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THREE YEARS' EXPLORATION IN CENTRAL ASIA, 1899-1902.*

By Dr. SVEN HEDIN.

It was on June 24, 1899, that I left Stockholm for the fourth time in quest of new experiences and new adventures in the heart of Central Asia. That journey, which occupied a period of three years and three days, is now happily concluded. And to-night I have the pleasure and privilege of laying before you an account of my various journeyings in the centre of the great continent which I have just mentioned.

My preparations for this my last journey resulted in a rather ponderous, but certainly more complete, outfit than I had carried with me in any of my previous expeditions.† Still I had no reason to complain on this score, since, through the courtesy of his Imperial Majesty the Czar of Russia, I was granted full exemption from customs duties, as well as free travelling and free transport through the length and breadth of his empire. The same monarch also gave me an escort of four Cossacks, fine, honest fellows, who, for their loyalty and courage, were, at the close of their term of service, rewarded with gold medals by both his Majesty the King of Sweden and his Imperial Majesty the Czar.

For the journey through the Trans-Caspian region I had the honour of a railway carriage all to myself, the last on the train, so that, from the platform in its rear, I was able to enjoy an uninterrupted bird's-eye

* Map, p. 348. This is simply a provisional sketch-map to show Dr. Hedin's routes. It is hoped that a finished map embodying Dr. Hedin's discoveries will be ready for publication before the end of the year.

† The means for undertaking this journey were chiefly given by H.M. the King of Sweden and Norway and some Swedish gentlemen, among others Emanuel Nobel.

Sketch map showing

Dr Sven Hedin's Routes

in

CENTRAL ASIA

Scale of Miles.

0 50 100 200 300

Nat. Scale 1 : 7,500,000 or 118·4 miles = 1 inch

Routes 1899 to 1902.

,, 1894 to 1897.

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view of the country we were travelling through. After that I journeyed by a well-known route from Osh to Kashgar. At Kashgar I raised and equipped a caravan of fifteen camels and ten horses, and with them marched to Lailik on the Yarkand-daria.

I had already crossed Eastern Turkestan in almost every direction, and the river was the only route with which I was not acquainted. Consequently, I decided to make its muddy waters carry me down to the region of Lob-Nor. As being the best suited for my purpose, I bought an ordinary ferry-boat, one of the kind which is ordinarily employed for ferrying goods across the river at those points where it is intersected by the caravan routes, and fitted it up as a comfortable floating house, which became my dwelling-place for many long months. This led to a regular workshop being established in the middle of the desert, carpenters and smiths being sent for from Yarkand to make such alterations in the craft as were necessary. I had a deck fitted over the fore part, and upon that set up my tent. Its interior was fitted up as a study, a writing-table, made out of a couple of boxes, being placed at the entrance. From that vantage-ground I commanded a complete view of the river during the whole of my journey of over 1300 miles. Not a single bend, or lagoon, or sandhill, or grove of trees escaped my observation; all were successively plotted on my maps as we glided on past them one after the other. Amidships I had a hut erected of planks and black rugs, to serve as a photographic dark-room. It was provided with tables and benches, while a barrel was placed on the roof to supply water to the samovar, in which I washed my photographic plates. My baggage was stacked in the stern of the boat, and there also my servants established their quarters. In the same part of the boat they built a small fireplace of bricks, on which they cooked their food throughout the journey; while in the cool autumn evenings they kept a fire burning constantly. A smaller ferry-boat was fitted up as our larder, or store-room. On it we kept our supplies of flour and rice, grapes, melons and pears, vegetables, live sheep and fowls; and these last had a very great deal of cackling to do before they got accustomed to their floating home. When everything was finished, however, the boat was exceedingly comfortable, being, as it were, a sort of country house set afloat on the bosom of the great river. I also had my dogs on board, and a small English collapsible boat, which I used for short reconnoitring trips up and down the stream.

The day before I started I invited the entire population of the district to a big entertainment, at which tea and hot rice-pudding were supplied *ad lib.* The very same musicians who celebrated my departure on my disastrous desert journey of 1895 came again, and twanged their strings in the same melancholy manner. And while their doleful strains fretted the stillness of the night, a couple of barefooted girls whirled round and round in a dizzy dance. But the latter, upon being

photographed the next day under the piercing rays of the sun, did not appear to anything like the same advantage as they did in the light of a Chinese paper-lantern!

On September 17, the caravan, led by the two Cossacks Sirkin and Chernoff, started to follow the land-route *viâ* Aksu and Korla to the rendezvous agreed upon on the Lower Tarim. With me in the boat I took my former faithful servant, Islam Bai, and five boatmen, whom I stationed with long poles one at each corner of the boat, as well as one on the provision boat, directing them to keep the flotilla from sticking fast in the bank should the current carry us too violently up against it.

When all was ready I gave the signal for the start. Our boats made their way up-stream, and the hospitable shores of Lailik were speedily lost to view behind the woods. Here began a most idyllic journey. It was indeed a pleasure to live on the river, and study its pulsating life, its ebb and its flow, its capricious windings, its ever-changing shores. To me, who had been accustomed to travel on horseback, or to survey the country from the back of a swaying camel, there was an incomparable enjoyment in feeling myself carried smoothly along by the current of a peacefully flowing river; and in sitting still all the time at my writing-table, while the landscape came, as it were, to meet me, and unfolded itself before my eyes like a perpetually changing panorama, so that all I had to do was to study and observe it from the vantage-ground of my seat in the stalls. And it was, too, a delightful feeling to be always at home, and carry my house about with me, as a snail does, through the interior of Asia. When the weather was warm, I had only to throw off my clothes and jump straight in from my writing-table. Then, later on, dinner would be served amongst my compasses, field-glasses, and levelling instruments. My meteorological observatory was on the roof of the hut, and in it were my barometer, which recorded daily how we slowly but gradually descended, and my thermometers, which gradually sank lower and lower as the autumn advanced.

We had only gone a very short distance when we managed to run aground. But the boatmen leapt into the water and pushed the boat off again. After that I sent the smaller provision boat on in front, to act as a pilot, and warn us of the presence of dangerous places.

I wonder how many scores of times we got stuck on sandbanks during that journey? As a rule, we camped among the woods on shore, where there was plenty of fuel. But while the crew slept on land, I slept on board. Every evening after we landed, I measured the volume of the river, with the help of my collapsible boat, a velocity instrument, a sounding-pole, and a rope stretched across the stream. During the first few days the volume worked out at the rate of 3355 cubic feet per second.

At Kotteklik we descended certain rapids, which our craft shot in

splendid style, without the slightest trouble. But below the rapids the force of the current was so strong that we were unable to keep clear of the banks, and my writing-table was in great danger of going overboard.

Further on the river divided, and we drifted in amongst arms so narrow that we were only just able to force the boat along them. In other parts the stream was encumbered with driftwood; and the trunks of the poplar trees, which lay submerged at the water's edge, were not noticed until the boat swung right round upon them. At one point, where large quantities of water are drained off to feed the irrigation canals of Maral-bashi, the current dwindled to 810 cubic feet in the second, and we were obliged to requisition the natives to help in hauling our boats over the shallows. After that the country became uninhabited; and the boats glided noiselessly through the dense forests, which were often so thick that scarce a ray of sunlight pierced through to the dark hiding-places and holes in which the wild boars, tigers, and other beasts of the jungle make their lairs.

At the beginning of our journey the gnats were very troublesome, but the frosty weather soon put them to flight. At the same time the poplars put on their robes of cloth of gold, as if preparing for an autumn carnival. Tall and straight they stood, solemnly mirroring their heads in the great river, the Alma-Mater, of East Turkestan, as though they were religiously paying their devotions to her, just as the Brahmins and grey-haired pilgrims who journey to Benares to die pay reverent homage to the Ganges.

In this way we glided on day after day, week after week, down the dark waters of the Tarim, through the enchanted forests, which shut it in, as it were, along a kind of Venetian thoroughfare lined by palaces magically changed into trees, and by quays of golden shimmering reeds. When the current flowed more slowly, the boatmen nodded in turns over their punting-poles. And when the wind blew through the forest, it scattered a shower of golden leaves over the face of the river, making a golden waterway for us all through the autumn, as we followed every curve and winding of the stream. It was as though we were threading enchanted sargasso seas!

As a rule, the Tarim is very sinuous. For instance, in one case, after making a detour of over three-quarters of a mile, we found we had only advanced 200 yards in a lineal direction, or, in other words, had gone round eight-ninths of a circle in order to get over a distance equal to the remaining ninth. In this way it occasionally happened that we came back to the very same poplars which we had left behind us a few hours previously.

Upon reaching Masar-tagh I stayed there two or three days, and carried out several excursions by boat and on foot, with the view of completing the maps I made on my previous journey. The temperature sank for the first time below zero, that is to say, to

30° Fahr., on the night of October 12. On the evening of October 17 we were cheered by the sight of a fire blazing amongst the trees on the bank. It was made by shepherds, who were in this way seeking to scare away the tigers. As soon as they caught sight of our boat, with its spectre-like tent and its coal-black hut, gliding noiselessly between the river-banks, they took incontinently to their heels, and fled, leaving both sheep and fire to their fate. Throughout the whole of the journey we had the greatest difficulty in getting into communication with the half-wild shepherds, who pasture their flocks in the primeval forests of the Tarim. No matter how we called to them, they steadfastly refused to come and talk with us; but, at the sight of our boat, they nearly always fled away like frightened antelopes, and it was only by the exercise of little stratagems that we were able to secure them at all, and detain them on board until their local topographical knowledge came to an end.

The first break or interlude in our monotonous journey occurred when we approached the inhabited region of Arvat. We were met by several begs, or chiefs, and a crowd of horsemen, amongst whom were eight falconers, each carrying his bird on his glove. These people accompanied us along the banks, and never have the waters of the Tarim witnessed a more festive procession.

As the autumn advanced, we saw, both day and night, huge flocks of wild geese flying overhead, making for India by way of Yarkand. They kept regularly at an altitude of 600 or 700 feet above our heads, and the air echoed again with their discordant quackings. Unerringly they find their way along their aerial highways—those wonderful feathered pilgrims, as surely as the rivulets from the melting glaciers find their way down to Lob-nor. And truly a majestic sight it is to stand and watch them streaming onwards in their serried phalanxes, like squadrons of the sky charging on and on, on silent and untiring wings.

At length we arrived at the mouth of the Ak-su-daria, and there our river met with a very noteworthy augmentation of its volume. The rate of flow of the current quickened up to nearly 2¼ miles an hour, and our boat swung right round as we glided out into the swirl of the confluence. But all went excellently well; the banks disappeared rapidly behind us, while every now and again the river was broken by rapids. For two days we travelled at the rate of 3¾ miles an hour, and consequently had to keep a sharp look-out as we raced past the woods and the *kamish* (reed) beds, at the risk of being submerged beneath the avalanche of a crumbling bank of sand. As the season grew older, it began to be sensibly cold on board. On the night of November 14 both boats froze fast in the ice, though, fortunately, it was thin, and by the end of the month the temperature had sunk 29° below freezing-point (Fahr. scale). On one occasion we had quite a dangerous adventure —our boat was carried close up underneath a high, steep bank, and a

little way ahead of us we saw a poplar tree leaning out low down over the current. The punting-poles failed to touch the bottom, and my tent and every other structure on board would infallibly have gone over the side had not one of my men, in the nick of time, jumped into the ice-cold water and swum to land with a rope.

And now we began to live in daily expectation of the river freezing, for sooner or later the ice would raise an insurmountable obstacle to our further progress. Hence there began a sort of race between ourselves and it. Could we manage to get as far as our rendezvous before it came and stopped us? For several days we journeyed all day long, and often far on into the night; and for a period of ten days towards the end of November we met with rare good fortune. Some years ago the river made for itself a new bed through a sea of sand, which flung up its dunes like pyramids on either bank. This new channel gave us a short cut. But not a vestige of vegetation, not an antelope, not a human being, not even so much as a raven or a vulture, gladdened our eyes on these dream-like, desolate banks. Here again the speed of the current was over 3½ miles an hour, so that we sped on at a breathless pace past the sandhills, which towered up fully 350 feet above the surface of the stream.

