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Charles H. Hawes M.A.

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£6000, and in order that the scientific results may be worked up, the total sum now required is £10,000.—T. B. WHITSON, C.A."

The Council of the Royal Scottish Geographical Society is fully convinced of the importance of another year's work in the Weddell Sea. Taking into consideration that the Expedition is now fully equipped, it is most desirable that the necessary funds to cover working expenses should be supplied to enable it to fully realise its object. The Council asks the assistance of members of the Society in this important work. Subscriptions will be received by Colonel Bailey, Secretary of the Society, at the Society's Rooms, Queen Street, Edinburgh.

RALPH RICHARDSON, J. G. BARTHOLOMEW, *Hon. Secs.*

A VISIT TO THE ISLAND OF SAKHALIN.[1]

By CHARLES H. HAWES, M.A.

THE Siberian island of Sakhalin, or Saghalien, as it is sometimes spelled, lies at the mouth of the river Amur, and is separated by the narrow Straits of La Pérouse from Yezo, the northernmost of the larger islands of Japan. I approached it from that country, and, landing at Vladivostok, reached Khabarovsk on the Amur by means of the Ussuri railway. Thence I descended this great river for 623 miles, as far as Nikolaevsk, 27 miles from its mouth. Here, with another passenger, a Russian engineer, and 300 convicts, I was stranded, but ultimately, by the timely aid of a German tramp steamer, I got away, and was landed at Alexandrovsk, on the west coast of Sakhalin.

The sandbanks at the mouth of the Amur, and to the north and south of the Straits of Tartary, offer great difficulties in the way of navigation. Our vessel had to proceed throughout at half-speed and with anchor ready to let go. At one spot in the tortuous and narrow channel, only 13 feet of water is available at neap tide. On reference to the map it will be noticed that the Straits of Tartary narrow at one place between Capes Lazarev and Pogobi to a breadth of about five miles. It seems probable that a neck of land once united the two, and so made Sakhalin a peninsula. The Gilyak natives tell an interesting legend, one of those curiously prevalent deluge stories, which describes the submergence of this neck of land. A similar cataclysm, which occurred further north and is historical, was described in 1813 by Peter Dobell—this was the insulation of the town of Okhotsk. The strange mixture of sub-arctic and sub-tropical plants and animals in Sakhalin seems to lend support to the theory, for in the antediluvian period the Kuro Siwo, or warm current of the east, would have probably washed the coast of the Primorsk and of W. Sakhalin unhindered by the cold current from the north which now forces it back. The form of the alluvial deposits immediately to the north of the funnel of the Straits also seems to favour this hypothesis.

The island is 588 miles long, and varies in breadth from 17 to

[1] An address delivered before the Society on February 25, 1903.

100 miles. It is mountainous, with one long ridge or backbone averaging about 2500 feet in height, and rising to its greatest altitude in Mount Itchara (4860 feet). There are a great number of torrential streams, but only two rivers of any note. These are the Tim (Gilyak, Tim = cranberry), and the Poronai (Ainu, Poro = big, and nai = river), each with a course of about 300 miles, the former flowing north and finding an outlet on the NE. coast, the latter with the same watershed running south into the Bay of Patience.

A Gilyak "dug-out" canoe.

The island is cliff-girt on its southern half, except at certain spots in the Bay of Patience, but on the NE. and NW. coasts low swamps, the "tundra" of the north, border the sea.

Geologists have been hoping to find traces on Sakhalin of a recent volcanic origin, but it would seem more probable that while the line of volcanic action runs down from Kamtchatka through the Kurile Islands and Japan, Sakhalin represents the remaining outcrop of the line of weakness. Although it is in the main composed of Tertiary rocks, I have observed hardened ferruginous marl containing huge Ammonites, which prove its secondary origin. Perhaps the commonest rock-

exposure observed consisted of conglomerate, resting on hard argillaceous sandstone.

Four days were consumed at Alexandrovsk in preparation for an expedition to the north-eastern coast of the island. I had the good fortune to find a convict, a man of rank and education, who was allowed to accompany me as interpreter. Arms, furs, canvas, articles of food and barter were laid in, and a start was made for the interior. The roads and forest-tracks were unsafe owing to "brodyagas" (escaped convicts), and it was necessary to have our guns always ready, as many of the outlaws were armed with rifles. On the second day after the start, the forest-track gave out, and further progress was only possible by river. We then descended the river Tim, in a native canoe dug out of a poplar trunk, to its mouth, a distance of 193 miles, which took six days. The width of the river increased during our progress from about 100 to 500 feet, but except for a few miles above the mouth, the water is very shallow. In the upper reaches it required great skill on the part of our Gilyak natives to steer the light craft over the shallows, and through the rapids.

