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THE SCOTTISH GEOGRAPHICAL MAGAZINE.

THE SIBERIAN RAILWAY.

By C. RAYMOND BEAZLEY.

For any proper understanding of the Siberian railway, one must have some idea of the country it is intended to serve and has already so greatly benefited. This country is usually defined as the whole region north of the Ob-Aral water-parting, the Sayan mountains, and the main course of the Amur—that is, roughly speaking, all Asia north of the 50th parallel, mainly composed of four huge river-basins, those of the Ob, Yenisei, Lena, and Amur. The western, northern, and eastern boundaries are naturally fixed by the Ural mountains, the Arctic Ocean, and the Pacific.

Here, in a land comprising nearly five millions of square miles, there are naturally great varieties of climate, soil, and physical conditions. The name, in its modern and extended use, is quite artificial; the original *Siberia*, or *Sibir*, was a north-western relic of the once great Mongol Empire, situated in the upper valley of the Irtysh and in the basins of its chief tributaries. It was the Russian conquest which stamped the term on the whole of Northern Asia; and it was mainly the absence of any organised state between the Irtysh and the Gulf of Okhotsk (even on a par with the Tartar khanate of Sibir) which caused this strange "growth of a title."

From the Yenisei river, and still more from the Baikal basin, Eastern Siberia becomes increasingly different from the great plain of the west and the far north, being covered over nearly all its surface with mountains of respectable height, thickly wooded, and presenting a totally different appearance from the agricultural zone of Central Russia and South-western Siberia through which the railway passes as far as Krasnoyarsk. Again, looking at the country from north to south, three very distinct

zones are to be found over a great part (and especially in the west) of this enormous area. First, there is the *tundra* or Arctic waste of the northern shore-lands, in winter a terrible desolation, and never at any season suitable for agriculture, but in summer affording a certain, though limited, pasture; and giving access to the northern sea-board, which, in places, is free from ice for some months in the year and has already developed a slender and intermittent communication with Europe. Secondly, there is the *taiga*, *urman*, or forest region, to the south of the *tundra*; a land of dense woodland, but available for agriculture, where clearings are made, about as far as the 60th parallel, the home of most of the fur and feather wealth of Siberia, and possessing in its timber, if properly and savingly used,¹ a great and permanent source of revenue. Thirdly, there is the southern belt of open agricultural country, in great part composed of the *black earth* region, a continuation of the *chernozom* of Southern Russia, answering to the rich prairies of America, bordered on the north by the forests, and on the south by the waterless or barren steppes. It is through this agricultural region that the railway passes, and in this belt more than five-sixths of the population is to be found (five and a quarter millions out of six and a quarter). The native tribes, now mostly declining in numbers, are usually located in the forest zone; the great mass of the Russian emigrants live in the agricultural region, which has a climate and soil similar to that of South-central Russia, but somewhat drier. As we go eastwards and approach the Yenisei and the Baikal, a mountainous mining district becomes more and more prominent in the south. This region is thrown off from the Altai range, and it is hardly, if at all, inferior in mineral wealth to the Ural. It has long been famous for gold and silver; it has lately begun to attract attention for its copper, iron, and coal. This mineral wealth continues (though at present less exploited) in the south-central region between the Yenisei river and Lake Baikal, as well as in the cold mountainous country of the trans-Baikal province. To the minerals already mentioned must here be added tin, quicksilver, and rock-salt. In the country east of the great lake, the average northern limit of agriculture drops to about the 53rd parallel; but as the coast of the Pacific is approached, a milder climate is again entered, and the cultivation of the land can be pushed several degrees nearer to the Pole.

The railway marks in every respect a new chapter in the annals of a country which has so long been one of the great secrets of the world, and whose unexplored capabilities were almost unsuspected down to recent times. Till about 1580 we have the aboriginal period of Siberian history, when the country was only inhabited by a few nomadic shepherds in the south and the Lapp-like hunters and fishers of the

¹ This is being done at present by the strict rule about the felling of trees, whose indiscriminate destruction is altogether forbidden, but whose utilisation has become much more extensive than before. Every forest region is divided into forty parts; only one part may be felled at a time, and immediately old timber is cut down, new trees must be planted. A definite interval is fixed between the felling of one section and another; in a regular cycle of years the whole forty sections will be made use of and the wood-cutters return to the first.

north. In this time there was, of course, no attempt to profit by the permanent riches of the soil, even in agriculture; flocks and herds were the only resources of the southern Tartars; in the catching of birds, beasts, and fish was the sole livelihood of the northern forest tribes.