At last it froze so hard at night that we had to chop out our boats with axes every morning. A white chain of drift-ice was trailed down the river, and jangled like a string of bells against the sides of our boats at night. During the first days of December the river grew full of ice of this description, and most fantastic were the shapes it assumed on those evenings when we continued our journey far on into the darkness. At such times our boats were preceded by small native canoes, carrying flaring oil-lamps. These constantly moving ice-bound channels gave out an unceasing succession of groans and moans; and when we became embedded in them, and were carried along at the same rate as they moved, they appeared to be relatively stationary—that is to say, we appeared to stand still, though the slow movements of the compass-needle revealed to us the windings of the river, while the dim-lit banks glided past us like wandering spectres. At last, however, the ice won the upper hand. The strips of ice along the banks fastened themselves to the sides and began to grow inwards towards each other, so that the channel of open water in the middle of the river became narrower and narrower. On December 7 the ice welded the two sides of the river together. We were frozen fast, and had to go into winter quarters. The place where this happened was called Yanghi-koll, and here, by a stroke of good luck, we fell in that very same day with our caravan. Then arose, as if by magic, a small town on the desolate banks of the Tarim. Tents were pitched, *kamish* (reed) huts constructed, and stables built to shelter the animals of the caravan. In the market-place we kept burning at night a Chinese lantern swung on a pole, and this was

SAND DUNES NEAR THE RIGHT BANK OF THE LOWER TARIM.

SAND DUNES ON THE RIGHT BANK OF THE TARIM, NEAR YANGI-KOLL.

the only lamp-post in the whole place. At this time, also, we kindled a fire, which was not allowed to go out until the end of May in the following year. Traders came to visit us from Korla and from Kuchar, and desired to barter their wares with us; in this way a lively market flourished in the wilderness.

After making an excursion into the interior of the sandy desert, and entertaining the famous French traveller Bonin, on his way from Peking, in my open-air camp, I set out on December 20 from Yanghi-koll with a caravan of seven camels, one horse, four men, and two dogs, to cross the most appalling desert on the face of all the earth, the Takla-makan, my object being to strike the town of Tatrau, on the Cherchen-daria, on the other side of the desert. That meant a journey of close upon 180 miles, or twice the distance I traversed in 1895 in another part of the same desert, in the course of which the whole of my caravan perished except one man. But now it was the depth of winter, and I loaded four of the camels with blocks of ice, while two others carried fuel, and the seventh our provisions and furs. As we had no tents with us, I slept the whole of that winter in the open air, although the temperature fell 27½° below zero. As we had to husband the camels' strength, I took with us for the first two days a small reserve caravan of two men and three camels, the latter carrying ice and fuel; but on Christmas Eve I sent them back.

When we set out from our camp, the inhabitants of the district looked upon us as suicides; and both I and Islam Bai knew only too well how dangerous the journey was. The desert opened out before us like an illimitable sea, and ere two days had passed we became lost in its endless labyrinths of sand. Their conformation, however, lent us great assistance in our march. The prevailing winds blow from the east, and heap up the sand in ridges like gigantic waves, or pile it up in vast accumulations of dunes 300 to 400 feet high. These on the sheltered side go down at an angle of 33°; but on the windward side, or the east, they have a gradual slope. But in addition to these north-and-south ridges there is also another system of sand-dunes disposed at right angles to the first, that is, in lines running from east to west. These have been built up by winds blowing from the north and from the south during the winter.

The sand-dunes thus form a kind of network; and within the meshes there exist depressions which are often perfectly flat, and show the clay-soil underneath, swept free from sand. These spots the natives call "bayir." It is in depressions of this character that we find the chain of unnumbered lakes, which accompany the right bank of the Tarim throughout its course.

Other circumstances of an unexpected nature also conspired to the successful issue of our enterprise. In the middle of the desert we chanced upon some plots of *kamish* (reeds); consequently the journey

cost us no more than one camel. The remainder of the troop stood the journey well, as they swayed backwards and forwards like ships ploughing over the waves of the desert. The worst evil we had to contend against were the incessant storms, which whirled up the sand in front of us, so that we were quite unable to see any distance on ahead. A semi-darkness prevailed the whole of the time; and no sooner had we left the small *kamish* oases behind us, than we were again lost in the labyrinthine network of sand-dunes. To make things worse, the hard clay depressions now disappeared. If there exist sand deserts on the moon, I do not think they can possibly be more desolate than the Taklamakan.

We had also to exercise the strictest economy with our fuel; only a certain number of sticks were allowed to be doled out every evening. Hence we had to wrap ourselves up in our furs and crouch close together round the fire to keep ourselves warm; while I jotted down my notes by the light of a single wretched lantern. We were also obliged to be sparing with our ice. Yet, even though this had failed us, the heavens were kind, for, in the beginning of January, they took care that we should not suffer from want of water. For it began to snow, and continued snowing for several days. I used to wake up in the morning completely buried under snow, so that Islam Bai had to set to work and dig me out of my warm lair with a spade. The sandhills disappeared from sight entirely underneath the undulating sheet of snow. To sleep in the open air with 60° of frost is, however, far more interesting than agreeable. When we sat over our camp-fire we often had a temperature of 85° on the side next the fire, but a temperature of 20° below zero on the outer side of the circle.

At last, on January 8, we sighted the first tamarisk trees, and, that same evening, we encamped on the banks of the ice-bound Cherchendaria. From this point I travelled up-country to a place called Andereh, a distance of 240 miles. Finally, by way of the ancient bed of the Ettek-tarim, now dry, and after that by unknown paths, we reached Yanghi-koll again on February 24. Here I was joined by two Buryats, or Trans-Baïkal Cossacks, who had spent four months on the journey from Trans-Baïkalia.

On March 5 I was again in the saddle, with my face towards the eastern part of the desert regions, at the head of a new and well-rested caravan, made up as follows: the Cossack Chernoff, six Mussulmans, twelve camels, and one horse. My first object was to map the Kumdaria, the dried-up bed of what was formerly an outlet of the Tarim, when that river flowed into the ancient lake of Lob-nor. The upper part of this ancient river-bed is exceptionally well defined, and contains, even at the present day, a few salt-water pools. Further on, however, it is completely dry, and in parts entirely obliterated.

But to return to our journey. One day, in the very middle of our

march, we were overtaken by a sandstorm of such a violent character that the whole caravan was brought to a sudden halt. These storms loom up in the east like a black wall, and swoop down upon you like lightning, so that in an instant everything is swallowed up in an impenetrable fog of reddish yellow sand and dust. Whilst this particular storm was raging I lost touch of my caravan, and spent a considerable time wandering about before I could find it again. We could only get up one half of my tent under the shelter of a sandhill. But the sand rained in through the canvas, and every single object that was lying about became covered with it. Nay, it even gets into your mouth and grits between your teeth. To cook food in such a tempest is of course absolutely out of the question, when the wind is blowing at the rate of 47 miles an hour. A cup of water and a piece of bread was all we could get to eat. The camels lay perfectly still, with their necks stretched out to leeward, and the men tightly muffled up in their coats. There is an amazing force locked up in these desert storms. The quantities of material they lift up and carry away, and deposit in other places, is enormous.

At last we found water at Yardang-bulak, a little well at the foot of the mountain. The well itself was tremendously salt, but the sheets of ice upon it contained fresh water. Wild camels were common in these parts, and we shot a couple.

From this point our route lay along the bed of the Kum-daria, sometimes in the channel itself, sometimes along its bank. Here on three separate occasions we came upon fragments of earthenware, showing that the banks of this river were formerly inhabited, although for centuries the ground has not been moistened with a drop of water. The further we advanced towards the east, the more desolate grew the desert. The poplar trees which stood on the banks of the river-bed were a thousand years old, and as brittle and fragile as glass—the grave-stones, as it were, of the ancient forest.

After this we came to a most remarkable oasis, namely, Altmish-bulak, or the Sixty Wells. Here again we found salt water, with big blocks of ice in close proximity. These salt-wells furnish sustenance to vigorous patches of *kamish* (reeds) and belts of tamarisks, but all huddled together within such a narrow space that it was easy to imagine we had landed upon an islet in the middle of the desert sea. When we were still a considerable distance off, the hunters of my party made out a herd of camels, consisting of an old male and five young animals, grazing amongst the bushes. The caravan came to a halt, and I went with the stalkers for the purpose of examining the creatures through my field-glass. They were barely 100 paces distant, and looked really splendid in their light brown woolly winter coats. Two of them were lying down, the others grazing, whilst the old one was gazing in our direction, as though he suspected danger. Our guide,

Abdu-Rehim, crept stealthily through the bushes like a panther. When he fired, the entire herd took to their heels, and went off in a whirling cloud of dust—all except one, a young and handsome male, whose flesh made a very welcome addition to our larder. The wild camel is certainly a wonderful animal. You find him in the dreariest parts of the desert. He only stays a short time in each oasis, but like a ship on the ocean of the desert, is continually passing backwards and forwards. Nobody knows how he lives. He springs up out of the dried-up earth as if he were a ghost, and vanishes like the wind, and when disturbed in his peaceful haunts does not stop in his wild flight for days and nights together.

Altimish-bulak was an important halting-place; and it was from there I proposed to cross the desert in a southerly direction. The distance to Kara-koshun, where we expected to find game, could be covered in a week, and even if our supply of water did give out, we knew that we were hardly likely to perish of thirst. Amongst other stores we took four sacks filled with ice; but, in spite of our utmost care to protect them from the sun, two pailfuls dripped away during the first day or two of the march. A few steps only away from the wells of Altimish-bulak, and we were again in mid-desert. The contour soon began to fall away gradually in the direction of the old Lob-nor lake, which was indicated by a belt of dead forest. Here we found myriads of Linnæa shells, so that the ground was in many places quite white with them. It was here, too, that Chernoff and Ördek—the latter one of the men I brought with me from Yanghi-koll—discovered the ruins of two or three houses. The beams and other parts of their wooden framework lay scattered about on the ground, half buried under dust and sand. One circumstance which at once lent a considerable antiquity to the buildings was the fact that they stood upon pediments of clay, that is to say, narrow mounds, about 8 feet high, which had been built up to suit the plan of the houses. Originally these clay footings were constructed on the level ground; but the north-east wind, in its restless activity, had scooped out the ground all around them, and swept it clean away. The clearest indications of the enormous erosive power of the wind in these parts exist everywhere throughout the desert, the clay soil being in many places furrowed with trenches 6 to 7 feet in depth in the direction in which the winds blow; and, as a consequence of this, you often appear to be marching amongst benches and tables all made of clay.

We collected specimens of the wood-carving from the houses, and dug up some Chinese coins, besides axes, sacrificial cups, and so-forth. The roof of each house lay piled up on its west side, and under the shelter of the house itself. No doubt it had been hurled there by the last desert storm, which it had been unable to withstand.

But as our water-supply would not allow us to stay more than

twenty-four hours in this place, we were obliged to continue our march southwards, though not until I had photographed the ruins and measured the site.

That evening, just when we were going to dig a well in our new camping-ground, to get water for the camels, we discovered that we had forgotten our spade; it had been left behind in the ruins. And as the spade was an implement of great importance to us, I sent Ördek back to fetch it. Accordingly he started back the next morning, while we continued our march. Not long after this a violent sandstorm came down upon us, and we feared the worst for our solitary traveller. But Ördek's topographical instinct did not fail him. Although he lost our track, he nevertheless succeeded in making his way back to the ruins, and, on his return with the spade, brought with him what was even more important, namely, some fresh wood-carvings, executed with still greater perfection than those we discovered first. Besides that, he also gave me information of such a character that I felt I must at all costs return to these sites of ancient civilization. To do so then was, however, impossible; I had to control my patience until the following winter.

Our supply of water was just on the point of giving out when we at length reached the shore of a completely new lake, which spread out to the north of the marsh of Kara-koshun. It was fed by an equally new branch of the Tarim, which left that river at Shirgeh-chappgan.

We made the return journey in canoes, first up the new branch and then along the Tarim and the network of waterways which make up its delta. The twenty-five days this canoe journey lasted would have been very delightful had it not been for the midges, which tormented us unmercifully every evening.

