

### THE LOB-NOR CONTROVERSY.\*

WHEN Dr. Sven Hedin made, in October last, a communication to the Russian Geographical Society on the discovery of what he considers to be the true historical Lob-nor, a lively discussion ensued. P. K. Kozloff, who knows the region well, as he has visited it more than once as a companion of Prjevalsky, and as a member of the last Tibet expedition, took an important part in the discussion, and now he sums up his arguments in a paper published both in the *Izvestia* of the Society and as a separate pamphlet.

The controversy, as is known, is about what is to be considered as Lake Lob-nor. No lake is called Lob-nor by the natives; they give that name to a whole region. Prjevalsky discovered an elongated lake, Kara-koshun-kul; also Karaburan, which runs west-south-west to east-north-east in  $89^{\circ}$ - $90^{\circ}$  E. long., its south-western extremity being 35 miles south of  $40^{\circ}$  N. lat. It became known since that this lake is continued towards the east-north-east by an old lake-bed, as far as  $91^{\circ}$  E. long. On the other hand, Sven Hedin discovered a chain 30 miles long, composed of four small lakes, running north to south in the north-west of Prjevalsky's Lob-nor. Kozloff had, two years before Hedin, visited the southern lake of this chain, which lies almost under the 40th degree of latitude; but Hedin went along the eastern shore of the whole chain.

When Prjevalsky's discovery became known, Baron Richthofen contested it. He maintained that the Kara-koshun-kul cannot be the Lob-nor, which has a more northern position on a Chinese map of the region; and now Sven Hedin claims that the chain of lakes which he has discovered along an old bed of the Konchedaria must be a relic of the Lob-nor, which formerly extended in that latitude further east; while the Kara-koshun-kul is but a temporary and recent formation, which, indeed, has much decreased since Prjevalsky's first visit in 1884-85, while the northern chain of Sven Hedin's lakes has increased since. This northern chain occupies, as to its latitude, the position given to Lob-nor on the Chinese map. Richthofen wanted, moreover, to identify the southern lake (Prjevalsky's Lob-nor) with another lake, Khas-nor (or Khas-omo), marked on the Chinese map.

P. K. Kozloff proceeds systematically in his paper, and gives in it all documents relative to the controversy; especially he quotes passages from the Chinese work, 'Si-yui-Shui-dao-tai,' published in 1823, relative to the region, and gives a reduced copy of the Chinese map published by Dr. Georg Wegener in 1863, upon which map Richthofen and Sven Hedin based their arguments. He reproduces next the texts of Prjevalsky's description of the Lob-nor, as given in his preliminary reports and travels; the geologist K. Bogdanovich's description of the same, as well as abstracts from his own diary relative to his visit, in 1893-94, to the region of the lakes discovered by Sven Hedin, and of the sandy deserts where the old bed of the Konchedaria is still seen in the north-east of Sven Hedin's lakes. He reproduces, also, the text of Hedin's description of the lake, and his remarks and arguments in favour of his hypothesis (taken from his paper, "Das Lob-nor Problem"). Finally, he publishes a map of the region, upon which all new discoveries and the journeys of Sven Hedin and Kozloff are marked. This map, alone, would be a weighty argument in the controversy.

Prjevalsky's description of the Lob-nor is well known to English readers, and it need only be mentioned that when he questioned, in 1885, during his second journey, the natives settled on the Lob-nor as to the possible existence of another lake situated northwards, they all replied in the negative, explaining at the same

\* Map, p. 692.

time that, according to tradition, the lake was always situated in the same spot where they now lived.

In the autumn of 1890 the Lob-nor was revisited by the Tibet expedition of M. V. Pevtsoff; and as his description was never published in English, some abstracts from it are reproduced here.

