out some interest, as no one has had the opportunity of navigating in those waters before my companions and myself.

In presenting this notice to yourself and the illustrious Society over which you preside, I beg leave to add, as an apology for its defects, that it is not written by a man of science, but by a rough sailor, and in a language which is not his own.

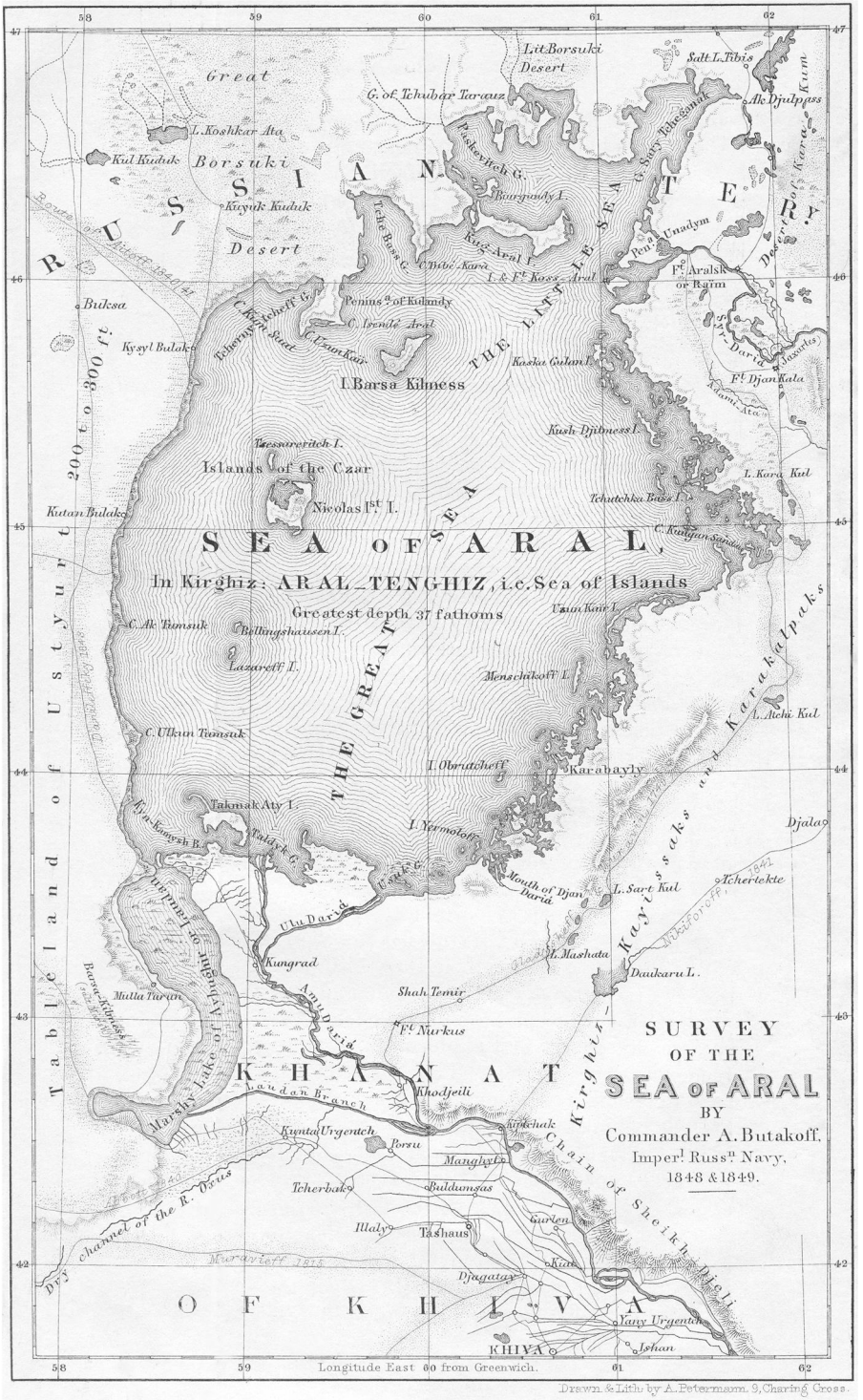
With the sincerest respect,
I have the honour to be, &c.

