No. 2, from Elkhorn coal, made in an oven in Connellsville, Penna.; No. 3, made from Elkhorn coal; No. 4, made from Bell County coal; Nos. 5, 6 and 7, Connellsville, Penna., coke; No. 6 used at iron works of New Castle, Penna., and No. 7 used by the Cambria Iron Company, Johnstown, Penna.

The value of coke for the manufacture of iron is demonstrated by the rapid increase in the production of coke iron in the United States. The following table will show the increase since 1873:

	ANTHRACITE IRON, TONS.	CHARCOAL IRON, TONS.	COKE IRON, TONS.
1873.....	1,312,754	577,620	977,904
1880.....	1,807,650	537,558	1,950,205

The value of the Elkhorn coking coal is determined by the following conditions: (1.) Superior quality and cheapness by which it may be mined. (2.) Ease by which it may be brought to the Ohio Valley and the furnaces of Eastern Kentucky and Western Ohio by proposed railways. (3.) The nearness to cheap iron ores of superior quality. (4.) The position with relation to the South Atlantic States, there being no coal between the southeastern border of this coal field and the Atlantic Ocean.

The amount of transportation necessary to bring the iron ore and the fuel to the furnaces in the United States is greater than is generally supposed. Says Mr. James M. Swank, secretary of the American Iron and Steel Association, and special expert of the Tenth Census, in his "Statistics of Iron and Steel Production in the United States for 1880," (page 168):

"From the ore mines of Lake Superior and Missouri to the coal of Pennsylvania is 1,000 miles. Connellsville coke is taken 600 miles to the blast furnaces of Chicago and 750 miles to the blast furnaces of St. Louis. The average distance over which all the domestic iron ore which is consumed in the blast furnaces of the United States is transported is not less than 400 miles, and the average distance over which the fuel which is used to smelt it is transported is not less than 200 miles."

On top of the sub-carboniferous limestone brought up by the great Pine Mountain fault, there is an excellent iron ore near the Elkhorn coking coal. Along the border of the State, in Southwest Virginia, is an extensive deposit of the Clinton or "fossil" iron ore—a very cheap ore—only a few miles distant from this Kentucky coking coal, whilst there is an abundance of high grade ores in the valley of Southwest Virginia, and in Western North Carolina is an extensive deposit of what is probably the best steel-making ore in America. During the census year 1,414,182 tons of ore was brought from the Lake Superior region and 439,451 tons from across the ocean, mainly to be used in the manufacture of steel; hauled hundreds of miles on railways to the furnaces in the valley of the upper Ohio. Standing in Southeastern Kentucky upon the mountains containing the coking coal, and looking at the blue hills of North Carolina containing the great steel-making ores, I have realized that it is only necessary to make the facts well known to insure the building of railways to unite these great resources, and the consequent development of a great iron and steel industry in our midst second to none in America.

There are extensive beds of iron ore favorably situated for cheap mining and contiguous to seams of coking coals.

#### PETROLEUM.

The almost revolution in fuel produced by natural gas at Pittsburgh gives to Kentucky a prospective importance hard to overestimate. It is understood that a large scheme is under consideration to utilize an area of this natural gas, to be used in Cincinnati. In view of this, something more than a brief abstract is due to Kentucky on the topic in question. A most important paper on petroleum has just seen the light in Vol. X of the last United States Census. From it we quote on page 24 *et seq*:

The oil and burning springs that mark the line from Blue Rock, in Ohio, to the Tug fork of the Sandy River, in West Virginia, is continued in outcrops on Paint Creek, Johnson County, Kentucky. This creek is a tributary of the west fork of the Big Sandy, and has been described by J. P. Lesley in his report published in 1865. Springs are also met with near Sayersville, in Magoffin County. In Lincoln, Rockcastle, Pulaski, Casey, Green, Adair, Russell and Metcalfe Counties oil springs are found, and oil wells have been drilled at different times. Some of these wells in Lincoln and Casey Counties are old salt wells drilled 50 or 60 years ago; others are oil wells drilled during the excitement of 1865 and 1878. The oil sand in Lincoln County lies at a depth of about 300 feet. A number of wells have been drilled in this county in the neighborhood of Stanford, all of which are reported to have reached oil, but the wells have not been piped or pumped, and none of the oil has been put upon the market. In Wayne County the oldest well in the country is still flowing oil. It was drilled for brine on the little south fork of the Cumberland River, in the southeast corner of the county, in 1818. The oil is heavy, black lubricating oil. Wells have been drilled near Monticello since 1865 that yield a heavy oil of a dark green color, specific gravity 25° Baume, that has a high reputation as a lubricator. In Clinton County oil was obtained in 1866; in Cumberland County the old American well was bored for brine in 1829 and flowed oil till 1860, and in 1865 a large number of wells were drilled along the Cumberland River and the creeks flowing into it, and they probably gave the most certain and largest yield of oil that has ever been obtained for the same cost in any locality. At the same time, probably a larger proportion of the oil produced was wasted than has been the case anywhere else in the United States, as it is supposed that 50,000 barrels from the American well ran down the Cumberland River before any attempt was made to save it. The oil near Burkes-

ville, Cumberland County, has a peculiar, offensive odor and a specific gravity of 37° Baume. Amber oil of a lower specific gravity was obtained from other wells in small quantity, and a larger amount was yielded by wells on Oil fork of Bear Creek (east of Burkesville), which was of a black color, with a specific gravity of 26° Baume. The oil here appears to be in a sort of marble at 90, 190 and 380 feet from the surface.

On Boyd's Creek, near Glasgow, Barren County, Kentucky, oil has been obtained for several years in commercial quantities, the wells being in the bed of the creek and on the adjoining hills. A few thousand barrels per year are obtained here. Wells have also reached oil on Beaver Creek north of Glasgow. A well is also reported to have yielded "considerable quantities" of oil near Bowling Green, Warren County, and another near the Mammoth Cave, in Edmonson County.

Directly north of these counties, on the Ohio River, wells have reached oil at Brandensburg, in Meade County, at a depth of 900 feet; but those who drilled them afterward concluded that they were not deep enough. Three wells were also drilled near Cloverport which yielded a small quantity of oil. Another well is reported in Bourbon County, and still another at Henderson, in Henderson County. This latter well is reported to have yielded a very valuable lubricating oil. Over at least one-third of the State scattering wells have yielded petroleum, some of which have been among the most remarkable in the country.

Springs of natural gas are common throughout the region just outlined; but I have not learned that the gas is anywhere used for any purpose, or that more than one well has ever been bored for gas—that at Bristow Station, Warren County.

#### TIMBER.

Just about one-half of the State is in forests of very valuable timber, consisting of oaks of several species, ash, yellow poplar, black walnut, hickory, lynn, beech, chestnut, red cedar, &c. Large quantities of black walnut are being shipped East and to Europe. The business of exporting staves is large and increasing.

The timbers of the North Cumberland have received especial praise. Mr. L. H. De Friese has made a report, from which the following extracts are made: "In parts of the Black Mountains there is a growth of chestnut, yellow poplar, black walnut, white and blue ash, birch, linden and white hickory that I have never seen surpassed. Parts of the region have been almost untouched." White walnut, cherry, elms, beech, etc., are also mentioned with high praise.

The United States Census of 1880 divides the area of Kentucky thus: "In cultivation and grass in rotation, 8,367,910 acres; in permanent meadows and pastures, 2,368,773 acres; in woodland and forests, 10,763,337 acres."

Prof. Charles S. Sargent, in the Census Report on the Forest Trees of North America, in writing of an area in part inclusive of Eastern Kentucky, says:

"The characteristic features of the forests of this whole region are found, however, in the broad-leaved species of which it is largely composed. Oaks, hickories, walnuts, magnolias and ashes give variety and value to this forest, and here, with the exception of a few species peculiar to a more northern latitude, the deciduous trees of the Atlantic region attain their greatest development and value. Upon the slopes of the Southern Alleghany Mountains and in the valley of the lower Red River, regions of copious rainfall and rich soil, the deciduous forest of the continent attains unsurpassed variety and richness. Upon the Alleghany Mountains, Northern and Southern species are mingled, or are only separated by the altitude of these mountains. Rhododendrons, laurels and magnolias, here attaining their maximum development, enliven the forests of Northern

pine and hemlocks which clothe the flanks of these mountains, or are scattered through forests of other broad-leaved species. The cherry, the tulip tree and the chestnut here reach a size unknown in other parts of the country. \* \* \* The hard-wood forests of the Mississippi basin are still, in certain regions at least, important, although the best walnut, ash, cherry and yellow poplar have been largely culled. Two great bodies of hard-wood timber, however, remain, upon which comparatively slight inroads have yet been made.\* The most important of these forests covers the region occupied by the Southern Alleghany Mountain system, embracing Southwestern Virginia, West Virginia, Western North and South Carolina, and Eastern Kentucky and Tennessee. Here oak unequaled in quality abounds; walnut is still not rare, although not found in any very large continuous bodies, and cherry, yellow poplar and other woods of commercial importance are common."

With reference to the State at large, the following language is found on pages 543-544:

"The forests of Kentucky resemble in general features those of Tennessee. Cypress, gum and various water oaks occupy the river swamps of the western counties. The central region, now largely cleared and devoted to agriculture, was once covered with the oaks, walnuts and hickories of the Atlantic region, while over the eastern and southeastern counties the dense forests of the Alleghany Mountains extended. The eastern counties still contain great bodies of the best hard wood, especially black walnut, white oak, cherry and yellow poplar, which are particularly fine and abundant in Bell, Harlan and other southeastern counties. These forests, protected by the falls of the Cumberland River, which have prevented the driving of logs from its upper waters, and inaccessible to rail communication, are still practically uninjured, and probably unsurpassed in the amount, quality and value of the timber which they contain. The destruction of forests to supply numerous iron furnaces with charcoal has been great in the northeastern counties, and no small part of this region has already been cut over.

"During the census year 556,647 acres of woodland were reported devastated by fire, with an estimated loss of \$237,635. Of these fires, by far the largest number was traced to farmers carelessly clearing land for agricultural purposes.

"In Barren, Edmonson and other central counties extensive tracts of prairie existed at the time of the earliest settlement of the State. The presence of these prairies in the midst of a heavily-timbered region is ascribed to the annual burning to which they were subjected by the aborigines. With the disappearance of the Indians trees sprang up, and this region is now well covered with a vigorous growth of black oaks of different species. White oaks, however, are not abundant, and other species common to the region, such as the walnuts, the yellow poplar and the beech, are wanting in these young forests, indicating perhaps the effect of fires in checking the subsequent growth or development of many useful timber trees.

#### PASTURAGE OF WOODLANDS.

"The forests of Kentucky, as well as those of all the central and southern portion of the United States, suffer severely from the almost universal custom of using woodlands for pasturage. The evil resulting from this practice is only more apparent in Kentucky and Tennessee because in these States the amount of live stock is proportionately larger than in other parts of the South, while in the thickly settled agricultural sections of these States the ratio of woodland to total area is smaller. The pasturage of woodlands necessitates, or at least induces, the annual burning of the dead herbage, by which underbrush, young trees, seedlings

\*This language applies to a period two or three years ago. Considerable spoliation has since been made.



and seeds are destroyed and the succession and permanence of the forest endangered. What the fires spare, browsing animals devour; hogs root out seedlings, and by selecting the sweet acorns of the white oak in preference to the bitter fruit of the black oaks, are gradually changing the composition of the oak forests. Comparatively few white oaks spring up in the forests of the more thickly settled portions of the central Atlantic region, and this change of forest composition must be ascribed to the preference of domestic animals for the palatable fruit of what, as regards their timber, are the most valuable species. The injury, too, inflicted by the constant stamping of animals and consequent packing of the land about the stems of old trees is very great, and all reports speak of the gradual dying of old trees left standing in the grazing regions of Kentucky and Tennessee.

"The spread of the mistletoe (*Phoradendron flavescens*), consequent upon the removal of the forest and the increase in the number of birds (the mistletoe seems to require a certain amount of light and air for its development; it does not flourish or increase rapidly in the dense forest, and cannot spread except by the agency of birds), is a cause of serious injury to the forest of this whole region. It slowly but surely destroys the trees upon which it obtains a foothold. The black walnut especially suffers from the growth of this parasite, which seems destined to destroy the finest walnut timber left standing in the settled portions of the southern central region.

"Large quantities of cooperage and wheel stock are produced all over the State, and manufacturers generally report no scarcity or deterioration of timber, with the exception of white oak. The principal centers of lumber manufacture are at the mouth of the Tennessee River, in McCracken County, where a large amount of cypress, sycamore, gum, oak, walnut and other hard wood is manufactured for the Northern market from logs rafted down the Tennessee and other streams flowing into the Mississippi; at Frankfort, where poplar, oak, ash, walnut, pine, cherry, hickory and maple logs, rafted from the upper waters of the Kentucky River, are sawed, the lumber being shipped North and East by rail; and at Louisville, where walnut, poplar and oak lumber is manufactured for local consumption. The manufacture of pumps and water-pipes from logs of the Jersey pine (*Pinus inops*), at one time an important industry at Louisville, has, since the general introduction of city and town water-works, become unremunerative and unimportant."

#### MANUFACTURES.

In 1880, when the census statistics were gathered, Kentucky stood second on the list of Southern States in the amount of capital invested in manufactures, being outranked by Maryland alone. At that date there were in Kentucky 5,328 manufacturing enterprises, employing a capital of \$45,813,039, the value of the products being \$75,483,377. The manufacturing capital of this State at that time equalled the combined manufacturing capital of North Carolina, South Carolina and Georgia. While Maryland ranked above Kentucky in this line in 1880, it is quite probable that the latter State is now ahead of the former, as the increase of manufactures in Kentucky during the last few years has been much greater than in any other Southern State. In fact, the development of the manufacturing interests of that State has been something remarkable, even when taken in connection with the rapid growth of the industrial interests of the whole South. In the statistics of new industries established in the South, as published quarterly by the Baltimore Manufacturers' Record, Kentucky invariably takes the lead in the amount of capital invested and in the number of new enterprises established.

Among the most important manufacturing industries in Kentucky in 1880 were the following:

KINDS.	NO.	CAPITAL.	VALUE OF PRODUCTS.
Agricultural implements.....	86	\$2,296,037	\$1,647,116
Flour and grist mills.....	652	3,685,759	9,604,147
Foundry and machine shop products.....	50	2,283,350	3,013,079
Iron and steel.....	29	5,493,035	5,090,029
Leather, tanned.....	63	1,741,430	2,511,960
Liquors, distilled.....	215	6,345,922	8,281,018
Liquors, malt.....	30	1,260,944	1,491,659
Lumber, sawed.....	670	2,290,558	4,064,361
Printing.....	48	1,401,700	1,289,316
Slaughtering and meat packing.....	31	2,229,500	4,538,888
Tobacco (chewing, smoking and snuff).....	28	1,069,800	3,734,835

The manufacture of whiskey, as will be seen from these figures, employed in 1880 more capital than any other industry, and the value of its products, taking distilled and malt liquors together, was slightly in excess of the value of the products of flour and grist mills, which stood second on the list. The increase in flour and grist mills during the last few years has been very great, and this industry doubtless now exceeds in the value of its products the manufacture of whiskey.

The manufacture of agricultural implements is a great industry in Kentucky, and in the making of plows especially this State does a heavy business. In 1880, Kentucky, with the exception of Indiana and Illinois, made more plows than any other State in the Union. This industry is mainly located in Louisville, where there are a number of immense plow factories, one of them having a paid-up capital of \$1,500,000.

It is not in these few leading industries alone, however, that good progress is being made, for the growth of the manufactures in Kentucky includes a wide diversity of enterprises, thus ensuring a more healthy and permanent future than if the progress noted was confined to a few over-stimulated industries.

#### WATERWAYS.

It would be an unpardonable omission to fail to give greater consideration than yet has been given to the waterways of the State, and if great elaboration could give due emphasis to this, the topic were well worth discursiveness. The State is most remarkably ramified by streams, and many of them have their rise in an imperishable source—the Cumberland Mountains. An English journalist puts it well thus:

“Kentucky, it will be seen, occupies a most central position in what is known as the Mississippi basin, a district which, in all coming time, cannot fail to be the most important in North America. Its contiguity to the vast river systems of the continent must have upon its future development the greatest possible influence, the more so because no single State of the Union has advantages equal to Kentucky in the way of water communication. Its river system impressed me greatly, more particularly the fact that about 1,500 miles of navigable water was to be found in the State. As I have pointed out, the Ohio River—one of the noblest streams on any continent—runs along one frontier for more than 600 miles. Then there is the Kentucky River, with at least some 300 miles now navigable, and capable of having two or three hundred more miles added by the judicious use of locks and dams. There are, besides, the Cumberland, the Green, the Licking, the Tradewater and the Tennessee Rivers, concerning which any ordinary geographical gazetteer will supply valuable information, rendering it unnecessary to refer to them at length here. I have emphasized this point, because, in a State with such a marvelous wealth of natural resources as Kentucky has, these important streams must unquestionably be of the greatest advantage.”

More authoritative is the following by Hon. John R. Procter, in one of his publications:

“The State has a river boundary of 813 miles—by the Chattaroi or Big Sandy on the northeast, 120 miles; by the Ohio on the north, 643 miles, and by the Mississippi on the west, 50 miles. The principal rivers have their sources in the Cumberland Mountains and afford to all parts of the State river communication with the Ohio and entire Mississippi River system. No State has a frontage on navigable rivers equal to Kentucky. This insures to the State cheap transportation in the future for the abundant forests and large deposits of coal and iron ores contiguous to the streams. \* \* \* The citizen of Kentucky has the advantage of navigable rivers penetrating all parts of the State. From these it is possible to run flat-boats, barges and rafts of timber into the Ohio River, and also by the river current, without any cost save the hire of necessary pilot and hands to man the boats, to New Orleans, thus giving to all the power of reaching ocean transportation at small cost.”

So much by way of generality as to the extent of her waterways. The system of waterways is one of the most important on the continent (as goes almost without saying), and the United States Government has recently begun improvement of the navigation of the rivers of the State.

Of course, the reflection is familiar how waterways not only compel decent rates in railroads subject to their competition, but incite competition in lines of transportation availing themselves of these water highways.

But there is another feature of Kentucky Rivers which is impressing, and that is a remarkable parallelism, and the almost inevitable competition between them (as it were) for the future business to be transacted upon them. Let one look how the Big Sandy, the Licking, the Kentucky, the Rolling Fork, the Green, the Cumberland, with all their branches, come into the Ohio. Just reflect in the future the small steamboats and barge lines that will come into vogue upon these, and see how, to enterprises situated between and near these streams, competing rates will be offered by lines of transportation on separate streams competing for the business of these enterprises. I know of nothing to which to compare it, except in Delaware and the Eastern Shore of Maryland, where small sloops and schooners run up creeks and rivers within a mile or two of each other, and bid sharply for the business of the farmers—in the former case for the city of Philadelphia; in the latter for Baltimore.