I now mapped out in detail the lakes which I had discovered on my previous journey, namely, Avullu-koll, Kara-koll, Tayek-koll, Arka-koll, and Chivillik-koll, together with several others which on that occasion escaped my observation. I found that they reached a depth of 30 feet; and in one arm of the river in this same neighbourhood I sounded a depth of 41½ feet, or seven and a half times more than anywhere else in the newly formed marsh of Kara-koshun.

It is indeed a significant fact that the deepest depression of the Lob region is found, not at the termination of the hydrographical system, but here in the region which, from a remote antiquity, has borne the name of Lob.

The 8th of May saw us again at the Yanghi-koll, where we found everything peaceable and well. By this the river had begun to swell from the melting of the ice, and its volume now measured 3400 cubic feet in the second, or about the same as at Lailik, where I began my voyage on its waters.

Next I sent off, under the charge of the Cossack Cherdon, my big

caravan of horses and mules, instructing him to make for Temirlik, in the Chimen-tagh, and after them the camels, bound for the same place, under Chernoff and Islam Bai. Meanwhile, I myself continued my journey, along with Sirkin and Shagdur, in the big boat, and so finished laying down my maps of the lower Tarim.

Our huts now stood empty and abandoned. The native traders departed in quest of more profitable markets; but as the place needed a name for future identification, it was, consequently, called Tura-sallgan-uy, which means "the houses built by the European." All very nice in its way. But the very next spring-flood that came swept away the whole of our bank of the river; our huts vanished off the face of the earth, and, together with the poplars, were swallowed up in oblivion.

During the course of my journey down the big river, I investigated and sounded many of the peculiar lateral or marginal lakes which lie embedded amongst the dunes of drift-sand immediately along its right bank. They are like growths or parasites, which suck away, as it were, the life-blood of the river. For instance, at the time I examined it, the lake of Karunalik was receiving through a very small feeder a volume equivalent to over 80 cubic feet in the second. Thus this one small lake alone drains away from the Tarim close upon 300,000 cubic feet of water every twenty-four hours. This, then, is a striking characteristic of the lower Tarim. Instead of gathering itself together and pouring its waters in a body into the terminal basin, it filters itself away in a number of lagoons strung all alongside the principal channel. And as the lower-lying portions of the region become filled and raised by the accumulated sedimentary matters which the river brings down with it, the lateral lagoons flit steadily higher and higher up the stream. Many of these lakes are carefully preserved by the natives for the sake of the fish which they contain. First they stop up the channel which supplies the lake with water from the river. This causes the lake to become stagnant, and it begins to shrink by evaporation, whereupon the water becomes slightly salt, which is believed to make the fish bigger and more palatable. The natives catch them in a drag-net pulled along by two canoes.

In this region the river makes its way immediately along the foot of the sand-dunes. You would think these sandhills would be swept away by the unceasing wind-storms which prevail; but one I measured, which stood close to the bank, rose to a height of 295 feet, and this was not the highest I saw in that position. The simple explanation of this fact is that the river-bed shifts as the sand shifts—that is, towards the right, or westwards. And, as a matter of fact, we have seen that the Tarim formerly flowed down the bed of the Kum-daria, or nearly due east, instead of, as now, towards the south. Sometimes the river is undecided in its course. It overflows its banks and makes its way

through lakes choked with reeds. Tirvadalu-koll, where it was only by the utmost exertions that we were able to punt our boat along through the unprecedentedly dense masses of *kamish* (reeds), was a lake of this description. The only way to get along was to set fire to the vegetation and burn it down to the water's edge, and then cut a channel through the tight-packed reed-stalks which remained.

Towards the end of May we became enveloped in veritable clouds of gnats and gadflies, and I was forced to have a hut put up on the fore-part of the deck instead of the tent. Meanwhile the heat increased day by day.

On May 25 I travelled by canoe to the Lake Beglik-koll, and sounded it. The great sheet of water was as placid as a mirror, and reflected the sand-dunes with the accuracy of a camera. Towards evening, after my work was done, we landed on the west shore of the lake to rest. But Kirghin Pavan, one of my old friends who dwelt in that part of the country, pointed towards the sand-dunes in the east, and cried, in a tone of interrogation, "Kara-buran?" ("black storm"), which signifies a desert storm of the worst description. At that moment an inky black pillar towered up on the horizon and bent its head forwards across the desert, whilst several similar pillars leapt up beside it like buttresses, supporting it. Then they melted together into one continuous wall, which rose higher and higher in the air. The lake, however, in spite of the oncoming storm, still maintained its mirror-like placidity. As we had still a good distance to row before we could enter the channel which led into the Tarim, I gave the order to start at once. The men rowed with such desperate haste that every moment I expected to hear the paddles snap in two. Their backs were bent like bows as we raced along over the sleeping waters, making the foam spin high off the bows of the canoe. We were going at the rate of $5\frac{1}{2}$ miles an hour. The atmosphere was still calm, but as we watched the portentous swiftness with which the tempest bore down upon us, we felt the full premonition of the appalling change which was about to take place. Such moments as these are magnificent, but put a severe strain upon one. "Now it's got to the sand-dunes!" cried one of the men. I glanced up and saw the outlines of the dunes disappearing as though they were being washed off a slate, and in a moment the entire labyrinth of sand-dunes, together with the lake shore, was engulphed in a thick yellow-gray fog. "Row, row!" shouted the Mussulmans. "Allah! Yes!" came the answer in hollow and awe-struck tones.

Down came the first gusts of wind from the east-north-east. With a mighty roar the "black tempest" swooped down upon the water, which, hissing and boiling, was in two minutes lashed into huge waves of white foam. Our boat flew along at a terrific pace—nearly 7 miles an hour. We were only about 1 mile distant from the northern shore. "By Allah! we can't do it!" was the cry. But just at the moment

when the tempest seized us in its grip, and would assuredly have capsized our frail craft if we had not thrown all our weight over on to the windward side in time, we were suddenly enveloped in an impenetrable fog of the finest dust. All our surroundings were absolutely blotted out, and we became lost in the darkness. The utmost we could distinguish was the nearest waves, up and down which our canoes danced like straws.

We were at our last gasp, so to speak, when we caught the first glimpse of the tamarisks looming through the fog. The canoes were so full of water that they were ready to sink; but we were protected by a tongue of sand which acted as a breakwater. Once on the lake of Göllmeh-ghetti our two canoes did fill with water, and sank out in the open lake. But fortunately the water was so shallow that we were easily able to walk ashore. The depth in none of these lakes exceeds 36 feet, and the greatest depth is always found close to the eastern shore, under the shelter of the steep sand-dunes.

Beyond Argan the Tarim again swells out into a large and powerful river flowing in a well-defined channel. We now pushed on rapidly, often keeping it up until three o'clock in the morning, to escape the gadflies. The way was led by torches and lanterns, which flitted ahead like St. Elmo's fires, to the accompaniment of an accordion which I had brought with me to entertain the people. One evening we were overtaken by a canoe, which came creeping alongside of our big boat like an eel. It turned out to be a courier from Kashgar bringing me letters from home. That, I need hardly say, was a "red-letter day" to me in the solitude of the desert. At the fishing hamlet of Chegghelik I abandoned my trusty old craft, to the great delight of the grateful natives. The only way by which the remainder of the journey, as far as Abdal, could be accomplished was by tying our canoes together, covering them with a deck, and setting up tents upon it. At Abdal I rested some days, and, with the ready help afforded me by my handy and reliable Cossacks, I prepared my mail-bag and got ready a number of photographic plates. At the same place I also made a collection of the popular songs, which for centuries have been sung by the poor but interesting fisher-folk who dwell there. Then, but with a smaller caravan, I continued my journey towards our principal camp at Mandarlik in the Chimen-tagh. And there we were all once more collected together again.

From that place I sent back Sirkin and Chernoff to Kashgar, to fetch some Chinese silver money, some tinned provisions, and my letters, and on July 20 I started upon a difficult and exhausting journey right across Eastern Tibet. I appointed the Cossack Cherdon my *valet-de-chambre*, and Turdu Bai *karavan-bashi*, or headman of the caravan. One of the most useful members of my company was Abdat, the hunter, who knew Northern Tibet from having spent six winters amongst its mountains

THE TARIM, NEAR KARAUL.

ARKA-TAG CHAIN.

hunting wild yaks single-handed. He did this to make a profit out of their skins. My caravan consisted of six men, seven camels, twelve horses, one mule, sixteen sheep, and two dogs. The greater part of it, however, under the leadership of Shagdur and Islam Bai, was instructed to proceed later on to Temirlik, and there wait until we joined them.

It was fine summer weather when we left Mandarlik: but we had barely gone two days' march when we encountered a violent snow-storm. Under cover of this, a band of venturesome wolves came and frightened our flock of sheep out of the camp and killed nine of them. Later on we captured two young wolves, and tried to take them with us; but one escaped, and the other gnawed himself to death.

Three days' journeying from the principal camp brought us over the mountains of Chimen-tagh, and the fourth over the parallel ranges of the Arka-tagh and Kalta-Alagan, by high but easy passes. Among these mountains I always had so much to attend to that I seldom got into camp until long after the rest of the caravan. One day the conformation of the country was more than usually complicated, and when darkness fell, putting a stop to all further work, I found myself obliged to spend the night with my Cossack attendant in the open air, without either warm clothing or supper.

On the south of the Kalta-Alagan mountains the surface is level or slopes imperceptibly down towards the sister lakes of Kum-koll, one of which, the upper lake, contains fresh water, but the other, the lower lake, salt water. Beyond these lakes again there stretched a belt of drift-sand, with dunes over 150 feet in height. The steppe was dotted with thousands of grazing *khulans*, or wild asses. My men contrived to catch two young ones, and very soon they became perfectly tame. We fed them with milk-porridge, which they drank greedily; but in spite of that they would not thrive, so I had them killed. The natives declared it would be useless to turn them adrift to rejoin their mothers, for the old wild ass refuses to take any notice of her offspring once they have been in the hands of man.

During the latter part of July we marched straight on south, towards the Arka-tagh, and crossed successively its four parallel chains one after the other. This tried the animals' strength severely; but they came through it all right. Amid these complicated mountain chains it was not always easy to hit upon the best road; and every time we found a fresh snowy range confronting us, I had to send a horseman on ahead to reconnoitre the way. On August 8 we went over the fourth of the parallel chains of the Arka-tagh and descended into the great longitudinal valley which I traversed in 1896. In the evening we could only get a little warm tea to drink, after we had broken one of our boxes to pieces to make a fire with. Here we encamped on the shore of a salt lake in a region of unmitigated sterility. The very bottoms of the valleys are here some 350 feet higher than the summit of Mont Blanc.

Next we floundered into a region which, for pure "cussedness," is absolutely without a parallel. The surface consisted of sand and mud, saturated with water like a bog, so that the animals sank in it up to their knees. The moisture, becoming thickened by the snow and hail, does not run off the ground, but sinks down into it, making it soft and spongy and fearfully treacherous. Our animals kept falling incessantly, and every time had to be unloaded before they could be got up again. This part of the journey cost me one camel and one horse. There was not a blade of grass to be found anywhere; and the continuous falls of snow, mingled with hail, caused our camels to suffer so much from the cold that we were forced to give up every sack and blanket which could be spared to make into rugs to keep them warm.

After crossing two fresh mountain chains, with extensive, but short, glacier-fields, we encamped, on August 21, on the northern shore of an unusually large salt lake. This I decided to cross by boat in the company of one man, Kutchuk, to act as boatman, while the caravan went round by the west side to a point indicated on the opposite or south shore.

The course I steered across this very remarkable lake was towards the south-east. The eastern shore was not, however, visible. Our six-foot punting-poles touched the bottom in almost every part; and the boat itself had to be carried more than a mile before it could be made to float. The bottom of the lake was covered with a thick encrustation of salt, over the rugged surface of which it was not pleasant to walk barefoot. The water is so salt that the indicator of my hydrometer came to a standstill a couple of inches above the surface, and I had to make a special mark on the glass to preserve the register. Everything in the boat—instruments, punting-poles, tackle, clothes—all became as white as chalk, or looked as if they had been dusted with flour. The drops of water which fell from the punting-pole were converted into rods of salt, which looked like stearine candles. No wonder this lake was as sterile as the Dead Sea.