From about 1580 the Russian conquest begins; it is completed (at least as far as Lake Baikal) by 1630; and with this an agricultural development of a certain kind begins. As time goes on, and especially during the eighteenth century, a commencement is also made in that mining development which has since become famous, and is certainly destined to a still wider celebrity. But till far into the nineteenth century these attacks upon the permanent riches of the land were of the most primitive kind, and though hunting and fisheries were carried on with some success, other resources quite as obvious, such as the timber-trade, were strangely neglected. Siberia, it has been often said, was till lately regarded by its rulers as nothing better than a refuse-heap, on which the criminal elements of European Russia might be conveniently thrown out; and, of course, there is much truth in this comparison. But what is forgotten by some of the critics is the fact that for the development of any country human beings are required, and you cannot open up immense regions of the earth's surface without a population adequate to deal with the area in question. Now the Russian dominions at the death of Peter the Great (1725), even then comprising more than five millions of square miles, only possessed some fourteen millions of inhabitants¹ to make use of all these lands, where, before the introduction of railways, steamers, and telegraphs, the problem of communication was much more serious than in Western Europe. Even at the commencement of the nineteenth century, the people of the empire did not number above thirty millions, and the attention of the Government and the people (throughout the eighteenth and earlier nineteenth century) was so concentrated upon European affairs that all things Asiatic were naturally and perhaps necessarily neglected. Daniel Defoe, in the second part of *Robinson Crusoe*, advises the Tsar to turn his conquests in the direction of the Celestial Empire, and assures him of an easy victory over the incompetent army and officials of China. Had this advice been followed, even in a moderate degree—as in 1858-60, or since 1894—it would inevitably have introduced a total change in the condition of Siberia. Apart from this, if the civilisation of European Russia had been more advanced, either the Government or enterprising individuals would have come to a better understanding of the value of Siberia for itself, and would have pushed forward the development of the country. But all this is to ask for something different from the actual facts of the case. The Russia even of Catherine II. and Alexander I. (1762-1825) was an extremely backward and sparsely populated country, whose very size was no small obstacle to its progress; whose climatic conditions were terribly hostile to civilisation; and whose peasantry (forming the great bulk of the people) were in a state of serfdom. Meantime the Government was continuously engaged in a series of European struggles, especially with Sweden, Poland, and Turkey—struggles by which the European State

¹ At present the empire has 130,000,000 people to its 8,660,000 square miles.

was made a great power; by which the Baltic and Black Sea outlets were obtained; and by which the old Russian lands, so long subject to Poland, were recovered; but by which all things Asiatic were pushed out of sight.

It might have been expected, with the European settlement of 1815, that a better time would dawn for Siberia, and that it would share in the development of the European provinces; but it cannot be said that much improvement was perceptible in any way till 1858. Here, perhaps, (in the later years of Alexander I. and throughout the reign of Nicholas I.) the Russian Government may be most justly and severely blamed for its attitude towards the Asiatic possessions of the empire. The time had now certainly come, with the introduction of steam, the growth of a sufficient population, and the comparative quiet of European affairs, for Russian statesmen to have seriously faced the Siberian question. We can only say here that they neglected it down to the close of this second period—1580-1858.

This neglect, however, does not imply total want of attention. Four kinds of Russian and European emigrants had been slowly filtered into the country: first, the Cossacks, who were so active in the original conquest; secondly, the prisoners of war¹ and political offenders, who introduced something of culture and science in certain favoured districts; thirdly, exiled criminals, the class from which the Old Siberia was chiefly known; and fourthly, free (mostly peasant) emigrants, who now compose the great majority of the people. Even as early as 1590, however, "volunteer" emigration was called for by Government,² and at the beginning of the nineteenth century there were nearly half a million of these non-criminal settlers in Western Siberia alone, forming a good half of the people of Asiatic Russia as then constituted. But the life of these settlers was poor and sordid, and it was only in the seats of Government like Irkutsk that European civilisation could be recognised, so far at least as this civilisation was represented on the other side of the Ural range.

In 1858 the third period of Siberian history begins with the annexation of the Amur region and the maritime province, which first gave Siberia a good outlet upon the Pacific. The administration of Count Muraviev, who played the leading part in these annexations, was the first instance for many years of the application of real administrative ability to the distant Asiatic provinces. The same years were marked by the tardy introduction of steam upon the west Siberian rivers; and the emancipation of the serfs in 1861 put the question of emigration in a new light. Still, as yet, progress was very slow, and perhaps the chief event immediately affecting Siberia between 1860 and 1880 was the development of Vladivostok, which in 1872 was selected as the chief Pacific port and naval station.³

¹ Such as the Decembrists of 1825. These men and their families made Irkutsk, for instance, equal to any city in the empire for intellectual attractions.