#### WATER-POWERS.

It is a corollary, from the innumerable streams of Kentucky, their sources, the rocks through which they have cut their way and the many “rapids” in their courses, that there are many fine water-powers on them. No comprehensive estimate can be given of them, and I do not know that any has ever been made; but it may be said that there is no going amiss of plenty of them if intelligent search be made, most particularly on the east side of the State.

#### SOIL AND PRODUCTIONS.

I quote from Dr. Robert Peter, chemist of the Kentucky Geological Survey, an agricultural chemist and practical agriculturist of large experience:

Geologists inform us that, even in strata which had been deposited or formed at the same geological time, the rock-layers at the North are sometimes formed of coarse-grained, insoluble, silicious material, while those farther South and West are limestones or fine-grained shales, rich in phosphates and other soluble materials.

Another geological cause of the comparative fertility of Kentucky soils is, that these rock strata out of which they were formed, and which are made up of the most finely divided or soluble materials, were raised above the general surface of the primeval ocean very early in geological history, and have therefore been exposed to the disintegrating influence of the atmospheric agencies for immense

unknown ages, so that soils formed of these rocks alone have been gradually produced to a much greater depth than is to be observed in almost any other country. Soils thus formed, in place, out of the rock strata on which they rest are called by writers "sedentary soils," and said to have usually little depth. They are hardly known over the broad expanse of our continent north and west of Kentucky, the whole of that extensive region being covered by a mixed deposit of clay, sand, gravel and boulders called the "drift," made up of the debris of more northern rock strata, which have been carried, during long periods of polar refrigeration, by the immense glaciers which then covered a great portion of the Northern Hemisphere.

This mixed deposit, made up largely of coarse and hard silicious materials, which so covers the country of the great Northwest that scientific observers of the North have asserted that the soil is not affected by its underlying rock stratum, does not seem to have crossed the valley of the Ohio River to enter Kentucky. The southern extremity of the polar ice-field seems to have been near the line of our latitude, and the great stream of water flowing from it, carrying its gravel and sand, deflected by the river valley and by the elevated table-land of our ancient rocks, was turned west of our State, leaving undisturbed and unburied the rich soil which had been produced in the long period during which those rocks had been raised above the ocean level.

To these fortunate geological conditions, therefore, are our Kentucky soils greatly indebted for their fertility and for the extremely fine state of division of their constituent particles. In the great majority of these soils analyzed by the present writer, the silicious particles left after digesting the soils in chlorohydric acid of specific gravity 1.1 all passed through a fine sieve which had sixteen hundred meshes in the centimetre square. All scientific writers on soils attach the greatest importance to the relative fineness of the particles which form them. Mons. DeGasparin ("Terres Arables," 3me. ed., p. 33) says: "It must not be forgotten that the nutritive power of a soil, other things being equal, is in direct proportion to the fineness of the particles which compose it;" so much so, indeed, that when a soil is to be chemically analyzed, only the "fine earth," or that portion which will pass through a sieve having ten wires to the centimetre, is taken for the analysis, the coarser part being considered practically inert as to plant nourishment—only a skeleton, which is not to be taken into account when estimating the fertility of a soil; and this is especially true when the coarser particles are of quartz, or some hard silicate not readily to be disintegrated or decomposed by the ordinary process of weathering, or which do not contain any essential element of plant nourishment.

In this important particular our Kentucky soils are more valuable than the great body of those of the great Northwest; that not only are their constituent particles very minutely divided, but even these, fine enough to pass through the meshes of the finest sieve above described, are not entirely fine sand of silica, but contain a considerable proportion of fine particles of decomposable silicates, which in the process of weathering help to keep up the supply of essential plant food and make the soils very durable. In some of his analyses of Kentucky soils the writer has found as much as 2.9 per cent. of potash in the fine silicious residue of a soil which was left after a week's digestion in diluted chlorohydric acid, but which would gradually be unlocked and made available for plant growth under the influence of time and the atmospheric agencies.

The late Dr. David D. Owen, former director of the Kentucky Geological Survey, placed in the writer's possession a series of samples of soils which he had collected during his celebrated exploration of the great Northwestern territory for the United States Government in 1847-50, some of which the writer analyzed,

giving the results in Vol. IV., O. S., Kentucky Geological Reports. These soils, characteristic of the best of this great prairie region, are mostly very dark colored, sometimes almost black, from the presence of a large proportion of organic matter, some of which is peaty or semi-bituminous—of little value for plant food—derived from the decomposing remains of many successive growths of grasses or aquatic plants in recent or former ages; but in them all, and in some of them in very large proportion, are visible grains of quartzose sand, reducing materially the quantity of “fine earth,” and consequently the durability of these soils. While the organic matters—the dark vegetable mould, give to such soils great fertility at first, and cultivation is facilitated by the sandy ingredient, the durability of such soils without the aid of artificial fertilizers would be much less than that of our best Kentucky soils, which contain no coarse sand, but are altogether “fine earth,” made up partly of decomposable silicates. By reliable accounts, the older prairie farmers find it necessary even now to resort to artificial fertilizers, while on the best lands of Kentucky cropping for a hundred years has not yet brought about this necessity, nor will it perhaps for hundreds of years more, where the soil rests on a decomposable limestone which annually gives up in solution to the soil above as much essential mineral plant food as may be removed from it by a judicious system of culture.

The great wheat-growing region of the Northwest, known as the Red River Valley, is unmodified glacial drift, and the exhaustion by the present system of culture may be confidently predicted.

In the Mississippi bottom Kentucky has some 320 square miles, lying between the Mississippi and Tennessee Rivers, in Fulton and the southern parts of Hickman, Graves and Calloway Counties. This is part of a great belt of country famous for its mellow rich lands and as a cotton-producing region. Then, near by is considerable of the *loess* soil, one of the most enduring and fertile of all soils in the country.

No State of this Union possesses a rounder or more symmetrical agriculture than Kentucky. Its many-sidedness is most impressive. The variety of products is striking enough, but the force and strength in many of them are what conspire to give the State such potency and weight in the scale of Federal agriculture.

The product for which Kentucky is most noted is tobacco. According to the last Census Report, Kentucky takes first rank as a tobacco-growing State, producing more than double the quantity of any other State, and more than one-third of the entire amount produced in the Union. The entire area covered by the crop for 1879 (226,120 acres) shows an average yield per acre of 756.77 pounds. The area of its cultivation is widening every year, extending into the mountainous districts on the east, and contracting the limits of the blue-grass region in the central portion of the State.

There are eight tobacco-growing districts in Kentucky recognized by the trade, each having some peculiarities of soil, producing types more or less distinct. These districts are:

I. Paducah or western district, embracing the counties of Fulton, Hickman, Graves, Ballard, McCracken, Marshall and Calloway.

II. Ohio River district, embracing the counties of Livingston, Crittenden, Caldwell, Lyon, Hancock, Breckenridge and Meade, in two separate bodies, the Lower Green River district lying between them, with its coal measures.

III. Lower Green River district, embracing the counties of Henderson, Union, Daviess, Webster, Hopkins, McLean and Muhlenburg, resembling adjacent districts of Indiana and Illinois.

IV. Green River district, embracing the counties of Butler and Ohio.

V. Upper Green River district, embracing the counties of Barren, Warren, Hardin, Grayson, Edmonson, Hart, Green, La Rue, Marion, Taylor and Allen.

VI. Clarksville district, embracing the counties of Trigg, Christian, Todd, Logan and Simpson, and seven counties in Tennessee.

VII. Cumberland River district, embracing the counties of Metcalfe, Russell, Adair, Clinton, Cumberland, Monroe, Casey, Wayne and Pulaski.

VIII. White Burley district, embracing what was formerly known as the Boone County district, the Mason County district, the Pendleton County district and the Kentucky River district. The following counties are now included in the White Burley district, though it is rapidly widening, and may soon embrace several other districts: Boone, Kenton, Campbell, Gallatin, Grant, Pendleton, Bracken, Carroll, Owen, Harrison, Robertson, Mason, Lewis, Fleming, Montgomery, Nicholas, Bourbon, Scott, Franklin, Henry, Trimble, Oldham, Shelby and Woodford. The cultivation of the White Burley is even invading the blue-grass region of Fayette and the surrounding counties.

#### FRUITS.

Although Kentucky has not gained prominence as a fruit State, there is thereby no necessary implication against her soil and climate with reference to fruit production. Owing to her great variety of soils and the character of her climates, it must be seen that the State is capable of producing a great variety of fruits. From the low elevation above the Gulf of Mexico of her rich alluvion on her western border, with its warm mellow soil, to the altitudes of the mountains on her eastern border, is a great range. In the latter area, by way of distinction from the former, the cherry, plums, raspberry, gooseberry, currant, and varieties of apple and pear, requiring generally a much higher latitude, are "at home." Further west and south, those fruits common to much of the country at large should receive greater consideration for the possibility of earliness than they have—early apples, peaches, pears, strawberries, grapes, raspberries, etc. The railroads in the latter area offer great conveniences for transportation to market and have measurably stimulated production. If it be said that the production of early fruits is overdone, the answer is that there is wide scope for improvement in methods in many regards.

#### VEGETABLES.

It need hardly be said to any American reader that there is nothing to bar the production of any vegetable in Kentucky that is common to the country at large, and early peas, beans, potatoes, tomatoes, etc., offer a fair field for operations.

The author of this book has visited many times various parts of the State of Kentucky, and he has leisurely observed some of its choicest areas. It is certainly no disparagement to any other portion of the United States to say that there is no more beautiful and celebrated area in the country, in point of pastoral attractiveness, than the blue-grass region. Its celebrity is almost world-wide. "The blue-grass region of Kentucky" sounds upon the ear like an incantation, and the name seems to involve the imagination and memory in a delicious spell, in which it is next to impossible to tell which of these faculties plays the greater part. It is a sort of modern Arcadia and rife with bucolic suggestions. It stands to all well-informed and appreciative citizens of the United States as the climax of pastoral life—the Eden of the stock-raiser, the Elysium of the cultured dreamer. Its magnificent parks, clad with its famous grass,\* where graze its renowned herds; the wide-spreading, towering trees gracing these parks; the ornate, spacious, costly homes, where wealth, beauty and culture dispense their fascinations to the grandly-welcomed guest, bind the heart in the gracious fetters of

\* Kentucky blue-grass (*Poa pratensis*).

their kindly spell. There the pellucid stream meanders in silvery sinuousness, and the sparkling brook leaps and laughs in a glee, as though gladsome and blest in the privilege of its pretty and tireless gambols; there is the most celebrated home of the lordly Short Horn; there is to be found the fleetest and most enduring racer; thither resort, as to both a Mecca and the choicest mart, the wealthiest and best known stock-raisers of Great Britain, the United States and Canada, to add to their fame and fortune selections from the horses, cattle and sheep of the Kentucky breeders. It is a wealthy, cultured, glorious country. The banks are crammed with money; for the stock-raisers there have got almost fabulous prices for their stock. It is, better than all yet said, a land of "fair women and brave men." Who shall tell of the indescribable union of charms in the women—"the ripe and real," the rich, round, sumptuous beauty, with its voluptuous spell, and yet the spiritual grace, the atmosphere of higher life, the hovering halo so rife of commerce with the skies? When one thinks of their sylphid grace, their luxuriant symmetry, the soft enchantments of their glorious figures, one is reminded of Suckling's beauty in the famous ballad on the Easter wedding. When one sees the light irradiating them and dominating the beholder, one thinks of how—

"Soul is form and doth the body make;"

or of that other sentiment:

"The eloquent blood  
Shone in her cheek, and so distinctly wrought,  
One could not tell if soul or body thought."

No one can be unobservant of the superb physique so common among the men of that country. Nowhere can there be seen as many men of fine height and vigor. Prof. Procter, in one of his publications, says: "That the conditions are most favorable for the production of a vigorous race of men is attested by the tables of measurements of the United States volunteers during the civil war by A. B. Gould. The soldiers born in Kentucky and Tennessee excelled all others in height, weight, circumference around the head, circumference of chest, ratio of weight to stature, and proportional number of tall men in each 100,000 of same nativity."

He also says: "The speed and endurance of the Kentucky horse, and the superior development of all kinds of domestic animals of the State, are well known." This development of domestic animals, it is very generally agreed, is owing to the large quantity of phosphate of lime in the soil available for plant food. It is a condition of soil destined to distinguish parts of Mississippi and Alabama, and possibly some other Southern States.

This blue-grass region has an area of 10,000 square miles, or one-fourth the State. Its elevation is from 800 to 1,150 feet above the sea.

#### HEALTHFULNESS.

It is a natural transition from a portrayal of the vigor of the men and women to the topic of the healthfulness of the State. From Prof. Procter we quote:

"In healthfulness the State ranks high. \* \* \* Death to population was, in 1850, 1.53 per cent.; in 1860, 1.43 per cent.; in 1870, 1.09 per cent.; in 1880, 0.72 per cent. \* \* \* The high elevation, perfect drainage, salubrity of climate and purity of waters combine favorably, and insure health and vigor to the population."

#### PROXIMITY TO MARKETS.

The State of Kentucky is singularly blessed in another respect—she is in the very center of population. The United States Census for 1880 places the center of population for the entire country in Kentucky, eight miles west by south from Cincinnati. To Cincinnati the citizens of Kentucky have access by water for a

large area of the State. Near are other considerable cities—Indianapolis, Pittsburgh, Louisville and others.

The prices of lands in Kentucky are much lower than in the competing States of Illinois, Indiana and Ohio. A glance at the map will show that these States share with Kentucky the benefits of the Ohio River.

#### PLACES OF 4,000 INHABITANTS AND OVER.

The places of 4,000 population and upwards, according to the last (tenth) United States Census, are: Bowling Green, 5,114; Covington, 29,720; Frankfort (capital), 6,958; Henderson, 5,365; Hopkinsville, 4,229; Lexington, 16,656; Louisville, 123,758; Maysville, 5,220; Newport, 20,433; Owensboro, 6,231; Paducah, 8,036. Louisville is a great whiskey and tobacco mart particularly, and by reason of her location and facility for procurement of and proximity to raw materials, must always manufacture much tobacco, whiskey, articles of hemp (in the production of which the State has long held the supremacy) and flour. The city ought some day to be a great place for manufacturing furniture, paper from wood pulp, and in the production of many articles in the iron line.



# TENNESSEE.

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Tennessee has for its northern boundary Virginia and Kentucky; on the east is North Carolina; on the south, Georgia, Alabama and Mississippi; while on the west it is separated from Arkansas and Missouri by the Mississippi River. The population of the State in 1880 was 1,542,359—1,525,657 native and 16,702 foreign; 1,138,831 white and 403,151 colored.

Concerning the general features of this State, nothing more accurate or satisfactory could be presented than the following from the Report of the Tenth Census. It was prepared by the eminent geologist, James M. Safford, A. M., Ph. D., M. D., State Geologist of Tennessee, and Professor of Geology and Natural History in Vanderbilt University:

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

## VARIETY IN NATURAL FEATURES.

The length of the State, and the fact that it reaches, in its ribbon-like form, from the crest of a great mountain range on the east to the very low alluvial plain of the Mississippi on the west, through a varied territory, gives to Tennessee its most prominent characteristic, to wit: great variety. This is seen in its topography, geology, soil, climate, agriculture, and we may say in the character and habits of its population.

Nearly all the important physical and geological features of the States around it are represented more or less (grouped as if for contrast) within its borders. Tennessee has, for example, on the one hand, some of the greatest mountain ridges of the Apalachians, with their 'bald' summits and ancient rocks; on the other, the low land, cypress swamps and alluvial beds of the Mississippi River. It has also well represented the singular parallel valleys and ridges of Middle Virginia; the highlands, the 'barrens' and the rich limestone lands of Kentucky, and the orange-colored sand-hills, the cretaceous beds and cotton soils of Northern Mississippi. The same variety and contrast exist in the matter of climate, especially as to summer temperatures.

## GENERAL TOPOGRAPHY AND ELEVATION.

To aid in understanding the topography of the State, it will be well to assume and have in mind a great horizontal plane, having an elevation of 900 feet above the sea, with which to compare the general surface. Throwing out of view for the moment some of the local geographical features—that is to say, the mountain ranges of the eastern portion and the basins and valleys of the western, the general surface coincides more or less with this plane. I say more or less, for

the surface is in a degree a warped one, coinciding at very many points with the plane, but at others either rising above or sinking below it.

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

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

Upon the surface, as described, rest the mountains of the State, the most important being the great ranges of the Unaka Region and the Cumberland Table-land. Cut out of it and below it are the central basin of Middle Tennessee, the western valley of the Tennessee River and the Mississippi Bottom Region.

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

#### CLIMATE.

As already stated, in climate, as in other natural features, the State presents a marked variety. This is especially true of summer temperatures. The valley lands of upper East Tennessee have the summers of Ohio and New Jersey; the lowlands of Middle Tennessee have the summers of the northern part of Georgia; while West Tennessee is warmed by the summer of the central parts of Georgia and South Carolina. And further, there is, as will be seen hereafter, an extended line of high points on the eastern border of the State which have the cool breezes of a Canadian summer, and are, to some extent, clothed with a Canadian flora. The climate of the State, exclusive of its mountains, is, in general, midway in character between that of a temperate and that of a sub-tropical region, or rather it combines the milder features of the two. In common with a large part of the Valley of the Mississippi, the climate is subject to comparatively great extremes, yet these extremes never reach the excessive cold of the Northern States or the highest temperature of the tropics.

Herbage is often green throughout the year, and cattle can generally graze, with but little interruption from cold or snow, during all the months of the winter. Many shrubs which, in States farther north, lose their leaves during the winter, here not unfrequently retain them the year round.

The daily changes of temperature are considerable, and, in common with a large area of the Mississippi Valley, the State has a full share of humidity and sufficient rains. It is a part of the region of which it is said "cotton, Indian corn

and the cane find their natural climate here, but not elsewhere in any considerable degree beyond the tropics."