When we reached the southern shore it was rapidly growing dark. But there was not the slightest sign of the caravan to be seen. Accordingly, we had no alternative but to spend the night on the desolate shore without either food or water, and the only shelter we could find was the two halves of the English boat. Kutchuk, the boatman, turned one half of the little boat over me as though it were a bell-glass; and in that way I slept, although my narrow domicile reminded me forcibly of a coffin, more especially as Kutchuk heaped up the sand all round the edges to keep out the draught. It came on to snow; but we cared little for that, though the big flakes pattered on the oil-skin covering of the boat like so many tiny spirits of the air trying to get in to us.

The next day, aided by favourable winds, we sailed to the west, and found that the caravan had been stopped in its march by a stream,

160 feet wide and 10 feet deep, and had consequently encamped on its northern bank. We raked together everything which in any way partook of the nature of a rope, tied them all together, and stretched them across the river between two firmly fixed camel ladders, and in that way conveyed the baggage across in thirteen instalments. The horses swam over of their own accord, but the camels were troublesome. They refused to budge an inch, wouldn't lift a foot, and lay down composedly in the middle of the stream, and even left us to hold their heads above water with stout ropes. In the mean time my little collapsible boat, which in itself made a fourth part of a camel's load, was of great assistance to us in conveying over the rest of the caravan. The river which caused this obstruction flowed out of a fresh-water lake, fed by swift glacier torrents, and, at the time of which I speak, was carrying down 1625 cubic feet of water per second.

As we travelled on towards the south, our provisions began to give out, and there was only ammunition enough for Aldat the hunter's Asiatic gun. At camp No. 36, where there was fair pasture, I gave the camels a nine-days' rest. Meanwhile I, with some of the better-conditioned horses and three men, made an excursion to the south-east, to examine and map a highly peculiar lake-region, where water was more plentiful than dry land. Two large fresh-water lakes, extending from west to east, gather up several streams and brooks from over a very considerable area, and give off another broad stream which enters a salt lake situated farther northwards.

On the northern shore of the eastern lake red sandstone cliffs plunge sheer down into the water. Here we fished one morning with great success; and, whilst the other members of the caravan marched round the lake, Kutchuk and I measured its depth, and found it to be 157½ feet. Here again we were overtaken by a hailstorm; but, fortunately, the wind was favourable, and we drove southwards at a tremendous pace. The inside of our little boat became quite white with hail and snow, and we failed to get even a glimpse of the shore. But before we landed at sunset the storm had passed over. The western lake also was sounded in a snowstorm. I now decided to make for the west and the north, and to cross the mountain chains which we had climbed over on our way south, and so return to Temirlik. While the caravan under the direction of Turdu Bai turned towards the north, I, accompanied by Cherdon and Aldat, rode towards the south-west, to examine a snow-covered mountain knot which I saw in that direction, and four days later we rejoined the rest. After this, on the second day, we pitched our tents at the highest elevation I have ever encamped in Asia or elsewhere. The hypsometers and aneroids registered 15·2 inches; consequently we were halfway through the atmospheric envelope which surrounds the earth. A few hundred feet above the spot where we were encamped we saw an old yak licking the lichens and moss from the stones.

Aldat crept upon him like a cat, and brought him down at 30 paces. But that proved to be Aldat's last achievement; for he fell violently ill, and had to be carried along on the back of a camel, and at the end of a few days he died. We buried him in the wilderness, and raised above his grave a tent-pole, with yaks' tails fastened to it, and a strip of cloth with the date written on it in Arabic and Roman numerals.

On September 14, at our fiftieth camping-place, we encountered a snowstorm, the equal of which I have hardly ever seen even in the Alai valley. The snow simply came down in sheets, and was driven by the wind into snow-wreaths with amazing rapidity, so that in a few minutes my tent was surrounded by a high thick wall; and it was impossible to obtain either firewood or pasture for the animals.

At daybreak on the morning of September 17 we were awakened by a fearful racket from the dogs. A bear had coolly walked right into the camp, and was going about sniffing and inspecting everything, and when the alarm was given, trotted off again with the same *nonchalance*. As we had to be economical with our ammunition, he was allowed to go away scot-free. Cherdon was a good shot, and a capital hand at bringing down yaks, khlans, and antelopes, but I forbade unnecessary shedding of blood.

Here again the surface consisted of nothing but pure mud; but as it froze sharply at night, the ground was hard in the morning. On one occasion, however, one of the camels broke through the frozen crust and sank into the mud. We at once ran and pulled off his load and his pack-saddle; but the harder we worked the softer grew the ground all round him, and before we had done he was like a toad in a basin of porridge. At last we managed to pull him out, one leg at a time, by putting felts under each foot as we got it up; but the poor brute was utterly exhausted, and looked like a half-finished piece of statuary still in the sculptor's hands.

At last, however, but again in the midst of a raging snowstorm, we once more crossed the Arka-tagh, and encamped on the western side of the lake of Achik-koll. On October 6, still going north, we crossed over a pass in the mountain chain which forms the northern boundary of the basin of Achik-koll. The cold was intense, and here again also we had to contend with a violent snowstorm. Five horses succumbed on the summit of the pass. There was not a blade of grass to be had, not even so much as moss. After that our route still lay northwards through the well-defined valley of Fogri-Sai, fenced in by granite escarpments. In this region we chanced upon a so-called *kan*, or deposit of gold, which, however, was deserted for the autumn and winter. I also found at a spot where the valley begins to open out an interesting carving, representing a tiger, yak, and antelope hunt. It was of considerable antiquity, for the hunters were depicted as using cross-bows. Another discovery in the same region was an *obo*, or religious stone

monument erected by Mongolian pilgrims, and inscribed with the Buddhist formula of prayer, "On maneh padmeh hum." Here also we fortunately fell in with a couple of yak-hunters, whom I sent on to our principal camp with a message asking for assistance. After losing two or three more camels and horses, we at length struck the broad valley of Chimen, and pushed up it at an increased speed, doing up to 26½ miles in a day. On October 16 we caught a glimpse of a fire in the far distance—to us, who for three months had not seen the face of any human being except ourselves, a most welcome sight. But although we pressed on until midnight, we were unable to reach it, and, thoroughly done up, were compelled to encamp where we were. It was Islam Bai, who perceived us the next morning, and soon after met us with fifteen horses laden with provisions. This was on October 16. Four days later our wanderings came to an end; we entered the head-quarters camp, Temirlik, and were once more at home.

My next expedition was one of twenty-five days' duration, its object the exploration of the mountain chains which shut in the valley of Chimen on the north and on the south, as well as to take soundings in the lake of Kum-koll. Accordingly we crossed the Chimen-tagh and the Kalta-Alagan mountains to the shores of the salt lake, upon which I spent two days boating. We found that the greatest depth of the Kum-koll was 75½ feet. It was decidedly cool sleeping out in the open air with the thermometer down to 8½° below zero. One of my men was attacked by a disease in his feet, which dropped off piece by piece. However, we managed to save his life.

My journeys were not, however, yet at an end; but on December 12, 1900, I again left Temirlik with an escort of nine men, eleven camels, ten horses, and three dogs. After paying a visit to the salt lake of Gas-nur, we struck up through a valley in the Akato-tagh. At the top we encountered a difficult pass, where steps had literally to be hewn out and the camels assisted over one by one. We then continued our march between the parallel chains of the Astyn-tagh, where we came upon traces of an ancient Mongol road. On the first day of the new century we reached Anam-baruin-gol, and after spending twenty days in marching round the vast mountain knot of Anambar-ula, wound up by visiting the Sirting Mongols, who gave us a friendly reception and replenished our stock of provisions. The temperature now sank to 25½° below zero (Fahr.), which would not have mattered much had the wind not blown with such steady persistency.

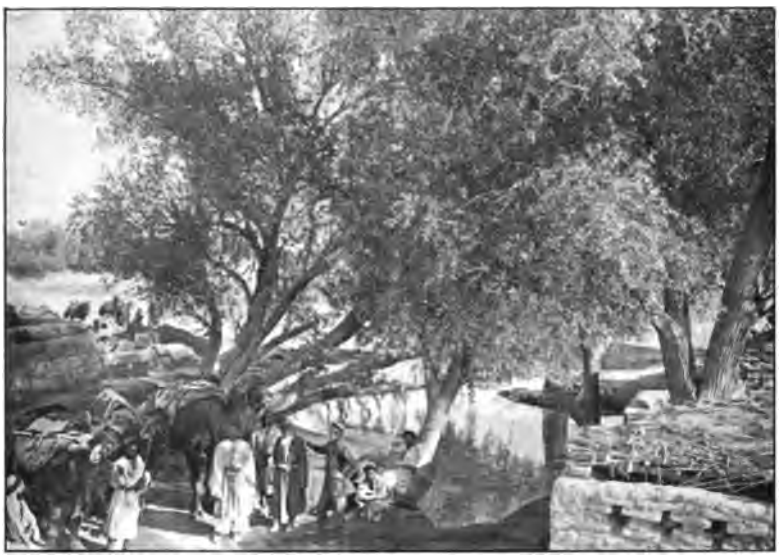
From Anambaruin-gol I sent back two men and seven horses to Charkhlik, our next rendezvous. I did not think I could take more than three horses with me across the desert, and consequently ordered the rest of the men, at the end of forty-five days, to be on the northern shore of Lake Kara-koshun, three days' journey north-east of Kum-chappgan, with fresh horses and provisions, and my letters. And

I directed them to guide us through the desert by setting fire to the reed-beds in the lake every evening. On January 27, taking with me the remainder of the caravan, I left Anambar and crossed the Gobi desert west of Sa-chau, a journey of ten days, to the well of Tograk-kuduk, situated on the desert route between Abdal and Sa-chau. On the way we passed through several different kinds of country—steppes, low mountains, complete sandy desert, with sand-dunes of considerable altitude, and finally steppes again.

The little oasis of Tograk-kuduk was then made the starting-point of a dangerous but interesting journey. We took with us ice to last twelve days, for ourselves and the horses; and, as it turned out, it was precisely the quantity that was needed. Our camels were just beginning to feel the want of water, but on the whole bore the journey well. We marched northwards, at the rate of 20 to 25 miles a day, mostly over wretched *asar* (eskirs) and ridges, scarce big enough to be called mountains. They were, however, greatly weathered, and the country utterly barren and desolate, without a drop of water anywhere.

On February 18 came the first buran of the year; and it was so bitterly cold that we had to go on foot to prevent ourselves from being frozen to death. At night we were only able to make a little tea at the cost of two of the tent-poles with which to make the fire. On the 19th the storm still continued to rage; but as we had no firewood of any description whatever, we were obliged to content ourselves with sucking small pieces of ice and munching dry bread—hardly a fitting repast for such truly arctic weather as we were then experiencing. The tracks of wild camel were exceptionally frequent, and I observed them with the greatest interest, and noted them down on my map-sheet; they might later on point to important conclusions. Our situation was now critical. Our stock of ice was exhausted, and the camels had not drunk a drop of water for twelve days. Fortunately, that same evening we reached a spot where the wild-camel tracks all converged into one common track, which eventually led into a valley, in the beginning of which, sure enough, there was a salt-well, surrounded by a belt of fresh-water ice, a few inches thick. As fuel also was to be had in the same place, we stayed there two days, the camels, meanwhile, quenching their thirst by crunching the ice, which we hewed to pieces for them.

On March 2, in a dense fog, we approached the oasis of Altimish-bulak. I discovered that I was just under 2 miles out of my reckoning, which was not so very bad, considering that my route was determined by upwards of 10,000 compass observations, extending over a distance of more than 1300 miles. Here we sighted a large herd of camels, and Shagdur shot two of them, one being a full-grown he-camel, whose skin and skeleton we took with us. Leaving behind at the oasis three weak camels and all the horses, in charge of one man, I took with me the rest of the caravan, and sufficient ice to last for a week, and set out



CHARKHLIK.

