the north-east extremity of Siberia, and Bering Sea between the land of the Chukchis and Alaska, with the Gulf of Anadyr, are often visited by seal-hunters, and the Commander Islands off Kamchatka are valuable stations for this pursuit. The Sea of Okhotsk, separated from the Pacific by the Kurile Archipelago and from the Sea of Japan by the islands of Sakhalin and Yezo, is notorious as one of the worst seas of the world, owing to its dense fogs and its masses of floating ice. The Shantar Islands in the bay of the Uda possess geological interest. The double bay of Gizhiga and Penzhina, as well as that of Taui, would be useful as harbours were they not frozen seven *or* eight months in the year and persistently shrouded in dense fogs in summer. The northern part of the Sea of Japan, which washes the Usuri region, has, besides the smaller bays of Olga and Vladimir, the beautiful Gulf of Peter the Great, on which stands Vladivostok, the Russian naval station on the Pacific. Okhotsk and Ayan on the Sea of Okhotsk, Petropav­lovsk on the east shore of Kamchatka, Nikolayevsk, and Vladivo­stok on the Sea of Japan, and Dui on Sakhalin are the only ports of Siberia.

*Climate.—*The climate is extremely severe, even in the southern parts. This arises chiefly from the orographical structure; the vast plateau of Central Asia prevents the moderating influence of the sea from being felt. The extensive lowlands which stretch over more than one half of the area, as well as the elevated plains, lie open to the Arctic Ocean. Although attaining, altitudes of 6000 to 10,000 ft., the mountain peaks of East Siberia do not reach the snow-line, which is found only on the Munku-Sardyk in East Sayan, above 10,000 ft. Patches of perpetual snow occur in East Siberia only on the mountains of the far north. On the Altai Mountains the snow-line runs at about 7000 ft. The, air, after being chilled on the plateaus during the winter, drifts, owing to its greater density, down upon the lowlands ; hence in the region of the lower Lena there obtains an exceedingly low temperature throughout the winter, and Verkhoyansk, in 67°N., is the pole of cold of the eastern hemi­sphere. The average temperature of winter (December to February) at Yakutsk is -40∙2° F., at Verkhoyansk -53∙1°. At the polar meteorological station of Sagastyr, in the delta of the Lena (73o 23' N.), the following average temperatures have been observed: January -34∙3° F. (February -43∙6°), July 40∙8o, year 2∙1°. The lowest average temperature of a day is -61∙6° F. Nevertheless owing to the dryness of the climate, the unclouded sun fully warms the earth during the long summer days in those high latitudes, and gives a short period of warm and even hot weather in the immediate neighbourhood of the pole of cold. Frosts of -13° to -18° F. are not uncommon at Krasnoyarsk, Irkutsk and Nerchinsk; even in the warmer southern regions of West Siberia and of the Amur the average winter temperature is 2∙4° F. and -10∙2° respectively; while at Yakutsk and Verkhoyansk the thermometer occasionally falls as low as -75° and -85° F. The minimum temperatures recorded at these two stations are -84° F. and -90° respectively; the minimum at Krasnoyarsk is -67o F., at Irkutsk -51°, at Omsk -56°, and at Tobolsk -58° F. The soil freezes many feet deep over immense areas even in southern Siberia. More dreaded than the frosts are the terrible *burans* or snowstorms, which occur in early spring and destroy thousands of horses and cattle that have been grazing on the steppes throughout the winter. Although very heavy falls of snow take place in the alpine tracts—especially about Lake Baikal—on the other side, in the steppe regions of the Altai and Transbaikalia and in the neighbourhood of Krasnoyarsk, the amount of snow is so small that travellers use wheeled vehicles, and cattle are able to find food in the steppe. Spring sets in with remarkable rapidity and charm at the end of April; but in the second half of May come the "icy saints’ days,” so blighting that it is impossible to cultivate the apple or pear. After this short period of frost and snow summer comes in its full beauty; the days are very hot, and, although they are always followed by cold nights, vegetation advances at an astonishing rate. Corn sown about Yakutsk in the end of May is ripe in the end of August. Still, at many places night frosts set in as early as the second half of July. They become quite common in August and September. Nevertheless September is much warmer than May, and October than April, even in the most continental parts of Siberia. The isotherms are exceedingly interesting. That of 32° F. crosses the middle parts of West Siberia and the southern parts of East Siberia. The summer isotherm of 68° F., which in Europe passes through Cracow and Kaluga, traverses Omsk, Krasnoyarsk and Irkutsk, whence it turns north to Yakutsk, and then south again to Vladivo­stok. Even the mouths of the Ob, Yenisei, Lena and Kolyma in 70° N. have in July an average temperature of 40° to 50°. Quite contrary is the course of the January isotherms. That of 14° F., which passes in Europe through Uleaborg in Finland only touches the southern part of West Siberia in the Altai Mountains. That of -4° F., which crosses Novaya Zemlya in Europe, passes through Tobolsk, Tomsk, Krasnoyarsk and Irkutsk, and touches 45° N. at Urga in Mongolia, turning north in the Amur region and reaching the Pacific at Nikolayevsk. The isotherm of -22° F., which touches the north point of Novaya Zemlya, passes in Siberia through Turuk- hansk (at the confluence of the Lena and the Lower Tunguzka) and descends as low as 55° N. in Transbaikalia, whence it turns north to the Arctic Ocean.