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

The length of the period between the last killing frost of spring and the first killing frost of autumn is to the agriculturist an important element of climate. It is the measure of the growing season, at least so far as the cotton-plant is concerned. Not including the mountains, the average time for the last killing frost of spring is the middle of April in the northern counties of the State, excepting in those of upper East Tennessee, where it occurs a few days later. In the southern part of the State it is a week sooner. The average time of the first killing frost of autumn in the northern counties is the middle of October. It occurs a few days earlier in upper East Tennessee, and a week later in the southern counties of the State. The number of days between these frosts—that of spring and that of autumn—averages 189 for the northern part of the State and 203 for the southern. Frosts, of course, may occur respectively before or after the times specified, but the probabilities are against it. Early frosts begin to be a source of apprehension before the last of September, especially in the more northern portions of the State, and the cotton crop often suffers more or less from them. The latitude of Tennessee is such that a fall of two degrees of temperature in the northern part of the State might cause a killing frost, resulting in the destruction of the cotton-plants, while the same fall in the southern part would leave them intact. The length of the growing season for cotton is, at the best, short enough in the southern part of the State, and where so slight a change of temperature produces such results, we can readily see how, in the northern part, it may be generally too short for full crops, which in reality it is. It amounts to nearly the same thing to say that the margin of the cotton-growing section of the country runs through Tennessee. In an inspection of the map showing percentage of aggregate areas in cotton, as compared with the entire area of any given region, it is seen that the counties in Tennessee which plant and produce the most cotton are strikingly the most southerly ones, and that from these the production decreases almost uniformly as we go north. This is especially so in West Tennessee. Now, in explanation of this, in great part at least, it is to be noted that the isotherms or lines of equal temperature for spring and fall extend west-northwest throughout the State, say parallel with a line running through Chattanooga and Trenton or thereabout. This shows the southwestern corner to be the warmest, and here is our great center of cotton culture. The greater warmth stimulates the cotton, and, by throwing back the killing frosts, increases the length of the growing season. The soils have their influence, but that they are not dominant in this distribution of percentage culture is shown by the fact that as we go north the decrease occurs, though the soils and elevation remain essentially the same. It is also noteworthy that as we go eastward from each of the two centers of cotton culture, (the southwesterly corner of the State and the

southern part of the central basin,) the percentage of cotton culture rapidly decreases. The temperature and high elevation obviously have much to do with this decrease.

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

#### MINERAL RESOURCES.

In minerals Tennessee is one of the richest States in the Union. She stands among the first of the Southern States that have within the last few years been found to possess such vast beds of coal and iron ore. She furnishes the most costly and beautiful marble. Other minerals, such as building stones, roofing slates, copper, zinc, etc., exist in quantities. The following in reference to the minerals of the State is from the pen of Henry E. Colton, Esq., geologist and mining engineer, Nashville, Tenn.:

##### COAL.

The superficial area in the State of Tennessee covered by coal-bearing strata amounts to 5,100 square miles; but this does not fairly represent the amount of coal in the State, as all this area has at least one seam of coal, a large proportion more than two, and a very considerable area has six or more workable seams. It is thus seen that the mere area of a coal-field may be a very poor indication of the quantity of coal it contains, and without an examination into the thickness of the seams and the quality of the coal therein, any judgment formed from area alone may be very incorrect. Missouri contains vastly more coal area than Tennessee, yet one seam in Tennessee is worth more for economic purposes than all the coal of Missouri.

In Pennsylvania there is a formation under the regular coal series known as the False coal measures, having only thin bands of coal; in Tennessee the measures contain several workable seams of coal of excellent quality. The lower and upper measures of Pennsylvania also appear in this State, but the great mass of rocks of the barren measures appear in much reduced thickness. It is thus seen that while Tennessee has all the bituminous coals of Pennsylvania, this State has also a coal-bearing strata which in that is bare of any productive seams. While the area covered by our coal-field is not so large, yet it is probable that we have as much or more of this mineral fuel—the anthracite field excepted—than the great iron State.

The Tennessee coal-field belongs to that division known in geology as the *Apalachian* coal-field, which, commencing in Pennsylvania, extends over Ohio, Kentucky, West Virginia, Tennessee, and ends in Alabama. While its width in Pennsylvania and Ohio extends through four degrees of longitude, at the northern boundary of Tennessee it is only about seventy-one miles, and at its southern boundary fifty miles. In its southern course into Alabama it expands into a heart-shaped area one hundred miles or more in width. The area of this coal-field in Tennessee includes within its limits the counties of Scott, Morgan, Cumberland, the greater part of Fentress, Van Buren, Bledsoe, Grundy, Sequatchie and Marion; considerable parts of Claiborne, Campbell, Anderson, Rhea, Roane, Overton, Hamilton, Putnam, White and Franklin, and small portions of Warren and Coffee.

The Cumberland Table-land has generally a broad, flat top, capped with a layer of conglomerate sandstone, averaging perhaps seventy feet in thickness. This layer of sandstone on the western edges of the table-land forms a steep escarpment or brow—bold, distinct, and well-marked—from twenty to one hundred, and sometimes two hundred feet high. Beneath this often overhanging brow the steep, woody slopes of the sides begin and run down to the lowlands. These slopes below the cliffs usually rest against the lower coal measures and upon the mountain limestone. The eastern outline of the Cumberland Table-land is for some distance a nearly direct line, making, however, a curve, and taking in portions of Roane, Anderson and Campbell Counties. The western edge is jagged, notched by innumerable coves and valleys, and presenting a scolloped or ragged contour, with outlying knobs separated from the main table-land by deep ravines or fissures. In the southern portion, near the eastern side, is a deep gorge, canoe shaped, with steep escarpments rising eight hundred to one thousand feet above the valley, through which the Sequatchie River flows. This is the Sequatchie Valley, which separates the lower end of the table-land into two distinct arms. Through the eastern arm the Tennessee River breaks, and after flowing down the valley for a distance of sixty miles, turns at Guntersville, Ala., and soon afterwards cuts through the western arm fifty miles from the Tennessee line. This Sequatchie trough is one hundred and sixty miles in length, the Tennessee end being sixty miles and the Alabama end one hundred.

The eastern arm of the coal-field, on the western side of which this remarkable valley passes, is six to eight miles wide. Between the Tennessee River and the Nashville and Chattanooga Railroad it is called Raccoon Mountain. Separated from this by Will's Valley, Lookout Mountain rises up in massive proportions. The latter is an outlier of the Cumberland Table-land, and geologically is closely allied to it.

Passing now to the northeast corner of the coal region, we find a quadrilateral block almost severed from the mountain mass by the valleys of Elk Fork and Cove Creek—the former running northeast and emptying into the Cumberland River; the latter running southeast into the Clinch River.

The average height of the Cumberland Table-land is two thousand feet above tidewater, but some of the ridges of the northeastern part rise to a much greater height, reaching at places, as at Cross Mountain, three thousand three hundred and seventy feet, and at Butt Mountain, near Coal Creek, three thousand five hundred. The Valley of Cove Creek is two thousand three hundred feet lower than the high points of Cross Mountain. The part of the Valley of East Tennessee immediately contiguous to the mountain is about one thousand feet above the sea; so that, viewed from that valley, the Cumberland Table-land stands out with singular boldness and sharpness of outline. Everywhere in the northern part it is marked by a succession of cliffs elevated one above the other, with intervening wooded slopes. On the eastern side, parallel with the main mountain mass, and separated from it by a narrow vale, is a steep, roof-like sandstone ridge, with the layers upturned on their edges, the only access being through a few gaps like that of Coal Creek. This ridge is known as Walden's Ridge. Following this ridge southward, the name is applied to the whole arm between Sequatchie Valley and the Valley of East Tennessee.

We have said that this coal region is sheeted with a thick conglomerate sandstone; but upon this sheet, a short distance from the edges of the precipice, other strata are superimposed, rising in some places one thousand feet and more above the conglomerate or general surface, and forming, as it were, mountains upon the top of the table-land. In the northern part of the coal region, its plateau character is destroyed by these superincumbent mountains.

While there should be a division of the Tennessee coal-field into lower, middle and upper measures, from the fact that the false measures contain workable coal, and that the true upper measures appear only north of Emery River, yet the line of demarkation between the last two has not been so well defined, and the usual classification has been into upper and lower measures, the division being the thick conglomerate which gives the cliff-like appearance to the mountain on its western side. The second conglomerate or sandstone which caps the plateau throughout its length is over what should be called the middle measures—really the lower measures of Pennsylvania.

Including the upper and lower coal measures, there are seven strata of coal, aggregating a thickness of from seven to fourteen and a half feet. Many of these beds, however, are too thin to work, and are given merely to show the extent of the coal measures.

The lower measures, though irregular and uncertain, supply a large amount of coal in White, Putnam, Overton, Fentress, Franklin and Marion Counties. The seams in these counties are of good thickness and afford coal of excellent quality.

The main seam of the upper measures on the western side of the table-land is the Sewanee. This seam will average four and a half feet in thickness—its largest development being ten feet four inches, and its least two feet.

The Sewanee seam furnishes a larger amount of coal than any other single seam in Tennessee, and has all the qualities that combine to make a useful and valuable coal. It varies in some of its characteristics and constituents in different localities, but that is a common freak of all coal seams in every coal-field. It makes a good coke, is a good steam-making coal, makes a hot, durable fire in the grate, and is nearly free from sulphur. It is found at a certain elevation all over the table-land, but in the horizontal strata of the Coal Creek and Winter's Gap section of the field it has probably sunk far beneath the surface. It is the main seam of Walden's Ridge, and continues with much persistency from Chattanooga to Coal Creek. Where the ridge is regular in surface and the strata in place, the seam is of regular thickness and easily worked, with a certainty of obtaining a constant supply; but where the strata are broken by ravines or gorges, it is also disturbed—sometimes lost entirely, and again rising into great thickness.

Walden's Ridge is an outlier of the Cumberland Table-land, for the greater part of its length a vast wall of upturned rocks ranging from six hundred to twelve hundred feet high. This singular formation is best seen north of Big Emery Gap. A base line drawn horizontally through the ridge would probably give a width of twelve hundred feet. The line of demarkation between the inclined strata of Walden's Ridge and the horizontal layers of the Cumberland Mountains is sharp and well defined. Within a few feet one steps from the almost vertical sandstones of Walden's Ridge to those of the Cumberland Table-land lying horizontally. Behind he sees the steep inclined crags of Emery Gap, and in front the shales, slates and sandstones lying one on the other. This ridge is most continuous and conspicuous in its tilted strata from Big Emery Gap to near Careyville; but those peculiar characteristics are gradually lessened to the southwest from Emery Gap, until near Chattanooga the dip of the strata is very slight, and its top, instead of being a narrow ridge, flattens out into a plateau six or eight miles wide. The greatest action of the downthrow, therefore, took place between Emery Gap and Careyville; and to its action, says Prof. Lesley, is due the preservation of the numerous beds of coal in the high mountains on Poplar Creek, at Winter's Gap and on Coal Creek.

It has been assumed that the inclined seams of Walden's Ridge pass down under the surface strata of the Cumberland Mountains and become as nearly

horizontal as the coals of that formation. No accurate demonstration of this has ever been made, but the record of the borings of the salt-well at Winter's Gap, though not strictly accurate, gives an idea upon which may be based some foundation for the truth of this theory.

On the western side of the coal-field the general dip of the strata is slightly to the northeast. The elevation of the sub-carboniferous limestone on the mountain-side near Tracy City is about sixteen hundred feet above the sea. On a direct east line, near the foot of Walden's Ridge, the same rock is only about nine hundred feet above the sea. On the line of the Tennessee and Pacific road, in Putnam County, the limestone is about fourteen hundred feet above the sea, while in a direct east line, near Winter's Gap, in the valley, it is only eight hundred feet above the sea-level. The level of the valley at Cowan is nine hundred and seventy-three feet above sea level, and the level of the Sewanee seam at Tracy City is nine hundred and forty-nine feet higher. This seam dips to the southeast about eight feet to the mile. Hence, from its location in Fentress, in the fifty miles distance to Winter's Gap, it would be deep down under the horizontal strata of the high mountains, though coming up again above the valley in Walden's Ridge.

Towering high above the valley, in Anderson, Morgan and Campbell Counties, is the series of mountains heretofore mentioned. They reach an altitude of over three thousand five hundred feet above sea-level and contain coal seams to their very summits. Here is the equivalent of the upper measures of Pennsylvania. And it is safe to assume that the carboniferous strata in this region, estimating by the data derived from the boring of the salt-well at Winter's Gap, attain a thickness of full four thousand feet in a direct vertical line from the top of the American Knob or Brushy Mountain to the lowest sub-conglomerate coal. At Careyville, Prof. Safford determined the elevation of Cross Mountain, with nine seams of coal, to be three thousand three hundred and seventy feet above the valley. This is the northeastern end of the upper measures, as the still higher Brushy Mountain is near the southwestern end. In this distance of about forty miles is the series of high ranges and peaks alluded to above. Hence we have in this distance an area of about two thousand square miles, the greater portion of which contains, above water-level, from four to seven seams of coal over three feet thick, thus showing, in this part of the Tennessee coal-field alone, an extent of thickness and a number of seams available in the future beyond the previous expectations of geologists.

#### IRON ORES.

The State of Tennessee contains every variety of iron ore known to commercial use, except the spathic carbonate. The area of the magnetic ores and of the azoic hematites is not large, yet in the limited area where found the magnetic ore exists in large quantity. The mass of unaltered deposit ores, however, is beyond the possibility of any accurate computation, and the area in which they are contained comprises nearly three-fourths of the State.

Geographically, these ores may be classed as the East Tennessee Iron Region, the Cumberland Mountain Iron Region and the Middle Tennessee Iron Region. Geologically, they belong to the metamorphic, the lower and upper Silurian, the sub-carboniferous and the carboniferous periods. Physically, they are vein, stratified and deposit ores, and in practical nomenclatures of ores they are magnetic, specular, red hematite—or really hematite—limonite, (frequently called brown hematite,) red fossil or lenticular red hematite and carbonate of iron.

The limonites are found over the largest territory, and have been most generally used of the two chief ores of iron. They are found in nearly every county in the State, in greater or less quantities, from the North Carolina line to the

sand belt which borders on the Mississippi River. In some counties the quantity is enormous; in others only scattered specimens; and the quality is equally variable. Some beds are almost chemically free from phosphorus or sulphur, while in others those injurious elements are found to a greater or less extent.

In East Tennessee this ore lies in a series of ridges running northeast and southwest, its greatest development being on the east side, on the western slopes of the Chilhowee and Unaka Mountains and their tributary ridges. Throughout the entire breadth of the State, in the counties of Johnson, Carter, Unicoi, Washington, Greene, Cocke, Sevier, Blount, Monroe and Polk, there may truly be said to be one continuous bed of limonite, at some points in immense masses like stratified or boulder rocks, and at others intermingled with the soil, but yielding large quantities of ore when subjected to the process of washing. The ores of this lead are all in the lower Silurian, and usually lie in slates or between the Chilhowee sandstones and dolomites of the Knox or Quebec periods, frequently intermingled or deposited between masses of the latter. In this position it is found in a matrix of red or yellow clay, from the size of coarse sand to large boulders. These are the ores from which a large part of the iron of the United States was made in times past, and many beds are now worked in Pennsylvania, New York and Massachusetts from which ore was taken a hundred years ago. The unsystematic and robbery-like character of obtaining the ore from many of the banks in Tennessee has greatly impaired their value, and in some cases apparently exhausted the supply of ore.

The limonite of this lead varies very greatly in quality, some being very free from any impurity—almost pure hydrated oxide of iron—but the greater part contains silica, alumina, phosphorus and sulphur in greater or less proportions; none to such an extent as to make it worthless. In some beds manganese prevails in such proportion as to make the manufacture of speigeleisen or ferro-manganese a possible source of profit. These deposits become more vast in size toward the southeast corner of the State; and the deposits on Tellico River and Lee's Creek, between the Little Tennessee and Hiwassee Rivers, challenge the admiration of the geologist and practical iron manufacturer.

At intervals in every ridge of the Knox dolomite formation beds of limonite are found. Some of them appear to be of considerable extent, though but few of them have been opened. When opened, the quality of the ore has proven to be good. On the summit of Walden's Ridge, at various points from Emery Gap to Careyville, beds of limonite are found, which are no doubt the result of local change of the carbonate of iron of the coal formation.

The largest body of limonites in the State is found in Middle Tennessee, in what has been usually called the Western Iron Belt. This vast deposit covers irregularly an area forty miles wide, and extending entirely across the State from North to South. It comprises the entire area of the counties of Wayne, Lawrence, Lewis, Perry, Hickman, Humphreys, Dickson, Houston, Montgomery, Stewart, Benton, Decatur, and part of Hardin.

The surface geology of this region belongs to the sub-carboniferous. It is in fact the counterpart of the Cumberland plateau of the east with the coal-measure rocks swept away. The general elevation of the corresponding strata underlying the coal-measure rocks is but a few feet more than that of Lawrence and Hickman Counties. Almost at an identical level on each side of the Middle Tennessee basin occur the same characteristic rocks. The vast body of coal which once may have extended from Kentucky to Alabama is gone; but deposited in its underlying strata from the slow action of ages now remain immense bodies of iron ore, in quantity and quality hardly surpassed by any like area in the United States. In the injurious elements of phosphorus and sulphur these ores frequently go down



to a mere trace, while they never rise to such an extent as to be in the slightest degree injurious for the very best grades of foundry irons.

The location of this ore has been stated to be an elevated plateau-land, yet it is well watered with many springs, and is also intersected with streams which flow west from the Middle Tennessee basin, being cut through on the north by the Cumberland River, while the western edge is intersected from north to south—the entire middle of the State—by the Tennessee River. All these streams cut down through the sub-carboniferous strata into the lower limestones, thus affording ample facility for obtaining flux in the manufacture of iron. The two great rivers named also afford cheap transportation to market, while other means of transportation and access to this region is afforded by the Memphis branch of the Louisville and Nashville Railroad, through Montgomery and Stewart Counties; the Nashville and Northwestern, through Dickson, Humphreys and Benton; a narrow-gauge south from Dickson station into Hickman County, and the railroad from Columbia, through Lawrence County, to Florence, Ala.

Along the western foot of the Cumberland Mountains and the Middle Tennessee basin, in a formation identical with that where the ores of Stewart, Montgomery and Hickman are found, exist some beds of limonite, the extent of which has not been fully determined. They are found chiefly in the counties of White, Warren, Putnam and Overton. At several points these beds appear to be of valuable extent.

*Red Fossil Ore.*—The next ore to be considered—and though occupying a less area, probably not less extensive in quantity—belongs to the true hematite series, and is known to mineralogy and the manufacturer as the red fossil ore, but is known locally in Tennessee as dyestone. It is almost entirely confined to East Tennessee, but almost three-fourths of the pig iron made in the State since 1870 was made from it.

