stone-polishing works in the Urals and those of Kolyvañ in the Altai are well known.

The orography sketched above explains the great development of the river-systems of Siberia and the uniformity of their course. The three chief rivers—the Ob, the Yenisei, and the Lena—take their rise on the high plateau or in the alpine regions fringing it, and, after descending from the plateau and piercing the alpine regions, flow for a few thousands of miles over the high plains and lowlands before they reach the Arctic Ocean. The three smaller rivers of north-eastern Siberia—the Yana, Indighirka, and Kolyma—have the same general character, their courses being, however, much shorter, as in these latitudes the plateau approaches the Arctic Ocean. The Amur, the upper tributaries of which rise in the eastern border-ridge of the high plateau, is similar. The Shilka and the Argun, which form it, flow first towards the north­east, through the bendings of the lower terrace of the great plateau ; from this the Amur descends, traversing the Great Khingan and flowing down the terraces of the eastern slope towards the Pacific. A noteworthy feature of the principal Siberian rivers is that each is formed by the junction of a pair of great rivers. Examples are the Ob and the Irtish, the Yenisei and the Angara (itself a double river formed by the Angara and the Lower Tunguzka), the Lena and the Vitim, the Argun and the Shilka, uniting to form the Amur, which in its turn receives a tributary as large as itself, —the Sungari. Owing to this twofold composition and to the circumstance that, the alpine regions once crossed, their course lies over the high plains and lowlands and crosses the few ridges which rise above the plains (as, for example, the Yenisei below Yeniseisk), instead of following the valleys between them, the rivers of Siberia offer immense advan­tages for inland navigation, not only in the line of their main direc­tion from north to south but also across it, *i.e.,* from west to east. It is this circumstance that has facilitated the rapid invasion of Siberia by Russian Cossacks and hunters : they followed the courses of the double rivers in their advance towards the east, and discovered short portages which permitted them to transfer their boats from the system of the Ob to that of the Yenisei, and from the latter to that of the Lena, a tributary of which—the Aldan—brought them close to the Sea of Okhotsk. At the present day steamers ply from Tyumen, at the foot of the Urals, to Semipalatinsk on the border of the Kirghiz steppe and to Tomsk in the very heart of Siberia. And the time is not far distant when the Ob and the Yenisei, both tra­versing the high plains on nearly the same level and separated only by low hills, will be connected by a canal, thus permitting steamers to reach Krasnoyarsk and Irkutsk. As the population becomes denser no difficulty should be found in connecting some of the navigable tributaries of the Yenisei with one of those of the Lena, for they flow within a short distance from one another on the high plain, and Cossack boats have already been transported from the Yenisei to the Lena. An uninterrupted water communication will then have been established from Tyumen to Yakutsk, Aldausk, and the gold-mines of the Vitim. Owing to the great plateau separating the Lena from the Amur, no easy water communication can be estab­lished between the latter and other Siberian rivers. The tributaries of the Amur (the Shilka with its affluent the Ingoda) become navi­gable only on the lower terrace of the plateau. But the trench of the Uda to the cast of Lake Baikal offers an easy access for a railway up to and across the high plateau ; and at the very foot of its eastern border-ridge lie Tchita, whence boats are floated down (in spring) to the Pacific, and Nertchinsk, whence steamers may ply to the mouth of the Amur, as also up the Sungari to Ghirin and up the Usuri to Lake Khangka. Unfortunately all the rivers are frozen for many months every year. Even in lower latitudes (52° to 55*°* N*.*) they are ice-bound from the beginning of November to the beginning of May@@1; while in 65° N. lat. they are open only for 90 to 120 days, and only for 100 days (the Yenisei) or even 70 days (the Lena) in 70° N. lat. During the cold winter the smaller tributaries freeze to the bottom, and about 1st January Lake Baikal becomes covered with a solid crust of ice capable of bearing files of loaded sledges.

The chief rivers of Siberia are the following. (1) The Ob (Obi) is formed by the confluence of the Biya and the Katun (400 miles), both of which rise in the Altai Mountains; it flows north-west and north for 2120 miles, past Barnaul, Tomsk, and Narym, and enters the great Ob Bay of the Arctic Ocean. Its tributary (2) the Irtish, which joins it in 60° N. lat., has an even greater length (2520 miles). It rises in the high plateau, under the name of Black Irtish (500 miles); then, descending from the highlands, it enters Lake Zaisan, whence it flows north and north-west, past Semipalatinsk, Omsk, and Tobolsk, to join the Ob. It receives a great number of tribu­taries, the chief being the Tobol, the Ishim, and the Tara. Tyumen on the last-named will soon be connected by rail with Perm on the Kama, and is already the head of a great line of water communica­tion; navigation is also open to Lake Zaisan and for a considerable distance up the Black Irtish. The chief tributaries of the Ob are the