"The lake of Lob-nor," wrote General Pevtsoff, "represents, according to the unanimous testimony of the natives whom I questioned, a large basin, mostly covered by thick and unusually high rushes, which reach in some places the height of 28 feet, and a thickness of more than an inch. It has an oval shape, and its longer axis runs from the south-west to the north-east for more than 62 miles; its width is about 25 miles. Kunchikan-Bek, who went round the lake, informed me that he made the journey in five days, travelling at the rate of about 30 miles a day. This Bek asserts that the lake is surrounded by a vast uneven area of clay, impregnated with salt, quite sterile, and covered in places with shells. Riding on its uneven hardened surface is very difficult, and only possible near the edge of the rush, where the ground is softer and more even. In vain did Kunchikan-Bek look out for convenient spots for settlements on the shores of Lob-nor. He found none.

"In the south-western portion of the lake, near the mouth of the Yarkand-daria (Tarim), there is an area of about 7 miles in circumference, which is free from rush-growth, and where the depth is 14 feet. But of such large open basins there are few, the rest of the spaces not covered with rush being much smaller. The same portion of the lake contains a narrow channel of about 13 miles long, in which one notices a very weak current of fresh water from the Yarkand-daria (Tarim), but on both sides of this channel the water of the lake is slightly salt.

"According to the unanimous testimony of the natives, the lake Lob-nor is becoming more and more shallow every year. The old folk still remember that it was much larger and contained incomparably more open areas. In the village of Abdal, situated  $2\frac{1}{2}$  miles above the mouth of the Yarkand-daria (Tarim), there lived during our sojourn a man, 110 years old, named Abdul-Kerim, who represented living annals of the physical changes which took place in the lake during his long life. He was still healthy and walked about freely, but he spoke so indistinctly that only his son, Arkhei-jan, fifty-two years old, could easily understand him, and with him we often spoke of the old times. The latter transmitted from his father to me that great changes had taken place in the Lob-nor since his father's youth. The old man said that he would not have recognized his country if he had spent his life abroad and had returned home in his old age. The lake Lob-nor, during the young days of Abdul-Kerim, i.e. more than ninety years ago, was in its south-western portion free from the rush, which grew only in the shape of a narrow rim along the flat shores, while the open area of water in the lake was spreading to the north-east as far as the eye could see. The mouth of the Yarkand-daria at that far-off time was  $2\frac{1}{2}$  miles more to the west than the present one, just opposite the spot where Abdul is situated now.

"The depth of the lake was much greater than it is now, and on its shores there stood many villages, from which hardly any traces are left now. In consequence of the gradual shrinking of the lake and its getting grown over with rushes, the inhabitants of these villages were obliged to leave their sites and to settle on the lower Cherchen-daria. Thus were deserted, one after the other, the villages Tur-kul, Bayat, Lob, and Kara-koshun.

"The river Yarkand-daria (Tarim), in accordance with tradition, was flowing two hundred years ago more to the north than it now flows in its lower part, and it discharged itself into a small lake, Uchu-kul, which communicated with the

Lob-nor by a channel. This tradition was confirmed by the old man, Abdul-Kerim, who heard of it from his grandfather, during whose life the river ran still in the just-mentioned place, and afterwards changed its channel. The ancient bed of the Yarkand-daria, called at present Shirga-chapkan, is clearly visible up to the present time. There are still, here and there, stumps of trees which grew on the shores of the river. . . .

"Twenty-five miles to the south-west from Lob-nor lies another large lake, Kara-buran (black isthmus), about 38 miles in circumference.\* This lake (Kara-buran), like Lob-nor, is mostly covered with high rushes. In its western part there are, however, several open areas of sweet, unusually clear water reaching 5 miles in circumference, the depth being up to 28 feet. . . . The Kara-buran is fed by the waters of the Yarkand-daria (Tarim) and the Cherchen-daria, of which the first flows into its north-eastern part, and the last one into the western part. . . .

"All along the Kara-buran, from the very mouth of Yarkand-daria, there runs, amongst the growth of rushes, a narrow channel, widening in places into lakes. In this channel a weak current is to be noticed, and one can row on it in a boat.