Orenburg, 19*th* (31*st*) *Aug.* 1852. ALEXEY BUTAKOFF.

Before the year 1848, the Sea of Aral was laid down on maps only from superficial and partial information derived from the native Kirghiz. In 1846 the astronomer M. Lemm was charged to determine a series of astronomical points in the Steppe, from the fortress Orskaïa to the banks of the Syr Dariá (Jaxartes). In 1847, a small vessel, the schooner 'Nicolas,' built at Orenburg, after the model of Caspian fishing-vessels, and destined for the survey of the Sea of Aral, was transported in pieces over the Steppe to the Syr Dariá. After being put together and launched, she had only time that season to make the survey of a part of the eastern coast, 70 versts southward of the mouths of the Syr Dariá. During the first part of the summer of 1848, MM. Akisheff and Goloff, belonging to the Corps of Topographers, made on board the 'Nicolas' the trignometrical survey of the whole northern coast, from the mouths of the Syr to the Cape Kum Suat.

In the beginning of 1848 I had the honour of being appointed at the head of a hydrographical expedition, charged with the complete exploration of the Sea of Aral. Arrived at Orenburg the 5th (17th) March, I began immediately the construction of the flat-bottomed schooner 'Constantine,' 50 feet long, which being finished on the 28th April (10th May) was transported in pieces over the Steppe, put together at Aralsk (Raïm), launched the 20th July (1st August) into the Syr, and on the 25th July (6th August) I sailed in her to explore the Sea of Aral.

The results of my first exploring voyage were—1st, a general reconnoissance of the sea; 2nd, soundings in divers directions; 3rd, the determination of many latitudes; 4th, a geodesical survey of the Isle Barsa-Kilmess; and, 5th, the discovery and survey of a group of islands, which I named *Islands of the Czar*, and which were entirely unknown even to the Kirghiz. The largest of these islands, *Nicolas the First*, is covered with steppe-wood (saksaul, anabasis ammodendron, or pinus orientalis, janquil, &c.), and its only inhabitants were innumerable saigaks, a sort of antelope. There were no vestiges of human beings, and the best proof that none have ever been there, was the circumstance that the saigaks,



Drawn & Lith.d by A. Petermann, 9, Charing Cross.

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generally very timid and watchful, did not fly from us, out, on the contrary, looked at us with a sort of curiosity. Such confidence could not last long; and, after two months' difficult navigation, living on salt food, exposed to constant heat and hard labour, we were but too happy to feed on the dainty flesh of these innocent animals.

I passed the winter of 1848-9 on the Isle Koss-Aral, at the mouth of the Syr, in a small fort, protecting our fishery, belonging to a company of Orenburg.

The only remarkable incident of my wintering there was a tiger-hunt in our near neighbourhood. On my return to the Syr, the first news was that a tiger had recently devoured four cows belonging to the fishery, on one of the islets of the delta. About two weeks afterwards I heard from the Kirghiz, that the same animal had devoured two men and a number of sheep; and on the 21st Nov. (3rd Dec.) the foreman of the fishery reported to me that this tiger had killed their horse at only 3 versts from our fort. It was necessary therefore to exterminate such a neighbour at any rate, the more that his fresh traces were seen quite close to us on the sand; and I went immediately against him with 35 men of my garrison. We made a battue and it was lucky; the tiger being killed without any injury to us. It was a real royal tiger, of a beautiful orange colour with broad black stripes, uncommonly fat, and 6 feet 4 inches long from the nose to the beginning of the tail. Tigers roam constantly in the vicinity of Aralsk, and particularly in winter, notwithstanding the frosts. On surveying the eastern coast of the sea I found in many places perfectly fresh traces of tigers' paws on the sand of the strand. Almost every year our soldiers and Cossacks kill two, three, even four of those animals.