² The growth of the serf system after this time, of course, rendered volunteer emigration more difficult till 1861.

³ This marked an advance in reference to which the development of intermediate country was now obviously necessary.

From about 1880 things began to move somewhat more quickly; volunteer emigration largely increased by land, and commenced by sea. From 1883 the vessels of the Volunteer Fleet and other Black Sea companies began the regular conveyance of settlers from South Russia to the maritime province on the Pacific. In 1881, moreover, the Russian railway system was first pushed across the Ural mountains by the completion of the line between Perm and Ekaterinburg, soon after continued to Tiumen (1884), and forming a connection between the great river basins of the Kama and Volga on the one side, and the Tura, Irtysh, and Ob on the other. This line, which we may really call the first Siberian railway, naturally suggested the question of further development, and in 1891 the fourth and present stage of the country's history was opened by the commencement of the new trunk line.

There had been much dispute on detail, and especially as to whether a line was to be attempted traversing the whole of North Asia, or only some smaller railways connecting the various chief river basins; and, again, whether the Northern Ural railway (from Perm to Tiumen) was to be taken as the basis and first section of the new line, or whether the eastern extension was to proceed from another point.¹ In the eighties, it may be remembered, the Volga was first crossed by the great railway bridge at Batraki, and the line from Moscow was pushed on through Samara to Orenburg in the south-east, and to Ufa in the north-east. After prolonged discussion it was the last which was taken as the beginning of the great scheme of 1891. At the other extremity, Vladivostok was the natural starting-point, and it was from the first arranged that work should begin from both ends. As a matter of fact, the formal commencement was made from the Pacific terminus, and the Heir-apparent (now Emperor) Nicholas cut the first sod at Vladivostok on May 19, 1891, in accordance with the Imperial order of March 17 of the same year, with which the enterprise began. The route selected was pretty direct between Ufa and Irkutsk, though in the original scheme it had to follow the windings of the Amur after leaving Lake Baikal. In a general way it may be described as following the 55th

¹ Among the earlier schemes for some sort of railway in Siberia we may notice the following, all subsequent to the impulse given by Muraviev's advances on the Amur:— (1) In 1857-58 a project of one Colonel Romanov for a road and railway near the mouth of the Amur to avoid a part of the long northern bend of that river between Mariinsk and the sea. (2) 1857-58, the scheme of the English engineer Dull for a horse railway from Nijni Novgorod through Kazan and Perm to some port on the Pacific. This suggestion was not accompanied by any estimate of cost, and was of course not for a railway proper, but for a tramway. (3) 1857-58, the project of the American engineer Collins for a short line between the Baikal lake and the upper Amur. (4) 1858, the project of Morrison, Horn, and Sleigh, of a similar character to the tramway-scheme No. (2). Both (2) and (4) asked for such important privileges as to amount to a foreign monopoly of the whole trade of Siberia for a long period. (5) The proposal of Sophronov for a railway from Saratov to the Amur (1858-59). (6) The scheme of Kokorov and Rashet (1862), which was realised in the Perm-Tiumen railway. The same project was recommended by Colonel Bogdanovitch in 1868, and by the merchant Liubimov in 1869. (7) In 1880 the plan of the engineer Ostrovski, which as far as Irkutsk has been almost exactly followed. Canal development and the improvement of the rivers Ob, Yenisei, and Angara was the subject of a valuable series of reports and suggestions in 1880-81 from the engineer Sidensner.

