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A HANDBOOK OF SIBERIA AND ARCTIC RUSSIA

VOLUME I GENERAL

*Compiled by the Geographical Section of the Naval Intelligence
Division, Naval Staff, Admiralty*

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NOTE

The region covered in this Handbook includes besides Siberia proper, that part of European Russia, excluding Finland, which drains to the Arctic Ocean, and the northern part of the Central Asian steppes. The administrative boundaries of Siberia against European Russia and the Steppe provinces have been ignored, except in certain statistical matter, because they follow arbitrary lines through some of the most densely populated parts of Asiatic Russia.

The present volume deals with general matters. The two succeeding volumes deal in detail respectively with western Siberia, including Arctic Russia, and eastern Siberia.

Recent information about Siberia, even before the outbreak of war, was difficult to obtain. Of the remoter parts little is known. The volumes are as complete as possible up to 1914 and a few changes since that date have been noted. No attempt, however, has been made to give any account of the social, and political and economic conditions which are the outcome of the Russian revolution of 1917.

Russian statistics have never been very trustworthy. As regards Siberia, when given separately from Russia and Central Asia, they are seldom of recent date. Such statistics as are obtainable are given in the chapters to which they refer. All figures relating to population must be accepted with caution.

The Admiralty will be glad to receive corrections and additions.

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	GENERAL OROGRAPHICAL MAP	<i>In pocket</i>

10 TRANSLITERATION OF RUSSIAN CHARACTERS

А а а	<i>a</i>
Б б Б б б	<i>b</i>
В в	<i>v</i>
Г г Г г	<i>g</i> <i>h</i> in foreign works
Д Д д д д	<i>d</i>
Е е	<i>e</i> <i>Ye</i> when initial
Ж Ж ж	<i>zh</i>
З з	<i>z</i>
И и И	<i>i</i>
І І і	<i>i</i>
К к	<i>k</i>
Л л л	<i>l</i>
М м М	<i>m</i>
Н н Н	<i>n</i>
О о	<i>o</i>
П п П	<i>p</i>
Р р Р	<i>r</i>
С с	<i>s</i>
Т т Т т т т	<i>t</i>
У у	<i>u</i>

Ф ф <i>F f</i>	<i>f</i>
Х х <i>X x</i>	<i>kh</i>
Ц ц <i>Ц ц</i>	<i>ts</i>
Ч ч <i>Ч ч</i>	<i>ch</i>
Ш ш <i>Ш ш</i>	<i>sh</i>
Щ щ <i>Щ щ</i>	<i>shch</i>
Ъ ъ <i>Ъ ъ</i>	mute
Ы ы <i>Ы ы</i>	<i>i</i>
Ь ь <i>Ь ь</i>	mute
Ъ ъ ь <i>Ъ ъ ь</i>	<i>ye</i>
Э э	<i>e</i>
Ю ю <i>Ю ю</i>	<i>yu</i>
Я я	<i>ya</i>
Ө ө	<i>th</i>
У у <i>У у</i>	<i>i</i>
Й й <i>Й й</i>	<i>i</i>

The combinations **ЫИ** and **ИИ** are transliterated *i*

NOTE

In the above table the principal forms of the letters of the Russian alphabet, printed and cursive, which occur in official Russian maps are given. In actual practice little or no distinction is made between printed and cursive forms, and consequently they have not been separated in this table. In the case of each letter only the commonest form of the small type is given, but in nearly all cases any form of the capital type, reduced in size, may be used.

This system is the same as that used by the Admiralty except as regards *и*, which the Admiralty transliterate *tz* instead of *ts*. The War Office system differs from the one adopted in this book by transliterating *ж* by *j* instead of *zh*. The sound of this letter is represented by the French *j*, which is the equivalent of *zh* in English. The Royal Geographical Society's system is the same as that of the Admiralty.

All proper names have been transliterated from official Russian maps. In the frequent cases of disagreement between different maps the 40-verst, or failing that the 100-verst map, has been preferred. Only words indicating geographical features as bay, lake, &c., have been translated. Russian words capable of translation which form the whole or part of a proper name have not been translated, but transcribed into Roman characters, e. g. *Byeli, Nizhne*. The only exceptions to these rules are in the case of names in common English usage such as *White Sea, New Siberia Islands, &c.*; and names that were originally English or French or of other foreign languages and have been adopted by the Russians, as *de Castries Bay, Nordenskjöld Archipelago, Jeannette Islands, Valentine Bay, &c.*

In order to simplify reference to Russian maps the adjectival endings showing gender of all Russian names have been retained. The result of this is a difference in the versions of the same name applied respectively to a bay (feminine in Russian), a village (masculine), or a church village (neuter).

NOTE

MAPS OF SIBERIA AND ARCTIC RUSSIA

The only official map of Siberia which covers the whole country is the *Map of the Oceans, Seas, Rivers and Lakes of Asiatic Russia and Adjoining Lands*, scale 100 versts to an inch (1 : 4,200,000), published by the Ministry of Ways and Communications, 1905. This map is in four sheets. It is coloured to show the drainage areas of the chief rivers. No attempt is made to show relief. There is much detail in relation to rivers, towns, villages, and tracks, but the map is untrustworthy in many parts. Moreover it is badly printed from worn type and somewhat illegible.

The topographical section of the Russian General Staff publishes a *Map of the Frontier Regions of Asiatic Russia*, scale 10 versts to an inch (1 : 420,000). There are twenty sheets in all of various dates from 1886 to 1911. The country covered is from about lat. 58° N. to northern Mongolia, but in western Siberia the sheets go north almost to the Ob delta. All Russian Central Asia is covered. The map shows relief by hill shading, but a great deal of it appears to be imaginary. Beyond the better known districts along the chief rivers and the railways this map cannot be relied upon. Roads and tracks are shown and a great many names are marked. Rivers are clearly indicated in blue. The map is generally legible. Little reliance can be placed on the altitudes, given in feet.

The Ministry of Ways and Communications also published in 1911 a *Map of Communications of Asiatic Russia*, scale 100 versts to an inch (1 : 4,200,000) in three sheets. The map shows roads, railways and navigable rivers, as well as telegraph lines. There are rough indications of topographical relief. The map is clear and legible if somewhat diagrammatic,

but like other maps of Siberia is far from accurate in many parts.

The Ministry of Ways and Communications also publishes a *Map of Communications of Asiatic Russia* in one sheet on a scale of 300 versts to an inch (1 : 12,600,000). The last edition revised to date was published in 1916 (Series No. 269). The map is clearly printed and gives much accurate information. It covers also European Russia. This map is a great improvement on the larger scale map of communications.

The best small-scale map of Siberia is in two sheets in the *Atlas Marksa*, Petrograd, 1910. It shows Siberia on a scale of 1 : 10,000,000.

The Ministry of Agriculture, Emigration Department, published in 1914 a large *Atlas of Asiatic Russia*, with three volumes of text. It contains a number of economic maps but no new topographical work and no maps on a scale as large as 40 versts to an inch.

Special maps of parts of Siberia are noticed under the chapters to which they refer.

Of European Russia there are maps on a scale of 10 versts to an inch (1 : 420,000), of which a new edition, but with few corrections, was issued in 1914.

The Ministry of Ways and Communications publishes a *Map of the Railways, Roads, and Waterways of European Russia* on a scale of 40 versts to an inch. The last edition is dated 1913, and there are nine sheets, of which Nos. 2 and 3 cover most of Arctic Russia. This map is much better executed than the smaller-scale one of Asiatic Russia.

All the maps referred to above are in Russian. The only good map of Siberia in Roman characters is a small scale one (1 : 7,500,000) in *Stieler's Hand Atlas* (1916). It should be noted that the transliteration of Russian characters by the German system is liable to disguise many of the names.

Maps of the Amur River and Lake Baikal on a scale of 1 : 1,750,000 are included in Volume III.

CHAPTER I

GENERAL GEOGRAPHICAL FEATURES

Position, boundaries, and extent—West and East Siberia—Main geographical divisions—Rivers—Lakes—Coasts.

POSITION, BOUNDARIES, AND EXTENT

SIBERIA is bounded by the Ural Mountains on the west, by the Arctic and Pacific Oceans on the north and east. In the south-west the generally accepted frontier runs from the sources of the River Ural in the west across the Central Asian steppe lands to the Tarbagatai Mountains, and thence by a devious course that does not coincide with the watershed eastward to the River Argun and along the Argun and the Amur to the Pacific. The western part of this boundary, against Russian Central Asia, is an arbitrary one with no counterpart in geographical features. Siberia in fact is often taken to include the two eastern steppe provinces of Akmolinsk and Semipalatinsk. The northern but not the southern parts of these are certainly Siberian in character, while the same applies to the western steppe province of Turgai, which, however, is always excluded from Siberia. For the purpose of this book the steppes in general are included without adherence to administrative boundaries. The eastern part of the southern boundary is against Chinese Mongolia and Manchuria and near the Pacific for a few miles against Korea. In its western part the Uryankhai region south of the frontier is nominally Mongolian but actually in Russian occupation. The total land frontier is about 10,000 miles long and the sea frontier twice that length.

Siberia, excluding the steppe regions, has an area of about 4,800,000 square miles, which is $1\frac{1}{2}$ times the area of Europe, $2\frac{1}{3}$ times the area of European Russia, and 40 times the size

of the British Isles. Its latitudinal limits are 49° N. to 77° $42'$ N., and it stretches from long. 59° E. to 174° $24'$ E. The Steppe regions included with Siberia in this book add about 450,000 square miles.

The name Siberia is supposed to be derived from the Russian word Сибѣрь, which in the sixteenth century indicated the chief Tartar settlement on the Irtish, and was afterwards extended to include all Russian possessions in Asia. Later it was restricted to its present application.

WEST AND EAST SIBERIA

Siberia may be conveniently divided into two unequal parts, western and eastern, of which western Siberia is the basin of the Ob, and though the more important of the two divisions, is only one-third of the area of eastern Siberia. The contrast between the south of Siberia with its great fertility, and the north with its barrenness almost as extreme, is easily recognized, but it is a contrast that holds chiefly in the west. The contrast between western and eastern Siberia is not so strongly marked and is often overlooked. The conception of Siberia as a vast plain rising with the gentlest gradient from the sea is true only for the west, or more strictly speaking for the Ob basin, and, in Arctic Russia, for the Pechora basin. East of the Yenisei these conditions do not hold. The elevations become considerable, and east of the Lena the surface is too irregular to be described as a plain. Low shores comparable with those in the west only occur about the mouths of the great rivers. In the extreme east the interior highlands reach the sea and leave only small and disconnected areas of plain along the coast.

Western Siberia extends through a great range of latitude and merges into the steppes of Central Asia and the plains of European Russia. Eastern Siberia is much narrower from north to south, and narrows progressively towards the east. Mountains cut it off from Central Asia and restrict its intercourse with the west. In the Amur basin it opens naturally to Manchuria.

Western Siberia has thus a large area in temperate latitudes not far removed from Europe, and fit for agriculture, while eastern Siberia lies mainly in more northern latitudes far removed from Europe, and its wide expanses of forests leave little scope for agricultural development. The physical link between western and eastern Siberia is Lake Baikal and the land route that with difficulty rounds its southern end.

MAIN GEOGRAPHICAL DIVISIONS

The main features of the relief of Siberia are comparatively simple, and consist of certain well-defined regions. Two high plateaux occupy the heart of Asia, and extending from extreme west to extreme east cover nearly two-fifths of the area of the continent. The western plateau, including Anatolia, Armenia, and Iran, is outside the region under consideration, but much of the eastern plateau, extending from the Pamirs and the Himalayas north-eastward towards the Bering Strait, lies within Siberia. This plateau includes Tibet, Chinese Turkestan, the Gobi desert, Mongolia, and much of Manchuria. A great part of it is desert and little of it is suitable for agriculture and human settlement. It forms a buffer land between that Asia which turns towards the Pacific and the Indian Oceans, tropical and sub-tropical in the main, and that which faces the Arctic Ocean and has its principal relations with Europe. The plateau lands have always formed an obstacle to the intermingling of the peoples on the two sides and have discouraged the meeting of east and west.

North of these plateaux and their high bordering ranges lies a broad alpine zone of rugged mountains and deep valleys. This zone averages about 150 miles in width, and its peaks rise to 5,000 or 6,000 ft. It includes the Altai Mountains and the Barguzinsk and other mountains around Lake Baikal.

North-west of the alpine zone comes the belt of high plains at an elevation of 1,500–2,000 ft. and with an average width of 200 miles, and beyond them, farther to the north-west, lie the low plains, not over 500 ft., which slope down gently to the Arctic Ocean.

Similar general physical features are repeated on a smaller scale to the south-east of the high plateaux.

Volcanic activity has played little part in Siberia. On the north-west border range of the high plateaux a few volcanic formations occur, but there are neither active volcanoes nor is there any historic record of one. In Kamchatka, however, the Pacific ring of volcanoes touches Siberia, and several active volcanoes occur, including Klyuchevskaya (16,130 ft.), said to be the loftiest volcano in Asia.

To these distinctive orographical features of Siberia may be added certain details.

The High Plateaux

The eastern plateau of Asia, the only one of the two which concerns Siberia, covers over one-fifth of the continent and extends 5,000 miles from south-west to north-east. It is widest in the west and middle, narrows towards the north-east, and is bordered by lofty ranges on all sides. Though called a plateau it is by no means of a uniform altitude, but is cut into terraces sharply defined from one another by escarpments which form ranges rising 500 to 1,000 ft. above the general level. The highest of these terraces is in the south and includes Tibet. It averages 12,000 to 13,000 ft. in height. Next in height is the terrace that lies on the north of the plateau, stretching from about long. 87° E. to long. 127° E., and includes north-west Mongolia and much of the Transbaikal region of Siberia with the Selenga, Vitim, and Aldan plateaux. This terrace has an average height of 3,000 to 5,000 ft. In addition to the escarpments which fringe the terraces there are a number of disjointed ranges, many of which run north-west and south-east, and others more or less parallel to the greater ranges. These still further diversify the surface of the plateau and give it the appearance of a region of great structural complexity. The plateau forms the water-parting between the Arctic and Pacific drainage. No stream crosses it from one side to the other. But on its surface there are few well-defined watersheds between the rivers except the escarpments which

fringe the terraces. In many cases adjacent rivers are separated from one another only by marshes. In the east and north-east the high plateau is forested, but in the centre and the west it is a desert, and it is little more productive in the south.

The high plateaux of Siberia are built of gneisses, schists, clay-slates, and old limestones, all of Archaean and Palaeozoic age. On these old rocks occur in places Jurassic and Tertiary beds which are due to fresh-water lakes in those periods, at a time when the lowlands to the north were submerged and the proximity of the sea caused greater precipitation on the plateaux than is now the case.

The Great Border Ranges

Along the north-western and the south-eastern sides of the great plateau are continuous lofty border ranges. The north-western range is the most continuous in Siberia and in it occur the greatest heights. The continuity of this range is badly shown on most maps of Siberia, and its nomenclature is somewhat confused. The Tienshan, the Sayansk, the Ulan-Burgasi, the South Muya, and the Aldan Mountains are all parts of the north-western border range. It is 17-25 miles wide and 6,000 to 8,000 ft. high in the west, decreasing in the north-east to 4,000 and 3,000 ft. The south-east border range of the great plateau is known as the Great Khingan Range from China to the Amur River and thence to the north-east as the Stanovoi Mountains, including the Dzhugdzhur, Kolimsk,¹ and Anadir Mountains. There is still some doubt about the exact course of the northern end of the Great Khingan and its junction with the Stanovoi Range. In most maps of Siberia it is represented as crossing the Amur at the confluence of the Shilka and there terminating, while the Yablonoi Mountains are represented as running eastward from the head streams of the Olekma, forming the northern boundary of the Amur basin

¹ This is the original use of the name Kolimsk Mountains, which is more generally but erroneously applied to the range east of the Kolima River.

and joining the Stanovoi Mountains which continue to the north-east. There seems to be no information to support this suggestion, which originated arbitrarily in the days when little was known of the Amur basin. The supposed continuity of the Stanovoi and Yablonoi Mountains has no existence, and the Stanovoi Mountains in reality are of the same structure and origin as the Great Khingan Range, which crosses the Amur in the vicinity of the River Kumara, about 600 miles east of the confluence of the Shilka. More light, however, is needed on the junction of these ranges.

The Great Khingan Range is about 1,000 to 2,500 ft. above the level of the plains to the east, but it rises little above the general level of the plateau, so that, viewed from the west from the surface of the plateau, it has hardly the appearance of a mountain-range. Its crest is 3,000 to 4,500 ft. The Stanovoi Mountains are little known, and their north-eastern termination is uncertain. They seem to maintain the general features of the Great Khingan Range.

The continuity of the north-western range is broken in places by great trenches or gently graded slopes which give access from the plateau to the plains beyond. These trenches are the most important orographical features in Central Asia, for they link the lowlands of Siberia and the Transcaspiian steppes with the high plateau and China. The most striking is the so-called Dzungarian trench, down which runs the head-stream of the Irtish from its source on the plateau to Lake Zaisan. As it descends the Irtish receives many tributaries from the Mongolian Altai, which stand above the northern side of the trench. The Dzungarian trench presents an easy route, and was one of the ways by which the Mongols spread westwards to nearer Asia and Europe. Farther east the Selenga River descends to Lake Baikal in another trench and affords a much-used route via Kyakhta between Siberia and China. By the lower part of this trench the Siberian Railway climbs to the plateau and by an eastern branch of this trench, down which flows the Uda, the Siberian road ascends to Chita on its way to the east.

The Vitim, Olekma and Konam trenches are others along the range, named from the streams which flow down them.

The Alpine Zone

The broad zone of alpine highlands lying north-west of the plateau is a complex mass of ranges and spurs separated by deep valleys which are often swampy and strewn with boulders. The Altai, Baikal and Barguzinsk Mountains are part of this region. It has an average width of about 150 miles and a length of about 2,000 miles. The summits range from 5,000 to 8,000 ft. Towards the north-east it becomes lower and less rugged as it meets the Arctic Ocean. The so-called Kolimsk Mountains (see above) are the most striking features of the alpine foreland in the north-east. A longitudinal valley 10 to 25 miles wide is often noticeable between the border range and the alpine foreland. Most parts of this valley are occupied by secondary tributaries of the main rivers. The valley floor has an elevation of 1,000 to 2,000 ft. The alpine foreland is built of granites, syenites and crystalline slates. In it occurs the deep depression in which lies Lake Baikal. The greater part of the alpine foreland is densely forested, except where the peaks rise above the limit of the tree growth, and little of it is accurately known. The wild inhospitable nature of the region and the virgin forests offer few inducements to its penetration by man except where rich gold deposits occur, as in the Altai Mountains and the Yeniseisk district. In places, however, the fertility of the mountain valleys is attracting Russian colonists. Routes through the region are difficult. Much skill was required to carry the Siberian Railway round the south of Lake Baikal.

The alpine foreland occurs also to the south-east of the Great Khingan Range. It is 70 to 150 miles wide in China, but disappears towards the north-east and is lost below the waters of the Sea of Okhotsk.

The High Plains

Beyond the alpine foreland lies a broad zone, about 200 miles wide, of high plains at an elevation of 1,500 to 2,000 ft. They

have few mountains, the only important ones being the Yeniseisk and Verkhoyansk Mountains, but the deep-cut gorges of the rivers draining from the plateau and the alpine zone give a hilly appearance to the plains. The plains are composed of more or less horizontal strata of Upper Devonian, Secondary and Tertiary ages in which the rivers have easily cut valleys 400 to 800 ft. deep. The high plains are forested in the wetter north-east but are steppe lands in the drier south-west.

On the south-eastern side of the plateau there is a belt of high plains about 100 miles wide. A range of granitic and schistose mountains called indifferently the Little Khingan, the Bureya and the Dousse Alin, runs along these plains parallel to the Great Khingan Mountains. Beyond these mountains, still farther east are the Sikhota Alin Range of the Maritime Province and the ranges crossing Sakhalin and Kamchatka.

The Low Plains

That part of Siberia which has most economic importance excluding only the Amur valley, and including practically the whole of western Siberia, comprises the low plains. They are seldom over 500 ft. in elevation, except where a few mountain ranges occur, and they slope gradually down to the Arctic Ocean. In some places an escarpment separates the high from the low plains: in other places the transition is gradual. The gradient of the plains is very gentle, being less than a foot per mile in the west. This gentle gradient is continued beneath the sea and gives shoal water far to the north of Siberia in the Arctic Ocean. Between the Urals and the Yenisei there are no hills of any importance. East of the Yenisei are the Pitski Range and the Tunguska Mountains on the borders of the high plains, the Syeverma Mountains (3,000 ft.) north of the Lower Tunguska, the Birranga Mountains in the Taimir Peninsula, the Vilyuisk Mountains west of the Lena, and the Verkhoyansk and Orulgan Mountains (4,000 ft.) east of the Lena. The highest peak in the Verkhoyansk Mountains is said to be 7,900 ft. Farther to the

east the plains are more diversified and much narrower. They scarcely merit the name of plains as they merge into the plateau region of the north-east.

The low plains of Siberia are of Palaeozoic rocks deeply overlaid with post-glacial deposits showing that their emergence from the waters of the Arctic Ocean is recent from a geological standpoint. Many gigantic boulders scattered over their surface were no doubt dropped from floating icebergs.

The south-western part of the plains is semi-barren steppe-land beyond the confines of Siberia, but farther north these give place to rich meadow lands where the rainfall and black earth afford the best possible conditions for corn-growing and cattle-raising. Farther north the grass lands give way to forests, which in their turn thin out and disappear in the treeless swampy tundra which fringes the Arctic Ocean from Scandinavia to the Bering Strait. The tundra is useless for cultivation and settlement.

Across the western plains there are no obstacles to communication in any direction except the swamps of the tundra, which are impassable in summer, and the dense forests.

The Plains of Arctic Russia

The characteristic features of the low plains of Siberia occur farther west in Arctic Russia, but their continuity is interrupted by the low folds of the Ural Mountains which extend from about lat. 50° N to the Arctic Ocean. Their summits vary from 2,600 to 5,000 ft., and the greatest height is Telposiz (5,530 ft.) in about lat. 64° N. The Urals are low and wide, and consist of three discontinuous ranges in the south, between which there are many routes. North of lat. 60° N. they are more compact and continuous. The range becomes lower as it approaches Baidaratskaya Bay, and reappears in the low hills of the Yamal Peninsula. Two branches run from the Urals towards the north-west. The first is the Timan Range, which crosses the plains from about lat. 60° to 62° N. to the Kanin Peninsula. Its greatest height is about 750 ft., and its average height considerably less. The second range is

the Pai-Khoi, which runs from about lat. 67° to 68° N. to Vaigach and Novaya Zemlya.

For the rest Arctic Russia east of the White Sea is low and swampy like north-western Siberia, and covered with forest and tundra.

The Kola Peninsula

West of the White Sea the country differs. The Kola Peninsula is geographically an extension of the mountainous region of Scandinavia. The interior is elevated and the north coast high and steep. Tundra in the north and meagre forests in the south cover the peninsula. South of the Kola Peninsula is the low-lying lake-studded region on the west of the White Sea, in reality an eastern extension of the Finnish lake plateau.

RIVERS

Across the plains of Arctic Russia and Siberia many great rivers drain from the highland regions in the south to the Arctic Ocean. The uniformity in the direction of flow and the other characteristics of these rivers find their explanation in the relief of the land. The largest rivers are the Ob, Yenisei, and Lena with their many tributaries. They all rise in the central high plateau and drain through the alpine foreland to the plains across which they flow with sluggish, winding courses whose length is dependent on the breadth of the plains. Further east, where the highland region trends northward towards the coast, the rivers are necessarily shorter, swifter, and more direct; but the Yana, Indigirka, Kolima, and Omolon show on a smaller scale most of the characteristics of the rivers of the west. The narrowness of north-eastern Siberia and the proximity of the highlands to the sea cause the eastward drainage to flow in short rapid streams. The only exception is the Amur, which is comparable to the northern rivers. Like them it drains from the high plateau, across the alpine foreland and the plains. The chief respect in which it differs from the other great Siberian rivers, in addition to its Pacific outlet, is that a great part of the courses

of the main river and the tributaries are on the high plains and the plateau.

The rivers of Arctic Russia, rising in the Urals, are necessarily shorter than those of western Siberia, but in other respects the Northern Dvina and the Pechora are similar to the Ob.

Importance of the Rivers

Their long courses over gently sloping plains give the Siberian rivers certain characteristics which have had a great influence on the history and development of Siberia. In the first place, the absence of a very decided slope means that the rivers wind a great deal, and have ill-defined watersheds which are easily crossed. In the second place, the gentle gradient of the plains makes the rivers slow and navigable almost to their sources. Lastly, the northward course of most of the rivers results in their waters swinging to the east, owing to the rotation of the earth, and as the rivers erode easily in the soft plain, their right or eastern banks are generally high and suitable for settlements, while their left or western banks are low, ill-defined, and liable to inundation. In their plain courses the rivers are sometimes several miles wide, shallow, and studded with sandbanks and islands, which are often completely inundated in times of flood. Their channels change from year to year, and their depth varies with the season. Yet despite all drawbacks the rivers form the chief highways of Siberia, and their value is enhanced by the vastness of the plains, the dense forests, and the swampy tundra, all of which make land travelling difficult if not impossible. There are no towns of any importance in Arctic Russia and Siberia which are not on navigable waterways. Of all the physical features of Siberia, it is the rivers that have had the most progressive influence on the country, the Ob, the Irtysh, and the Yenisei most, and the Lena least of all the great rivers; but as population spreads eastward even the Lena will take its share. Railways will never replace waterways: they will make east and west

routes, but will feed and be fed by the waterways. Railways link Siberia to the outer world, and in a measure advertise it, but the rivers do the work of real progress and settlement.

The chief disadvantage of the Siberian rivers is that most of them flow north, and so give access only to the Arctic Ocean, and all of them are closed to navigation by ice for more than half the year. The northern exits of the Ob, Yenisei, and other rivers have so far made them of use principally for internal commerce, and militated against their value as gateways of external trade. But there are signs that this will not always remain the case to the same extent (see Vol. II, Chapter IV).

In the southern part of the plains, the region of most value for human settlement, the tributaries of the different systems closely approach one another, and the basins are so dove-tailed that by short and easy portages there is water communication from one end of Siberia to the other. This facilitated the penetration of Siberia by the Cossacks. Passing from the Ob to the Yenisei and Lena they reached the Sea of Okhotsk. And it was probably due to their missing the Amur and being led further north by the waterways to uninviting shores that Russia's entry into the Amur basin was so long delayed. Her claims on the Ussuri and the Yellow Sea coast came too late to be firmly established before Japan had begun to look westward.