The geological position of this ore is in the Clinton group of the Niagara period, below the black shale of the Devonian formation. In this State there are usually but thin strata intervening between the two, and while the latter is frequently found outcropping, it does not mean that the ore is found underneath it. This is the case all around the Middle Tennessee basin; but in East Tennessee, all along the western base of the Cumberland Mountains, from Chattanooga to Cumberland Gap, the two strata are found in close conjunction, and where one exists it is certain that the other is to be found in that vicinity, though it may be covered with drift. This ore is one of the most persistent strata of the Apalachian geological system. It is found in New York bordering Lake Ontario, curving northward on the west and southward on the east, sinking there beneath the Hamilton shales and slates; rising again in Pennsylvania, and continuing thence in an almost unbroken outcrop southwest into the heart of the State of Alabama. The seams of ore in this State, however, are much thicker than in Pennsylvania, and besides the regular, continuous seam at the foot of the Cumberland Mountains, there is an independent seam almost as continuous, and at places much thicker, in what is called White Oak Mountain, a high ridge entering the State from Georgia, in the county of James, and, passing northward, is continuous to Virginia, though the northern end, in the county of Hancock, is called Powell's Mountain. This is the Mountour Ridge of Pennsylvania. This ridge in Pennsylvania is only twenty-seven miles long, and from it in 1846 Prof. Rogers states that twenty furnaces, making sixty thousand tons of iron per annum, were deriving their supply of ore; and in 1881 there were still nine large furnaces deriving their supply in whole or in part from this same ridge. The White Oak Mountain has a continuous length in East Tennessee of over one hundred miles.

This red fossil ore is also found in several detached ridges, from three to ten miles long, which lie parallel with the White Oak Mountain, at intervals, in a general southwest and northeast direction.

This ore is less variable in quality than the limonites, and the analysis of a specimen from one point in a leading range will usually be identical with that from another point ten, twenty or fifty miles distant. Below water level the ore on the White Oak Mountain, and at a certain depth the ore in the seam at the foot of the Cumberland Mountain, becomes poorer in iron and richer in lime. Hence, for the present, mining is stopped when this hard and poor ore is reached. The proper course would be to mix it, as done in Pennsylvania, with the richer soft ore from near the surface.

Two other bodies of this ore are detached from the East Tennessee Valley proper. These are in Elk Fork Valley and Sequatchie Valley. The former is about twenty-five miles long, and extends into Kentucky; the latter is about sixty miles long, and extends into Alabama. Throughout the whole length of these valleys the red fossil ore appears, dipping slightly to the east. On the opposite side of the mountain, at its eastern base, along the foot of Walden's Ridge, the ore dips to the west. Hence, if the ore is continuous for the eight to ten miles of distance under the intervening carboniferous strata, the amount of iron ore thus stored away for future use is simply enormous. The ore on the east side of the mountain is three feet thick, and in the valleys much thicker. Therefore, even if containing only thirty per cent. of iron, the amount of available ore the seam would yield to capital invested in scientific mining will equal if not surpass that of any known deposit of ore in the world.

At present the mode of mining this ore is to get the ore on the cheapest plan possible, without the slightest reference to the future. In the seam at the foot of the mountain it occurs in a series of knobs, with short, narrow valleys between them. The ore is robbed from the knobs by rough tunnels as long as they think it pays, and then that knob is abandoned and another attacked. No mining is done below level of the little branches. In White Oak Mountain the dirt and shale is stripped with picks and shovels off the seam of ore until the wall of shale reaches a height or thickness of six or eight feet. The stripped ore is then taken out and the rest abandoned. In so-called worked-out leases near Ooltewah are thousands of tons of ore which, by intelligent mining, can now be gotten out as cheaply as has been any which had the thinner covering. The price of this ore in Chattanooga ranges from \$2 to \$2.50 per ton.

The seams of this ore have very superior facilities for transportation. The Tennessee River runs parallel between the White Oak Mountain seam and that of Shin Bone Ridge, at the foot of the Cumberland Mountain. The latter has also the Cincinnati Southern Railway in a few hundred yards of it for nearly seventy miles. It is also accessible by the Knoxville and Ohio road at Coal Creek and Careyville. The White Oak Mountain ore is cut through by the East Tennessee, Virginia and Georgia Railroad near Ooltewah, and also by its Red Clay extension, and by the Knoxville and Ohio branch of that road from Knoxville to Kentucky, near the town of Clinton. The Tennessee River also cuts it at Welker's, in Roane County. The Tennessee River also cuts through the Half Moon Island bed for a distance of ten miles. A system of cheap narrow-gauge roads would bring to the river and railroads in short distances a large amount of ore now too far distant for hauling by teams.

The red fossil ore has not been found in any part of the Middle Tennessee Region. In Overton County a hematite ore is found, locally called dyestone, but it is not the same as the East Tennessee dyestone, nor is it known to exist in large quantities. In the county of Wayne are three knobs which contain a large

amount of hematite. Its geological position has not been exactly determined. The location is near Clifton, on the Tennessee River, and the ore is of good quality. It was once used in a furnace near by, and some of it has been shipped off and used for paint.

The third most important ore, as respects quantity, in the State of Tennessee is the carbonate of iron of the coal measures. This is, in England and Europe, one of the chief ores from which iron is made. It is used to some extent in Ohio and Pennsylvania, but as yet not at all in Tennessee, though it is one of the most abundant and easily worked ores. There are points in the Tennessee coal-field where it can be mined very cheaply. It is found in the State underlying the coal seam worked at Coal Creek and at Careyville; at the latter it is specially abundant. There are a number of layers of it in the Tennessee coal-field.

The least abundant but most valuable iron ores of the State are the ores found in the metamorphic rocks, from which Bessemer steel pig may be made. There are the hematite and the magnetic. These are found at intervals in the strata just edging on the Potsdam sandstone and in the hornblende gneiss of Carter and Johnson Counties. The hematite has not been developed to any special extent; hence its quantity is not known. In Sullivan and Carter Counties, in the foot-hills of the Holston Mountains, is found hematite ore of very compact structure. It has been used in forges and made good iron, but no sufficient exploration has ever been made to test its quality, though small pieces of it are scattered over a large area of country.

The magnetic ore exists in a limited area, but is in large quantity and of excellent quality. Little beyond explorations for the investment of capital and a little digging for forges has been done in this State, but beyond the North Carolina line very extensive excavations have been made for the owners of the East Tennessee and Western North Carolina Railroad, and an immense amount of ore uncovered. In the eastern part of Johnson County magnetic ore is also found, but transportation is so far distant that there is no likelihood of its development for many years.

#### MARBLE.

Nearly all the Tennessee marble belongs to the variegated class; some has a solid drab or dove color, and in other localities it is gray or pinkish gray. Of this class it has no rival east of the Rocky Mountains, except in a limited area of the State of Vermont. The sienna and variegated marbles of Italy have been supplanted by the more brilliant stone from the land whose people delight to call it the Switzerland of America.

The geological position of this marble is in the upper part of the lower Silurian, one of the strata of the group of Trenton limestones, being the next to the lowest member of that series. In the county of Henry and also in Benton are found local beds of marble which are in the Niagara formation; but they, while of truly handsome appearance, do not have the brilliancy of the East Tennessee marbles. In Lincoln County a variety of shell marble is found in the Trenton limestones which very much resembles the true variegated species, and may afford handsome blocks of commercial size; but by far the greatest body of marble is found in East Tennessee, and from that section alone shipments from the State have been made.

The original opening of the Tennessee marble was in Hawkins County, and until within a few years past there was its greatest development. Now the largest business is done in Knox County, and there are quarries in Hawkins, Knox, Hamblen, Jefferson, Loudon, Monroe and Bradley.

The marble beds of Hawkins County are in a narrow ridge running northeast and southwest with the general line of all East Tennessee strata, the outcropping

being usually on the western side of the ridge. This ridge commences about six miles north of Rogersville and ends abruptly about eight miles southeast of that place, being apparently isolated, though careful examination proves that its strata connects with Clinch Mountain on the north and continues in the strata to the south, though losing for some distance its elevated ridge-like position above the general face of the country. The railroad from Rogersville connects with the main East Tennessee, Virginia and Georgia Railroad.

The amount of marble in Hawkins County is very great, and therein are found variegated marbles of more brilliancy than in any other section. The chief markets of this marble are Philadelphia, Baltimore, New York, Boston and other cities. It is seldom used for outside work, but from selected blocks very handsome and durable door-steps and banisters have been made, which stood the wear of weather and time equally with any stone.

Jefferson County contains a large quantity of marble, from the beds of which beautiful specimens have been obtained, but no extensive quarrying has yet been done.

The largest business now carried on in quarrying and shipping marble is in Knox County. The marble of Knox is more varied in its quality and the uses to which it is adapted than that of Hawkins County, and the facilities of transportation are much better. The quality varies from the plain gray-colored building stone to the most beautiful pink and variegated ornamental marble. The gray or whitish drab with pink tinge has no superior as a building stone. It has been used in the United States Custom-houses at Knoxville and at Memphis and the State House at Albany, New York, and in many other private and public buildings in other cities. For durability and resistance to moisture it has no superior in the world. An analysis gives its contents of carbonate of lime at 98.436, and tests show its capacity to bear 12,000 pounds pressure to the square inch. This marble has been sent to all parts of this country from San Francisco to New York City. The interior of the Governor's room in the new capitol at Albany is built of it, trimmed with Mexican onyx. When polished it has a rich mottled pink color, but bush-hammered and rough for building purposes, has the appearance of being a white marble. The demand for the marble is constantly increasing, and there is still room for capital invested in quarries located near to transportation.

#### TIMBER.

Tennessee possesses an unbounded source of wealth in her vast forests of hardwood timber. On this subject I quote the following from the *Baltimore Manufacturers' Record* of October 11, 1884, which is part of an able and interesting series of articles by Mr. Charles H. Wells on the "Timber Resources of the South:"

"In conclusion, I will speak of the Tennessee, Georgia, Alabama and Louisiana tracts—the most beautiful lumber to be found anywhere on the American Continent. Beginning with Tennessee, let us discard the stilts of the scientists and the iron tracks of the four great railroads penetrating the country, and take it afoot along these sparkling streams, across the hills and dales teeming with redundant crops of grass and grain, and over the mountains bristling with unbroken forests of primeval growth, and, 'with an eye single to business,' see what there is to lure the ironmasters of more crowded regions to bring their money and their labor here, or to induce the shrewd lumberman to move his mills and enterprise from the rigorous, wintry regions of the great Northern forests, rapidly nearing exhaustion, to this almost virgin field of production in his peculiar line.

"Beginning with Holston Mountains, a high line of hills, we tramp northeastward. The distance is quite thirty miles to the Virginia line, and it is nearly all

in forest; till we follow it some twenty miles there is no great quantity of high-grade timber. The trees are not so large as upon other ranges where the soil is richer; still there will be a great deal of timber taken from it at no distant day. There is a large growth of medium-sized black or yellow pine on it. On the Stony Creek side it has been considerably denuded in making chareoal for the forges and furnaces. On the northwestern side, next to the Holston River, little if any cutting has been done, and there is much good timber—some white pine, large quantities of white oak, red and black oak and chestnut, and in many of the hollows large and excellent yellow poplar. This mountain will yield a large supply of the best tan bark—chestnut, oak and hemlock—as these trees are very plentiful in many localities. Reaching 'Cross Mountain,' we enter a magnificently timbered region, being the whole of 'Shady,' and the slopes of the Holston and Iron Mountain on the Virginia line. The growth of white pine in the eastern part of 'Shady' for miles rivals such forests in the Northern States as have supplied so long the large demands of the cities and towns there. Hemlock, cherry, poplar, the oaks, maples and chestnut are of great size, and are abundant all through 'Shady' and down the slopes of the mountains. One strange fact is presented—there is not a hickory tree or sapling to be found in the entire region. Just beyond 'Shady' the great 'White Top' Mountain, 5,000 feet in height, forms the boundary line between Tennessee and North Carolina. Here we are again in the home of the white pine, and it is the king of timber trees here. A belt of it runs along 'Stone Mountain,' through Johnson County, and here and there through Carter County, all the way to the 'Roan' and 'Yellow' Mountains. There is a great deal of very valuable timber of all varieties I have named in Johnson County, on the east side of Roan's Creek, up to the State line of North Carolina and Virginia. Doe Mountain has a little but not much good timber on it, and in Carter County there is not now remaining much good timber, except near the North Carolina line. In the broken and mountainous district lying above Hampton, and between the Doe, Watauga and Elk, there is one block over one hundred miles square of unbroken forest, worth a mint of money to some energetic man. In the 'Walnut Hills' District is found the most beautiful walnut lumber in abundance, while cherry is also plentiful. The 'Cranberry Narrow-Gauge Road' has opened up all the 'Crab Orchard' District in Carter County, and many mills are now at work cutting hundreds of thousands of feet of the finest cherry and ash and a good deal of walnut, and still more poplar and oak timber, taxing the little railroad to its utmost to move it, making Johnson City the largest lumber depot on the East Tennessee, Virginia and Georgia Railroad. An important factor to be taken in consideration is the low price of land all through the State. Those who own the property are willing to sell cheap."

#### MANUFACTURES.

In facilities and advantages for general manufacturing Tennessee is unsurpassed, and there is probably no State in the South that is making more rapid and healthy progress in the development of industrial interests. While her manufactures are wonderfully increasing in number and extent, there is a very marked diversity that will prevent any undue expansion of one industry to the neglect of others. The manufacture of pig iron has possibly attracted more attention than any other one industry, but yet there has been no such increase in that business as to overshadow other interests or to draw into it too much capital. A wide diversity of manufactures is essential to the healthy, permanent growth of the South, and Tennessee is doing her full share in this direction. The increase in pig iron production of late years has been very great, but hardly out of proportion to the increase in the foundries, machine shops and agricultural-implement

factories, in which pig iron is used as a raw material. It is true that a considerable amount of Tennessee pig iron is shipped to the West and North, but it is also true that the home consumption is steadily increasing, and that a very large proportion of Tennessee iron now finds a market in that State. In Nashville, Chattanooga, Memphis, South Pittsburgh and other places there has been a remarkable increase in iron-working establishments, which are now furnishing a large amount of the machinery needed in the manufactures of that State, besides shipping largely to the adjoining States. In 1880 Tennessee produced 70,873 tons of pig iron, while in 1885 the production was 161,199 tons, or more than double. A number of furnaces are now under construction, and others are projected, assuring a very largely increased production of iron in this State in 1887.

Tennessee is the first of the central Southern States to make Bessemer steel, an experimental plant at Chattanooga having proved such a success that the Roane Iron Company, of the same place, have built a large Bessemer rail mill, to be started up about March, 1887. The activity in the iron interests is very great, and especially is this noticeable in the building of diversified industries, such as stove works, pipe works, machine shops, foundries and kindred enterprises that will take the pig iron from the furnaces, turn it into finished goods, and thus save to the South the expense of shipping pig iron North and buying it back in the shape of agricultural implements, stoves, &c.

According to the last census, there were 4,326 manufacturing establishments in Tennessee, having an aggregate capital of a little over \$20,000,000 and employing 22,345 hands, the total value of the products being \$37,074,886. There were 990 flour and grist mills, with a capital of \$3,595,585; 19 cotton goods factories, capital \$1,184,600; 43 iron and steel works, capital \$3,681,776; 770 saw and planing mills, capital over \$2,100,000; and 106 woolen goods factories, capital \$418,664. These figures, however, give but little idea of the present extent and value of the industrial interests of the State. Since 1880 there has been an enormous increase in the manufacturing interests of the State. Not only in the iron interests, such as furnaces, machine shops, foundries, &c., is this true, but in all other industries. Wood-working factories of all kinds, from the small portable saw mill to the large planing mills, sash and door factories and similar enterprises, have increased wonderfully. In the manufacture of cotton and woolen goods the same rapid growth is seen, while in flour and grist mills, tobacco factories, etc., great progress has likewise been made.

As illustrating the increase in manufactures in Tennessee, a few facts gathered from the "Revised Hand-Book of Tennessee," prepared by A. J. McWhirter, Commissioner of Agriculture, Statistics, Mines and Immigration, will be of general interest. From this book the following figures are mainly gathered: In 1880 Chattanooga had a population of 13,000; in 1885 her population is 25,000, or nearly double. In 1880 Hamilton County, in which Chattanooga is situated, had only \$2,045,000 invested in manufactures—the number of hands employed being 2,100, and the aggregate value of the products being \$3,230,000; in 1885, on January 1st, Chattanooga alone is credited with having \$5,600,000 invested in manufactures, employing 4,213 hands, and producing in 1884 products valued at nearly \$11,000,000. In Nashville the increase, while not quite so great, has still been very large. The same authority gives the statistics of manufactures of that city January 1, 1885, as follows:

CENSUS RETURNS FOR 1880.		
Number of manufactories, estimated.....	800	268
Capital employed.....	\$6,160,500	\$3,892,380
Average number of hands employed.....	7,615	4,791
Total amount paid in wages during the year 1884.....	\$2,082,900	\$1,312,765
Value of materials.....	8,760,000	5,312,527
Value of products.....	14,070,000	8,597,278

These figures will give some idea of what has been done in two cities in Tennessee in the last five years in the way of developing manufactures. Knoxville, Memphis, Columbia and other cities, as well as the small towns and out of the way places, have also done their full share in this splendid progress.

Tennessee is abundantly supplied with the materials and facilities needed for the development of great manufacturing interests. Her mines of iron ore, coal, marble and other minerals are inexhaustible; her timber resources are wonderfully great; her water-powers are unfailling; her climate is all that could be desired, and her transportation facilities, already excellent, are being steadily increased by the building of new railroads and the improvement of her waterways. With all these advantages she combines a splendid soil capable of producing the most bountiful crops, while the healthfulness of the State is remarkably good. Her manufacturing industries have made great progress during the last five years, but the next five will in all probability show a still more rapid advance.

#### AGRICULTURAL FEATURES.

The soil and climate of Tennessee are suited to the growth of every variety of agricultural product known to the temperate zone, and all the cereals, vegetables and fruits are grown in abundance. In 1880 there were in the State 165,650 farms covering 20,666,915 acres, or about three-fourths of the land surface of the State—an average of about 125 acres to a farm. Of this area 8,496,556 acres were improved and 12,170,359 acres unimproved. The value of farms, including land, fences and buildings, was \$206,749,837; the value of farming implements and machinery, \$9,054,863; the value of live stock on farms, \$43,651,470; the estimated value of all farm productions, \$62,076,311. The cotton production of the State was 330,621 bales, Tennessee being ninth in order of production in the list of cotton-growing States. There were raised 62,764,429 bushels of corn, 7,331,353 bushels of wheat and 4,722,190 bushels of oats. The production of tobacco was 29,365,052 pounds on 41,532 acres. The value of orchard and market garden products was \$1,148,113.