NATIVES OF ABDALL.

to visit the ruins which I had noticed the previous year. We reached the place at the end of the third day, and made a stationary camp in the vicinity of a big tower, constructed of burnt and sun-dried bricks. Our investigations resulted in the discovery of a small village of nineteen houses, which I carefully surveyed, and then had dug out. Our finds embraced a lamp, some Chinese money, several small articles, the wheel of an *arba*, or Turkestan cart, various kinds of utensils, pottery, and wood-carvings, which had been used to decorate the houses, etc. In the village which Ördek had discovered the previous year we found and examined a small Buddhist shrine, which must at one time have been beautifully ornamented, as you will perceive from the specimens which are here displayed for your inspection. The interior of the shrine contained an image of Buddha enthroned. Its dilapidated trunk is also included in my collection. While the excavations were in progress, a small piece of wood was flung aside as being of no value; but I picked it up, and found it covered with native hieroglyphics, which the savants have not yet succeeded in deciphering. On the north the shrine seems to have been protected by poplar woods, but towards the south it looked out over the thick reed-beds which fringed the ancient lake of Lob-nor. On one piece of timber, by the way, there was, amongst other objects, a fish depicted.

The brick tower which I just now mentioned was $29\frac{1}{2}$ feet high, and afforded an excellent view over the desert. I wondered whether it was in any way akin to the *stapas* which are found near Kashgar, and tried to dig through it. But there was nothing in its interior. It was probably a watch-tower, or signal-tower, in times of war, fires being kindled at its corners.

We discovered three other similar towers, and four villages altogether. It is of importance to remember that all these ancient habitations lay on a line which ran from the north-north-west to the south-south-east, and which, consequently, coincided with a great high-road that led along the northern shore of the lake. In two or three of the houses there were large quantities of fish bones, of the same species as those which now live in the Kara-koshun. Amongst other things we also found wheat and rice, and parts of the skeletons of sheep.

In another of the houses, built of sun-dried brick, and resembling a stable more than anything else, we came upon a large quantity of papers and letters written over with Chinese writing. This was a grand discovery. These ancient documents would throw a flood of light upon the history of the place. We prosecuted our labours with double zeal. But these were the only manuscripts we found, and they lay buried under 2 feet of sand. In the same place, however, we dug out forty-two small, narrow wooden wands, also written over with the same kind of writing. On my return home I sent these materials to the learned sinologue, Mr. Himly, at Wiesbaden, who is now deciphering them. As soon as he had

made a preliminary examination of them, Mr. Himly wrote saying that the data and other indications pointed to a period between the middle of the third and the beginning of the fourth century A.D. "The objects themselves appear to have belonged to a wealthy Chinese merchant, who supplied commodites of every description, let out carriages and beasts of burden on hire, besides conveying letters to Tun-kwang, *i.e.* Sa-chau. Travellers going to the latter city used horses, carriages, and even oxen. One of the documents appears to contain an allusion to a military campaign, but it gives no indication of date. Amongst the geographical names mentioned we find the very one which designates the country here in question, viz. Lau-lan.* The inhabitants must also have been engaged in agriculture, for one of the principal items in the manuscripts consists of weights and measures of seed-corn; some of them also name this or the other kind of corn. Possibly there once stood on the site where the manuscripts were found an old revenue office, or a sort of 'grain-bank,' where grain was bought and stored, or received as security for loans advanced. The papers exhibit one strange peculiarity, in being written on on both sides—a practice which does not now obtain in China either in writing or in printing.

"In any case, the collection of manuscripts which you have brought home with you is one of great interest, even to the Chinese, and will unquestionably form the subject of scientific speculation for some time to come. Some of the sheets are nothing more than simple exercises in writing; others consist of fragments only. But in both cases the style of writing differs but little from that which is now in use in China. The wooden wands have this advantage over the paper manuscripts, that each contains one or more complete sentences; as, for example, an antelope is delivered, such and such a quantity of seed-corn has been handed in, or so many men have been furnished with provisions for a month, or longer. To judge from one passage, the official who lived at this place would seem to have governed a pretty large province. The passage runs thus: 'The approaching army is to be met at the frontier (or the shore?) by forty officials, and the farmsteads are many.' He seems also to have had two native chieftains in close dependence upon him. The majority of the dates in the manuscripts fall between the years 264 and 270 A.D. In 265 the emperor Yüan-te of the Wei dynasty died, and was succeeded in the north of China by Wu-te of the Tsin dynasty, who died in 270. Most of the copper coins that are legible are what are known as *wu-chu* pieces, a variety which was struck between 118 B.C. and 581 A.D. Numerous other pieces belong to the *hwo-tsian* mintage, which goes back to Wang-mang, who held the reins of power between 9 and 23 A.D. Thus the dates on the coins agree fully with the indications of date conveyed by the letters and the wooden wands."

* See the following article by Mr. Macartney.

These few observations by Mr. Himly, on his first cursory examination of the materials which I have brought home with me, will serve to indicate the value of the information which I have been instrumental in unearthing from the sands of the great desert of Central Asia. For one thing, they throw unsuspected light upon the physical and political geography of the interior of Asia during the first centuries after Christ, and show what prodigious changes have taken place in that part of the world during the last fifteen hundred years. The name Lau-lan occurs in the writings of Edrisi, and a learned mandarin in Kashgar, to whom I showed the manuscripts, told me that, according to the old Chinese geographies, the country round the present Pityan, near Turfan, was formerly called Lau-lan. Read in connection with the physico-geographical investigations which I have made into the movements of the lake of Lob-nor, these historical data are of inestimable value. Not only do they give us information about the country of Lau-lan on the northern shore of the ancient Lob-nor, but they also throw light upon several unsolved problems connected with the region which lies halfway between China and the countries of Europe. They tell us there was a regular post between Lob-nor and Sa-chau, and, consequently, there must have been a route of regular communication through the desert of Gobi. The ancient road which ran from Korla alongside the Concheh-daria, where I previously discovered a chain of brick towers (*pao-tais*), as well as the fort of Merdek-shahr, acquire an entirely new importance in the light of these more recent facts. Numerous ruins exist also at Yin-pen, another important station on that same highway.

The question of agriculture, having been followed in ancient times in Lau-lan, is one of very great interest. How was it possible to carry it on? Not one rivulet flows down from the Kurruk-tagh mountains; not one drop of rain ever falls from the sky. Canals, or irrigation *ariks*, similar to those which are found all over Eastern Turkestan at the present day, must have been made from the river which flowed into Lob-nor. The grain-banks spoken of still exist in every town in Eastern Turkestan, under the control of the Chinese authorities, and serve the purpose of securing an equal distribution of bread amongst the natives. True, I unearthed four villages only, one of them consisting of not more than nineteen houses; but there is no reason why the desert should not yet yield many other valuable archæological remains. The mention of forty officials, a military expedition, and many farms, points to the inference that Lou-lan was a well-peopled region. Possibly the people dwelt in perishable reed-huts, as they do at the present day. Time, however, will not permit me to linger longer on this interesting subject. I must return to my journeyings. As soon as I arrived at the ruins, I sent the camels back to Altimish-bulak, to get pasture and fetch ice. Upon their return, at the end of a week, we broke up camp, and marched southwards, beginning what turned out to be a most interesting

and instructive journey across the desert. My own party consisted of one Cossack, three Mussulmans, and four camels. The rest I sent, under the command of Faysulla, who had accompanied me the year before, to the south-west, with instructions to try and get to Kum chappgan. In this, however, they failed, being stopped by vast sheets of water of quite recent formation, so that they were driven as far west as the Tarim. And I was consumed with anxiety about them until I learned they were still alive, though they lost all their horses and ran short of supplies. Meanwhile we in our party had a difficult and tedious task to perform, namely, to take exact instrumental measurements for determining the slope of the desert from north to south; that is to say, from the northern bank of the ancient Lob-nor to the northern shore of the existing lake of Kara-koshun. The contours of the region were, however, peculiarly favourable for our purpose, being as level as the sea, except for the furrows scooped out by the wind, so that I was able to continue my measurements in a direct line, without hindrance. The distances between the levelling instrument and the staff were taken with the tape, and the total distance worked out at 50½ miles. This cost us eight long days' work, and of course obliged us all to go on foot; but we took four camels with us, chiefly to carry ice.

On the very first day we had an adventure which might have proved disastrous. I myself started early, with my assistants and my levelling instruments, after giving orders to one of the men to follow on with the camels a couple of hours later, make a *détour* round us, and then meet us at the appointed camping-ground. One of the camels carried, amongst other things, all my maps and note-books. We worked on all day, and measured 5 miles and 1196 yards, and in that distance there was a fall of only 7½ inches. When darkness set in the caravan was nowhere to be seen, and we made a big signal-fire at the edge of the dead forest, which happened just there to come to an end. Shagdur set out to hunt for the caravan. If it had missed us it was doomed, and our situation, too, would be very critical, for we had not one drop of water with us. But fortunately our signal-fire was visible at a great distance, and the camel-driver turned up in the course of the evening with everything all right.

That same night a storm got up in the east, and compelled us to strike work for the whole of the next day. But Shagdur had not returned. However, as he was provided with a compass, and was quite familiar with my methods of mapping, I had not the slightest anxiety on his account. As it turned out, he did take the precaution of noting his compass bearings the moment he left the camp, and during the course of the next day he turned up all right. This I regard as a triumph of native intelligence, seeing that the region was perfectly flat, without any distinctions of contour, and a violent storm, accompanied by an impenetrable fog, was raging all the time.

As soon as the storm subsided, we continued our levelling operations, and by the end of another day had descended 8 feet 2½ inches. In fact, we crossed over a depression which lies 26½ feet below the level of our point of departure. During the two following days we again ascended 10 feet 10 inches, but during the last three days once more descended something like 10 feet. The result of the cubic measurement showed that the surface of Kara-koshun lay 7 feet 5½ inches below our point of departure on the northern shore of the ancient lake of Lob-nor. At the same time it must not be forgotten that during a great part of the second and third days we were down below the present level of Kara-koshun, and that our camp on the second day of our operations was pitched 8 feet 8½ inches below the point of departure. Without stopping to analyze exhaustively the results of this remarkable survey of over 50 miles, I will only pause to observe that it proves in the most conclusive way the existence in the northern part of the Lob desert of a depression with a depth precisely similar to that which I sounded in Kara-koshun.

Upon reaching the northern shore of this latter lake, our labours came to an end, and our next step was to hasten back to Charkhlik, where the main body of the caravan was supposed to be encamped. I had instructed Tokta Ahun, one of my men, to go three days north-east of Kum-chappgan and there light signal-fires for our guidance. But as we were unable to see these, and the country grew perfectly barren as we approached the lake, I sent on Khoda Kullu, another of my men, westwards, on foot to look for them, and guide them to us the moment he found them. But for several days nothing more was heard of him, and as, in the mean time, we were reduced to a few ducks which Shagdur managed to shoot, I resolved to follow after Khoda Kullu. But after going one day's journey along the lake-shore, we were stopped by a vast sheet of water, stretching towards the north-east, which we could neither see across nor get across. Just when we were becoming hopelessly entangled amid this labyrinth of waters, we perceived three horsemen coming galloping from the north-east. The riders were my faithful Cossack Chernoff, Tokta Ahun, and Khoda Kullu, the man I sent out in search of the caravan. The latter, it appeared, had travelled for five days before reaching the encampment, and when he did arrive he was half dead with hunger. Now, strange to say, the encampment he went in quest of was all this while not more than 2 miles distant from our own, and had there not prevailed a dense fog during the whole of this time, we assuredly should not have missed seeing their signal-fires. It will appear almost incredible that Khoda Kullu should have taken five days to ride a matter of only 2 miles, but the fact was there lay between the two camps a newly formed arm of the river, flowing with a volume of upwards of 1130 cubic feet of water in the second. We ourselves were hemmed in on both sides by this

stream. As the water flowed northwards at a prodigious rate, forming a new lake as it went, it took us four days to get round it. It had cost the mounted men three days' hard riding to reach us, and as we returned we found their horses' hoof-marks already under water, in some places at a depth of 18 inches. Indeed, the water bubbled and boiled along at such a rate, and over such a wide stretch of country, that it was dangerous to encamp anywhere near its margin. Consequently, we were obliged to travel halfway back to the ruined villages before we could turn to the west. After that we bent round to the south, until, finally, we reached the caravan encampment, and found there everything we needed.

The lake of Kara-koshun, which is thus gradually disappearing in the place where Prjevalsky found it, is slowly creeping northwards, seeking to return to its ancient bed, where, I am perfectly convinced, it will be found at no great distance of time.