The extent of the Siberian plains is so vast that many parts are at a considerable distance from a navigable waterway. In the north, where the rivers are fewer, and many run direct to the sea, this isolation of certain areas is most marked. Some of the northern regions away from rivers or drained by small independent streams are almost unknown except to wandering tribes.

LAKES

Siberia has many lakes, particularly in the west. The largest lie in the alpine foreland in the south. Lake Baikal covers an area of nearly 13,200 square miles, and is 400 miles

long and 18 to 66 miles broad. Lake Zaisan, which lies outside Siberia proper, on the course of the Irtish, is 707 square miles in area. The Kirghiz and Baraba steppes are dotted with small lakes, many with ill-defined margins. On the Selenga and Vitim plateaux there are also many small lakes. In the lower part of the Amur basin are several larger lakes, including Lake Kada and Kizi near the mouth of the Amur, Lake Odzhal further up, and Lake Khanka (1,700 square miles) in the Ussuri valley, partly within Chinese Manchuria.

COASTS

The coast-line of Siberia has a great length, but little of it is important, as traffic to and from Siberia is principally overland via European Russia. The northern coast-line is still imperfectly charted except in the extreme west. It is blocked with ice for the greater part of the year, and in no month is navigation free from difficulties on account of ice. The coast of Russia west of the White Sea is the only part of the Russian Arctic coast which is approachable all the year round.

The Pacific coast of Siberia is less inhospitable, is faced with deeper water, and has several good harbours, but it opens to an unproductive hinterland, and is blocked with ice for much of the year. These drawbacks decrease progressively towards the south. Consequently the most important seaport, Vladivostok, lies at the extreme south of Russian Pacific territory.

The coasts of Siberia and the off-lying islands are described in detail in subsequent chapters in Volumes II and III.

CHAPTER II

CLIMATE

General characteristics—Temperature—Pressure and winds—Precipitation—Climate and Agriculture—Climatic Regions—Freezing and thawing of rivers of Siberia.

GENERAL CHARACTERISTICS

THE climate of Siberia is typically continental, and is characterized by a great range of temperature between winter and summer; a reversal of pressure conditions, and consequently of winds, between winter and summer; and a small amount of annual precipitation. In a general way it is comparable with the climate of European Russia, but is more extreme in all respects. The winter is long and very cold, but generally calm and dry with little cloud to interfere with the bright sunshine. The chief populated parts of Siberia lie between lat. 50° N. and lat. 60° N., and so receive, roughly speaking, as much insolation as the British Isles, but the extreme north has a certain period of darkness in midwinter. January is the coldest month. Snowfall is seldom deep.

The months of vegetative growth are May to October, with a mean temperature of about 56° F. in western Siberia, and about 53° to 60° F. in eastern Siberia, but only the three months of June, July, and August can really be regarded as summer. Most of the precipitation occurs in that period. In September the temperatures begin to fall rapidly. Spring and autumn are short seasons and are scarcely noticeable except in the south.

The causes of these characteristics are to be found in the physical circumstances of the country. It is a compact land mass open to the north by gently sloping plains, but closed to the south by mountains which serve to a great degree as

climatic barriers. The moderating influence of the ocean can be felt only in the extreme east, where the Dzhugdzhur and Stanovoi Mountains lie near the coast, and prevent the oceanic influences penetrating far inland. The only ocean to which the plains of Siberia lie open is the cold Arctic Ocean, which is so encumbered by ice for a great part of the year, that it has little beneficial influence on the climate. Lastly, the country rises towards the south, except in the extreme west, and so the temperatures are lower than they would otherwise be, despite the comparatively low latitudes of that part of Siberia.

TEMPERATURE

The mean annual temperature of practically the whole of Siberia is below 36° F., and of all, except the extreme south, below 32° F., but these figures convey little because of the great seasonal range of temperature. The winter temperatures are much lower, and the summer temperatures slightly higher than the latitudes suggest. The greatest extremes occur in the north-east between the Aldan and the Arctic Ocean, where Verkhoyansk, in lat. 67° N., has a January mean of -60.7° F. and a July mean of 59.7° F., or a range of over 120° F., probably greater than occurs elsewhere on the face of the globe. Other places in eastern Siberia much farther south experience very low winter temperatures, such as Yakutsk in lat. $62^{\circ} 1' N.$, which has a January mean of -46.0° F. From this pole of cold in the Yana and Lena region winter temperatures increase in all directions. Even to the north along the shores of the Arctic Ocean the mid-winter temperatures are not so low as at Verkhoyansk. At Sagastir in the Lena delta, in lat. $73^{\circ} 23' N.$, the mean of February, the coldest month, in two years' observations, was -36.4° F., and the *Fram*, in her drift across the Arctic Ocean, had a January mean no lower than -31.9° F. In the east the waters of the Pacific in winter carry comparatively high coastal temperatures north as far as the Chukchee Peninsula, but the fall westward to the low temperatures of the interior

is rapid. Thus the January mean of Vladivostok is 4.8° F., of Petropavlovsk in Kamchatka 13.8° F., but of Nikolaevsk -10.1° F. To the west and particularly the south-west of the pole of cold the increase in winter temperatures is more gradual. Yeniseisk has a January mean of -10.1° F., Tomsk of -3.3° F., and Tobolsk of -2.2° F. Even in the Steppe provinces the January mean ranges from -4° F. in the north to 17.5° F. at Lake Balkhash in about lat. 45° N. A January mean above freezing point does not occur north of Tashkent and Bokhara near the southern frontier of Asiatic Russia. In north-west Siberia the Atlantic influences make themselves felt to a small extent; thus Berezov on the Ob in about lat. $63^{\circ} 40'$ N. has a January mean of -10.6° F., and Arkhangel in $64^{\circ} 32'$ N. has a January mean of 7.5° F. This influence is considered further on p. 34. The freezing of Siberian rivers is considered at the end of this chapter, and ice in the polar seas in Vol. II, Chapters I and IV, and Vol. III, Chapter II.

In summer the highest temperatures occur in the south and south-west, and there is a decrease towards the north and east coasts, but the distribution of temperature conforms to latitude much more than in winter. The shores of the Arctic Ocean have a July and August mean generally well above freezing point, thus Sagastir in the Lena delta has a July mean of 40.3° F., and the *Fram*, in the Arctic Ocean, had a July mean no lower than 32° F. As far south as the Arctic Circle the increase of temperature is comparatively rapid, but south of the Arctic Circle it becomes more gradual. In the east temperatures as a rule are slightly higher than in corresponding latitudes in the west, but this small difference disappears in the south. The extreme south of Siberia has a July mean of over 71° F., and in the Steppe provinces the July mean goes as high as 80° F. On the east coasts the Pacific makes itself felt as a cooling influence, and the July isotherms, like the January ones, run roughly parallel with the coast from Sakhalin to the mouth of the Anadir. Thus Okhotsk in lat. $59^{\circ} 21'$ N. has a July mean of only 55.2° F., or about 11° F

lower than Olekminsk, in the interior in much the same latitude, and Petropavlovsk in lat. $52^{\circ} 53' N.$ has an August mean of 58.3° compared with $66.9^{\circ} F.$ at Yeniseisk on about the same parallel. Despite the low summer pressure over Siberia these maritime influences do not penetrate far inland. Lake Baikal exercises locally the functions of a sea in reducing summer temperatures in its vicinity.

PRESSURE AND WINDS

The low winter temperatures of Siberia result in an extensive high-pressure system developing over the country at that season. The frozen ocean to the north aids in its development. In January the highest pressure lies SW. of Lake Baikal, and extends thence to the NE. and SW. The pressure decreases towards the NW. of European Russia, where a comparatively low pressure area extends from the Atlantic over the Barents Sea, and towards the east, where a wide low pressure system lies over the North Pacific. Lake Baikal causes a local weakening of pressure in the heart of Siberia. As a result of these pressure conditions over Siberia the winter winds as a rule are light, generally from the SW. in the north, and from the E. and SE. in the south. But calms are characteristic of a Siberian winter, and consequently the intense cold is tolerable, and has comparatively little ill effect on vegetation and human activities. In March the centre of high pressure moves northwards to the Arctic Ocean, and by April the pressure over Siberia and the Pacific is almost equalized, while in May the rapidly rising temperature results in the formation of an extensive low pressure system over the country, which reaches its greatest development in July. The reversal in pressure conditions results in inflowing currents of air throughout Siberia. In western Siberia westerly and northerly winds prevail, in the Taimir region cool northerly winds, and in the north-east easterly winds. On the Ussuri and Maritime regions there is a more marked monsoon effect owing to the close proximity of the cool ocean to the comparatively warm

land. Vladivostok has a prevalence of warm south-easterly winds during summer.

As a result of the low pressure the summer winds of Siberia are often strong, and gales occur at that season. The mountains of the south form a fairly effective barrier against southerly air currents, but föhn winds, warmed by their descent from high altitudes, not infrequently blow in the northern valleys of the Altai and Sayansk Mountains.

PRECIPITATION

Precipitation throughout the whole of Siberia is slight and occurs chiefly in summer. It is least in the far north, where it is less than 8 ins. in the year, and it increases towards the south, reaching its maxima of 18 ins. or over in the south-west and the Altai region, and 20 ins. or more in the Amur region. In Kamchatka, where the monsoon is well marked, the total annual fall is 40 ins. or more. In the Steppe provinces in the far south-west the annual precipitation again decreases towards the Sea of Aral, where it is under 4 ins. In the Tianshan Mountains, however, between the steppes and Chinese territory, the annual amount rises to three or four times that figure.

As regards seasonal distribution, summer, as already stated, is the time of most precipitation. On an average 50-55 per cent. of the annual amount falls during June, July, and August. The daily fall is generally slight. The southern part of the Steppe provinces are again an exception, for they receive most of their scanty rainfall in winter. The only parts of Siberia proper that receive an appreciable amount of winter precipitation are the Vasuigan swamps and the Ishim steppes in the west, and Sakhalin and Kamchatka in the east. The Arctic coast, the Transbaikal, and the upper Amur regions are particularly dry in winter.

Cloudiness is a general accompaniment of the rainy season.

Drought is characteristic of many parts of Siberia, although the country is well supplied with great rivers. It must be remembered, however, that these rivers have their sources in

the mountains of the southern frontier lands, where rainfall is more abundant than on the plains; and furthermore, that their stoppage by frost for more than half the year, and the slight loss they suffer from evaporation, except for a few weeks, are factors which combine to conserve their water-supply. Lastly, the frozen subsoil of the greater part of Siberia and the gentle gradients of the plains, especially in the west, make drainage slow, and give the country a wet appearance despite the small amount of precipitation that falls.

CLIMATE AND AGRICULTURE

The influence exercised by the climate on most aspects of human activity in Siberia is noticed more particularly in the chapters on agriculture and communications, but attention may be drawn here to a few more general relations between climate and agriculture.

The high summer temperatures, if they were unaccompanied by cloudiness and rainfall, would be disastrous to agriculture. As it is the clouds temper the heat, and the rainfall is so evenly distributed throughout the summer months that agriculture receives the maximum benefit from it. However, a small diminution in the annual rainfall is most serious, as there is no margin to spare. In the Steppe provinces, where the summer rainfall is slight, and the summer temperatures very high, agriculture can be practised only along the rivers of the far south where irrigation is possible. In the Amur region the abundant summer rains favour agriculture while the monsoon region, including Kamchatka, has too much rain, in relation to its low summer temperatures, for agriculture to flourish.

The scarcity of snow in winter, throughout most parts of Siberia, allows the ground to freeze to great depths even in the south of the country. A permanently frozen subsoil extends north and east of a line drawn from the Kanin Peninsula, on the White Sea, east by Berezov on the Ob to Turukhansk on the Yenisei, thence south-east to Ilimsk and round the north and east of Lake Baikal, and west to the Uryankhai region: the lower Amur, Ussuri, and Maritime regions are

excluded from this area. In summer the surface soil, in the area so defined, thaws to certain depths. Tree growth is not prevented, as the roots spread out laterally when they reach the frozen soil. In fact, some of the finest forests of Siberia are in this region. Provided a district has a sufficiently long and warm summer, the frozen soil actually assists cereal cultivation. The short roots of cereals do not reach the frozen subsoil, which on the other hand ensures a supply of water in the upper layers, and so saves the crops from disaster in case of drought. Of course, over the greater part of northern Siberia cereal cultivation is impracticable on account of the shortness of the summer and the waterlogged soil.

In western Siberia, with its greater winter snowfall and its higher winter temperatures, the soil does not remain permanently frozen. In other respects, however, the lower winter temperatures of eastern Siberia are not more unfavourable to agriculture than the higher temperatures of western Siberia, for both are too low to allow work on the land in winter. Frosts which occur as late as early summer and as early as August or September are most injurious to agriculture. In some agricultural regions July is the only month in which frost never occurs.

CLIMATIC REGIONS

While practically the whole of Siberia experiences the same type of climate, the country can be divided into certain climatic regions. These regions have no clearly defined boundaries, and they merge imperceptibly into one another. The differences between their climates is in degree rather than in kind. The regions are as follows :

1. *The Arctic region* stretching from Lapland through Arctic Russia and Siberia to Bering Strait and extending southward to about lat. 64° N. in the west, and about lat. 67° N. in the east. Summer is very short and the temperature does not rise above 60° F. Winter is long and cold with a January mean of -10° F. to -40° F. except in the west. Spring and autumn scarcely occur. Rainfall in summer and

snowfall in winter are both slight. This region has neither so severe a winter climate, nor so warm a summer climate as east-central Siberia (Region 3).

The climate of the Kola Peninsula and the White Sea district forms a sub-region characterized chiefly by a milder winter than the rest of the region. This is due to the warm Atlantic drift, the influence of which is felt chiefly on the Murman coast but to a lesser extent in the White Sea and Kanin region, and rapidly disappears on the mainland farther east. The winter climate of Novaya Zemlya, particularly on the west side, feels its influence in comparatively high temperatures and in amount of precipitation, and Franz Josef Land may do so in exceptional years. The summer climate of this sub-region differs little from that of Arctic Siberia.

Temperature and Precipitation in Arctic Siberia

	Jan. mean ° F.	July mean ° F.	Range ° F.	Precipitation (inches)	
				June-Aug.	Annual total
Franz Josef Land	-11.5	36.1	47.6	?	?
Obdorsk	-16.4	56.5	72.9	4.7	11.1
Tolsti Nos	-28.8	51.8	80.6	2.0	12.0
Turukhansk	-18.7	59.5	78.2	7.5	14.0
Sagastir: Lena delta	-36.4 (Feb.)	40.3	76.7	?	?
<i>Fram</i> ¹	-31.9	32.0	63.9	?	?

Temperature and Precipitation in Arctic Russia

	Jan. mean ° F.	July mean ° F.	Range ° F.	Precipitation (inches)	
				June-Aug.	Annual total
Kola	11.8	54.8	43.0	4.0	8.0
Arkhangel	7.5	60.4 (Aug.)	52.9	6.0	15.5
Kem	12.4	58.3	45.9	?	15.0
Troitsko-Pechorskoe	-1.1	60.2	61.3	?	?
Karmakul: Novaya Zemlya	2.3 (Feb.)	43.2	40.9	1.7	12.5

2. *West-central Siberia* is the chief populated region of Siberia and includes the south part of the Tobolsk Province,

¹ The mean of the temperatures taken in the *Fram* from October 1893 to July 1896 during her drift in the ice from between lat. 77° 30' N. and lat. 85° 55' N.

most of the Tomsk Province, the south of the Yeniseisk and Irkutsk Provinces, and the northern parts of the Steppe provinces. Both winter and summer are warmer than in the Arctic region. The January temperature varies from 0° F. to -10° F., and the July temperature from 64° F. to 70° F. Early morning frosts may occur as late as June or as early as September. The mean annual rainfall is about 16 to 20 ins., of which more than half falls in the three summer months. On account of the high temperatures summer, like winter, is a period of clear weather despite the rainfall.

Temperature and Precipitation in West-Central Siberia

	Jan. mean	July mean	Range	Precipitation (inches)	
	$^{\circ}$ F.	$^{\circ}$ F.	$^{\circ}$ F.	June-Aug.	Annual total
Bogoslovski	-2.2	62.6	64.8	8.0	16.5
Tobolsk	-2.2	66.4	68.6	9.5	18.0
Ishim	-3.8	66.0	69.8	9.0	17.5
Narim	-7.4	67.4	74.8	?	?
Tomsk	-3.3	65.6	68.9	10.0	20.0
Kurgan	-1.5	68.7	70.2	?	?
Yeniseisk	-10.1	66.9	77.0	6.5	17.0
Krasnoyarsk	-3.6	66.7	70.3	?	?
Barnaul	-2.2	67.1	69.3	5.0	12.0
Irkutsk	-7.4	65.1	72.5	8.5	16.0

3. *East-central Siberia* is the largest region and includes most of the Yakutsk Province except the extreme north, the north of the Irkutsk Province, and the Transbaikal Province. The climate is the most extreme in the whole of Siberia, and is characterized by the great severity of the winter rather than by exceptional warmth in summer. In January the mean temperature ranges from -60° F. in the north to -4° F. in the south, but some parts of the south on account of their considerable elevations have a January mean much lower than -4° F. The absolute minimum recorded is -90° F. at Verkhoyansk. Several months may occur during which the temperature remains below -20° F., but on the other hand great ranges may occur in any month except July. July has a mean temperature ranging from 60° F. to 70° F.

Precipitation varies from an annual total of 5 or 6 ins. to 17 or 18 ins. Snowfall is nowhere heavy and the Transbaikal Province is almost snowless.

Temperature and Precipitation in East-Central Siberia

	<i>Jan. mean</i>	<i>July mean</i>	<i>Range</i>	<i>Precipitation (inches)</i>	
	<i>° F.</i>	<i>° F.</i>	<i>° F.</i>	<i>June-Aug.</i>	<i>Annual total</i>
Kyakhta	-18.4	67.1	85.5	7.5	10.0
Olekminsk	-33.3	66.0	99.3	7.5	11.0
Yakutsk	-46.0	66.2	112.2	6.5	12.0
Verkhoyansk	-60.7	59.7	120.4	?	5.0
Novi-Selenginsk	-15.7	70.5	86.2	?	?
Verkhne-Udinsk	-17.3	66.2	83.5	4.5	8.0

4. *Amur and South-east region.*—This has a somewhat anomalous climate, for not only is much of the region farther south than any other part of Siberia proper, but it is the only region that is influenced by the ocean to any great extent. The Amur valley shows climatic features intermediate between those of the Transbaikal and the south-east coast region, which has January means above zero and in which thaws may occur in any month. A few miles inland the continental low temperatures occur. Strong winds on the coast may make the winter, despite its higher temperatures, much more unpleasant than in the colder but calmer interior. Winter minima as low as -27° F. have been recorded at Vladivostok. July means are about 65° F. to 70° F., decreasing towards the north, but summer may be chilly on account of strong wet winds. Monsoon influences cause heavy summer rainfall, decreasing from the coast inland. As a rule more than half the total annual precipitation falls in summer. Dense fogs are common on the coast in summer.

Sakhalin and Kamchatka are extreme examples of this type of climate, but their sea-girt position redeems them from the severity of the continental winter and mitigates the summer heat. Rainfall is heavy all the year round. Ayan, on the west coast of the Sea of Okhotsk, with a total annual fall of $44\frac{1}{2}$ ins. gets the same heavy rainfall, but the northern coasts of the Sea of Okhotsk get comparatively little.

Temperature and Precipitation in the Amur Region and on South-east Coast

	Jan. mean ° F.	July mean ° F.	Range ° F.	Precipitation (inches)	
				June-Aug.	Annual total
Nerchinsk	-21.3	65.3	86.6	11.5	16.0
Blagovyeshchensk	-13.7	70.3	84.0	11.5	20.0
Khabarovsk	-13.2	69.4	82.6	12.5	22.0
Sofiisk	-30.8	59.5	90.3	?	?
Nikolaevsk	-10.1	62.2	72.3	6.5	17.5
Vladivostok	4.8	69.4	64.6	6.0	15.0
Olgi Bay	8.9	68.0	59.1	9.0	20.5
Alexandrovsk (Sakhalin)	- 0.6	62.0 (Aug.)	62.6	7.5	22.5
Okhotsk	-15.9	55.2 (Aug.)	71.1	3.5	8.0
Petropavlovsk (Kamchatka)	13.8 (Feb.)	58.3 (Aug.)	72.1	6.5	48.0

5. *The Steppe region* of the south-west has extreme continental conditions of climate but with great summer heat more marked than severe winter cold. The January means range from about zero to 10° F. and the July means from 70° F. to 80° F. Rainfall is slight at all seasons and much of the region is practically a desert. However, the best agricultural region in Siberia lies where the steppe merges into West-central Siberia (Region 2). Strong winds sometimes occur in winter with drifting snow and in summer with driven sand. Only the northern part of the Steppe region is considered in this book.

Temperature and Precipitation in the Steppe region

	Jan. mean ° F.	July mean ° F.	Range ° F.	Precipitation (inches)	
				June-Aug.	Annual total
Semipalatinsk	0.5	72.0	71.5	2.5	7.5

FREEZING AND THAWING OF THE RIVERS OF SIBERIA

The rivers are frozen over in 5-20 days of frost, the length of time varying with the severity of the frost. It is noteworthy that the smaller polar rivers, especially those lying between the Ob and the Yenisei and the Yenisei and the Lena, freeze far more rapidly than these great rivers with their enormous

basins and warmer waters coming from the south. Rivers like the Taz or the Khatanga are unable to attain a high temperature during the short summer. The early freezing of the rivers between Lake Baikal and the Pacific is probably the result of the mountainous character of these regions, where cold is felt earlier than in the neighbouring districts. Several small rivers and streams flowing into the Verkhne-Vitim in the marshy Bargunsk forest, some of them running through deep ravines, remain covered with ice throughout the year.

The tables here given for the opening and closing of the rivers do not correspond with the opening and closing of navigation. The rivers are not navigable for at least a week after the breaking up of the ice, and often for a fortnight or more before the river is actually frozen over.

The dates given are the average for a varying number of years. An estimated date is given in brackets where actual figures were unobtainable. The dates according to the Russian calendar would be 13 days earlier than those given here.

WESTERN SIBERIA

<i>River.</i>	<i>Average date of breaking up of ice.</i>	<i>Average date of freezing over.</i>
Atbasar at Atbasar	May 7	—
Ayaguz at Sergiopol	April 5	Nov. 27
Biya at Biisk	May 5	Oct. 23
Charish at Byeloglazovo	" 4	" 21
Chulim at Ust-Chulimskaya	" 8	" 23
" " Nazarovskoe	" 12	" 18
" " Bogotolskoe	" 9	" 19
" " Achinsk	" 8	" 23
" " Tutalskoe	" 18	" 14
" " Ziryanovskoe	" 12	" 19
Irbit at Irbit	" 5	" 11
Irtish at Lake Zaisan	April 30	" 21
" " Krasnoyarsk	" 25	Dec. 6
" " Ust-Kamenogorsk	" 30	" 2
" " Semipalatinsk	" 30	Nov. 26
" " Yamishevskaya	May 2	" 24
" " Pavlodar	" 6	" 22
" " Omsk	" 14	" 18
" " Tara	" 15	" 18
" " Tobolsk	" 14	" 20
" " Samarovskoe	" 28	" 19

<i>River.</i>	<i>Average date of breaking up of ice.</i>	<i>Average date of freezing over.</i>
Iset at Yekaterinburg	May 11	Nov. 12
Ishim at Akmolinsk	" 5	" 17
" " Petropavlovsk	" 11	" 13
" " Ishim	" 13	" 14
Kartisak at Kartisak	" 3	" 9
Kiya at Mariinsk	" 12	" 13
Ob at Barnaul	" 8	" 23
" Kolivan	" 14	" 21
" Kolpashevo	" 15	(Nov. 21)
" Narim	" 22	Nov. 18
" Timskoe	" 20	(Nov. 18)
" Aleksandrovskoe	" 26	Nov. 16
" Surgut	" 30	" 15
" Pesk fishing station	" 24	" 16
" Kondinskoe	" 28	" 16
" Obdorsk	June 16	" 9
Om at Kainsk	May 17	Nov. 14
" Omsk	" 14	" 13
Pishma at Tahtsa	" 4	" 17
Polui at Obdorsk	June 11	Oct. 27
Pyazina at Vedenskoe	—	Nov. 1
" " Zaostrovskoe	July 9 (one year)	Oct. 14
" " mouth	Aug. 4 (one year)	" 7
Sosva at Berezov	June 3	Nov. 12
Tavda at Nikolsk factory	May 15	" 17
Taz	June 10	" 4
Tobol at Svyerinogolovskaya	May 5	" 21
" " Kurgan	" 8	" 16
" " Yalutorovsk	" 7	" 20
" " Blinnikova	" 7	" 14
" " Tobolsk	" 20	" 17
Tom at Kuznetsk	" 10	" 29
" " Polomoshnaya	" 9	" 25
" " Tomsk	" 13	" 17
Tura at Verkhature	" 13	" 11
" " Turinsk	" 7	" 17
" " Tyumen	" 8	" 12
Ui at Troitsk	April 27	" 20
Uvelka at Troitsk	May 1	" 17

EASTERN SIBERIA

Abakan at Ust-Abakanskoe	April 30	Nov. 30
Aldan at Ust-Maiskaya	May 31	Oct. 30
Amga at Sulgachinskskaya	June 2	(Nov. 30)
" " Amginskaya	May 29	Dec. 4
Amur at Pokrovskaya	" 13	Nov. 19
" " Albazin	" 16	" 18
" " Chernyaeva	" 16	" 26

<i>River.</i>	<i>Average date of breaking up of ice.</i>	<i>Average date of freezing over.</i>
Amur at Blagovyeshchensk	May 12	Nov. 25
" " Raddevka	" 12	(Nov. 25)
" " Yekaterino-Nikolskaya	" 10	Nov. 28
" " Mikhailo-Semenovskaya	" 2	(Dec. 2)
" " Khabarovsk	" 6	Dec. 7
" " Mariinsk	" 23	Nov. 24
" " Nikolaevsk	June 1	" 25
Anadir at Markovo	" 19	Oct. 27
Anabar at mouth of River Krilya-Kan	—	" 20
Angara (Upper Tunguska).		
" at Irkutsk	April 22	Jan. 25
" " Usolskoe	May 11	" 8
" " Olonskoe	" 11	" 3
" " Verkhne-Ostrovskaya	" 10	" 5
" " Balagansk	" 20	Dec. 20
" " Malishevka	" 19	" 21
" " Shiveri	" 23	" 17
" " Ust-Udinskoe	(May 24)	" 15
" " Podvoloshnaya	May 27	" 13
" " Bratski-Ostrog	" 24	" 7
" " Pyani Poroga	(May 27)	" 6
" " Padunskoe	June 1	" 8
" " Shmanek	May 26	" 9
" " Voroveva	(May 26)	" 5
" " Karapchanskoe	May 26	Nov. 29
" " Kezhemskoe	" 28	" 15
" " Boguchanskoe	" 26	" 18
" " Pinchuga	" 26	" 22
" " Ribinskoe	" 29	(Nov. 30)
Argun at Olochinskoe	April 26 (1875)	Nov. 19
" " Argunskaya	May 16	" 21
" " Urovskoe	" 17	" 20
" " Pokrovskaya	" 17	" 16
Balei at Gorokovskoe	April 29	" 12
Barguzin at Barguzin	May 10	" 12
Biliktui at Biliktuisкое (mouth)	" 9	" 29
Biryusa at Biryusa	" 15	" 21
" " Kontorskoe	" 13	" 27
Byelaya at Maltinskoe	" 11	" 20
Chikoi at Baikhor	" 15	" 21
" " Kudarinskaya	" 8	" 23
Chima at Cheremkhovskoe	" 16	" 16
Gizhiga at Gizhiga	June 7	" 2
Ilga at Znamenskoe	—	" 14
Il'm at Nizhne-Il'msk	May 18	" 9
Indigirka at Russkoe Uste	June 29	Oct. 16
Ingoda at Titovo	May 13	Nov. 15
" " Chita	" 10	" 17
" " Kaidalovo	" 14	(Nov. 19)