parallel of North Latitude as far as the Great Lake; beyond this the more recent Manchurian developments have bent its course a good deal to the south. As Ostrovski recommended in 1880, the railway traverses the agricultural or *black earth* region (the most fertile and best populated part of the southern zone of Siberia) in all its length, and thus becomes a natural backbone of the country. Reckoning from Samara on the Volga, it had seven sections assigned to its construction—(1) from the Volga to the eastern side of the Ural range, where its return to the plain country was marked by the important junction of Chelyabinsk; (2) from Chelyabinsk to the river Ob, passing through the official town of Omsk;¹ (3) from the Ob to Irkutsk and Lake Baikal, passing through or near Tomsk, Krasnoyarsk, and Kansk; (4) the short but very difficult line round the southern end of Lake Baikal; (5) the trans-Baikal line from the eastern side of the lake to the town of Stretensk, where the deep-water navigation of the Amur river begins; (6) the Amur valley line between Stretensk and Khabarovka at the junction of the Amur and Ussuri rivers; and (7) the Ussuri line, dropping south from Khabarovka to Vladivostok. Later on No. 6² was indefinitely postponed in favour of the direct line through Manchuria from the Upper Amur to Vladivostok, obtained from China in 1896, in return for the diplomatic aid given against Japan. To this last a new and important branch was added in 1898, running still farther south to the newly acquired harbours of Port Arthur and Ta-lien-wan on the Yellow sea. For the more rapid completion of the work the various sections were divided into three groups; and among these groups the first, which took precedence of all others, included the western and central parts of the line as far as the Baikal, and a short connecting branch between the northern Ural railway (Perm-Tiumen) at Ekaterinburg and the main trunk at Chelyabinsk. In the second group, the trans-Baikal line, between the lake and the upper Amur, and the extension of the Perm railway to Kotlas, were the chief items; and in the third came the Amur valley (or its substitute, the Manchurian) line. In the original plan it was expected to complete the sections of the first group by 1900, but matters proceeded so rapidly that by 1895 a careful estimate gave three years more for this part of the work, and it was, as a matter of fact, open for traffic by the autumn of 1898, when the first trains reached Irkutsk from Europe. The first and second sections between the Volga and the Ob were ready in October 1896; the seventh or far-eastern section, between Vladivostok and the Amur, was opened in September 1897; and the main trunk was joined to the north Ural line in 1896. The sections of the second group, the trans-Baikal portion, and the extension from Perm to Kotlas on the northern Dvina were finished before the end of 1899; and therefore, at the present time there only remains the circum-Baikal line and the Manchurian portion, about one-third of which was said to be ready at the time of the Chinese troubles of this summer.

By the June of 1900, 3375 miles of line had been laid down and were in use, without counting some 400 miles in Manchuria which were

¹ Now the capital of Western Siberia.

² The Amur Valley line.

practically, if not formally, in the same state of advancement. This is the result of eight and three-quarters years' work, and shows a rapid rate of progress. Between Europe and Irkutsk, as well as between the Amur and Vladivostok, the train service has now become for Asia fairly regular and speedy—of course only a very moderate pace (less than twenty miles an hour) is attempted, but the primitive and haphazard progression which travellers found in the first months after construction cannot be spoken of now in the regions west of the Great Lake.

Steam communication has thus been completed between Europe and the Pacific; for the transit of Lake Baikal and the passage down the middle Amur is made in steamship as well, if not as quickly, as by the railway. Soon, indeed, the passage of Lake Baikal will be rendered unnecessary by the completion of the railway along the south-west and south shores of the Holy Sea, which (section No. 4) is expected to be ready for traffic within the next six or seven months.

The connections of the main trunk with the regions to north and south are of considerable interest. What is already made, under this head, is only a small part of what is designed, but it includes the important links between Chelyabinsk and Ekaterinburg, and the extension north-west to Kotlas on the Dvina, a large navigable river opening on to the northern ocean and thus affording an outlet for export trade by Archangel and the White Sea.¹

Among the most important of the side-lines projected, but not yet constructed, is the branch from Chelyabinsk to the Lower Volga at or near Tsaritsin. This will connect with the recently completed lines from Tsaritsin to the Black and Azov seas, at Novo-Rossiisk, and at Rostov on the Don; with the still newer line just commenced from the same point (Tsaritsin) to Astrakhan; and with the Petrovsk-Baku line to the ice-free coast of the SW. Caspian; and it will thus afford an outlet for Siberian produce to the southern seas. Other branches which will probably be taken in hand within the next few years are the suggested lines from Tashkent to Omsk, uniting the Central Asiatic railway with the Siberian, and so bringing the influence of the Siberian railway in a sense up to the Afghan border; from Tiumen to Tobolsk; and from the neighbourhood of Tomsk to the mining districts of Barnaul and Biisk, already prepared for by the new and creditable steamer service along the rivers Tom and Ob.

From the first the Siberian Railway has been treated as a matter of national concern, and its administration has been put under a special organisation, called the Siberian Railway Committee, and still constituted as Alexander III., its founder, designed. Its first president was the Heir-apparent Nicholas, who retained this position on his accession to the throne. The members of the committee were partly *ex-officio*, comprising nearly all of the more important Ministers of State (*e.g.* Finance,

¹ This, however, being only a summer outlet, it is proposed to continue the Perm-Kotlas line either (1) to the Kanin peninsula, north of Mezen bay, where an ice-free strip has recently been found; or (2) to Ekaterina Harbour, at the mouth of the Gulf of Kola, in Russian Lapland.

War, Marine, Communications, Agriculture, and Interior), and partly private individuals appointed for reasons of personal confidence by the Emperor himself (*e.g.* two generals and two State Secretaries). The committee was also to be assisted by the Economic Department of the Council of State, and by the occasional advice of the Siberian governors-general and of the other Ministers not holding a permanent place on the board (*e.g.* Foreign Affairs and Justice).