That such great changes as these are able to take place in this part of the world, which my measurements have shown to be almost perfectly horizontal, is not at all surprising. The lake of Kara-koshun, which has occupied its present situation for a very long period, is getting choked with mud and drift-sand and decaying vegetable matter; while, on the other hand, the northern part of the desiccated desert is being eroded and furrowed by the winds, and is thus growing deeper and deeper every year. The basin which serves as the terminal reservoir of the Tarim system must necessarily be extremely sensitive to these changes of level, determined as they are by purely mechanical laws and atmospheric depression of a strictly local character. It is simply a physical necessity that the water of that reservoir must ultimately overflow its basin and seek a relatively lower level. Thus a drop of some 3 or 4 feet in level is sufficient to cause, through the action of the wind, a total transformation in the map of the district. As the lake moves, so do the vegetation and the various animals of the desert. They, as well as the fisher-folk, with their reed huts, follow after to the new shores, while the old lake gradually dries up. In the far-off future the same phenomena will recur again, but in the reverse order, though the natural laws which will effect the reversal will remain precisely the same. Whenever that occurs we shall be in a position to determine, on the basis of a more complete accumulation of data, what is the length of time required for these periodic movements. This, however, we do know already, with perfect certainty, that in the year 265 A.D., the last year of the reign of the Emperor Yüan Té, the lake of Lob-nor lay in the northern part of the desert. Lob-nor is, as it were, the oscillating pendulum of the Tarim river, and even though each oscillation extends over a space of a thousand years or more, yet, measured by the clock of geological time, we know that such periods are of no more account than so many seconds of *our* time.

PART OF THE NORTH SHORE OF BANGGONG-TSO.

NORTH SHORE OF KUM-KOLL.

After the completion of this journey, I pitched my camp at the little town of Charkhlik, on the edge of the desert, and gave myself a month's much-needed rest. Meanwhile, however, I organized and equipped the largest caravan I have ever led into unknown regions. It comprised 30 Mussulmans, 4 Cossacks, 1 Mongolian lama from Kara-Shahr, 39 camels, 45 horses and mules, 70 asses, 50 sheep, and 8 dogs.

Both men and animals were in the very pink of condition, and a picturesque and imposing array they made, for it was the most considerable caravan ever conducted by a European into Tibet. And yet how different was its appearance at the end of the year! How decimated and shattered!

I sent on the caravan, under the command of two of the Cossacks, by well-known trails over the mountains which run along the northern boundary of Tibet, and so up on to the great plateau of that country. I myself, taking with me the other two Cossacks and some of the horses, rode up by the bed of the little river Charkhlik, a most disagreeable road, encumbered as it was with loose stones. One day we crossed the stream no less than sixteen times, getting several wettings in doing so, but we did not lose anything except one horse-load of supplies. Finally, after an instructive journey over many difficult passes, we reached the western shores of the lake of Kum-koll, the appointed rendezvous.

On June 4 we beheld in the distance the long black line of the caravan slowly wending its sinuous way towards us. It was quite a pleasure to watch them battling up through the storm, while the water of the lake, crumpled into big waves, was dashing against the shore. The two Cossacks in command, Chernoff and Cherdon, putting their heels into their horses' sides, galloped on ahead to my tent and reported, in military style, that all was safe, and then the whole party filed on past me in procession, which took them a good hour to accomplish, the camel-bells meanwhile jangling in solemn harmony. And when they were all settled down into their new quarters they gave the lake-side the appearance of a busy market.

My plan was to march on southwards until we reached a region with tolerable pasture, and there establish a fixed camp as a basis from which to carry on further operations. But a difficult piece of country still lay between us and the Arka-tagh, the highest mountain range on the face of the Earth. The ground was soft and gave way under the animals' feet, and we got entangled in a bewildering labyrinth of exasperating small hill ranges, where we were again and again obliged to turn back and retrace our steps. Every day I sent on pioneers in advance to reconnoitre and find out the best route for the caravan to take. In one place we lost thirteen asses, in another nine: but we saved their loads, and packed them on the horses, though not before we had cut them down considerably. Upon reaching the foothills which stretch in front of the mighty chains that form the Arka-tagh mountains, we

rested a couple of days to reconnoitre and search for a pass. Here the animals got the last bite of pasture they ate for a long, long time.

We had just finished putting up our tents and *yurts* (or Kirghiz tents), and turned the animals loose to graze, when Chernoff came to tell me there was a big bear trotting towards the camp, seemingly utterly indifferent to the strange intruders on his domain. Two of the Cossacks seized their weapons and ran to meet him. Their shots rang out both at the same moment. Bruin sprang round, turned tail, and set off up a hill-slope. We followed after him on horseback. But before he reached the top his strength failed him. He fell, and came tumbling down to the bottom of the slope like a ball. He was an old male, of a dark grizzly colour, and had been hunting through the marmots' earths. To judge from his hollow teeth, he must at one time have been furnished with formidable jaws. I kept his skin and skeleton, and had them preserved.

From our last encampment on the north side of the Arka-tagh, I sent home ten men and such of the asses as survived, and then continued my march over the repellent mountains which, in my experience, have always been so formidable to surmount. We made our way up through sterile valleys littered with gravel, battered every day by violent storms of snow and hail and rain. In this way the animals' strength became more and more exhausted in proportion as their burdens were made heavier and heavier.

The final slope up to the summit was extremely precipitous, and we were repeatedly brought to a standstill by the exhausted camels. The snow lay deep all around, and a howling snowstorm made it impossible to see the road in front of us. Three camels fell just below the pass, and were unable to get up again, so that we slaughtered them and left them, and two others shared the same fate on the summit of the pass. I did not doom them until it was unmistakably certain that their strength was utterly expended, then we put an end to their sufferings, a red stain on the snow showing where their bones would soon lie bleaching under the terrible winds of those awful altitudes.

Once over the pass of the Arka-tagh, we pushed on south through an absolutely unknown region, where we crossed innumerable mountain chains, over passes of stupendous height, skirted the shores of innumerable lakes, and forded innumerable rivers, but almost the whole time through a barren country, totally devoid of grass, so that every day the caravan animals grew more emaciated. We continued to shoot yaks, wild asses, and antelopes, and consequently were in no want of meat. The Cossacks also kept the camp supplied with partridges and wild geese.

The same parallelism in the mountain ranges which prevails throughout the whole of higher Asia characterizes the region of which I am now speaking—that is to say, the chains run from west to east,

and as we were travelling from north to south, we had consequently to cross over every one of them.

At camp No. 32 I weeded out the twelve worst camels, besides a number of inferior horses, and left them to follow on after us at a slower pace, under the charge of the Cossack Chernoff and four Mussulmans. Then, taking with me the rest of the caravan, I pushed on all the faster towards the south.

Rain and snow had made the ground as soft as pap; indeed, it was as though the earth were attenuated like the atmosphere, and were unable to sustain any weight. On one of the worst passes a big camel literally sank right into the bog, and could not be rescued. Every time we endeavoured to approach the spot where he lay we ran the greatest risk of sharing the same fate. We could only hope that the next day, when the surface of the ground was stiffened a little by the frost, we might be able by sheer force to drag the poor beast up out of the slough of despond into which he had fallen. But during the night he sank deeper and deeper, and at length died, frozen fast into the odious, treacherous morass in which he was engulfed. Another camel, although perfectly well and sound, absolutely refused to move, and accordingly we left him on a declivity where there happened to be a few blades of grass growing, in the hope that he would stay there and rest until Chernoff picked him up. But unfortunately Chernoff at this place made a *détour*, and consequently never saw the camel. This was the only animal I ever left behind me alive in any of my numerous journeys.

As camp No. 38 yielded a bit of tolerable pasture, we stayed there two or three days to rest. Whilst we were there the Cossacks chanced to catch sight of a bear, and whilst following him up came upon a Tibetan encampment of three men, with horses and yaks. The Cossacks hurried back to bring the news to me; and I at once sent them back again, with the lama to act as interpreter, to glean some information about the region we were in. But when they reached the place the Tibetans were gone, and our horses were not in a good enough condition to admit of our following them.

We learned afterwards that the Tibetan hunters posted off southwards and told the nearest native chiefs that an army of Russians was approaching from the north. Hence our arrival was known long before we suspected it, and a sharp look-out was being kept throughout the country north of Lhasa and along all the roads which led to that mystic city. I strongly suspected that this encounter with the Tibetan hunters would bode us no good. Accordingly, when we found there was very good pasture at camp No. 44, besides traces of recent nomad encampments in the neighbourhood, I decided to make that my main camp or base for further expeditions. At the same time I made haste to complete my Mongolian equipment, and after having made quite sure of

the position of the camp by astronomical determination, on July 27 I started for the south, accompanied by the Buriat Cossack Shagdur and the Mongolian lama. I left Sirkin in charge of the camp, with instructions to move on to some other place as soon as the pasture was done, and when *that* was finished to move on again to a third place, and so on. But he was always to leave behind him in every encampment a report of what he was going to do, so that I might be able to follow up the caravan. My Mongolian equipment was very simple; it consisted of two small cases, a tent, provisions for a few days, some Chinese silver, and a few surplus furs, everything being of Mongolian manufacture. We lived also in genuine Mongolian fashion. However, I also took with me a few small note-books, an aneroid barometer, a thermometer, compass, and chronometer, so as not to be obliged to discontinue my observations. Those whom I left behind looked upon the undertaking as a piece of madness, and thought that surely I had taken leave of my senses. For the first two days Ördek accompanied us, to keep watch upon our animals at night, so that for at any rate two nights we might sleep in peace. The animals we had with us were five mules and four horses. At the end of our second day's ride, or when we had left the camp 46 miles behind us, I had my head shaved as bare as a billiard ball, and my moustache cut off altogether. I looked horrible; but then I was something like a genuine Mongol, especially after the lama had for several days smeared my face with grease, till I was partly black and partly brown. We were all in good spirits. Our tent was pitched on a neck of land between two lakes, one salt, the other fresh, and the horses and mules, guarded by Ördek, were peacefully grazing a short distance away. About midnight Ördek came rushing into the tent, and woke us up with the cry of "Robbers! Robbers!" We snatched up our rifles and revolvers and hurried out, but the dim moonlight was barely sufficient to show us some mounted men hurrying away over the nearest hills, taking with them two of our horses. All thought of pursuit was, of course, out of the question, because, for aught we knew, our camp might even then be surrounded by a whole band of thieves. We therefore sat round the fire and talked till daylight, when we struck camp and travelled on farther towards the south-east. Poor Ördek had to trudge the 46 miles back to camp on foot. My men there looked upon us as lost for good and all. But I left instructions with the Cossacks that, if I did not return within three months, they were to make for Kashgar and report. On the third day we made a long march, and in the evening perceived some Tibetan horsemen keeping a watch upon our movements from a distance. From this time onward we made it a practice to divide the night into three watches of three hours each, so that each of us had his three hours to do sentry-go. Fortunately, we had two first-rate helpers in Yollbars and Malenki, the two biggest and fiercest dogs my caravan possessed.

And we always pitched our tent so that the animals were tethered on the side that was against the wind, for it was from that quarter that night visitors might be expected, and the dogs were tied up one at each end of the camp-line. Never shall I forget those interminably long night-watches, when I tramped backwards and forwards between Yollbars and Malenki listening to every the least suspicious sound. I had not the slightest difficulty in keeping awake; any moment we might be suddenly fallen upon. Many and many a time the dogs set up a fearful barking. Thereupon I would hear a noise in a certain direction, and would creep towards it, revolver in hand. Then the dogs would stop barking, and everything become still again.

On the third night we heard horses' hoofs, and the dogs became very uneasy. But a reconnaissance of the vicinity revealed nothing suspicious. It rained cats and dogs, and when my watch was over I was wet to the skin. And even after I crept into the tent I could hear the sweet little rivulets of rain trickling amongst our few precious belongings.

Our fourth day's march led through uninhabited and very hilly country. It rained in torrents both day and night without once ceasing. I confess I never saw such rain. Our tent stood beside a little lake. Fortunately for us there was a moon, which was able to shed a gentle diffused light through the dense masses of cloud that hung in the sky, and by its means we were enabled to keep in sight, though it was not altogether easy to do so, the line of animals tethered in front of the tent. During my turn at watching two of the mules contrived to get loose, and I had no end of a business running up hill and down dale to catch them again.

