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THE UNIVERSITY OF NORTH CAROLINA
NEWS LETTER

Published Weekly by the University of North Carolina for the University Extension Division.

DECEMBER 23, 1925 | CHAPEL HILL, N. C. THE UNIVERSITY OF NORTH CAROLINA PRESS | VOL. XII, NO. 8

Entered as second-class matter November 14, 1914, at the Postoffice at Chapel Hill, N. C., under the act of August 24, 1912

KNOW NORTH CAROLINA

THE NEW INDUSTRIAL REVOLUTION

[Note: This is the second installment of the story of North Carolina and the New Industrial Revolution by C. R. Fay, eminent British economist, which recently appeared in The Economic Journal of The Royal Economic Society. The first installment appeared in last week's issue of this publication.]

3. Why is North Carolina becoming an industrial state? Why within North Carolina is the Piedmont an industrial centre so strong that it is not only growing without pause, but drawing to it, as by force majeure, some of the textile trade of Massachusetts? North Carolina possesses many favourable factors which in combination exercise a cumulative force.

(1) The Piedmont, like the West Riding of Yorkshire or the Valley of the Clyde, has a soil which is less fertile than that further east. It is one of the paradoxes of economic growth that regions of quick fertility, because they are easy and warm, carry less industry than those which must be industrial if they are to grow at all. This is true as between tropical and temperate zones, and true within a given zone, as between alluvial plains and rolling foothills. North Carolina is the "Old North State" and the Piedmont is the temperate zone of North Carolina.

The mean temperature of the Piedmont is 59 degrees F., and the average precipitation for the state is 50 inches. The largest rainfalls occur in July and August, when the cotton and tobacco need moisture. In 1924, however, the cotton in some parts of North Carolina was drowned out by excessive June rains. The humidity of the outside atmosphere in a cotton-spinning district is no longer a critical consideration, as the humidity inside the factory is controlled by a simple installation, the humidifiers, which hang from the ceiling like electric arc lights. The lowness of the "counts", by comparison with those of New England or Lancashire, is due to other things—namely, the youthfulness of the industry in the South, the standard nature of America's mass demand, and the employment, as generally in the U. S. A., of the easier and cheaper ring spinning, which is the modern adaptation of the continuous roller spinning done by Richard Arkwright on the water frame. In 1923, out of 34 million spindles in active operation, the South had 16 million, i.e., nearly 50 percent (North Carolina 5½ and South Carolina 5); but spinning coarser yarns it consumes over 60 percent of the cotton grown and consumed in the U. S. A.

Cheap Power

(2) North Carolina has cheap power; water power, steam (which means coal) power, and oil power. North Carolina itself has no oil and very little coal, but flanking it on the northwest are West Virginia and Kentucky. These two states in 1923 produced 141 million tons, seven-ninths of the coal of the South and two-sevenths of the coal of the whole U. S. A. Flanking it on the southwest at some distance are Oklahoma and Texas, which in 1923 produced nearly half the oil of the U. S. A. Moreover, the one great oil field still to be tapped, that on the Gulf Coast, is nearer to North Carolina than to the industrial North. But in addition the Piedmont has at its doors the power of its mountain rivers. Electric power is generated from water power and steam. North Carolina has 560,000 developed horse-power out of a possible maximum of 2,000,000 under conditions of complete storage and flood control. The power available 90 percent of the time ("commercial power") is put by the North Carolina Geological Survey at 578,000; that available 50 percent of the time 875,000. This latter can be made commercially usable if the several sources are combined in a system (as Bank resources are combined in a central reserve), if storage dams are built and auxiliary steam plants are used to supplement periodic deficiencies. By comparison with the American West, where great rivers are sometimes trickles six months of the year, the stream flow of the Western Appalachians is remarkably uniform and easy to control. But the industrial pace has been so quick that fuel has gained relatively to water in North Carolina since 1918. One horse power equals 746 watts, one k.w. equals 1,000 watts. North Carolina consumed in 1920 a total of 732 million k.w. hours, in 1923 a total of 1,313 million k.w. hours; but whereas in 1920 only 7 percent was generated from steam, in 1923 this percentage had risen to 17.9. However, by interconnections one state can draw on another. Thus in North Carolina there are two great power companies, the Southern Power Company, and the North Carolina Power and Light Company. 1921-1922 were years of drought in the North Carolina Power and Light Company's territory; therefore the steam plant of the U. S. A. Government at Sheffield, Alabama, was loaned to companies in the south-east; Alabama power being thus available for its neighbor Georgia, Georgia was able to supply the Southern Power Company, which in its turn released equivalent power sufficient to meet the deficiency of the North Carolina Power and Light Company. Because of water-power development, increased efficiency of steam plants and interconnection of stations, the cost of electricity in the U. S. A. was 5.1 percent less in 1923 than before the war, notwithstanding the greatly increased cost of labor, coal and other materials. Where cheap power is, there are the industries gathered together.