With this central management were also connected three preparatory committees, the first composed of representatives of the departments (*e.g.* mines, forests, rivers, etc.) interested in the undertaking. To manage the details of peasant colonisation which soon became so prominent, another sub-committee was appointed from the staff of the Ministry of the Interior; while a third, to deal with matters of practical railway working, was selected from the staff of the Ministry of Ways and Communications. This administration has not always succeeded in preventing local abuses, waste and peculation; it has encountered great difficulties, especially in 1896, through the unexpectedly great rush of emigrants, and its critics might accuse it of sacrificing in many places finish of detail to speed of construction; but its achievements have been great. It has provided an immense country with a new main artery, a new means of intercourse among a widely scattered people, and its work has already had a marked effect upon the population, mining enterprise, agriculture industries, and general prosperity of Siberia.

As to population, the railway age of Siberian development has seen beginning of the one of the greatest emigration movements ever known, and in consequence the Siberian people has doubled in numbers in the past ten years. By the commencement of the nineteenth century we have seen that one hundred and fifty years of possession had created a new Russia of European settlers, amounting to some 500,000 souls; as brighter days began to dawn, this new Russia increased more rapidly, and between 1860 and 1880, 110,000 free emigrants entered Siberia. Still rising, the tide flowed during the next twelve years (1880 to 1892) beyond all expectation, bringing 450,000 fresh settlers into the country by land, *plus* 17,000 by the maritime route from the Black Sea to the Pacific coast. Finally, after the construction of the Southern or Grand Trunk railway had been sufficiently advanced to aid in this movement, from 1893, it was no longer a tide, but a tidal wave of emigration. In the next seven years, 1893 to 1899, almost a million human beings moved from European Russia to new homes beyond the Ural—in 1893, 65,000; in 1894, 76,000; in 1895, 109,000; in 1896, 203,000; in 1897, 87,000; in 1898, 206,000; and in 1899, 225,000;—making in all 971,000 who went overland, besides 25,000 who were conveyed by sea to the Pacific coast. We must not forget that the first line over the Urals¹ was at work as early as 1881; and it is from this date that the emigration movement takes really large proportions. As early as 1885 this attracted the attention of the Government, and a special corps of land-surveyors and land-agents was formed to organise and regulate the settlement of

¹ Perm—Ekaterinburg—Tiumen.

emigrants. In 1889 the present general law of Siberian Allotment was issued, by which every male emigrant going to the new country with the sanction of the Government has 15 dessyatines (or about 40 acres) assigned him "for perpetual use," and enjoys exemption from taxes for three years, reduced taxation for the next three, and postponement of army service for nine. Emigrants to the Amur and Pacific maritime territories have special privileges—100 dessyatines, or about 250 acres for each family, and exemption from taxes and conscription for twenty years.

On the formation of the Siberian Railway Committee, the general superintendence of the emigration movement, and of all matters connected with it, was intrusted to the new board, which, in spite of all temporary difficulties and failures, has planted upon the soil, with every appearance of permanence and success, the enormous body of new settlers who have entered the country in the last nine years. The committee has also done much useful work in spreading a knowledge of the local conditions among intending emigrants, and in accompanying the progress of the railway by provisions of every kind—loans of money, stores of timber, agricultural implements, medical necessities, and other things specially called for by the settlers. It has also undertaken the building of churches and schools along the course of the railway: at the beginning of 1900, 165 of the former, and 105 of the latter were built or building.¹ It has built three orphan asylums for emigrants' children, and organised a travelling medical staff, and a corps of road surveyors, to carry out and maintain a permanent improvement in the Siberian "trakt." Besides the geological and mineral surveys undertaken by the Committee, a hydrographical survey has also rendered the river navigation of the Ob basin pretty well as secure as that of the Volga; work is now proceeding at Lake Baikal,² where four new lighthouses have been erected, and a great increase of steamer traffic is expected. Among other things, this survey claims to have shown that the Yenisei river has no bar, as sometimes alleged, and is navigable for ocean steamers for 1000 miles from its mouth; that the Ob is open from the sea to vessels drawing 12 feet of water; and that in the Gulf of Ob an excellent and sheltered harbour for large ships exists at the Nakhodka bay.

A special emigrant railway tariff has been settled, amounting only to twenty-five per cent. of the ordinary third-class fare; and thirty stations have been provided along the route (the chief of which is at Chelyabinsk) where the settlers can find medical aid, hospital accommodation, and places to stay until they are ready to go to their proper allotments. At these stations no charge is made for the attendance on, or food provided for, the sick; all children of emigrants, as well as the poorest class, also obtain provisions gratis at these places.