The extent of the live stock and dairying interest is shown by the following figures: In 1880 there were in the State 439,617 horses and mules, 27,312 working oxen, 303,900 milch cows and 452,463 other cattle, 672,789 sheep (exclusive of spring lambs) and 2,160,495 hogs. There were 17,886,369 pounds of butter and 98,740 pounds of cheese made on farms in 1879. The yield of wool (spring clip of 1880) was 1,918,295 pounds.

On the subject of the agricultural interests of the State I quote from Hon. A. J. McWhirter's able and accurate description of the three civil divisions of the State—East Tennessee, Middle Tennessee and West Tennessee:

EAST TENNESSEE is that portion of the State that lies between the Unaka and Smoky Mountains on the east, and a line drawn from north to south centrally across the Cumberland plateau on the west. It embraces thirty-four counties, and is much the oldest settled portion of the State. It is literally a land of misty mountains, of pensive vales and of swift waters.

The agricultural interest of East Tennessee is diversified and progressive. Under the lead of a few intelligent farmers and the inspiration of the East Tennessee Farmers' Convention, great changes for the better have been wrought within the past few years. Improved breeds of cattle, sheep and hogs, and better methods of cultivation, have been pretty generally introduced. All the cereals flourish here, and all the grasses of the temperate zone, including blue-grass. All the fruits common to the Middle States are successfully grown, especially apples, pears, cherries, plums and grapes. It is urged by those who, from experience and study, are best acquainted with the industry, that this is the finest grape region

on the continent, California not excepted. Great things are predicted in this direction, and many believe that the chief wine center of the future in the United States will be within this mountain-bound and mountain-decked region of Tennessee. Lands suitable for grape culture can be purchased very cheap.

Immediately around Chattanooga the growth of small fruits is attracting much attention. There are large plantings of strawberries and raspberries, and hundreds of acres, especially on Missionary Ridge, planted in these and peach and plum trees. This industry has already reached large proportions, and is still advancing under the powerful stimulus of uniform success.

Three trunk railroads pass through East Tennessee, three others penetrate its borders, and several branch roads run into the more prominent mineral regions. The Tennessee, Holston, Clinch and French Broad Rivers furnish waterways all or the most of the year, and thus, with iron and water highways, the wonderful resources of this section find, in the main, ready outlet to the markets of the world. Other railroads are projected, and within a few years all the resources of this marvelous region will be within the easy reach of active capital and development.

**MIDDLE TENNESSEE.**—The middle division of the State of Tennessee is remarkable for the variety and beauty of its topography. Extending from the Cumberland Mountains on the east to the Tennessee River on the west, its landscapes partake of all the varieties of mountains, plains, hills and valleys; of extensive forests; of numerous streams, large and small—some deep and quiet, others noisy and swift, but all bright and pleasant lines in a charming picture. There is not on earth a country that fills more completely the measure of the beautiful.

This section resembles a vast plain interspersed with hills and lofty knobs, sunny streams and waving forests, surrounded by elevated plateaus that in the east swell into mountains, and in the west and north to picturesque highlands. The usual description is that it is an extensive basin inclosed with an elevated mountainous rim or plateau. One who views Middle Tennessee from surrounding heights will be reminded, provided he has read the work, of Plato's description of the "Lost Atlantis," that fair island on a summer sea to which tradition and mythology point as the eden home of the ancient gods.

The valleys, and here and there dips in the plateau, are very fertile, and contain many valuable farms and much valuable farming lands. The plateau seems marked by nature for sheep husbandry, possessing in remarkable abundance the best known food for these useful animals. Tens of thousands of flocks may feed and flourish on the extensive sweeps of these now profitless and almost valueless uplands, and it is safe to predict that in the near future this inviting industry will be there developed on an immense scale. It is also an inviting field for fruit industry, especially apples, peaches, pears, plums and grapes. These lands are, as a rule, the cheapest in the State.

The valleys are all rich and well watered, and much of the plateau contains valuable farming lands. The lands of the Elk, Duck and Buffalo Rivers are among the finest in the world. Here again is a splendid region for sheep and every variety of live stock. These uplands bordering the valleys of these rivers are unsurpassed in the production of the native grasses, and are so extensive that millions of animals may roam uncrowded and fatten without let or hindrance. This, again, is a cheap land region—the uplands, not the valleys. The valley lands are comparatively high-priced and contain many of the finest farms in the State.

The northern rim, or the highlands proper, embraces some of the best farming lands in Tennessee. The scenery is bold and broad, the water clear and pure,



and the forests in many places extensive and valuable. This is also a fine fruit region, particularly for apples, peaches, grapes and berries. It is also a superb stock country and the home of plenty. No portion of the State offers superior inducements to thrifty settlers, and nowhere can more charming homes be found. Clarksville, a thriving, beautiful, cultured city, is the commercial and educational center of this fair region, and there the immigrant or capitalist may learn what he may wish to know of one of the most highly favored regions of the South. Lands in these highlands are generally rich and comparatively cheap.

The basin of Middle Tennessee embraces ten whole counties and parts of all adjoining ones. It is a lake-like plain of beautiful farms dotted with island summits of green and groves, and seamed with brooks and rivers that glisten like silver in the genial sunshine. It teems with herds of lordly cattle, with whitening flocks on a thousand hills, with royal blooded horses whose shining coats glisten in the sun and whose tossing heads proudly speak of ancestral centuries. In summer, miles of waving grain, miles of green pastures threaded with murmuring brooks, miles of nodding forests, and an archipelago of baronial homes in the highest state of comfort and beauty, greet the gazer from every summit in this broad and matchless landscape.

As a grain and stock country Middle Tennessee is unequalled. The lands of the basin are uniformly rich and the fruit unsurpassed; the world can't beat it for grass and grain and stock. For exquisite landscapes that embrace every phase of hill, valley, plain, mountain, forest and stream that the artist would choose for a perfect picture, it stands unrivaled. For homes where all the conditions unite to satisfy, refine and liberalize, while they stimulate to high-bred achievements and lordly hospitality, it is unsurpassed. The lands of this matchless region are high-priced, but worth the money.

Two trunk railroads pass through Middle Tennessee, and each has many branches. Another trunk road is under contract and still another projected. The Cumberland River, the longest for its width in the world, is navigable the most of the year.

WEST TENNESSEE.—The twenty-two counties composing West Tennessee lie between the Tennessee and Mississippi Rivers. The topography of this division is almost totally different from that of either of the other divisions of the State. The lofty mountains, the elevated ridges and mound-shaped knobs, characteristic of the other divisions, disappear or sink into rolling plains, level plateaus and broad bottoms, with occasionally a ridge that swells into a suggestion of mountain chains. Old settlers say that this region was very beautiful when first settled. The soil was surpassingly rich, and thousands in the older States and the older divisions of this State were drawn thither by stories of marvelous production. Counties were rapidly organized, towns built, and the foundations of many fortunes successfully laid.

This division of the State is best described in three parts. First, the eastern tier of counties which skirt the Tennessee River, and those lying next to them on the west. Through the center of one of the former and all of the latter runs a ridge from north to south, separating the waters of the two great rivers that border West Tennessee on the east and west. From this ridge numerous water-courses, small and large, flow east into the Tennessee or west into the Mississippi. This ridge and the country east of it is high and broken, resembling very much the highlands on the east side of the Tennessee River. The land on the ridge and its numerous spurs is thin, and, as a rule, unsuited to cultivation; but they produce exceedingly fine sheep food, and, together with the many sheltered hollows and slopes and nooks, would afford rich and ample pasturage summer and winter for thousands of flocks. As a sheep country it is equal to any in the

world. The timber of this region is also fine and varied, and will afford fortunes to the enterprising of the future. These lands are very cheap. There are many beautiful and fertile valleys in this region that are musical with clear, perennial streams of purest water. Much fine stock is raised, and abundant crops of corn, wheat, hay and fruit. Peanuts are a staple crop in several counties and are grown with great success. Tobacco is extensively grown on the northern border and is of superior quality. All this region is finely adapted for fruit growing, and possesses superior advantages for cattle and sheep culture on a large scale. Much of it is picturesque in the highest degree, presenting in charming succession hills and valleys mantled with trees or green with crops or golden with abundant harvests, and threaded with silvery streams whose pleasant waters dance merrily over rocks and sand in bustling haste to join the great army of waves that sweep hard by on their march to the sea. This strip of country also abounds in marble, iron ore of the best quality, building and paving stone, and marl-beds rich and inexhaustible. The projected Nashville, Jackson and Memphis Railroad will pass centrally through this region from east to west, and will open its valuable resources to the world. The northern portion—that is Henry, Benton and Carroll Counties, already have railroad and river communication with the markets of the world, and only need capital to become valuable and enriching contributors to the country's commerce. The central part of West Tennessee is the richest and most populous. It embraces all of the counties of Hardeman, Fayette, Madison, Chester, Haywood, Crockett, Gibson and Weakley, the western half of Henry, Carroll, Henderson and McNairy, and the eastern half of Shelby, Tipton, Lauderdale, Dyer and Obion. This section is filled with populous towns, and so thoroughly traversed by railroads that, excepting Henderson and small portions of Henry and Carroll, no citizen of this central plateau is exceeding twelve or fourteen miles from two or more railroads, or a railroad and a river. The lands not butchered by reckless methods are very productive, and there is comparatively little land but what can be restored at small cost to original fertility. In the northern counties, tobacco, corn, wheat, and all the cereals, and many varieties of the grasses, are grown. In the middle and southern counties, cotton, corn, wheat, oats, clover, red top, orchard grass and millet are grown. But all over this part of Tennessee, tobacco, cotton, corn, wheat and all the cereals, and clover and all the grasses, are or may be grown successfully. It is, beyond any section known to the writer, the home of diversified production. For fruit it stands unsurpassed. Nowhere are peaches, strawberries, raspberries, dewberries and blackberries more successfully or profitably grown, and nowhere is the quality of the fruit surpassed. Berries of every description grow wild in luxuriance, and this region seems their natural home, where they reach a higher perfection than is possible farther north or farther south. The fruit industry is already large and growing, but may be profitably extended. Vegetable crops of every description are also peculiarly well favored by the soil and climate of this region, and are receiving more and more attention. In addition to advantages of soil and climate for fruit and vegetables, the market facilities of this locality are extra fine. Five trunk railroads pass through West Tennessee, connecting the great cities of the Northwest, North and Northeast with the cities of the South and gulf coast. Thus early fruits and vegetables find convenient and profitable markets North, and later, when the heat and drought exhaust Southern crops, shipments are turned in that direction with advantage. Geographical position, climate, soil and transportation facilities all conspire to make this region the market garden and orchard of the future.

Nor should its fine advantages for stock raising be overlooked. It grows everything necessary to successful stock raising. It has miles of wild cane upon which cattle feed in winter; its grasses are green from seven to nine months in

the year; it is almost literally quilted with running streams, and nowhere on earth does the soil respond more gratefully to kind treatment. The lands of this section are comparatively cheap, and there is a stronger desire for immigration. The lowlands and the bottoms of the Mississippi River region are magnificently timbered. The world can't beat it for variety, size and merchantable value of its forests. Its lands are as rich as those of the Nile, and in the parts free from overflow, or where the overflows are not frequent, there are many farms of unequaled productiveness. Obion, Lake and Dyer contain much land of surpassing and inexhaustible richness. There is also considerable of the same character of land in Lauderdale, Tipton and Shelby. Here, too, land is reasonably cheap, and there is much on the market.

Nine trunk railroads penetrate West Tennessee, five passing through and three terminating in its borders. Two others are projected, and one—the Nashville, Jackson and Memphis—will be built soon. River transportation is had by the Tennessee on the east, the Mississippi on the west, and the Hatchie and Forked Deer penetrating the interior.

#### EDUCATION.

The State has a good system of public schools, and there are many private schools of high grade. The famous Vanderbilt University is located at Nashville, in this State.

#### SOME LAWS.

A homestead in the possession of each head of a family, and the improvements thereon to the extent of \$1,000, shall be exempt from sale under legal process during the life of such head of a family; to inure to the benefit of the widow, shall be exempt during the minority of their children occupying the same; nor shall the same be alienated without the joint consent of the husband and wife, when that relation exists. This exemption shall not operate against public taxes, nor debts contracted for the purchase-money of such homestead or improvements thereon.

Married women owning a separate estate, settled upon them and for their separate use, can dispose of the same by will, deed, or otherwise, in as full and complete a manner as if she were unmarried. The property of the wife is not liable for the debts of the husband incurred before marriage. The same law is applicable to the husband. Money deposited in bank by a married woman is free from the claims of husbands or their creditors.

Under the revenue laws of Tennessee, all property owned in the State, excepting \$1,000 worth of personalty belonging to the heads of families, is subject to taxation for State and county purposes. The tax on property levied by the State is 40 cents on the \$100 worth, 10 cents of which shall be for school purposes. Merchants pay *ad valorem* and privilege taxes amounting to 70 cents on the \$100 worth, 10 cents of which is for free schools. Taxes are also levied upon a great number of privileges and upon polls, the poll-tax being applied to school purposes. The county courts are authorized to levy taxes for general county purposes not to exceed the State tax.



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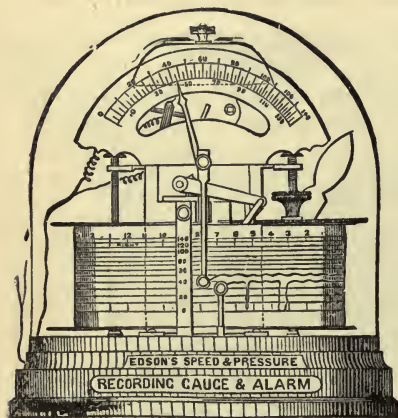
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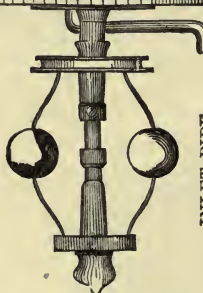
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"Sir: I have carefully examined your Indicating and Recording Steam Pressure Gauge and High Pressure Alarm, and am well satisfied that it will do all that is claimed for it. I have witnessed its action for some years past, and consider it invaluable to owners and users of steam power, as it is a complete check on the doings of the engineer and fireman. Its perfect reliability is unquestioned. Nothing harms a boiler more than fluctuations in pressure, and nothing is more prejudicial to economy in fuel, and the record chart of this gauge shows at once whether the pressure is uniform, and the amounts of all variations. In case of an explosion it is very difficult, and generally impossible, to determine the amount of steam pressure at the moment of rupture; but if this gauge is attached, the record-sheet gives an indubitable and accurate register of the pressure in pounds, which may assist greatly in determining the cause of the explosion. It is of great assistance to boiler inspectors, for it shows them how efficiently an engineer has cared for his boiler, and, also, whether the prescribed pressure has been exceeded—how much and how often; and for this reason alone, if for no other, the 'Charts' should always be carefully preserved for reference. I think too much cannot be said in its favor.

Respectfully,

"GEO. B. N. TOWER,

"Sup'g Inspector Am. Steam Boiler Ins. Co.

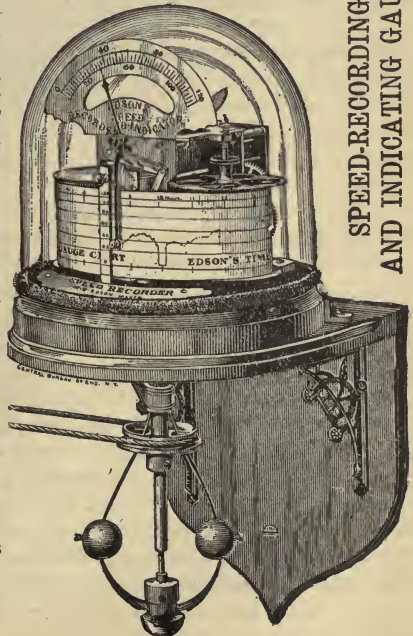
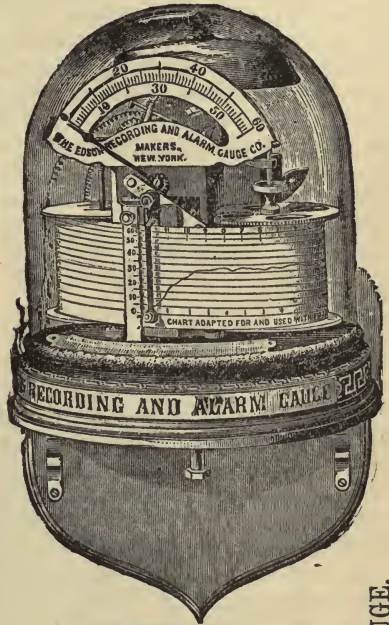
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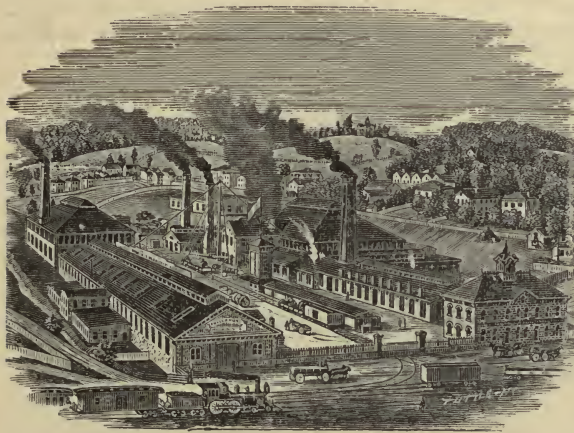
## FLOUR TRADE OF BALTIMORE.