<i>River.</i>	<i>Average date of breaking up of ice.</i>	<i>Average date of freezing over.</i>
Ingoda at Knyaze-Beregovaya	May 16	(Nov. 19)
" " Raz-Makhnina	" 17	Nov. 20
Irkut at Shchinkovskoe	" 2	" 18
" " Tunkinskoe	" 11	" 18
" " Smolenskoe	" 14	" 19
" " Irkutsk	" 14	" 5
Iya at Tulunovskoe	" 15	" 23
Kan at Kansk	" 11	" 25
" " Antsiferskoe	" 12	" 18
Khara-Ulakh at mouth	June 23 (one year)	—
Khatanga, near mouth	June 28 (one year)	Oct. 12
" " at Khatangskoe	July 7	" 19
Khilok at Petrovski Zavod	May 23	Nov. 17
Khor	April 30	Dec. 13
Kirenga at Kirensk	May 21	Nov. 22
Kolima at Urocheva	June 6	Oct. 25
" " Sredne-Kolimsk	" 11	" 24
" " Nizhne-Kolimsk	" 18	" 17
Kukhtui at Okhotsk	" 2	Nov. 29
Kuta at Ust-Kutskoe	May 20	—
Lena at Kachugskoe	" 17	Nov. 17
" " Verkholensk	" 19	" 17
" " Ust-Ilginskaya	" 20	" 13
" " Ust-Orlinskaya	" 18	" 9
" " Omoloevskaya	" 18	" 14
" " Kirensk	" 24	" 4
" " Vitimsk	" 25	" 21
" " Nyuiskaya	June 3	" 19
" " Olekminsk	" 1	" 19
" " Yakutsk	" 10	" 12
" " Markha	" 6	" 10
" " Bulun	" 16	" 2
" " (mouth)	July 8	Oct. 15
Lower Tunguska, <i>see</i> Angara.		
Maya at Ust-Maiskaya	May 29	Nov. 10
Nercha at Nerchinsk	" 14	" 9
Oka at Ziminskoe	" 15	" 23
" " Bratski-Ostrog (mouth)	" 23	" 19
Olekma at Troitskoe	" 30	" 16
Olenek at mouth	July 16 (one year)	Oct. 13
Onon at Aksha	May 5	Nov. 25
" " Ust-Ilya	" 12	" 20
Oya at Yermakovskoe	" 1	" 24
Penzhina at Penzhina	June 12 (one year)	Oct. 23
Pyasina at Vedenskoe	—	Nov. 1
" " Zaostrovskoe	July 9 (one year)	Oct. 14
" " mouth	Aug. 4 (one year)	" 7
Selenga at Novi-Selenginsk	May 8	Dec. 1
" " Verkhne-Udinsk	" 9	Nov. 22

<i>River.</i>	<i>Average date of breaking up of ice.</i>	<i>Average date of freezing over.</i>
Shilka at Mitrofanova	May 10	Nov. 23
" " Monastirskoe	" 17	" 17
" " Stryetensk	" 11	" 21
" " Pokrovskaya	" 18	" 15
Suifun at Razdolnoe	April 18	Dec. 11
Suputinka at Nikolsk-Ussuriski	" 16	" 4
Taimir at mouth	July 23 (one year)	Sept. 29
Tuba at Kuraginskoe	May 7	Dec. 6
(Lower) Tunguska at Preobrazhenskoe	" 21	Nov. 1
" " " Monastirskoe (mouth)	June 10	Oct. 31
Turukhan at Yanov	" 11	" 13
" " " River Bayukta mouth	" 11	" 21
" " " Turukhansk	" 6	Nov. 3
Uchur at Yarmank	May 24	—
Uda at Udski-Ostrog	" 7	Nov. 25
Uda at Nizhne-Udinsk	" 14	" 17
" " Verkhne-Udinsk	" 13	" 25
Upper Tunguska, <i>see</i> Angara.		
Ussuri at Kozlovskaya	April 30	" 28
" " Khabarovsk	May 6	Dec. 8
Vilyui at Nyurba	June 1	Oct. 29
" " Vilyuisk	" 5	Nov. 2
Yana at Verkhoyansk	" 11	Oct. 23
" " Kazache	" 17	" 9
Yenisei at Minusinsk	May 11	Nov. 29
" " Abakanskoe	" 11	Dec. 4
" " Krasnoyarsk	" 12	" 5
" " Kazachinskoe	" 15	Nov. 26
" " Yeniseisk	" 19	Dec. 2
" " Nazimovo	" 18	Nov. 28
" " Verkhne-Imbatskoe	" 29	" 21
" " Turukhansk	June 8	" 11
" " Potapovskoe	" 20	(Nov. 14)
" " Luzino	" 19	Nov. 4
" " Selyakino	" 19	(Nov. 14)
" " Tolsti Nos	" 25	Nov. 3
" " Golchikha	July 2	" 5
" " (mouth)	June 23	Oct. 30
Zalara at Zalarinskoe	May 4	Nov. 15
Zavitaya at Mikhailovskaya	April 25	" 21
Zeya at Blagovyeshchensk	May 11	" 26

CHAPTER III

VEGETATION

The Tundra—Coniferous Forests—The Amur Forests—The Pacific Forests—Alpine Vegetation—Wooded Steppes—Kirghiz Steppes—Transbaikal Steppes.

THE vegetation of Siberia remains in its original state, and man has effected few changes. Broadly speaking, there are three great types of vegetation, very unequal in the areas they cover. In the north along the Arctic Ocean is the tundra, while an immense forest covers the rest of Siberia, with the exception of the steppe-lands in the south-west. The first two of these divisions extend into Arctic Russia.

THE TUNDRA

The tundra stretches in a band 20 to 200 miles wide from west to east of the Russian Empire along the Arctic shores. The southern limit averages about lat. 68° N., but in the Pechora and Ob basins the boundary recedes south to about the Arctic Circle, in the Khatanga basin it advances to about lat. 72° N., and in the far east it trends south to the northern end of Kamchatka. All the far north-east from about long. 160° E. to Bering Strait is covered with tundra. Tundra in an impoverished form occurs on the Arctic islands north of Russia and Siberia.

While the term tundra is often used to convey the sense of a treeless Arctic plain, it really has reference only to the special type of vegetation which is generally found associated with Arctic plains. Tundra frequently occurs also on considerable elevations, as in the Taimir region, the Chukchee Peninsula, or the far east generally.

The vegetation of the tundra is chiefly grasses, sedges, and

herbaceous plants, among which are many bulbous species. Cold waterlogged soil and want of humus militate against plant life. The only trees are dwarf birches (*Betula nana*) and willows not exceeding a few inches in height and generally creeping on the ground. Low bushes of heath, azalea, and arbutus also occur, but only in sheltered nooks do the trees or bushes grow to any height. Mosses and lichens, including the reindeer 'moss' are numerous, and in the east are the principal plants. In general character the tundra is uniform from Russia to Bering Strait, and for that matter all round the Arctic Ocean, even if the species of plants differ. In level places it is more swampy than in the hilly parts, and peat forms extensively. It is frozen and snow-covered for 8 or 9 months in the year. In the summer the surface thaws, but the subsoil remains frozen: the tundra for a few weeks is bright with flowers and alive with insect life, including mosquitoes, but at that season it is almost impassable to man. It is quite useless for agriculture, and has no economic value except for reindeer breeding.

CONIFEROUS FORESTS

The coniferous forests or *taiga* begin gradually where the tundra ends. The polar limit of trees is largely determined by dry cold winds in winter which are hostile to all tree growth. The forests never reach the north coast, but in some sheltered river valleys such as those of the Ob, Yenisei, and Lena, a few badly developed trees reach the delta, and, generally speaking, the rivers seem to carry the forests northward into the tundra region. The taiga in one form or another extends from the Pacific through Asia, Russia, Finland, and Scandinavia, to the Atlantic. Southward it extends to the confines of Siberia, where it gives way to the steppes of Mongolia and Russian Central Asia. The forests vary a good deal in appearance and species, but are everywhere with a few small exceptions either solely or principally coniferous.

In Arctic Russia the chief species are the Scots pine (*Pinus sylvestris*), the Norway spruce (*Abies excelsa*), and the silver

fir (*A. pectinata*) ; in the Urals the Siberian fir (*Abies sibirica*), and the Siberian larch (*Larix sibirica*). The deciduous trees which occur are oak, elm, ash, maple, and apple.

In the drier parts of the taiga of western Siberia the commonest species are the Siberian fir, the so-called Siberian 'cedar', or stone pine (*Pinus cembra*), the spruce (*Picea obovata*), the silver fir, and the Siberian larch. These are the prevailing trees in the Yenisei basin, the basin of the upper Ob, and the Altai region. Deciduous trees are rare. In the wetter region of the basins of the middle and lower Ob and the lower Irtish the taiga is marshy and has thick, impenetrable undergrowth. Larch is rare, and the Siberian fir predominates, but there is also an admixture of deciduous trees such as birch and aspen. Thickets of poplar, alder, and willow fringe the streams, and there are some birches.

Berry bushes are frequent except in the swampy parts, and include the wortleberry, bilberry, Arctic bramble, raspberry, and red and black currants.

The Altai Mountains have the same coniferous forests as western Siberia, but they are more open and the trees grow tall. In places there is undergrowth, but as a general rule it is absent. The forests extend to an altitude of about 5,000 ft. on the southern and 6,000 ft. on the northern side. On the south the flora is richest, and rhododendrons and azaleas appear.

The southern part of the marshy taiga of the Ob basin is known as the Vasuigan swamps. They are most fully developed in the northern part of the region between the Ob and the Irtish, but also stretch north of the Ob, and consist of swamps covered with dense thickets of birch, alder, aspen, Siberian cedar, pines, and a few larches. The Russian name is *urman*. They are practically impassable except in winter. In time of spring floods these urmans are so much inundated that they are termed the Vasuigan Sea.

The forests of eastern Siberia are very uniform from the Yenisei basin eastward to the Amur region and the Stanovoi Mountains. In the north they merge gradually through

a region of gnarled and stunted trees into the tundra. The Siberian fir and the eastern larch (*Larix daurica*) are the prevailing species, but the Siberian 'cedar' (*Pinus cembra*) and the Scots pine also occur. The spruce (*Picea obovata*) and the Norway spruce go as far east as the Lena. On the whole, however, the forest of east differs from that of west Siberia mainly in less luxuriant growth. Undergrowth is not so frequent, and the hilly nature of the country gives fewer areas of marshy taiga. Furthermore, the poor rainfall and the cold dry winds during the long severe winter do not favour tree growth. The forests on the whole are open and low. Along the river banks, however, and in more sheltered places the trees grow taller and thicker. In the upper Lena basin the forests are more of the western type, and the Scots pine and the Siberian larch grow to a large size.

THE AMUR FORESTS

East of Lake Baikal and in the Amur region the vegetation changes. The Transbaikal is a transition region between the eastern and western floras, but among forest trees all the widespread species of the northern taiga are found. In the eastern part foliage trees make their appearance. These are of species different from, though allied to, those which occur in the northern forests of Russia, the oak, the elm, and characteristic species of the hazel and wild apple. Bushes that are typical of Mongolia also make their appearance.

In the Amur region the divergence of the vegetation from that of eastern Siberia in general is more pronounced. The flora is characterized by a great variety of forms and by the luxuriance of some species. Plants which are typical of China and Japan occur, and even representatives of the North American flora. In the northern part of the basin the forests are like those of eastern Siberia in general, but different species appear, until nearer the Amur the forests have an entirely different appearance, owing largely to the presence of many deciduous trees. The eastern larch, the Siberian fir, the Siberian spruce, the Scots pine, and the yew occur as well

as another species of spruce, the ayan pitch pine (*Picea ayanensis*), and the white cedar or Manchu pine (*Pinus mandshurica*), which replaces the *Pinus cembra* of the north and west. Among deciduous trees are the oak, elm, lime, maple, walnut, ash, aspen, willow, hornbeam, and apple, all of distinct eastern species, and the cork tree (*Phellodendron amurense*). In the upper and middle Amur regions deciduous woods are commoner than coniferous woods along the river, and wide meadows of natural grass land often occur, but in the lower Amur region coniferous forests again prevail.

The Sikhota Alin Range and the Maritime Province generally are also forested. In the north the forests are mainly of larch, Siberian fir, and white cedar, but in the south deciduous trees are more common, and the oak as well as the Siberian cedar are the characteristic species. These forests are typical of the Ussuri region.

THE PACIFIC FORESTS .

The northern taiga continues to the shores of the Okhotsk Sea, and occurs in Kamchatka and Sakhalin. The eastern larch (*Larix daurica*) is the prevailing species, but the Siberian fir and Siberian cedar are common, mingled with a few birch, alders, and shrubs, including the clematis, wild rose, and honeysuckle. The herbaceous vegetation is more prominent than farther west, and the forests undergo a change in appearance. The upper limit is at a low altitude, and the trees are dwarfed on account of the strong winds.

In the forests of Kamchatka the trees are more widely spaced, and the Siberian fir and the cedar are the commonest species, mixed with which are a few deciduous species including the birch, alder, and poplar. Some natural meadows occur.

Sakhalin, in the south, has forests like Kamchatka : in the north the forests rather resemble those of Okhotsk, the eastern larch being the chief species.

ALPINE VEGETATION

Alpine vegetation occurs at varying altitudes on the highest mountains in eastern Siberia. In the Altai it begins at about 6,500 ft.; in the Sayansk Mountains at about the same altitude, but in the Dzhugdzhur and Stanovoi Mountains and in the Verkhoyansk Mountains at gradually decreasing altitudes towards the north until it merges into the Arctic tundra. The general aspect of the alpine vegetation is much like that of the tundra except in the absence of swamps. Between the alpine vegetation and the forests lies a belt of rich mountain pasture, comparable with the high pastures of the European Alps and containing many of the same species.

WOODED STEPPES

Steppe land is rare in Siberia proper, and occurs in large areas only in the west, where it is found to the south of the taiga. The Ural forests and the Vasuigan swamps give way to the Ishim and Baraba steppes, which extend in a strip about 100 to 200 miles wide from the Ural slopes to the Altai region. These are intermediate between the forests to the north and the true steppe lands to the south. Firs gradually disappear and are replaced by birches, aspens, and willows, which occur in clumps and along river banks, in a general expanse of rolling grass lands. In the northern part of the Ishim and Baraba steppes trees are frequent and swamps and urmans occur. Southward the swamps are replaced by numerous small lakes, many of which are saline, and trees become less frequent until in about lat. 55° N. true steppe lands begin. The Siberian Railway runs across the Baraba steppes. In the upper Ob basin these steppe lands are wider than to the west, and extend from the railway south to Semipalatinsk and east to Biisk and Kuznetsk.

The Ishim and Baraba steppes have a fertile soil consisting largely of black earth (*chernozem*), a kind of loess, rich in humus, and are the most valuable agricultural region in Siberia. A detached area of wooded steppes lies farther east between Achinsk and Minusinsk.

KIRGHIZ STEPPES

True steppe lands begin south of the wooded steppe and lie outside Siberia proper. They cover the region known generally as the Kirghiz steppes. To the north, bordering the Baraba steppes, are the feather-grass steppes stretching from the Caspian steppe lands of Russia to the Yenisei basin, with a breadth of 200 to 270 miles. Trees are rare, and are represented only by a few birches, aspens, willows, alders, ashes, and poplars in the wetter places. Dwarf bushes, many of them thorny, are characteristic, including broom, hawthorn, and tamarisk. The herbaceous flora is rich and embraces many flowering plants. Feather grass (*Stipa*) is characteristic. To the south the climatic conditions peculiar to this region become intensified. Rainfall decreases and summer temperatures increase. The change is reflected in the vegetation, which assumes a semi-desert appearance as the steppes become more arid.

The steppe lands of western Siberia are chiefly of value for horse and cattle breeding. On account of the want of rainfall there is little scope for agriculture.

TRANSBAIKAL STEPPES

In eastern Siberia natural steppe land is rare, for climatic conditions are more favourable to the development of forest, but in the Transbaikal region between the south of Lake Baikal and the River Argun there are considerable areas of steppe lands, in general appearance not unlike the mountain pastures of the Altai Mountains. This is best developed in the valleys. The higher ground of the Yablonoi and other ranges is covered with forests. These Transbaikal meadow lands are excellent for agriculture. In the south towards the frontier of Siberia they pass into the dry steppe lands of Mongolia.

CHAPTER IV

ANIMAL LIFE, FISHERIES AND HUNTING

Animal Life—Fisheries : A. Arctic Russian ; B. Western Siberian ;
C. Eastern Siberian—Products of Wild Animals

ANIMAL LIFE

THE land may be divided into four zones with special geographical characteristics, which are differentiated to some extent by their fauna. In the north (1) the Arctic or tundra zone, with ice or reindeer-moss, has its special group of animals ; westward is (2) the taiga belt of coniferous trees, where in the depths of the forest there are not many wild animals ; it is rather the skirts of the forest and the clearings made by the axe or fire to which animals resort, and in such clearings and at river fords the trapper finds them ; (3) farther south the open steppe has fresh denizens, and finally (4) the high mountains of the Altai and Sayansk Ranges introduce a new element. No hard and fast line, however, can be drawn between these belts, and there is considerable overlapping.

Special Characteristics of Siberian Fauna

Among the characteristics of Siberian fauna are to be noted : (1) The animals as a rule are of greater size ; some varieties are twice as large as the corresponding breeds in Europe. (2) White predominates, even among domestic animals : many animals, like the ermine, Arctic fox, and hare, are white during the winter months. (3) In exceptional circumstances there are huge migrations. Most famous are those of the lemmings, which move in vast armies regardless of natural obstacles, swimming estuaries, where they become the prey of killer whales or seals, and often plunging into the sea.

Land Mammals

There are found in the south the tiger, panther, snow-leopard (*Felis irbis*), lynx, and two varieties of wild cat. The tiger and snow-leopard do not reside north of Lake Balkhash, or the River Amur, but occasionally stray beyond. The tiger is not infrequently found near Chita and within 120 miles of Nikolaevsk, and is often met with in the jungles of Primorsk, in which 120 to 150 are shot or poisoned every year. Tigers gave great trouble during the construction of the Ussuri Railway. The natives view the tiger with superstition. The tiger is originally a Siberian and Mongolian animal, which has only reached India in comparatively recent times; the Indian tiger has much shorter hair than the northern variety. The lynx is comparatively common in all mountainous parts of Siberia; its fur is regarded as very valuable. The panther is found in the Primorsk forests. The steppe-cat is found in the Kirghiz steppes, and there are two varieties of wild cat in the Altai. It may be observed that the domestic Siberian cat is very fine, rivalling the Persian, but the European climate does not agree with it. In Tura black cats are specially bred for their fur.

The wolf is found all over Siberia; in the tundra it hunts the reindeer, and on the steppes the roe. The wolf is driven from the reindeer by shouting at it. Often a wooden clapper is hung round the neck of the leading reindeer: it makes a noise as though of a man chopping wood, and keeps the wolves at a distance till they have become habituated to the sound. Wolves, when hunting in small packs, are not dangerous to human beings. The solitary wolf is a retiring creature and anxious to avoid observation. In the north it is hunted not merely to protect the reindeer, but because the fur is valuable for caps, mittens, &c. The Alpine wolf is found in the Altai.

The fox is found in many species over the whole country. North of lat. 60° is the Arctic fox (*Vulpes lagopus*), distinguished by its short, blunt ears, long, bushy tail, and very long hair in winter. In the summer its upper parts are of a

brownish colour ; in the winter its whole coat turns white. It is found on the continent and on the islands of the Arctic Ocean, but is less common in eastern than in western Siberia. It is diminishing in numbers, owing to the reckless way in which it is trapped. The cubs are trapped in the burrow. All trapping of the fox-cub and sale of the cub-skins should be prohibited, nor should it be permitted to catch it when young, for its summer coat is of little value. The winter coat is exceptionally valuable for its downy fur and its colour. One variety of it is the blue fox, so called from its slaty colour, which is found chiefly in Arctic Russia and Kamchatka ; it is valuable and scarce ; its colour remains the same throughout the year, but its hair is longer in winter. The red fox of Siberia has a deeper, richer red than our variety, and a much more bushy tail. Its skin is esteemed, but not so much as that of the blue fox. Another very valuable species is the black or silver fox (*V. argentatus*) which has black hair with silver tips. The bulk of the skins exported by the Koryaks are fox skins. In the steppes, ranging from European Russia to the Amur, is the steppe-fox or *corsac*, a sort of representative of the Indian species. Foxes are usually killed with clubs or trapped, so as not to spoil the skin : they are also poisoned with strychnine.

The raccoon dog, a native of China and Japan, is found in the Amur basin : it is highly valued by the Manchu for its winter skin : in summer it is eaten.

Wild dogs are found in the south up to the snow-line.

Bears are found throughout Siberia. In the north is found the Polar bear (*Ursus maritimus*) wherever there are seals, which it hunts either along the beach or on the sea-ice. It arrives on floating ice, and lands on the coast, but does not penetrate far inland, and though known to have gone up the Gulf of Yenisei as far as Tolsti Nos, it generally does not leave the vicinity of sea-ice, for it is really a sea-mammal. Its fur is used for floor-rugs and is very durable. The brown or Kamchatkan bear (*Ursus beringianus*) is found across the centre of Siberia, wherever there are forests. It is hunted for

fur and food. In the southern mountain ranges that adjoin the steppe district and by the Amur is found a black bear, (*Ursus tibetanus*) and several other species occur in the south. The bear is sometimes snared, sometimes hunted. Where fish abound, the huntsman waits for him by the rivers. The bear cage is a standing feature of the villages of many tribes, especially of the Goldi and the Gilyaks. The bear takes part in many religious ceremonies (see Chapter V).

The group of Mustelidae is of great economic value because of the trade in their furs. Most important of all is the sable (*Mustela zibellina*), a variety of marten. Its furs were the great lure into Siberia of the Russian trader in the sixteenth century, and for many years were the form in which *yassak* (tribute) was paid. It dislikes the proximity of human habitations and retires more and more to uninhabited parts, and has been seriously diminished in numbers. There are, however, many in Kamchatka. An order was made by the Russian Government that from February 1, 1913, to October 15, 1916, no sables should be killed nor sable fur sold throughout Siberia. It is a difficult animal to hunt. It possesses a down which is entirely dark and of bluish tinge, and long, soft, glossy, black hair: the finest sable fur is tipped with silver. The farther north the sable is found the better is its fur, and it varies somewhat in tint in different parts of Siberia. It is found up to lat. 68° N. The best sables are found in the Vitimsk and Olekma regions, and in the neighbourhood of Nerchinsk and the headwaters of the Amgun and Zeya. The Sakhalin sables are of little value. White sable found in the Barguzin region is very rare and valuable. It is hunted in the beginning of winter. The kolonok (*Mustela sibirica*) is used as a substitute for the sable, especially to provide artists' 'sable' brushes. At Irbit fair 50,000 skins are sold annually. Other animals of the same type are the marten, of which there are three varieties in the Altai and upper Yenisei, and the cognate, but smaller weasel and polecat. The ermine is valuable, and is becoming correspondingly rare in some districts: the best ermines come from Ishim and the Baraba

steppe: the skins are rarely over a foot in length, and they are sold in lots of 40 together, known as 'timbers'. The ermine is usually trapped. The glutton (or wolverine) is a much larger member of the same sub-family. It has powerful teeth, is almost entirely nocturnal in its habits, and is usually active through the winter: it swims streams and ascends rough-barked trees in search of food. It inhabits a belt across the middle of Siberia excluding the extreme north. It is also found in the north of Sakhalin. The glutton is no longer common. The skunk is taken for his fur in large numbers in the south of the Tomsk Government and in the Amur region.

The badger is found right across Siberia as far north as lat. 53° N.

The otter is found throughout Siberia up to the Arctic Circle and on Sakhalin, but is becoming rare. It is most hunted on the Amur for trade with the Manchu and Chinese, who value its fur highly.

The reindeer is most widely spread, being found not only in the northern tundras, but among the Soyots in the Sayansk Mountains, where there is plenty of lichen. The domesticated reindeer has been described elsewhere (see chap. V, p. 103). The wild reindeer is hunted for food in winter; it is also used for interbreeding with the domesticated animal.

In the north is also found the elk, the largest member of the family: the flesh is edible, the taste resembling something between venison and mutton. Its skin is also valuable; in many years there are 10,000 elk skins in the market of Yeniseisk. Its importance along the Amur is shown by its name *bayu*, a Tungus word meaning 'the animal'.

There are several varieties of the American wapiti (*Cervus canadensis*) in the south of the country. The number of wapiti has been greatly diminished by the sale of their horns to the Chinese, and the Russian Government have issued a prohibition which forbids their being shot on the Russian side of the frontier. The wapiti is distinguished by the great size of the fourth tine of the antlers.

Closely akin to the wapiti is the maral deer, which is domesticated in the Kirghiz country, the Altai, the middle Amur, and the Ussuri region : it is bred for the sake of its horns, which are sawn off when in the velvet, to produce from them a powder called *panty*, in high request among the Chinese for medicinal purposes. Western physicians believe that it has no medicinal value, but merely quickens the heart's action. It is sold for 30s. a lb. Another member of the family that produces an article of value is the musk-deer (*Moschus moschiferus*), which is hunted in the Altai, Sayansk, and Amur regions, and in Sakhalin, for the sake of the musk obtained from it. It is caught in winter, when the more vigorous climate makes it migrate from its ordinary home to something more accessible to hunters. Its flesh is eaten, its skin used for clothing, and its thin leg bones made into arrow-heads.