"The Yarkand-daria, on issuing from the lake Kara-buran, carries pure and fresh water, which, however, is not so clear as in the lake itself. This river, on the whole distance from Kara-buran to Lob-nor, has a winding bed and rather high shores, but its width does not exceed 175 feet. It flows with a velocity of about 4 feet in the second and is everywhere very deep; its length between the lakes, counting with the windings, attains 38 miles. . . .

"About 32 miles from Chighelik, near the spot Kabagassy, the Yarkand-daria receives from the left a branch of the Konche-daria, which contains plenty of water, and forms in its course a chain of four lakes. In 1880 the Konche-daria, about 22 miles from its mouth, has opened for itself a channel in a south-eastern direction into a valley, which further on turns to the south. On its way along this valley it has formed four deep lakes—Chivelik, Sogot, Talkeichin, and Tokum-kul, each of them from about 3 to 4 miles long, and about 1 or 2 miles wide, covered on the shores with high rushes. . . ."

After having reproduced the above important extracts from General Pevtsoff's work, Kozloff gives an excellent picture of the present state of Lob-nor, and very interesting conjectures as to its former development by the geologist of the Tibet expedition, K. T. Bogdanovich.† According to the observations of Bogdanovich, there are in the Lob-nor region doubtless dunes whose characteristic distribution in rows could not be accounted for otherwise than by supposing that they mark an ancient shore-line of the Lob-nor.

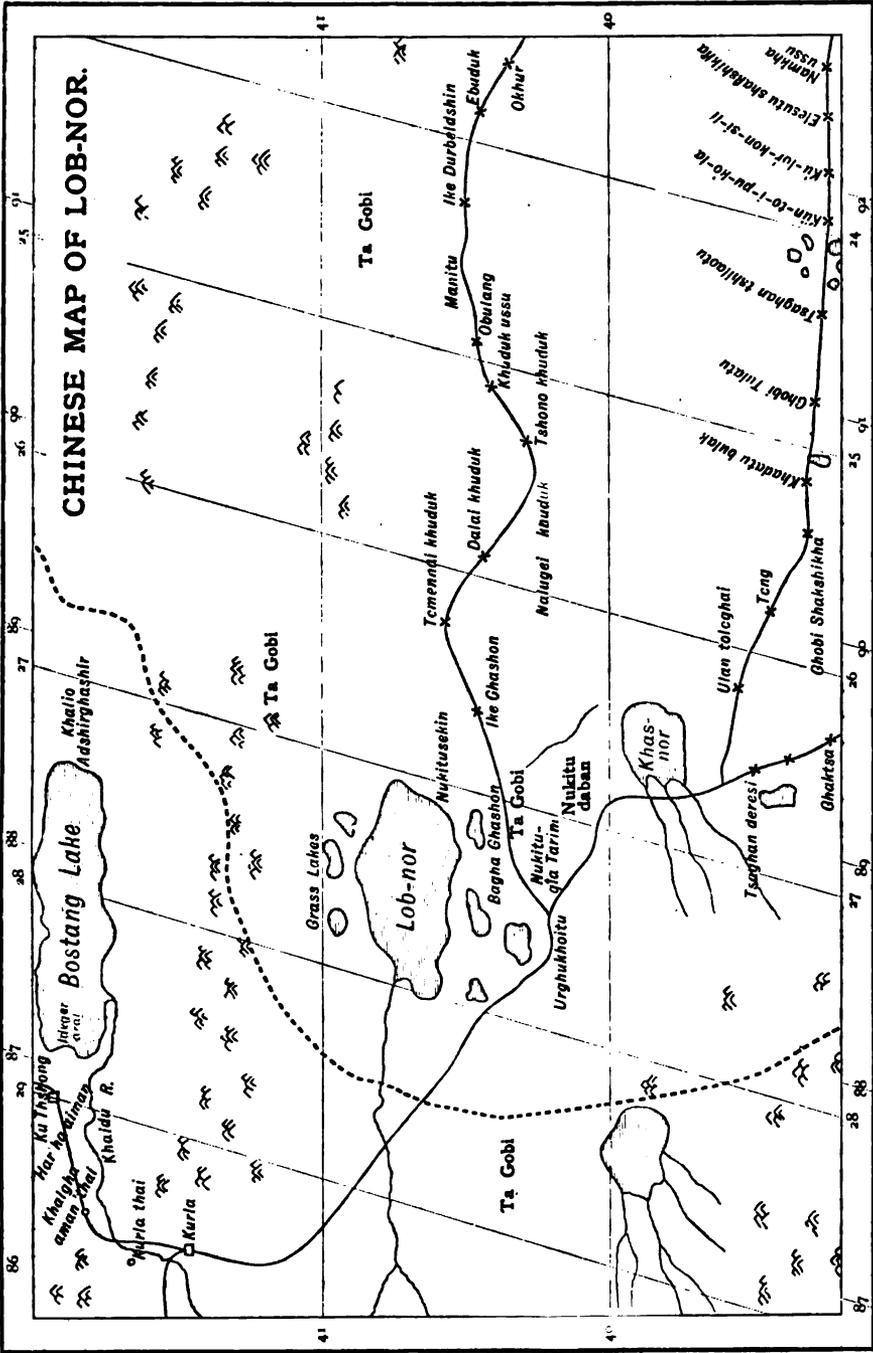
Kozloff gives next extracts from his own and Boborovsky's descriptions relative to the region, his visit to the southern lake of the chain of lakes discovered by Sven Hedin, and reproduces in full Sven Hedin's interesting description of the part of his journey which he made along the eastern shore of the lakes and his discovery, as given on pp. 305-361 of vol. xxxi., 1896, in the *Zeitschrift* of the Berlin Geographical Society, under the title of "Das Lop-nor Problem." The cartographical results of Sven Hedin's investigations are given by Kozloff in the map (p. 655), which is reproduced from the *Izvestia*.