ONE of the most important industries of Baltimore is the manufacture of flour. Since 1774, when the Ellicotts first built the Patapsco Flour Mill at Ellicott City, a few miles from Baltimore, this city has been noted as a great flour market. The superior quality of Maryland and Virginia winter wheat, which contains more nutriment than the Western spring wheat, has always enabled our best millers to produce the highest grade of flour—the “Patapsco” brand, for instance, now over a century old, being known from Canada to Florida, as well as in Europe, as a flour that has always stood at the very top; a flour, in fact, the superior of which can nowhere be found. Of course, the leading mills are the three Patapsco Mills, owned by the C. A. Gambrill Manufacturing Company. A few facts about this company will serve to give an idea of Baltimore’s flour business. It is an incorporated company, having a capital of \$500,000, a fact which will give the readers of THE NEW SOUTH some idea of the extent of their operations. They own and operate three large mills, having an aggregate daily capacity of about 2,000 barrels, or over 600,000 barrels a year. Their mills are unsurpassed in design and construction, and are supplied with the very latest and most improved roller process machinery, one of their mills having been built only about three years ago, while the other two have, since then, been remodeled and changed from buhrs to rollers, no expense whatever having been spared either in the building of the new mill or the remodeling of the others, the company being determined that these mills should have every advantage that the highest skill, backed by an abundance of money, could give. As they now stand, these three mills are models of perfection, and as they are managed by the best millers to be found in the country, and use the finest wheat raised in America, they, of course, produce, as we have already said, a grade of flour that has no superior in the United States. It is these mills and this brand of flour, more than all else, that have given Baltimore such a world-wide reputation as a flour market. The manufacturers have steadily, from year to year, added the latest improvements in milling, until it really seems that they have reached absolute perfection in making flour. The New York Produce Exchange Reporter, one of the best authorities in the country on flour and grain matters, in a late issue, says: “Some years ago the millers of the Northwest adopted the roller system, which proved a great success, and flour manufactured by this new method at once took a front rank, and came into severe and sharp competition with the old standards and brands of winter wheat flour as manufactured by the old buhr system. The adoption of the new roller system, in connection with other modern appliances, produced this result. This stimulated the winter wheat millers to enter the line of evolution, and knowing winter wheat to be in all respects far superior to spring wheat, they entertained no fear as to results. \* \* \* During the past fortnight we have devoted considerable time in carefully testing the qualities of the flour of the Patapsco Flour Mills. This flour has been long known to the trade, and during this century it has held a very distinguished position, growing in the popular estimation almost yearly. This renowned flour is made from carefully selected Maryland red wheat, \* \* \* and in this brand we have an article embracing unrivalled qualities. \* \* \* It is not often we find a flour possessing so many admirable qualities. Its color is very much in its favor; and to the excellent wheat, the skillful milling and improved machinery, we are indebted for this unrivalled article.” And thus we might go on almost indefinitely telling of the good qualities of this most excellent flour. In Europe it is as great a favorite with those who have used it as in this country—a late letter from Dunlop Bros., of Glasgow, to the Gambrill Manufacturing Company mentioning the fact that they had sold this flour at a higher price than could be obtained for the best Minnesota flour.



## MANUFACTURE OF MACHINERY.

**A**S the home of great engineering skill, Baltimore has for many years enjoyed a most excellent reputation, not only in America, but also in Europe. Baltimore engineers and engineering work have always, or at least as far back as the memory of man runneth not to the contrary, been regarded as equal to the accomplishment of the most difficult undertakings, and this reputation is well deserved. Probably in no way is the standing of Baltimore mechanical engineering work better illustrated than by a reference to the business of Messrs. Poole & Hunt. This firm has now been in existence over a third of a century, and the highest commendation that can be given them is simply to mention one or two of the large contracts that they have received when in competition with the whole country. Chicago, for instance, is a great city; and yet, two or three years ago, when the first cable street railroad was to be constructed in that city—a work involving several million dollars—Messrs. Poole & Hunt received the contract for furnishing the enormous amount of transmission machinery required; and such was the case in Kansas City; and again even in New York, the largest manufacturing center in the country, when the Third



Avenue Cable Road ordered their machinery of the same firm. In addition to these roads Messrs. Poole & Hunt have lately built the same class of machinery, but on a much more extensive scale than for any other road in existence, for the new cable road in Hoboken, N. J., and for extensions in Chicago and Kansas City. In this connection it may be said that all cable roads whose

plants have been furnished by Poole & Hunt are now in successful operation. Another sample of their work is seen in 3 immense dredges which they recently finished for dredging the Potomac flats at Washington, D. C. They are built on an entirely new system, and are known as the Von Schmidt Hydraulic Dredge. In operating them the material to be excavated is first stirred up, and is then pumped into large delivery pipes, and may be conveyed to any distance. The works of this firm are located at Woodberry, a suburb of Baltimore, and are connected by telephone with their office in Baltimore. Their works now cover

12 acres of ground, and are in every way admirably located for the manufacture, handling and shipping of machinery to all parts of the country. The iron foundry, pattern shop, melting house, brass foundry, blacksmith and machine shops, pattern loft, tool room, and in fact every department connected with this extensive establishment, are all systematically arranged, and replete with every modern appliance for doing the best work with the greatest dispatch. This firm manufacture steam engines, boilers, gang saw mills, paint mills, flouring-mill machinery, an improved patent mixer for paints, white lead, fertilizers, etc., gearing for cotton and other mills, hydrostatic presses, white-lead works and oil-mill machinery, the Leffel double turbine water-wheel, shafting, gearing, pulleys, hangers, and every variety of mill machinery.

## THE HYGEIA HOTEL, OLD POINT COMFORT, VA.

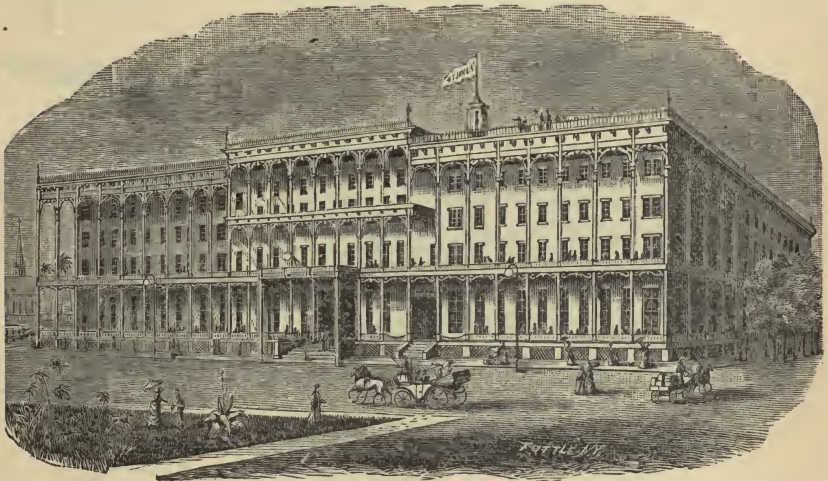
**O**LD POINT COMFORT was the name given by Captain John Smith, the tempest-tossed mariner of the seventeenth century, to that point of land which juts into the broad and pleasant waters of the long-sought harbor of Hampton Roads. Situated in latitude 37 degrees, it escapes the rigors of a more northerly climate. Its temperature during the coldest weather rarely falls below 42 degrees. In summer it preserves a temperate mean between 60 and 80 degrees. Since 1817 it has been a military post, and sanitary records kept with absolute fidelity show that during a term of fifty years not a single case of malarial, typhus or scarlet fever, nor diphtheria, has originated on the Point. So close to the shore that the cheek is fanned by the salt breeze, and the music of the waves lull the weary traveler to repose, rises the tall-towered, many-windowed Hygeia, the queen of health and pleasure resorts of the North Atlantic coast. It stretches its leviathan length a quarter of a mile along the white beach. Its six hundred rooms are luxuriantly furnished with all modern conveniences—gas, electric bells and oral annunciators, Russian, Turkish, Roman, electric, thermo-electric, hot and cold sea baths, and the most perfect system of drainage to be found in any hotel in this country. The wide verandas, 15,000 square feet of which are encased in glass, afford delightful promenades and sun baths for the delicate invalid. A spacious ball-room is reserved for dancing, with an excellent military band in



nightly attendance. The table is unsurpassed. The surrounding country furnishes the choicest and earliest vegetables; Baltimore, Washington and Norfolk markets supply meat and game, while the fish and oysters of the Chesapeake Bay enjoy a world-wide celebrity for their variety and flavor. The historic interests which cluster about Old Point Comfort are familiar to all. The Hygeia is adjacent to one of the largest military posts in the world, Fort Monroe, the stronghold during the late civil war of the Union army and navy. Just opposite her green parapets the battle which decided the fate of the Confederacy at sea, between the Merrimac and the Monitor, took place. Within two miles of the Hygeia are those famous philanthropic institutions, the Normal and Agricultural School for Colored People and Indians, and the National Soldiers' Home; a half a mile beyond, the ancient colonial town of Hampton. Portsmouth, with its navy yard and arsenal, and Norfolk, the thriving shipping and commercial town, are distant an hour's sail across the Roads. The modes of reaching the Hygeia are various, and admit of a variety of routes. The best of medical and surgical skill is within five minutes' call. The visitors include residents of all parts of the United States and Canada, and the register last year held the most distinguished names on the roll of their citizens, comprising representatives from Manitoba, on the north, to British Honduras, on the south, and from California to the Atlantic Ocean.

## THE ST. JAMES, JACKSONVILLE, FLA.

THE St. James Hotel is an old house, yet it is a new and modern house. It might be said that it was built in 1868; or better, that they have been since 1868 building it. The first building, of wood, was erected at a cost of \$30,000, and furnished at an expense of \$20,000. The size was 105 by 150 feet, and it was four stories high. Enlarged and improved from time to time, it has always kept in the lead. One familiar with its continued growth in size must wonder where it will stop. Brick additions, large dining rooms and kitchen have been built, until now nearly the whole square bounded by Duval, Laura, Church and Hogan streets is covered. The situation is in the best residence portion of the city, just far enough back from the business section to be both convenient and pleasant. The churches and places of amusement are in close proximity. The hotel fronts on a beautiful public park filled with tropical plants, trees and shrubbery. The verandas are wide and extend the whole length of the front and part of the side on the first and second stories. A good entrance ornaments the center, and large trees surround the whole. The St. James now stands without a rival in the whole South, and evokes the admiration of its thousands of guests

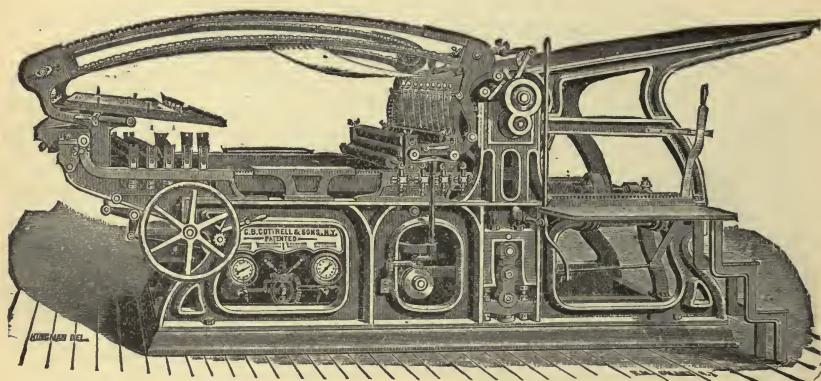


THE ST. JAMES HOTEL.

at its large and beautiful proportions and furnishings, as well as the energy and enterprise of its proprietor. To its host of friends no mention need be made of its spacious and cheerful office and halls, pleasantly impressing the traveller on entering; of its magnificent public parlor, suggestive of luxurious comfort; of its immense and elegant dining room, with its unexcelled service and the enviable reputation of its *cuisine*, and of its private parlors, private and public bath rooms, elegant rooms *en suite*, with baths, &c., attached, billiard parlor, telegraph office, electric bells, elevator, gas, and the whole building heated with steam. In fine, these, with all the modern devices and improvements which skill and experience can suggest, together with the delightful climate, are presented as inducements and temptations to the public to visit Florida and the St. James. The house and grounds are lighted by electric light. A select band of musicians, organized both as brass band and orchestra, is engaged for every season, which gives concerts daily for the entertainment of the guests, and for impromptu hops, which occur every evening. For information regarding rooms, terms, or other particulars, address by letter or telegraph J. R. Campbell, proprietor, Jacksonville, Florida.

## PRINTING PRESSES.

**A**MONG the recent improvements in printing machinery, there has never been a more radical departure from the old-established form and style of building these machines than that of Messrs. C. B. Cottrell & Sons, of New York City and Chicago, Ill. These gentlemen, realizing that for the finest class of press-work, in both black and colored inks, the ordinary fly delivery was far from perfection, have perfected and put on the market their New Patent Front Delivery, and have applied the same to both the Two-Revolution and Stop-Cylinder Presses of their manufacture. The improvement consists of arched ways or tracks running from the cylinder at one end to the receiving table at the other. In these ways run carriers attached to and carrying gripper-bars, which take the sheet from the cylinder by the "front" or "gripper" edge, and carry it through the air, clear of all tapes, cords or strings of any kind, and deposit it, last printed side up, on the receiving table (which is situated over the fountain) without any pressure whatever, thus doing away with the necessity of slip sheets. The sheet being deposited right under the eye of the pressman, he can adjust his fountain without leaving his position, thus economizing time and saving spoilage. The high commendation this improvement is receiving from printers who have adopted and are using it is a sufficient attestation of its merits. The publishers



COTTRELL'S NEW FRONT DELIVERY PRESS.

of this book have had one of this make of presses in use for some time, and the present volume was printed on it. They consider this method of delivery an immense improvement on the old style, and would not use any other press for fine work. This press was their latest purchase in that line, and was selected after a careful examination into the merits of all the best known makes, seeking a make of press best calculated to gratify their ambition to secure for the Manufacturers' Record the reputation of being the best printed trade journal in the United States, and thus naturally the finest in the world. There were presses of this make and embodying this improvement exhibited at the World's Industrial and Cotton Centennial Exposition at New Orleans, and they were awarded medal of first class over all competitors. Messrs. Cottrell & Sons make a specialty of presses for the finest book and color work. They also manufacture cylinder presses of all grades and sizes for newspaper and job work. Their country press was awarded first medal at the New Orleans Exposition. The decision of the judges confirms the opinion held by the leading printers throughout the country that the Cottrell presses are the best in existence. The offices of Messrs. Cottrell & Sons are at 8 Spruce street, New York, and 198 Clark street, Chicago, Ill.

## PRINTING INKS.

THE Queen City Printing Ink Company, located in Cincinnati, right on the borders of the "Sunny South," with unexcelled facilities for shipping to all points of the Southern States, is claimed by its founders to be the oldest now in existence, and the most extensive manufactory of its kind in the great Southwest. Whatever of credit or honor may be attached to pioneership, this company is justly entitled to, for its history can be traced back to the earliest attempt to manufacture a really fine printing ink west of the Alleghanias; but a higher honor than comes from its age is the reputation which the Queen City Printing Ink Company has achieved among printers. The excellency of its productions created a demand for them which has steadily grown year by year, necessitating frequent enlargements of factory and increased facilities for manufacture, until now the establishment of the company is one of the largest and most completely equipped works of the kind in the United States. The company, under the name of DeGolyer & Rychen, began business in a small way in 1860, and determined to achieve success through the merits of their productions, deeming it good business policy to make superiority in the quality of their inks the leading feature, and to maintain the most absolute uniformity of quality for each grade. Confident of their ability to do this, and wishing to reap the full benefit of the favor with which superior and uniform inks would surely meet, they determined to adopt a distinctive brand which all their productions would bear—the various grades being designated by special name and price. With this end in view, the name Queen City Printing Ink Company was adopted as a brand, and so widely and favorably known did it become, that a few years later, when the firm became a corporation, what had merely been a brand or trade-mark became the name of the company; and the business growing on the merits of its inks, in 1870 they removed to 600 West Fifth street, and enlarged their facilities by erecting large works on Court street. In 1876 a stock company was formed under the name of Queen City Printing Ink Company, with John Rychen, president; E. F. Rychen, vice-president, and Joseph Green, secretary and treasurer. The company recently erected large buildings on South street, near Evans, which are supplied with all the modern improvements and appliances necessary for extensive production, and every facility and convenience is provided for the prosecution of the work. The works have a capacity of three and a half tons per day. The manufacture embraces all grades and colors of printing and lithograph inks, tints, varnishes, sizes, etc., the principal production being news inks, for which the house has an extensive demand, the quality of its inks commanding a wide preference. All the Cincinnati dailies and nearly all of the less frequent issues are supplied from this establishment; also a large number of papers in St. Louis, Chicago, Pittsburgh, Cleveland, Detroit, Nashville, Atlanta, New Orleans, Buffalo, etc. The news ink is put up in 5 to 500-pound packages; the fine and colored inks in smaller packages, down to a single ounce. They also manufacture a special grade of illustrated book and catalogue ink, with which this edition of the "New South" is printed, and which is used on a large number of illustrated and trade journals, among which are the Manufacturers' Record, Northwestern Miller, Modern Miller, American Miller, Carriage Monthly, and many others. It is suitable for printing a fine card as well as the largest and most difficult cut work. From being a pioneer concern, the Queen City Printing Ink Company has grown to be the largest and best equipped west of the Alleghanias. It makes all its own materials, and hence insures the quality of its product. Its inks are the standard in the West, their superiority being universally recognized. The trade, which extends throughout the North, South and West, is steadily and deservedly increasing—the management being marked by intelligent enterprise, and the products first-class in all respects.

# A Scrap of Unwritten History.



When the star of empire of which Jefferson Davis had so fondly dreamed had waxed and waned, and fate decreed that the Southern Confederacy should go out in darkness, the curtain fell upon the last act of the bloody drama in North Carolina, Lee having capitulated at Appomattox. Sherman, on his march to the sea, had demonstrated to Johnston that further resistance was useless, so April, 1865, found Sherman with his army at Raleigh, N. C., while Johnston, with the remnant of his troops, was resting at Greensboro, N. C. From Raleigh to Greensboro, a distance of 75 miles, both armies roamed indiscriminately. Gen. Johnston signified to Gen. Sherman his desire for a conference, and an armistice of ten days was declared, and the two great chieftains met in consultation at a little house four miles west of Durham, N. C. Durham, an insignificant railway station, having a population of two hundred, was declared neutral ground. Here the gray and blue met in friendly intercourse—swapped horses, ran foot races, shot at targets, and around the same campfire told of hair-breadth escapes. Not more than one hundred yards from the railway station stood a two story frame tobacco factory, owned by John R. Green. During the war Green had manufactured smoking tobacco for the "boys in the army," but now his occupation was gone. Stored in the factory were large quantities of smoking tobacco ready for shipment, and during the armistice the building was sacked and around the camp-fires in Durham the blue and the gray liberally smoked the pipe of peace. When the terms of surrender were arranged, the soldiers of each army provided themselves with a "poke" of tobacco, and marched homeward. In this way the tobacco was scattered from Maine to Texas. What Green had regarded as a great calamity soon proved to be a great blessing. When the soldiers, on reaching home, had exhausted their "poke," orders directed to the railroad agent, postmaster, etc., at Durham, N. C., began to pour in for that smoking tobacco. Green, quick to perceive his advantage, christened his tobacco "Durham," and selected the Durham bull as his trade mark. Nowhere on the globe is tobacco of such fine quality or so peculiarly adapted to smoking purposes raised as is grown in the vicinity of Durham. Almost entirely free from nitrates and nicotine, the Durham tobacco has become so celebrated

that to-day, all over the United States, the Canadas, South America, Japan, Australia, China, etc., it is the acknowledged standard of excellence and purity. In 1860 Green died, and W. T. Blackwell & Co. purchased the business, and, putting into it fresh capital and enterprise, soon made it a wonderful success, until to-day they are one of the largest and most flourishing firms in the country. At the time of the purchase from Green, the total force employed in the factory numbered less than twelve, and the population of the town less than 300. Today the Blackwell's Durham Tobacco Co., successors to W. T. Blackwell & Co., pay annually to the government a revenue tax of more than \$250,000 and employ from 500 to 600 hands. The embryo village of 1865 has a population in 1886 of over 5,000, and contains the largest smoking tobacco factory in the world. The factory of Blackwell's Durham Tobacco Co., the famous manufacturers of the celebrated Bull Durham smoking tobacco and cigarettes, is the feature of attraction at Durham. Immediately fronting the railroad, it looks more like one of our mammoth metropolitan hotels than a tobacco factory. On the first floor are fine offices, and here a gentlemanly usher shows visitors all the items of interest. Everything indicates industry and enterprise, and perfect system prevails. All the best improved machinery is provided for granulating, shredding, combing, drying and packing tobacco. The amount of leaf tobacco (in the raw state) carried by the firm is amazing to the visitor. Six immense storage warehouses, in addition to the mammoth four-story brick factory, are required to hold the stock of raw leaf constantly on hand.