The banks of the river were for the most part forest-clad, as is indeed the greater part of the island. The commonest trees in the northern half of the island are the larch (*Larix daurica*) and the birch; in the southern half the spruce (*Picea ajanensis*) and the fir (*Abies sachalinensis*). On our way over the backbone of the island and through the forests towards the river Tim, I had observed the elm, rarely the wych elm (*Ulmus montana*), nut trees (*Panax ricinifolia*), maple, and mountain ash (*Pyrus aucuparia*). The hedges were gay with the fruit clusters of the red-berried elder (*Sambucus racemosa*), and on the skirts of the forest wild raspberries and Spiraea (*betulaefolia*?) were very common. The last-named dislikes the company of the needle-bearing trees, and flourishes in the company of the birch and larch.

On the banks of the river poplar and aspen, occasionally seen on our overland journey, were quite common, as were also willow (*Salix macrolepis*) and alder. The undergrowth also included more "berried" bushes. In addition to the beautiful wild rose (*Rosa rugosa*) were the cloudberry (*Rubus chamaemorus*), the cranberry (*Oxycoccus palustris*), the crowberry (*Empetrum nigrum*), and the red whortleberry or cowberry (*Vaccinium vitis idaea*).

The flora of Sakhalin represents a link between those of Japan and of Siberia. The trees and plants enumerated above are mostly found in the Siberian "taiga," but many of those occurring more commonly in the south of Sakhalin are included in the flora of Japan. Among these are the spindle tree (*Euonymus macropterus*), hydrangeas, the vine (*Vitis thunbergii*), the cork tree (*Phellodendron amurense*), and the bamboo (*Arundinaria kurilensis*). A noticeable feature in connection with the distribution of these is that the last-named is found over large areas on mountain slopes, alongside of the birch (*Betula ermani*), and only just below the gnarled wood region of the Swiss pine (*Pinus cembra pumila*).

In descending the Tim and proceeding along the north-eastern coast, I had in view a short study of the interesting native tribes, and

chiefly the Gilyaks, who inhabit this region. Strings of dried fish, or the yelpings of sledge dogs, announced to us the proximity of a native village, as our canoe shot round the bend of the river. At such tiny villages, for they generally consisted of about half a dozen huts, we stopped to barter and get information, and later, when we reached the coast and found rather larger collections of huts, we became the guests of the headman, sleeping on the fishskins or reindeer skins spread on

The Headman of Newa and his two Wives.

the place reserved for the honoured, amid the score of other inhabitants of the house.

Three different tribes were met with in our wanderings: the Gilyaks, who are the most numerous, the Orotchons and the Tungus. In the south are 13 Yakuts and about 1300 Ainus, these latter akin to the native population of Yezo. The Ainus were the earliest arrivals of the five tribes enumerated above, but discoveries have been made which suggest an even earlier race. In hollowed ground spaces—supposed pit dwellings—have been found diorite and obsidian implements and clay potsherds, and the Ainus, declaring their ignorance of these and any such craft, give the name of Tonchi or Toitchi, *i.e.* clay-bakers, to their

makers. The analogy with the Koro-pok-guru or dwarf pit-dwellers of Yezo is obvious.

The Ainus are a patriarchal-looking race with abundant hair, and their presence among Mongolian races with a notable absence of it has led to exaggerated statements. Like the tribes of the north of Sakhalin, they live by fishing and hunting, but they are considerably less wild than these, and possess a knowledge of weaving, unknown among the Gilyaks, etc.; they make use of the fibres of the nettle in the process.

The tribes of the north may be classed as of semi-Tungus, semi-Mongol stock. The Gilyaks still retain their pigtails, while the Tungus, who have cut off theirs under Russian influence, are the wildest of the tribes and the best hunters. The most civilised branch of the Tungus race to-day is the Manchu, which has for two and a half centuries given China its ruling caste.

These Sakhalin peoples are veritable children of the forest, which with the river and sea supplies them with their food, clothing, and gods. The Great Creator is above all, but "Kiskh," as he is called, is confused with his agents Pal ni vookh, the god of the mountains and forest, Tol ni vookh, the god of the sea and rivers, and Toor ni vookh, the god of fire.

Tol ni vookh sends them their chief means of subsistence and clothing, the salmon (*Salmo proteus* and *lagocephalus*) and the seal (*Phoca vitulina* and *nummularis*). Salmon dried in the sun (*yukola*) forms their winter provision, and the skin scraped, pounded, and dried does duty for summer dress, though this material is gradually giving way to Chinese cloth (*ta-pu*) which is slowly penetrating into the wilds. The seal is chiefly valued for its oil, a great delicacy which renders palatable the most revolting leathery scrags of six-months-old fish. The skin of this (the hair-seal) serves them, especially the women, for winter clothing.