The roebuck is represented by two species, *Capreolus pygargus* in the upper Yenisei and Altai region, and *C. manchuricus*, which migrates from Manchuria into the Amur region in spring. It supplies abundant food. The skin and horns are sold to the Chinese.

Other members of the family found in Siberia are the common stag, rock-deer, spotted deer, and siku. The last named is found in the island of Askold near Vladivostock. There are several kinds of big-horn, but the *Ovis poli* of the Pamirs, which is sometimes said to be found in the Tienshan, is never really found so far north. The real *O. ammon*, or argali, is found in the Altai; its wrinkled horns curl so much that they often make more than a complete circle. It lives amid the forest on mountains between 3,000 and 4,000 ft. high, and is difficult to secure. Its chief enemy, the wolf, hunts it to the neighbourhood of its lair, so that the young may have a share. Travellers who refer to argali among the lower heights of the Kirghiz region probably mean *O. sairensis* or some closely allied species. Between the Lena and Indigirka *O. borealis* occurs, and in Kamchatka *O. nivicola*. The saiga antelope (*Saiga tatarica*) extends as far east as long. 92° E., and another species is found in the Primorsk region. A gazelle

(*Gazella gutturosa*) is found in the steppes near Kosh-Agach: it is usually in colour of a light fawn, with white limbs, cheeks, underparts, sides, and rump; its tail is short, with a brown tip, and it has no dark face-markings, like most gazelles. Among the Altai there are a large but rapidly diminishing number of ibex (*Capra sibirica*), gradually being driven into the more remote valleys. It has very long horns, which are sold to the Chinese for the same purpose as those of the maral. The Kalmuks are very wasteful in hunting, and unless checked will exterminate the game of their region. There are wild oxen and wild goats among the Sayansk Mountains.

The musk ox (*Ovibos moscatus*) is rare, if not extinct, in Siberia. It has been reported from Sakhalin.

The prickly hog is found in the southern portion of the steppe region and the steppe lands of the east. The wild boar occurs in the east mostly in Transbaikal and the Amur region.

The wild ass (*kulan*) is found upon the Kirghiz steppe: farther south, but outside the limits of this book, is found the famous Prezhevskii horse.

There are numerous species of rodents. Most important from the commercial point of view are the squirrels, the sale of whose skins is enormous: only the skins of Russian and Siberian squirrels are marketable. They are used for a great variety of articles, such as gloves, hoods, and carriage-aprons. The squirrels are of various colours, of which the black are most esteemed. Black squirrels eat mushrooms, brown squirrels cedar-cones, red squirrels hazel-nuts. Squirrels are found throughout south Siberia, especially in the forests, but there are none in Kamchatka. Besides the common squirrel there are to be found striped squirrels and flying squirrels. In the centre of Siberia the squirrel is much hunted. In the Transbaikal Province three million are killed annually. Squirrels are usually shot with guns having a small bore, and with bullets the size of a pea, so as to injure the skin as little as possible. The marmot found in the south, though

much more frequently beyond the frontier, is of commercial value, because of the export of its skin to Europe, where it is sold as imitation sable. A variety of the marmot is the *tarabagan*, which is common in Transbaikal. Related to the marmot is the bobac (*Arctomys bobac*) which lives in the plains and stony hill lands, and the suslik, alike the friend and enemy of man, the former by reason of its flesh, which is esteemed a delicacy by the dwellers in the steppes, and the latter because its energetic burrowings make it a pest to agriculturists. It has been found specially injurious along the Lena. It is sometimes called the pouched marmot, because of its big cheek-pouches. Both it and the lemming (*Lemmus obensis*) store their food in winter. The lemming is said to protect its food against the depredations of other animals by covering it with poisonous plants. In eastern Siberia the Kamchadals remove the creature's store of grain and roots, but replace it with caviar or remains of fish, so that a regular trade is instituted between man and beast. The migrations of the lemming have been already noted (p. 51). The beaver is only found west of the River Yenisei, in the streams of north and mid-Siberia; but it has grown very rare, and at the present time has almost disappeared. It has a commercial value not only for its skin, but for the castoreum (beaver's cod) obtained from it. The *ush-kan*, or Siberian hare, is spread over the country: it is grey in the summer and white during the winter, and has very long hair. About 1,000,000 or 1,200,000 skins are sold a year, half of them at Irbit. The Siberian peasants neglect it as a means of food, and only unwillingly eat its flesh. The polar pika hare comes as far south as lat. 47° N. Other rodents are the vole, hamster (west of the Ob), jerboa (south of the Steppes), and hairy-nosed porcupine (at greater altitudes). The rat is a great pest, but its activities are somewhat restricted by building store-houses on poles.

Sea-mammals

The sea-mammals of Arctic Russia and western Siberia are not nearly so important as in eastern Siberia. The seals

found are the true seals (*Phocidae*), in both west and east, but the sea-bears or fur-seals (*Otaridae*) only occur in the east. True seals have a great commercial value by reason of their hides, their blubber, and the oil produced from their fat. But they are extremely destructive of the fish: in many places where the seal appears, the fisherman abandons his occupation, knowing that his task is useless on the arrival of the *kozhya* ('leather:') as he calls him. In places like the Kola Peninsula they ought to be kept down much more energetically, for the protection of the fishing industry. At Ponoï the seal-hunting in March and April is very profitable. In the Kara Sea there are no seals; so that region is without attraction for polar bears. Seals ascend the Amur as far as Eri in about lat. 51° N. In Lake Baikal and up the Selenga is found a distinct species, *P. baicalensis*, which is hunted for its skin.

The fur seal (*Otaria ursina*) occurs in great numbers in parts of the northern Pacific, including the Commander Islands, Robben Island, and the Pribilof Islands; there at the end of May or early in June the males arrive: then about the middle of June arrive the females, and give birth to their young. The pups are black when born, but in August have a fresh coat of grey fur. The promiscuous killing of fur seals when in calf out at sea led to the protracted disputes in connexion with the Bering Sea arbitration. The sea lion (*O. Stelleri*) visits the Pacific coasts in autumn. No fur seals occur in the Arctic Ocean.

The walrus is found in the islands of the Arctic Ocean, and at various points west of the Lena (between which and the Bering Strait it is never found), e.g. Ponoï and the Kara Sea. It no longer occurs in the Sea of Okhotsk. It is differentiated from fur-seals by the absence of external ears, by the structure of the teeth, including the presence of tusks, and by its more substantial build. It is hunted for the sake of its blubber, its hide, from which are manufactured harness and sole leather, and its tusks, the ivory of which, however, is far less valuable than elephant ivory. Its breeding season is from April to June.

The chase of the bowhead or right whale has decayed in the Sea of Okhotsk and Bering Sea.

The finner whale (*Balaenoptera*) is found along the coasts of Arctic Russia and eastern Siberia. The whale 'fisheries' of Finmark are active, but those of the Kola Peninsula are feeble. There were two for a time at Port Vladimir and Ara Bay, but they closed for lack of capital. During their short period of activity they killed 300 whales. A well-developed whale fishery might do great business, but it might have to face the antipathy of fishermen in other parts of the coast on the same grounds as those on which the Norwegian fishermen attacked the whalers. These reasons were, first, the whales were thought to drive away the Greenland seal which preys on fish, and secondly because whales feed on capelan, a kind of salmon which pursues the cod inshore, so that the destruction of whales reduces the number of cod. The beluga or white whale (*Delphinapterus leucas*) is found in these waters. Its skin is cut into broad strips and sold to the Samoyedes and Yuraks for reindeer harness.

Birds

There are said to be 285 species of birds in the whole of Siberia, few of which are unknown in Europe. The chief line of demarcation of species is thought to be the watershed between the Yenisei and Lena, but so much of the country east of that boundary is unexplored that it is difficult to be very precise on the subject. Seebohm, in his book *The Birds of Siberia*, has given a great deal of information about the birds of Arctic Russia and the valley of the Yenisei.

The Arctic zone has few permanent residents: only the ptarmigan, snow-bunting, raven, snow-owl, and Icelandic falcon are found there always, but with the return of summer the tundra becomes full of bird-life, and it is the breeding-place of a vast variety of birds from the beginning of May. They are bountifully provided by nature with berries that have been frozen throughout the winter, and with swarms of mosquitoes. The commonest of these summer visitants

seemed to Seebohm to be the Asiatic golden plover. But few birds stay longer than the beginning of winter, when they migrate to the belt of coniferous taiga further south.

Edible birds.—It is difficult to say what a native of Siberia will or will not eat, and it is probable that his taste in the flesh of birds is as catholic as in other forms of food. It is enough, therefore, to mention the most important of the birds that can be eaten. Duck of various kinds, including a long-tailed species, are common over all Siberia, especially in the lake district north of the Kirghiz and Baraba steppes; around Narim they assemble at different lakes: they are frightened from one to another, their way being netted in advance. They are thus caught and then killed by having their necks bitten through. They are found in great numbers along the lower course of all the Siberian rivers. Geese are found in multitudes as far north as the mouth of the Yenisei. The goose falls an easy prey in the moulting season, when it cannot fly. Among other edible birds are ptarmigan, willow-grouse or kuropatka, swans, hazelgrouse, pronounced as especially delicate eating, capercaillie, blackcock, partridge, and heathcock. In the neighbourhood of Biisk and Novo-Nikolaevsk, woodcock, hazelhen (or *ryabchik*), and quails are common from May to the end of August, and during the threshing season 5,000 birds, mostly quails, are netted. In hunting the capercaillie a barking dog is used, which has an irritating effect on the bird; the hunter then gets in a shot, while its attention is distracted. The same practice is adopted in hunting the elk.

Birds valuable for plumage.—Most valuable of all is the eider duck, found along the shores of Arctic Russia, by reason of the down that is obtained from it. But the dwellers along the Pomorski coast are killing off these ducks for the sake of their flesh and pillaging their nests for eggs. Grebes are of economic value: crested grebes used to be shot in great numbers in the Tyukalinsk district in order to make muffs. Magpies, which are particularly frequent in the steppe district west of the Ural, are of value for the feathers, which are

exported. A thousand are taken annually in the Biisk district.

The pigeon for religious reasons is never molested among the Russians. The seagull enjoys a like immunity for the same reason among the Samoyedes.

FISHERIES

A. ARCTIC RUSSIAN FISHERIES

Speaking generally, there are three main kinds of fishing on the north coast of Arctic Russia: (1) In the open sea there is fishing for cod, haddock, flatfish, and wolf-fish. (2) Along the coast there is fishing for herring and *navaga*. (3) Up the rivers there is fishing for salmon and certain freshwater fish, including also salmon-fishing along the coast. There is some hunting of sea-mammals also along this coast.

Murman Coast

Cod.—The main fishing here is for cod (*Gadus morrhua*), the yearly average catch being 10,000,000. The fishing-season is from the end of March till the end of August. As the cod comes from Norway, the fishing begins on the west coast first and works eastward. It employs the local inhabitants, and about 3,000 men from the districts of Kem and Onega. The cod-fishing is done in small sailing boats (*shnyaks*), which are worked by four men and a boy, who has to roll up and dry the nets: this crew is called an *artel*, the name applied to what corresponds to a trade union in Russia. The men who come from the White Sea are exploited by *procruters* or factorists, who supply them with their vessel, their tackle and supplies for themselves and their families, in return for which they are entitled to one-third of the catch, but the value of the goods supplied is deducted when accounts are squared, and as the valuer both of these goods and of the fish caught is the *procruter* himself, the fisherman finds himself more and more in his power.

The course of the warm Atlantic waters varies, so that the

voyages are regulated by the existing currents. Usually the fish are at something between seven and twenty miles from the shore and at a depth of from 120 to 150 fathoms. One way of fishing is with lines, 180 fathoms long, but this needs a great deal of muscular exertion, and is not adopted except by poor fishermen. The other and more effective method is to use 'gartlins' or great lines (*yarus*), which are sometimes five miles long, made of rope of the thickness of the little finger with finer ropes of from 3 ft. 6 in. to 4 ft. 8 in. in length attached to it at intervals of about 2 ft. 4 in. About 5,000 hooks are attached to a *yarus*, and these are baited with capelan (a small oily fish like a smelt), or sand-eels, sandworms, or the inside of crabs. The *yarus* is lowered to the bottom of the sea and taken up again after six hours. Over 1,200,000 hooks are used each year on the Murman coast.

Other fish caught on this coast are turbot (*Rhombus maximus*), haddock (*Gadus aeglefinus*), coal-fish or saith (*Gadus virens*), wolf-fish (*Anarrhichas lupus*), flat-fish (*Pleuronectidae*), comber or sea-perch (*Serranus cabrilla*), eelpout (*Lota vulgaris*). The herring-fishing on this coast is practically disregarded, though herrings are numerous. The Greenland shark is the inveterate foe of the whale, and whales have been captured which show traces of combat with this relentless enemy. Sharks come in pursuit of cod, and can be caught with a line on the Murman coast, but despite the value of shark-liver and the oil extracted to adulterate cod-liver oil, the fishing is only casual, and not properly developed. From those sharks whose skin is not too rough is made shagreen for smoothing or polishing wood. The shark is never eaten, on the ground that it is a great eater of human flesh itself; and it is an enemy to the fisherman, because it despoils his *yarus*. At certain places on the west coast of the Murman are fat-melting works for the fat of sharks and stock-fish.

Prices of fish.—The price per pud of fish on the Murman in the last decade of the nineteenth century was as follows: cod 10*d.* to 2*s.* 1*d.*, haddock 2½*d.* to 10*d.*, wolf-fish 3¼*d.* to 8¾*d.*, coal-fish 2½*d.* to 7½*d.*, turbot 2*s.* 3*d.* to 2*s.* 6*d.* The prices for

fish products were cod-liver 1s. 3d. to 2s. 6d., shark-liver, haddock-liver, and coal-fish-liver 10d. to 1s. 5½d. Another fish product is the fish-guano made of the discarded portions of fish, especially torn and dried fish-heads. The total value of the Murman fishery in 1897 was £48,158.

Winter employment of fishermen.—An auxiliary trade for the fisherman to carry on during winter is carpentering, e. g. they manufacture the wooden packing-cases in which the fish are exported, and find it very remunerative.

There are government salt depôts along this coast.

White Sea

The main fishing is for salmon, herring, and *navaga*, which is done in home waters, and is more especially the work of the old men, women, and children, while the more enterprising and active men do deep-sea fishing for cod or go seal-hunting, starting out for these employments early in the spring.

Salmon.—The salmon-fishing lasts from the middle of May till the beginning of November, but the best salmon are caught in August and September when the salmon come up the rivers to spawn. The fishing is done at the estuaries of the bigger rivers by means of dragnets, trammel-nets, &c. Higher up the rivers it is done by *zakots* or weir traps: close to Kem is a *zabor* (a sort of fence trap) made of logs embedded in the bottom, in which a large net (*morda*) is inserted. Salmon of large size (about 22 lb.) are thus caught. The spring-catch is for local consumption, the fish caught early in the year having less taste than the others; the autumn catch is sold to dealers.

Herring are caught along the Pomorski coast mostly from the end of June till October, but the fishing continues in winter. To the north-west of Kem the best fisheries are Kandalaksha, Keret, Kovda, and Knyaz Bay, from which about 25,000,000 fish are obtained in the year. The fish are salted and shipped to Arkhangel in barrels of 27 lbs., but these are so badly put together that the fish deteriorates and only realizes a low price. To the south-east of Kem the principal

fisheries are Soroka, Shizhnaya (from each of which the annual catch is about 5,000,000), Sukhona volok (with an annual catch of 2,000,000), Virma with an annual catch of 1,500,000), and Sumski (with an annual catch of 1,000,000). The herring is caught with poke-nets, sweep or drag-nets, &c. The whole catch is sold on the spot to dealers, the fish being either frozen or smoked. The usual price is 1s. to 3s. per 1,000. A fish loses its value if it is frozen and then salted; so the winter-catch is eaten fresh. In the neighbourhood of Sumski there are several smoke-drying sheds, in which 5,000,000 herrings are annually smoked.

Navaga.—The *navaga* (*Gadus navaga*) is a fish allied to the cod. The season for fishing is from November to January, and it is done through holes in the ice. It is so easy that it is an occupation usually left to the children. The *navaga* is caught chiefly by the inhabitants of Kolezhma, Sumski, Shuya, and Nyukhcha. Those caught at the first two are about twice the size of those caught at Shuya, and average about 1 lb. 14 oz. A load of good *navaga*, consisting of about 4,000, costs from 16s. to £2. In February the *navaga*, having spawned, becomes lank and tasteless: in March it migrates.

Other White Sea fish are cod, flat-fish, wolf-fish, gwyniad (*Coregonus lavaretus*), but these are not an object of export-trade, but are only for local consumption. There are two fish also, the lumpsucker (*Cyclopterus lumpus*) and father lasher (*Cottus scorpius*), which are not eaten by the inhabitants, but dried and given as food to the cattle.

The Karelians, especially at Pongamskaya and Keret, hunt marine animals.

Gulf of Mezen to Kara Sea

The fishing along this coast is of much less importance. The industry is almost entirely in the hands of the Samoyedes. Owing to the absence of markets they deliver their catch to monopolists. The Russian dealers supply tackle, &c. to the natives, whom they organize in small groups on a system that closely resembles that of the *procruters* with the Pomors.

Marine animals are hunted, when they are brought down on floating ice by the northerly winds: among these are the walrus, Greenland seal, sea-hare (*Phoca leporina*), and white whale (*Delphinapterus leucas*). The seal blubber is sent to Arkhangel, thence to Russian and foreign markets. Along the Gulf of Mezen during August and September there is fishing for salmon and *nyelma*, and in November and December for *navaga*. The waters round Kanin Peninsula and Kolguev Island were for a long time untouched, despite their vast supply of cod and flat-fish, but lately very large plaice have been caught by British trawlers and other foreign boats. About a hundred steam trawlers in these waters make an aggregate haul of 40,000 tons, chiefly plaice.

Lake and River Fish

In 1897 there were caught 1,192 tons of lake and river fish, valued at £13,112. The chief districts in which they were caught were Pechora, Kem, and Kola, the best salmon being found in the Northern Dvina, Onega, Mezen, Pechora, and Varzuga. In Lake Imandra in the Kola Peninsula Engelhard caught salmon, grayling (*Coregonus thymallus*), gwyniad, trout, and salmon-trout. The *nyelma* (*Coregonus leucichthys*), a salmon with white flesh, is found in these lakes and rivers.

In the Pechora are found the peliad (*Coregonus peled*), the *omul* (*C. omul*), a salmon with white flesh, of primary importance farther east, and the *chir* (*C. nasutus*). The *Coregonus* is the characteristic salmon of the Arctic Ocean, as the *Oncorhynchus* is of the Pacific. In the Dvina is the sterlet (*Acipenser ruthenus*), a smaller member of the sturgeon tribe and the one which penetrates highest up the rivers.

B. WESTERN SIBERIAN FISHERIES

The Ob Basin

The basin of the Ob constitutes the whole of western Siberia, and all the fishing centres are either along its waters

or along those of its confluent or the lakes from which its waters are fed. The chief are on the lower waters of the Ob and Irtysh, on Lake Zaisan and the upper Irtysh, and on Lake Chani near Kainsk, the fishery of which is stimulated by the immediate contiguity of the Siberian Railway. There are other places where there is fishing, as in Lake Marka-Kul and the lakes of the Kirghiz steppes, but in these it is a secondary and subordinate occupation of the inhabitants. In the Ob 42 species of fish are known, the most abundant families being the Cyprinidae with 15 species, and the Salmonidae with 12; among others are three species of sturgeon (the sterlet, the *sturio*, and the *ossetr*), two of perch, two of cod, and pike is extraordinarily abundant. There are but slight differences between the fish of the Ob and the Irtysh.

Regions of the Ob basin.—Varpakhov divides the Ob basin into three regions—lower, middle, and upper—differentiated to some extent by their species of fish.

The first region includes the Ob estuary and extends as far as Berezov. The characteristic conditions of the region are masses of water with a very slow current or stationary, and abundance of 'sands', i. e. stretches of clear water with sandy or rocky bottoms. The chief fish of this part are chub, *navaga*, *seld* (*C. merki*), a member of the salmon tribe with white flesh, salmon, *pidchian* (or *sig*), *chir*, *muksun*, a broad fish with large bright scales and small head, sturgeon, pike, roach, *gremille*, peliad, and eelpout, some of these being common to the whole river.

The second region extends from Berezov to about lat. 54° N., up both the Ob and the Irtysh and their tributaries, coinciding approximately with the wooded territory. The type of fish found especially in this region demonstrates the abundance of lake and marsh, e.g. crucian carp, tench, sterlet, and other fish. Salmon and *muksun* are found in great numbers here as well.

In the third or upper region which extends from lat. 54° N. to the sources of the Ob and its confluent the characteristic fish include trout, grayling, *seld*, *Gobio fluviatilis*, and *taimen* (*Salmo*

fluviatilis) which gives its name to many villages. The *nyelma*, a very popular fish in Siberia, is the commonest in the whole river. Of course there are no very marked boundaries between these three zones: sometimes, for instance, sterlet, which is characteristic of the central region, descends to the Ob estuary, or grayling, a typical fish of the mountain streams, is found in the tributaries of the lower Ob. Some fish may be regarded as local, which always inhabit the river, while others, which are migrants, visit it from the Gulf of Ob or cross from one locality to another.

Migration of fish.—The movement of great masses of fish takes place everywhere after the ice breaks, especially about the middle of May. These movements do not take place simultaneously with the various kinds of fish. The first arrival is the peliad, followed in order by the *muksun*, the *nyelma*, the *pidchian*, the *chir*, the sturgeon, the eelpout, and last of all the *seld*. They ascend slowly, making about 40 miles a day. Many of them (the *muksun*, *nyelma*, and peliad) make for the *sori* (shallow backwaters which dry up in hot weather), and then when in early autumn there is later abundance of water they move up the river and spawn in its higher waters and in those of its upper tributaries. Others, such as the *pidchian* and *chir*, spawn in the lower Ob, and the *seld* only comes into the lower Ob and its tributaries. The sterlet spawns in flooded meadows. The sturgeon goes up to the upper Ob and spawns on the way: in the autumn some sturgeons remain in the river, but more go down to the sea where they are caught in great numbers by the natives in the Gulf of Taz. Sometimes the grampus or killer-whale arrives in the lower Ob: its appearance is the signal for the fish to leave the river and go up the backwaters, where an occasional grampus will follow them.

The Zamor.—There is one special phenomenon of the Ob that deserves attention, as it has a great influence upon the fishing. It is called the *dur* or *zamor*, or 'the dying of the water'. In December and January the accumulation of protoxide of iron brought down by the tributaries of the lower

Ob that flow through tundra and marsh, coming over the lower surface of the ice, proves fatal to the existence of all living things. It gives the water an unpleasant taste and smell. The process goes on unequally, first in the shallow parts, and reaches from the middle of the stream to the shores. In rapid and deep places the *zamor* does not exist, and the fish do not die. The instinct of the fish makes them escape before the *zamor* can destroy them. Pike, roach, and *nalim* go into tributaries where the waters are not so corrupted, sturgeon and sterlet to the mouth of the Ob, and some of the sterlet up the Irtish. The *zamor* gradually extends up and down the river, and by the end of the winter the central and lower regions of the Ob are lifeless. On the Irtish this phenomenon is found up to the village of Semeika. The effect upon the fishing is obvious; the great mass-movements of the fish towards the sea are obstructed by fish-dams. Instinct forbids retreat up stream, and multitudes of fish are accordingly caught.

Methods of capture.—The favourite instrument of capture is called *gimga*. It is like the *morda* of European Russia, but larger. It is made of long thin twigs, on a substructure, which costs at least £100 to erect, so that it is a method only within the reach of those who are possessed of capital. The fish trying to escape the massive obstructions come to the gaps where the *gimga* is set, and fall ready victims. The *gimga* is so close-woven that even quite small fish are caught by it. The number of *gimgas* at various points of the river differs in accordance with the breadth from 40 to 100. The part where the majority of them is set is between Berezov and Obdorsk; 500,000 fish are sometimes caught in one day. In the lower course of the Irtish and in the Ob near its estuary instead of *gimgas*, there are set with the obstructions *cherdaks*: these are four-cornered sacks made of netting, attached to long poles by means of which they are lowered and raised. These methods are employed in the summer fishing as well as in winter, and on a smaller scale by local fishermen when the fish are leaving the *sori*. A good deal of fishing is done with nets:

big nets 4,200 ft. long and 70 ft. high, or half-nets more simply constructed and of smaller dimensions. These are employed generally on the 'sands'. In the neighbourhood of Tobolsk there are 120 of these 'sands'. The big traders employ the first kind, the half-nets being used by those of humbler means. A large amount of ice-fishing is done especially in the reaches of the Irtish between Tobolsk and Semeika (where the *zamor* stops). The ice is divided into sections, and snares armed with hooks are let into the water through the holes that are made in it. In some places 800,000 hooks are let down, but the catch is not great, varying from ten to four hundred puds.

The fishing industry.—About 10,000 men take part in the fishing industry of the Ob. The poorest are the impoverished Samoyedes and Ostyaks, men who have lost their reindeer and taken to fishing: an epidemic among the reindeer always adds to the number of fishermen. But, with the exception of the Reindeer Samoyedes and a few fur-hunting Ostyaks, all the inhabitants of the uncultivated north along the Ob are engaged in fishing. The great centre of the industry is Tobolsk on the Irtish, which is the head-quarters of the six big fishing firms that erect the largest dams. Every spring, as soon as the ice clears, the summer expedition proceeds down the river from Tobolsk. They give pay on an average of about 30 roubles a month and provide certain supplies: at the beginning of October they return to Tobolsk. About 1,000,000 puds (15,000 tons) are taken annually, of the value of between £300,000 and £400,000. 50,000 puds are taken annually to Irbit fair in February from the middle Ob. Farther north the winter catch is kept till the summer and sold to the summer-fishing expeditions. Fish are transported by sledge, a weight of about 20 puds to each sledge, the transport industry necessitating the existence of a race of winter-dwellers along the Ob. Sterlets are caught in winter near Tobolsk, fetching 5-8 roubles the pud in that city. Good sturgeon are caught on the river, weighing 8 puds and containing half a pud of caviar. The sturgeons of the Ob are much bigger than those of the Irtish. Pike are sometimes so numerous on the Ob that they

are sold for only 12 kopeks, but this is not surprising as a company of 50 or 60 can take in one season up to 7,000 puds. 350,000 puds of fish are carried annually on the Siberian Railway, 200,000 on the Perm-Tyumen Railway.

