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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 254,

For the Week ending November 13, 1880.

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THE PROSPECTS OF TRADE.

On all sides the business outlook is of the most cheering character. The statistics of the Treasury Department show that during the nine months ending with September the total exports of breadstuffs was in round numbers nearly $209,000,000, or over $30,000,000 more than during the corresponding period last year. The exports of domestic provisions during the same period approached $104,000,000, against $82,000,000 for the same months last year. The total exports of domestic manufactures and merchandise of all sorts during the first eight months of the current year exceed those of the same period last year by more than twenty per cent; and the general conditions of trade during the latter part of the year—for which the full statistics are not at hand—certainly indicate no falling off in the ratio of increase. The increase in the value of goods imported this year is greater than the increase in exports; while the steady inflow of gold from Europe is proof enough of the healthful condition of our foreign trade as a whole.

Our domestic trade was never being prosecuted with greater vigor, confidence, and profit. The great lines of communication are taxed to the uttermost to handle the merchandise now in motion. The trunk lines of railway report their western bound freights to be from 25 to 40 per cent greater than this time last year, while the eastward movement is fully 10 per cent above that of the corresponding period in 1879, with the heaviest parts of this year's crop yet to be moved. The coastwise trade is likewise reported as considerably in excess of last year's.

Not less cheering are the reports from manufacturing centers, East, West, and South. The mills and factories are running full time and full handed, and critical observers note as a source of special gratification that at no time since the war has there been so great a demand for tools and machinery required in extending old established works and for equipping new ones. The manufacturers of tools, machinery, and other appliances for manufacturing are crowded with orders, indicating not merely a present active demand for manufactured products for general consumption, but a confident expectation on the part of producers of increasing demands in future.

Even so conservative an authority as the United States *Economist* does not hesitate to say, what we had the pleasure of asserting more than a year ago, that the country has entered upon a period of productive energy and prosperity such as it has never seen before. In the words of our contemporary, the best ten years in all the history of this country are now before us. During the coming decade we shall enjoy a period unexampled prosperity, a prosperity whose foundations are as real and whose basis is as broad as the unequaled products of our fields, flocks, factories, and mines.

"With our currency on a specie basis, with our population steadily increasing through the active toilers of foreign immigration, with vast areas of rich virgin soil being constantly added to our productive growth, with all our vast industries in successful operation, with the balance of trade in our favor, with peace at home and abroad, with labor steadily employed and wages good, with the wealth of the nation rapidly augmenting, there is no bar in the way of our commercial advancement. All obstructions are happily removed, and taking care of home wants and developments, let the business men of this country reach out for the commerce of the world."

As we remarked in a recent issue of the SCIENTIFIC AMERICAN the closing years of this century should see, and certainly promise to see, as rapid a progress toward American commercial supremacy as the two decades just past have seen in the development of our agricultural and mechanical supremacy, with a collateral progress in our industrial affairs that the boldest scarcely dream of now.

PROPOSED PALM OIL INDUSTRY.

Mr. Edward S. Morris, of Philadelphia, suggests that something profitable might be done in this country in the extraction of palm oil by means of naphtha. While in Hamburg, Germany, lately, he found three factories running night and day extracting oil from palm kernels, and tried to gain admission to them. He was not admitted, the Germans thinking that Americans know quite enough, and that we will soon undersell them under every business head. He learned, however, that the oil was extracted from the kernels by naphtha, and not by hydraulic pressure. Most of the oil thus made goes to France, where it is refined and made into a fine table oil. Labor is so cheap in Germany that they can afford to throw the meal away after extracting the oil. If the oil was obtained by pressure, then the meal or cake would have the same market value as linseed cake, as food for cattle.

At Liverpool he learned that palm oil and palm kernels formed about two-fifths of the entire tonnage of more than twenty steamers trading along the African coast to and from Liverpool. The exportation of palm kernels from Africa began only a few years since. They now have a regular market value and a ready sale in England, where the oil is mostly purchased by soap makers and perfumers. There the oil is extracted by pressure, and the cake or meal finds a ready sale, being free from the odor of naphtha.

