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(Illustrated articles are marked with an asterisk.)

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Table listing contents of the supplement, including sections on Engineering and Mechanics, Technology and Manufactures, Chemistry and Metallurgy, Electricity, Light, Heat, etc., Natural History, Geology, etc., and Medicine and Hygiene.

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STEAM RAILWAYS IN THE STREETS OF NEW YORK.

The Court of Appeals of New York State has rendered a decision covering the cases before it, based on the questions arising under the State constitution and laws relative to the construction of elevated railways in the city of New York. The sum and substance of the judgment is that existing companies are at full liberty to go on and complete their roads in accordance with the plans modified and approved by the Rapid Transit Commission of this city, and that they are under no necessity of obtaining the consent of the property owners to use the streets for their purpose. The various obstructions placed in the path of these enterprises by courts of inferior jurisdiction are entirely swept away, and the decision, being that of the appellate court of last resort, becomes settled law. The immediate consequences, it is reported, will be the construction of an elevated road on the east side of the city similar to that already in existence on Ninth avenue on the west side, together with branches extending along some of the finest cross streets, and the continuation of the Gilbert Elevated Railway, which has already been begun in West Broadway, over its projected route. Probably other competing lines will also be undertaken.

This result is hailed as "a victory for rapid transit" with scarcely a dissenting voice on the part of the press of the metropolis. We desire none the less to record our disapprobation, and to say, as we have steadily held from the time when the elevated system of city railways was first broached, that in our opinion this mode of transit is unsuited to the wants of the public, unjust to our citizens, open to grave objections from an engineering point of view, and manifestly inferior to other systems, the success of which has been demonstrated by the plainest results of experience. That rapid transit is an urgent necessity admits of no question; but the need is not such as to warrant the hasty conclusion that the end will justify any means. The business welfare of our city depends greatly upon the condition of its streets, and that these should be maintained clear and unobstructed is a measure of public policy even more important than the securing of quick transit. The Elevated Railroad is a serious obstruction, it has proved ruinous to the property past which it runs, and it is an unsightly blemish on the magnificent thoroughfares which now constitute the chief ornament of New York.

We need not go on and multiply objections now that the elevated road has the sanction of law. We simply wish to point out that a project loaded with them has been adopted, in preference to a system in which they are absent. The elevated road and the underground road are now and have been for some time in operation in this city simultaneously, where one was made and has been maintained in the teeth of the opposition of citizens and property owners, the other, which stands as one of the most splendid engineering achievements of recent years, was constructed in accordance with a most urgent popular demand. Residents along Fourth avenue held public meetings to insist that the tracks of the Hudson River and other lines be sunk, and no one for an instant advocated their elevation. Rapid transit trains are now constantly run over this underground road, and people have had the opportunity to judge of its thorough efficiency. In Baltimore and St. Louis, the underground system has been adopted in decided preference and now exists; in London it has been in successful operation for many years, and even in Constantinople, a city destitute in other respects of the most ordinary improvements, the underground railway now furnishes the means of transit.

The subject must now be regarded as singularly anomalous. A project, the feasibility and advantages of which are recognized by the best engineers, which is a demonstrated success and which is objectionable to nobody, is strangely enough deferred in favor of one, the practicability of which is by no means free from doubt, which has afforded only very restricted proof of its benefits, and which meets the strongest disapproval from every one directly affected by it, and numbers its supporters only among those whose property is not likely to be injured by the incursion of its tracks.

THE EXTENSION OF TEA CULTURE.

For a number of years the Department of Agriculture at Washington has been trying, without much success, to induce the citizens of our warmer States to undertake the cultivation of tea. The plant has been successfully grown in a number of States. In many parts of the South and in California, the tea plant thrives quite as well as in its native country. In fact, there is no reason to doubt the capacity of the country to produce all the tea required, certainly for home consumption, and thus keep at home the millions annually paid to the tea-growers of China and Japan. The great obstacle to this extension of home industry appears to be the prevalent impression that, to be successful, tea-growing must be carried on in large plantations. If that were true it would be hopeless to expect ever to compete with the tea growers of China, Japan, and other countries, where labor is plentiful and cheap. That sort of tea-growing is barred out of this country by the high price of labor. But that does not or need not prevent our raising a large, if not the larger, part of the tea we use. Even in China it is the wide and general distribution of the tea plant, not its wholesale culture, that makes the annual crop so large. The two hundred and fifty million pounds a year sent to foreign countries is probably not more than one tenth the amount produced; yet the subordinate part allotted to tea-growing

is one of the most striking facts noticed by travelers in the tea-producing districts. Large plantations are few, and six or seven hundred weight is a large annual average for an individual farm. But, while few grow tea on a large scale, every one who has a garden has a few tea trees in the corner of it. In this way millions of trees go to make up the bulk of the tea crop without materially affecting the general agricultural industry of the country. It is rather a domestic industry left to women and children than an integral part of agriculture; and though of late years tea plantations are increasing in number and importance, no specific enumeration is yet made of tea lands in the revenue returns of the taxable lands of the empire. In like manner, by the general raising of a few shrubs for domestic use by families owning garden plots, a large portion of the fifty million pounds of tea annually consumed in this country might easily be grown on the spot without perceptibly interfering with present garden products or household industries.