Centres of fishing industry.—Besides on the Irtysh below Tobolsk, and the Ob below the mouth of the Tom, fishing is one of the chief occupations of the population along the Rivers Om, Tom, and Chulim, and higher up it is of importance to a large number of inhabitants of the Altai district, not only on the Ob between Barnaul and Biisk, but on tributaries like the Kondom in the Kuznetsk district. No statistics are furnished, but there is a generally prevalent local belief that the fish are on the decrease. On the Ob itself it has been calculated that the fish exported from the different regions are as follows: Obdorsk 300,000 puds, Berezov 150,000, Samarovskoe 75,000, Surgut 90,000, Narim 90,000.

Fish products.—Several canning factories have been erected. Caviar is obtained from the roe, and isinglass from the bladder of the sturgeon. Besides these two important products, the sturgeon is of importance for its fat, dried sturgeon being fatter than smoked salmon, and for its spinal cord, which is eaten raw or else dried and cut into small pieces and used for baked fishcakes with fish inside and dough outside, while it furnishes a constituent in *selanka*, a soup which is the Russian national dish. *Poziom* is prepared from sterlet, *sirok*, and *muksun*: the fish is split open, freed from bones, salted, dried in the air and slightly smoked. In summer the fish taken from the Ob are dried and salted, in winter they are frozen.

Lake fisheries in Western Siberia

Lake Zaisan is the centre of a considerable fishing industry, partly in the hands of Cossacks, partly in the hands of Kirghiz. Carp, trout, *nyelma*, and sterlet are found, but roach and perch are more numerous. The fishing begins at the end of April and continues till the end of August. The height of the fishing season is June, after which the fish begin to go down

the Irtish. Pavlodar on the Irtish is in a district where fishing is very important.

Lake Chani.—This lake has the great advantage of being served by the Siberian Railway. About 100,000 puds are exported annually. The principal fish are pike and crucian.

The *River Ural* is practically outside the sphere of this book, but is important for its protected fishery, especially for the sturgeon.

C. EASTERN SIBERIAN FISHERIES

The principal fisheries in eastern Siberia are the lower Yenisei; Lake Baikal and the rivers that flow into it; the Lena and other rivers of the Yakutsk Government; the Okhotsk and Kamchatka fisheries of the Pacific; the Amur and its estuary; and the coast of the Ussuri Province (south-west fishery).

The Yenisei Basin

As an important industry the fishing of the Yenisei is practically concentrated in its lower waters. The fish most sought in these waters are the sturgeon, the sterlet, the *nyelma*, the *omul*, the *muksun*, the *seld*, the *gwyniad*, the *chir*, and the *sig*. Most of these make long migrations up and down the river to spawn; many sturgeons stay in the deep pools of the river, at any rate during the winter; they begin to go up the Yenisei when the ice melts, at the end of May or the beginning of June. A good many fish stay in the estuary throughout the winter; some fish, like the sterlet and *chir*, keep to the river all the year, and are never found at its mouth. Altogether, about fifteen varieties are caught for the purposes of trade, including the sturgeon, sterlet, *muksun*, *nyelma*, and *omul*. So that the caviar may retain its quality, the sturgeon is often kept alive in floating fish-tanks; it is said that the *omul* which migrate are fatter than those which stay in the estuary all the year.

The fishing is done partly by Yenisei-Samoyedes, Yuraks, and some Dolgans, Tungus, and Ostyaks, partly by non-resident Russians. The work of the natives is exploited by

Russian buyers, who, as a rule, do not give money, but goods on credit, a system which leads the fisherman into perpetual debt. The Russians who live along the river fall victims to it as well as the natives. The natives, who own fishing-places, usually let them cheap and act as fishermen. Primitive methods are employed in preparing the fish, with little regard for cleanliness, so that a rotten smell is a constant accompaniment of fish from the Turukhansk district ; the preparation of caviar is equally primitive.

Every year, at the beginning of June, boats containing the necessities for the season are rowed or towed down the river, reaching Dudinka in about three or four weeks, dropping fishermen and supplies at the river-stations as they go. The traders buy some of the natives' winter catch, and reach Yeniseisk again at the beginning of August. After ten days they start on their second voyage, and about the beginning of October the expedition is back again at Yeniseisk with the men and the summer catch. The first voyage only brings back strongly salted fish, the second brings back what is less strongly salted ; some of it is dried. What they cannot carry is often brought by sledge to Krasnoyarsk during the winter. For salting, as on the Ob, steppe salt is used ; the proportion is usually about 180 lb. of salt to 700 lb. of fish.

In the rest of the Yeniseisk Government the fish trade only amounts to about £5,000 a year. About 3,000 puds reach Minusinsk from the upper Yenisei. Lake Bozhe, in the Achinsk region, also produces a certain amount of fish. But most of the fishing is only for local consumption.

The fishing in the Yenisei is done principally by seines, with, as a rule, five men to a net. The big employers of labour usually make combinations of two or three, and have a tug ; they completely control the smaller workers. The rich men have nets of nearly 20,000 ft. in length, but the natives have to be content with much smaller nets. Besides nets, there are also dams of interlaced branches stretched across the river. In the winter some fish, especially sturgeon, *omul*, and *muksun*, are caught under the ice. Hunger and

curiosity make them fall at this period ready victims to any bait.

Absence of good communications has greatly restricted the fish-industry of the Yenisei. There is no canning, and the attempt to send frozen fish by rail to Russia has been a failure, despite the demand for such supplies. The present amount exported south annually is about 175,000 puds, including about 155,000 puds of summer-salted fish and 20,000 puds of winter-salted fish, but the market is almost entirely confined to the Yeniseisk Government, with Yeniseisk and, to a lesser extent, Krasnoyarsk as centres of the trade, though a few of the fish from this region go as far as Tomsk and Irkutsk. The best fish are found a long way north, and it is only possible to make one voyage within the year for the summer catch.

About 175,000 puds are caught in the Yenisei and the shallow tundra lakes by the local population and used for the needs of themselves and their dogs. The annual value of the Yenisei fisheries, including export fish, is about £80,000.

Lake Baikal

The Baikal fishing-region includes Lake Baikal itself, the lower reaches of the rivers that feed it, especially the Barguzin, the Selenga, and the Upper Angara, and the lagoon-like lakes along the shores of Lake Baikal, termed *sori*. The principal fish of these waters are the sturgeon (which is found in the Lower Angara and Lake Baikal, and fished for in the latter during the winter through the ice), the *omul*, the *chir*, the gwiniad, the grayling, the roach, the crucian, and the burbot. There is also a mysterious fish, the *golomyanka* (*Comephorus baicalensis*), which lives only in the profoundest depths of this lake, and is about 10½ ins. long. In Lake Baikal there is further a species of seal (*Phoca baicalensis*). In other parts of the Transbaikal Government are found, besides most of the fish of Lake Baikal, pike, carp, tench, and silurus. In Lake Frolikha, near the north extremity of Lake Baikal and communicating with it by a river of the same name, is a special kind of trout, not known elsewhere (*Salmo erythreas*).

The main fishing in the Baikal fisheries is for the *omul*, of which 500,000 are taken yearly of the value of about £20,000. During the winter the *omul* keeps in the deepest waters of the lake; in the spring it begins to approach the shores and enter the small inlets along them; towards September it moves in masses to the estuaries, up which it goes to spawn; it ascends the Upper Angara for more than 60 miles: at this period the 'running-catch' is made. Later, when it has spawned, it goes back to the lake, and the 'swimming-catch' takes place. When the lake is frozen, it is caught under the ice by nets let down to a depth of 100 to 150 fathoms. The winter catch is put on the market frozen, the summer and autumn catch salted.

The implements for taking fish in Lake Baikal greatly vary, nets and 'bagnets' being used where the fishing is on a large scale. Bagnetting is carried out by small companies; there are also net associations, where each member supplies a settled number of fishing-nets and ropes.

Lena and Kolima

The Lena and Kolima region is of very little industrial importance owing to the absence of means of communication, but none the less a great deal of fishing goes on to satisfy the needs of the inhabitants. For most of them fish is the staple food, and has the same importance that grain has for the inhabitants of agricultural districts. The natives eat chiefly small fish. Thus 94 per cent. of the inhabitants of the Yakutsk district are engaged in fishing, and it is the occupation of 92 per cent. in the Kolima district, and 87 per cent. in the Verkhoyansk district, and of 68 per cent. in the Olekminsk district. It is possible that the Kolima fishers will find an outside market for their fish, as since 1911 there has been regular steamer communication with Vladivostok. The amount of the catch of the district, including the adjoining lakes, is estimated at from 4,000 to 5,600 puds. At present the only market for the Lena fishery is the mining district.

The chief fish are sturgeon, sterlet, *muksun*, *nyelma*, gwyniad, *chir*, bass, common gremille, dace, pike, and burbot. A great number of herrings are found in the estuaries of both the Lena and the Kolima. Crucian carp is specially common. Fishing is most vigorous on the lower reaches of both rivers. About 25,000 puds are exported annually by steamer from Bulun up the Lena to Yakutsk. The Aldan, with its tributary, the Maya, is also prolific in fish. The fishing on the Kolima is vigorous, so far as the conditions allow, but the river is frozen for 268 days in the year. The fishing on that river is mostly done by companies, but, even though clubbing together, they have very insufficient implements. At ninety-nine fishing-stations along its lower waters there were only fifteen entire nets in all, the remaining fishermen contenting themselves with broken parts. The methods of preparation are as inadequate as the fishing-tackle; caviar is hardly prepared, and is often thrown away, as the natives do not eat it. Frozen fish is frequently eaten like cheese, cut into thin slices and called *stroganin*. The sturgeons are very large, often weighing as much as 200 lb. The coast dwellers hunt for seals, especially in March and April.

Okhotsk-Kamchatka

This district in the Pacific extends from Uds kaya Bay, where the River Uda flows into the sea (in lat. 55° N.) to the mouth of the River Anadir (in lat. 65° N.), taking in the coasts of the peninsula of Kamchatka and of the Commander Islands. It is divided into a western and an eastern section by Cape Lopatka, the southern point of Kamchatka.

In the Pacific the conditions of the industry and the species of fish are entirely changed. Instead of a Russian monopoly there is keen competition with Japan. In fact the Japanese had got the fishing trade almost entirely into their hands, before the Fishing Convention was made in 1907, which gave them free rights of fishing, except in certain specified bays and river mouths. Even now a great deal of fishing is under Japanese control, and the market for the fish is largely

Japanese. In the western section only one bay (Penzhina Bay) is excluded from the convention ; in the 1,850 miles of coast in the eastern section sixteen bays and gulfs are excluded, but yet in only one of these (Avacha Bay) is the industry carried on by Russian enterprise. Several areas have been closed to all fishing since 1913 in order to conserve the fisheries. These include the mouths of the Ulya, Urak, Okhota, Kukhtui, Kola, Tau, Yana, Arman, Ola, Yama, Takhyama, Nayakhan, Gizhiga, Tigil, Bolshaya, Osernaya, Kamchatka and other rivers.

The fish of the Pacific differ largely from those of the Arctic Ocean and of the rivers that flow into it. The characteristic Salmonidae are not *Coregoni*, but *Oncorhynchi*. The principal salmons of the Pacific that ascend the rivers that flow into it are six in number. (1) The *chavucha* (*S. orientalis*), confined to Kamchatka and the Sea of Okhotsk, the largest of the tribe, but a fish that has not yet established itself in European markets ; it is a fine fish with good flavour, averages 15 to 20 lb., and is often six feet long. It supplies the best caviar, experiments showing that the best comes from fish over four years old. (2) The *goltsi* (*S. collaris*), a kind of sea trout, ascends the rivers to the head waters, and returns in the following spring. (3) The *keta* (*Oncorhynchus lagocephalus*) or dog-salmon, is the commonest of all in these waters, except in south Kamchatka (where the *chavucha* is most prevalent) ; it weighs nine or more pounds ; a man can catch 1,000 in a day. It is of inestimable importance to the natives ; its skin provides them with sails, dress, and boots ; it is preserved in various manners, and forms the chief food of the inhabitants of Primorsk ; its caviar, which is of a pale red colour, is now regarded as of value, though previously it was thrown away. The *keta* is a very timorous fish and avoids clear water : it comes in great shoals. (4) The *gorbusha* (*O. proteus*), the humpbacked or Alaskan pink salmon, is less choice : it weighs from four to eight pounds, or occasionally even ten. It is found in all the rivers. (5) The *krasnaya* (*O. lycoodon*) or red salmon is smaller than the *chavucha* and appears a fortnight

after it. It weighs eight pounds, and salts better than other species. (6) The *kizhucha* (*O. Sanguinolentus*) is most plentiful about the beginning of August. It weighs four or five pounds.

Herring and cod, though numerous, are not articles of trade. Only in Gizhiga and Penzhina Bays, when there is scarcity of salmon, do the inhabitants make use of herrings for themselves and their dogs. Yet they advance on the east coast of Kamchatka, when the ice breaks up, so closely packed that they can be dug out, it is said, with a spade, and towards the beginning of June they almost block certain places like the mouth of the Kukhtui River near Okhotsk. There are a great number of cod also about the Commander Islands, but the natives do not touch cod, and the trade in them is entirely in the hands of Americans, who salt them for Japanese and Chinese consumption. The cod are so numerous that sometimes, when breeding, shoals of cod reach a length of $1\frac{1}{2}$ miles and a depth of several feet.

There are other fish also, the *mikisha* (*Salmo purpuratus*) largely a Kamchatkan fish; the *valek*, a fish of Okhotsk; the *korzhukha*, a kind of smelt, and the *uiki* (*S. socialis*), which frequent the west coast of Kamchatka, where there are hardly any herrings, but of all these the natives take no stock. Farther north, in Anadir Bay, there are pike, grayling, dorse, and malma, as well as salmon, but, though there has grown up a fishery that aims at commercial value as well as the satisfaction of local needs, it is difficult for it to be exploited properly at that distance. About 350,000 are caught; the fish goes mainly to Japan, which receives two-thirds of the total, amounting to nearly 10,000 tons; some also goes to Vladivostok and some to Petrograd direct. The inhabitants of Markovo secure about half a million red salmon, in addition to the white. The local population makes large stores of dried fish (*onkoli*) for their own food and that of the dogs.

So far as local consumption is concerned, there are two periods of fishing in the year: (1) in spring, when the hungry inhabitants, who have had difficulty in eking out their winter

supply, feed themselves; the earliest arrivals being plaice, haddock, and shad, and the western Kamchatkan coast being visited before the north coast of Okhotsk; and (2) the summer fishing, which has to supply the winter needs of their dogs and themselves; this begins in mid-June in Kamchatka.

Commercial fishing is largely in Japanese hands. For the whole Far East the fishing-stations are put up to auction every year at Vladivostok by the Department of Domains. The total amount realized in 1913 was £31,419; the amount three years before was only £9,700. The number of Russians that take up the fishing-stations is increasing; in 1910 only 5 per cent. were taken by them, in 1912 22 per cent. In 1913 there were 148 stations in western Kamchatka, of which only 9 were Russian, and 61 in the eastern Kamchatka region, most of which were Japanese. There were also 39 Russian river stations in Kamchatka. There is a strong tendency in Kamchatka to look for better customers than the Japanese, who beat down prices. But the cost of freight makes it almost impossible for the fish of this region to compete with those of the Amur. Again all labour and supplies have to be brought from Vladivostok. Not only is the distance from Japan considerably less, but the workmen are paid less, their food costs less, and they have a large supply of schooners and steamers for handling the fish. The only communication between these uninhabited districts and Vladivostok or Nikolaevsk is by sea during a short sailing season by the limited steamer service of the Volunteer Fleet, and all nets and material have to be brought a long distance. The Japanese fishermen secure abundant supplies from Hakodate by their own vessels.

Canning has been started in Kamchatka with some success; the work is mostly done by Japanese firms. The chief canneries are on the Osernaya, Bolshaya, Kamchatka, Palana, and Kolpokara rivers. In 1913 the total output of tinned salmon in Kamchatka was 137,314 cases of four dozen 11b. tins.

The extent of the salmon fishery in Okhotsk and Kamchatka can be realized from the numbers of fish taken in 1913,

which were: Okhotsk, 500,000; western Kamchatka, 33,500,000; eastern Kamchatka, 11,800,000. The herring catch in these districts totalled about 188,000.

Besides this salmon in 1913 there were prepared in Okhotsk 213 tons of caviar, in western Kamchatka 1,134 tons, in eastern Kamchatka 1,034 tons.

There are various ways of preparing fish: one, called *yukola*, of a crude nature, is only applied to fish intended for the consumption of natives or dogs; the form of fish-preserve which is most exported is called *balyk*. It is exported from Okhotsk to Vladivostok and Yakutsk, and from Petropavlovsk and Ust-Kamchatsk to San Francisco and Vladivostok.

Seal Fisheries of Commander Islands

One special marine industry is the hunting of the sea bear or fur seal, which supplies 'sealskin'. The centre of this, as of the cod industry, is the Commander Islands, where the creatures congregate in the summer. In the course of the last twenty-five years they have greatly diminished owing to immoderate fishing in the open sea. In 1890 no less than 55,435 reached the market, but in 1911 only 200. In 1912 a prohibition against killing them for the next five years came into force. During this period there is every reason to hope that the breed will have been regenerated and restored, especially as hunting these animals in the open sea has been prohibited by the Washington International Commission for fifteen years. With the renascence of the sea bear it is hoped that the Commander Islands will recover in prosperity and population.

Amur

Fishing districts.—There are three fishing districts in this region: (1) Nikolaevsk, the most important, comprises the lower Amur for 200 miles above its mouth, the Amgun, the Amur estuary, about 130 miles of the coast of Sakhalin, and about 860 miles of the coast of the Okhotsk Sea from Uds kaya

Bay to the Amur estuary. (2) Mariinsk, from Troitskoe to Sofisk, a reach of about 263 miles. (3) Khabarovsk, above the last district as far as Khabarovsk, a reach of about 107 miles.

In the Nikolaevsk district there are three kinds of fishing villages: fish-catching stations, salting stations which buy but do not catch fish, and villages which do some fishing incidentally. Leaving out of account the many villages in the last category, in 1913 there were 111 fishing stations leased from the Government at a total annual rental of £32,000 and 28 fishing stations leased from the municipality of Nikolaevsk at a total annual rental of £17,000. In the Mariinsk district there were 27 and in the Khabarovsk district 3 commercial fishing stations. In the two latter districts all the stations were Russian. Other stations were given free of charge to certain villages in order to ensure their food supply. The fisheries of the River Ussuri are entirely in the hands of Cossacks or natives who fish for their own needs with primitive methods. Prongé, lying south of the Amur mouth, used to have an important fish trade with Germany. The Volga caviar merchants have a station in this region which was reported to be very successful.

Japanese fishing.—Up to 1899 the Japanese invasion so completely monopolized the fishing industry that hardly anything remained over for the Russian population or Empire; in that year foreigners were prohibited from fishing in the Amur and its estuary, and Russians were forbidden to use foreign labour. Under these conditions development of the fishing industry became possible, and it has been especially stimulated since the Russo-Japanese War. In 1907 a convention was concluded with Japan by which the Japanese were admitted to the same fishing rights as the Russians. From this convention all rivers and thirty-four bays in the Far East fisheries were exempted, and it is practically in these alone that Russian fishing prospers. In the Amur estuary foreigners are allowed to prepare but not to catch the fish. The chief buyers in the Amur fishery were originally the Japanese, but they

have lost their market by trying to force down prices. The catch in 1910 was so good that it enabled the trade to send great quantities to Europe, and the business thus inaugurated has continued. In 1912 the fish trade with Japan from the Maritime Province was practically extinct.

Amur fishery.—The conditions of the fishing industry on the Amur have greatly improved. The fact that better prices now obtain ought to stop the excessive fishing that formerly prevailed, but probably stringent regulations will have to be introduced. In the remoter districts the rule that fish may not be caught within two versts of a river mouth is constantly disregarded. A fish hatchery is to be established at Nikolaevsk by the Government, which is alive to the danger of the rapid exhaustion of the fisheries under the present method. With a view to encouraging local consumption the experiment is to be made of giving fish a prominent place in the rations of the troops. The Amur stations are being equipped according to the latest plans with refrigerators, electric-light installation, and all processes that make for cleanliness.

Salmon.—The most important fishery is for salmon, and then for sturgeon. Besides the fish specially named there are about fifty varieties of less commercial value. The salmon of the Amur are the *keta*, which enters the river from the end of June, and the *gorbusha*, which ascends the river at intervals from the middle of August to the middle of September, often going up-stream 1,200 miles. On the lower Amur the average weight of the spring *keta* is 4 lb., of the autumn *keta* 9 lb., and of the *gorbusha* 2½ lb. In 1913 the catch on the lower Amur, exclusive of the Nikolaevsk district, was about 1,340,000 *keta*. In the Nikolaevsk district the catch was about 18,260,000 *keta*, and 7,500,000 *gorbusha*.

In 1913 there were sent 46,031 tons of fish and fish products by rail via Khabarovsk. The trade has become so much stimulated that special storage-houses are to be built at Moscow and Vladivostok. The fish for the Russian market is either frozen or salted, and sent in 25-pud barrels; for Japan

it is dry-salted in the Japanese way, without barrels. There is a rapidly growing trade in salmon-caviar, especially the roe of the *keta*, which used formerly to be thrown to the dogs, but 3,652 tons of it were in 1912 carried by railway in refrigerators. There is some trade also in train-oil made of fishes' livers, about 10,000 gallons being secured in a month and a half. There is only one canning factory in this region: in 1913 it turned out about 100,000 tins of salmon, each of 1 lb.

Scientific investigation has revealed a good many facts about the Amur salmon. It is a migratory fish, that lives in the sea and ascends the river only at spawning-time. The young fish make their way down to the sea and live there for three or four years, after which they assemble in large shoals, and ascend the river against the current for more than 1,200 miles. In their life as river fish their colour and appearance change. After spawning they become weakened and are swept down by the current, while so many die of exhaustion that there is a general belief that all fish that enter the river succumb.

Sturgeon.—Sturgeon-fishing on the Amur is mainly a winter industry, but there is serious danger of the fish being exterminated. The Government have had little success in attempting to limit the season from June 15 to the melting of the ice and to prevent the use of drag-nets. Fishing goes on all through the year, even during the spawning season. Large specimens are already scarce, the average being from 30 to 40 lb. In winter they are caught by hooks through holes in the ice in large pools, which the natives know them to frequent. The consumption is almost entirely local. In 1913 the total catch was 147 tons. The Government imposes a tax of $\frac{3}{4}d.$ per lb. The better kind is caught in the neighbourhood of Khabarovsk, though the sturgeon is much more plentiful near Nikolaevsk. A certain amount of caviar is shipped to Vladivostok. One special form of sturgeon on the Amur is the *kalug*, or white sturgeon.

Sakhalin

The fishing in Sakhalin is losing importance. Here besides the *keta* and *gorbusha*, which swarm in August, herring is a common fish; it is used almost entirely as fish-manure, which is exported to Japan. In 1913, a bad year for herring, the total catch in the fourteen stations in Russian Sakhalin was about 200,000 salmon and 4½ million herring. About 274 tons of herring manure and an equal amount of salted salmon were exported to Japan. Smaller quantities of fish and caviar went to Russia. The Gilyaks engage in herring-fishing, when the *keta* season is over. To the Gilyak fish is the principal form of food. His supply for winter is almost exhausted by December, though there is fishing for dorse in Baikal Bay during the winter. Then comes a time of great hardship. In April the seals appear, but before their arrival comes the haddock, which is hooked through holes in the ice. Then come herring and halibut (*Pleuronectes hippoglossus*), which sometimes weigh more than 100 lb. Trout (*Salmo fario*) appears in the rivers, but the next great catch is the ide (*Idus melanotus*), which is caught by baskets in the rivers. The smelts (*Osmerus eperlanus*) are so numerous that they are often ladled out of the water. An ally to the Gilyak fisherman is the grampus or killer-whale, a voracious animal which drives fishes and seals before it up the rivers or on to the coast; in return for these services the natives give it a friendly reception if they meet it alive, and inter its body with due rites if it is washed ashore.

The Gilyak have a special type of weir or dam for catching fish; this, as well as a Japanese weir, is constantly used also on the mainland.

The South-west

The sea-coast of the Ussuri district of Primorsk is known as the south-west region. It extends from the boundary of Korea to Cape Lazarev at the south of the Amur estuary. In this region seven bays, including Peter the Great and Imperatorskaya Bays, are excluded from the convention.

North of Peter the Great Bay the industry is principally in Japanese hands. The reservation of the fishing-rights in this bay for Russians has put an end to Chinese and Korean trade, and the proximity of a good market in Vladivostok has greatly helped Russian industry. Steam-trawling is beginning in this bay, the first trawler being British-built. Fish caught in this way are salted.

The chief fish caught in these waters is herring; it approaches the shores and enters Peter the Great Bay about the middle of November, comes again through the end of December, January, and the beginning of February, and pays a final visit in April. The principal herring fisheries, however, are north of Imperatorskaya Bay. Besides the herring, the *keta* and *gorbusha* are also obtained. Other fish, like the smelt, flounder, mackerel, and dorse, are of much less economic importance. Counting the three most important fish, the catch in 1913 was about 41,000,000 herring, 658,000 *gorbusha*, and 138,000 *keta*.

An important fishery is that for trepang (*Holothuria edulis*), the Chinese name for the Golden Horn of Vladivostok, applied to the *bêche-de-mer* or sea-slug. It is found on rocky bottoms along the whole coast of the Primorsk, but is especially common in the neighbourhood of Peter the Great Bay. The Chinese spear or net it. There are two seasons, from the end of March to June and from mid-September to October. The average catch for a fisherman is 120 a day. They weigh about six pounds when dried. In 1913 about 9 tons were exported from Vladivostok.

In 1913 about 125 tons of dried crabs went to China and Korea. There is a considerable market for shrimps.

PRODUCTS OF WILD ANIMALS

Fur

Fur is the oldest established trade of Siberia. Originally the lure of the invaders, it was for many years the form in which the subject tribes paid their tribute. Siberia is extremely

rich in fur-bearing animals, but with the growth of civilization and the destruction of the forests, they are being driven further and further north, the number of many breeds is being seriously diminished, and rigid restrictions on their capture have to be introduced, if they are to survive. As a rule, the colder the climate, the better is the quality and colour of the coat. The lower the latitude, the less silky is the fur, and the hair is apt to be 'harsh' in the tropics, lacking in softness and depth.

In western Siberia the most important parts for fur-bearing animals are the Berezov, Surgut, Turinsk and Obdorsk districts in Tobolsk, and the Narim district of Tomsk. In certain parts of Tobolsk Government hunting is the chief occupation of a large section of the population, providing them with the means of existence, e. g. along the Rivers Vakh and Yugan; for the inhabitants of the valleys of the Rivers Agan and Torum-Yugan it is as important as fishing, and for those of the lower Ob it often supplements fishing and reindeer-breeding. In the Narim district of Tomsk it is one of the main industries, as much as fishing, for the Ostyaks, and is an addition to the industries carried on by Russian settlers. In the Kirghiz steppes there is hunting, but it is principally for sport; it is only the poor who trade with the proceeds of the chase, though they do secure a certain number of wolves, foxes, and ermines.