Durham is twenty-six miles west of Raleigh, the capital of the State, and is the outlet to what is known as the Golden Tobacco Belt of North Carolina. Facts show that the tobacco grown in this section is not equaled elsewhere in the world. As all the tobacco raised in this Golden Belt finds its market at Durham, Blackwell's Durham Tobacco Co. are so situated that they control the pick of all the offerings, and this, in connection with their enormous storage facilities, enable them to carry the choicest stock until it is as sweet and fragrant as a rose. Success always brings imitators and several unprincipled manufacturers who have attempted to pirate their goods have been brought to justice. The smoking public are, however, fast learning that the Durham bull must be on the package to insure purity, and they will not take any other. Blackwell's Durham Tobacco Co. have lately added the manufacture of long cut smoking tobacco and cigarettes to their business, but the purity and quality of these goods have already secured them an enormous trade. Little did the gallant "boys in blue and gray," around their camp-fires in Durham in 1865, dream that they were sowing the seeds which have grown till Durham is one of the thriftiest and most widely known towns in the South, if not in the Union.

Messrs. M. E. McDowell & Co. are the sole agents for the sale of the goods manufactured by Blackwell's Durham Tobacco Co. The main office of this enterprising firm is at 603-605 Chestnut street, Philadelphia, and they have branch offices as follows: New York, No. 102 Chambers street; Chicago, No. 8 Wabash avenue; St. Louis, No. 416 N. 2nd street; San Francisco, No. 228 Front street; Atlanta, No. 9 W. Alabama street; New Orleans, No. 476 Constance street; London, England, No. 52 Farringdon street.

## A VALUABLE REMEDY.

ONE of the most widely known medicines at the present day is Swift's Specific. The growth in the sales of this remedy during the last few years has been astounding. As showing something of its efficacy and the estimation in which it is held, the following letters are presented:

Mr. Charles Berg writes as follows from the Hot Springs, January 1, 1883:

"Mercurial rheumatism made me cripple. After trying the springs two years, and the mercury and potash treatment until I was a skeleton and unable to do anything, I was prevailed upon to take a course of S. S. S. After taking three bottles my appetite began to improve and I gained flesh rapidly. When I had taken twelve bottles I felt as well as I ever did. It is now twelve months since I took S. S. S. My health and appetite are good, and I am able to attend to all the business I can get."

The following is from Peter E. Love, Esq., Augusta, Ga., January 8, 1885:

"I am a coppersmith by trade, and during a series of years my arms (being bare when at work) absorbed a wonderful amount of metal poison. Having a serofulous tendency from my youth, the small particles of copper and brass would get into the sores, and by this process the poison was conveyed into my blood until my whole system became infected. I was treated with the old remedies, mercury and iodide of potash. Salivation followed, and my teeth are all loose in my head, and my digestive organs became deranged. I have been helpless in bed for a year with mercurial rheumatism. My joints were swollen, I lost the use of my arms and legs, and became helpless as an infant. My sufferings became so intense it was impossible for me to rest. The doctors advised me to go to the city hospital for treatment. This I could not bear. A friend, who has proved a friend indeed, urged me to try Swift's Specific, believing it would cure me. Others discouraged me; but I secured a supply, and have now taken two dozen bottles. The first effect of the medicine was to bring the poison to the surface, and I broke out all over in running sores. They soon discharged and disappeared, and my skin cleared off. My knees, which had become twice their natural size, were soon reduced to natural shape again. My arms and hands, which had become useless, became all right again, and I can now use them without pain. The disease has left all parts of the body, save ulcers on my wrists, which are rapidly healing. I am weak from long confinement, but I have the use of all my limbs. This medicine is bringing me out of the greatest trial of my life, and I cannot find words of sufficient strength to express my appreciation of its virtues and the gratitude I feel that I ever heard of it."

Mr. W. C. Furlow, Sumpter County, Ga., September 11, 1884, writes:

"The drouth in Southwest Georgia last spring dried up the wells, and we were compelled to use water from a creek on the plantation. The result was that all were troubled with chills and fever. I carried with me several bottles of Swift's Specific, and as long as I took it I had perfect health. As soon as I ceased taking it, I, like the rest, was afflicted with chills. When I resumed its use I was all right again. We have used it in our family as an antidote for malarial poison for two or three years, and have never known it to fail in a single instance."

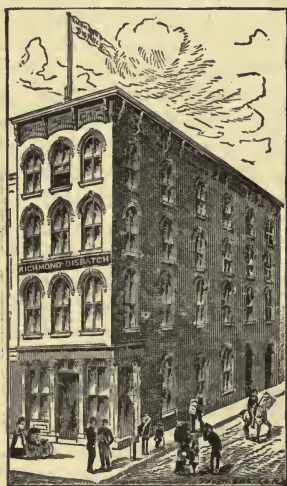
Here is a medical endorsement. It is from F. A. Toomer, M. D., Perry, Ga.:

"Bad blood is inclined to come to the surface in the spring, because of the effort made by good old mother nature to throw it off. If nature does not have help at this time the poison may go back to the system and produce all manner of ills; but by the aid of Swift's Specific the bad blood is all driven out through the pores of the skin, and permanently relieves the trouble. This remedy is purely a vegetable and harmless preparation, but so powerful an antidote to blood poison that it finds and roots it all out. Do not be deceived by mercury and potash mixtures, which drive in the poison, only to come out again in a worse form. I have cured permanently blood taint in the third generation by the use of Swift's Specific, after I had most signally failed with mercury and potash."

Get the genuine treatise on blood and skin diseases, mailed free by the Swift Specific Co., Drawer 3, Atlanta, Ga.

## THE RICHMOND DISPATCH, RICHMOND, VA.

IN 1850 James A. Cowardin, Esq., who had had a large and varied experience in newspaper work, undertook the establishment in Richmond, Va., of the "Daily Dispatch." His enterprise contemplated a penny paper, which, while giving paramount attention to the news of the day, would at all times be ready to discuss editorially topics of public interest. The *Dispatch* early became a popular favorite, distinguished for its activity in the collection of news, for reliability and readableness of its reports, for devotion to the best interests of city and State, and for its independent but calm discussion of all matters—political, financial, and other. It was the persistent friend and advocate of every judicious scheme of internal improvement, and devoted much of its energy to the promotion of such other enterprises—State, municipal and individual—as promised to advance the prosperity of Richmond. The *Dispatch* continued its career with uninterrupted prosperity during the late civil war, and until the 3d of April, 1865, when, in the evacuation of the Confederate capital by Confederate troops, a large portion



of the city was destroyed by fire, and in the general calamity the *Dispatch* lost its office. The building and all that was in it was destroyed, including a new outfit secured for it by a special messenger sent to England, who had run it through the blockade at Wilmington, N. C. But undaunted by this severe loss, and while yet the principal streets of the city were blockaded with the debris of the best business houses, the owners of the paper, Messrs. Cowardin & Ellyson, negotiated for a new and more complete equipment, and made ready to start again. Here their enterprise was frustrated by a United States military order. The publication of the *Dispatch* was forbidden. As soon as the revocation of that order could be obtained, in December, 1865, the *Dispatch* resumed its publication; but there were already six other daily papers in the field. It was a memorable period of newspaper competition in

Richmond; but the *Dispatch* soon took the lead, and its most formidable rival, the *Times*, went down after two years' struggle, the *Dispatch* becoming the purchaser of its good-will. The firm of Cowardin & Ellyson was dissolved a short time before the death of Mr. Cowardin (in 1882), and a stock company was formed, with the former owners as principal officers. The *Dispatch* has the best business location in Richmond, and twelve months ago it put in a Hoe type-revolving machine. It gets as full Associated Press news as is sent South; it has a regular correspondent in Washington, and in each city and town and center of intelligence in Virginia; it has a complete corps of editors and reporters, and is by no means backward in the expenditure of money for special work, whether it be reporting, telegraphing or illustrating. The *Dispatch* enjoys the confidence of the people of Virginia, West Virginia, North Carolina and other States. Its daily circulation is from 14,000 to 16,000, being larger than that of any paper south of Baltimore, if New Orleans be excepted.

The *Weekly Dispatch* is an 8-page paper filled with the latest news, miscellaneous and choice literature. Its present circulation is 9,000.

The *Dispatch* is altogether a live, prosperous and progressive paper, and is one of the many indices pointing to the healthful progress of Richmond City.



## THE NEWS AND COURIER, CHARLESTON, S. C.

IN no phase of Southern development has there been greater progress than in journalism. The press of the South has, within the last few years, taken rapid strides forward, and in the ability and enterprise of its papers that section now ranks with any other portion of the country. In fact, it may be safely claimed that each of the leading Southern cities can boast of one or more dailies that, in all that goes to make up a great newspaper, are far ahead of any to be found in cities of the same size in the North and West, with rare exceptions. One of the foremost of these is the Charleston *News and Courier*, a leading exponent of Southern sentiment; in politics, Democratic to the core; national, not sectional, in policy and purpose. For Northern and Western men who desire to increase their knowledge of the South; for Southern men who wish to know what is thought and accomplished and proposed in the Southern States; for Americans everywhere and at all times, the *News and Courier*, daily, Sunday, weekly, will be found to be without a rival in the completeness of its news service, the thoroughness with which the Southern field is covered, and the frankness and liberality with which the questions of the day are discussed. The *News and Courier* makes special rates to agents and for clubs, and will send specimen copies and special club rates free on application. Address the *News and Courier*, 19 Broad street, Charleston, S. C.

## THE TIMES-UNION, JACKSONVILLE, FLA.

THE Florida *Times-Union* and the Florida *Weekly Times* are published by C. H. Jones & Bro., *Times-Union* Building, West Bay, corner Laura street, Jacksonville, Fla. The great public, whatever their differences on other subjects, by common consent, unite in the verdict that the great papers of Florida are the Florida *Times-Union* and the Florida *Weekly Times*. There is scarcely a parallel where two papers with such wide circulation have in so short a time won their way into the confidence and support of the people. Up to the year 1881 various attempts had been made to establish a daily newspaper in Jacksonville, but the time was not ripe for the undertaking. Florida had not progressed far enough to support a great paper that would rank among the foremost journals of the country. To that end, and in November, 1881, Mr. Charles H. Jones, the senior proprietor and present editor and chief of the above-named papers, started the Florida *Daily Times*, which was a success from the start. In May, 1882, he formed a partnership with Mr. John P. Varnum and George W. Jones, his brother, the firm being Jones, Varnum & Co. In November, 1882, the Florida *Weekly Times*, at \$1 per year, was started, which had unprecedented success, and now circulates in every State and Territory in the Union, as well as to foreign countries, and claims to have by far the largest circulation of any paper in the State. In January, 1884, the proprietors of the *Times* purchased the Florida *Daily Union*, and consolidated the two papers under the title of the Florida *Times-Union*, which is the only daily paper in Florida with a general circulation which is as large as that of any other journal in the South outside of New Orleans. It has a solid reputation and is extensively quoted. The purchase of the Union included a job office, which has been thoroughly equipped with new material, and is now one of the best and most extensive in the South. In June, 1884, a book-bindingery with new equipment, including improved tools and machinery, was added. In March, 1884, Mr. Charles H. Jones purchased the interest of Mr. John P. Varnum, since which time the firm has been, as now, C. H. Jones & Bro. This firm conducts business on a strict cash basis, and ranks A1 in the mercantile world. In the early fall of 1884 the establishment was removed to more spacious quarters, the proprietors having arranged for the possession of the building on the corner of West Bay and Laura streets. They have also purchased one of the most valuable corner lots in the city, and will have a spacious building of their own erected before the present lease expires. Mr. Charles H. Jones, the founder, is a native of Georgia, and was in the Confederate army, but went North immediately after the war, and resided in New York City until he came to Jacksonville in October, 1881. In New York he had an extensive literary and journalistic experience editing the *Eclectic Magazine* and *Appleton's Journal*, and as contributor to other leading journals. The literary and financial success of the Florida *Times-Union* and the Florida *Weekly Times* is a marvel in journalism.

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MISSION HOUSES, SHIPPERS OF  
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THE JOURNAL OF COMMERCE was purchased by the present publishers in August, 1886, from the estate of the late George U. Porter, who established it in 1850. It is the only general trade paper of any standing in the entire South, and has for 36 years been the acknowledged exponent and representative of the commercial interests of Baltimore. The present publishers have given it a wider field, and it is their purpose to make it a paper that will be indispensable to every merchant in the Southern States. It is under the same management that has in 4 years brought the *Manufacturers' Record* to its present position as the most widely known and quoted industrial paper in the country. Since taking possession of it the publishers have inaugurated several changes, omitting some features and adding others, and we will endeavor to make every issue an improvement upon the last. There is nothing slow or antiquated about it. It is live, vigorous, enterprising and wide-awake; always up with, or in advance of the times, and thoroughly readable. In its editorial and news columns it deals with live topics in a live manner. Its review of the markets and quotations of prices are exhaustive; are compiled with the utmost care, and present the most satisfactory, thorough and reliable reflex of the state of the markets.

*The attention given to matters of general commercial interest, its General Jobbing Quotations, and accurate review of the markets in FOOD STUFFS, GRAIN, FLOUR, TOBACCO, LUMBER, COTTON, NAVAL STORES, and PRODUCE in GENERAL, make the paper of special value to Country Merchants, and to Grocers, Commission Houses and Shippers of Produce.*



The Paper has now a large circulation among this class of trade in Maryland, Virginia, West Virginia, North Carolina, &c., and its advertising columns offer a most valuable medium through which WHOLESALE GROCERS and DEALERS IN FOOD SUPPLIES, MANUFACTURERS OF SPECIALTIES, COMMISSION HOUSES and JOBBERS IN GENERAL may reach the trade in these States and farther South,

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FACTURES AND THE DEVELOPMENT OF THE MATERIAL  
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THE MANUFACTURERS' RECORD is more extensively quoted and more highly commended by the press than any other industrial or trade paper in existence. It is everywhere commended for the accuracy and thoroughness of its articles and statistics on Southern development. Its weekly issues constitute an authentic history of the industrial progress of the Southern States. From no other source can so much reliable information relative to Southern affairs be gathered. To those who have not read it regularly its weekly record of Southern material growth will be a revelation. The *Atlanta Constitution* says of it: "One of the ablest industrial journals in the country." The *Augusta Chronicle* says: "No paper in the Union has more entitled itself to Southern gratitude than this enterprising and reliable journal. \* \* It has come to be the standard of authority in the matter of Southern advancement. \* \* Its labor in this work has been remarkable, and its care and accuracy phenomenal. \* \* It has conferred an incalculable benefit upon our section." The *Charleston News and Courier* says: "It has in many ways contributed largely to the material development of the South, and deserves a wide circulation throughout the Southern States." The *New Orleans Times-Democrat* says: "The press of the South would be recreant to its mission if it did not recognize the excellent work being done in the cause of Southern development by the enterprising MANUFACTURERS' RECORD, published in Baltimore." The *Southern Lumberman*, of Nashville, says: "The Baltimore MANUFACTURERS' RECORD has spent more money, time and energy than perhaps any other paper in America trying to get at the exact facts in regard to Southern industrial progress."

It has an extensive circulation in all the 14 Southern States, and is widely read in the North and West by capitalists, manufacturers and others who desire to keep posted on the industrial progress of the South. As a medium for manufacturers of machinery, mine and mill supplies, hardware, &c., desiring Southern trade, its advertising columns possess unequaled advantages.

A feature of special importance is the CONSTRUCTION DEPARTMENT. Under this head is published a list of all new enterprises in the South, with the names of persons connected with them. Its readers thus get the earliest obtainable information of new mills or factories to be erected, old ones to be rebuilt or enlarged, new furnaces to be started, mining companies organized, railroads to be built, public buildings to be erected, etc., etc.

MANUFACTURERS' RECORD CO.

Publishers,

BALTIMORE, MD.

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Anniston Inn.

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Relay House.

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St. James Hotel,  
Laclede House.

### MONTGOMERY.

Exchange Hotel,  
Railroad Hotel,  
Central Hotel.

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### LITTLE ROCK.

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Deming Hotel,  
Grand Central.

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Windsor Hotel.

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Occidental,  
Lick House,  
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## STOCKTON.

Commercial Hotel.

## COLORADO.

### DENVER.

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Charpiot's Hotel,  
Grand Central Hotel,  
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St. James Hotel,  
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Merchants Hotel,  
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Wentworth House.