On the fifth day of our march we did a very long ride, passing on the way a caravan of Mongolian pilgrims. Late at night we came to a black tent, the owner of which, Sampo Singhi, a shepherd, gave us a friendly reception, and sold us a sheep, which he suffocated by holding his fingers in its nostrils. He also gave us cream and sour milk, so that for the next few days we fared quite sumptuously. In the course of the following day's march we forded the river Satyu-sangpo, at that time tremendously swollen by the rains. It was the worst fording of a river I have ever experienced. The water in its deepest part came up to the pommel of the saddle, and little more than our horse's head and neck was visible above the raging flood. The mule which carried the two cases was swept away by the current, and floated a good distance down-stream, upheld by the cases, which acted as swimming-bladders. My horse slipped into deep water, and gave me a thorough drenching before he got his feet again. Our encampment on the opposite bank was of a tragi-comical description. Not a scrap of dry wood was to be had, the *argol*, or dried dung, refused to burn, and it was impossible to move a foot without splashing into a pool of water.

The next day, the seventh of our journey, we crossed a wide, open expanse, bounded in the far distance by a range of low mountains, and overtook a caravan of three hundred yaks, led by thirty Tibetans, and laden with Chinese tea for Tashi-lunpo on the Bramahputra (Sangpo).

The eighth day carried us over a couple of very high passes, beyond the second of which we entered a region fairly well peopled with nomads; their black tents dotted the clefts and slopes of all the mountains in the vicinity. The next evening we pitched our tent in a sort of corrie beside a brook, and had to the south of us the mountains which overhang Tengri-nor on the north. We had now travelled a distance of 180 miles from our main camp. Thus far were we destined to go, but no further. For just before it got quite dark we were surrounded by Tibetans, who announced that we were their prisoners, and that one step further would cost us our lives. Our lama was in a panic of terror, and believed we should be instantly slain. We accordingly halted, and awaited passively the progress of events. Thirty-seven sentinels were posted round our tent. We saw the Tibetans' fires through the mist in every direction, but more especially on the road towards Lhasa. The next day, too, we kept tolerably quiet upon perceiving a band of fifty-three mounted men, armed with long black muskets, swords, pikes, and lances, spring up like mushrooms out of the ground, and gallop in extended order towards our tent. Uttering a string of the wildest yells, or war-whoops, they charged straight down upon us, but, swinging off to both sides, drove on past, then wheeled round, and came back again like a hurricane, flourishing their pikes over their heads. After that they pitched their tents close to ours, and began to shoot. This they did, it would seem, to inspire us with respect. Our impression was, that, if they intended to take our lives in a polite manner, it was scarcely necessary to levy so many people to do it.

After a while this later band arranged themselves in little troops, and rode off in the direction from which we had come. They were all dressed in black and red cloaks; the officers wore big white hats, while the remainder had red bands round their heads. As a rule, however, the Tibetans go bareheaded, and never have their hair either combed or cut.

Meanwhile we were treated with the greatest friendliness by the first-comers. An old lama assured us that we had nothing whatever to fear; the Dalai Lama had given orders that we should be treated with the greatest consideration, and that all we needed in the way of provisions should be provided us free of cost. Accordingly they brought us milk, butter, and lard in their bowls, and presented us with more mutton and firewood than we knew what to do with, nor would they accept any kind of payment whatsoever in return. In the course of a few days, he said the "bombo," or governor, of the province of Nakchu

would arrive, and then we should know our fate. And in due time the said high official put in his appearance, and we soon saw a large village of white and blue tents spring up alongside the road to Lhasa. Through his interpreter, who spoke Mongolian, the governor invited me to a grand banquet in his tent, but I answered that, if he wished to see me, he was at liberty to pay me a visit. Accordingly, in the course of the afternoon, we perceived a crowd of horsemen gallop out from amongst the tents and ride towards us. They consisted of Kamba-Bombo, governor of Nakchu, and Nanso Lama, accompanied by several other dignitaries, besides officers and soldiers armed as if for a campaign—sixty-seven of them in all, each man mounted and dressed in handsome ceremonial robes. I question whether they ever clearly understood who I was; but, seeing the pomp and ceremony they assumed, it was evident they imagined somebody out of the common was disguised beneath my tattered Mongolian garb. Kamba-Bombo rode first, surrounded by his staff. He wore a costume of yellow silk, had on a red head-dress and Mongol boots of green velvet, and was mounted on a big grey mule, with a costly saddle, and had his saddle-cloth embroidered with silver and turquoises. He dismounted, and, followed by a throng of his officers, greeted me politely, and, stepping into our wretched tent, took his seat on a bag of maize.

All these men carried swords, suspended from richly chased silver belts, ornamented with corals and rubies. They wore, further, *gavos* (or talisman cases) round their necks, and were adorned with rings, bracelets, and other finery, and had their hats trimmed with feathers. My honest lama was completely overcome by all this magnificence, and kept his eyes the whole time fixed on the ground.

Meanwhile Kamba-Bombo was in the very best humour, now that he had us completely in his power, and declared categorically that, no matter who we were, we must retrace our steps if we did not wish to have our heads cut off, at the same time drawing his hand significantly across his throat. I found it was perfectly useless to argue with him; he had imperative orders from the Dalai Lama. Thereupon he presented me with a couple of horses, a flock of sheep, and some provisions—gifts of priceless value, which, however, I was totally unable to return—and appointed an escort of three officers and twenty men to accompany us as far as the river Satyu-Sangpo on our way back. With these men we were soon on the most friendly footing, so that when they left us we felt quite melancholy.

At last, on August 20, we reached our main camp, thankful that we were still safe and whole in life and limb. For, although we had not had the good fortune to reach the "Holy City," we comforted ourselves with the thought that we had done our utmost to get there, even to the extent of risking our lives for that object.

With the full strength of my caravan once more behind me, I

proceeded southwards by a different route, being firmly resolved not to turn to the west until I should be compelled to do so by absolutely insurmountable obstacles. But we did not get very far before we once more had the Tibetans upon us. They sprang up on every side, their numbers increased, and they rode in close-ordered troops on both flanks of our caravan; then they disappeared, and anon reappeared, racing past us at full gallop.

With these bands we lived upon a sort of war-footing, and every night posted strong guards or outposts round our camp. We were but scantily supplied with ammunition; but luckily shots were not exchanged. When we showed signs of continuing our journey, the Tibetans sent a deputation to me, begging me, in touching terms, not to proceed further. When they found their request was unheeded, they hurriedly despatched couriers to Lhasa. Meanwhile we proceeded on our way.

One of my Mussulmans fell sick while we were on the shore of the lake of Naktsang-tso; so we made a couch for him on the back of a camel, and in that way took him with us when we marched again. But one afternoon, a few days later, when we stopped for the day, we found him dead on his living bier. On the following morning we buried him according to Mohammedan ritual, our molla reading prayers over his grave out of the Koran. The Tibetans watched our proceedings from a distance. They thought we were making a deal of unnecessary fuss over a dead man, and advised us to fling the corpse out to the wolves. Subsequently we witnessed how they did throw out a dead body to be devoured by vultures and ravens.

Later on that same day there was another rift in the lute. Hladyeh Tsering and Yunduk Tsering, two of the Dalai Lama's ministers or members of his *devashung* (or council) in Lhasa, came direct from the Holy City, bringing with them 500 mounted men, and against such a force I had no inclination to declare war. These officials read to me a proclamation from the Dalai Lama, which, amongst other things, contained the following passage: "Let letters be sent with all speed to Namsu and Naktsang, that no Russian can have permission to travel on any of the roads of Nakchu and inwards as far as my kingdom extends. Let letters be sent to all the chieftains. Watch the frontiers of Naktsang. It is absolutely essential to guard strictly every part of the country. It is entirely unnecessary that any European shall enter into the kingdom of the holy books and spy out the land. In your provinces they have nothing whatsoever to do. If they say they have, then know they must not travel to Lhasa. And if they do travel, then shall you lose your head. See to it that they turn back by the way they came."

Autumn was now approaching, and we had a long way to go to reach Ladak. Nevertheless, I stayed where I was until I had mapped

Naktsang-tso and Selling-tso. Thus for ten days longer we were honoured with the company of our Tibetan escort, though we lived on the best of terms with its leaders. We visited one another every day, and they arranged a *jigitovka* (or play on horseback), in my honour, gave me horses and sheep, and throughout treated me with the utmost politeness. Our united camps presented an imposing spectacle, with their sheets of tents, their innumerable fires, their troops of horses and horsemen. While my caravan, escorted by the Tibetans, marched from the eastern shore of the lake of Chargut-tso, round by the northern shore, I and Kutchuk the boatman crossed it by boat to take soundings, the arrangement being that the caravan was to look out for us at the western extremity of the lake. But a more disagreeable voyage it has never been my lot to participate in. When the caravan had disappeared behind the mountains which shut in the lake on the north, and we were far out on the water, we were overtaken by a violent westerly storm, and it was only by dint of the very greatest exertions that we managed to reach a tiny rocky islet; and there we were kept prisoners for forty-eight hours. At last the tempest subsided, and we continued our voyage by night, I making my soundings by moonlight, with the aid of a lantern. Next morning the storm broke out afresh, and we again took refuge on a similar rocky islet. In the afternoon of the same day we once more started, but only just managed to reach the western shore, through having to battle for our very lives with a third tempest. We only just escaped being wrecked; and, utterly exhausted by our exertions, we slept that night on the desolate lake-side, and, after going for one day more, were seen by the men whom the leaders of my own caravan sent out in search of us. On my return to camp I was greeted by the Tibetans with shouts of joy. During my absence they had manifested the utmost uneasiness, and kept incessantly asking the Cossacks where I had gone to. The latter at length told them I had rowed to the southern side of the lake, had there procured horses, and ridden to Lhasa. Instantly they sent out patrols of fifteen to twenty men to ride round the lake, and even go on farther to the south. In the mean time I and Kutchuk were quietly smoking our pipes on the tiny islet in the middle of the lake. But now they were convinced I had *not* escaped them, their delight knew no bounds. They met me on horseback and conducted me in triumph to their tents, where, under the protection of their idols of Buddha, and in the light of their oil lamps, I was entertained in the most sumptuous manner.

At this juncture Hladyeh Tsering and Yunduk Tsering, and a great part of their mounted force, took their leave of us. Nevertheless there was still a considerable escort left, and these men remained with us all the way to the frontier of Ladak, although their numbers gradually dwindled, until by the middle of December there were only twelve men

left. But by that time they were fully satisfied that I seriously meant to leave their country. Time, however, will not allow of my giving further particulars about this wearisome journey of three months' duration, right through Tibet from east to west. It was a time of severe trial for both man and beast. A strong west wind lay right in our teeth the whole of the time, and chilled us to the marrow with its icy blasts. The pasture was miserable in the extreme, and every day we lost camels or horses, or both; but, fortunately, the Dalai Lama had given orders that I should be kept supplied with as many yaks as I needed. As a rule we travelled between lofty mountain ranges, lakes grew less and less frequent, and the cold was intense. I also lost yet another of my men, making the fourth to die during this surpassingly trying journey.

By the middle of November there was scarce one-third left of the imposing caravan with which I started from the other side of the Arka-tagh. The country we travelled through was sparsely inhabited by nomad tribes; but we were everywhere received with friendliness and politeness, notwithstanding that almost the whole of Tibet was up in arms because of my attempt to reach the Holy City. I fear I must have caused them a fearful amount of trouble.

On November 19 the thermometer registered 48½ degrees of frost on the Fahrenheit scale. After crossing an uninhabited and almost waterless region, we reached, at the end of the month, the river Tsangarshar, and then followed it down as far as the temple-village of Noh, situated in a beautiful valley, thickly clothed with bushes and other vegetation, so that in the evenings we had magnificent fires to sit round. One day about this time we lost four out of our five surviving horses, and on another three camels.