I began my next campaign the 5th (17th May). Having charged M. Pospeloff, who received the command of the 'Nicolas,' with the survey of the eastern coast, its islands, and the sounding of the northern part; I took the rest of the coasts to myself, as well as the determination of the astronomical points, and the sounding of the open sea. Thanks to Providence, and the most exemplary zeal of all my subordinates, our labours were crowned with the most complete success; notwithstanding manifold risks and difficulties, inseparable from an exploring expedition on waters so boisterous and so completely unknown. Notwithstanding a good deal of privation, we returned from our work with entire and healthy crews; though the vessels had become leaky. Generally speaking for such expeditions, nobody can be better suited than a Russian sailor or soldier—for he is active, intelligent, obedient, patient, and adventurous; it is not easy to discourage him—he laughs at privations, and dangers have in his e es a particular sort of charm.

I consider it an agreeable duty to render the most complete justice to the zeal and ability of M. Pospeloff, who executed, in the most creditable and conscientious manner, the survey of the eastern coast; to our topographers, Rybin and Khristoforoff; to the Assistant-Surgeon, Istomin, who, beside his medical duties, was my assistant-astronomer; and to the non-commissioned-officer, Werner, who acted as mate, geologist, and botanist.

Of the astronomical results I think it necessary to say a few words of explanation. The latitudes are determined by meridional altitudes of the sun. Wishing to have for my longitudes an independent starting-point, I determined that of Koss-Aral (the fort) by lunar distances from the sun, and attached to it all the other points chronometrically. The longitudes of M. Lemm are calculated from the first geographical meridian, and as I wanted to attach mine to two of his, I took the difference of longitude between Greenwich and Ferro 17° 45′ 8″, communicated to me by the late Admiral Bellingshausen, under the idea that the first geographical meridian passes still through that island. On placing those two points (Aralsk or Raïm and Ak-Djulpass) on my chart I found them exactly corresponding with the geodesical survey of that place, and was satisfied with that circumstance. But on my return to St. Petersburg I learned—a thing not much known among sailors—that geographers take their first meridian 20° W. of Paris, without reference to the Isle of Ferro. This makes a difference of about 0° 5′ between my longitudes and those of M. Lemm. Which of us is right and which wrong? My longitude of Koss-Aral was the result of two lunar distances from the sun, one eastern and the other western. Every one acquainted with astronomy knows to what errors the mode of taking lunar distances is liable even with experienced astronomers. On the other hand, the longitudes of M. Lemm were determined chronometrically from the fortress Orskaïa—consequently, even with his well-known skill, some slight variations in the rate of his chronometers might have occurred in a long lapse of time. I hope to settle that point by determining the longitude of Aralsk by means of occultations of the stars, by the moon, and by meridian passages of the moon. For this purpose our distinguished astronomers, MM. Simonoff, Savitch, and Knorre have promised me their kind co-operation. After that I shall take as accurately as possible the chronometrical difference between Aralsk and the fort of Koss-Aral—(an ophthalmia did not allow me to do it at the end of my exploring campaign)—and thus I shall correct all the longitudes of the Sea of Aral. I hope that this will also serve to correct the longitudes of M. Lemm.

The northern and eastern coasts of the Sea of Aral, and the

Islands of the Czar, Kug-Aral, Barsa-Kilmess, Bellingshausen, are surveyed geodesically "*à la planchette.*" The capes Kum-Suat and Isendé-Aral are placed after their latitudes and bearings by compass (corrected by its declination) from Uzun-Kaïr; the cape Tubé-Karà and the southern extremity of Barsa-Kilmess are placed after their latitudes and bearings from Isendé-Aral. I had before the survey of the western coast, also "*à la planchette,*" but finding it too dangerous because of the violent winds and breakers, I was obliged to content myself with the common maritime survey, by bearings from the vessel.