Raw Materials

(3) North Carolina has its raw materials at its doors. It has at Mount Airy, on the edge of the Blue Ridge Mountains—and once again the superlative may be used—the largest granite quarry in the U.S.A. It is still a leading state in hard and soft woods. In the furniture industry, which uses the gum tree very largely, more than one firm has protected itself against timber shortage for very many years ahead; for they hold large tracts in the swamps of South Carolina, where the risk of destruction by fire is slight. Cotton and tobacco, the two leading cash crops of the state, are the raw materials of its two most valuable industries. North Carolina spins more than the one million bales it grew in 1923. It turns into stripped or finished tobacco, a tobacco crop which for 1920-23 averaged over 300 million pounds, and in addition it imports other tobacco for blending.

Subsidiary Industry

(4) North Carolina has within its boundaries or on its flanks important subsidiary industries. When a country grows and produces a leading raw material of industry, the types of subsidiary industry which tend to gather around it are three in number.

(a) Chemical industries supplying the ingredients of crop production.

(b) Mechanical industries supplying the machinery of the manufacturing processes.

(c) By-product industries utilizing the by-products of the main product or products.

In North Carolina these are represented by the manufacture of:

(a) Commercial fertilizer.
(b) Textile machinery (in its infancy).
(c) Cotton-seed oil and cake.

The fertilizer industry in the South had its inception in South Carolina more than fifty years ago through the discovery of rock phosphate. Today two-thirds of the capital invested in the industry is in the South. In 1920 the South produced 7.6 million tons of fertilizer and consumed five millions. Georgia leads in production, North Carolina being fourth; but the Carolinas run level as the leading consumers. Like banking in Great Britain and Canada, the industry has evolved along the line of numerous local establishments under large-scale control, represented now by the "Big Six." The product sold is the mixed fertilizer, combining the three elements essential to plant growth—phosphoric acid for fruiting and maturity, nitrogen for vegetation and growth, potash for vigor. Phosphoric acid, which forms about two-thirds of the plant food in commercial fertilizer, is yielded by the rock phosphates of the South; nitrogen by imports from Chile, and also as a by-product from coke ovens and packing plants. Down to the war Germany held a monopoly of natural potash, but during the war native sources were found in the brine lakes of the American West and the oil borings of Texas. Their use is a matter of development and cost; and meanwhile the "Big Six" have reached out to control supplies in Chile, Germany, and elsewhere. The relation between the fertilizer company and the grower of tobacco or cotton is a study in itself, exhibiting a domination as far flung as that of the agricultural implement companies over the western grain grower, and much more oppressive.