Most rain falls in summer, especially in July and August. During the summer an average of 8 in. falls on a zone that stretches from Moscow and St Petersburg through Perm to Tobolsk and, after a dry belt as far as Tomsk, continues in a narrower strip as far as the S. end of Lake Baikal, then it broadens out so as to include the whole of the Amur basin, the total summer precipitation there being about 12 in. North of this zone the rainfall decreases towards the Arctic.

*Flora.—*The flora of Siberia presents very great local varieties, not only on account of the diversity of physical characteristics, but also in consequence of the intrusion of new species from the neighbouring regions, as widely different as the arctic littoral, the arid steppes of Central Asia, and the wet monsoon regions of the Pacific littoral. Siberia is situated for the most part in what Grisebach describes as the "forest region of the Eastern continent.”@@1 The northern limit of this region, must, however, be drawn nearer to the Arctic Ocean. A strip 60 to 200 m. wide is totally devoid of tree vegetation. The last trees which struggle for existence on the verge of the tundras are crippled dwarfs and almost without branches, and trees a hundred years old are only a few feet high and a few inches through and thickly encrusted with lichens.@@2 The following species, none of which are found in European Russia, are characteristic of the tundras —arbutus *(Arctostaphilus alpina),* heaths or andomedas *(Cassiope tetragona* and *C. hypnoides), Phyllodoce taxifolia, Loiseleuria procumbens,* a species of *Latifolium,* a Polar azalea *(Osmothamnus fragrans)* and a Polar willow *(Salix arctica).* In Yakutsk the tundra vegetation consists principally of mosses of the genera *Polytrichum, Bryum* and *Hypnum.* Some two hundred species of flowering plants struggle for a precarious existence in the tundra region, the frozen ground and the want of humus militating against them more than the want of warmth@@3 From this northern limit to the Aral-Caspian and Mongolian steppes stretches all over Siberia the forest region; the forests are, however, very unequally distributed, covering from 50 to 99% of the area in different districts. In the hill tracts and the marshy depression of the Ob they are unbroken, except by the bald summits of the loftier mountains *(goltsy)* ; they have the aspect of agreeable bosquets in the Baraba steppe, and they are thinly scattered through south-eastern Transbaikalia, where the dryness of the Gobi steppe makes its influence appreciably felt. Immense marshy plains covered with the dwarf birch take their place in the north as the tundras are approached. Over this immense area the trees are for the most part the same as we are familiar with in Europe. The larch becomes predominant chiefly in two new species *(Larix sibirica* and *L. dahurica).* The fir appears in the Siberian varieties *Picea obovata* and *P. ayanensis.* The silver fir (*Abies* *sibirica, Pinus pectinata)* and the stone-pine *(P. Cembra)* are quite common; they reach the higher summits, where the last-named is represented by a recumbent species *(Cembra pumila).* The birch in the loftier alpine tracts and plateaus becomes a shrub *(Betula nana,*

*B. fruticosa),* and in Transbaikalia assumes a new and very elegant aspect with a dark bark (B. *daurica).* In the deeper valleys and on the lowlands of West Siberia the larches, pines and silver firs, inter­mingled with birches and aspens, attain a great size, and the streams are fringed with thickets of poplar and willow. The alpine rose *(Rhododendron dauricum)* clusters in masses on the higher mountains ; juniper, spiraea, sorbus, the pseudo-acacia *(Caragana sibirica* and

*C. arborescens, C. jubata* in some of the higher tracts), various Rosaceae—*Potentilla fruticosa* and *Cotoneaster uniflora—*the wild

cherry *(Prunus Padus),* and many other shrubs occupy the spaces between the trees. Berry-yielding plants are found everywhere, even on the *goltsy,* at the upper limit of tree vegetation ; on the lower grounds they are an article of diet. The red whortleberry or cow­berry. *(Vaccinium Vitis idæa),* the bog whortleberry (V. *uliginosum,* the bilberry *(V. myrtillus)* and the arctic bramble *(Rubus arcticus)* extend very far northward; raspberries and red and black currants form a luxuriant undergrowth in the forests, together with *Ribes dikusha* in East Siberia. The oak, elm, hazel, ash, apple, lime and maple disappear to the east of the Urals, but reappear in new varieties on the eastern slope of the border-ridge of the great plateau.@@4 There we encounter the oak *(Q. mongolica),* maple *(Acerginala,* Max.), ash *(Fraxinus manchurica),* elm *(Ulmus montana),* hazel *(Corylus hetero- phylla)* and several other European acquaintances. Farther east, in the Amur region, a great number of new species of European

@@@1 According to A. Engler’s *Versuch einer Entwickelungsgeschichte der Pflanzenwelt* (Leipzig, 1879-1882), we should have in Siberia *(a)* the arctic region; (*b*) the sub-arctic or coniferous region—north Siberian province; *(c)* the Central-Asian domain—Altai and Daurian mountainous regions; and *(d)* the east Chinese, intruding into the basin of the Amur.

@@@2 See Middendorff’s observations on vegetable and animal life in the tundras, attractively told in vol. iv. of his *Sibirische Reise.*

@@@3 Kjellmann, *Vega Expeditionens Vetenskapliga Iakttagelser* (Stock­holm, 1872-1887) reckons their number at 182; 124 species were found by Middendorff on the Taymyr peninsula, 219 along the borders of the forest region of Olenek, and 344 species within the forest region of the same; 470 species were collected by Maack in the Vilui region.

@@@4 Nowhere, perhaps, is the change better seen than on crossing the Great Khingan.