After having thus brought before the reader all the necessary materials for forming an independent judgment, Kozloff takes one by one Richthofen's arguments. To the argument based on the fact that the Kara-koshun-kul is a fresh-water lake, while the Lob-nor is a salt lake, Kozloff replies that the Kara-koshun-kul

\* Kara-bouran, according to Prjevalsky (Kozloff).

† 'The Works of the Tibet Expedition' (Russian), part ii., 1892, pp. 95-100.

# CHINESE MAP OF LOB-NOR.



Walker & Bewall, Jr.

contains fresh water only in the channel of the Yarkand-daria, which flows through it. As to the borders of the lake where the water does not flow, it is slightly salt, and further to the east it becomes more salt, even bitter. This was pointed out by Prjevalsky, Pevtsoff, the Prince of Orléans, Sven Hedin, and Kozloff himself. The further one proceeds from the spot, where the Yarkand-daria enters the Kara-koshun-kul, the more salt is the water, and at last even the camels refuse to drink it. The drying-up bottom of the lake is impregnated with salt, and areas of clay impregnated with salt surround it. All this is in accordance with both the historical facts and with theory.

The main argument of Richthofen was the Chinese map upon which the Lob-nor is marked one degree further north than Prjevalsky's Lob-nor. This is true, Kozloff says, but the map is wrong. The position of the spot Airylgan, where the Konche-daria joins the Tarim, was already determined by the Jesuits in 1760-65, and was found to be  $40^{\circ} 2' N.$  lat. and  $87^{\circ} 23' E.$  long. Its true position, as determined by General Pevtsoff, differs very little in latitude from the Jesuits' determination: it is  $40^{\circ} 8' 7'' N.$  lat. and  $88^{\circ} 20' E.$  long. And yet the Lob-nor was placed on the Chinese map much further north.

Richthofen wanted also to identify Prjevalsky's Lob-nor with the Khas-nor on the Chinese map; but the country in the south of Lob-nor is not flat on the Chinese map, as it bears between the Lob-nor and the Khas-nor an inscription, "Nukitu dahan," which means "Nukitu pass." So it is in reality, as seen from V. M. Uspensky's paper, "The Land Kuke-nor or Tain-hai,"\* compiled from Chinese sources, in which paper the Nutsitu range of mountains is mentioned. The lake Khas-omo of Richthofen and Khas-nor of the Chinese map is evidently Prjevalsky's Lake Ghas, and this was pointed out at once to Sven Hedin by the Russian geographers. It also has in reality a more southern position than on the Chinese map ( $38^{\circ} 7'$  instead of  $38^{\circ} 15'$ ). If the latitudes be corrected on the Chinese map according to recent determinations, the whole argument based on the Chinese map falls to the ground, Kozloff remarks.