The better organisation of the emigration movement and the wider knowledge of the country (partly owing to the millions of descriptive

¹ With the aid of the Alexander III. Fund, which at the beginning of 1900 reached £120,000.

² Begun 1897, to be finished 1902.

papers distributed by the committee among the peasantry) have reduced the number of haphazard or "independent" settlers, of the disappointed who return to Europe, and of the failures who perish on the way.¹ Most families who intend to go to Siberia now prepare themselves by sending on ahead a *khodok* or scout, who settles with the Government about the allotment of land, collects all necessary information, and pilots his friends and relations on their journey.

Mining enterprise has also been stimulated by the railway; alike in the Ural, the Altai, and the trans-Baikal region decided progress has been made since 1881, and still more since 1891. This progress has been not a little owing to the new geological survey of Siberia, ordered by the railway committee with the view of "discovering useful minerals." Several important beds of coal have been found in the neighbourhood of the trunk-line and others at considerable distances from the same;² important deposits of iron ore were also brought to light in the trans-Baikal region; and discoveries were made of copper in the steppe country to the south of Omsk, and of jade in the province of Irkutsk. The gold-bearing districts of Siberia were also surveyed afresh, and previously unknown deposits were found in the valleys of the Yenisei, Lena, and Amur, on the shores of the sea of Okhotsk, and in the Kwangtung peninsula "leased" from China in 1898, on the very site of Port Arthur, and in the neighbourhood of Ta-lien-wan. There are few regions that surpass Northern Asia in mineral wealth, and it seems probable that in the near future Siberia will take a high rank in the output of other metals than the gold on which its past reputation is built.

In this respect, as in others, the progress of Siberia reflects that of European Russia, where, since the last Turkish war, industrial matters (and mining enterprise not least) have steadily advanced. The last annual report³ of the Minister of Finance rightly lays emphasis upon this, which no one who has travelled intelligently in the country can overlook. New railways, new steamers, new manufactures, new mining works, new bridges, new electric trams, the deepening of rivers, the improvement of roads—these things are to be seen everywhere, and the Siberian railway in particular is the largest detail in an extension of iron ways which has averaged 2500 miles during the past seven years.⁴ It marks the abandonment of the old policy of keeping the country in a state of nature, as a preservative against attack, for a new policy of binding together the most distant provinces by a network of communications.

As to agriculture, we have already referred to various measures recently taken for its encouragement in Siberia under the head of

¹ 0·14 per annum now.

² Among the most important of these beds were those: (1) at Ekibaz-Tuza near Pavlodar; (2) at Sujenka; (3) at Mysovaya, on the eastern shore of Lake Baikal.

³ January, 1900. This report gives the following statistics of mining progress:—

Russian total coal output: 1878, 1,774,000 tons: 1898, 12,000,000 tons.

Russian pig-iron output: 1878, 370,000 tons: 1898, 2,160,000 tons.

Russian steel output: 1878, 48,000 tons: 1898, 1,400,000 tons.

⁴ In November 1892 the Russian railway net amounted to 18,670 miles; in January 1900 to 36,800 miles.

population.¹ Here it may be added that between 1891 and 1899, nearly 20,000,000 acres ($7\frac{1}{2}$ million dessyatines) of Government land were allotted to emigrants in the provinces of Tobolsk and Tomsk, and $2\frac{1}{4}$ million acres (1 million dessyatines) of the pasture-country hitherto occupied by roving Kirghiz nomads were also devoted to Russian agriculture.² Large tracts, moreover, of the northern forest-zone or *taiga* have been turned to tillage. The irrigation of the dry steppe of Ishim has been commenced, as well as the draining of the marshy steppe of Baraba.

The improvements in the knowledge of Siberia and its conditions, and the increased use of better appliances in agriculture, together with the new communications, have opened quite a fresh chapter in the treatment of the Siberian soil, and brought about the commencement of an export trade in grain. Here the northern railway with its outlet to the Dvina and the White Sea has been found especially useful.