The recent rapid extension of tea-growing in Japan, Java, British India, and elsewhere is evidence that there is nothing in Chinese soil, climate, or industrial conditions to secure to that country the monopoly of tea growing. In Japan tea is cultivated as far north as the 39th parallel, the most favorable region lying between the parallels of 30° and 35° north latitude; while the cultivation is most successful between the 21st and 33d parallels, though the plant thrives almost anywhere up to the 45° north latitude. The Japanese crop has nearly trebled during the past twelve or fifteen years, and large areas of newly planted shrubs are rapidly coming into bearing.

Next in rank as a tea-producing country is Java. Since 1860 the industry has advanced so rapidly that the annual crop is now about half that of Japan. The plantations are most successful on the mountain slopes from three to five thousand feet above the sea; and the crop is said to pay better than coffee. Tea growing has also been begun lately in the British Straits Settlements with promising results.

The most rapid recent development of the industry, however, has occurred in British India, particularly in Assam. The first sample of Assam tea was sent to market in 1843; now there are upwards of 100,000 acres of tea plantations in Assam, yielding nineteen or twenty million pounds a year. In Bengal, Madras, the northwest provinces, and the Punjab, the industry is rapidly spreading and the prospect good. The crop of 1875-6 was estimated at 29,000,000 pounds—thus giving India the lead of Japan. The most of the India tea goes to England, where it is much liked.

In Ceylon also, tea culture has advanced very rapidly of late. In Brazil, it has been grown successfully in several provinces; but for home consumption Paraguay tea is preferred, and for export, coffee growing is more profitable. Tea growing is also advancing in Tonkin, Cochin China, Malacca, the Corea, and several of the islands of the Indian Ocean, formerly devoted to coffee; and efforts are making to introduce it into Australia and Jamaica. France, Spain, Portugal, Algeria, Italy, Turkey, and the Crimea, all have climates suitable for tea growing; and the same may be said of Tasmania, New Zealand, Mexico, and Central America.

THE CONGO RIVER.

Thanks to Stanley's pluck and energy, the well founded belief that Livingstone's Lualaba was no other than the Congo has now been fully justified; and henceforth the Congo must rank with the three or four great rivers of the globe. It is to Africa what the Amazon is to South America, the Mississippi to North America, the Yang-tse Kiang to Asia. It certainly exceeds the Nile in volume, and possibly also in area of drainage. Rising in the upland north of Lake Nyassa, it flows northerly through the great interior basin of Africa, until it reaches a point about the second degree of north latitude (long. 24° E.) when it swerves to the westward, then to the southwestward until it approaches the coast. Where Livingstone was stopped, the Lualaba was a noble stream from 2,000 to 6,000 yards wide; after making the great bend near the equator, it develops into a still broader stream, from two to ten miles wide, choked with islands. At the cataracts, where the river breaks through the coast mountains, the stream narrows to 500 yards or less: then spreads out into a broad stream from two to four miles wide with a current flowing about three miles an hour. The volume of water discharged is enormous; Captain Tuckey's estimate—2,000,000 cubic feet a minute—is probably not far from the truth. At its mouth the Congo is a thousand feet deep, and the water has been found to be perfectly fresh nine miles from the coast. For forty miles out the sea is perceptibly freshened by the vast volume of fresh water poured into it. The tide is felt as far as the first cataract, 140 miles up the river. In its lower course the river spreads out into extensive swamps covered with mangrove and palm trees.

The first successful explorer of the lower Congo was Captain Tuckey, who ascended the river to a considerable distance above the cataracts, when he was forced to turn back. His belief was that the Congo drained some large lakes north of the equator, and was a continuation of the Niger.

The next to reach the cataract was Captain Hunt, of the British steamer Aleto, in 1857. Six years later Captain Burton attained the same point. In 1872 Lieutenant Granby's expedition for the relief of Livingstone ascended still further, but was recalled in consequence of Livingstone's death. Cameron's failure to descend the river is fresh in the memory of all. He was forced to take a more southerly course to the coast by the opposition of the cannibal tribes, through