The fur seal (*Callorhinus ursinus*) and the sea-otter (*Enchydris marina*) are both very rare now. The white whale (*Delphinapterus leucas*) is considered a great friend of the natives, for this wolf of the ocean drives in before him the salmon seals, all manner of small fish, and on rare occasions the huge carcass of a whale slain in an onslaught of these murderous dolphins. During the summer the fish arrive in "posts," as the natives say, the herring, the trout, the turbot, and smelt.

Having reached the mouth of the Tim, I found there a curious delta formation. For a hundred miles, and probably for another fifty or seventy miles along the as yet unexplored coast to the north, stretched a series of lagoons—bays, I ought rather to call them, for the long and narrow sand dune was pierced about every twenty miles by a narrow strait giving entrance and exit to the tide. A similar formation occurs on the NE. coast of Yezo, and would seem to have been caused by the check produced by the strong Okhotsk cold current flowing south, on the alluvium laden waters of the Tim, with a consequent deposition.

Entrance into the Bay of Ne, into which the Tim discharges its

waters, was possible for small brigs, but to the north the water became so shallow that it was with the greatest difficulty that our craft, drawing but 3 or 4 inches of water, could be dragged through. At latitude 53° N. we were compelled by storm and by the necessity of making sure of means of retreat to turn back. It was here along this NE. coast that we saw the Siberian "tundra." This was the haunt of the reindeer, and we saw them cropping the lichen that grew in snow-like patches over the swampy ground. With a subsoil eternally frozen, the surface of the tundra is a stretch of meres and swamp covered with coarse dank grass, gnarled and stunted bushes of larch and birch and low clusters of berry-laden bushes, in summer a region shrouded in sunlit mist, but in winter a frozen waste over which the Tungus, clad in skins, course with their reindeer sledges. Returning again to the mouth of the Tim, we found there our river crew with a message transmitted through natives by the Russian police, stating that five convicts had escaped from the *Rikovsk prison*, three of whom were armed with Winchester rifles, and were descending the river with intent to murder our hosts in the Bay. To this was added the warning to fire at any Russian we might see in the forest. Camping that night just above the mouth of the river, amid shelterless swamps, the sound of paddles was heard, and a canoe manned by five *Gilyaks shot into* our temporary haven. They also were bound up the river, and under the circumstances were desirous of our company. Their object was to buy a bear of their brethren of the village of Ada Tim, and they had with them their purchase-money, which consisted of a dog and a piece of brocaded satin, the last probably obtained for sable skins from some wandering Japanese brig.

On land the big brown bear (*Ursus arctos*) fills the greatest *rôle* of any animal among the Gilyaks. They capture it, if possible when young, feed, bathe, promenade it, and house it in a strong log cage. At the age of four the animal is the subject of a great festival, probably religious in origin. The bear is adjured to give a good account of the tribe to the great Pal ni vookh, is directed the way his spirit should take, and two dogs are then killed in order that their spirits shall hunt his to the great lord of the mountains and forest, and he is finally shot by an archer. A great feast followed by games then ensues.

Wolves are no longer met with in large packs, but foxes are plentiful and include both the red and the black varieties. It is however the sables and otters that are particularly the prey of the native snares and traps. The reindeer, musk deer, hares, squirrels, mice, and rats all occur on the island, but the tiger, notwithstanding all reports to the contrary, has never been observed in Sakhalin. It is however true that to-day he still crosses the Amur on the ice as far north as latitude 51°.

Late autumn still found us on the Tim with most of the birds migrated. Wild swans, geese, and wild ducks had nearly all departed, and our larder was being rapidly reduced to its prime factors. The monotony of a cup of boiled rice and a lump of sugar three times daily was only relieved by our natives shooting a seal.

Seabirds were in great numbers on the island, including the cormorant, osprey, guillemot, crested auk, gulls, etc. Along the river,

wild geese and wagtails were commonest, but I noted a considerable variety of other birds, such as robins, finches, larks, nutcrackers, jays, carrion crows, woodpeckers, kingfishers, sandpipers, snipe, and several white-tailed eagles. In addition to these I heard the snowy owls, and the following have been observed—fieldfare, water ouzel, swallow, raven, cuckoo, plover, wren, etc. etc. A careful classification gives twelve per cent. of the birds as sub-tropical and fifteen per cent. circumpolar, the rest being found in Siberia, Europe, and the North Pacific.

