GOLD IN NORTH CAROLINA.

By Frederic Moore.

North Carolina is the pioneer gold State of this country.

Besides seeking the salvation of souls, the early European visitors to the South Atlantic States were impelled by the desire to acquire gold. There is nothing remarkable, therefore, in the fact that the early narratives report the presence of gold all along the section. As early as 1513 Ponce de Leon reported that a cacique in Florida had an abundance of it; but this, like most of the subsequent reports, was founded more on hope than actual discovery. Lack of success killed the hope in the early gold-seekers, and the search for the precious metal was given up until 1799, when a man named John Reed found in Carribus County a nugget weighing 17 pounds. And not even from that year does the beginning of gold mining in this country date, for it was four years after the find—during which time Reed used the nugget as a door prop—that it was ascertained to be gold.

When this discovery was made, further search was immediately instituted, with the result that many more nuggets were found, the largest of which weighed 28 pounds. In a year gold hunting had fairly begun, and from that time until 1827 all the gold produced in this country came from North Carolina. But the total amount during that time, so far as records go, was of only $110,000 value.

Up to 1825 all the gold came from washings. In that year a successful excavation was made in Montgomery County; then valuable quartz veins were located in Mecklenburg County, and from that time the mining of gold proceeded.

It was because the streams of the State became exhausted, in so far as the methods of extraction then in use were concerned, that attention was turned to vein mining. When, in 1834, the streams were practically abandoned, newly-located veins gave fresh impetus to the business. The South reached the highest point it had yet attained as a result. In the forties $1,000,000 of gold was produced, far the largest portion coming from North Carolina, though South Carolina, Virginia and Georgia were by this time producing gold. In the fifties a decrease set in in the production of the metal, with a practical cessation during the civil war. Immediately thereafter, however, the interest in gold mining revived; but the maximum output, about a quarter of a million dollars, has never been a factor in the production of the country (now between $70,000,000 and $80,000,000) since the western territory was opened.

The virgin ground where placer mining was operated in North Carolina undoubtedly yielded handsome returns; for many of the old tailings, imperfectly worked, have been washed over a second and a third time—even to a seventh—with a profit.

Through this placer mining, the first mode of getting gold in North Carolina, many of the mechanisms now universally used—for instance, the rocker and the "Long Tom"—originated. In the past, placer deposits have been worked with considerable energy and system. In the South Mountain Mining district there has been much work done in a small way, chiefly by men and women working singly or in small gangs, the pan being the most common means of separation.

Occasionally these people strike a pocket with from $5 to $100 in it, but for the rest they subsist on trifling quantities of gold and great expectations. It is said that an average of 60 or 70 cents per day can be made by a skillful and industrious workman. The women, beginning in childhood, develop great acumen in selecting the best gold-bearing land and become very expert in panning it.

At present very few placer mines are in operation. The Crawford mine, in Stanley County, four miles south of Albemarle, was opened on a fresh bed in 1892. The gravel consists of angular quartz and slate fragments in a clay matrix, and occurs in a narrow stream bottom about 250 feet wide. Its thickness is from one and a half to two feet and the overlay is from two to four feet deep. Owing to the scarcity of water, a method of washing, out of the ordinary, was pursued. A wooden tank of 200 cubic yards capacity was placed at an elevation above the stream bed. At one end was set up a standpipe, 30 feet high, which was supplied by a steam pump from a reservoir below. The gravel was hauled to the top of the tank in tramcars and dumped. Here it was washed by a discharge from the standpipe. A line of riffled sluice boxes ran from an opening in one side and near the bottom of the tank. The gold was collected from the tank bottom and the riffles in the sluices.

The gold occurs almost exclusively in the shape of nuggets. In April, 1895, an 8-pound nugget was found, and in August one weighing 10 pounds. The cost of working averaged about 50 cents per loose cubic yard.

The Mills property at Brindleton, Burke County, was worked over ground that had already been covered by the early hunters. Other placers of some importance are the Sam Christian mine, Montgomery County, and the Parker mine, Stanley County. In the South Mountain region the mining of large veins has been attempted to some extent, and several shafts have been sunk to a depth of 100 feet. The ore from these shafts looks good and is said to assay extremely well, $15 or $20 being asserted as the average, and much higher values being sometimes given. Though mining is sporadic throughout the State, fine specimens are frequently found, and very often the assay office in Charlotte shows ores running above $60 per ton. The ores can be mined and reduced for $3 per ton or thereabout, and it seems incredible that veins 18 inches or more in width, averaging $10 a ton in assay, should be allowed to remain idle. For economic reasons veins should be prospected with local capital. If reasonable quantities of gold with an average of $10 can be put "in sight," i. e., exposed on three or four sides, plenty of capital from the commercial centers will be forthcoming.

The veins are, as a rule, of comparatively moderate dimensions as compared with the great quartz lodes of California, but they are often more abundant within a given area, and within the zone of oxidation portions have proven exceptionally rich in free gold.