The development and effect of the Siberian railway must also be taken in connection with the river navigation of Siberia, and of the eastern parts of European Russia. Everywhere in the empire the connection of railway and steamer traffic is one of the chief elements in the system of ways and communications; and as elsewhere, so in Siberia. Immediately the iron horse enters the country, the steamer appears or multiplies upon the rivers. Thus in the whole Ob basin, as late as 1880, there were only ³ 37 boats of this kind, but in 1898 the number had risen to 120. Among these are some of the best Volga or Mississippi pattern, with every necessary, and even luxury, of travel.⁴ On the Yenisei basin progress has been slower; the difficulties of navigation on the Lower Angara, the *branche maitresse* of this basin, have been an excuse for past backwardness; but the steam traffic on the Yenisei itself is undoubtedly capable of great improvement. On the Lena a beginning has been made, but here, in a mainly Arctic basin, with a mouth practically sealed against the outer world, traffic is limited to the upper river, and to a short period of the year, and will probably wait for the assistance of a branch connection with the main trunk ⁵ before any marked advance is made. But on the Amur, which so naturally forms a part of any line of communication across Northern Asia, steamers have rapidly increased, even though the main stream was not tapped by any railway till the autumn of 1897. At that time the twelve paddlers of 1870 had increased to ninety-four.

¹ It is only wonderful that so rich a soil should have had to wait so long for the beginnings of proper cultivation.

² Out of a surplus of 25 million acres (10 million dessyatines) not required by these Kirghiz.

³ Ten in 1860, twenty-two in 1870. For purposes of comparison we may mention that the Volga basin has about 1300.

⁴ As in the new service between Tomsk, Barnaul, and Biisk on the rivers Tom and Ob, opened this summer (1900). The five chief steamer services on the Ob basin (1) Tomsk—Tiumen; (2) Omsk—Tiumen; (3) Omsk—Semipalatinsk; (4) Tomsk—Barnaul—Biisk; (5) Tomsk—Chulym are all connected with the chief districts of Siberian cultivation and population, and have a great advantage over the sparsely peopled Yenisei basin.

⁵ e.g. by a line from Irkutsk or Kansk to Kirensk.

Two of the earliest sub-sections of the Main Trunk in date of completion were those between Achinsk and Krasnoyarsk, connecting the basins of the Ob and Yenisei,¹ and between Omsk and Kolyvan, connecting the Ob with the upper course of its chief branch the Irtysh. Especial energy was also thrown into the work on the later section between the Baikal and Stretensk on the Upper Amur, connecting the basin of that river, not only with the Great Lake, but also with the Yenisei-Angara; and this portion of the line was beset with so many obstacles and dangers from floods and landslips, that its opening at the end of 1899 was a surprise to most of those who had watched the slower execution of less troublesome details. In all these instances the connection of iron road and waterway is the immediate object; and one result is seen in the development of the river traffic. Thus on the central part of the Ob basin this is reckoned as 50,000 tons (3 million puds) in 1886; at 266,000 tons (16 million puds) in 1895.²

No part of the Siberian railway is more noticeable than the system of bridges by which it is carried over the great streams of North Asia. These bridges, west of Lake Baikal, cover a space of thirty miles; the longest³ are those over the Irtysh (2100 feet), over the Ob (2500 feet), and over the Yenisei (almost 3000 feet). With their spans of from 300 to 500 feet (the Yenisei spans measure 490) and their massive piers and iron-work, they present an extraordinary contrast, like most of the new industrial Muscovy, to the thatched roofs and primitive dwellings of so many of the villagers, representing what was till lately the only type of country Russia.

Lastly, the immediate results of the Siberian railway may be illustrated from the statistics of passengers and goods carried during 1896, 1897, 1898, and 1899. The figures for passengers are, respectively, 417,000, 600,000, 1,049,000, 1,075,000; for goods, in thousands of tons, 184, 443, 700, 657.

Among exports from Siberia, the chief is grain (42 per cent.), then come meat, butter, tallow, hides, wool, eggs, and game. Of goods in transit tea is still the principal, and the amount carried by the line in 1898 was 36,000 tons, as against 28,000 tons in 1897. Among imports, the chief are raw iron and machinery.

When the whole railway is completed it is intended to increase the speed of passenger trains to twenty-three miles an hour and of goods trains to fourteen miles an hour. This is the rate adopted on the American inter-oceanic lines, and, slow as it may seem, it will then be possible to go from Moscow to Vladivostok⁴ or Port Arthur in ten to

¹ Also now connected by a small and shallow canal, which needs deepening to be of any great use.

² As to the connections of the Siberian line with the river system of European Russia, it is enough to repeat that the Volga is crossed by the main trunk at Batraki, is touched by the same at the river-ports of Syzran and Samara, and is connected with it also through the Northern Ural railway which crosses the Kama at Perm. From the Volga river steam communication is now possible to almost every part of the European territories of the empire.

³ Not counting that over the Volga at Batraki, 4300 feet.