Kozloff analyzes next Hedin's arguments based on the old course of the Konche-daria (or Kum-daria), which Kozloff visited under the 90th degree of longitude and mapped; these arguments—although very interesting—are too lengthy to be reproduced in full, but he words his conclusions as follows:—

"The Konche-daria thus took formerly a more eastern direction. Gradually its course was more and more diverted southwards, as is proved by the old beds which are now seen between the old Konche (Kum) daria and its present bed. After having thus turned full 40 to 45 degrees to the right, it took its present bed toward Airylgan, where it joins the Tarim. At any rate, even in those remote times the river flowed towards the lowest part of the desert which it watered—that is, into the Lob-nor.

"There was undoubtedly a time when the Lob-nor spread much more northwards than it does now; its western shore lay along the line Urten—Abdal—Airylgan, as is proved by the only dunes preserved in Kaahgaria (see Bogdanovich's reports). As to the southern shore of Lob-nor, it occupied approximately the same position as it has now, and along it ran the road from Lob-nor to Sa-chau, which was followed six hundred years before me by Marco Polo.

"In the upper part of its shifting course, between Gheralgan and Turpan-korul, the Konche-daria shows some old dry beds, but has now a defined water-course. In the swamps adjoining Tykenlik we have the first store-basin, in

\* *Memoirs (Zapiski) of the Russian Geographical Society, "Ethnography,"* vol. vi. 1890.

which a first transmission of water takes place from the Konche to the Tarim—that is, to the Kunchikash-tarim, which joins the Yarkand-tarim at Airylgan, and which, therefore, the natives quite rightly named Konche-daria to Prjevalsky. The investigations made by Sven Hedin in the spring show that two-thirds of the water of the Konche-daria runs in cascades into Kok-ala, and only one-third continues to move in the former direction in a deep bed, bending abruptly in its lower half towards the south. From this remarkably long old bed—Ilek—a comparatively small branch flows into the Kunchikash-tarim above Airylgan, and a still smaller one below Airylgan to join the Yarkand-tarim. Such was, I believe, in a broad outline, the scheme of the Konche-daria before the lakes discovered by Sven-Hedin had been formed.

“The level of the water in the Konche-daria stood then somewhat higher than it stood in the Tarim, as is now the case near Tykenlik, where the Konche-daria falls in cascades into Kok-ala. From nine to fifteen years ago, the waters of the Konche-daria, always deflected westwards, so as to approach, so to say, the Tarim, came down almost to the same level as this last. At that time, just in the middle of Kunchikash-tarim, where the shores are comparatively not high and solid, a trench was formed, as the natives say, and the water ran back to the old bed Ilek, inundating the sandy and salted depression of Ohivellik, and thus revived the nearly dried-up lake-shaped valley of the Ilek, which the natives now began to name Avyulu-kul, Kara-kul, Sogot (Arka-kul), etc. A great portion of the water, however, again returns down the nearest old bed to the Yarkand-Tarim, while a very small portion only flows further down, along the more distant part of the old bed, where most of the lagoons were entirely dried up. I consider that such an abnormal deviation towards the east is merely temporary; the sand and the wind, working hand in hand, will necessarily soon raise the bed of the river, and they will thus deflect the water in its proper direction towards the west. Then the lake-shaped old bed will again begin to dry up, and while this will be going on, the Kara Koshun-kul—that is, the true Lob-nor—will continue to be further reduced in size. But several water-arteries will finally join in the principal one, the Chu-tarim, although, of course, unimportant fluctuations may take place in the mean time.