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Tremont House,

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Lanier House,  
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National Hotel,  
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Ashley House,  
Phoenix Hotel,

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Brevoort House,  
Briggs House,  
Burk's European Hotel,  
Clarendon House,  
Clifton House,  
Commercial Hotel,  
Continental Hotel,  
Farwell House,  
Gault House,  
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Hotel Brunswick,  
Hotel Richelieu,  
Leland Hotel,  
McCoy's New European Hotel,  
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Matteson House,  
Merchants Hotel,  
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Sherman House,  
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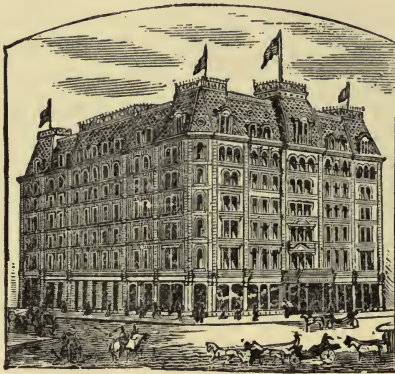
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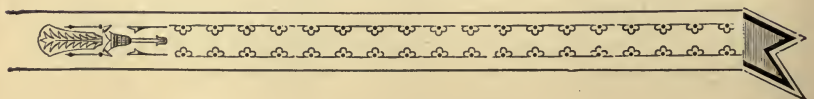


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Ashbrook House,  
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Ashland House,  
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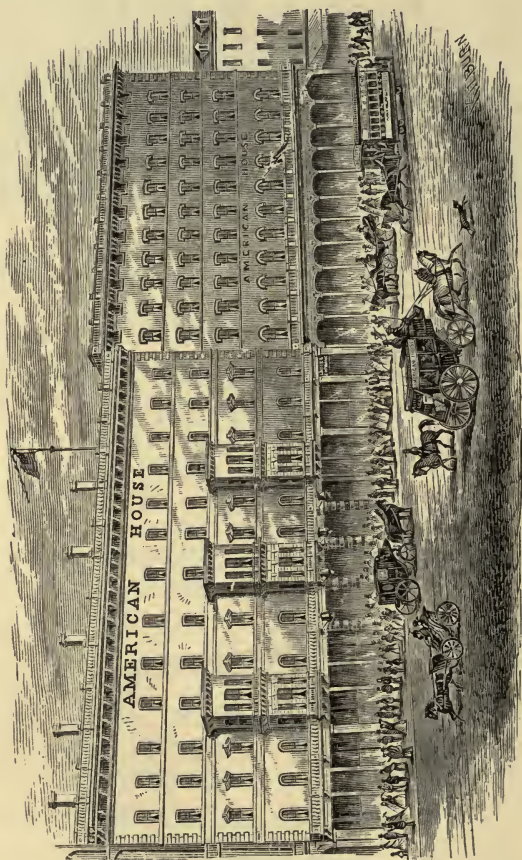
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Crawford House,  
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Parker House,  
Park House,  
Quincy House,  
Revere House,  
Sherman House,  
Tremont House,  
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NORTH ADAMS.

Mansion House,  
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Metropolitan Hotel,  
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Sherman House,  
Windsor Hotel,  
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Hotel Brunswick,  
Lindell Hotel,  
Metropolitan Hotel,  
Pacific House,  
St. James Hotel,  
Union Depot Hotel.

ST JOSEPH.

Bacon House,  
Commercial House,  
Pacific House,  
Saunders' House,  
Union Depot Hotel,  
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Laclede Hotel,  
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Hotel Brown,  
Hotel Belvedere,  
Everett House,  
Hotel Moser.

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St. Nicholas Hotel.

NEBRASKA.

LINCOLN.

Arlington Hotel,  
Commercial Hotel,  
Grand Central Hotel,  
St. Charles Hotel,  
Windsor Hotel.

OMAHA.

American House,  
Canfield House,  
Causin's Hotel.  
Creighton Hotel,  
Millard Hotel,  
Paxton Hotel,  
St. James Hotel,  
Windsor Hotel.

NEVADA.

VIRGINIA CITY.

International Hotel,  
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NEW HAMPSHIRE.

CONCORD.

Eagle Hotel,  
Phenix Hotel.

DOVER.

American House,  
Franklin Hotel,  
Mew Hampshire Hotel.

MANCHESTER.

City Hotel,  
Manchester House,  
Windsor Hotel.

NASHUA.

Tremont House.

NEW JERSEY.

CAMDEN.

West Jersey House.

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Coleman House,  
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Continental Hotel,  
Cosmopolitan Hotel,  
Earle's Hotel,  
Everett House,  
Fifth Avenue Hotel.  
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Gedney House,  
Gilsey House,  
Hotel Dam,  
Hotel Madison,  
Hotel Normandie,  
Hotel Royal,  
Hotel St. George,  
Hotel St. Marc,  
Hotel St. Stephen,  
Hotel Shelburne,  
Hotel Vendome,  
Kitsell House,  
Langham Hotel,  
Madison Avenue Hotel,  
Manhattan Hotel,  
Metropolitan Hotel,  
Morton House,  
Murray Hill Hotel,  
New York Hotel,  
Occidental Hotel,  
Park Avenue Hotel,  
Parker House,  
Plaza Hotel,  
Prescott House,  
Rossmore Hotel,

St. Cloud Hotel,  
St. Denis Hotel,  
St. James Hotel,  
St. Nicholas Hotel,  
Sherwood Hotel,  
Sinclair House,  
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Revere House,  
Troy House.

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	Warrenton Branch.....	Warrenton Jc. to Warrenton, Va. 9
	Gordonsville Branch.....	Orange to Gordonsville, Va..... 9
	Franklin Branch.....	Franklin Jct. to Rocky Mount. 37
	Washington & Ohio Div....	Alexandria to Round Hill, Va... 50
		400
York River Line . . . .	Balt., Ches. & Rich. S. B. Co.	Baltimore to West Point, Va.... 100
	Rich., York Rl. & Ches. R. R.	Richmond to West Point, Va.... 38
		138
Rich'd & Danville Div.	Main Line.....	Richmond to Greensboro, N. C. 189
	Rich. & Mecklenburg R. R.	Keysville to Clarksville, Va.... 31
	Milton & Sutherlin R. R....	Sutherlin to Milton, Va..... 10
		230
North Carolina Div. . . .	Main Line.....	Goldsboro to Charlotte, N. C.... 223
	No. thwestern N. Car. R. R.	Greensboro to Salem, N. C.... 28
	State University R. R.....	University to Chapel Hill, N. C. 10
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Atlanta & Charlotte Air Line Div.	Main Line.....	Charlotte to Atlanta, Ga..... 267
	Elberton Air Line.....	Toccoa to Elberton, Ga..... 51
	Hartwell R. R.....	W. Bowersville to Hartwell, Ga. 10
	Lawrenceville Branch.....	Suwannee to Lawrenceville, Ga. 10
	Roswell R. R.....	Roswell Junction to Roswell, Ga. 10
		348
Northeast'n R. R. of Ga.	Athens Division.....	Lula to Athens, Ga..... 40
	Tallulah Falls Branch.....	Rabun Gap Jct. to Tallulah, Ga. 21
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South Carolina Div. . . .	Char., Col. & Aug. R. R....	Charlotte to Augusta, Ga..... 191
	Atlantic Tenn. & Ohio R. R.	Charlotte to Statesville, N. C.... 44
	Chester & Lenoir R. R.....	Chester to Lenoir, N. C..... 109
	Chester & Cheraw R. R....	Chester to Lancaster, S. C..... 29
		373
Columbia & Greenville Div.	Main Line.....	Columbia to Greenville, S. C.... 143
	Spi'g, Union & Col. R. R....	Spartanburg to Alston, S. C.... 68
	Blue Ridge R. R.....	Benton to Walhalla, S. C.... 42
	Laurens Branch.....	Newberry to Laurens, S. C.... 12
	Abbeville Branch.....	Hodges to Abbeville, S. C..... 31
		296
Wst'n N. Carolina Div.	Main Line.....	Salisbury to Paint Rock, N. C.... 190
	Murphy Branch.....	Asheville to Jarretts, N. C.... 100
		290
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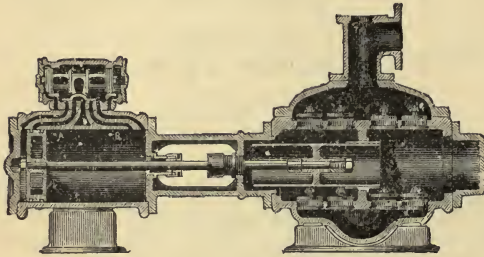
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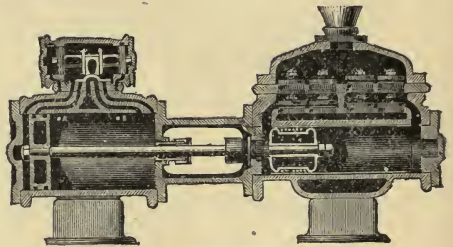
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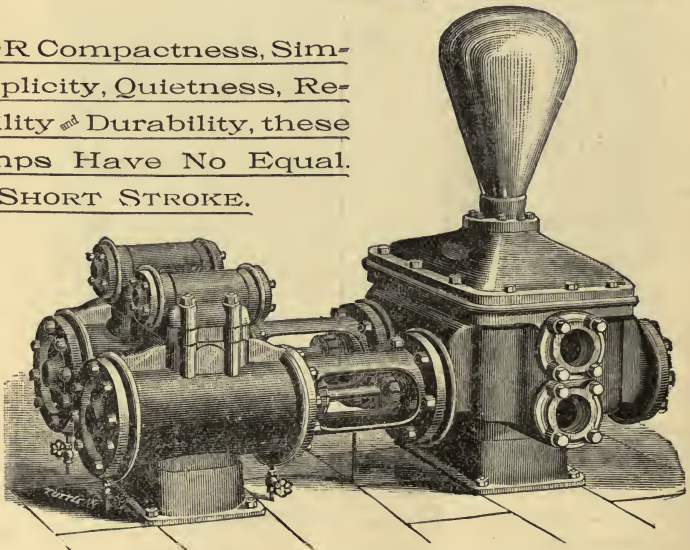
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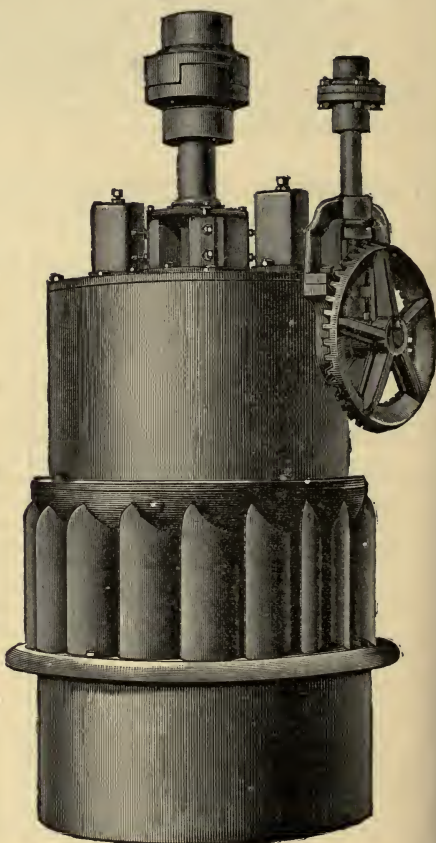
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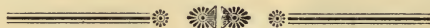


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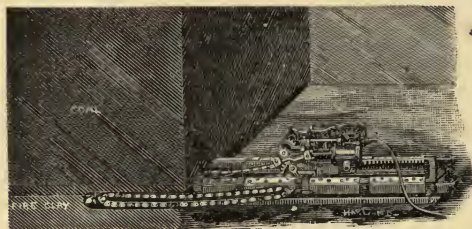
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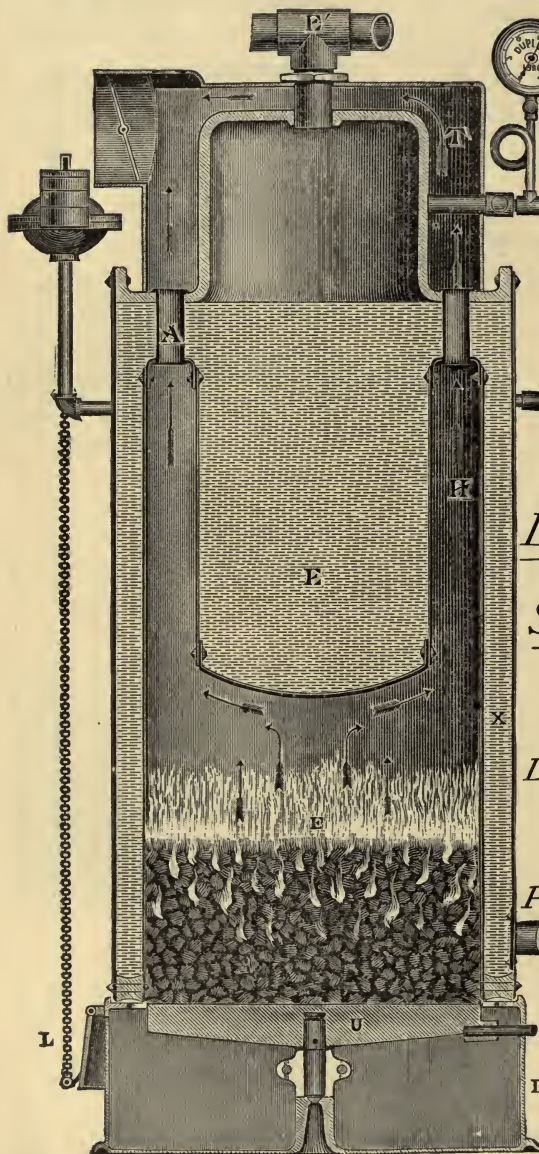
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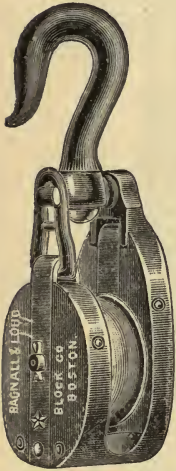
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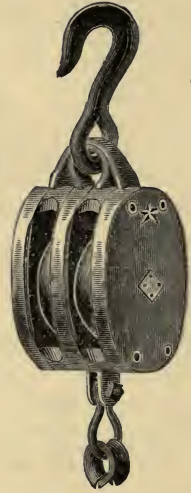
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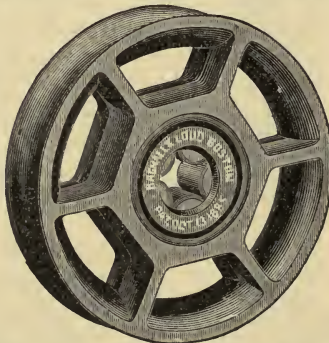
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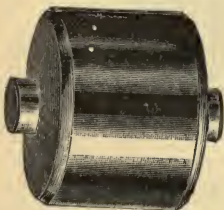


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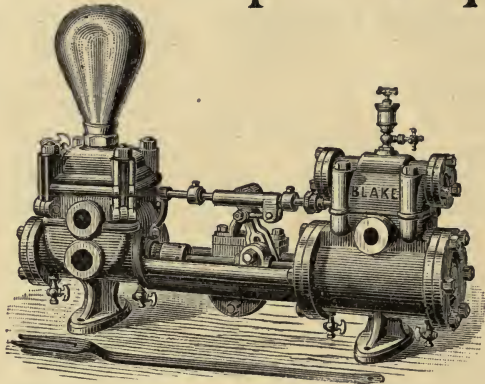
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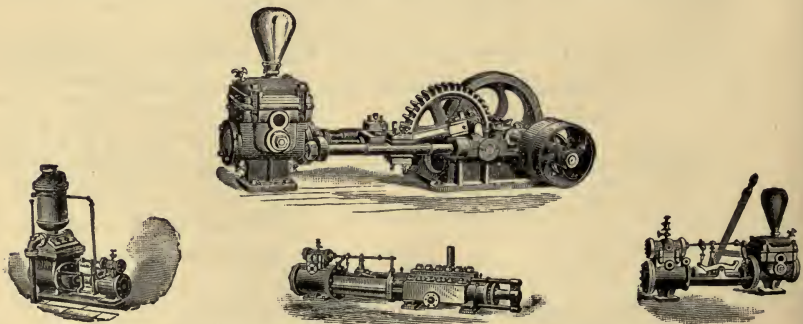
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FROM *F. C. & E. H. Buffum*, Bankers, Brokers and Real Estate Dealers, Stanton, Fla.: "We desire to thank you for the very valuable matter relative to the increase of Southern progress which you have so freely furnished us. We do not know of any other source from which we could have gained information so reliable and abundant. We look upon the MANUFACTURERS' RECORD as the most valuable paper of its kind published. It has been and is of great worth to us in our business, and we should not now feel that we could afford to do without it. It deserves liberal support from all who are interested in the advancement of the South."

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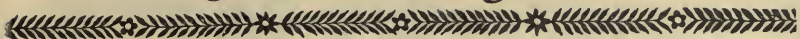
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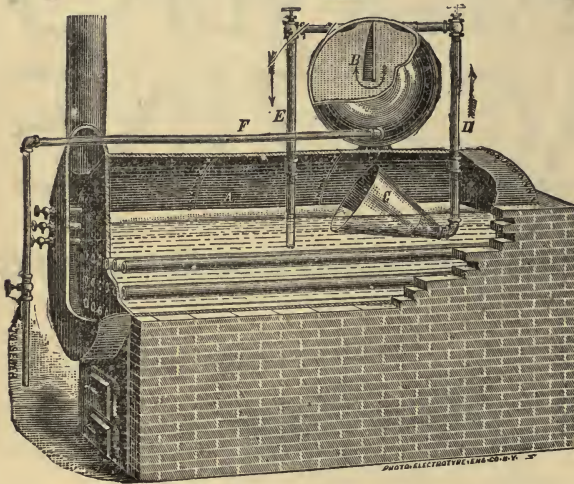


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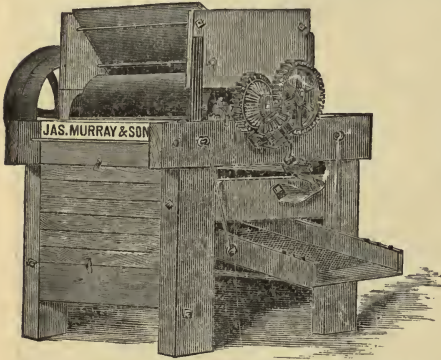
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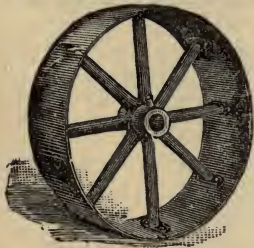
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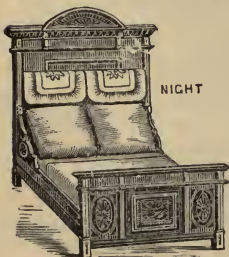
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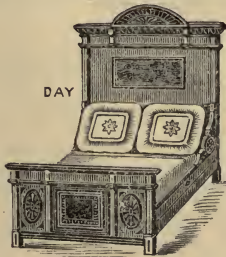
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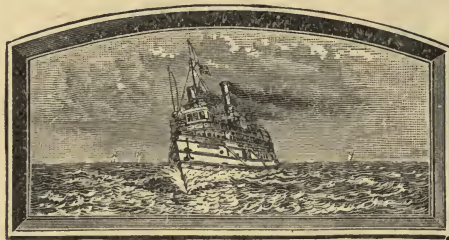
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