⁴ First class. The present time from Moscow to Vladivostok is about seventeen days.

eleven days, at a cost of £12. But from London or Paris to Shanghai by the present sea route takes thirty-five days and costs, in first-class fare, over £80. The Siberian railway thus offers a possibility of a new way to East Asia, which, when allowance is made for excessive hopes and over-great expectations on the part of its promoters, will probably be speedier, shorter, and cheaper than the maritime circuit round Arabia, India, and the Malay peninsula. On the other hand, a very long railway journey must always be more fatiguing than a sea voyage, though where men are travelling for business alone, time and money may outweigh all other considerations. On ordinary Russian trains fatigue is greatly reduced by the excellent sleeping arrangements; and in the Siberian *train de luxe* the ease and rest of sea or river travelling is perhaps approached as nearly as is possible on iron roads.

In any case, the new trunk line connects Europe and the thickly peopled world of China and Japan (three hundred millions on one side, four hundred millions on the other) by a fresh highway whose advantages are obvious. It connects Russia with the Pacific coast in a way unknown before, and it will probably lead to the development of an ocean service between this eastern outlet of eastern Europe and the Western States of the American Republic. From the strategic point of view it would seem to give Russia the command of Manchuria, now being traversed by railways that start from Moscow; it also appears to give the same power a very strong hold over Northern China, south of Manchuria. If Mongolia is crossed by the projected straight line from Kiakhita to Peking, *via* Urga and Kalgan, what has just been said of Manchuria may be also said of this vast but thinly peopled region.

From a general point of view the Siberian railway, even more than the Central Asiatic, marks the growing importance of overland routes. The maritime ways have for so long commanded attention as the chief means of communication between far distant regions—it has so long been true that the sea “unites rather than separates”—that the future, opened by the new Continental lines in Siberia and Turkistan, is even now difficult to appreciate.

The railway across Northern Asia, from an internal point of view, acts as a distributor of a population at present exceedingly uneven; it takes away from congested districts, like the SW. of European Russia, and fills up great wastes beyond the Urals; it is now the chief factor in one of the largest racial movements in the world. Here, in the union of these two forces, modern communications and a movement of racial emigration,¹ lies the special importance of the Siberian railway. As this racial movement touches (and will touch more and more) districts where only Asiatic civilisation and means of defence are to be found, it seems not improbable that it will continuously advance and absorb until it reaches the thick mass of unmalleable material in China proper. Russia has already reserved to herself, by agreement with Great Britain, the

¹ Based upon a yearly increase of nearly 2,000,000 in the population of the empire as a whole; 1½ millions of this annual surplus of births over deaths belong to European Russia.

exclusive right to build railways north of the Chinese wall, and the control of Asia north of that wall seems to be in her hands when she has completed the lines already in construction or authorisation.¹

But apart from these political matters, it is only fair to recognise (which has been one of the chief objects of this paper) that the Siberian railway is the principal agent in a work of civilising and reclaiming a huge but long-neglected country of no small capabilities; that it goes along with many other measures for the same object, such as the foundation of the University at Tomsk and the abolition of the exile system; and that it cannot be dismissed as nothing more than an aid to expansive territorial ambitions. It is but the greatest item in a remarkable system of communications by land, river, and lake which Russia has been recently developing, and it deserves a fair appreciation at the hands of all those who are interested in the present condition and immediate future of Europe and Asia.

THE VALLEY OF THE JOUX (JURA).

By VICTOR DINGELSTEDT.

THE author has spent many a summer in the happy valley of the Joux, greatly benefited by his sojourn both physically and morally; and on this account feels himself sufficiently justified in presenting to the readers of this magazine a rather long description of the country and its inhabitants. He has been assisted in this task by several friends who live in the country summer and winter, and he here wishes to express his acknowledgment to Messrs. Gauthier and Samuel Aubert, professors in the College of Sentier, Dr. Yersin, the doctor of the valley, and Alfred Reymond, an amateur naturalist.

The Jura.—Before entering into our proper subject, a few words concerning the Jura may be acceptable.

Rising between the Rhine and the Rhone, the Jura Mountains represent a typical instance of remarkably regular wrinkles in the crust of the earth. With the exception of two comparatively small tracts—one to the north-east, and the other to the south-west—which have escaped compression, and consist of approximately horizontal strata (Tabular Jura), these mountains form a series of parallel or almost parallel ridges (mostly anticlinal), separated by intervening valleys (mostly synclinal). According to Sir John Lubbock (*The Scenery of Switzerland*), some one hundred and sixty undulations and about fifteen main folds, nearly

¹ The railway development of Siberia is to be completed by the construction of a large number of branch or side lines from the main trunk to all the chief centres of Siberian life at a distance from the present railway.