Textile Machinery

The great bulk of the textile machinery is made in the specialized machine-making centres of New England—Worcester, Hopedale, Lowell, Pawtucket (Rhode Island), Whitinsville (the headquarters of the Whitin machine works) and the like; one large firm, Messrs. Howard & Bullough, being originally an English concern. In the days when there were no railroads and technical processes were secret—and it was at such a time that the leading industries of Great Britain were localized—physical distance between machine-maker and machine-user was a grave handicap to the latter. Today the handicap amounts to little more than a higher freight rate on machine parts. The machine companies install the machinery and some of them send service men periodically to the mills. Their experts can serve North Carolina as thoroughly as New England; and indeed must, for it is there that the greater expansion is occuring. As late as 1919 the characteristic of the Southern textile industry was the multiplicity of small enterprises, and their numerical increase was sufficient to keep the size of the textile establishments in the U. S. A. constant for the period 1909-1919. But since 1919 there has been a trend towards (a) the financial control of many mills by a chain of interests; (b) the grouping of all the stages of manufacture, spinning, weaving, and finishing, in or around a parent establishment of great size selling a standard product with a trade name. It is claimed that in 1924 $60 millions of New England money found its way to Southern mills for purchase or new building; but the one billion of capital invested in the textile industry of the South is mainly in the ownership and control of Southern men. There is, therefore, no atmosphere of dependence on a distant machine-producing centre. The South makes many of its cotton gins, the key machine of the first cotton process; Charlotte, N. C., and other Southern towns have plants engaged in making cotton cards and a few machine parts. In the denim mills of Messrs. Cone (White Oak, Greensboro, N. C.), the writer was shown a process of continuous warp dyeing invented by this concern. The machinery had been put together by the firm's shop and the fittings were rough; but with pioneer work such as this proceeding in Southern mills the machine-makers have as much need of the South as the South of them. Furthermore, North Carolina, though itself not a producer of coal and iron, is in the industrial atmosphere which coal and iron generate. For it is on the main lines of communication between Pennsylvania and Birmingham, Alabama, the great and growing iron and steel centre of the South.

Utilizing By-Products

In the third type of subsidiary industry, the utilization of by-products, North Carolina has an assured position because it is a great producer of cotton as well as a great consumer of it. Since these by-products per volume have a lower value than the main product, it is generally more economical to process them near to the point at which they emerge. On this fact rests the strength of the cotton-seed oil and cake industry of the South. The cotton seed crushed in the South grew from a trifle in 1875 to nearly five million tons in 1914; during this period the value of cotton by-products and the method of securing them were learned. From 1914 to 1923 the cotton crop declined from 16 to 10 million bales under ravages of the boll-weevil; and the seed crushed declined correspondingly to some three million tons. Ginned cotton yields linter cotton by a second ginning in the proportion of 80 pounds of lint to one ton of seed. The seed itself yields oil, meal and hulls. The oil is used in the manufacture of oleomargarine, soaps and perfumery. The meal and hulls, separately or in combination, are used as cattle feed. They might be used as a fertilizer on near-by farms, but their recent price has been too high to allow much to be consumed in this way. Memphis, Tennessee, is the headquarters of the trade, but the plants are widely distributed; and there is no Hull or Marseilles in the American South. "The oil mill has been taken to the cotton fields rather than the seed to some oil producing centre . . . . . it has allowed the most economical processes of assembling seed from the farmers and distributing meal and hulls to the farmers in turn. In many places it is a custom for the farmer to haul in his seed to the cotton oil mill and take meal in exchange." (The South's Development, p. 206.) Under these conditions the manufacture is seasonal. Thus in the winter of 1924-25 the Elba mill, Charlotte, N. C., expected to run from October to April, working continuously with two twelve-hour shifts. When the plant shuts down the workers, who are colored people, will find summer employment, as the tobacco stemmers do, in cotton picking, road work, hotel service, etc.

—To be concluded next week.

A HUMAN NATURE TEXT

The Bible is the best of all textbooks on human nature. William Lyon Phelps is a Yale college professor as well as an interesting writer and remarkable human being. When he speaks of education it is fair to assume that he knows what he is talking about. He says: I thoroughly believe in a university education for both men and women, but I believe a knowledge of the Bible without a college course is more valuable than a college course without the Bible. For in the Bible we have profound thought beautifully expressed; we have the nature of boys and girls, of men and women, more accurately charted than in the work of any modern novelist or playwright. You can learn more about human nature by reading the Bible than by living in New York.—Bruce Barton, in Colliers.