The configuration and physical character of the country is not such as to favor the accumulation of large bodies of placer gravel, yet, occurring as it does in the unglaciated region, the surface material in the vicinity of the outcrops of veins, as a result of the secular disintegration, is often rich enough to be worked profitably as placer deposits. When the limit of the zone of oxidation has been reached, the sulphuret ores are generally found to be of too low grade to be profitably amalgamated, and this treatment is sometimes further complicated by their association with tellurium. Hence the many abandonments of mining when the workings were still comparatively shallow, and the impression has gotten abroad that gold is not found at greater depths.

There is less positively known with regard to the geology of the rocks in which gold veins occur, and the relations of the deposits themselves, than there is of any other gold-bearing deposits in the country. It is probable that to this ignorance, combined with a want of technical knowledge on the part of so many of those who have attempted to mine gold, may in a great measure be attributed the many financial disasters that have brought gold mining in the State into ill repute.

When the geology of the belt becomes better known, and the mining falls entirely into the hands of those who have not only sufficient capital but also the necessary practical knowledge, the gold yield of the State will be considerably larger and gold mining will undoubtedly prove to be profitable.

THE COAL FIELDS OF THE UNITED STATES.

The third part of the Twenty-second Annual Report, 1900-1901, of the United States Geological Survey, dealing with Coal, Oil, and Cement, is now passing through the press. The volume is the answer to many requests made to the Geological Survey for information concerning the coal supply of the country, and is based on geographic, geologic and trade relations. The introductory part, by Dr. Charles Willard Hayes, Geologist, discusses briefly the distribution, development, production, and markets of the coal fields of the United States.

The total coal areas foot up some 280,397 square miles, exclusive of Alaska, and exclusive also of vast areas of lignite coal not strictly comparable with the higher grade anthracite and bituminous coals. Of this total area approximately 55 per cent is probably productive. The rank of States in production differs greatly from their rank in coal area. Thus Pennsylvania, ranking seventh in coal area, was easily first in production in 1900, with a little over 132,000,000 short tons out of a total production of about 241,000,000 tons. The same is true of the Northern Appalachian field as a whole, which, third in area, ranks first in tonnage and value of product, a result due to proximity to market, suitability of coal to fuel requirements, and relative quantity of workable coal per square mile of productive area. The anthracite field consists of several long, narrow basins in eastern Pennsylvania. Several small basins of Triassic rocks in the Piedmont region of Virginia and North Carolina, containing an aggregate of about 1,000 square miles, are coal bearing.

The Appalachian field, subdivided into northern and southern, extends from northern Pennsylvania 850 miles to central Alabama, embracing portions of nine States, and containing approximately 70,800 square miles, of which about 75 per cent contains workable coal. The Northern Interior field lies wholly within the State of Michigan with an area of approximately 11,000 square miles. The Eastern Interior field, lying in Indiana, Illinois, and Kentucky, has an area of 58,000 square miles. It is estimated that about 55 per cent of this area is productive. The Western Interior and Southwestern fields form a practically continuous belt of Coal Measure rocks, extending from northern Iowa southwestward 880 miles to central Texas and embracing an area of 94,000 square miles. The Rocky Mountain fields extend from the Canadian borders southeastward some 1,200 miles, with a maximum breadth of 500 miles and aggregate 43,610 square miles. The San Carlos field, El Paso County, Texas, and the Eagle Pass field, extending from Uvalde County, Texas, 75 miles to the Rio Grande and across into Mexico, properly belong to the Rocky Mountain field. The Pacific coast coal fields have a total area of about 1,000 square miles, with the most important deposits in Washington, a few deposits in extreme western Oregon and in central and southern California.

The lignite coal deposits, which are not treated of in this series of papers, embrace about 56,000 square miles in Montana, the Dakotas, and Wyoming; and then, in an area of about equal extent, they run in a narrow belt from the Georgia-Alabama line nearly to the Mississippi, and then west of the Mississippi in a broader belt, from Little Rock southwestward through Arkansas, Louisiana, and Texas.

The Appalachian field presents certain well-marked types of coal which for particular purposes are regarded as standard. The coal of the Connellsville district of the Pittsburg bed is the standard for coking coal, as the Pocahontas coal of West Virginia is the standard for steam coal. The Northern Interior field, of Michigan, contains only bituminous coal, a fair steaming fuel. In the Eastern Interior field, the largest part is a soft bituminous fairly good steam coal; then there is the block coal in Indiana; and also numerous small areas of cannel coal, valuable for gas making and for domestic purposes, in Kentucky. The coal of the Western Interior fields is fairly uniform in composition and makes a fair steaming fuel. In the Southwestern Interior field the coal varies from a soft bituminous in northern Texas to semi-anthracite in Arkansas. In the Rocky Mountain and Pacific fields the coal varies from lignite to anthracite. Owing to location and character of coal, the northern Appalachian field controls the coal trade of the Eastern States, sending its coal to the seaboard by the trunk-line railroads. It competes with the interior coal fields to the west by way of the Great Lakes and the trunk-line railroads, and to the south by way of the Ohio River. The Southern Appalachian field supplies the South Atlantic and Gulf States as far west as the Mississippi, and Dr. Hayes thinks this field will in time support a large export trade to Central and South American ports, and, after the Isthmian canal is built, to Pacific Coast ports also. The markets for the coal of the Northern and Eastern Interior fields are chiefly within their own limits, and they are in more or less competition with the Appalachian coal, and with the natural gas of Ohio, Indiana, and Kentucky. The Western Interior coal field supplies its own markets and those toward the north and west, where it must compete with the Rocky Mountain fields. The Southwestern Interior field has but little competition except from fuel oil in a large territory toward the south and west. Practically all the coal fuel used by the southern transcontinental railroads, as well as the Texas roads, comes from the north Texas and Indian Territory fields. Considering the entire region between the Appalachian coal field and the Rocky Mountain fields, there is observed a general movement of the coal westward, a tendency due chiefly to the higher grade of the eastern coals, but also in part to the generally lower westward railroad freights and to the ease of westward water transportation. The region west of the one hundredth meridian—about half the area of the United States, Alaska excepted—contains less than 20 per cent of the coal fields. The development of the coal resources of Alaska is as yet in the experimental stage. Practically all the information at present available concerning these Alaskan coal fields is summarized by Mr. Brooks in his paper, which should form an invaluable aid in future prospecting and development.