“More serious changes will happen in the future, when the Tarim will join the Konche-daria in the meridian of Kuria, and will flow in its lower part again in the bed of the Ketek-tarim, while the present basin of Lob-nor will move also south-westwards, and will form something in common with the present Kara-buran, spreading at the same time to the north and to the east; but it will hardly abandon the salty depression which from time immemorable was the bed of Lob-nor, and maintains this historical name.”

Kozloff's final conclusions are the following: “The Konche-daria, since very remote times till the present day, has moved a long way. The spot Gherelgan may be taken as a spot of relative permanence of its bed, while the basis of its delta is a line traced from the farthest northern border of the area of salt clays surrounding the Lob-nor to the Tarim. At a later period the Konche-daria mostly influenced the lower Tarim, and each time a change occurred in the latter's discharge, the Konche took a more westward course, to the detriment of its old eastern branch (Ilek). Always following the gradually receding humidity, the vegetable life changed too, while moving sands were taking its place, conquering more and more ground for the desert, and marking their conquest by remains of old shore-lines. . . .

“The facts noticed by Sven Hedin have thus another meaning—the desert in the east of the lakes, which he discovered, was formed, not by Lob-nor, which is situated 1° southwards, but by the Konche-daria, in its unremitting deflection

to the west. The old bed Ilek, lake-shaped in places, and having a belt of salt lagunes and swamps along its eastern shores, represents remains of waters belonging, not to Lob-nor, but to the shifting river which has abandoned this old bed.

"These facts and explanations refute the second point of the arguments which were brought forward by Sven Hedin in favour of his hypothesis, asserting the existence of some other Lob-nor.

"I accept the third point of his objections, namely, that the grandfathers of the present inhabitants of the Lob-nor lived by a lake whose position was more to the north of Lob-nor; that was mentioned already by Pevtsoff, and the lake was Uchu-kul.

"Why Marco Polo never mentioned the Lob-nor, I leave to more competent persons to decide.

"The only inference which I can make from the preceding account is that the Kara-koshun-kul is not only the Lob-nor of my lamented teacher, N. M. Prjevalsky, but also *the ancient, the historical, and the true Lob-nor* of the Chinese geographers. So it was during the last thousand years, and so will it remain, if 'the river of time' in its running has not effaced it from the face of the Earth."

## NORTH-EAST NICARAGUA.\*

By JOHN M. NICOL, C.E.

NICARAGUA has only been half explored, and very few surveys have been made; the latter have been mostly done by compass, with the exception of those for railway and canal work. The accompanying map is copied from a reduction of the Government map, with some alterations made after going through the country myself, and after collecting all the reliable data I could get. It is, of course, not correct, but is probably the most reliable extant. The red lines indicate my various routes. I also travelled, by canoe, up the rivers Coco, Wasspook, and Pis Pis from Cabo Gracias to the Pis Pis mines, and on foot from the mines to Matagalpa. This journey took me nearly two months, and as the country is almost uninhabited, and covered with dense forests, we were often short of food, living principally on monkey meat. The area within the dotted red line is almost all of a gravel formation, with pine forests and grass land, very healthy, and free from insects.

BLUEFIELDS.—The real harbour here is just inside the lagoon behind the bluff; Bluefields town is situated on the further and shallow side of the lagoon, and is quite inaccessible to craft drawing over 14 feet of water, and even these often drag on the oyster-beds. The only way to save the town, and place it in direct communication with the steamers, would be to throw an embankment across the channel separating Deer island from the mainland, where the shallow water is only from 2 to 3 feet deep, and abundance of the necessary material could be obtained behind Bluefields. On this embankment and on a second at the other end of Deer island a tramway could be laid down, thus connecting the town with the small island opposite the bluff; and, if necessary, a further anchorage could be dredged where are now the oyster-beds, or a regular harbour could be constructed there.

The present bar averages 12 to 14 feet of water. Bluefields is a healthy little town of about 3000 inhabitants; it is well laid out on high ground, and has plenty of room for expansion. According to Dr. Garces, the Government engineer, it is

\* Map, p. 692.