RURAL ELECTRIC POWER

XVII. THE ISOLATED FARM PLANT

The problem of electrifying farms and rural homes, as has been stated before, splits into two separate problems according to the distance of the community in question from an existing transmission line. If the place is within reasonable distance of an existing public utility system, probably the best hope is an extension of service from that system. The problem then becomes one of finding enough uses for electricity to pay for a long transmission line with only a few customers per mile of line. But if the place is far distant from any public utility system, the only hope at present is for the farmers to get their own small systems, either individually or in cooperation.

Fuel Plants

The small systems may take the form of either fuel or water power plants. The fuel plant, consisting of a gasoline or kerosene engine, driving a dynamo and supplying current through a storage battery, is in common use. It is well adapted to lighting and household use, but is not quite so suitable for larger farm operations which require greater power. This has been expressed by engineers as follows: "There is little advantage in using a gasoline engine to drive a generator which would in turn operate the motor, when the engine itself could be used to drive the machine, obtaining more power for the same expenditure by eliminating losses in line and motor." Nevertheless the individual fuel plant will probably continue to give good service in many farm homes for purposes of lighting, pumping, and small household appliances.

Water Power

The other type of isolated plant, that of a small water-wheel and generator located on a convenient stream, requires access to a stream, of course. But it requires more than that, and here is where our hopes of harnessing the many tiny streams in North Carolina to relieve the drudgery of farm work and increase production, are sometimes over-stated. That requirement is that the quantity of water flowing, and the number of feet it drops within the given distance, be sufficient to generate the required horse-power. The difficulty in meeting this requirement is illustrated by the case of a certain rural resident in North Carolina who desired to install a 10 horse-power plant on a stream located a mile and a half from his house. The stream flow was 225 gallons per minute and the height of the fall was 13 feet. To find the horse-power that can be generated, the method of calculation is to change gallons per minute to gallons per second, multiply this figure by the fall in feet, and divide by 82. (Divide by 11 if flow is measured in cubic feet per second.) In this case it was found that instead of 10 horse-power less than one horse-power could be generated, and much of this would be lost in transmitting the current a mile and a half to the residence. However, in many cases like this where the stream-flow is too small, a dam may be used for the double purpose of securing the fall of water and providing a pond. A pond which will store the flow of the stream for twelve hours each day, permits the user to double the power output for the remaining twelve hours.

Many Idle Streams

From these statements about the inadequacy of some streams for isolated farm plants, it by no means follows that there is no future for this kind of farm power development. The Department of Agriculture estimates a large number of such streams now running idle which could supply between five and ten horse-power during all seasons of the year.

Further information about power from small streams may be obtained from articles in the News Letter of July and August, 1925 (Vol. XI, Nos. 35 to 59). A simple method of measuring the flow of water in a given stream is described in Farmer's Bulletin No. 1430 entitled "Power for the Farm from Small Streams," which can be obtained free by writing to U. S. Department of Agriculture, Washington, D. C.—A. T. Cutler.

FARM HOMES OF GRANVILLE

For years we have heard about the drudgery and dreariness of domestic life in the rural communities of the county. For centuries the good housewife was condemned to human slavery in doing her part to make the old farm earn a living. But today the burdens of the women who live on them have been lightened.

A partial survey shows that almost every farm house boasts of a sewing machine and oil stove. The auto was outnumbered only by the sewing machine. Out of a total of 100 homes canvassed the following conveniences were found: Automobiles 43; sewing machines 52; oil stoves 30; washing machines 38; piano or organ 40; phonograph 30; telephone 26; carpet sweeper 18; bath 12; fireless cooker 10.

Residents of Granville who study over that list for a few minutes will see how drudgery is disappearing from the farm home and how labor saving devices and modern conveniences are slowly but surely coming to relieve the woman of the rural district of back-breaking toil.

Farm lighting systems and power from gasoline engines or dynamos are to be found now in many places in Granville county outside of the incorporated towns. And these are the things that are freeing the farm wife from the slavery that has already existed entirely too long.—Oxford Public Ledger, Sept. 29, 1925.