The chief fur animals found in western Siberia are, in the Tobolsk Government, the squirrel, fox, ermine, and hare, and in the Berezov tundra the Arctic fox; less common are the kolonok, sable (diminishing greatly in the Turinsk district), brown bear, wolf, and, beyond Obdorsk, the polar bear, on the shores of the Arctic Ocean; in Tomsk, of most importance are the squirrel, kolonok, sable (greatly decreasing), fox, ermine, bear, hare, and skunk.

In Yeniseisk hunting is the chief occupation in the north, and also in the Turukhansk and Angara districts. Elsewhere it is only supplementary. The deer, the Arctic fox, the hare and the squirrel are the chief animals. The others are rare

and small. In the Irkutsk Province the natives are nearly all trappers. The Kirensk and Verkholensk districts were once well stocked with animals, but they are rapidly declining. Nearly all the fur animals are found here, the squirrel being the commonest. In Yakutsk hunting is still the principal occupation of nearly all the inhabitants, but the decrease in the game is rapidly making it secondary to fishing. However, fur is still the basis of barter with the natives. In the Amur and Maritime Provinces hunting is the chief means of livelihood for the natives, but in the Amur Province not for the Cossacks. In the Amur the natives are chiefly occupied with hunting the sable for its fur, while the Russians mainly hunt the roebuck for its leather. A number of valuable animals are found in the Maritime Province. (For a detailed description of the fur animals, see pp. 52-59.)

The great centre of the trade in Siberia is the Irbit fair, though the December fair at Ishim also has importance, especially for the sale of squirrels' fur. But besides these big centres there are many smaller fairs arranged at the close of the hunting season, which is usually the early winter. The hunting is often done by co-operative groups, who share profits. The fur trader often deals with these people, directly trafficking in things like tea, sugar, tobacco, gunpowder, and manufactured goods, which are indispensable to the inhabitants, for the furs which they have come to buy. The smaller fairs are losing their importance. But the fur trader is often the agent of a bigger man, and the fur passes from hand to hand till it reaches one of the great fairs. The agents of the larger firms, principally German and English, push farther and farther inland.

It is difficult to give accurate figures of the number of animals killed, and the amount of fur secured; we do not know how much is used in local consumption, in manufacturing clothes for the inhabitants, but the figures of Irbit fair are accurately known, and furnish the best evidence of the present state of the trade. Irbit fair takes place from February 8 to March 10. It is supposed that two-thirds of

what is for sale there comes from the country west of Lake Baikal. What is not sold at Irbit usually goes on to Nizhne-Novgorod. A great deal of sable is not sent to Irbit, but direct to Moscow. Now, owing to the restriction on killing sable (mentioned on p. 54), which may be continued, sable appears to a much smaller extent among the sales at Irbit. The most important centre and distributing point of the fur trade is London, the next most important is Leipzig, near which place, at Weissenfels, there is a gigantic industry in dressing the skins of Russian grey squirrels and making them into linings. Irbit used to be eighty miles from the railway: the opening of the branch that goes through Irbit and Turinsk from the Perm-Tyumen Railway to the Tavda may do a great deal to recreate the greatness of the Irbit fair by making it more accessible; but it looks as though the importance of fairs would be lessened, as the traders are more and more making their purchases at the place of production and dealing with the trappers on the spot.

In 1910 the total sales at Irbit amounted to £729,000; in 1912 prices had risen from 15 to 20 per cent., and the total amounted to £833,000; in 1917 with a great increase in prices the sales totalled £724,160. The sales in 1912 included 4,535,000 squirrel-skins, 1,500,000 rabbits, 12,250 sables, 200,000 ermines, 1,500 brown bear, 180,000 kolonok, 16,500 grey wolf, 14,000 to 15,000 fox. Very fine sable sold for £42 each; black fox skins were scarce, and fetched anything from £21 to £105; grey wolf skins were sold from £1 5s. to £3 11s. In 1914 the total value of squirrel-skins alone was £228,000, but in 1915 there was a great drop in the sale of these to £90,000. In 1916 business was rather slack. The chief fur-sales were as follows: about 3,500 badgers; 1,500 bears, the price being about £3 4s. 5½d. per skin; 60,000 black cats fetching up to 1s. 5½d. per skin; 10,000 Orenburg marmots; 1,000 pine martens from £1 12s. 2½d. to £1 18s. 7½d. each; 500 stone martens, £1 7s. 11d.; 6,000 mink; large quantities of red fox; small quantities of Yeniseisk white fox at £3 4s. 6d.; 7,000 Obdorsk white fox, ranging from £2 5s. to £3 per skin;

some Pechora white fox at £2 13s. 8d. ; about 100 silver fox, ranging from £16 2s. to as much as £107 each ; about 4,000 reindeer fawns sold up to 7s. 6d., the same number of summer reindeer skins sold from 10s. 9d. to 15s. 0½d. ; only some 3,000 sable, the lowest price being £2 15s. 10d., the highest £8 11s. 2d. ; squirrels were very numerous, and fetched high prices, the best with full tails (3,000,000), realizing from 8s. 7d. to 9s. The Chinese bought up most of the dark ones on the spot, and only about 500,000 of them were offered for sale, less valuable types fetching 10d. or 1s. ; 1,000,000 white hares sold up to 1s. 1½d. for the best ; about 250,000 white pole-cats from 3s. 5d. to 3s. 9d. ; wolves were much in demand, about 2,000 were sold, fetching £1 18s. 7d. The best from Turukhansk sold from £3 0s. 1d. to £3 15s. 1d.

Fur-fairs are held at the confluences of the chief tributaries of the Amur, at Albazin, for instance, and Blagovyeshchensk. In the Uda district, where the sable is especially good, the fairs are at Kulcha on Lake Orel, Burukanskaya on the Tugur, and at the mouth of the Uda. There is an important fur-fair, on a much larger scale than these, at Nikolaevsk. As the natives of this region remove the heads and claws of the bears from religious motives, the bear-skins here are not of much value.

In the far North-East the Anyui fair, once of the first importance, has declined considerably, since the Chukchee prefer to barter most of their furs with the Americans on Bering Strait. Only the most valuable furs are sent to the Anyui, as for these Russians give better prices. A number of furs, walrus, and mammoth-tusks now reach Vladivostok by sea from Gizhiga. The Russian traders at the Anyui fair all come from Yakutsk.

At one time the Kyakhta fair, where Chinese merchants bought the peltries, was of great importance, but this is now no longer the case.

There are many small fairs throughout the north and east. The fur sold at those in the south goes to Yeniseisk and Irkutsk. But the great fur-market of the north is the Yakutsk

fair, which is held in July. The following table shows the number of skins sold :

	1902.	1905.	1913.	Price.		
				£	s.	d.
Sable	2,640	3,000	—	(in 1911-12) up to 2 14 0		
White fox	8,400	14,000	20,000			
Fox	844	5,000				
Red fox			1,000			
Grey fox			100	2	12	1
Kolonok	220	1,000				
Ermine	900	12,000	10,000	5	9	
Squirrel	73,500	300,000	70,000	1	2	
Black bear			100			

In the average of the total amount of skins of fur-bearing animals in the international markets, the share of Russia and Siberia is as follows :

	<i>All Russia.</i>	<i>Siberia.</i>
Squirrels	15,500,000	15,000,000
Hares	5,250,000	5,000,000
Ermines	1,100,000	700,000
Kolonok	200,000	150,000
Skunk	300,000	150,000
Brown bear	8,000	6,000
Sable	215,000	70,000

A word or two may be added about the last-named animal. Its numbers had fallen so alarmingly that a law has been passed forbidding its slaughter from February 1, 1913, to October 15, 1916, with a permanent close time from February to October in each year. The Moscow Fur Association has pressed for a renewal of this law for another three years. In Kamchatka the danger of the sable becoming extinct was recognized some years ago, and reserves were marked out within which the hunting of sable was prohibited. A recent expedition has staked out two large sable-reserves in the Sayansk district. Sable skins range from 15 to 20 in. in length, and from 5 to 8 in. in breadth. In genuine sable the outer covering of hair is especially delicate in quality and beautiful in colour, having a rich blue tint, and varying from 1½ to 2½ in. in length, while the pelt is very soft, but

durable. In Kamchatka, Sakhalin, the Maritime Province, and the Barguzin district of the Transbaikal the sable holds the first place. It is, indeed, the most valuable of the fur animals. The best black sables come from the Yakutsk Province, notably the Lena district, the lightest and least valuable from the Ob and the Yenisei. The Kamchatka sable is browner than the others. The fur of the kolonok ('Tartar sable'), which is really yellow, can be dyed so as to resemble sable with such success, that expert judges often cannot tell the difference.

Another animal for which protection is necessary is the white fox. Though it is found throughout northern Siberia, it is in great demand for imitating the rarer black and silver fox furs, and is ruthlessly hunted in consequence.

The Indigirka is now the centre of the white fox hunting, the skins being bought up by the agents of the Ust-Yansk and Yakutsk merchants. In 1911 good skins fetched from 15s. to 30s. there.

The squirrel appears in the largest numbers in the fur-markets. The farther north and east the animal is found, the darker, thicker, and more valuable is its fur. Next to the squirrel comes the hare. The best squirrels come from the Lena, but the ermines from that region are the least valuable.

Tiger-hunting is a regular occupation in winter on the lower Amur. In 1912 fifteen were killed and twelve caught alive. Of these ten were sent to Hamburg for sale. In some years 120 or more are killed. The bile, heart, and claws are sold to the Chinese, who make from them a powder, which is supposed to produce courage.

Game

The export of game is small. In 1909 it was about 1,200 tons, worth £53,000; in 1910 about 1,800, worth £73,600. But Siberia abounds in edible birds of many kinds—duck, geese, hazel-hens, ptarmigan, &c.—and the export might be much increased if the business were better organized, and

more ice-wagons were supplied on the railways. The principal place for the export of wildfowl in western Siberia is Barnaul.

Fossil Ivory

The collecting of fossil ivory is a regular industry among the natives of the far north. The mammoth tusks are found principally along the Arctic Ocean. Those near the shore are usually smaller than those inland. The New Siberia Islands are a favourite hunting-ground, the waves washing the tusks out of the sand-dunes in stormy weather. On the mainland these are most commonly found embedded in the earth banks of the smaller streams, the spring floods exposing them to view. The natives make their way to the Arctic Ocean or the adjacent islands with their dog-sledges in April, returning in November, when the ice is firm again. The Yakutsk fair is the chief market for fossil ivory, which is little inferior to ordinary ivory. Nearly twenty tons were taken in 1913, the price at Yakutsk being about £5 10s. for 36 lb. A certain amount is brought to the fairs in the Tobolsk Government. The Chukchee possess beautiful breast-ornaments made of fossil ivory. The flesh of the mammoth is eaten by the natives, apparently without harm to themselves, but Europeans will be loth to follow their example.

CHAPTER V

NATIVE TRIBES OF SIBERIA AND ARCTIC RUSSIA

Classification : I. Palaeo-Siberian Tribes. II. Neo-Siberian Tribes: (i) Finno-Ugrian, (ii) Samoyedic, (iii) Turkic, (iv) Mongolic, (v) Tungusic

CLASSIFICATION

THE inhabitants of Siberia may be considered in three groups, corresponding to the different periods at which the country was settled. (1) The first group are the descendants of the pre-historic inhabitants, who have always existed in the country, or else entered it at an early period of which for Siberia there is practically no knowledge. Such are the Chukchee, the Koryak, the Gilyak, and these are the aboriginal inhabitants. (2) Secondly there are races who settled in Siberia during the great movements of population which took place in Asia from the third to the thirteenth century. Such are the Finno-Ugrian tribes—for instance, the Vogul, and perhaps the Samoyedes—who came from the south of the Altai Mountains in the third century ; such the Turkic tribes, Yakuts and Tartars, who came from the regions of the Oxus, perhaps in the eleventh century or earlier ; such the Mongols, a people akin to the Turks, coming from the regions of the Himalayas into Siberia in the time of the famous Jenghiz Khan, early in the thirteenth century ; such are the Buryats. (3) Thirdly there are the Russian colonists, who have come more or less continuously into Siberia ever since the notable expedition of the Cossack Yermak, in 1580.

The tendency to expand eastward is very distinct in Russian history. With regard to Siberia, Russian historians are fond of comparing the stream of immigrants to a military column, which has thrust itself along a broad belt of territory stretching east and west, from the south of the Ural Moun-

tains to the valley of the River Amur. The territorial belt thus settled, more densely than any other part of the country, begins on the west, between Verkhoture to the north and Troitsk to the south, and stretches eastwards between Tobolsk and Petropavlovsk; between the Tara and the Om the belt narrows, broadens a little between Tomsk and the Biya, and, as a compact mass, ends about Nizhne-Udinsk, with the rivers which flow into the Yenisei. In its eastward march from the Urals the column of immigration has thrown off outposts, as it were, which form settlements along the Ob, Yenisei, and Lena; and gradually the Amur valley is being penetrated. By this more or less thickly settled belt of colonization, the native races have been divided into a northern and southern portion; but far the greater number of them lie to the north, along the valleys of the great rivers that flow into the Arctic Ocean.

A few native stocks are said to have disappeared altogether, or to have been absorbed; some, like the Gilyaks and Chukchee, in the far corners of the land, are practically intact; some, like the Irtish-Ostyaks, have preserved their nationality even amidst Russians; some by intermarriage have exercised a greater influence upon the Russians than the Russians have upon them; this is especially true of the numerous tribes of the Yakuts, whose customs, dress, and even language, have to a great extent been adopted by the immigrants. This mixing of Russians with native stocks is commonest on the outskirts of the belt of settlement, along the Yenisei and Lena. It is the converse of what happened, in the Middle Ages, in Russia itself, when native stocks from central Asia invaded the country, and intermarried with and were absorbed by its inhabitants. Only where the immigrants are comparatively thick in Siberia, do the natives become Russianized.

In this way new types have arisen in Siberia; in addition to pure native stocks, there are native stocks infused with Russian elements, stocks whose dominant element is Russian, but who have been distinctly affected by native elements; and finally there are the pure Russians, who, from living in

the novel conditions of life, social and geographical, of Siberia, have themselves become a new type, different from the western Russian.

It is difficult to make a satisfactory classification of the tribes of Siberia. The name, Palaeasiasts or, better, Palaeo-Siberians, has been applied to those indigenous stocks, which bear no clear relation to the other races that inhabit the world, but their own mutual relations are very indeterminate. To the rest, sometimes called loosely the Ural-Altai stock, is given the name of Neo-Siberians. The word Mongolian is used too loosely for the purposes of scientific classification, sometimes so as to cover all the yellow races, including the Palaeo-Siberian tribes; at other times for the Ural-Altai stock, so as to include together Finns, Tartars and Turks; again at other times, and more accurately, it is applied to one branch of this stock, i. e. that of which the Kalmuks and Buryats are members.

Palaeo-Siberians.—To the Palaeo-Siberians can be assigned without further definition of their relations to one another the following not very numerous tribes: Chukchee, Koryak, Kamchadal, Gilyak, Yukaghir with their branch the Chuvanzi, Ostyak of Yenisei; outside Siberia are the Ainu, Aleut, of whom some live in the Commander Islands, and Eskimo, of whom a small number have returned to Asia.

Neo-Siberians.—The Neo-Siberians can be divided into five fairly clear branches: (1) the Finno-Ugrian, which is practically confined to western Siberia and Europe; (2) the Samoedic, which extends along the north coast beyond the Yenisei, and has one branch, the Soyots, among the Sayansk Mountains; (3) the Turkic; (4) the Mongolic, whose great representative is the Buryat; and (5) the Tungusic, which includes the Manchu and many of the tribes of northern Manchuria.

Altogether the number of these natives in Siberia is roughly a million. Many of the tribes are dying out; few only, like the Yakuts and Buryats, are increasing in numbers and have set their impress upon the Russians who have settled among them.

In the more barren parts for instance among the marshes of the Irtish, or in the regions towards the Arctic Ocean, where there is little or no scope for agriculture, and where hunting and fishing are almost the only occupations, the number of natives is not increasing. But in the more fertile parts of the country, in the best parts of the river-valleys, in the middle and south, the native stocks do tend to increase. It is in these parts also that the process of Russification is most clearly taking place. Generally speaking, it may be said that the annual number of births among the natives is satisfactory; diminution in their numbers comes from a disproportionately high death-rate, particularly among infants. Nominally most of the natives are Christian, and belong to the Orthodox Greek Church. But the old superstitions and the old gods to a great extent prevail among them, while the more outlying tribes have hardly been touched by Christianity at all. They still have their images, magic, and medicine-men, their sacrifices, and their taboos; polygamy and loose morality are not uncommon; in places, even slavery exists; the blood-feud is handed on from generation to generation. Amid cold and dirt, they live lives which to the western mind appear to be of unrelieved discomfort, bringing with it painful diseases, unrelieved by any medical help, and only aggravated by the brandy for which they greedily offer their wares.

I. THE PALAEO-SIBERIAN TRIBES

CHUKCHEE

Territory.—The Chukchee territory proper lies east of Chaun Bay and north of the Anadir. But now, owing to their growing herds, the Chukchee have spread even as far as the Indigirka in the west, over the Anyui to the Omolon, and to the River Opuka and the Polpol Mountains on the Pacific. The few who reached Kamchatka have been largely assimilated by the Koryaks (see p. 106). Their territory consists chiefly of tundra with a fringe of forest, the camps lying mostly along the rivers, which are separated by bare watersheds. In

autumn they seek the edge of the forest for shelter, in summer the hills near a small glacier, or preferably the open tundra. A camp wanders about 100–150 miles, following the same track each year. If the ground proves unsatisfactory, another may be chosen, so long as it is not already occupied. It is worth noting that by entering the Anyui and Omolon territory the Chukchee have put an end to the migrations of the wild reindeer between the Omolon and Chaun Bay. Hence the Yukaghir (see p. 113), who live almost entirely upon them, are rapidly dying out.

The villages of the Maritime Chukchee stretch from Cape Erri to Anadir Bay, except for a few Eskimo settlements.

Name.—The word 'Chukchee' is generally derived from *cau'cu* (rich in reindeer). It is the name by which the Reindeer Chukchee distinguish themselves from the Reindeer Koryak or the Maritime Chukchee. But both Reindeer and Maritime Chukchee call themselves *li'i-yi-lulit* (those of genuine language) as distinct from other tribes.

Language.—The Chukchee language is very similar to that of the Koryak. Though rich in words and pliant, it is less vital than Koryak and it has virtually no dialects. The similarity of the Chukchee language, as of their stature and features, to those of the Indians on the other side of Bering Strait is said to be noteworthy.

The dominant position of the Chukchee is shown by the way in which they force other tribes and even the Russians to speak their language. Even on the Kolima and the Anadir they speak very little Russian.

Numbers.—The Chukchee probably number about 12,000. The greater part are reindeer-breeders, who inhabit some 650 camps. Thanks to their success with their herds they are increasing steadily and are the most powerful tribe in the east of Siberia.

Relations with the Russians.—Since the failure of their attempts to subdue the Chukchee in the eighteenth century, the Russians have left them virtually independent and the relations between them have been, on the whole, excellent.

Many parts of the peninsula have never been visited by a Russian.

The power of the Chukchee chief whom the Russians recognize is barely nominal. Since 1889 a tribute of 247 roubles is paid by the Chukchee at the Anyui fair, but most of it comes from wealthy reindeer-breeders, and apparently the Russians are again obliged to give very substantial presents to secure it, now that the fair is so rapidly declining.

Tribal divisions.—There are two great divisions of the tribe, Reindeer Chukchee and Maritime Chukchee. There is considerable evidence, apart from tradition, to show that the Chukchee were at one time entirely a maritime people which only turned its attention to reindeer-breeding by degrees. Their folk-tales are generally of the sea and the dog figures more largely in their religious-life than the reindeer, though it has long ceased to be used by the Reindeer Chukchee for driving and is kept chiefly for religious reasons. Some of their stories point to their having migrated from the south, as do their names of the months. The process of transformation is still going on. Many of the Maritime Chukchee have a few deer in the herds of friends and thus gradually acquire the means of starting as breeders. Even the Eskimo are following their example, for the depredations of American whalers are rendering the livelihood of the Arctic people who live on sea-mammals more and more precarious. Not that reindeer-breeding is without its risks. In a bad winter many owners may lose half their stock. But it is more profitable and more stable, on the whole, and many coast villages have already ceased to exist.

Social organization.—The family is the permanent Chukchee unit, but the camp is the economic unit. It generally consists of a few families, perhaps of ten to fifteen persons in all. Rich people generally divide their herds, forming new camps. Permission to join a camp must be granted by its members. Each camp has its master, who is also called 'the strongest man', and lives in the 'front tent'. The maritime villages only occasionally have such a master. The commoner unit with

them is the 'boatful' of eight rowers and a helmsman who commands, and whose nearest relatives form the crew. The catch is divided among them on a regular system. The 'strong man' has more influence in the village than in the scattered camp. Murder within the family group is dealt with by the family alone and dangerous or disagreeable members are sometimes done away with. Murder outside the family entails a blood-feud; for revenge is a duty. A group of kindred families is called *varat* (i. e. 'collection of those who are joined together'). But this bond of union is nowadays very loose.

Physical appearance and characteristics.—In appearance the Chukchee are well-built and healthy though heavy, and the well-fed reindeer-breeders are wonderfully strong. The nose is large and well-formed, but the lower part of the face is disproportionately heavy. Except on the Pacific coast, the hair is black. That on the face is scanty, but a moustache is the sign of manhood. The skin of the Maritime Chukchee is darker than that of the Reindeer. Women are more often of the Mongolian type, but many are as fair and shapely as the average of the white race. On the whole the stock is pure.

Marriages with Russianized creoles are perhaps increasing, owing to the prosperity of the Chukchee, but they are generally childless. There is a marked decrease of syphilis in the present generation owing, perhaps, to the precautionary measures taken in the last. But the country is liable to be swept by epidemics of measles and other diseases. The Chukchee are easily angered, but quarrels are usually settled by fights or wrestling-matches. Murders are still fairly numerous, however. The language is notably poor in terms of abuse. The kindness of the Chukchee towards suffering, even in animals, is most noticeable, as is their gentleness with children. They are also wonderfully generous towards other tribes. In time of famine a rich breeder near the Kolima will kill hundreds of animals for hardly any return. Some of the Lamuts (see p. 103) on the Chaun tundra get half their food from the Chukchee. Though there is now no ill-feeling towards

foreigners, the Maritime Chukchee are more hospitable than the others and less given to stealing. The Reindeer Chukchee are continually robbing each others' herds, the theft being punished by a fine or a thrashing, where the victim is strong enough to enforce his rights. The Chukchee are slow-witted and easily cheated in business. Their quinary-vigesimal system of counting is clumsy in the extreme and they can only keep track of the more notable animals in their herds. They have no remedies against disease except magic. Their endurance of cold is astonishing. Women will sew in the open snow half naked, because the exertion makes them so hot. They are not clean. They even call themselves the 'non-washing people'.

Fishing.—Seal-hunting is the chief occupation of the Maritime Chukchee. They use light harpoons for stabbing the seals through their blow-holes in winter, when they do not net them. For stalking them in the open they use heavier ones, but these are being rapidly superseded by guns. Walrus are much less common, though since the Americans no longer hunt them they are a little more numerous. On the Pacific coast they are most easily killed during their migrations between Kresta Bay and Cape Dezhneva. Walrus and white whale are the favourite food. The Chukchee skin-boats are made out of one or at most two walrus-hides. They are light and can carry more than a whale-boat, but they are easily holed. Whale-boats are being more and more used, but owing to the scarcity of wood they are difficult to make.

Hunting.—The Reindeer Chukchee, in addition to breeding reindeer, also hunt the wild reindeer when they cross the Anadir between the mouth of the Main and Chikayeva. They leave the Polpol Mountains in March and continue crossing in June, beginning to return in July. Some twenty Chukchee families on the middle Anadir live on nothing else and each gets 100–200 deer in a year. Non-migratory deer are also shot and mountain sheep are highly prized. Wolves, bears, and white or red foxes are trapped, while birds are snared. North of the Anadir there is comparatively little fishing.

Bows and spears are still used in quarrels and every Chukchee wears a knife on his hip. The Chukchee make themselves snow-goggles out of leather or wood, with narrow slits for the eyes. The armour of walrus-ivory, seal-hide, or iron is now kept only as a curiosity. The Chukchee dogs are poor, though the Maritime Chukchee eat them in time of famine. The excellent Anadir dogs fetch high prices among the Chukchee.

Dwellings.—The Chukchee tent is large and round with an oblong inner room which is the chief habitation. The three central poles have a sacred character. The tent is always set to the same points of the compass and the left side belongs by custom to the master. The inner tent is lit by a single lamp and the main evening meal is eaten there. Guests strip to the waist, while the family is naked except for a belt, as the heat rapidly becomes stifling. The stench is intolerable. Older and thinner skins are kept for the summer tent.

Clothing.—The chief garment of a Chukchee is a heavy double loose-fitting reindeer-fur shirt, the collar of which can be tightened with a string. His boots and trousers are also double and of the same material. In these and his cap he can sleep in the open in winter. The Maritime Chukchee buy the cast-off clothes of their Reindeer brethren, who never wear them two winters running. In very bad weather they also wear a cape or a long great-coat. The women wear long boots and clumsy combinations, the sleeves of which so interfere with their work that they frequently keep one arm and breast bare. The Chukchee woman tattoos very little.

Food.—The Maritime Chukchee live largely on sea-mammals, the Reindeer Chukchee on meat, but each at times craves for the other's diet. The Reindeer Chukchee are not squeamish. They will eat meat or entrails in any state of decomposition. They drink large quantities of tea and all the alcohol they can get and are inveterate smokers. Like the Koryak, they make an intoxicant from a mushroom.

Birth and marriage.—The Chukchee are prolific, many families having from 5 to 9 children.

Marriage is not permanent. A man may change his wife. As a rule, however, the marriage is broken by her relatives reclaiming the bride. There are also 'group-marriages' of 10 couples, in which the husbands have a right to each other's wives. But this tie is never made between people in the same camp. On the death of a husband his brother succeeds him, keeping the dead man's reindeer herd for his children. Polygamy is rare among the Maritime Chukchee, as they cannot afford to support two wives, but not uncommon among the Reindeer breeders.

Death.—Chukchee funeral rites are largely a protection against the evil influence of the dead. The body is drawn up through a hole in the roof or the back of the tent and all traces are removed to prevent the dead man's return. It is taken to the burial-place on a sledge. Here it is opened, the organs examined, and the cause of death proclaimed. The throat is then cut. The corpse is either exposed or burned. It is afterwards visited, to see whether it has been carried off by beasts—the best sign. On the fifth day the tent is moved to another place, but sacrifices are afterwards made at the grave. The usual abode of the dead is thought to be underground. Those who die sudden or violent deaths dwell in the Aurora Borealis.