The southern coast and Isle Takmak-Aty are surveyed in the same manner. On comparing the survey of the western coast with the astronomical points, Ak-Tumsuk and Ak-Suat, I found them almost coinciding the one with the other.

Not being a geologist or naturalist, but wishing to make my labours useful to science, I begged Colonel Helmersen, Inspector of the Imperial School of Mines, to furnish me with advice. I am particularly obliged to him for the clearness and precision of his instructions, by the aid of which one of my subordinates, the non-commissioned officer Werner, collected samples of rocks, measured the thickness of the strata, and noted their inclination and direction: he also collected samples of plants, with roots and flowers, according to instructions which the late Admiral Bellingshausen had the kindness to send me. The geological collection was despatched to the Institute of Mines, and Colonel Helmersen wrote a description of it in German, which he sent to the Baron von Humboldt; whilst 75 samples of the Aralese Flora were sent to M. Fischer, formerly director of the Imperial Botanical Garden. The zoology and ornithology of these places must be known from the descriptions of MM. Lehman and Basiner. On the desert coasts and islets there are immense quantities of pelicans, cormorants, sea-gulls, and sea-swallows: the birds of passage are swans, geese, both red and common, and ducks. A great many wild hogs live in the reeds of the eastern coast; and on the sand of the margin, as I said already, we saw frequently tiger-traces.

The coasts of the Sea of Aral present a perfectly dead and barren desert. The northern coast is composed of argillaceous table-land, from 200 to 300 feet high, abrupt to the S., and sloping to the northward; the isles Kug-Aral and Barsa-Kilmess are of the same character. Near Tchubar-Tarauz fresh water is to be found in wells, in sands. The sands Little Borsuki finish hereabouts. The eastern coast is sandy, with hills of sand mixed with clay, of about 80 feet high. All this coast is covered with steppe-wood, or rather brushwood, as well as most of the adjacent sandy islands—saksaul, or anabasis ammodendron, djanquil, kooyan-sooyuk, &c. The margins of the

coast and islands are covered with reeds. The eastern coast, southward of the mouths of the Kuvan-Dariá, now dry, is intersected by creeks, deeply cutting into the land, with shallow entrances. Along it I found many strongly saline lakes. In the wells which we dug in many places along the whole eastern coast, we found only very bitter, salt water, and for that reason caravans do not pass that way. Kush-Djitmess, Tchutchka-Bass, and Menschikoff, were the only islands where we found fresh water in wells. The western coast is composed of the table-land Ustyurt, from 200 to 300 feet high; it begins at Kara-Tamak (Black Throat), to which the sands Great Borsuki also reach. The Ustyurt is abrupt to the sea-side, and composed of strata of argillaceous schist (flagstone), sandstone, and limestone. Small and scarce tufts of bright-green grass and reeds are seen in some places on the abrupt side of the Ustyurt, and indicate the presence of fresh water. Along the Ustyurt Kirghiz caravans pass, and I have seen one of about 500 camels; but these animals are reduced to drink salt water. The southern coast is entirely flat, and composed of alluvions of the Amu-Dariá (Oxus). Here wander the nomad tribes called Karakalpaks, subjects of the khan of Khiva.

The water of the Sea of Aral is salt, but in a less degree than that of the ocean: its taste resembles that of the Gulf of Finland, at about 100 versts from Cronstadt. I suppose that the reason of this brackish condition is the enormous quantity of fresh water poured into the sea by the two large rivers, Syr and Amu Dariá (Oxus).

At one time, with three anchors out in breakers, close to a lee shore, with our provision of fresh water exhausted, we were obliged to use salt water during about two weeks, and the consequence was a strong diarrhœa, from which we all suffered severely. I lost a bottle of this sea-water in the strong frost, on my return to Petersburg.