WELLS OF SOUTHERN CALIFORNIA.

In the Series of Water Supply and Irrigation Papers, the United States Geological Survey has in press, but not yet published, the "Wells of Southern California" (Nos. 59 and 60), by Mr. Joseph Barlow Lippincott. In his letter of transmittal Mr. F. H. Newell, Hydrographer in Charge, remarks: "The results are instructive, as showing what may be done in other parts of the United States under favorable conditions of climate and soil, and have peculiar interest in any consideration of the extent to which the arid land can ultimately be redeemed by irrigation."

The region discussed is the San Bernardino Valley in Southern California, which has an area of 563 square miles, and lies south and west of the Sierra Madre and San Bernardino Mountains. Riverside and Redlands are the centers of fruit production. Up to elevations of 2,000 feet the relatively high lands are free from frost, and the relatively low lands are subject to it. The distinctive crop of San Barnardino Valley is citrus fruits. Oranges predominate, followed next by lemons, and of late years the grape fruit has become a popular product. Olives, almonds, prunes, apricots, peaches, pears, and wine, raisin, and table grapes, are all grown to perfection in this district. In the eleven years prior to 1898 Riverside shipped nearly seven million boxes of oranges, an average annual income of $1,000,000.

Water is the lifeblood of the land. Without it this valley would become a semi-desert. The rain clouds from the Pacific Ocean are condensed against the 6,000 to 11,000-foot elevations of the Sierra Madre and San Bernardino Mountains, in the winter time usually in the form of snow, which feeds the streams up to about May. Mr. Lippincott classifies the water supply as surface streams, underground water, and storage reservoir water. The Santa Ana and other mountain streams have brought down detritus and built up deltas in the valley. The winter floods gradually disappear in flowing over these deltas and, sinking down, form reservoirs of artesian water of unknown but great capacity. In addition to the winter floods the summer flow of all the streams from San Antonio Creek to Mill Creek is diverted and used for irrigation purposes, and probably 50 per cent of it sinks into the ground and reinforces the water plane. This large underground reservoir slopes toward Santa Ana River, the most important stream of Southern California west of the Coast Range. It drains a total area above Rincon of 1,657 square miles; 971 square miles of the basin are mountainous. The controlling outlet of this great underground reservoir is at Rincon, where there is a larger body of water flowing during the summer than at any other place in California south of the Tehachapi Mountains, except along the Colorado. If an area of gravel of 500 square miles should be charged to a depth of 300 feet—a fair average depth to assume for this valley—its storage capacity would be 32,000,000 acre-feet of water. These figures suggest the enormous capacity of this great underground storage reservoir of San Bernardino Valley. It has been charged with waters through a long cycle of years by the floods described. Hence measurements made in the summer of 1898 showed that there was almost three times more water rising in the central portion of the valley than there was entering the valley from the mountain drainage basin.

Mr. Lippincott holds, therefore, that properly located development works near Rincon, permitting the lowering of this water plane each season 21 feet over an area of 1,000 acres, should yield from 1,500 to 2,000 miners' inches of water. He thinks the proper method of procedure should be to divert, for the creation of pumping power, the entire flow of the Santa Ana River, near the Auburndale bridge, about the first of May, and to return the water to its natural bed at the close of the irrigation season. His conclusions are: That a large percentage of irrigation water returns to the channels of the streams; that the movement of the water through the soil being exceedingly slow, this return water from irrigation will be a permanent source of supply; that water of this character is now making its appearance on the lands near Rincon; that it is impossible to determine the amount of water that could be gathered by collecting galleries on these lands; that the stream measurements show a loss between Rincon and the head of the Santa Ana River of about 800 miners' inches, which might be saved by a lined conduit extending down the canyon about 7.4 miles; that a power canal, water wheels, electric machinery, twenty pumping plants, and the gathering flumes necessary for 2,000 miners' inches of water could be constructed at an approximate cost of $75,000.

Numerous tables, eleven plates, and fourteen figures illustrate the discussion.