Religion.—*Vairgit* among the Chukchee are the benevolent beings to whom sacrifices are made, and they live in the 22 directions of the Chukchee compass. The chief one lives in the zenith; and Midday, the Sun, and the Pole-Star are very important. Others live in the reindeer and the walrus and in the winds. There are three classes of *kelet* or evil spirits, (a) invisible spirits, bringing disease and death; (b) blood-thirsty spirits, the enemies of warriors; (c) spirits which assist the *shaman*. The *kelet* is fond of the liver. Hence the opening of a corpse to discover what *kelet* has attacked its liver. According to the Chukchee there are from five to nine worlds one above the other, connected by a passage under the pole-star. Other parts of the sky are also inhabited.

The object of Chukchee ceremonial is to maintain the

welfare of the community, and incantations are the leading feature. The chief festivals are the autumn and winter slaughterings, the ceremonial of antlers and the sacrifices to the New Moon, the Fire, and for Luck in Hunting. Moreover, each family must perform a thanksgiving ceremony twice a year.

Sport.—The Chukchee are fond of sport. They will travel enormous distances to race their reindeer in the spring. There are also foot races and wrestling matches.

Reindeer-breeding.—The Chukchee reindeer herds, which are probably the most numerous in the world, are the most important economic feature in far north-eastern Siberia. It is therefore convenient to include in this section a general account of reindeer-breeding in eastern Siberia with more particular reference to the Chukchee.

The Chukchee laid the foundations of their present prosperity in their raids on the Koryak herds during the eighteenth century, but the principal increase has been during the last fifty years. The son of a chief who used to be looked on as very wealthy because he owned two herds, possesses five to-day, while his brother-in-law and his cousin each own three.

The Chukchee deer are imperfectly tamed and readily run wild again. Milking is out of the question and they are difficult to manage in harness. The breed is undersized with short head and legs, heavy body, and thick antlers, and is dark in colour when compared with the Lamut. It is good for food, fattening quickly and keeping its condition. But it cannot be ridden and is much weaker than the Lamut, which is of twice its value. A Lamut fawn is exchanged for a full-grown Chukchee deer. Hence the Chukchee use Lamut deer in harness and sell their own to the Lamut for food. Crossing between wild and tame animals is common, the wild deer visiting the Chukchee camps in the rutting season. The fawns are much valued for racing, as they are swifter and have more mettle than the others. Their pedigree is preserved for three or four generations. A cross between

a wild doe and a tame buck is especially prized. In colour the deer vary from dark grey to hazel, the fawns being darker than the full-grown animal. They live from twelve to fifteen years. They begin to shed their coats in spring and finish by midsummer. The hair thickens rapidly. By September it is suitable for winter clothes, for which fawn-skins are used. The skins of full-grown animals make tent-covers or rugs.

In winter the herd lives almost entirely on reindeer moss, in summer chiefly on reed-grass and willow-shoots. In late summer and early autumn both moss and grass are necessary to fatten the herd. This is most important, because if a herd does not fatten then it will never fatten and there is a risk of losing the fawns in spring. In the autumn the deer will eat mushrooms, bird-dung round the moulting-places, and even young mice or birds. They are very fond of human urine and are so excited by the smell that they will charge a man who is making water near them. The natives in the camps are very careful in consequence. They use urine to attract the deer when troublesome and it is the most effective means of reviving an exhausted deer on a long journey.

If snow falls late, it is bad for the deer as they cannot walk on ice. The herd must not remain too long in one place because their constant scraping hardens the snow so that they cannot reach the moss. Large herds move every few hours and are therefore leaner than small ones. Hence sufficient space is essential. But summer pastures will stand much more wear and tear than the winter ones. The deep snow of the forests makes it almost impossible for the deer to find food there. Trespassing is a serious offence, as once two herds get entangled it is very difficult to separate them.

Calving goes on from mid-March to the end of May in the herds, three weeks earlier than in the wild state, with the result that many fawns die. During summer the bucks are kept away from the fawns and does. Does often rut in their first year. Hence the rapid increase of a herd. The Chukchee are careful in selecting animals for breeding. Gelded

deer or barren does alone are driven. In an average herd the percentage is 12 breeding bucks, 10-15 sledge-deer, and 60 or 70 half-grown fawns. In a large herd there will be 30 bucks to 1,000 does. Wolves are the chief enemies. Hoof-swelling, caused by walking on dry ground, is the principal malady. The first frost cures it, but it often causes a number of deaths. Ticks are troublesome. Far more serious is the scabies that carries off whole herds when it pays its periodical visits.

The herds require careful attention during the breeding-season and still more in summer when they are troubled by insects. Even the women then help to watch them, as the least thing causes a stampede. The herdsmen are often bound to stay two or three nights without sleep. In summer they have to carry everything themselves, including the skins of slaughtered animals, and the weight the less active will carry so as to leave the others free is astounding. But in winter a couple of boys can watch a herd for weeks. Deer are caught with the lasso, and a good lasso is worth a fat buck. The Yukaghir on the Omolon, who only use their animals for riding, keep them in sheds during winter, allowing them two small graylings a day for food. Poor men anxious to own a herd take service with a big breeder. They must work hard, but with luck may own 100 deer after five years.

The least timid animals are chosen for driving and broken in during the first year. With the Lamut deer this is easy, but often very difficult with the Chukchee. One animal is used for a pack-sledge, two for driving. One woman will lead 10 or 15 sledges fastened one behind the other, but a wealthy family may travel with 40-60 in several lines. With good going well-fed deer will do 200 miles in two days, but they need instant rest if tired, and spare animals are therefore usually taken. Dogs have far more endurance.

Thanks to their herds, the Chukchee are much better off than the fish-eating tribes and they are always called in to stave off famine, as well as to supply food in ordinary times—at the Anyui fair, for instance. But the highest famine price

for a deer is 16s. 8d. and their ordinary value is only a cake of brick-tea and a packet of tobacco in fair time. On the Anadir, with its salmon and its wild deer, a shilling is the usual price.

ESKIMO

The Eskimo are not a Siberian tribe, but a number of them have crossed over from America and have settled along the west coast of Bering Strait from Cape Dezhneva to Cape Bering, either in villages of their own or in common with the Maritime Chukchee, with whom they are identical in material civilization. They are most numerous near Cape Dezhneva and between Capes Chaplin and Ulyakhpen. They number about 1,600, including those on St. Lawrence Island and the Diomedé Islands. Their language is said to be closely connected with that of the Aleuts. Most of those round Cape Chaplin speak a little English. They smoke as much tobacco and drink as much spirits as they can obtain. When their customs and beliefs differ from those of the Maritime Chukchee, they are of American origin. A dying Eskimo is placed in a specially built snow hut or tent, according to the time of year. He is carried in by a back entrance, all signs of which are then removed. He is visited occasionally by relatives, but at the approach of death he is left altogether alone. The Eskimo are a maritime people and hold that their dead live under the sea. The road thither is very difficult and a soul may die again on the way, but once there a man has all he can desire.

KORYAKS

Territory.—The Koryak tribe extends from the Stanovoi Mountains to the sea and on the west side of Kamchatka as far south as lat. 55° N. The north-west boundary of their habitat is now the River Varkhalan; they used to extend along the west shore of the Sea of Okhotsk.

Name of tribe.—The name 'Koryak' is not used by themselves, but probably derived from neighbouring tribes. Its derivation is quite uncertain.

Racial affinities and language.—They seem to be closely related by race and language with the Chukchee, but their language is not reduced to writing. There are four main dialects of it spoken by (1) the Koryaks of north Kamchatka, (2) the Reindeer Koryaks of Kamenskoe, &c., (3) the Alutor Koryaks, (4) the Kereks in the NE. The main division of the Koryaks is into Reindeer and Maritime Koryaks; the manner of life of these two branches of the race has made them develop on wholly different lines; there is little intermarriage between them because of the difference of their mode of housekeeping; the Reindeer Koryaks intermarry with the Chukchee, the Maritime Koryaks with the Kamchadals. The Reindeer Koryaks have advanced less far in civilization, but they are generally given a better character. The Reindeer Koryaks are mainly in Gizhiga and Petropavlovsk; there are few in Anadir, none in Okhotsk.

Numbers.—In the census of 1897 the population was distributed as follows:

Gizhiga . .	4,434 (2,389 Reindeer : 2,045 Maritime)
Petropavlovsk	2,675 (1,284 Reindeer : 1,391 Maritime)
Okhotsk . .	244 (0 Reindeer : 244 Maritime)
Anadir . .	177 (75 Reindeer : 102 Maritime)
Total . .	<hr/> 7,530

The population increases in the intervals between epidemics and famines, but the Koryaks have suffered from many scourges: syphilis (called the Yukaghir or Chuvanzi disease, because of the route by which it came to them from Russia), two forms of arctic hysteria, small-pox, and measles, the spread of which was attributed by them to their shortage of professional *shamans*.

Relations with Russians.—The Russians first came into contact with them about 1640. Until 1712 the Koryak refused to recognize Russian sovereignty, but not until 1764 did their opposition cease. From 1649, when the fortress of Anadirsk was built, the Cossacks tried to exact tribute from

them. But wars have now ended for them, even with the Chukchee, their secular foe. The relations between the Russians and Koryaks are not altogether happy; the Koryaks resent the Cossacks' demand for transport free of cost, and see in every traveller an official, and so an object of suspicion. They like better the Americans, who practise 'contraband' hunting of sea-animals; from them they suffer no harsh exactions, and receive supplies much more cheaply than from the Russians. They also appreciate their alcoholic liquors. Few Maritime Koryaks and no Reindeer Koryaks have learnt Russian.

Social institutions.—The Russian Government have divided them into clans, but these were territorial designations and have become misleading owing to migrations. Their own social unit is the family, though families related by marriage have a tendency to draw together; there are even cases of fraternizing with unrelated families; members of such alliances were formerly bound to help one another in war, but the absence of war has abolished this aspect of the alliance.

Physical appearance and characteristics.—The Koryaks are described by Jochelson as below average height. They are well developed, have broad shoulders and good muscles. Their hair is usually black (78 per cent. of the men, and 53 per cent. of the women have black hair), bald heads are rare among them. Their eyes are narrow, but not peculiarly Mongolian; their nose is of moderate width; they have little hair on the face; their skin is bronze coloured. Their speech is slow, and they talk in a lazy manner unless they are excited. Travellers give very diverse accounts of their character, but their marked characteristics seem to be obstinacy, austerity, and dauntlessness. They are said to be hard to deal with, unless their customs are understood; if displeased, they are churlish, rude, and quarrelsome; if in good humour, they are friendly and jocose. They are truthful and straightforward and do not flatter. They are hospitable and treat their families and animals with kindness.

Art.—They have highly-developed artistic skill, and make carvings in wood, ivory, whalebone, and horn. Among their arts are basketwork decoration and rugs made of reindeer-skin, with ornamental patterns of the black and white fur of the young reindeer.

Occupations.—Their main occupations are fishing, hunting, and reindeer-breeding. Fishing takes place only during the summer months. The fishing implements are of a primitive kind, little affected by the Russians. They are as yet unfamiliar with seine-nets. They use nettle-fibre, which they spin in a primitive and imperfect manner. They use skin-boats constructed like those of the Eskimo; a large boat is nearly 30 ft. long with a maximum width of about 8 ft. between the gunwales. It is covered usually with skins of the thong-seal, the use of which is spreading to other parts where the walrus is disappearing. The Koryaks steer with an oar; they are not really good seamen, though better than the Kamchadals. They also use *kayaks* (boats for one man) and, in northern Kamchatka, dug-outs. Hunting for sea-mammals is of great importance; they hunt for ground-seal and ringed-seal throughout the year, except in the winter months; the principal period for thong-seal is September and October. Their chief weapon is the harpoon, but they also use the mallet for stunning those creatures that have fallen asleep on shore. During the fishing season the Koryaks are too busy to trouble about the seals. The whale industry is long dead: the Koryaks do not go far enough out to sea, but American whalers occasionally bring them dead whales, from which the skin, blubber, and whalebone have been removed. The only animals killed by the Koryaks on land for the sake of food are wild reindeer and big-horns. There are but few of the former; the latter are hunted principally in autumn. They hunt animals chiefly for their fur; the bear (which also furnishes food) is hunted four times in the year, (1) in summer, when it goes fishing; (2) in autumn, when it hunts berries; (3) in winter in its lair; and (4) in spring in self-defence. Hunters among the Maritime Koryaks train dogs, which do

not drag sledges, to attack bears. Foxes, especially red foxes, are clubbed, trapped, shot, and poisoned. There are some grey wolves in the tundra. The sable is now rare; so are the ermine, otter, and glutton.

Reindeer-breeding is still in a primitive stage (see pp. 103-106). It may not be more than a thousand years old. Left to themselves, the reindeer readily return to the wild state. However, the Koryaks will domesticate wild reindeer. Reindeer-breeding necessitates a wandering life, as the herds in search of their food paw up all the snow. The use of dogs for driving is probably very old. Dog-breeding necessitates settled habits, as it requires large stocks of animal food for the winter. The main food of the Siberian dogs consists of fish. The Maritime Koryaks (as also the Yukaghir) build roomy sheds at the side of their houses for their dogs. When spring comes and the sledge is no longer employed, the dogs are given no food, but have to hunt for it. They are very fierce while driven. Should a team of dogs meet harnessed reindeer they will, unless prevented, inevitably tear them in pieces, and a meeting of two dog-teams will lead to a serious encounter, if not forcibly prevented. The average number of dogs possessed in one household among Maritime Koryaks is ten.

Dwellings and furniture.—The habitation of the Reindeer Koryaks is an outer tent with an inner tent for sleeping; the Koryak tent usually has three or four inner sleeping-tents (*polags*) of small dimensions (6 ft. square and 4 or 5 ft. high) partitioned off with light poles and skin curtains. A camp seldom contains more than three tents. They have four main removals in the year: (1) in October they put up their tents in the river valleys under the protection of high banks among poplar and aspen groves; (2) in spring, at the end of March, before the fawning period begins, they descend to the open tundras on the lower courses of rivers; (3) in July they ascend the mountains to be near the river sources; (4) in autumn, at the time of the fawn-festival, they return from the ridges to the tundras and river-valleys. The

Maritime Koryaks have their dwellings underground, or half underground: one type is described as like an hour-glass in shape; these are permanent buildings of wood, varying in size; they used to be more spacious than now. Among the Kereks as many as twenty-five persons often live in one house. During the winter the lower entrance is closed, and the house is approached by a ladder, or rather a log of wood with holes for the feet, inconveniently small for Europeans. The descent into the interior is disagreeable when there is a smoky fire. In the summer-time the ladder is removed. They import metal kettles, prizing especially copper; for water they use skin or wooden buckets. The atmosphere inside the huts is such that the Koryaks usually sleep naked; sometimes their clothes are put outside for the parasites to freeze off them. The fire-drill is only used ceremonially.

Clothing, food.—They dress in deer-skin, their costume consisting of a *kotlanka* (or frock), trousers, boots, and leggings. In summer their clothes are of dressed skins, in winter of skins with the hair remaining. They are passionately fond of tobacco, which they chew, but rarely smoke. A favourite intoxicant is made of fly-agaric, a kind of fungus, but women never take it; it is a poison, which if taken in very great quantities will kill; it is used by *shamans* to produce an ecstatic state. Brandy, though forbidden, finds its way among them: it is popular, especially with older people. The ordinary food is fish, reindeer meat, dried salmon, and seal's blubber with rancid oil.

Birth, marriage, and death.—The mortality of infants up to one year is enormous, and the number is increased by putting to death any child whose mother dies during or soon after confinement, as artificial feeding is impossible.

The penalties for unchastity are very severe, and illegitimacy is almost unknown. Polygamy is rare; the 'elder' in the settlement is often polygamous, but most cases of polygamy are due to the observance of the levirate law, by which a man has to marry his deceased brother's wife or owing to the barrenness of his first wife. The future bridegroom has to

serve for his bride ; the period of service may be anything from six months to three years. If a man does not please his future father-in-law he can be sent away after many years of service without any reward. Money cannot be substituted for service. The preliminaries of marriage are arranged by the 'matchmaker' (asking one). The actual ceremony is by seizure.

When a Reindeer Koryak dies his body is dissected to find the probable cause of death, and the Maritime Koryaks stab the dead man in order that the child in whom his body is reincarnated may not die of the same illness. The dead are burnt, except by the Kereks, who let down their dead in funeral attire into the sea. Parenticide is now abandoned ; even the tradition has disappeared in some places ; but it seems to have been a general practice, in order to spare the sick and aged unnecessary suffering. Now relatives take good care of a dying man.

Other customs.—Only clothing and ornaments are personal property among the Koryaks. The wooden 'guardians', household appurtenances, house, nets, and skin-boats are family property. The reindeer are the property of all the members of the family, but the movements of the herd are directed by the father. The Koryak can count better than the Chukchee. He has two bases of computation, 5 and 20, and in counting uses both hands and feet.

Religion.—The Maritime Koryaks have adopted Christianity and renounced many of their superstitions ; the Reindeer Koryaks retain much of their primitive religion, as do also the Maritime Koryaks of Penzhina Bay and north of Alutorski Cape. However, the combined influence of traders and Cossacks has made them abandon a good deal of their religion.

It was among the Koryaks that the *shamans* were first affected by Christianity. In the Koryak houses are wooden images of 'guardians' ; they receive homage as containing a vital principle in them and having had incantations pronounced over them.

The chief religious festivals among the Koryaks are :

- (1) Among the Maritime Koryaks :
 - (a) Whale festival.
 - (b) Putting away the whale-boat for winter.
 - (c) Launching the skin-boat.
 - (d) Wearing of masks.
- (2) Among the Reindeer Koryaks :
 - (a) Ceremony on the return of the herd from summer pastures.
 - (b) Fawn festival.
 - (c) Reindeer races.
- (3) Ceremonies common to both :
 - (a) Bear festival.
 - (b) Wolf festival.
 - (c) Ceremonies in connexion with fox-hunting.

The reindeer races are religious, in honour of the One on High, while dog-races and foot-races are secular. Every owner of a large reindeer herd arranges races once a year, usually about the close of winter. Sometimes the host sacrifices the reindeer that he has been racing.

YUKAGHIR

Territory.—The Yukaghir originally extended from the Lena to the Anadir and from the Verkhoyansk Range to the Arctic Ocean ; now they are principally to be found above Verkhne-Kolimsk, along the valleys of the Yasachnaya and Korkodon, and in the region of Alaseiskoe. They are a very ancient tribe, who have been gradually pushed northwards. They were once very numerous, for tradition says that the northern lights were the reflection of their innumerable camp-fires.

Name of tribe.—The word *Yukaghir* is not used by themselves : it seems to be a Tungus word, judging by its termination, and probably means the 'distant ones'. Sauer says that they call themselves Andon Domni, which is probably an incorrect rendering of *Odud omni* the 'people'.

Racial affinities and language.—It is difficult to trace

strong racial affinities for them; most of them now speak the Tungus language, but there are survivals of their own tongue, which seems to have been highly inflected, and very rich in suffixes and case-endings: it has two dialects, one spoken by Yukaghir and Lamuts who live with them on the Rivers Korkodon and Yasachnaya, the other spoken by the Yukaghir and Yukaghirized Tungus on the tundra between the Rivers Kolima and Indigirka.

Numbers.—The Yukaghir are dying out: their marriages are mostly sterile, and they are a sickly breed. The latest figures of their numbers give them only 754, of whom 388 are males. With them must be included the Chuvanzi, a branch of the Yukaghir who live round Markovo, and who number 453 (236 males), but they have either become Russianized or have fallen much under the influence of Chukchee or Koryaks.

Divisions.—The Anaul formed a division of the Yukaghir living on the Anadir; they were fishermen and had no reindeer; they have partly died out and partly become Russianized. The tribal name Odul has been adopted by the Yukaghirized Tungus of the tundra; the Tungusized Yukaghir call themselves Dutki. There has been much intermarriage with Tungus and Lamut, so that the regular type of Yukaghir has largely disappeared. Like the Chukchee and Koryaks they can be divided into Reindeer and Maritime tribes; they have also been classified from the names of the rivers along which they lived (*viz.* Alaseya, Omolon, Kolima, Kongina, Korkodon).

Relations with Russians. Social institutions.—At the time of the Russian conquest they had a well-organized clan system, but it is now much in decay. The only tribal unity that they seem to recognize is that they do not make war among themselves; no traditions survive among them of a common tribal ancestor. Such clan system as they had was disregarded by the Russians, who have composed clans, which are little more than associations for paying tribute. The Russian law allows the natives to settle their own affairs (with the exception of capital

offences, such as murder and mutilation) according to the customs of the people concerned. The elder, who under the Russian system replaces the 'old man', is authorized to punish the clansmen with imprisonment and even physical chastisement. Severity, however, is not often required among the law-abiding and timid Yukaghir. Under the native system the prominent personages in the clan life were the 'old man', the *shaman*, the 'strong man', and the first hunter: the last two offices may be combined in the same personage, and the last is the only one whose duties have not fallen at all into desuetude. There used to be a class of captive slaves called *po* (hired labourers were called *nicil*); among these women had a better position than men.

Physical appearance and characteristics.—The Yukaghir are of short stature; on the average they are the shortest people in north-east Siberia; the men's waists are small, and they have slender and supple figures, moving and dancing gracefully. The women have stout waists, and as a rule short clumsy figures; but there are no really stout figures among either sex. Their children look very weak and sickly, and their young men effeminate. The hair of the Yukaghir is usually dark brown; the hair on his face is scanty; the eyes are dark-brown and more widely open than those of Mongol peoples; the complexion is either brown as the Chukchee's and Koryak's, or it is yellow as the Tungus'. They are the most timid tribe in Siberia, and will submit to any treatment to avoid an oath or curse. They are hospitable to a fault, a fact which is known by their neighbours the Yakuts, who make protracted stays among them and eat up their fish. Though mild and kindly, they do not readily forgive an offence, but their fear of Russian administration is such that they do not often commit murder; for the same reason they are accustomed to render services to the Russians without any remuneration. A desire to imitate the Russians has led them to wash, and soap is popular among them; at the same time they regard lice on the person as a sign of good health. They are extraordinarily honest and truthful, and will spare no effort

to pay off the debts incurred by themselves or inherited. Despite irregularities in their lives, they are bashful and modest in speech.

Occupations.—Their chief occupations are hunting and fishing. They hunt the squirrel, glutton, and fox, in order to obtain in their place, tea, sugar, and other requirements. The rifle has taken the place of the bow. They capture reindeer while swimming, having discovered the place where they will come down the river when driven by mosquitoes. The hunters kill reindeer for the entire group that accompanies them during the period of the chase; for fear of the evil eye they give a portion of their booty to strangers. Their only domestic animals are dogs and reindeer; they do not breed horses or cattle, but the Yasachnaya Yukaghir hire horses of the Yakuts for the squirrel-hunting season. They use hemp for fishing-nets, and horsehair has replaced the flexible willow-branches that they previously used. They have such wide-meshed nets that, as they say themselves, 'a bear could get through.' But they have other means of catching fish. A bad fishing season and a bad reindeer year lead them almost to starvation. They say when the fishing is bad: 'there is an old man in Verkhne-Kolimsk, whose heart is harder than Russian iron, and he won't let the salmon out of his cave.'

Dwellings and food.—They live during summer in conical tents (*urus*) made of thin poles, and during winter in small houses made of hewn logs. They are more particular than the Koryaks or Yakuts about their food, and will not eat rancid meat. They are great smokers. Such funds as are over from the purchase of tobacco are used for buying brandy, but they will not drink alone. They share their pleasure with the whole family, including infants in arms.

Birth, marriage, and death.—New-born children used to be killed if the mother died in childbirth. Sterility was regarded as a punishment sent by dead relations, and the *shaman* would be resorted to in order that such resentment might be modified.

Before marriage, chastity is not expected of girls, but

indiscriminate bestowal of their favours is disapproved. Marriage is endogamic, but there are strict laws prohibiting marriage between near relatives. A man serves three years for a bride, and if he is then rejected has no compensation. Polygamy is practised: a man will sometimes spend part of the year in the house of one father-in-law, and the rest in that of another. The Tungus and Yukaghir have to some extent borrowed one another's marriage customs.

The dead used formerly to be placed on platforms which were raised on poles. In the Kolima district it was a custom to distribute the flesh and bones among the relatives of the deceased: these were dried and put in leather bags and then worn as amulets, called 'grandfathers'.

Religion.—A nominal Christianity has not affected the Yukaghir much. Shamanism has a much greater hold upon him. Even the Christian Yukaghir has no Church ceremony till a year or more after his marriage.

KAMCHADALS

Territory.—The name may be applied either strictly to the principal tribe who inhabit the peninsula of Kamchatka, or more vaguely to some wandering tribes north of the peninsula. There are some tribes, too, like the Palanzi, who live in the ostrog north of Tigilski, and the Olyutorski, who live along the Pacific behind the cape which bears their name, who have close racial affinities with them and the Ukinzi between Cape Ozerni and the River Timlata.

Name.—The name Kamchadal is given them by the Russians: they call themselves Itelmen, and are called Konchalo by the Koryaks.

Racial affinities and language.—The race is mainly a half-breed between the aborigines and Siberian emigrants or escaped convicts: the pure Kamchadals are very rare. They have many attributes, especially in costume and customs, in common with the Mongols, but share more with the dwellers in north-east Siberia and north-west America. They are found in the Kuril Islands, especially in Shumshu, the

northernmost of the group. The language cannot be assigned to any known group: it is very guttural, and has many inflexions and prefixes. The vocabulary is very poor, there being only one word for the sun and moon. It is most spoken in the south and in the north about Penzhinskoe, where it is purest; but it is disappearing, and most of the tribe speak Russian.

Divisions.—There are three divisions of the Kamchadals: one group occupies the valley of the River Kamchatka, the second the west coast from Bolsheryetsk to Oblukovina, the third the Kurils, where they are found together with the Ainus.

Numbers.—Drink and illnesses have reduced the population. The last figures give 2,805, of whom 1,415 are males, but it is not known precisely which tribes were included in this numeration, and the real Kamchadals are possibly only half that number. They are not a very prolific people: women usually have only four or five children.

Relations with Russians.—Since the suppression of the revolt in 1731 the Kamchadals have been quiet, and they are now largely Europeanized: European have taken the place of native dances; the native costume is discarded for something like that of a Russian peasant; they have also largely given up their extreme fondness for dirt.