Believing that the industry might be profitably introduced here and the importation of palm kernels made a useful adjunct to the trade of American vessels visiting the African coast, Mr. Morris brought home three tons of the kernels purchased in Liverpool. He sent samples to several parties likely to have facilities for extracting the oil, but found no one ready to undertake the work. He is still confident that the industry could easily be established here, and that it would pay. Seeing, however, that we have only begun to utilize the equally valuable oil of our enormous yield of cotton seed, there does not seem to be much probability of any rapid increase in the importation of African palm kernels for their oil. It might be a profitable thing to do, nevertheless. The objection to the naphtha process, that it leaves an odor of naphtha about the oil cake, is, we are inclined to think, unfounded in fact. At any rate, the taint must be rapidly dissipated on the exposure of the meal to free currents of air.

THE EFFECT OF FORESTS UPON RAINFALL.

The effect of clearing land of its trees, according to the opinion of many meteorologists, engineers, and other scientific students of the subject, is to diminish the average rainfall of the country thus cleared, to lessen the outflow of the rivers, and also to cause such concentration of the amount of rain and snow within short periods as to increase the danger of floods to a marked extent. This theory was formulated most fully in 1873 by Sir Gustav Wex, chief engineer of the improvements in the Danube River at Vienna, who supported his opinion by very ample calculations as to the decrease in the volume of water discharged by the five principal rivers of Central Europe. Since that time many opinions have been expressed by experts, some affirming, others denying, the correctness of Sir Gustav's theory; some have claimed that the fact of such a decrease in the discharge of the rivers cited has not been satisfactorily established; while others, admitting that the decrease has gone on, deny that this fact is sufficient to prove the accuracy of all, or even any of Sir Gustav's conclusions. The latter has, therefore, recently published a second treatise, in which he says that for six years he has shunned neither labor nor expense in obtaining as many and as reliable technical hydraulic measurements and data of different streams as possible; and he has come to the conclusion that his theory has been proven to be correct.

Sir Gustav gives voluminous tabular exhibits of observations taken on a number of large rivers, extending over periods of more than 100 years in some cases, and in nearly every case it is found that the river surface has been lowered to a marked degree. The rivers cited are the Upper and Lower Rhine, the Danube, the Elbe, the Vistula, the Oder, the Moselle, the Main, the Theiss, the Tiber, the Po, the Seine, the Glommen (in Norway) and the Mississippi. In reply to the objection that the lowering of a river's surface may be due to the deepening of its channel, and not to the decrease in the volume of water discharged, Sir Gustav admits that the channel beds are sometimes raised and sometimes lowered; "but," he says, "if from the numerous gauge readings submitted by me are eliminated those which were taken on stretches of the stream in which changes in the bed of the river took place, we will still find some rivers or stretches of stream which lie either in a natural unchangeable bed, or which have been improved from time immemorial and are in permanent condition. The most scrupulous expert must admit that on such rivers and stretches we can justly assume that the decrease in their stages—*i. e.*, the sinking of their surface, indicates a decrease in their volume of water, since it would be impossible to explain the phenomenon in any any other way."

Sir Gustav claims that the destruction of forests, necessarily coincident with the advance of civilized habitations into new countries, not only diminishes the aggregate amount of rainfall, but it increases the tendency of floods. This is, of course, equivalent to saying that the rainfall (which word includes all atmospheric aqueous deposit, such as rain, snow, hail, dew, etc.) is concentrated into briefer spaces of time during the year, instead of being equally distributed; and as this concentration must have a detrimental influence upon agriculture, the importance of the subject extends beyond its effect upon rivers alone, which is the only point of view taken by Sir Gustav Wex. It therefore deserves double attention in this country, where droughts are so often such serious causes of crop failures.

The observations of the Mississippi recorded by Sir Gustav were made at Natchez, Miss., and extended over a period of 11½ years. They showed a mean annual fall of seven-tenths of an inch in the surface level of the water, while the highest stages averaged nine hundredths of an inch higher each year, and the lowest stages thirty-nine hundredths of an inch lower each year.

THE BRUNTON TUNNELING MACHINE.

The Society of Associated Coal Miners, of the Bouchès du Rhône, in the south of France, have long had in view the cutting of a tunnel nearly ten miles long between their mines in the basin of Fuveau and the sea. During the last three years they have made many experiments with machinery intended for tunneling, at an aggregate expense of about $40.000. There are serious objections to the use of explosives for removing the rock, and recently they have made some trials with the tunneling machine of J. Dickinson Brunton, invented for the purpose of cutting the tunnel beneath the Channel. The machine consists of revolving cutting disks placed at different angles, and so directed as to remove the rock in considerable quantities directly without the use of explosives. Mr. Brunton estimated that in a tunnel of 7¼ feet in diameter, he could progress at the rate of about two feet an hour through calcareous rock.