The Sea of Aral, in Kirghiz Aral-Tenghiz (Sea of Islands), is divided by the Kirghiz into two unequal parts: the *Little Sea*, which comprises the northern part to the southern extremity of the Isle Barsa-Kilmess, and which freezes almost every year, and over the ice the natives pass with their cattle, horses, and camels; and the *Great Sea*, which includes all the rest, and which freezes only along the coasts. Some of the oldest of the Kirghiz told me, that they had heard from their fathers, that once, during an uncommonly hard winter, all the sea was frozen. Probably, therefore, the saigaks came over the ice from the continent to the Island Nicolas the First. The level of the Sea of Aral, it seems, is constantly sinking:* which is particularly visible on some cliffs

* This may be due to elevation of the land, like that of the coast of Norway and some shores of the Mediterranean.—*R. I. M.*

of the Ustyurt and the Isle Nicolas, where there are evidences of the action of water on heights to which the waves of our days cannot attain in the most violent storms. The bottom of the Sea of Aral, as seen by the soundings on the chart, presents a depression to the N.W. coast, where the greatest depth, we found, was 37 fathoms. The ground is mud in the centre of the sea and along the northern and western coasts; about the eastern and southern it is sand, or sand with shells. Rocky reefs are only to the southward of the peninsula Kulandy and the Isles Nicolas and Constantine; the rest of the bottom is clear.

The mouths of both large rivers, which fall into the sea, are very much obliterated by sands and mud; the deepest channel of the Syr has seldom 4 feet, but generally 3½, 3, and sometimes only 2½ feet in spring and summer. The water in the river is highest in June and July, caused by the melting snows on the summits of its mountains; but towards autumn the water of the Syr falls considerably, and near Aralsk, at 70 versts from the mouth, the difference of high and low water levels is about 3½ feet. During the winter the ice lies on the ground in many places of the delta, and the current, washing its way below, deepens the channels; but towards the autumn the great quantity of mud and sand, forced on by the stream, obliterates them. A considerable quantity of water from the Syr goes into lakes and bogs, which the river fills about its mouth, and which are thickly overgrown with reeds, as well as both banks of the Syr; the reeds are there in many places about 20 feet high. The principal fishes of the Syr and Aral are the sharp-nosed sturgeon and the Silurus, or bony pike. Other large and valuable fishes, which abound in the Ural river and Caspian sea, are not to be found here, nor are there any seals or crabs. The smaller species of fish are, however, almost the same as those of the Caspian.

The Syr-Dariá falls into the Sea of Aral by two branches, to the N. and S. of the Isle Koss-Aral; the southern has a very feeble current, is grown up with reeds and rushes, and at the mouth, which is very much obliterated by sands, washed on by the sea-waves, and by the alluvions of the river itself, is very shallow. In the northern branch are many small islets, and the depths are there as I said above. In former times the Kuvan-Dariá fell into the Sea of Aral, also a branch of the Syr; but now it has very little water; and the Kirghiz, anxious not to lose that which accumulates at the melting of snows and serves them for their cattle and irrigation, have barred the mouth at a distance of about 50 versts from the sea. At present the Kuvan pours not a drop of water into the sea; in summer and autumn the water remains there only in small lakes, the communication between which is dried

up. The oldest inhabitant *aksakal* (white beard) of my Koss-Aral neighbours told me that in olden times, about 60 years back, the Kuvan had more water than the Syr, and the stream was so strong that it "turned stones" At that time the southern branch of the Syr was the principal one, for the quantity of its water and strength of current. The same old man told me that the Yanghee-Dariá (another and more southern branch of the Syr, now entirely dried up), of which we saw no traces, had water at that time and a very feeble current. Generally speaking, as much as could be observed, and conforming to this information, the Syr changes its bed to the northward. Its banks are very low from Aralsk to the mouths, and the islets of the delta heighten constantly from the annually accumulating sediment at high-water. About Aralsk, and at some distance up and down the river, its overflowings are contained by mud-dams, made formerly by the Karakalpaks and maintained by the Kirghiz. At the period, therefore, of high water, the level of the river is higher than that of the fields and kitchen-gardens along the banks, which are easily irrigated.