Physical appearance and characteristics.—The true Kamchadal in general is below the common height; his figure is round and squat, his eyes small and sunken, his cheek-bones prominent, his nose flat, his hair black, his beard scanty, his complexion brown or yellow. He is mild-tempered and honest, an easy prey to traders who deceive him, apt to get drunk, lazy, and apathetic, with no thought for the future, but careless and indifferent. They used to be a warlike and revengeful people, but they are now more remarkable for their readiness to oblige and their hospitality. Lansdell attributes to them a custom of tactfully relieving themselves of a guest whose protracted stay threatens to exhaust their stock by serving him a dish called *tolkootha*—the dish is found among

Tungus tribes also—which consists of a mixture of meat, fish, and vegetables. The guest takes the hint and departs the next day.

Occupations.—Their chief occupations are fishing, especially for salmon, and hunting. The efforts of the Government to introduce cattle-breeding have failed; agriculture does not flourish, as corn will not ripen (except round Klyuchevskoe); gardening prospers better, as roots will grow. Their method for catching salmon, as described by Demidoff, is to fix rows of inclined birch-stakes across a river from one bank to the other with only a narrow aperture on one side for canoes. Attached to these poles a little below the surface of the water and a few yards apart, are set two or three long wicker baskets according to the width of the river. The fish, which come up, are unable to proceed on account of the stakes: they then make their way through the gaps leading into these baskets, out of which inward-turned spikes prevent them from escaping. When the natives go to collect their catch, they lift part of the basket out of the water and secure the fish with iron-edged gaffs through a small door at the top. In this way they manage to take 2,000 fish in a day. They seldom use seines, but almost always common nets, made of packthread purchased from the Russians, or of nettle-fibre: they also use harpoons. They hunt reindeer, big-horns, foxes, otters, beavers, hares, and sables: special methods have been adopted to protect the last, which would otherwise become extinct. They trap bears, and show great patience when they lie in ambush for them. Their chase is attended with certain superstitions: they abstain from washing themselves, they are careful not to pronounce the name of an animal that they hunt for fear of ill-luck, and not to make the sign of the cross. They invoke their god Kutkhu and sacrifice in his honour the first animal that they catch. They are indefatigable walkers, but are also experts in driving sledges and training sledge-dogs. When in a team, the most intelligent dog is selected as leader; the others are harnessed two and two behind. A cry of *tag-tag* makes them turn to the right, a cry

of *kougha* sends them to the left. The harness is of leather : it is passed over the dog's breast and is joined to the sledge by a strap 3 ft. long in the manner of a trace. If the driver strikes the ice with his stick (*oshtol*) they go to the left ; if he strikes the side of the sledge they go to the right ; if he places the stick in front of the sledge, they stop. The dog-sledge is practically their only means of communication and horses are very rare.

Dwellings.—Like many other Siberian tribes they live in different kinds of huts during summer and winter. The former (*balagans*) are erected on posts about 12 or 14 ft. high ; their conical roof is covered with a kind of thatch made of bark ; the cooking is performed in the middle of the room where they all eat and sleep together ; there are no windows and the doors are so low that they scarcely admit the light. The staircase is merely a beam jagged in an irregular manner ; if it is turned with the steps, or notches, inward, it is a sign that the residents are not at home. One advantage of the height of the house is that they can dry their fish out of the reach of the dogs. Their winter houses (*izbas*) are of wood : they are made of trees placed horizontally with the interstices filled with clay ; the interior usually has two rooms, which can be warmed, as in Russian inns and small houses, by a stove set between them. The insides are tidy and often decorated. Windows are made of skins of salmon or bladders of various animals.

Clothing, food.—Lesseps in 1790 describes their costume as an outer garment (*parka*) made of skins of deer or other animals, tanned on one side, and long breeches of similar leather ; next the skin is worn a very short and tight shirt of nankin or cotton, the woman's being of silk. They wore fur caps. A recent traveller, Demidoff, says that now their costume resembles that of a Russian peasant—a blue cotton shirt under an old brown jacket, broad trousers tucked into topboots, and a military cap. Their boots are made of reindeer hide, the soles being stitched on to seals' throat-skins round the calves. In summer they wear boots of goats' or

dogs' skins tanned. Their principal food is dried fish; some fish they allow to become putrid in a hole and then eat them.

Birth, marriage, and death.—Births take place in public, with relatives and neighbours gathered round. Infanticide is practised, women giving their undesired offspring alive to the dogs; if twins are born, one of the pair must be killed; so must a child born during a storm unless incantation can remove the evil that would ensue.

A man's bride is usually selected from the next village, not from his own; he serves for her, but is given compensation if he fails in his suit. He has to capture his bride as among the Koryaks, but the ceremony is more of a reality. Marriage is only forbidden between parents and children. Virginity is not required in a bride. Divorce is easy.

The dead are eaten by dogs; children are buried in hollow tree-trunks.

Religion and superstition.—Their chief god is Kutkhu, the supreme being; his wife with them is called Kakee, his son Trel-Kutan, his daughter Shi-Shakels. Their mythology is crude and obscene. Volcanoes and hot springs are the abode of evil spirits (*Kamuli*). Sacrifices are not made to the gods, but to the many spirits good and bad with which they people heaven and earth, the greatest of whom is Pikhlyash. There is little professional Shamanism among them; every old woman and woman in man's clothes is counted as a witch. There was a class among them called *Koekchuk*, who were treated as women; it is possible that they were captive slaves who were purposely rendered effeminate to make them less dangerous, and who therefore were made to share the woman's life. Certain trades were regarded as unmanly; if a man became a tailor or shoemaker, he was regarded as a *koekchuk*.

GILYAKS

Territory.—The Gilyaks extend along the coast of the mainland on either side of the mouth of the Amur, from

Tugurski Bay on the north-west to the Mamia Rinzo Strait on the south-east, and they also occupy the northern part of Sakhalin down to lat. $50^{\circ} 10'$ N. on the west shore and to about lat. 51° N. on the east shore, the southernmost settlements being respectively Porokolan and Chamr-vo.

Name.—The name by which they know themselves is Nibch (=the men), but the Russians have called them Gilyaks, a modification probably of the Chinese designation for the Kilor or Kiler.

Racial affinities and language.—They present one of the greatest ethnological problems in all Asia. They have been variously claimed as a branch of the Ainu (the race that inhabits south Sakhalin and Yezo), of the Tungus, and of the Tartars—an error which is repeated in the name 'Gulf of Tartary' applied to the sea between Sakhalin and the continent. Some of their characteristics have been regarded as Caucasian, and it has been supposed that there was a large infusion of the blood of Russian adventurers from the seventeenth century. Were it not for their language they might be regarded, so far as their physiognomy and bone structure goes, as a branch of the Tungus; in many of their customs they approximate to their neighbours, such as the Olcha and Goldi, but their speech is quite distinct and cannot be classified. It is an isolated tongue like that of the Koryaks and Yukaghir, and even one unacquainted with the language can on the most casual training distinguish it from any Tungus speech. It is harsh and full of consonants; sibilant, nasal, and guttural sounds prevail. It has many words borrowed from other languages, but apart from its vocabulary it bears no close resemblance to any Mongol language. As far as language goes therefore, the Gilyaks must be classed among the Palaeo-Siberians, but it is possible that they are a people, like the Normans and Bulgarians, who have learnt the language of the conquered, and that a great infusion of Mongol blood in the past has profoundly modified the real type.

Divisions.—There are, however, three types of Gilyak physiognomy, one of which approximates to the Ainu,

another to the Mongol or Tungus, while the third is typically Gilyak. There is also a geographical distinction between those of the mainland and the two tribes which live on Sakhalin, Smerenkur on the west, and Tro on the east.

Numbers.—Their numbers are now 4,649, of whom 2,556 are males. They are dying out. Their women have few children. Six is considered a large family. Because the population is dwindling, clans have had sometimes to adopt individuals or whole groups.

Relations with Russians.—The Gilyaks have been less spoiled by civilization than many tribes. They have been known to the Russians since the seventeenth century. For years they succeeded in keeping the Chinese traders out of their land, and they have not become demoralized by intercourse with Chinese and Japanese. But the acquisition of Gilyak land by Russian settlers has not had a good effect on them.

Social institutions.—They have a highly developed clan organization, with its common fire, common enemies, common obligations of revenge, and common *thusind*. The last is the name for the compensation exacted in place of blood-revenge and in recompense for certain crimes.

Physical appearance and characteristics.—The typical Gilyak is below medium height, of stronger build than his Ainu or Tungus neighbours; he has a well-developed chest, moderately broad shoulders, short neck and fairly big head, but small hands and feet. There is no superfluity of fat. The complexion is brown, the hair is less abundant than that of the Ainu, but grows longer on the head and more freely on the face than among the Mongols and Tungus. The eyes are small and sparkle with a dull light, the lips have been called 'voluptuous', the nose is rather flat, the cheek-bones prominent, and the eyebrows are bushy. They do not shave the head, but wear the hair tied up in a thick tail or in tresses.

They are an energetic people and temperate in the use of spirits. They prize their tribal and individual liberty. Their principal faults seem to be avarice and covetousness, and the islanders have had a reputation for theft. Their

aloofness from civilization has made them less ready than other tribes to adopt habits of cleanliness.

Occupations.—The men's occupations are mainly hunting, fishing (for sturgeon, salmon, &c.), and trading. They are adventurous in hunting the bear, but their courage is not equal to entering the water, and, though fishermen, the Gilyaks cannot as a rule swim. They are expert in the use of bow and arrows, and are good mountaineers. In rowing the Gilyaks scull, but pull the oars alternately. In fishing they use in some parts gill-nets and seines, and in others scoop-nets; for their nets they use the stalks of the nettle in place of flax.

The man's work takes him much from home; a great deal of work at home is done by women, who occupy a low menial position. Slaves are bought from the Ainus and Goldi. They do not, however, hold or sell their own people as slaves: There are not many slaves, as a female slave costs more than a wife. The slaves have no rights at all; they have to perform the heaviest housework, hewing wood and drawing water.

Dwellings.—Their *yurta* is a wooden house, of which the interior is often divided into an ante-room and an inner room which is inhabited. In the centre of the room burns the fire with a hole in the roof above it for the smoke to escape. The windows are of fish-skin. The walls and the floors are made of trunks of trees, the interstices being filled up with birch bark or leaves, and the roof being covered with birch bark. They used to domesticate ermine to kill the rats and mice, and the Manchus supplied them with cats at a high price, but always castrated so as to keep the monopoly in their hands. Their winter dwellings are in small groups of from two or three to a dozen. In 39 villages Collins counted 140 houses.

Clothing, food.—In winter they dress in dog-skins or the skins of the fox or wolf. In summer they wear fish-skin, which has given them the name of *Yupitatse* ('fish-skin people') among the Chinese. They often wear blouses of Chinese pattern. Their boots are of seal-skin or sometimes

cotton. Men and women dress much alike, but the woman's garb is distinguished by metal disks round the bottom of their blouses. The skins of salmon are stripped off very dexterously; they are then beaten with a mallet, so as to remove the scales and render them supple. This gives them waterproof clothing. They live almost entirely on fish. But occasionally they eat animals killed in the chase and even dogs, as do the Ainu and American Indians. The fish is prepared with herbs, roots, and train oil; sometimes they procure a little millet or rice from the Manchu and Japanese in exchange for furs. They do not cultivate the ground themselves. The use of bread, tea, salt, and sugar they have learnt from the Russians. Bread is regarded as a very great delicacy.

Marriage and death.—Chastity is not demanded in a bride. Marriage is exogamic. There seems to be no settled form of marriage, and there is a certain amount of polygamy. The price of a bride is the chief bar to polygamy, but it is on the other hand a great incentive to industry.

Death is supposed to result from the action of evil spirits. Burial rites are of an imposing character. The body is first burnt on a funeral pyre, and a small wooden house is erected over the ashes after they have been carefully collected. The deceased's favourite dog, which has been previously fattened, is killed over the grave.

Other customs: the tiger and the bear.—If a man has been killed by a tiger, superstition forbids any ceremonies at the burial of his body. The tiger is much feared, and his appearance is supposed to portend evil. Their most characteristic ceremonies are connected with the bear, who is called *Mafa* (Chief Elder). There is a bear cage near every village, and in January of each year there is a solemn bear-sacrifice, and at other times a procession in which the bear takes a less exacting part. A bear must not be killed by surprise, for they fear his posthumous anger; they always catch or kill him in fair fight. It is regarded as a happy death to be killed by a bear.

Religion and superstition.—The highest benevolent god of the Gilyaks is Ytsigy according to Schrenk, but according to Sternberg they call him Kurn, by which name also they call the Universe. The 'owner' of the mountain is called Pal; the 'owner' of the sea is Tol. Every natural object has a life of its own and an 'owner'. In their belief also Sakhalin conceals an immense deity. There are besides a great number of spirits, good and bad. Such is their belief in the gods' ordering of the world that they will not save a man from drowning for fear of thwarting the will of a heavenly power. Ancestor-worship permeates their religion, and supports their clan-system. They have many taboos, and among the most rigid of their restrictions is the custom by which no one but a clansman may remove fire from a *yurta*. This is so strict that a stranger must always be careful to finish a pipe before he leaves a house. The Gilyak seem to have been indebted to the Goldi for much in their ritual, customs, ideas, and art.

Among the Gilyaks of Sakhalin are a number of isolated settlements of Oroke (a Tungus tribe). The southern half of the island is inhabited by the Ainus (a Palaeo-Siberian tribe), but their habitat is entirely included in the part that belongs to Japan.

OSTYAKS OF YENISEI

Territory.—This tribe lives along the course of the middle Yenisei and its tributaries between Miroyedikha, near the mouth of the Lower Tunguska, and Yeniseisk. They are most numerous about Sumarokovo. They were probably once more widely extended.

Name of the tribe.—Though called Ostyak, they have nothing to do ethnologically with the Ostyaks of the Ob basin. They do not even, it appears, belong to the Ural-Altaic stock. They call themselves Tindigvet. Kanacket and Din (people).

Racial affinities and language.—Their origin presents a difficult problem, which seems to defy solution. They are

thought to be a remnant of the primitive people who were the original inhabitants of Siberia, the centre of whose civilization was further south. Their language is unlike any other known tongue. Most of the river-names in the neighbourhood of the River Tom belong to it.

Numbers.—They are now not as many as 1,000 in number, and they are diminishing. Their principal foes have been syphilis and alcohol, both of which have had deplorable effects in reducing their numbers.

Relations with Russians.—They have become deeply in debt to Russian traders, sometimes owing as much as 500 roubles. They do not intermarry or have sexual intercourse with Russians.

Physical appearance and characteristics.—Their faces are of two types: one is short and broad with heavy cheek-bones, typically brachycephalic, the other approximates more to the Aryan type, and is longer. Their hair, though dark, is finer and lighter than that of any other inhabitants of the Yenisei valley. They have not the chief Mongolian characteristics: e.g. their eyes are not oblique.

Occupations.—Their principal occupations are hunting, fishing, and reindeer-breeding, but they have only taken to the last in recent times. They hunt elk and squirrels. For fishing they use canoes, not made of birch bark, but hollowed out of the trunks of trees. A bad season in fishing or squirrel-hunting impoverishes them badly, and epidemics of anthrax among their herds have brought about the decay of the tribe. But despite their poverty they seem a contented people. During the fishing season they live in birch-bark tents along the river banks.

Costume.—The special feature to notice is the men's habit of wearing a handkerchief round the head, as is so often done by women in other lands.

Religion.—Nominally members of the Russian Orthodox Church, they have remained comparatively faithful to their old traditions.

ALEUTS

The Aleuts are found in the Aleutian Islands, which now belong to America, but a few of them are found in the Commander Islands, off the coast of Kamchatka. They are of low stature, but well shaped; they have dark faces, black eyes, long black hair and short necks. They are nominally Christians, but seem to have assimilated more of the bad habits of professing Christians, than of their doctrines.

II. THE NEO-SIBERIAN TRIBES

(i) FINNO-UGRIAN TRIBES

LAPPS

Territory.—The Lapps in Russia occupy the whole of the interior of the Kola Peninsula, and some live on the coast in the Ponoï district. They extend west into Norway, Finland, and Sweden.

Name.—Their own name for themselves is Same, and for their country Sameland.

Racial affinities and language.—The Lapps are a branch of the Finno-Ugrian tribe. Their language in some respects resembles the Mordvinian speech, but the general system of conjugation and declension is like Finnish, from which tongue, however, it differs phonetically by its great number of diphthongs and consonants.

Numbers.—In 1897 there were 2,040 Lapps in Russia, of whom 1,590 were in the Kola Lapp district and 450 in the Ponoï district.

Divisions.—Among the divisions in which the Lapps are grouped are the Lyavozersk Lapps and Ponoï Lapps. The former, numbering 349, are in four villages, and have been little influenced by Russian manners; the latter, numbering 450, are in six villages, and have been much influenced by Russian customs. The two groups speak a different dialect from one another and are mutually very suspicious. They are not divided, as in Finland, into Fisher and Reindeer

Lapps, but each family as a rule practises both occupations, tending reindeer in winter and fishing in summer.

Relations with Russians.—Different parts of the country have been differently affected; the most Russified have been the dwellers in the Ponoï district, and along the coast generally there has been much interbreeding with Russians and Norwegians. The race is losing its national characteristics and is degenerating. In 1897 the population of the whole of Kola Peninsula included 6,020 Russians, 850 Finns, 230 Norwegians, as opposed to 2,040 Lapps.

Physical appearance and characteristics.—The Lapps are the shortest and most brachycephalic race in Europe. They are a dwarfish and thick-set people. In complexion they are generally fair, with long shaggy hair, which is usually dark-brown, with a good deal of yellowish hair on the face, the beard being often cut to a point. The eyes are narrow, but set horizontally, the nose is broad, the mouth big, the chin pointed, the cheek-bones high and prominent, but not so prominent as those of the Samoyedes, who altogether have a more Mongolian look. They are cleaner and have more pleasant manners than the Samoyedes; they are not intellectual, and, unlike the Finnish Lapps, from whom they also differ in dialect and creed, they are unable to read and write.

Occupations.—In spring and summer the Lapp families engage in fishing, especially for salmon, in regions which the custom of each village defines fairly closely. The summer villages are found from 10 miles north of Voroninsk eastward to Paitspahk and the sources of the River Ponoï, and south to the Umpjavr Lake. Many of them migrate to the sea-coast with their reindeer. Lake Imandra, on the old post-road from Kola to Kandalaksha, both in summer and winter, has Lapp villages around it. Reindeer-breeding is their great occupation, but they are very unscientific and unbusinesslike in their attention to it. In summer, when they do not want the deer for travelling purposes, they let them roam in freedom, on the bare heights of the interior, when they become half-wild, breed at will, and sometimes stray away altogether.

In winter they are left near the winter village, feeding on the reindeer 'moss' which they reach through the snow by pawing with their hoofs. There they stay till some time in May, when the new-born calves can be marked. The consumption of the lichen necessitates the removal of the Lapps' villages every 15 or 20 years, but a minor migration takes place each year in April or May, when they pack up the windows and more valuable things, abandon the villages, and go off to their summer quarters. Each family generally possesses from fifty to two hundred reindeer, but real independence is only attained by those who have as many as three hundred. Really rich men have a thousand or more, but such wealth does not make them change their simple life. The boat-sledge in which the reindeer is driven is called *kereoshka*; the Lapps drive without the *harray* or long pole which is customary among other reindeer peoples. Generally speaking their sledges and methods of driving are inferior to those of the Samoyedes. In winter the Lapps do some business in the transport of goods. They trade with Russians and Zirians, who exchange knives, powder, and other objects of barter for their reindeer-skins. They leave all enterprise on the sea itself to the Russians and Karelians.

Dwellings.—The settlements of the Lapps are called *pagosts*. They have summer and winter villages, the former near the sea-coasts and lakes, the latter near the forests, where they herd their deer. The summer-dwelling, called a *viezha*, resembles a Samoyede *chum*, but is not covered with skins, but with branches, tree-bark, and turf. The winter-dwelling, called a *tupa*, is a small, smoky, sod-covered timber hut, some 150 to 200 square ft. in area. These huts are always in groups or villages. A good example of a Lapp settlement is the village of Lyavozerski, on the west of the Lujavr lake and on the south bank of the Varmyok stream. In 1887 it contained 61 males and 63 females, in 19 wooden huts and 7 turf huts. The church was nearly two miles to the west, where the village had originally been, until want of wood and lichen caused its transference.

Clothing and food.—In summer the Lapps dress like Russian peasants, common features being a grey cloth jacket and high woollen cap with a tassel at the top. There is nothing distinctive about the women's dress, which is usually a calico *sarafan*. The Lapp has no strong prejudices in favour of a national costume, and is ready to wear whatever he can get hold of. In winter they wear garments of reindeer skin. The *pesk* is a fur garment with the hair outside, somewhat like the Samoyede *suvik*, but without the mittens being attached to the garment. Instead of a hood they have detachable caps. They wear short fur boots, known as *kadzhi*, and also longer boots made of reindeer-skin, called *yerra*, with the hair removed above the knee.

Throughout the winter they have for food reindeer-flesh and dried and salted fish. At various times they get snow-chickens, water-fowl and their eggs, and berries.

Religion.—They have assimilated Russian religion, just as they have assimilated Russian customs, but it may be questioned whether the adoption is not even more external. They have a name for being very superstitious, and an association of wizardry and vaticination goes with the name of the Lapp.

KARELIANS

Territory.—The bulk of the people of this name live in the Governments of Olonets and Arkhangel, and there are considerable numbers at Tver and Novgorod. The country which bears their name is part of the district of Kem in the Government of Arkhangel, lying to the north of Pomorland or Pomoria.

Racial affinities and language.—They are closely allied to the Finns, but are a distinct tribe, and show certain differences as the result of having come much more under Russian than Swedish influence. They are first mentioned in the ninth century. The tribe to which they belong overran most of the south-west coast of the White Sea till the fourteenth century, when they spread eastward and occupied the banks

of the Dvina. They speak a tongue like, but distinct from, the Finnish of Finland: the spoken tongue is corrupt and has become mixed with a number of Russian words, but among the Karelians farther to the south-west was collected the *Kalevala*, the great Finnish epic.

Relations with Russians.—They have come much under Russian influence, and, unlike the Finns, have never been subject to any other European nation. But owing to their remoteness they have preserved their customs more than their western neighbours. Those of them who live near Russian settlements can usually speak Russian, though they speak their own language among themselves.

Physical appearance and characteristics.—The Karelians resemble Russians: their eyes are usually blue, their hair is brown or ruddy; their forehead is low with hair clipped down over it, level with their eyebrows and hanging down evenly behind. They are slighter in build and better proportioned than the Finns. They show themselves more enterprising, vivacious, and sociable, but they exhibit less perseverance.

Occupations.—Their occupations are very various. Agriculture means a great struggle against the forces of nature. The best and most lucrative employment is the felling, transport and floating of timbers for the saw-mills. River- and lake-fishing provide only a small income, and have nothing but local importance; but they also do sea-fishing in the Gulf of Kandalaksha for salmon, herring, and marine animals. Hunting of game in the forests was profitable, but it has died out since the law in 1892 against trapping. The people require good guns to secure success again. The carrying trade with Finland was more prosperous before the Finns opened a shop in almost every village, a step which greatly reduced their trade with the Karelians.

Houses and furniture.—The Karelian houses are built on a sort of permanent scaffolding: they are reached by ladders. The door is generally on the left, and a corridor divides the rest of the habitation from the store-shed. On the ground

are sheep-pens and cattle-sheds. The kitchen utensils are poor, consisting as a rule of nothing but a kettle, a water-tub and a few spoons. Only those who are well-to-do have anything like a *samovar*, but earthenware is imported from Arkhangel.

Clothing and food.—The men wear an outer dress of grey cloth, somewhat like the smock frock of the Little Russians, underclothing of coarse linen, and boots of yellowish leather with leggings attached. Their head-dress is anything that they can find in the way of hats or caps. The women's smock-frock is much like that of the men, and they wear a *sarafan* of striped or printed calico. For footgear they have shoes and for headgear kerchiefs or headbands. In winter long sheep-skin coats are worn. Those who traffic across the border of their district are apt to imitate town fashions.

Their principal food is *ukha* or *tchi* (a soup of fish and vegetables). Most mix their flour with bark and straw. On holidays they eat fish-cakes (*ribniki*): on fast-days their fare is salted mushrooms and edible fungi stewed with turnips and potatoes. When the harvest is good, they brew a sort of country beer, called *braga*, but vodka is not drunk among them. Tea is a luxury of the rich, but is much appreciated when obtained.

Religion.—They belong to the Orthodox Church.

ZIRIANS

Territory.—This important tribe is found in the Governments of Perm, Vologda, and Arkhangel: it inhabits part of the Pechora district of the Arkhangel province, and the whole of the Ust-Sisolsk district and two-thirds of the Yarensk district of the province of Vologda. Its centre is Ust-Izhma. Formerly the Zirians extended further west.

Name.—There are many forms in which their name is spelt: they are known variously as Syryenians, Zyrenians, Sirianians, Zirianians, Zyrians and Zirians. Their own name for themselves, however, is Kami.

Racial affinities and language.—Like the Permyaks and

Votyaks, they are part of the Permian branch of the Finns. Their language was early reduced to writing, but they have no literature nor written memorials. It is sufficiently like the language of the Permyaks for the two peoples to be mutually intelligible. It is freely supplemented by Russian words and has a Samoyedic element in the vocabulary associated with reindeer, for they have derived from the Samoyedes the art of breeding and herding deer. A grammar of their tongue has been published by the celebrated Finn, Castrén.

Numbers.—It is estimated that there are 85,000 altogether in European Russia, and another 1,000 in Asia along the lower Ob. In 1899 they formed 60 per cent. of the population of the Pechora district, distributed as follows: 1,780 in Ust-Kozhivinskoe, 1,730 in Kevda, 5,590 in Krasnoborsk and 12,000 in Mokhcha, the total number being 21,120.

Relations with Russians.—In the ninth century the Finns and Russians were living in amity together in north Russia, the Finns paying tribute. The Zirians have been in constant relations with the Russians, have learnt much from them, and are likely to be absorbed by them. It seems probable that they will lose their language: they sing Russian songs without any idea of their meaning, and have adopted much that is Russian in customs and costume. The most important change is that they are ceasing to be nomadic. They have assimilated the village institutions of the Russians.

Physical appearance and characteristics.—The Zirians are a people of medium stature and robust frames: they are blond and grey eyed: they do not differ greatly in appearance from an ordinary peasant of Arkhangel. The best Zirians are those that dwell about Ust-Izhma, and those who live at Mokhcha. These are vigorous and vivacious, and devote themselves with success to commerce. The other Zirians are apt to be inert and unenterprising. Outwardly the Zirians are very devout, and most of their villages have a well-built church. They are noted for their hospitality even when they are very poor. Their morals are inclined to be easy.

Occupations.—Their chief source of prosperity is reindeer-