Winter had laid its mantle of snow on the tops of the mountains before our six hundred miles' canoe journey had ended, and in the course of a day (Sept. $\frac{16}{29}$), the thermometer fell from 64° to 24° F. The range of temperature in the island is very great, and for the year 1900 the records at Alexandrovsk showed a range of 119° F., from 81° in July to −38° in January. In the interior, at Rikovsk, this range was increased to 129½°, with a record fall of −49°. The range of the average monthly readings is rather less than that of Khabarovsk and Tchita on the mainland. Snow falls on about 96 days in the year, and remains for six to seven months, usually attaining a depth of from 1 to 3 feet, while depths of 7 feet are quite common. The total annual rainfall is less than that of England, a sixteen years' average giving 22⅓ inches. Fogs are much less frequent on land than at sea; the average number of days on which fog has been observed at Alexandrovsk being 27. Any modifications of continental climate which we should expect on the island are balanced by the local conditions. The prevailing winter winds are from the N. and NW., and those of the summer from the S. and SE., whence we may say that Sakhalin has its monsoons. Winter finds one vast stretch of ice from the Okhotsk Sea to Sakhalin, which a cold current from the northerly regions has helped to envelop in Arctic frost. In 1900 the days on which frost occurred were 208, and on 141 of these no thaw took place.

The vegetation period varies with latitude and locality, but averages rather less than one hundred days; it is thus not surprising that agriculture is at a low ebb. I have seen oat crops yielding two or three fold, and a report from the village of Slavo, where our canoe journey began, gave a yield of eleven grains of wheat for every ten sown. But the average for the whole of the cereal crops was for 1898 a 6·35 fold crop.

A late spring and early frosts are against the cultivator, but more serious are the laziness and indifference of a criminal population, which feels no love for their island-prison, and a want of care on the part of the officials in the selection of arable districts. Potatoes and a few other vegetables are grown in parts with success, the average crop of the first being 7·73.

The industries of Sakhalin are very few. Coal-mining proceeds slowly and by crude methods, though as a steam coal the product is superior to that of Japan. Fish is caught in very large quantities in the south of the island, and is prepared as guano and shipped to Japan for use in the paddy fields. Bêche-de-mer and seaweed are also gathered for the Chinese market. Some oil-wells and lakes have been discovered

on the north-eastern coast, but I do not expect, after visiting them, any great development. Sakhalin still yields large quantities of furs, *i.e.* the skins of otters, bears, foxes, sables, squirrels, reindeer, etc., which are taken by the natives on dog-sledges across the frozen straits to Nikolaevsk.

The island is so convenient a dumping-ground for convicts, and the difficulties of escape from it are so great, that it is hardly to be expected that the Russian Government, with large areas of ground as yet untouched, should go out of their way to develop Sakhalin. Other difficulties face individual enterprise, for the pioneer and his staff have to live in an atmosphere of criminals, and on an island where there is no security for life or property; so that it cannot be said that the future prospects of Sakhalin are bright.

THE TANGANYIKA PROBLEM.[1]

MR. MOORE'S new volume will be welcomed by all geographers, as it sums up much information which has hitherto been scattered in the Magazines and Journals of the Scientific Societies. All this material is now available in the form of a connected narrative, so that the solution which Mr. Moore offers of the "problem" is clearly set forth. Before proceeding to the consideration of this solution, it may be well for the benefit of those who have not followed the Tanganyika question closely to state the "problem" as it has disclosed itself through the efforts of successive explorers.

Tanganyika was discovered by Sir Richard Burton, and his companion Speke picked up some shells on its shore which ultimately found their way to the British Museum. These shells, which were supplemented by further collections made by missionaries, proved on examination to be curiously marine in character. So much was this the case that Mr. E. A. Smith in describing them suggested that their presence in Tanganyika might prove to be the result of a former connection between that lake and the sea. The interest of this suggestion was greatly accentuated when the German traveller, Dr. Böhn, announced the discovery of such characteristically marine animals as jelly-fish in the waters of Tanganyika. Böhn's discovery was confirmed by others, and, as a result of the interest aroused, the first Tanganyika Expedition with Mr. Moore at its head set out in the autumn of 1896. The Expedition obtained large collections of the aquatic animals of Tanganyika, and found that within the waters of this lake there occur a whole series of animals distinctly marine in type. These animals are accompanied by a series of ordinary fresh-water forms similar in character to those which occur in the other lakes. The first series, those of marine character, constitute what Mr. Moore calls the "halolimnic fauna," and after the

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[1] *The Tanganyika Problem.* An account of the researches undertaken concerning the existence of marine animals in Central Africa. By J. E. S. Moore, F.R.G.S., author of *To the Mountains of the Moon.* London: Hurst and Blackett, Limited. 1903.