After that we travelled for six days along the shores of Tsongombo, one of the most remarkable lakes I have ever seen. It resembles a Norwegian fjord, and is generally only a mile or two wide, though occasionally its width diminishes to less than a quarter of a mile, and in one or two places is actually not more than 20 or 30 yards wide. It is enclosed in a framework of steep and lofty mountains, and presents some magnificent scenery. As it was covered with a sheet of ice, I had to sound it from the frozen surface, over which I was drawn in an improvised sledge, made out of one of the halves of my collapsible boat. Our route took us along the northern shore. In one place the cliffs plunged down into the water so precipitously that it looked for a time as if we should be unable to proceed further. The pass which led over the mountain was impracticable for hoofed animals, and the lake was at this spot quite open water. But the extreme cold was an ally on our side. We had but to wait two or three days for the ice to thicken, and then we drew the baggage past the place of danger on an improvised sledge.

TSO-NGOMBO IN WESTERN TIBET.

TSANGARSHAR RIVER IN WESTERN TIBET.

After that we skirted along the northern shore of Panggong-tso. This lake formerly belonged to the basin of the Indus, but is now cut off and divided from it by a low pass, which acts as a threshold. Consequently its water is at the present time slightly saline, and the lake free from ice. Its fresh-water molluscs are on the high-road to extinction. Its former beach-lines are, however, wonderfully well defined.

On the frontier of Ladak we found a large relief caravan, sent from Leh to meet us, and here the last of our Tibetan escort turned back home, after having performed their mission in a more than satisfactory way. Then, with two of the Cossacks to bear me company, I pushed on to Leh by forced marches over the passes of Dugub and Jimreh. The temple of Jimreh stands on a shelf, or high cliff, overlooking the valley of the Indus. Here the lamas had no secrets to preserve, but showed me everything, and even took me into the very holiest nooks of their shrines.

I spent my Christmas with the hospitable Herrnhut missionaries in Leh, and on January 1 I was on the road to Calcutta, in response to an invitation from Lord Curzon, Viceroy of India, whose acquaintance I made several years ago. This meant a journey of over 260 miles on horseback to Srinagar in Kashmir, and of another 200 by rail to Rawal Pindi. It was a hard ride, being the depth of winter, and led over the pass of Zoji-la, which is always dangerous, and at that season of the year generally quite impassable. My only companion was the Cossack Shagdur. We crossed the pass on foot, and all went well. The danger lies in the fact that the road leads through a sort of gorge, which is apt to be partly choked with falling avalanches. The tramp through the pass took us four days, and I had a hundred coolies to carry my baggage. It is really a great wonder we came out alive, considering how many of the native Ladakis lose their lives on this pass every year. Fortunately we managed to get over before it was definitively closed by the snow. When I returned from India the gorge contained a far greater quantity of snow. Then from Leh I journeyed on over the nasty pass of Kara-korum, some 19,200 feet above sea-level, where Dalgleish was murdered some years ago, and then struck down to Yarkand and Kashgar. Arrived there, I dissolved what remained of my caravan, and its members, Christian, Buddhist, and Mussulman, scattered to the four winds, each to his home in various parts of Europe and Asia.

Before the paper the PRESIDENT said: We have amongst us this evening our old friend and colleague, Dr. Sven Hedin. It is now five years since he was with us, and during that time he has done an amount of work as a traveller by which he has equalled himself—we cannot say more than that—in his former expedition, for which he received the Royal gold medal of our Society. But I consider that he has done much more than that. He has shown himself to be a scientific geographer of the very highest merit—as a linguist, an observer, and a historian. Our Council this

afternoon has considered the very great merits of Dr. Sven Hedin, and has decided to award him at once our Victoria medal instituted for the highest record in geographical research. I am glad to be able to announce this to Dr. Sven Hedin and to the meeting. I will say no more now, but will call upon Dr. Sven Hedin to address the meeting.

Dr. SVEN HEDIN: I have to begin by expressing my deep and sincere thanks for the very kind words which Sir Clements Markham has addressed to me, and for the great honour I am receiving in the Victoria medal, of which I am very proud, and of which I will try to be worthy in the future. I think it a great honour, also, to be invited to the Royal Geographical Society to address you once more; and I am very glad to hear Sir Clements Markham call me an old friend. I feel as an old friend here; not as a foreigner, but as an old colleague of the Royal Geographical Society. I have been in Central Asia for several years—it is a long time. I have not had much practice with your beautiful and charming language. If I am not able, during the description of my journey, to find the right words in the right places, perhaps somebody will help me, so that you may know what I mean. It is certainly not possible to give a detailed description of a journey which has taken three years and three days in an hour and a half; and I shall not be able to give the contents of the paper which is to be published in one of the next numbers of the *Journal*. I may tell you that I am writing a book about the journey, and this book will be published next year. The scientific results will be published three or four years afterwards.

Dr. Sven Hedin then proceeded to give a *résumé* of his paper, illustrated by over a hundred lantern-slides.

After the lecture, the PRESIDENT called upon Prince Kropotkin to speak.

PRINCE KROPOTKIN: It gives me great pleasure to comply with Sir Clements Markham's request to speak on the description of the journey which was made by Dr. Hedin in Central Asia. I can only say that I am delighted to add my voice to the many voices of praise which Dr. Sven Hedin must have heard all over Europe—viz. in Russia (where he lectured in Russian before a very large audience); in Germany; in his own mother country; and at last in England. This journey covered certainly ground that had been explored to a very great extent by Russian, French, and English travellers, and the journey which he undertook for reaching Lhasa he could not continue till its end. Like all other explorers, he was compelled, when he was almost, so to say, in sight of Lhasa, to return; whereupon he took the route to Ladakh, which had been followed once by Littledale. But the interest of his journey has not been lessened by the fact that he did not reach Lhasa. He was but a very few days' journey from that capital of Tibet, and he had crossed, during his attempts to penetrate as far as this capital, the most interesting parts of Northern Tibet. He crossed the great border ridge, Altyn-tagh, and also those immense chains of mountains where we find, as he remarks, almost the highest mountains of the world, at least as high as the Himalayas. Very probably Sven Hedin will change the direction of these mountains, which are shown on this large map (of the German General Staff) running west and east, and his surveys will surely very much alter the whole aspect of the country represented on this map. They will surely show to us that the mountains are running in directions from the north-west to the south-east, and when his determinations of altitudes are calculated, we shall see what tremendous plateaus he had to cross between the border range and the spot where he was turned back. As to his levelling in the Lob-nor desert, and the archæological discoveries which he has made in the country of Lob-nor, they will certainly throw new light on the changes which have been going on in the basin of this great Central

Asian lake. With regard to Lob-nor, I will permit myself to remark that I do not think that the lake Kara Koshun—that is, the Lob-nor of Prjevalsky—can be considered as anything else but the present remainder from the great lake Lob-nor. But what appears to me almost quite certain, after Sven Hedin's surveys, levellings, and discoveries, is that there was first a time when Lake Lob-nor covered the whole of the triangular space which is limited on the west by the southward course of the Tarim, on the south-east by the Lake Kara Koshun, and on the north-east by the escarpment of the Kuruk-tagh, which runs in a north-west to south-east direction. The place of the Sixty Springs, Altimish-bulak, which had been visited previously by the Russian explorers, and lies, according to their determinations, at an altitude of 3600 feet, stands on the border of the escarpment, and the triangular space between the escarpment, the Tarim river, and the plains which spread at the foot of the Altyn-tagh, must have been occupied some time by a large basin, upon the shores of which stood that spot of the Lau-lan region, in which Dr. Hedin has found such interesting manuscripts. Later on, the lake occupied the eastern part only of that triangular basin; and now the Lake Kara Koshun, or the Lob-nor of Prjevalsky, represents the southern trough of that depression, which continues still to be occupied by what has survived of the Lob-nor. At any rate, when the full reports and the levellings of Dr. Hedin are published, and the whole region is better explored, it will certainly appear that within this triangular depression ("Lob Nor desert" on Stieler's Atlas map) the lake was changing its position in proportion as it decreased, and it may change it several times more before the general desiccation of Central Asia, which is going on at great speed, will finally move the Tarim lake further south-westwards to meet the Cherchen, and finally reduce what will remain of the Lob-nor to the little lake Kara buran, which we see at the junction of the Yarkand-daria with the Cherchen. The journeys which Sven Hedin has made are certainly an event in the exploration of Central Asia; and we must only congratulate him, and express to him our warmest thanks, and the thanks of all the geographers of the world, for the remarkable journeys which he has made, for the accuracy of the description which he has given, and for the mass of information which we can expect from the publication of the full scientific report of this journey, and which will even surpass what we have found in the reports of his former journey published a few years ago.

The PRESIDENT: There are several other authorities present who might have addressed the meeting, but it is too late, I am afraid, to continue the discussion; therefore it only remains for us to acknowledge to Dr. Sven Hedin the great pleasure that we have derived from his admirable descriptions of the country he has traversed. He has, however, given us no adequate idea of the perils and hardships through which he went in collecting this information; nor has he given us any adequate idea of the diligence and care with which, day by day, he mapped the country and took regular and most valuable observations. He did not mention whether he suffered from being at great heights. I now gather from him that he never felt the sickness often experienced in the ascent of mountains. I asked him because I have just received a letter from Mr. Douglas Freshfield, who maintains that this feeling of sickness at great heights differs with individuals in the same way as sea-sickness differs with individuals. While some suffer very seriously, others at heights up to 20,000 feet do not feel the sickness at all. I gather from Dr. Sven Hedin that he is one of those who never suffered at all at great heights. Prince Kropotkin has so fully described to you the great importance of the work that has been done by Dr. Sven Hedin, that it is only necessary to allude to his discovery of ruins, and of the interesting manuscripts that were found in them; and to the care he took in levelling on the plain where the great lake once existed, to show you the vast geographical

and historical importance of the work that he has done. And those are only two instances out of many. I am sure, therefore, that the meeting will unanimously pass a vote of thanks to Dr. Sven Hedin for his most interesting communication.

Dr. SVEN HEDIN: I may once more express my hearty thanks for the great kindness shown to me this evening by the Council of the Royal Geographical Society, for the great honour bestowed upon me in the Victoria medal, which will be a great and precious souvenir of this evening. And I am very glad, also, to have almost heard how silent it has been in the hall during my lecture. I have got encouragement in the silence and the attention of the audience, and that is a most agreeable feeling for a lecturer. I hope I shall be able in the future to give more details about this journey. It was a very poor and short description I could give you now. I am very glad and happy to hear the kind and eloquent words addressed to me to-day by Sir Clements Markham, and the extremely kind opinion by Prince Kropotkin. I shall be very glad from this evening to keep those words in memory. I am sorry that any other Asiatic specialists who are present here did not get time to speak. It is probably too late, but I hope another time they will get an opportunity of talking about Central Asia.

The PRESIDENT: I may mention to the meeting that Dr. Sven Hedin is publishing his atlas, which will consist of two volumes of maps besides text, and I trust that the wealthier portion of our Fellows will subscribe to this most valuable and important geographical work.

NOTICES, FROM CHINESE SOURCES, ON THE ANCIENT KINGDOM OF LAU-LAN, OR SHEN-SHEN.

By GEORGE MACARTNEY, C.I.E.

IN his lecture delivered before the Royal Geographical Society on December 8 last, on his "Three Years' Exploration in Central Asia," Dr. Sven Hedin gave us a graphic description of the ruins of an ancient town on the border of the old Lob-nor. Amongst the finds brought home by him from this site were many Chinese manuscripts, which have been identified to be of the second and third centuries A.D. Some of these manuscripts bear not only the dates, but the name also of the locality where they were written. This name is Lau-lan, and the knowledge of this fact is one of special interest. The actual name of Lau-lan is well known to modern Chinese geographers, but hitherto, apparently, neither they nor savants in Europe have been able to fix with anything like accuracy the position of the country anciently called by that name. Mr. A. Wylie, a Chinese scholar of eminence, in 1880 had computed this position to be 39° 40′ N. lat. and 94° 50′ E. long. Now, this would show an error approximately of 250 miles if we are right in understanding that the place where Dr. Hedin found the Chinese manuscripts bearing the name of Lau-lan was in about 40° 40′ N. lat. and 90° E. long. The more accurate localization of Lau-lan, now apparently possible, may, it is hoped, lead to some useful results in the identification of other neighbouring countries whose ancient names are known, but whose positions are still a puzzle to modern geographers.