Anui (160 miles), Tcharysh (230), Tom (450), Tchulym (600), Ket (240), and Sosva (200),—all for the most part navigable. (3) The Yenisei rises on the high plateau in north-western Mongolia, where it is formed by the confluence of two great rivers—the Shislikit and the Bei-khem—and has the name of Ulu-khem. After descending the high plateau on the Chinese frontier, it flows north and enters the Arctic Ocean in a deep bay situated close by that of the Ob. The area of its basin is estimated at 1,380,000 square miles. It receives (4) the Upper Tunguzka or Angara (1100 miles), which itself has a basin of 275,000 square miles, (5) the Podkamennaya Tunguzka, and (6) the Lower Tunguzka. The Angara, whose tribu­taries on the left (Irkut, Oka, and Uda) are each large rivers, flows from Lake Baikal (40 miles above Irkutsk) and, describing a huge bend to the north-east, joins the Yenisei a little above Yeniseisk. (7) The Selenga, which enters Lake Baikal from the east, might be considered as the real source of the Angara. It is a very large river and rises on the high Mongolian plateau, entering Siberia about Kiachta. Its length may be estimated at more than 600 miles; it receives (8) the Uri (outflow of Lake Kossogol), (9) the Orkhon, (10) the Tchikoi (300 miles), (11) the Khilok (300), (12) the Uda (130), and (13) the Djida (200). Lake Baikal has two other con­siderable feeders—the Barguzin and the Upper Angara. (14) The Lena is also an immense river, having an estimated length of not less than 3000 miles. It rises in the Baikal Mountains, some scores of miles from the lake, and flows north and east past Kirensk, Olek- minsk, and Yakutsk. Thence it turns to the north-west and enters the Arctic Ocean, forming a wide delta. It receives several large tributaries—(15) the Vitim, which has a greater length (about 1400 miles) than the Lena above the point of junction, (16) the Olekma (about 800), (17) the Aldan (about 1300)—which receives in its turn (18) the Utchur (350), (19) the Maya, and (20) the Amga—and (21) the Vilui (about 1300). (22) The Taz (about 750), (23) the Kha­

tanga (400), (24) the Anabara (670), and (25) the Olenek (1200), which enter the Arctic Ocean to the west of the Lena, and (26) the Yana (1000), (27) the Indighirka (950), and (28) the Kolyma (1000) to the east of it are also considerable rivers, but small in comparison with the former. (29) The Anadyr enters the gulf of the same name in the Sea of Behring. (30) The Okhota (270) and (31) the Ud (350) are relatively small streams flowing into the Sea of Okhotsk. Of the rivers flowing to the Pacific the chief is (32) the Amur, which is navigable for more than 2400 miles from its entrance into the Tartar Strait (between the mainland and the island of Saghalin) to Sryetensk on the Shilka,—boats being floated from Tchita on the Ingoda. It bears the name Amur after the confluence of (33) the Shilka and (34) the Argun (see Transbaikalia) at Ust-Stryelka, and from this point flows east and south-east until its junction with its great tributary the Sungari; thence it flows north-east and north, and finally (for some 50 miles) east, before entering the Pacific. Its length, taking the Onon for its source, is about 2700 miles, and its basin is at least 785,000 square miles in area, but has diminished recently, —the waters of the Dalai-nor no longer reaching the Argun. It receives a great many large tributaries,—(35) the Zeya, whose affluent (36) the Selimja is itself a considerable river, (37) the Bureya, (38) the Kur, (39) the Gorin, and (40) the Im from the left; while from the right it receives (41) the Sungari and (42) the Usuri, whose affluent, the navigable Sungatcha, brings the Amur into steam communication with Lake Khangka. The rivers flowing into the Sea of Japan are mostly short, only (43) the Suifun being worthy of particular mention.

Numberless lakes occur in both Eastern and Western Siberia. There are wide areas in the plains of Western Siberia, or on the high plateau of Eastern Siberia, where the country may be said to be still passing through the Lacustrine period ; but the total area now under water bears but a trifling proportion to the immense extent which the lakes had even at a very recent period, when Neolithic man already inhabited Siberia. All the valleys and depressions bear traces of immense Post-Pliocene lakes. Even within historical times and during the 19th century the desiccation of lakes has gone on at a very rapid rate.@@2 The chief lake is Lake Baikal, more than 400 miles long, from 20 to 53 broad, and 12,430 square miles in area. Its surface is 1560 feet above sea-level, and it reaches in its south- west part a maximum depth of 751 fathoms. Another great lake, Lake Kossogol, on the Mongolian frontier, is 120 miles long and 50 broad, 5000 feet above the sea. The large Lake of Oron on the Vitim has not yet been visited by geographers. Vast numbers of small lakes stud the Vitim and upper Selenga plateaus; the lower valley of the latter river contains the Goose Lake (Gusinoye). In the basin of the Amur are Lake Khangka (1692 square miles), con­nected with the Usuri; Lakes Kada and Kizi, by which the lower Amur once flowed to the Pacific; and very many smaller ones on the left bank of the lower Amur. Numerous lakes and extensive marshes cover the low plains of Western Siberia ; the Baraba steppe is dotted with lakes and ponds,—Lake Tchany (1300 square miles) and the innumerable smaller lakes that surround it being but trifling

@@@1 The Lena at Verkholensk is navigable for 170 days, at Yakutsk for 153 days; the Yenisei at Krasnoyarsk for 180 days; see *Izvestia of* the Eastern Siberian Geographical Society, vol. xii. *sq.*

@@@2 See Yadrintseff, in *Izvestia* of the Russian Geogr. Soc., 1886, No. 1 (with maps).