Of the climate of those countries I shall only say, that the summers are exceedingly hot and the winters very cold for such low latitudes. As there is a meteorological observatory of four years' standing at the fort Aralsk, M. Kupffer, the distinguished member of the Imperial Academy of Sciences, has certainly a much fuller and better store of climatological information than I can give, and the more so as my barometers were spoiled during the voyage over the Steppe. In the winter of 1848-49, which I passed at Koss-Aral, the frosts began the 22nd October (3rd November), and the small lakes filled by the Syr were so well frozen that I skated on them. The Syr-Dariá was covered with ice the 26th November (8th December), and broke up the 3rd (15th) April. During the winter, heavy loaded sledges, drawn by three horses, crossed over the ice, and the frosts reached frequently − 18° R. Snow-drifts were frequent and often very violent. In summer the heat on shore is intolerable, and rain is a most unwonted curiosity. The air is purified only by the domineering winds, which blowing almost constantly between W.N.W. and E.N.E., sweep away miasma and unwholesome evaporations rising from fresh-water bogs and reeds, and which are so unhealthy in other countries. These winds render the navigation on the Aral Sea very difficult. They often blew in gales, and put us in our small vessels into imminent danger, forcing us to incur risks which could be justified only by the proverb, "All's well that ends well." The winds, freshening almost suddenly, raise a very boisterous sea, and then, falling again suddenly, leave behind them a most intolerable swell. Generally speaking, the

Sea of Aral is very stormy and turbulent, but the climate of its shores, however little agreeable, is not unhealthy.

Finally, I adjoin the astronomical points which I determined, adding to them the latitudes and longitudes of Aralsk (Raïm) and Ak-Djulpass, determined by M. Lemm, as before mentioned. I thought it useless to enumerate those points of which I had only latitudes without longitudes.

Astronomical Points.	Latitudes N.			Longitudes E. from Greenwich.		
	°	′	″	°	′	″
The fort Koss-Aral (by distances ☉ ☽) .	46	1	17·7	61	1	44·6
Aralsk or Raïm } by M. Lemm . . .	46	4	19	61	41	48
Ak-Djulpass } by M. Lemm . . .	46	41	32	61	43	43
The southern coast of the entrance into Tchubar-Tarauz	46	44	42·2	60	30	59·6
Cape Uzun-Kaïr (S. point of Kulandỳ) .	45	46	3.5	59	17	44·9
Cape Ak-Tumsuk (on the Ustyurt) . .	44	36	1·8	58	18	47·7
Cape Ak-Suat (S. W. corner of the sea) .	43	42	41·2	58	22	6·5
Isle Nicholas I. (southern bay)	44	59	4·6	59	16	54·6
Isle Bellingshausen	44	35	35	58	56	11
Isle Yermoloff (mouth of Djan-Dariá) . .	43	43	23·3	60	18	30·6
Cape Kungàn-Sandau (eastern extremity of the sea)	44	52	43	61	46	44·8

V.—*Notes on the Possessions of the Imaun of Muskat, on the Climate and Productions of Zanzibar, and on the prospects of African Discovery from Mombas.* By Colonel Sykes, F.R.S., F.R.G.S.

Read June 14, 1852.

Lieutenant Fergusson, of the Indian Navy, at present in charge of the magnetic and meteorological observatory at Bombay, lately transmitted to me a record, during eleven months in 1850, of the indications of several meteorological instruments kept at Zanzibar. As far as I am informed, nothing of the kind has ever been before attempted, the understood extreme insalubrity of the climate for European constitutions having deterred any competent and willing person from a residence at Zanzibar for any length of time sufficient to render meteorological observations of any scientific or normal value. In the present instance, the apothecary (I believe an Eurasian, or half caste) who made the observations was compelled in the twelfth month of his residence to abandon his post, his medical duties, and his meteorology to save his life. A glance of the eye over the observations satisfied me that the atmospheric phenomena were not of a usual character for the